Anti-Lock/TCS - Corvette

DESCRIPTION & OPERATION

ANTI-LOCK BRAKING

The Anti-Lock Brake System (ABS) and Traction Control System (TCS) increases vehicle control during severe deceleration and acceleration on most road surfaces. The ABS/TCS monitors individual wheel speed during a braking event. The Electronic Brake Traction Control Module (EBTCM) processes these values and produces commands to prevent braked wheels from locking.

The Brake Pressure Modulator Valve (BPMV) regulates brake fluid pressure based on road condition information from EBTCM, regardless of master cylinder output pressure. The BPMV can maintain, reduce or increase brake fluid pressure under ABS conditions; however, BPMV cannot increase brake fluid pressure above master cylinder output. BPMV can apply brake pressure to rear brakes when EBTCM requires a rear wheel be slowed (regulated) during a Traction Control System (TCS) event.

TRACTION CONTROL SYSTEM (TCS)

NOTE: Traction is a function of tire design, inflation pressure, load, tire slip angle, level of percent slip and road condition.

The Traction Control System (TCS) uses spark retard, throttle close-down and rear brakes to enhance vehicle acceleration and stability. TCS is capable of functioning up to maximum vehicle speed. Traction control is given priority at low vehicle speeds. Directional control is given priority at high vehicle speeds and during cornering. During a cornering maneuver, difference in front wheel speeds is monitored to detect cornering. During low vehicle acceleration, control strategy is more sensitive.

The TCS is capable of simultaneous or separate usage of engine control (spark control and throttle close-down) and rear brake intervention. When a TCS event occurs, TCS disables cruise control and torque converter clutch (automatic transmission equipped vehicles). Traction control logic uses a reference speed from the non-driven front wheels. A sophisticated slip threshold calculation considers vehicle acceleration, vehicle speed, cornering and start-up. There are rear wheel acceleration rates which will trigger rear brake intervention to reduce wheel spin.

SYSTEM SELF-TEST

The EBTCM performs an automatic test once every ignition cycle when ignition switch is turned to RUN position. The self-test cycles each solenoid valve and pump motor (and any necessary relays) in order to check component operation. If a malfunction is detected, EBTCM will set a DTC. The self-test may be heard or felt, and is a normal mode of operation.

BRAKE PRESSURE MODULATOR VALVE (BPMV)

The BPMV valve is located in rear crossmember. The BPMV contains a DC motor driver recirculation pump with separate circuits for front and rear brakes.

During an Anti-Lock Brake System (ABS) event, BPMV transfers fluid from brake calipers back to master cylinder. During a Traction Control System (TCS) or an Active Handling event, BPMV transfers fluid from master cylinder to the individual wheel circuits.

ELECTRONIC BRAKE TRACTION CONTROL MODULE (EBTCM)

The EBTCM is mounted directly to the BPMV and is located at the rear crossmember. The EBTCM receives input from Powertrain Control Module (PCM), wheel speed sensors, steering sensor and brake switch. The EBTCM outputs information to PCM and BPMV.

The EBTCM determines when to activate the TCS and how to respond to a particular situation requiring TCS. The TCS intervention is achieved using one or more of the following: spark retard (timing), throttle closed or brake intervention. EBTCM also disables TCS when engine is off, with ignition on (when vehicle is being towed).

PUMP MOTOR RELAY & BPMV RELAY

Both pump motor relay and Brake Pressure Modulator Valve (BPMV) relay are integral with EBTCM and cannot be serviced separately. Pump motor relay supplies power to pump motor during an ABS or TCS event. The BPMV relay supplies power to solenoid valves in BPMV.

REAR BRAKE INTERVENTION

Rear brake application is a relatively slow and less effective method of wheel speed control compared to spark retard and/or throttle close down. Rear brake application is more effective at slower speeds during excess wheel spinning. Using individual rear brake control, it is possible to utilize traction available on split road conditions such as dry/wet or wet/icy road conditions. Rear brake intervention only occurs when vehicle speed is less than 50 MPH. With vehicle speeds greater than 50 MPH, engine torque is controlled by spark retard and throttle close-down.

SERVICING

TIRES

Tire size is important for proper performance of ABS/TCS. Replace tires in axle sets only. Tires must be same size, load range, and construction as original tires. Using any other tire size or type may affect ABS/TCS operation. Using compact spare supplied with vehicle will not affect ABS/TCS performance.

SERVICE PRECAUTIONS

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all WARNINGS and SERVICE PRECAUTIONS in appropriate AIR BAG RESTRAINT SYSTEM article in ACCESSORIES & EQUIPMENT.

BLEEDING BRAKE SYSTEM

CAUTION: ONLY use DOT 3 brake fluid. DO NOT use DOT 5 silicone brake fluid. DO NOT allow brake fluid to contact skin or painted surfaces.

MANUAL BLEEDING PROCEDURE

1. Deplete vacuum reserve from power brake booster by depressing brake pedal several times with engine off. Fill master cylinder and keep at least half full during bleeding procedure. If master cylinder is not suspected of having air in bore, go to step **4)** . If master cylinder is known or is suspected of having air in bore, go to next step.
2. Loosen forward 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. Loosen forward fitting. Tighten fitting while pedal is still depressed. Release brake pedal slowly. Wait 15 seconds.
3. Repeat step **2)** , including 15 second wait, until fluid is clear and free of air bubbles. Repeat procedure at other (rearmost) brakeline fitting on master cylinder. Master cylinder is now bled. If calipers are not suspected to have air in them, it is not necessary to bleed them.
4. If 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 cylinder. Tighten bleeder valve and slowly release brake pedal. Wait 15 seconds. Repeat sequence, including 15 second wait, until all air is removed.
6. Remove tube and wrench. Proceed to left rear, right front and left front wheels in this order. Fill master cylinder reservoir, and install cover. Ensure there is no sponginess in brake pedal and that BRAKE warning light is off.

PRESSURE BLEEDING PROCEDURE

1. Install Bleeder Adapter (J-35589) to brake master cylinder. Pressurize bleeder to 20-25 psi (1.41-1.76 kg/cm^2). Connect bleeder hose to adapter, and bleed air from adapter.
2. Raise and support vehicle. Starting at 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.
3. Loosen bleeder valve at least 3/4 turn to purge air from cylinder. Tighten bleeder valve when air is no longer present in tube. Repeat sequence until all air is removed.
4. Remove tube and wrench. Proceed to left rear, then right front and finish at left front wheel. Remove bleeder adapter. Fill master cylinder and install cover. Ensure there is no sponginess in brake pedal and that BRAKE warning light is off.

AUTO BLEED PROCEDURE

CAUTION: Perform MANUAL BLEEDING PROCEDURE or PRESSURE BLEEDING PROCEDURE before performing auto bleed procedure.

NOTE: Auto bleed procedure is used to provide a complete bleed procedure on Anti-Lock Brake System/Traction Control System (ABS/TCS) equipped vehicles. This procedure cycles system valves and runs the pump to purge air from circuits normally closed during non ABS/TCS (normal) brake system operation and bleeding. This procedure should be used when air is suspected in secondary circuits or when Brake Pressure Modulator (BPM) valve has been replaced.

1. Raise and support vehicle. Remove wheels. Inspect brake system for leaks or damage. Repair as necessary before continuing. Bleed base brake system. See **MANUAL BLEEDING PROCEDURE** or **PRESSURE BLEEDING PROCEDURE** .
2. Ensure battery is fully charged. Connect scan tool to DLC. Turn ignition on, with engine off. Using scan tool, establish communications with the ABS/TCS system. Select ABS/TCS then Special Function and then AUTOMATED BLEED PROCEDURE.
3. Install Bleeder Adapter (J-35589) to brake master cylinder. Pressurize bleeder to 30 psi (2.1 kg/cm^2) minimum. Connect bleeder hose to adapter, and bleed air from adapter.
4. Bleed basic brake system following scan tool directions until desired brake pedal height is achieved. If bleed procedure is aborted, a malfunction is present. If a DTC is present, diagnose affected DTC first. If brake pedal is spongy, perform conventional brake bleeding procedure again. See **MANUAL BLEEDING PROCEDURE** or **PRESSURE BLEEDING PROCEDURE** .
5. After diagnosing affected DTC or performing conventional brake system bleeding procedure, go to next step.
6. When desired pedal height is achieved, depress brake pedal to check for firmness. Disconnect scan tool. Check brake fluid level. Road test vehicle.

DIAGNOSIS & TESTING

The EBTCM performs system self-diagnostics and can detect and often isolate a system malfunction. When a malfunction is detected, EBTCM sets a DTC and illuminate the ABS/TCS warning light and may also disable the ABS/TCS functions as necessary for the duration of the ignition cycle.

The EBTCM performs an auto test once per ignition cycle when ignition is turned to RUN position. The auto test cycles each solenoid valve and pump motor (and all necessary relays) in order to check the component operation. If an error is detected, the EBTCM will set a DTC. The AUTO TEST may felt or heard while it is in progress.

RETRIEVING DTCS

Diagnostic Trouble Code (DTC) is retrieved using Tech 2 scan tool. Follow scan tool manufacturer's instructions to perform tests.

Before diagnosing DTC(s), perform **DIAGNOSTIC SYSTEM CHECK** first. Scan tool is also used to perform

test modes for diagnosis and service of the ABS/TCS system.

ABS/TCS DIAGNOSTIC TROUBLE CODE (DTC)

DTC	Description
C1214	Solenoid Valve Relay Contact Or Coil Circuit Open
C1217	BPMV Pump Motor Relay Contact Circuit Open
C1221	LF Wheel Speed Sensor Input Signal Is Zero
C1222	RF Wheel Speed Sensor Input Signal Is Zero
C1223	LR Wheel Speed Sensor Input Signal Is Zero
C1224	RR Wheel Speed Sensor Input Signal Is Zero
C1225	LF Wheel Excessive Speed Variation
C1226	RF Wheel Excessive Speed Variation
C1227	LR Wheel Excessive Speed Variation
C1228	RR Wheel Excessive Speed Variation
C1232	LF Wheel Speed Sensor Circuit Open Or Shorted
C1233	RF Wheel Speed Sensor Circuit Open Or Shorted
C1234	LR Wheel Speed Sensor Circuit Open Or Shorted
C1235	RR Wheel Speed Sensor Circuit Open Or Shorted
C1236	Low System Supply Voltage
C1237	High System Supply Voltage
C1242	BPMV Pump Motor Ground Circuit Open
C1243	BPMV Pump Motor Stalled
C1245	Brake Sensor Pressure Always High
C1247	Brake Pressure Differential Switch Activated
C1255	EBTCM Internal Malfunction (ABS/TCS Disabled)
C1256	EBTCM Internal Malfunction
C1261	LF Inlet Solenoid Valve Malfunction
C1262	LF Outlet Solenoid Valve Malfunction
C1263	RF Inlet Solenoid Valve Malfunction
C1264	RF Outlet Solenoid Valve Malfunction
C1265	LR Inlet Solenoid Valve Malfunction
C1266	LR Outlet Solenoid Valve Malfunction
C1267	RR Inlet Solenoid Valve Malfunction
C1268	RR Outlet Solenoid Valve Malfunction
C1271	LF TCS Master Cylinder Isolation Valve Malfunction
C1272	LF TCS Prime Valve Malfunction
C1273	RF TCS Master Cylinder Isolation Valve Malfunction
C1274	RF TCS Prime Valve Malfunction
C1275	Serial Data Malfunction
C1276	Delivered Torque Signal Circuit Malfunction
C1277	Requested Torque Signal Circuit Malfunction

C1278	TCS Temporarily Inhibited By PCM
C1281	Steering Sensor Uncorrelated Malfunction
C1282	Yaw Rate Sensor Bias Circuit Malfunction
C1283	Excessive Time to Center Steering
C1284	Lateral Accel Sensor Self Test Malfunction
C1285	Lateral Accel Sensor Circuit Malfunction
C1286	Steering Sensor Bias Malfunction
C1287	Steering Sensor Rate Malfunction
C1288	Steering Sensor Circuit Malfunction
C1291	Open Brakelight Switch Contacts During Deceleration
C1292	Low Brake Pressure During Decel
C1293	DTC C1291 Set In Previous Ignition Cycle
C1294	Brakelight Switch Circuit Always Active
C1295	Brakelight Switch Circuit Open
C1296	Brake Pressure Sensor Circuit Open/Shorted

CLEARING DTCS

There are 2 methods to clear DTCs:

- Scan tool method.
- Ignition cycle default. On the ignition cycle default method, DTCs will be cleared if ignition cycles 100 times without a particular malfunction/DTC appearing. EBTCM ignition cycle counter will reset to zero.

DTCs cannot be cleared by unplugging EBTCM, disconnecting battery or by turning ignition off (except on 50th cycle of ignition cycle default). Whichever method is used, ensure proper system operation and absence of DTCs when clearing procedure is completed.

SCAN TOOL TEST MODES

Data List

Data list includes DATA LIST 1 and 2. When DTC is set, EBTCM turns off the solenoid valve relay. This is normal and should not be considered a system malfunction.

DATA LIST 1 - In this test mode, scan tool continuously monitors the brake switch, indicator light status, etc.

DATA LIST 2 - In this test mode, scan tool continuously monitors the wheel speed data, brake switch status, inlet and outlet valve status, TCS information, etc.

DTC History

In this mode, DTC history is displayed. This data includes the number of times a particular DTC was set, along with other system information. History information on up to 5 DTCs can be stored.

DTC(s)

In this mode, DTCs stored in the EBTCM memory may be displayed or cleared.

Snapshot

In this mode, scan tool captures data before and after a snapshot-triggering condition which may or may not set a DTC. Refer to scan tool manufacturer's information on the use of this mode.

Special Functions

This mode performs functional tests on ABS/TCS system which help to verify proper operation. In this mode, testing and observing the test results can further identify malfunction conditions. Under this test, the following 7 tests are available:

- Automated Test
- Automated Bleed
- Solenoid Test
- TCS Test
- Magnasteer Test
- Steering Wheel Position Sensor Test
- TCS Switch Information

To perform Special Functions, see **SCAN TOOL SPECIAL FUNCTIONS** .

SCAN TOOL SPECIAL FUNCTIONS

Automated Test

1. This test cycles each solenoid valve, pump motor and relay to check component operation. This is identical to self-test that is performed when ignition switch is turned to RUN position. A DTC will set if malfunction is detected. To perform test, go to next step.
2. Turn ignition off. Install scan tool. Turn ignition switch to RUN position. Using scan tool, select Special Functions and then select Automated Test. Run Automated Test and note DTCs present. Diagnose affected DTCs.

Solenoid Valve - Pressure Hold Test

1. This test activates selected wheel circuit inlet valve, placing valve in the pressure hold position and not allowing master cylinder pressure to be delivered to hydraulic wheel circuit.
2. This action is taken because EBTCM has determined that wheel is moving too slowly, allowing it to rotate at an appropriate speed. In this test, scan tool commands the valve to close, allowing wheel to spin even though brake pedal pressure is applied. To perform test, go to next step.
3. Turn ignition off. Install scan tool. Turn ignition to RUN position. Raise and support vehicle until wheels are about 6 inches from floor. Using scan tool's Special Functions, select VALVE SOLENOID TEST and

command HOLD PRESSURE. With assistant holding brake pedal down, attempt to turn wheel being tested by hand.

4. The wheel should turn even with pressure on brake pedal, it may be difficult to turn it by hand, but still can be turned if system is working properly.

Solenoid Valve - Pressure Reduction Test

1. This test indicates whether specific valves in the BPMV allow hydraulic wheel circuit pressure to be returned to master cylinder circuit, reducing wheel circuit pressure.
2. This test activates selected hydraulic wheel circuit valves, placing valves in pressure reduce position, allowing wheel caliper pressure to be returned to master cylinder.
3. This action is taken because EBTCM has determined that wheel is moving too slowly, allowing it to rotate at an appropriate speed. In this test, scan tool commands the valve to close, allowing wheel to spin even though brake pedal pressure is applied. To perform test, go to next step.
4. Turn ignition off. Install scan tool. Turn ignition to RUN position. Raise and support vehicle until wheels are about 6 inches from floor. Using scan tool's Special Functions, select VALVE SOLENOID TEST and command RELEASE PRESSURE. With assistant holding brake pedal down, attempt to turn wheel being tested by hand.
5. The wheel should turn even with pressure on brake pedal, it may be difficult to turn it by hand, but still can be turned if system is working properly.

TCS Test

1. This test runs the pump motor and TCS valves for about 25 seconds in order to apply fluid to rear wheel circuit. To perform test, go to next step.
2. Turn ignition off. Install scan tool. Turn ignition to RUN position. Raise and support vehicle until wheels are about 6 inches from floor. Using scan tool's Special Functions, select TCS TESTS.
3. Command TCS system test ON. Pump motor should turn on for about 25 seconds. Attempt to turn rear wheel by hand. Wheel should not turn, due to pressure from pump motor.

Steering Position Sensor Test

1. This test monitors the analog and digital steering angle position and can only be run after the Steering Wheel Position Sensor has been centered. To perform test, go to next step.
2. Turn ignition off. Install scan tool. Start engine. Drive vehicle in a straight line for 45 seconds at 15 MPH while monitoring Steering Wheel Position Centering Angle on scan tool. When centered, scan tool will indicate YES. Stop vehicle, leave engine running. Using scan tool's Special Functions, select Steering Position Sensor Test.
3. While monitoring the scan tool, turn the wheel lock to lock three times. The scan tool reading at the centered position should always be near zero for the digital and analog display (5 degrees of each other).

DIAGNOSTIC SYSTEM CHECK

1. Install Tech 2 scan tool. Turn ignition ON. Using the scan tool, attempt to display DTCs. If any DTCs are present, diagnose affected DTCs. If DTCs are not present, go to next step.

2. Turn ignition off. Turn ignition to RUN position. Observe ABS indicator light. If indicator light illuminates for 3 seconds then go off, go to next step. If not, go to step **6)** .
3. Turn ignition off. Turn ignition to RUN position. Observe TCS indicator light. If indicator light illuminates for 3 seconds then goes off, go to next step. If not, go to step **6)** .
4. Road test vehicle for several minutes over different road surfaces while making several turns and at speed of at least 15 MPH. Observe if ABS or TCS indicator illuminates. If ABS or TCS indicator light illuminates, go to step **6)** . If neither indicator light illuminates, go to next step.
5. If brake did not operate properly or if BRAKE indicator light illuminated, diagnose hydraulic brake system. See appropriate DISC article. If brakes were okay and indicator light did not illuminate, system is operating properly.
6. Using scan tool, attempt to display DTCs. If scan tool communicates with EBTCM, go to next step. If not, go to step **8)** .
7. Attempt to display DTCs. If any DTCs are present, diagnose affected DTCs. See **DIAGNOSTIC TROUBLE CODES (DTCs)** table. If DTCs are not present, system is okay.
8. Turn ignition off. Disconnect and reconnect EBTCM harness connector. Attempt to establish communication with EBTCM. If communication is established, repeat step **1)** . If not, diagnose Data Link Connector (DLC) system. See appropriate diagram in DATA LINK CONNECTOR article in WIRING DIAGRAMS.

DIAGNOSTIC TESTS

NOTE: To identify circuits and wire colors referenced in testing, see WIRING DIAGRAMS . Testing system requires the use of Pinout Box (J 39700) and Adapter Cable (J 39700-25). After repairs, recheck system operation to verify that problem has been repaired. See DIAGNOSTIC SYSTEM CHECK under DIAGNOSIS & TESTING.

DTC C1214: SOLENOID VALVE RELAY CONTACT OR COIL CIRCUIT OPEN

Circuit Description

Battery voltage is supplied to EBTCM harness connector terminal "D". The EBTCM then energizes the pull-in coil by completing the ground circuit at terminal "B". Battery voltage is then supplied to the solenoid valves.

DTC will set anytime solenoid valve relay is commanded on and the relay voltage is less than 8 volts, and ignition is greater than 10.5 volts.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Inspect 20-amp ABS/RTD Maxi-fuse. If fuse is open, go to next step. If fuse is okay, go to step **4)** .
3. Check resistance between Maxi-fuse block C5 pin "A" and ground. If resistance is 0-5 ohms, go to step

7) . If not, go to step **6)** .

4. Disconnect EBTCM harness connector. Connect pinout box and adapter cable to EBTCM harness connector. Check resistance between terminal "A" and Maxi-fuse block C5 pin "A". If resistance is 0-5 ohms, go to next step. If not, go to step **9)** .
5. Install ABS/RTD Maxi-fuse. Turn ignition switch to RUN position. Check voltage between Pinout Box (J 39700) terminal "D" and ground. If voltage reading is 13-18 volts, go to step **10)** . If not, go to step **11)** .
6. Install new ABS-RTD fuse. Test drive vehicle at speeds of at least 15 MPH. Turn ignition off and inspect Maxi-fuse. If fuse is open, go to step **8)** . If fuse is okay, go to step **13)** .
7. Disconnect EBTCM harness connector. Check resistance between ground and Maxi-fuse C5 pin "A" terminal. If resistance is 0-5 ohms, go to step **12)** . If not, go to step **10)** .
8. Remove EBTCM from BPMV. Connect Pinout Box (J 39700) to BPMV. Check resistance between pinout box terminal No. 7 and BPMV body/case. If resistance is 0-5 ohms, go to step **14)** . If not, go to step **10)** .
9. Repair open in circuit No. 1242. After repairs, go to step **13)** .
10. Replace EBTCM. After replacing EBTCM, go to step **13)** .
11. Inspect power distribution circuit. Repair circuit as necessary. After repairs, go to step **13)** .
12. Repair short to ground in circuit No. 1242. After repairs, go to next step.
13. Clear all DTCs.
14. Replace BPMV.

DTC C1217: BPMV PUMP MOTOR RELAY CONTACT CIRCUIT OPEN

Circuit Description

The ABS relay supplies voltage to the ignition through terminal "D". The EBCM energizes the pull-in coil by completing the ground circuit at terminal "B" of the EBTCM, closing relay contacts. Battery voltage and current is supplied to the EBTCM which supplies power to the solenoid valves.

DTC will set after the relay is commanded on and an open in the solenoid valve relay coil circuit is detected. An open in this circuit will not allow relay to energize, preventing solenoid valves from operating.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Remove and inspect 40-amp ABS fuse. If fuse is open, go to step **6)** . If fuse is okay, go to next step.
3. Remove and inspect 20-amp ABS/RTD fuse. If fuse is open, go to step **7)** . If fuse is okay, go to next step.
4. Disconnect EBTCM harness connector. Connect pinout box and adapter cable to EBTCM harness connector. Turn ignition switch to RUN position. Check voltage at pinout box terminal "A" and ground. If voltage reading is 13-18 volts, go to next step. If not, go to step **8)** .
5. Check voltage at pinout box terminal "D" and ground. If voltage reading is 13-18 volts, go to step **9)** . If

not, go to step **10)** .

6. Repair short to ground in circuit No. 1642.
7. Repair short to ground in circuit No. 1242.
8. Repair open or high resistance in circuit No. 1642.
9. Replace EBTCM.
10. Repair open or high resistance in circuit No. 1242.

DTC C1221: LEFT FRONT WHEEL SPEED SENSOR INPUT SIGNAL IS ZERO

Circuit Description

As the toothed ring passes Wheel Speed Sensor (WSS), an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set when vehicle in not in an ABS or TCS event and one wheel speed is equal to zero and vehicle's reference speed is greater than 5 MPH for 2.5 seconds.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Inspect left front WSS wiring and connectors for damage. Inspect sensor ring for looseness or damage. If any damage is present, go to step **7)** . If no damage is present, go to next step.
3. Disconnect harness connector from left front WSS. Check resistance between sensor terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
4. Using DVOM on AC scale and still connected to sensor, spin wheel by hand while monitoring voltage reading. If voltage reading is 100 millivolts or greater, go to next step. If not, go to step **8)** .
5. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 15 and 31. If resistance is infinite, go to next step. If not, go to step **9)** .
6. Check for short in circuits No. 830 and 873 to EBTCM harness connector. Repair as necessary. Reconnect all harness connectors. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, go to step **10)** . If DTC does not reset, go to step **11)** .
7. Replace sensor components as needed. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, repeat step **3)** .
8. Replace left front WSS.
9. Repair short between circuits No. 830 and 873.
10. Replace EBTCM.
11. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

WSS may have a low or no output signal. Check for excessive gap due to worn or damaged WSS or bearing assembly. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1222: RIGHT FRONT WHEEL SPEED SENSOR INPUT SIGNAL IS ZERO

Circuit Description

As the toothed ring passes by the Wheel Speed Sensor (WSS) an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set when vehicle in not in an ABS or TCS event and one wheel speed is equal to zero and vehicle's reference speed is greater than 5 MPH for 2.5 seconds.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Inspect right front WSS wiring and connectors for damage. Inspect sensor ring for looseness or damage. If any damage is present, go to step **7)** . If no damage is present, go to next step.
3. Disconnect harness connector from right front WSS. Check resistance between sensor terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
4. Using DVOM on AC scale and still connected to sensor, spin wheel by hand while monitoring voltage reading. If voltage reading is 100 millivolts or greater, go to next step. If not, go to step **8)** .
5. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 14 and 30. If resistance is infinite, go to next step. If not, go to step **9)** .
6. Check for short in circuits No. 833 and 872 to EBTCM harness connector. Repair as necessary. Reconnect all harness connectors. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, go to step **10)** . If DTC does not reset, go to step **11)** .
7. Replace sensor components as needed. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, repeat step **3)** .
8. Replace right front WSS.
9. Repair short between circuits No. 833 and 872.
10. Replace EBTCM.
11. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

WSS may have a low or no output signal. Check for excessive gap due to worn or damaged WSS or bearing assembly. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1223: LEFT REAR WHEEL SPEED SENSOR INPUT SIGNAL IS ZERO

Circuit Description

As the toothed ring passes Wheel Speed Sensor (WSS), an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set when vehicle in not in an ABS or TCS event and one wheel speed is equal to zero and vehicle's reference speed is greater than 5 MPH for 2.5 seconds.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Inspect left rear WSS wiring and connectors for damage. Inspect sensor ring for looseness or damage. If any damage is present, go to step **7)** . If no damage is present, go to next step.
3. Disconnect harness connector from left rear WSS. Check resistance between sensor terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
4. Using DVOM on AC scale and still connected to sensor, spin wheel by hand while monitoring voltage reading. If voltage reading is 100 millivolts or greater, go to next step. If not, go to step **8)** .
5. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 12 and 28. If resistance is infinite, go to next step. If not, go to step **9)** .
6. Check for short in circuits No. 884 and 885 to EBTCM harness connector. Repair as necessary. Reconnect all harness connectors. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, go to step **10)** . If DTC does not reset, go to step **11)** .
7. Replace sensor components as needed. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, repeat step **3)** .
8. Replace left rear WSS.
9. Repair short between circuits No. 884 and 885.
10. Replace EBTCM.
11. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

WSS may have a low or no output signal. Check for excessive gap due to worn or damaged WSS or bearing assembly. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1224: RIGHT REAR WHEEL SPEED SENSOR INPUT SIGNAL IS ZERO

Circuit Description

As the toothed ring passes Wheel Speed Sensor (WSS), an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set when vehicle in not in an ABS or TCS event and one wheel speed is equal to zero and vehicle's reference speed is greater than 5 MPH for 2.5 seconds.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Inspect right rear WSS wiring and connectors for damage. Inspect sensor ring for looseness or damage. If any damage is present, go to step **7)** . If no damage is present, go to next step.
3. Disconnect harness connector from right rear WSS. Check resistance between sensor terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
4. Using DVOM on AC scale and still connected to sensor, spin wheel by hand while monitoring voltage reading. If voltage reading is 100 millivolts or greater, go to next step. If not, go to step **8)** .
5. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 13 and 29. If resistance is infinite, go to next step. If not, go to step **9)** .
6. Check for short in circuits No. 833 and 882 to EBTCM harness connector. Repair as necessary. Reconnect all harness connectors. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, go to step **10)** . If DTC does not reset, go to step **11)** .
7. Replace sensor components as needed. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, repeat step **3)** .
8. Replace right rear WSS.
9. Repair short between circuits No. 833 and 882.
10. Replace EBTCM.
11. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

WSS may have a low or no output signal. Check for excessive gap due to worn or damaged WSS or bearing assembly. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1225: LEFT FRONT WHEEL EXCESSIVE SPEED VARIATION

Circuit Description

As the toothed ring passes Wheel Speed Sensor (WSS), an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set when brake is off and no WSS hardware DTCs are present and EBTCM sees a wheel speed variation of more than 9 MPH for 2.5 seconds. This test detects a situation in which one wheel acceleration or deceleration is beyond specified limits.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Inspect left front WSS wiring and connectors for damage. Inspect sensor ring for looseness or damage. If any damage is present, go to step **7)** . If no damage is present, go to next step.
3. Disconnect harness connector from left front WSS. Check resistance between sensor terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
4. Using DVOM on AC scale and still connected to sensor, spin wheel by hand while monitoring voltage reading. If voltage reading is 100 millivolts or greater, go to next step. If not, go to step **8)** .
5. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 15 and 31. If resistance is infinite, go to next step. If not, go to step **9)** .
6. Check for short in circuits No. 830 and 873 to EBTCM harness connector. Repair as necessary. Reconnect all harness connectors. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, go to step **10)** . If DTC does not reset, go to step **11)** .
7. Replace sensor components as needed. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, repeat step **3)** .
8. Replace left front WSS.
9. Repair short between circuits No. 830 and 873.
10. Replace EBTCM.
11. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

WSS may have a low or no output signal. Check for excessive gap due to worn or damaged WSS or bearing assembly. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1226: RIGHT FRONT WHEEL SPEED VARIATION

Circuit Description

As the toothed ring passes Wheel Speed Sensor (WSS), an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set when brake is off and no WSS hardware DTCs are present and EBTCM sees a wheel speed variation of more than 9 MPH for 2.5 seconds. This test detects a situation in which one wheel acceleration or deceleration is beyond specified limits.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Inspect right front WSS wiring and connectors for damage. Inspect sensor ring for looseness or damage. If any damage is present, go to step **7)** . If no damage is present, go to next step.
3. Disconnect harness connector from right front WSS. Check resistance between sensor terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
4. Using DVOM on AC scale and still connected to sensor, spin wheel by hand while monitoring voltage reading. If voltage reading is 100 millivolts or greater, go to next step. If not, go to step **8)** .
5. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 12 and 28. If resistance is infinite, go to next step. If not, go to step **9)** .
6. Check for short in circuits No. 884 and 885 to EBTCM harness connector. Repair as necessary. Reconnect all harness connectors. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, go to step **10)** . If DTC does not reset, go to step **11)** .
7. Replace sensor components as needed. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, repeat step **3)** .
8. Replace right front WSS.
9. Repair short between circuits No. 884 and 885.
10. Replace EBTCM.
11. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

WSS may have a low or no output signal. Check for excessive gap due to worn or damaged WSS or bearing assembly. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1227: LEFT REAR WHEEL EXCESSIVE SPEED VARIATION

Circuit Description

As the toothed ring passes Wheel Speed Sensor (WSS), an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set when brake is off and no WSS hardware DTCs are present and EBTCM sees a wheel speed variation of more than 9 MPH for 2.5 seconds. This test detects a situation in which one wheel acceleration or deceleration is beyond specified limits.

Diagnosis

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

system check, go to next step.

2. Inspect left rear WSS wiring and connectors for damage. Inspect sensor ring for looseness or damage. If any damage is present, go to step **7)** . If no damage is present, go to next step.
3. Disconnect harness connector from left rear WSS. Check resistance between sensor terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
4. Using DVOM on AC scale and still connected to sensor, spin wheel by hand while monitoring voltage reading. If voltage reading is 100 millivolts or greater, go to next step. If not, go to step **8)** .
5. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 12 and 28. If resistance is infinite, go to next step. If not, go to step **9)** .
6. Check for short in circuits No. 884 and 885 to EBTCM harness connector. Repair as necessary. Reconnect all harness connectors. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, go to step **10)** . If DTC does not reset, go to step **11)** .
7. Replace sensor components as needed. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, repeat step **3)** .
8. Replace left rear WSS.
9. Repair short between circuits No. 884 and 885.
10. Replace EBTCM.
11. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

WSS may have a low or no output signal. Check for excessive gap due to worn or damaged WSS or bearing assembly. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1228: RIGHT REAR WHEEL EXCESSIVE SPEED VARIATION

Circuit Description

As the toothed ring passes Wheel Speed Sensor (WSS), an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set when brake is off and no WSS hardware DTCs are present and EBTCM sees a wheel speed variation of more than 9 MPH for 2.5 seconds. This test detects a situation in which one wheel acceleration or deceleration is beyond specified limits.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Inspect right rear WSS wiring and connectors for damage. Inspect sensor ring for looseness or damage. If

any damage is present, go to step **7)** . If no damage is present, go to next step.

3. Disconnect harness connector from left rear WSS. Check resistance between sensor terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
4. Using DVOM on AC scale and still connected to sensor, spin wheel by hand while monitoring voltage reading. If voltage reading is 100 millivolts or greater, go to next step. If not, go to step **8)** .
5. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 13 and 29. If resistance is infinite, go to next step. If not, go to step **9)** .
6. Check for short in circuits No. 833 and 882 to EBTCM harness connector. Repair as necessary. Reconnect all harness connectors. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, go to step **10)** . If DTC does not reset, go to step **11)** .
7. Replace sensor components as needed. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets. If DTC resets, repeat step **3)** .
8. Replace right rear WSS.
9. Repair short between circuits No. 833 and 882.
10. Replace EBTCM.
11. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

WSS may have a low or no output signal. Check for excessive gap due to worn or damaged WSS or bearing assembly. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1232: LEFT FRONT WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

Circuit Description

As the toothed ring passes Wheel Speed Sensor (WSS), an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set after initialization. A malfunction exists when either of the wheel speed circuits are open or shorted to voltage or ground.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Spray left front WSS with a 5 percent salt water solution. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 15 and 31. If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
3. Check resistance between pinout box pin No. 31 and ground. If resistance is infinite, go to next step. If

not, go to step **12)** .

4. Turn ignition switch to RUN position. Check voltage between ground and pinout box pin No. 31. If voltage reading is one volt or less, go to step **7)** . If not, go to next step.
5. Turn ignition off. Disconnect left front WSS harness connector from sensor. Turn ignition switch to RUN position. Using DVOM, check voltage between ground and WSS harness connector terminal "A" and then terminal "B". Note voltage reading. If voltage reading on both terminals is greater than one volt, go to step **13)** . If not, go to next step.
6. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .
7. Turn ignition off. Inspect terminals to WSS at EBTCM harness connector for poor contact, contamination, open circuit, shorted to ground, or shorted to voltage. Repair as necessary. Reconnect all harness connectors. Turn ignition switch to RUN position and check for DTCs. If DTC resets as current DTC, go to step **14)** . If DTC does not reset, go to step **11)** .
8. Disconnect left front WSS harness connector at sensor. Check resistance between EBTCM harness connector terminal No. 15 and WSS harness connector terminal "B". If resistance is 2 ohms or less, go to next step. If not, go to step **15)** .
9. Check resistance between EBTCM harness connector terminal No. 31 and WSS harness connector terminal "A". If resistance is 2 ohms or less, go to next step. If not, go to step **16)** .
10. Check resistance between WSS terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **17)** .
11. Malfunction is intermittent.
12. Repair short to ground in circuits No. 830 and 873.
13. Repair short to voltage in circuits No. 830 and 873.
14. Replace EBTCM.
15. Repair open or high resistance in circuit No. 873.
16. Repair open or high resistance in circuit No. 830.
17. Replace left front WSS.

Diagnostic Aids

WSS may have an open or shorted circuit, or is shorted to voltage greater than 4 volts. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1233: RIGHT FRONT WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

Circuit Description

As the toothed ring passes Wheel Speed Sensor (WSS) an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set after initialization. A malfunction exists when either of the wheel speed circuits are open or shorted to voltage or ground.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Spray right front WSS with a 5 percent salt water solution. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 14 and 30. If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
3. Check resistance between pinout box pin No. 30 and ground. If resistance is infinite, go to next step. If not, go to step **12)** .
4. Turn ignition switch to RUN position. Check voltage between ground and pinout box pin No. 30. If voltage reading is one volt or less, go to step **7)** . If not, go to next step.
5. Turn ignition off. Disconnect left front WSS harness connector from sensor. Turn ignition switch to RUN position. Using DVOM, check voltage between ground and WSS harness connector terminal "A" and then terminal "B". Note voltage reading. If voltage reading on both terminals is greater than one volt, go to step **13)** . If not, go to next step.
6. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .
7. Turn ignition off. Inspect terminals to WSS at EBTCM harness connector for poor contact, contamination, open circuit, shorted to ground, or shorted to voltage. Repair as necessary. Reconnect all harness connectors. Turn ignition switch to RUN position and check for DTCs. If DTC resets as current DTC, go to step **14)** . If DTC does not reset, go to step **11)** .
8. Disconnect left front WSS harness connector at sensor. Check resistance between EBTCM harness connector terminal No. 14 and WSS harness connector terminal "B". If resistance is 2 ohms or less, go to next step. If not, go to step **15)** .
9. Check resistance between EBTCM harness connector terminal No. 30 and WSS harness connector terminal "A". If resistance is 2 ohms or less, go to next step. If not, go to step **16)** .
10. Check resistance between WSS terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **17)** .
11. Malfunction is intermittent.
12. Repair short to ground in circuits No. 833 and 872.
13. Repair short to voltage in circuits No. 833 and 872.
14. Replace EBTCM.
15. Repair open or high resistance in circuit No. 833.
16. Repair open or high resistance in circuit No. 872.
17. Replace left front WSS.

Diagnostic Aids

WSS may have an open or shorted circuit, or is shorted to voltage greater than 4 volts. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1234: LEFT REAR WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

Circuit Description

As the toothed ring passes Wheel Speed Sensor (WSS) an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set after initialization. A malfunction exists when either of the wheel speed circuits are open or shorted to voltage or ground.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Spray left rear WSS with a 5 percent salt water solution. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 12 and 28. If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
3. Check resistance between pinout box pin No. 11 and ground. If resistance is infinite, go to next step. If not, go to step **12)** .
4. Turn ignition switch to RUN position. Check voltage between ground and pinout box pin No. 12. If voltage reading is one volt or less, go to step **7)** . If not, go to next step.
5. Turn ignition off. Disconnect left rear WSS harness connector from sensor. Turn ignition switch to RUN position. Using DVOM, check voltage between ground and WSS harness connector terminal "A" and then terminal "B". Note voltage reading. If voltage reading on both terminals is greater than one volt, go to step **13)** . If not, go to next step.
6. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .
7. Turn ignition off. Inspect terminals to WSS at EBTCM harness connector for poor contact, contamination, open circuit, shorted to ground, or shorted to voltage. Repair as necessary. Reconnect all harness connectors. Turn ignition switch to RUN position and check for DTCs. If DTC resets as current DTC, go to step **14)** . If DTC does not reset, go to step **11)** .
8. Disconnect left rear WSS harness connector at sensor. Check resistance between EBTCM harness connector terminal No. 28 and WSS harness connector terminal "B". If resistance is 2 ohms or less, go to next step. If not, go to step **15)** .
9. Check resistance between EBTCM harness connector terminal No. 12 and WSS harness connector terminal "A". If resistance is 2 ohms or less, go to next step. If not, go to step **16)** .
10. Check resistance between WSS terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **17)** .
11. Malfunction is intermittent.
12. Repair short to ground in circuits No. 884 and 885.
13. Repair short to voltage in circuits No. 884 and 885.
14. Replace EBTCM.
15. Repair open or high resistance in circuit No. 885.
16. Repair open or high resistance in circuit No. 884.
17. Replace left front WSS.

Diagnostic Aids

WSS may have an open or shorted circuit, or is shorted to voltage greater than 4 volts. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1235: RIGHT REAR WHEEL SPEED SENSOR CIRCUIT OPEN OR SHORTED

Circuit Description

As the toothed ring passes Wheel Speed Sensor (WSS) an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC will set after initialization. A malfunction exists when either of the wheel speed circuits are open or shorted to voltage or ground.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Spray right rear WSS with a 5 percent salt water solution. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 13 and 29. If resistance is 850-1350 ohms, go to next step. If not, go to step **8)** .
3. Check resistance between pinout box pin No. 29 and ground. If resistance is infinite, go to next step. If not, go to step **12)** .
4. Turn ignition switch to RUN position. Check voltage between ground and pinout box pin No. 29. If voltage reading is one volt or less, go to step **7)** . If not, go to next step.
5. Turn ignition off. Disconnect right rear WSS harness connector from sensor. Turn ignition switch to RUN position. Using DVOM, check voltage between ground and WSS harness connector terminal "A" and then terminal "B". Note voltage reading. If voltage reading on both terminals is greater than one volt, go to step **13)** . If not, go to next step.
6. Malfunction is intermittent. See **DIAGNOSTIC AIDS** .
7. Turn ignition off. Inspect terminals to WSS at EBTCM harness connector for poor contact, contamination, open circuit, shorted to ground, or shorted to voltage. Repair as necessary. Reconnect all harness connectors. Turn ignition switch to RUN position and check for DTCs. If DTC resets as current DTC, go to step **14)** . If DTC does not reset, go to step **11)** .
8. Disconnect right rear WSS harness connector at sensor. Check resistance between EBTCM harness connector terminal No. 13 and WSS harness connector terminal "B". If resistance is 2 ohms or less, go to next step. If not, go to step **15)** .
9. Check resistance between EBTCM harness connector terminal No. 13 and WSS harness connector terminal "A". If resistance is 2 ohms or less, go to next step. If not, go to step **16)** .
10. Check resistance between WSS terminals "A" and "B". If resistance is 850-1350 ohms, go to next step. If not, go to step **17)** .

11. Malfunction is intermittent.
12. Repair short to ground in circuits No. 882 and 883.
13. Repair short to voltage in circuits No. 882 and 883.
14. Replace EBTCM.
15. Repair open or high resistance in circuit No. 883.
16. Repair open or high resistance in circuit No. 882.
17. Replace left front WSS.

Diagnostic Aids

WSS may have an open or shorted circuit, or is shorted to voltage greater than 4 volts. Intermittent malfunctions can be caused by a poor connection, rubbed through wire insulation or a broken wire inside insulation. Resistance of WSS increases with an increase in sensor temperature. Also, inspect for signs of water intrusion at sensor connector or circuit.

DTC C1236: LOW SYSTEM SUPPLY VOLTAGE

Circuit Description

This DTC monitors voltage level available to EBTCM. Full performance of ABS/TCS cannot be guaranteed if voltage drops to less than 10.5 volts. Several current requirements can cause battery voltage to drop during an ABS/TCS operation. Because of this, voltage is monitored prior to ABS/TCS operation to indicate good charging system condition and during ABS/TCS operation when voltage may drop significantly.

DTC will set only when vehicle's speed is greater than 5 MPH. A malfunction exists when both battery and ignition voltages are less than 10.5 volts.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect and inspect EBTCM harness connector for signs of corrosion or damage. If corrosion or damage is present, go to step **6)** . If not, go to next step.
3. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between ground and pinout box terminal "B". If resistance is 0-5 ohms, go to next step. If not, go to step **7)** .
4. Check voltage between pinout box terminals "B" and "D". If voltage reading is 13-18 volts, go to next step. If not, go to step **8)** .
5. Diagnose charging system. If charging system is okay, replace EBTCM.
6. Clean, repair or replace connectors as needed.
7. Repair open or high resistance in circuit No. 1251.
8. Diagnose battery.

DTC C1237: HIGH SYSTEM SUPPLY VOLTAGE

Circuit Description

This DTC detects high voltage levels to solenoid relay. High voltage may cause damage to system.

DTC will set only when vehicle's speed is greater than 5 MPH. A malfunction exists when battery voltage is greater than 17 volts.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn off all accessories. Start engine. Using scan tool, select DATA LIST and monitor battery voltage while operating engine at about 2000 RPM. If voltage reading is less than 17 volts, go to step **5)** . If not, go to next step.
3. Check battery voltage. If battery voltage is less than 16 volts, go to next step. If not, go to step **6)** .
4. Test drive vehicle at speed greater than 5 MPH. Check DTCs. If DTC resets, go to next step. If DTC does not reset, system is okay.
5. Replace EBTCM.
6. Diagnose charging system. Repair as necessary.

DTC C1242: BPMV PUMP MOTOR GROUND CIRCUIT OPEN

Circuit Description

A ground stud on the pump motor to chassis ground supplies the BPMV pump motor ground.

DTC will set when pump relay is commanded off. A malfunction exists if pump motor ground circuit No. 1250 resistance is greater than 6900 ohms.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect battery terminals. Check resistance between pump motor ground stud and chassis ground. If resistance is 0-2 ohms, go to next step. If not, go to step **8)** .
3. Disconnect EBTCM harness connector. Remove EBTCM from BPMV. Inspect EBTCM-to-BPMV connector for damage, corrosion, poor contact or presence of brake fluid. If fault is not present, go to next step. If fault is present, go to step **5)** .
4. Check resistance between BPMV internal connector terminal No. 8 and motor ground stud. If resistance is greater than 2 ohms, go to step **6)** . If not, go to step **7)** .
5. Replace BPMV or EBTCM as needed.
6. Replace EBTCM.
7. Replace BPMV.
8. Repair open in circuit No. 1250.

DTC C1243: BPMV PUMP MOTOR STALLED

Circuit Description

When pump motor relay is grounded by the EBTCM, it closes and provides battery voltage to operate the pump. Once motor circuit is energized, a pump on signal is sensed by EBTCM to verify pump operation.

DTC will set when pump motor relay has been commanded off after pump motor has been on. A malfunction has occurred is pump motor was on and EBTCM sensed a stuck or a slow turning pump motor.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Test battery and charge as needed. Inspect charging system and repair as necessary. After repairs, go to next step.
3. If DTC C1217 is also present, diagnose DTC C1217 first. Check ABS fuse and replace as necessary. Turn ignition switch to RUN position. Check ABS fuse. If ABS fuse is open, go to step **12)** . If ABS fuse is okay, go to next step.
4. Turn ignition off. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Turn ignition on. Check voltage between pinout box pins "B" and "E". If voltage reading is 13-18 volts, go to next step. If not, go to step **13)** .
5. Turn ignition off. Disconnect pinout box from EBTCM harness connector. Inspect EBTCM harness connector contacts, especially terminals "B" and "E". If fault is found, go to step **7)** . If not, go to next step.
6. Reconnect EBTCM harness connector to EBTCM. If connector connects/plugs in properly, go to step **8)** . If not, go to next step.
7. Repair or replace EBTCM or wiring harness as necessary. Clear DTCs.
8. Check resistance between pump motor ground stud and a good chassis ground. If resistance is 2 ohms or less, go to next step. If not, go to step **14)** .
9. Disconnect EBTCM harness connector. Remove EBTCM from BPMV. Check EBTCM-to-BPMV connections for intermittent or poor connection. If terminals are okay, go to next step. If not, go to step **15)** .
10. Install pinout box to BPMV connector. Check resistance between pinout box terminal No. 8 and pump motor ground stud. If resistance is greater than 2 ohms, go to step **16)** . If not, go to next step.
11. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition to RUN position. Using scan tool, perform AUTO TEST. If pump motor runs, go to step **17)** . If not, go to step **18)** .
12. Repair short to ground in circuit No. 1642.
13. Repair open in circuit No. 1642.
14. Repair open or high resistance in circuit No. 1250.
15. Repair or replace connectors as necessary.
16. Replace BPMV.

17. See **DIAGNOSTIC AIDS** .
18. Replace EBTCM.

Diagnostic Aids

Check for seized pump motor, slow turning pump motor (due to corrosion in motor or connections), open in pump motor ground circuit, or a high resistance in pump motor ground circuit. Check wiring and connectors to avoid misdiagnosis.

DTC C1245: BRAKE SENSOR PRESSURE ALWAYS HIGH

Circuit Description

EBTCM uses input from the Brake Pressure Sensor for more accurate control during an Active Handling event. DTC is set after two consecutive ignition cycles if vehicle speed is greater than 25 MPH and Brake Pressure Sensor is always above 100 psi.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Using scan tool, check Brake Pressure Sensor State. If sensor is OFF, go to next step. If sensor is not OFF, go to step **4)** .
3. Replace EBTCM.
4. Disconnect EBTCM harness connector. Connect pinout box and adapter cable to EBTCM harness connector. Disconnect Brake Pressure Sensor connector. Turn ignition on, engine off, measure voltage at pin 24. If voltage is above 1.5 volts, repair circuit No. 901. If voltage is not above 1.5 volts, replace Brake Pressure Sensor.

Diagnostic Aids

An intermittent may be caused by a poor connection, rubbed through wire insulation or wire broken inside insulation. Check connection between EBTCM and Brake Pressure Sensor.

Use the scan tool's enhanced diagnostic function to check frequency of malfunction. Check suspected circuit causing intermittent malfunction for backed out terminals, improper mating, broken lock, deformed terminals, damaged terminals, or damaged wiring harness.

DTC C1247: BRAKE PRESSURE DIFFERENTIAL SWITCH ACTIVATED

NOTE: For circuit reference, see WIRING DIAGRAM.

Circuit Description

EBTCM monitors the Brake Pressure Differential Switch to turn off Traction Control and Active Handling if a pressure loss is detected in the hydraulic brake system. DTC can be set any time, if the Brake Pressure

Differential Switch has been grounded due to loss of brake pressure or a short to ground.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect Brake Pressure Differential Switch. Turn ignition on. If the red BRAKE Warning indicator remains lit, go to next step. If the red BRAKE Warning indicator goes out, check for a problem with the brake hydraulics.
3. Repair circuit No. 1659.

Diagnostic Aids

This DTC could be caused during a hydraulic brake system bleeding procedure if the ignition switch is left on. An intermittent may be caused by a poor connection, rubbed through wire insulation or wire broken inside insulation.

Use the scan tool's enhanced diagnostic function to check frequency of malfunction. Check suspected circuit causing intermittent malfunction for backed out terminals, improper mating, broken lock, deformed terminals, damaged terminals, or damaged wiring harness.

DTC C1255: EBTCM INTERNAL MALFUNCTION (ABS/TCS DISABLED)

Circuit Description

This DTC identifies a malfunction within the EBTCM. DTC is set when an internal EBTCM malfunction exists.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Using scan tool, record all DTCs. Turn ignition off. Disconnect scan tool. Turn ignition switch to RUN position for 30 seconds, then turn ignition off. Connect scan tool. Check if DTC C1255 is present. If DTC resets, go to next step. If DTC does not reset, go to step **4)** .
3. Replace EBTCM.
4. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

An intermittent may be caused by a poor connection, rubbed through wire insulation or wire broken inside insulation. Check connection between EBTCM and BPMV.

Use the scan tool's enhanced diagnostic function to check frequency of malfunction. Check suspected circuit causing intermittent malfunction for backed out terminals, improper mating, broken lock, deformed terminals, damaged terminals, or damaged wiring harness.

DTC C1256: EBTCM INTERNAL MALFUNCTION

Circuit Description

This DTC identifies a malfunction within the EBTCM. System will still operate with DTC present. DTC sets when an internal EBTCM malfunction exists.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Check if DTC C1261 through C1274 is present. If any of these DTC(s) are present, diagnose affected DTC(s) first. If not, go to next step.
3. Record and clear all DTCs. Turn ignition off. Disconnect scan tool. Turn ignition switch to RUN position for 30 seconds, then turn it off. Connect scan tool. Check for DTCs. If DTC C1256 resets, go to next step. If not, go to step **5)** .
4. Replace EBTCM.
5. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check for seized pump motor, slow turning pump motor (due to corrosion in motor or connections), open in pump motor ground circuit, or a high resistance in pump motor ground circuit. Check wiring and connectors to avoid misdiagnosis.

DTC C1261: LEFT FRONT INLET SOLENOID VALVE MALFUNCTION

Circuit Description

Battery power is supplied to wheel solenoid valve when ignition switch is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is present, go to step **7)** .
3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 7 and 14. If resistance is 8-12 ohms, go to next step. If not, go to step **8)** .

4. Check resistance between pinout box pin No. 14 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition switch to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .
6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1261 resets. If DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .
7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.
8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1262: LEFT FRONT OUTLET SOLENOID VALVE MALFUNCTION

Circuit Description

Battery power is supplied to wheel solenoid valve when ignition switch is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is present, go to step **7)** .
3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 7 and 9. If resistance is 4-7 ohms, go to next step. If not, go to step **8)** .
4. Check resistance between pinout box pin No. 9 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition switch to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .
6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1262 resets. If

DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .

7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.
8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1263: RIGHT FRONT INLET SOLENOID VALVE MALFUNCTION

Circuit Description

Battery power is supplied to wheel solenoid valve when ignition is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is present, go to step **7)** .
3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 7 and 13. If resistance is 8-12 ohms, go to next step. If not, go to step **8)** .
4. Check resistance between pinout box pin No. 13 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition switch to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .
6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1263 resets. If DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .
7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.
8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1264: RIGHT FRONT OUTLET SOLENOID VALVE MALFUNCTION

Circuit Description

Battery power is supplied to wheel solenoid valve when ignition switch is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is present, go to step **7)** .
3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 7 and 10. If resistance is 4-7 ohms, go to next step. If not, go to step **8)** .
4. Check resistance between pinout box pin No. 10 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .
6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1264 resets. If DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .
7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.
8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1265: LEFT REAR OUTLET SOLENOID VALVE MALFUNCTION

Circuit Description

Battery power is supplied to wheel solenoid valve when ignition switch is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is present, go to step **7)** .
3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 7 and 6. If resistance is 4-7 ohms, go to next step. If not, go to step **8)** .
4. Check resistance between pinout box pin No. 6 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition switch to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .
6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1266 resets. If DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .
7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.
8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1266: LEFT REAR INLET SOLENOID VALVE MALFUNCTION

Circuit Description

Battery power is supplied to wheel solenoid valve when ignition switch is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is present, go to step **7)** .
3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 7 and 1. If resistance is 8-12 ohms, go to next step. If not, go to step **8)** .
4. Check resistance between pinout box pin No. 1 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition switch to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .
6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1265 resets. If DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .
7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.
8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1267: RIGHT REAR INLET SOLENOID VALVE MALFUNCTION

Circuit Description

Battery power is supplied to wheel solenoid valve when ignition switch is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is

present, go to step **7)** .

3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 7 and 2. If resistance is 8-12 ohms, go to next step. If not, go to step **8)** .
4. Check resistance between pinout box pin No. 2 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition switch to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .
6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1267 resets. If DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .
7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.
8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1268: RIGHT REAR OUTLET SOLENOID VALVE MALFUNCTION

Circuit Description

Battery power is supplied to wheel solenoid valve when ignition switch is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is present, go to step **7)** .
3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 7 and 5. If resistance is 4-7 ohms, go to next step. If not, go to step **8)** .
4. Check resistance between pinout box pin No. 5 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition

switch to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .

6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1268 resets. If DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .
7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.
8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1271: LF TCS MASTER CYLINDER ISOLATION VALVE MALFUNCTION

Circuit Description

Battery power is supplied to master cylinder isolation valve when ignition switch is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is present, go to step **7)** .
3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 11 and 7. If resistance is 8-12 ohms, go to next step. If not, go to step **8)** .
4. Check resistance between pinout box pin No. 11 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition switch to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .
6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1271 resets. If DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .
7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.

8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1272: LF TCS PRIME VALVE MALFUNCTION

Circuit Description

Battery power is supplied to TCS prime solenoid valve when ignition switch is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is present, go to step **7)** .
3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 7 and 12. If resistance is 8-12 ohms, go to next step. If not, go to step **8)** .
4. Check resistance between pinout box pin No. 12 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition switch to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .
6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1272 resets. If DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .
7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.
8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1273: RF TCS MASTER CYLINDER ISOLATION VALVE MALFUNCTION

Circuit Description

Battery power is supplied to master cylinder isolation valve when ignition switch is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is present, go to step **7)** .
3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 3 and 7. If resistance is 8-12 ohms, go to next step. If not, go to step **8)** .
4. Check resistance between pinout box pin No. 3 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition switch to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .
6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1273 resets. If DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .
7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.
8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1274: RF TCS PRIME VALVE MALFUNCTION

Circuit Description

Battery power is supplied to TCS prime solenoid valve when ignition switch is turned to RUN position. The EBTCM controls the valve functions by grounding the circuit when necessary.

DTC will set when EBTCM senses an open, a short to ground or a short to voltage in the circuit. ABS/TCS is disabled and ABS and TCS indicator light will be illuminated.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Remove EBTCM from BPMV assembly. Inspect EBTCM-to-BPMV connector for intermittent or poor connection, or presence of brake fluid. If connectors are okay or brake fluid is not present, go to next step. If connectors are faulty or brake fluid is present, go to step **7)** .
3. Install pinout box to BPMV connector. Check resistance between pinout box pins No. 7 and 4. If resistance is 8-12 ohms, go to next step. If not, go to step **8)** .
4. Check resistance between pinout box pin No. 4 and BPMV case. If resistance is infinite, go to next step. If not, go to step **8)** .
5. Remove pinout box. Install EBTCM to BPMV. Reconnect EBTCM harness connector. Turn ignition switch to RUN position. Using scan tool, select HOLD PRESSURE mode and check solenoid valve. If solenoid valve is operating properly, go to next step. If not, go to step **8)** .
6. Clear DTC(s). Turn ignition off. Turn ignition switch to RUN position. Check if DTC C1274 resets. If DTC resets, go to step **9)** . If DTC does not reset, go to step **10)** .
7. If connector damage or corrosion is present, replace BPMV or EBTCM as needed. If brake fluid is present, replace both BPMV and EBTCM.
8. Replace BPMV.
9. Replace EBTCM.
10. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check wiring and connectors. Failure to carefully and fully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1275: SERIAL DATA MALFUNCTION

Circuit Description

Serial data link is a communication line between the PCM, EBTCM and other system controllers.

DTC will set when ignition switch is in RUN position and a malfunction exists. A malfunction will exists if a message from the PCM has not been received for 7 seconds. DTC C1275 and C1276 can be set simultaneously when vehicle speed is greater than 3 MPH. TCS indicator light will illuminate and TCS is inhibited. The ABS is not disabled.

Diagnostic Aids

The following are possible causes:

- PCM does not transmit data.
- An open in serial data line.
- A short in serial data line.

The malfunction may be intermittent. Wiggling wiring and connectors can cause fault to appear. PCM DTC will likely be set along with this DTC if malfunction is a short to ground or voltage, or serial data circuit. An open between EBTCM and PCM may be the malfunction if ABS/TCS DTC C1275 is set and PCM DTC is not.

DTC C1276: DELIVERED TORQUE SIGNAL CIRCUIT MALFUNCTION

Circuit Description

Traction control is simultaneously controlled by EBTCM and PCM. The PCM sends a DELIVERED TORQUE message via a Pulse Width Modulated (PWM) signal to the EBTCM confirming the delivered torque level for proper traction control system operation. The EBTCM supplies the pull up voltage.

DTC can be set anytime when ignition voltage is present. A malfunction exists if PWM signal is out of range or no signal is received for a period of 7 seconds. If DTC is stored, TCS is disabled and TCS indicator light is illuminated. ABS remains functional.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Check ground circuits G101, G106 and G108. Ensure each ground is clean, tight and free of damage. If ground circuits are okay, go to next step. If not, go to step **4)** .
3. Repair as necessary.
4. Turn ignition off. Disconnect EBTCM harness connector. Install pinout box and adapter cable between EBTCM harness connector and EBTCM. Turn ignition on, with engine off. Using DVOM, measure DC duty cycle between pinout box pins No. 6 and "B". If duty cycle is 5-25 percent, go to next step. If not, go to step **7)** .
5. Measure DC Hertz between pinout box terminals No. 6 and "B". If frequency range is 121-134 Hz, go to next step. If not, go to step **13)** .
6. Replace EBTCM.
7. Turn ignition off. Disconnect PCM harness connector C2. Turn ignition on. Check voltage between pinout box pin No. 6 and pin "B". If battery voltage is present, go to next step. If not, go to step **10)** .
8. Turn ignition off. Disconnect adapter cable from EBTCM, leaving it connected to EBTCM harness connector. Turn ignition on, with engine off. Check voltage between pinout box pin No. 6 and pin "B". If voltage reading is greater than 1 volt, go to next step. If not, go to step **12)** .
9. Repair short to voltage in circuit No. 464.

10. Turn ignition off. Check resistance between pinout box pin No. 6 and pin "B". If resistance is infinite, go to step **6)** .
11. Repair short to ground in circuit No. 464.
12. Check resistance between pinout box pin No. 6 and PCM harness connector C2 terminal No. 40. If resistance is 0-2 ohms, go to next step. If not, go to step **14)** .
13. Replace PCM.
14. Repair open in circuit No. 464.

DTC C1277: REQUESTED TORQUE SIGNAL CIRCUIT MALFUNCTION

Circuit Description

Traction control is simultaneously controlled by EBTCM and PCM. The PCM sends a REQUESTED TORQUE message via a Pulse Width Modulated (PWM) signal from the EBTCM requesting the desired torque level for proper traction control system operation. The PCM supplies the pull up voltage.

DTC can be set if there is an open or short in the requested torque line between the EBTCM and PCM or there is a TCS communication malfunction detected by the PCM and indicated to the EBTCM, by broadcasting a PWM message.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Check ground circuits G101, G106 and G108. Ensure each ground is clean, tight and free of damage. If ground circuits are okay, go to next step. If not, go to step **4)** .
3. Repair as necessary.
4. Turn ignition off. Disconnect EBTCM harness connector. Install pinout box and adapter cable between EBTCM harness connector and EBTCM. Turn ignition on, with engine off. Using DVOM, measure DC duty cycle between pinout box pin No. 25 and pin "B". If duty cycle is 85-95 percent, go to next step. If not, go to step **6)** .
5. Measure DC Hertz between pinout box pin No. 25 and pin "B". If frequency range is 121-134 Hz, go to next step. If not, go to step **13)** .
6. Turn ignition off. Disconnect adapter cable from EBTCM, leaving it connected to EBTCM harness connector. Turn ignition on, with engine off. Check voltage between pinout box pin No. 25 and pin "B". If voltage reading is 4.5-5.5 volts, go to next step. If not, go to step **8)** .
7. Replace EBTCM.
8. Turn ignition off. Disconnect PCM harness connector C1. Turn ignition on, with engine off. Check voltage between pinout box pin No. 25 and pin "B". If voltage reading is greater than one volt, go to next step. If not, go to step **10)** .
9. Repair short to voltage in circuit No. 463.
10. Turn ignition off. Check resistance between pinout box pin No. 25 and pin "B". If resistance is infinite, go to step **12)** . If not, go to next step.

11. Repair short to ground in circuit No. 463.
12. Check resistance between pinout box pin No. 25 and PCM harness connector C1 terminal No. 46. If resistance is 0-2 ohms, go to next step. If not, go to step **14)** .
13. Replace PCM.
14. Repair open in circuit No. 463.

DTC C1278: TCS TEMPORARILY INHIBITED BY PCM

Circuit Description

PCM monitors various parameters. PCM will not allow traction control operation if nay parameter fall below a predetermined value.

DTC will set if a malfunction is detected by PCM. PCM causes the TCS to shut down until malfunction has been corrected.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition switch to RUN position. Using scan tool, retrieve DTCs. If other DTCs are present, diagnose the other DTC(s) first. If not other DTC(s) are present, go to next step.
3. If DTC C1278 is set as current DTC, go to step **5)** . If not, go to next step.
4. Clear all DTCs. Test drive vehicle to greater than 10 MPH for 3 drive cycles. If DTC C1278 resets, go to next step. If DTC does not reset, go to step **6)** .
5. Refer to POWERTRAIN OBD SYSTEM CHECK. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If OBD system check passed, go to step **7)** .
6. See **DIAGNOSTIC AIDS** .
7. Replace EBTCM.

Diagnostic Aids

This DTC is for information only. It indicates there are no problems in the ABS/TCS system.

DTC C1281: STEERING SENSOR UNCORRELATED MALFUNCTION

Circuit Description

EBTCM receives digital information from the following to calculate steering wheel position:

- Index circuits of steering position sensor.
- Phase "A" circuits of steering position sensor.
- Phase "B" circuits of steering position sensor.

EBTCM also receives information from steering position sensor in an analog signal. Then, the EBTCM compares the 2 values to evaluate is the steering sensor angles correlate.

DTC will set when the digitally derived centered angle differs from the analog derived angle by 30 degrees or greater for a period of 5 seconds. An erratic signal from any of the 6 steering position sensor wires will set a DTC (i.e. open or short to ground or voltage).

Diagnostic Aids

Inspect wiring and connectors. Failure to carefully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1282: YAW RATE SENSOR BIAS CIRCUIT MALFUNCTION

Circuit Description

Yaw rate bias is calculated by the EBTCM any time the ignition is on, and is used to compensate for in the yaw rate sensor output due to temperature changes and manufacturing tolerances.

DTC will set if the ignition is on and the yaw rate bias exceeds 7 degrees/second, a measured yaw rate changes by more than 390 degrees/second within one second, signal voltage is less than 0.15 volts or greater than 4.85 volts, or during an Active Handling event if the yaw rate difference is greater than 10 degrees/second for more than 20 seconds.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Disconnect EBTCM harness connector. Install pinout box and adapter cable between EBTCM harness connector and EBTCM. Check resistance between pinout box pins 21 and B. If resistance is infinite, go to step **4)** . If not, go to next step.
3. Check for short in circuit No. 910. Repair as necessary. Reconnect all harness connectors.
4. Check resistance between pinout box pins 11 and B. If resistance is infinite, go to step **6)** . If not, go to next step.
5. Check for short in circuit No. 1056. Repair as necessary. Reconnect all harness connectors.
6. Disconnect yaw rate sensor, lateral accelerometer, brake pressure sensor, and SWPS connectors. Check resistance between pinout box pins No. 11 and 27. If resistance is infinite, go to step **8)** . If not, go to next step.
7. Check for short between circuits No. 556 and 1056. Repair as necessary. Reconnect all harness connectors.
8. Check resistance between pinout box pins No. 11 and 21. If resistance is infinite, go to step **10)** . If not, go to next step.
9. Check for short between circuits No. 910 and 1056. Repair as necessary. Reconnect all harness connectors.
10. Check resistance between pinout box pins No. 21 and 27. If resistance is infinite, go to step **12)** . If not,

go to next step.

11. Check for short between circuits No. 556 and 910. Repair as necessary. Reconnect all harness connectors.
12. Turn ignition switch on. Measure voltage between pinout box pins No. 21 and "B". If voltage reading is greater than 1 volt, go to next step. If not, then go to step **14)** .
13. Check for short to voltage in circuit No. 910. Repair as necessary. Reconnect all harness connectors.
14. Turn ignition switch on. Measure voltage between pinout box pins No. 11 and "B". If voltage reading is greater than 1 volt, go to next step. If not, then go to step **16)** .
15. Check for short to voltage in circuit No. 1056. Repair as necessary. Reconnect all harness connectors.
16. Turn ignition switch on. Measure voltage between pinout box pins No. 27 and "B". If voltage reading is greater than 1 volt, go to next step. If not, then go to step **18)** .
17. Check for short to voltage in circuit No. 556. Repair as necessary. Reconnect all harness connectors.
18. Turn ignition off. Connect a fused jumper between pins No. 21 and "B" of the pinout box. Measure resistance between yaw rate sensor terminal "C" and ground. If the resistance is between 0 and 5 ohms, go to step **20)** . If not, go to next step.
19. Check circuit No. 910 for an open or high resistance. Repair as necessary. Reconnect all harness connectors.
20. Turn ignition off. Connect a fused jumper between pins No. 27 and "B" of the pinout box. Measure resistance between yaw rate sensor terminal "B" and ground. If the resistance is between 0 and 5 ohms, go to step **22)** . If not, go to next step.
21. Check circuit No. 556 for an open or high resistance. Repair as necessary. Reconnect all harness connectors.
22. Turn ignition off. Connect a fused jumper between pins No. 11 and "B" of the pinout box. Measure resistance between yaw rate sensor terminal "A" and ground. If the resistance is between 0 and 5 ohms, go to step **24)** . If not, go to next step.
23. Check circuit No. 1056 for an open or high resistance. Repair as necessary. Reconnect all harness connectors.
24. Turn ignition off. Disconnect EBTCM harness connector. Install pinout box and adapter cable between EBTCM harness connector and EBTCM. Reconnect yaw rate sensor, remove fused jumper and measure the voltage between terminals No. 11 and 27. If voltage is between 4.75 and 5.25, go to next step. If not, replace EBTCM.
25. Measure the voltage between terminals No. 21 and 27. If voltage is between 2.35 and 2.65, go to next step. If not, go to step **27)** .
26. Using the scan tool, read the yaw rate sensor voltage. If voltage is between 2.0 and 3.0, replace yaw rate sensor. If not, replace EBTCM.
27. Reconnect all harness connectors. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets.
28. If DTC resets, replace EBTCM. If DTC does not reset, see **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check vehicle for proper wheel alignment. Be sure vehicle is parked on level ground when performing diagnostic procedures. Find out, from the driver, if the SERVICE ACTIVE HNDLG message was displayed. Inspect wiring and connectors. Failure to carefully inspect wiring and connectors may result in misdiagnosis

and replacement of non-faulty parts.

DTC C1283: EXCESSIVE TIME TO CENTER STEERING

Circuit Description

The EBTCM uses the yaw rate sensor, lateral accelerometer and wheel speed sensors to determine if the vehicle is traveling a straight line. The steering wheel position sensor center angle is calibrated with steering wheel in the straight-ahead position after driving more than 6 MPH for more than 10 seconds. This calibration is necessary for proper ABS/TCS functions.

DTC will set if the system believes the steering is far off center with a vehicle speed greater than 25 MPH for longer than 10 minutes.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition switch to RUN position. Using scan tool, retrieve DTCs. If other DTCs are present, diagnose the other DTC(s) first. If not other DTC(s) are present, go to next step.
3. Turn ignition off. Disconnect EBTCM harness connector. Install pinout box and adapter cable. Check the voltage between pin 22 and B of the pinout box. If the voltage is between 2.3 and 2.7, go to next step. If not, replace Lateral Accelerometer.
4. Check the voltage between pin 21 and B of the pinout box. If the voltage is between 2.3 and 2.7, go to next step. If not, replace yaw rate sensor.
5. Reconnect all harness connectors. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets.
6. If DTC resets, replace EBTCM. If DTC does not reset, see **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check vehicle for proper wheel alignment. Be sure vehicle is parked on level ground when performing diagnostic procedures. Find out, from the driver, if the SERVICE ACTIVE HNDLG message was displayed. Inspect wiring and connectors. Failure to carefully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1284: LATERAL ACCELEROMETER SENSOR SELF TEST MALFUNCTION

Circuit Description

The Lateral Accelerometer performs the self test at start-up. The sensor's output will be offset for a short period of time by a fixed amount while the EBTCM powers up. The test will run when ignition is on, all 4 WSS are 0 MPH and the steering angle is within 90 degrees.

DTC will set if the EBTCM does not see the expected changes in the output of the Lateral Accelerometer soon after initialization.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition switch to RUN position. Using scan tool, retrieve DTCs. If other DTCs are present, diagnose the other DTC(s) first. If not other DTC(s) are present, go to next step.
3. Replace Lateral Accelerometer. If DTC 1284 resets, replace the EBTCM.

Diagnostic Aids

Check vehicle for proper wheel alignment. Be sure vehicle is parked on level ground when performing diagnostic procedures. Find out, from the driver, if the SERVICE ACTIVE HNDLG message was displayed. Inspect wiring and connectors. Failure to carefully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1285: LATERAL ACCELEROMETER SENSOR CIRCUIT MALFUNCTION

Circuit Description

The EBTCM measures the output of the Lateral Accelerometer. Usable output voltage range of the Lateral Accelerometer is 0.25 to 4.75 volts. Scan tool will report a zero lateral accelerometer signal of 2.5 volts if there is no sensor bias and the vehicle is on a flat surface.

DTC will set when the ignition is on and the Lateral Accelerometer voltage is less than 0.15 volts or greater than 4.85 volts for more than one second.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Disconnect EBTCM harness connector. Install pinout box and adapter cable to EBTCM harness connector. Check resistance between pinout box pins No. 22 and B. If resistance is infinite, go to next step. If not, go to step **4)** .
3. Check for short in circuit No. 1338. Repair as necessary.
4. Check resistance between pinout box pins No. 11 and B. If resistance is infinite, go to step **6)** . If not, go to next step.
5. Check for short in circuit No. 1056. Repair as necessary. After repair Perform diagnostic system check.
6. Disconnect yaw rate sensor, Lateral Accelerometer, Brake Pressure Sensor, and SWPS connectors. Check resistance between pinout box pins No. 11 and 27. If resistance is infinite, go to step **8)** . If not, go to next step.
7. Check for short between circuits No. 556 and 1056. Repair as necessary. After repair Perform diagnostic system check.
8. Check resistance between pinout box pins No. 11 and 22. If resistance is infinite, go to step **10)** . If not, go to next step.
9. Check for short between circuits No. 1056 and 1338. Repair as necessary. After repair Perform diagnostic

system check.

10. Check resistance between pinout box pins No. 27 and 22. If resistance is infinite, go to step **12)** . If not, go to next step.
11. Check for short between circuits No. 556 and 1338. Repair as necessary. After repair Perform diagnostic system check.
12. Turn ignition on. Measure voltage between pinout box pins No. 22 and "B". If the voltage is greater than 1 volt, go to next step. If not, go to step **14)** .
13. Check for short to voltage in circuit No. 1338. Repair as necessary. After repair Perform diagnostic system check.
14. Turn ignition on. Measure voltage between pinout box pins No. 11 and "B". If the voltage is greater than 1 volt, go to next step. If not, go to step **16)** .
15. Check for short to voltage in circuits No. 1056. Repair as necessary. After repair Perform diagnostic system check.
16. Turn ignition on. Measure voltage between pinout box pins No. 27 and "B". If the voltage is greater than 1 volt, go to next step. If not, go to step **18)** .
17. Check for short to voltage in circuits No. 556. Repair as necessary. After repair Perform diagnostic system check.
18. Turn ignition off. Connect a fused jumper between pin 22 and B of the pinout box. Measure resistance between Lateral Accelerometer terminal "B" and ground. If the resistance is between 0 and 5 ohms, go to step **20)** . If not, go to next step.
19. Check circuit No. 1338 for an open or high resistance. Repair as necessary. Reconnect all harness connectors.
20. Connect a fused jumper between pin 27 and B of the pinout box. Measure resistance between Lateral Accelerometer terminal "C" and ground. If the resistance is between 0 and 5 ohms, go to step **22)** . If not, go to next step.
21. Check circuit No. 556 for an open or high resistance. Repair as necessary. Reconnect all harness connectors.
22. Connect a fused jumper between pin 11 and B of the pinout box. Measure resistance between Lateral Accelerometer terminal "A" and ground. If the resistance is between 0 and 5 ohms, go to step **24)** . If not, go to next step.
23. Check circuit No. 1056 for an open or high resistance. Repair as necessary. Reconnect all harness connectors.
24. Turn ignition off. Disconnect EBTCM harness connector. Install pinout box and adapter cable between EBTCM harness connector and EBTCM. Reconnect Lateral Accelerometer Sensor, remove fused jumper and measure the voltage between terminals No. 11 and 27. If voltage is between 4.75 and 5.25, go to next step. If not, replace EBTCM.
25. Measure the voltage between terminals No. 21 and 27. If voltage is between 2.35 and 2.65, go to next step. If not, go to step **27)** .
26. Using the scan tool, read the Lateral Accelerometer Sensor voltage. If voltage is between 2.0 and 3.0, replace yaw rate sensor. If not, replace EBTCM.
27. Reconnect all harness connectors. Test drive vehicle at speed greater than 15 MPH for at least 30 seconds. Check if DTC resets.

28. If DTC resets, replace EBTCM. If DTC does not reset, perform DIAGNOSTIC SYSTEM CHECK.

Diagnostic Aids

Check vehicle for proper wheel alignment. Be sure vehicle is parked on level ground when performing diagnostic procedures. Find out, from the driver, if the SERVICE ACTIVE HNDLG message was displayed. Inspect wiring and connectors. Failure to carefully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1286: STEERING SENSOR BIAS MALFUNCTION

Circuit Description

The steering wheel position sensor center angle is calibrated with steering wheel in the straight-ahead position. This calibration is necessary for proper ABS/TCS functions.

DTC will set if EBTCM receives a steering angle reading greater than 30 degrees from center. When DTC is stored, ABS/TCS is disabled. ABS and TCS indicator lights are illuminated.

Diagnostic Aids

Malfunction can be caused by the following:

- Steering wheel not centered due to alignment and/or suspension/steering damage.
- Steering sensor slipped and rotated on steering shaft.
- Steering sensor not recalibrated following a sensor or EBTCM replacement.

Correct a suspension damage and/or misalignment of wheels before troubleshooting or before recalibrating steering sensor. Inspect wiring and connectors. Failure to carefully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1287: STEERING SENSOR RATE MALFUNCTION

Circuit Description

EBTCM receives unrealistic steering wheel speed measurements from the steering wheel position sensor.

If a malfunction is detected, the ABS/TCS is disabled. ABS and TCS indicator lights are illuminated.

Diagnostic Aids

Inspect wiring and connectors. Failure to carefully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1288: STEERING SENSOR CIRCUIT MALFUNCTION

Circuit Description

Steering wheel position sensor provides the EBTCM with an analog voltage reading of 0.2-4.8 volts depending on steering wheel angle.

DTC will set when analog output voltage falls out of range. When malfunction is detected, the ABS/TCS is disabled. ABS and TCS indicator lights are illuminated.

Diagnostic Aids

Malfunction can be caused by an open or shorted steering wheel position sensor circuit. Inspect wiring and connectors. Failure to carefully inspect wiring and connectors may result in misdiagnosis and replacement of non-faulty parts.

DTC C1291: OPEN BRAKELIGHT SWITCH CONTACTS DURING DECELERATION

Circuit Description

DTC is used to detect an open brake switch in the non-ABS mode. EBTCM looks for a deceleration rate that would indicate braking action and verifies this assumption by requiring several repeats of this detection method. In each case, the TCS will not be available since no brake switch voltage is seen by EBTCM.

DTC will set after the brake switch remains open for 3 deceleration cycles. This fault occurs when power distribution system does not supply battery voltage to circuits No. 20 and 140. Check for open fuses, faulty wiring, terminal corrosion or poor connections. When a malfunction is detected, TCS is disabled and TCS indicator light is illuminated. ABS remains functional.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition switch to RUN position. Using scan tool, select DATA LIST. Lightly depress brake pedal while monitoring brake switch status on scan tool. If scan tool indicates ON within 1/2 inch of pedal travel, go to step **9)** . If not, go to next step.
3. With brake pedal still depressed, have assistant check brakelights. If brakelights are on, go to next step. If not, go to step **6)** .
4. Turn ignition off. Disconnect EBTCM harness connector. Install pinout box and adapter cable. Using DVOM, check resistance between pinout box pin No. 9 and brakelight switch terminal B2. If resistance is less than 2 ohms, go to step **11)** . If not, go to step **12)** .
5. Inspect EBTCM harness connector terminal No. 9 for intermittent or poor contact. Repair as necessary. Reconnect all harness connectors. Drive vehicle and perform 3 moderately hard stops from 20 MPH. Check if DTC C1291 is present. If DTC is set, go to step **8)** . If not, go to step **9)** .
6. Check voltage between brake switch terminal "A" and ground. If voltage reading is greater than 10 volts, go to next step. If not, go to step **10)** .
7. Check voltage between brake switch terminal B2 and ground while depressing brake pedal. If voltage reading is greater than 10 volts, go to step **12)** . If not, go to step **11)** .

8. Using scan tool, select DATA LIST to monitor brake switch status. If brake switch status is OFF, go to step **13)** . If not, go to step **11)** .
9. Repair as necessary.
10. Repair open or short in circuit No. 140, or faulty STOP/HAZ fuse. Repair or replace as necessary.
11. Adjust or replace brake switch as necessary.
12. Repair open or high resistance in circuit No. 20.
13. Replace EBTCM.

Diagnostic Aids

Malfunction can be caused by:

- Open in brake switch.
- Open in brake switch circuit fuse.
- Misadjusted brake switch.

Check for intermittent malfunction caused by poor connection, rubbed through wire insulation or a broken wire inside insulation. Check for backed out terminals, improper connector mating, broken connector locks, improperly formed or damaged terminals, or poor terminal-to-wiring connections.

DTC C1293: DTC C1291 SET IN PREVIOUS IGNITION CYCLE

Circuit Description

This DTC is the second portion of DTC C1291. If DTC C1291 occurred during the last ignition cycle, then DTC C1293 becomes a current malfunction during the next ignition cycle and keeping the TCS disabled until a brake switch ON state is seen. When a change is seen during an ignition cycle in which DTC C1293 is a current malfunction, DTC C1291 will clear itself at the end of the current ignition cycle and the TCS will enable itself at the start of the next ignition cycle.

DTC C1293 alone indicates that DTC C1291 occurred previously and that DTC C1291 is intermittent or that DTC C1291 has been corrected. During a malfunction, TCS is disabled. TCS indicator light is illuminated, but ABS remains functional.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition switch to RUN position. Using scan tool, retrieve DTC(s). If DTC C1291 is present, diagnose affected DTC first. If DTC C1291 is not present, go to next step.
3. Using scan tool, select DTC HISTORY. Verify frequency was low. Clear all DTC(s).

DTC C1294: BRAKELIGHT SWITCH CIRCUIT ALWAYS ACTIVE

Circuit Description

This DTC is used to determine the proper operation of the brake switch. This is important because ABS is activated when brake switch is on and turned off when brake is off. If brake switch is always on, the ABS operation will always be requested, resulting in potential modulator cycling on rough roads. This malfunction will likely result in a dead battery due to brakelights staying on if operator is not informed of malfunction.

DTC will set when vehicle speed reaches at least 25 MPH and brake is never off during 2 consecutive drive cycles. When a malfunction is detected, TCS is disabled and TCS indicator light will be illuminated. ABS remains functional.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition off. Apply brakes. Observe brakelights. If brakelights are on, go to step **4)** . If brakelights are not on, go to next step.
3. Disconnect brakelight switch harness connector. Check brakelights. If brakelights are still on, go to step **6)** . If brakelights are off, go to step **7)** .
4. Disconnect EBTCM harness connector. Install pinout box and adapter cable between EBCM harness connector and EBCM. Check voltage between EBTCM harness connector terminal No. 9 and ground. If voltage reading is less than 2 volts, go to next step. If not, go to step **6)** .
5. Turn ignition off. Check for short between circuit No. 20 and EBTCM harness connector. Repair as necessary. Reconnect all harness connectors. Test drive vehicle for 3 cycles. A cycle is, starting engine, driving vehicle at speed greater than 25 MPH, stopping vehicle and turning ignition off. After going through 3 cycles, check if DTC C1294 resets. If DTC resets, go to step **8)** . If not, go to step **9)** .
6. Repair short to voltage in circuit No. 20.
7. Adjust or replace brake switch as needed.
8. Replace EBTCM.
9. See **DIAGNOSTIC AIDS** .

Diagnostic Aids

Check brake switch circuit for short to voltage. Check brake switch for misadjustment or shorted brake switch.

An intermittent malfunction can be caused by poor connection, a rubbed through wire insulation or a broken wire inside insulation. Also, check for backed out terminals, improper terminal mating, broken connector locks, deformed/damaged terminals, poor terminal-to-wiring connections, or physical wiring damage.

DTC C1295: BRAKELIGHT SWITCH CIRCUIT OPEN

Circuit Description

This DTC identifies an open brake switch circuit preventing brake switch input to EBTCM from changing state when brake is applied. This DTC is used in conjunction with DTC C1291 to determine the cause of an open

brake switch malfunction.

DTC can set after initialization is completed. A malfunction exists if brake switch input voltage is out of range for one second, indicating an open circuit. When malfunction is present, TCS is disabled and TCS indicator light is illuminated. ABS remains functional.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition switch to RUN position. Using scan tool, select DATA LIST. Apply brakes lightly while monitoring brake switch status on scan tool. If scan tool indicates ON within 1/2 inch of pedal travel, go to step **6)** . If not, go to next step.
3. While still depressing brake pedal, have an assistant check brakelights. If brakelights are on, go to next step. If not, go to step **7)** .
4. Disconnect EBTCM harness connector. Install pinout box and adapter cable between EBCM harness connector and EBCM. Check resistance between EBTCM harness connector terminal No. 9 and brake switch harness connector terminal B2. If resistance is less than 2 ohms, go to next step. If not, go to step **8)** .
5. Turn ignition off. Check EBTCM harness connector terminal No. 9 for intermittent or poor contact. Repair as necessary. Reconnect all harness connectors. Test drive vehicle and perform 3 moderately hard stops from 20 MPH. Check if DTC C1295 resets. If DTC resets, go to step **9)** . If not, go to next step.
6. Repair as necessary.
7. Repair open in brakelight circuit.
8. Repair open in circuit No. 20.
9. Replace EBTCM.

Diagnostic Aids

Check brake switch input circuit for open. Check for faulty brakelight bulbs or open/misadjusted brake switch. Check for open in brakelight circuit.

An intermittent malfunction can be caused by poor connection, a rubbed through wire insulation or a broken wire inside insulation. Also, check for backed out terminals, improper terminal mating, broken connector locks, deformed/damaged terminals, poor terminal-to-wiring connections, or physical wiring damage.

DTC C1296: MASTER CYLINDER SENSOR CIRCUIT OPEN OR SHORTED

Circuit Description

The EBTCM uses input from the Brake Pressure Sensor for better control during an Active Handling event.

DTC can set after initialization is completed, and the Brake Pressure Sensor signal is less than 0.20 volts or greater than 4.80 volts.

Diagnosis

1. Perform diagnostic system check. See DIAGNOSTIC SYSTEM CHECK. After performing diagnostic system check, go to next step.
2. Turn ignition switch to RUN position. Using scan tool, retrieve DTCs. If other DTCs are present, diagnose the other DTC(s) first. If not other DTC(s) are present, go to next step.
3. Turn ignition off. Disconnect EBTCM harness connector. Install pinout box and adapter cable between EBTCM harness connector and EBTCM. Turn ignition on, and measure the voltage at pin No. 24. If the voltage is between 0.20 and 4.80 volts, go to next step. If not, go to step **5)** .
4. Replace the EBTCM.
5. Disconnect the Brake Pressure Sensor connector. Disconnect the cable adapter from the EBTCM, leaving the other end attached to the EBTCM harness connector. Measure the resistance between pin No. 24 and terminal "C" on the Brake Pressure Sensor harness. If resistance is between 0 and 5 ohms, go to step **7)** . If not, go to next step.
6. Check circuit No. 901 for an open. Repair as necessary.
7. Measure the resistance between pin No. 24 and terminal "B" on the Brake Pressure Sensor harness. If resistance is infinite, go to step **9)** . If not, go to next step.
8. Repair short in circuit No. 901.
9. Measure the resistance between pin No. 27 and terminal "A" on the Brake Pressure Sensor harness. If resistance is between 0 and 5 ohms, go to step **11)** . If not, go to next step.
10. Repair circuit No. 556 between splice S106 and the Brake Pressure Sensor for an open circuit.
11. Measure the resistance between pin No. 11 and terminal "B" on the brake pressure sensor harness. If resistance is between 0 and 5 ohms, go to step **13)** . If not, go to next step.
12. Repair circuit No. 1056 between splice S108 and the Brake Pressure Sensor for an open circuit.
13. Replace the Brake Pressure Sensor.

Diagnostic Aids

An intermittent malfunction can be caused by poor connection, a rubbed through wire insulation or a broken wire inside insulation. Also, check for backed out terminals, improper terminal mating, broken connector locks, deformed/damaged terminals, poor terminal-to-wiring connections, or physical wiring damage.

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.

WARNING: Vehicle is equipped with Supplemental Inflatable Restraint (SIR) system. Disable SIR system when working near steering column or instrument panel. See SUPPLEMENTAL INFLATABLE RESTRAINT (SIR) under

SERVICE PRECAUTIONS.

BRAKE PRESSURE MODULATOR VALVE (BPMV) & ELECTRONIC BRAKE TRACTION CONTROL MODULE (EBTCM)

NOTE: The BPMV and EBTCM are removed as an assembly.

Removal

1. Turn ignition off. Disconnect negative battery terminal. Remove right and left side stabilizer shaft insulator boots. Note brakeline location on BPMV. Remove brakelines. Disconnect EBTCM harness connector. Remove mounting nuts and bolts from EBTCM/BPMV assembly.
2. Remove EBTCM/BPMV as an assembly. If EBTCM is being replaced, remove ground wire and then remove EBTCM. Ensure EBTCM seal is not damaged during this step.

CAUTION: Ensure brakelines are correctly connected to BPMV or wheel lock-up will occur.

Installation

To install, reverse removal procedure. Position EBTCM/BPMV assembly on vehicle with brackets attached. Clean up any spilled brake fluid in mounting area. Tighten bolts and brakelines to specification. See **TORQUE SPECIFICATIONS** . After completing installation, bleed brake system. See **BLEEDING BRAKE SYSTEM** .

PUMP MOTOR RELAY & VALVE RELAY

NOTE: Pump motor relay and valve relay are internal to Electronic Brake Traction Control Module (EBTCM) and are not serviceable.

TOOTHED RING (REAR)

NOTE: The toothed ring for rear wheels is not serviceable. Toothed ring is incorporated into rear drive axle spindle. A NEW rear drive axle spindle (containing a NEW toothed ring) must be used if toothed ring requires replacement.

STEERING WHEEL POSITION SENSOR

The steering wheel position sensor is mounted to steering shaft. For removal and installation, see appropriate STEERING COLUMNS article in STEERING.

WHEEL SPEED SENSORS (WSS)

NOTE: Wheel speed sensors are incorporated in hub assembly. Entire hub/wheel

speed sensor assembly must be replaced.

Removal & Installation (Front)

1. Turn ignition off. Raise and support vehicle. Remove wheel. Remove brake caliper and rotor. Remove the stabilizer shaft link from the lower control arm. Disconnect WSS electrical connector. Support the lower control arm. Separate outer tie rod and lower ball joint from the steering knuckle. Remove wheel hub retaining bolts and remove hub/wheel speed sensor assembly from steering knuckle.
2. To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** . Front wheel speed sensor air gap is not adjustable.

Removal (Rear)

1. Turn ignition off. Raise and support vehicle. Remove wheel. Disconnect WSS connector. Disconnect Real Time Dampening (RTD) position sensor link, if equipped. Remove brake caliper and rotor. Remove shock absorber solenoid electrical connector, if equipped. Separate tie rod end from suspension knuckle. Remove spindle nut and washer. Separate upper and lower control arm from suspension knuckle. Remove suspension knuckle from vehicle Remove wheel hub retaining bolts and remove hub/wheel speed sensor assembly from steering knuckle.

Installation

To install, reverse removal procedure. Tighten mounting bolt to specification. See **TORQUE SPECIFICATIONS** . Rear wheel speed sensor air gap is not adjustable.

ADJUSTMENTS

PARKING BRAKE

Parking brake lever/cable adjustment is automatic when parking brake lever is cycled 3 times. When properly adjusted, lever should move 3-5 notches before brake engages when 61 lbs. (27.7 kg) of force is applied. If further servicing information is needed, see DISC - CORVETTE article.

BRAKELIGHT/CRUISE CONTROL SWITCH

NOTE: Brakelight/cruise control switch must be correctly adjusted for ABS/TCS to operate properly.

1. Depress brake pedal to applied position. Press brakelight/cruise control switch into retainer until switch body is fully seated. Pull brake pedal fully rearward against pedal stop until clicking noise is no longer heard as switch moves through retainer. DO NOT exceed 50 lbs. (22.7 kg) of pressure or power brake booster may be damaged.
2. Switch is now adjusted. Ensure brakelights do not stay on with brake pedal at rest (released). Switch is correctly installed when no clicking sounds are heard as brake pedal is pulled rearward.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	**Ft. Lbs. (N.m)**
Anchor Plate Bolt	37 (50)
Axle Tie Rod Nut	37 (50)
Brake Hose-To-Caliper Inlet	30 (41)
Brakeline-To-BPMV	12 (16)
Brakeline-To-Master Cylinder	13 (18)
Brake Pedal Pivot Nut	22 (30)
EBTCM/BPMV Insulator Nut	11 (15)
Rear Spindle Nut	118 (160)
Spindle Rod Adjustment Nut	187 (253)
Spindle Rod-To-Knuckle Nut(1)	107 (145)
Tie Rod Jam Nut	44 (60)
Wheel Hub/Speed Sensor-To-Steering Knuckle	96 (130)
Wheel Lug Nut	100 (136)
	INCH Lbs. (N.m)
Adjuster Assembly Nut	89 (10)
Caliper Bleed Screws	80 (9)
EBTCM Bracket Bolt	40 (4.5)
EBTCM-To-BPMV Bolt	53 (6)
(1) Vehicle must be at proper trim height for final torque.	

WIRING DIAGRAMS

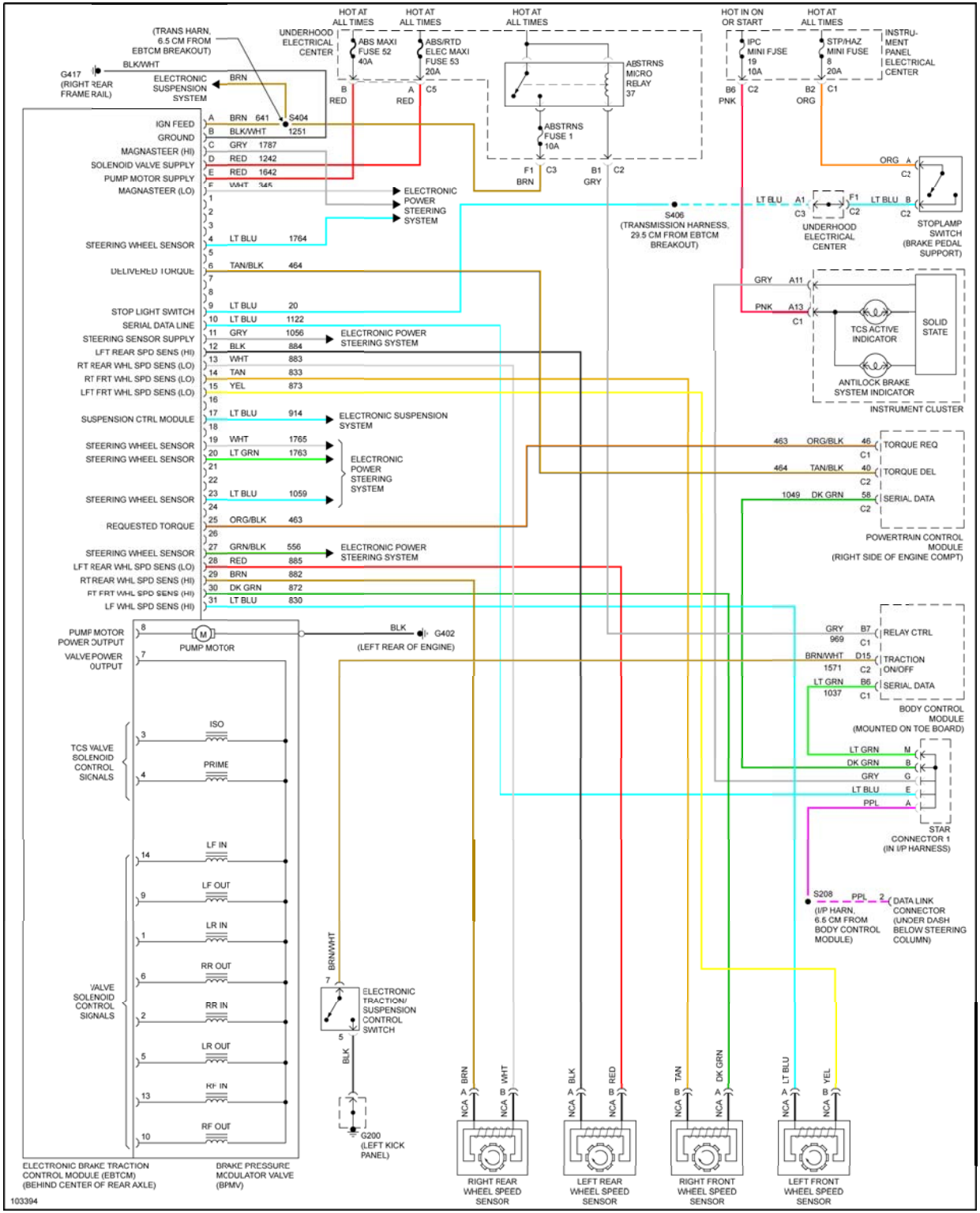
HOT AT ALL TIMES
HOT AT ALL TIMES
HOT AT ALL TIMES
HOT IN ON OR START
HOT AT ALL TIMES
UNDERHOOD ELECTRICAL CENTER
ABS MAXI FUSE 52 40A
ABS/RTD ELEC MAXI FUSE 53 20A
ABSTRNS MICRO RELAY 37
ABSTRNS FUSE 1 10A
IPC MINI FUSE 19 10A
STP/HAZ MINI FUSE 8 20A
INSTRU-MENT PANEL ELECTRICAL CENTER
(TRANS HARN, 6.5 CM FROM EBTCM BREAKOUT)
BLK/WHT
G417 (RIGHT REAR FRAME RAIL)
ELECTRONIC SUSPENSION SYSTEM
BRN
IGN FEED
GROUND
MAGNASTEER (HI)
SOLENOID VALVE SUPPLY
PUMP MOTOR SUPPLY
MAGNASTEER (LO)
S404
STEERING WHEEL SENSOR
DELIVERED TORQUE
STOP LIGHT SWITCH
SERIAL DATA LINE
STEERING SENSOR SUPPLY
LFT REAR SPD SENS (HI)
RT REAR WHL SPD SENS (LO)
RT FRT WHL SPD SENS (LO)
LFT FRT WHL SPD SENS (LO)
SUSPENSION CTRL MODULE
STEERING WHEEL SENSOR
STEERING WHEEL SENSOR
STEERING WHEEL SENSOR
REQUESTED TORQUE
STEERING WHEEL SENSOR
LFT REAR WHL SPD SENS (LO)
RT REAR WHL SPD SENS (HI)
RT FRT WHL SPD SENS (HI)
LF WHL SPD SENS (HI)
ELECTRONIC POWER STEERING SYSTEM
ELECTRONIC SUSPENSION SYSTEM
S406 (TRANSMISSION HARNESS, 29.5 CM FROM EBTCM BREAKOUT)
UNDERHOOD ELECTRICAL CENTER
STOPLAMP SWITCH (BRAKE PEDAL SUPPORT)
TCS ACTIVE INDICATOR
SOLID STATE
ANTILOCK BRAKE SYSTEM INDICATOR
INSTRUMENT CLUSTER
TORQUE REQ
TORQUE DEL
SERIAL DATA
POWERTRAIN CONTROL MODULE (RIGHT SIDE OF ENGINE COMPT)
PUMP MOTOR POWER OUTPUT
VALVE POWER OUTPUT
PUMP MOTOR
G402 (LEFT REAR OF ENGINE)
TCS VALVE SOLENOID CONTROL SIGNALS
ISO
PRIME
VALVE SOLENOID CONTROL SIGNALS
LF IN
LF OUT
LR IN
RR OUT
RR IN
LR OUT
RF IN
RF OUT
ELECTRONIC TRACTION/ SUSPENSION CONTROL SWITCH
G200 (LEFT KICK PANEL)
RELAY CTRL
TRACTION ON/OFF
SERIAL DATA
BODY CONTROL MODULE (MOUNTED ON TOE BOARD)
STAR CONNECTOR 1 (IN I/P HARNESS)
S208 (I/P HARN, 6.5 CM FROM BODY CONTROL MODULE)
DATA LINK CONNECTOR (UNDER DASH BELOW STEERING COLUMN)
ELECTRONIC BRAKE TRACTION CONTROL MODULE (EBTCM) (BEHIND CENTER OF REAR AXLE)
BRAKE PRESSURE MODULATOR VALVE (BPMV)
RIGHT REAR WHEEL SPEED SENSOR
LEFT REAR WHEEL SPEED SENSOR
RIGHT FRONT WHEEL SPEED SENSOR
LEFT FRONT WHEEL SPEED SENSOR
103394

Fig. 1: Anti-Lock Brake/Traction Control System Wiring Diagram (1998 Corvette)

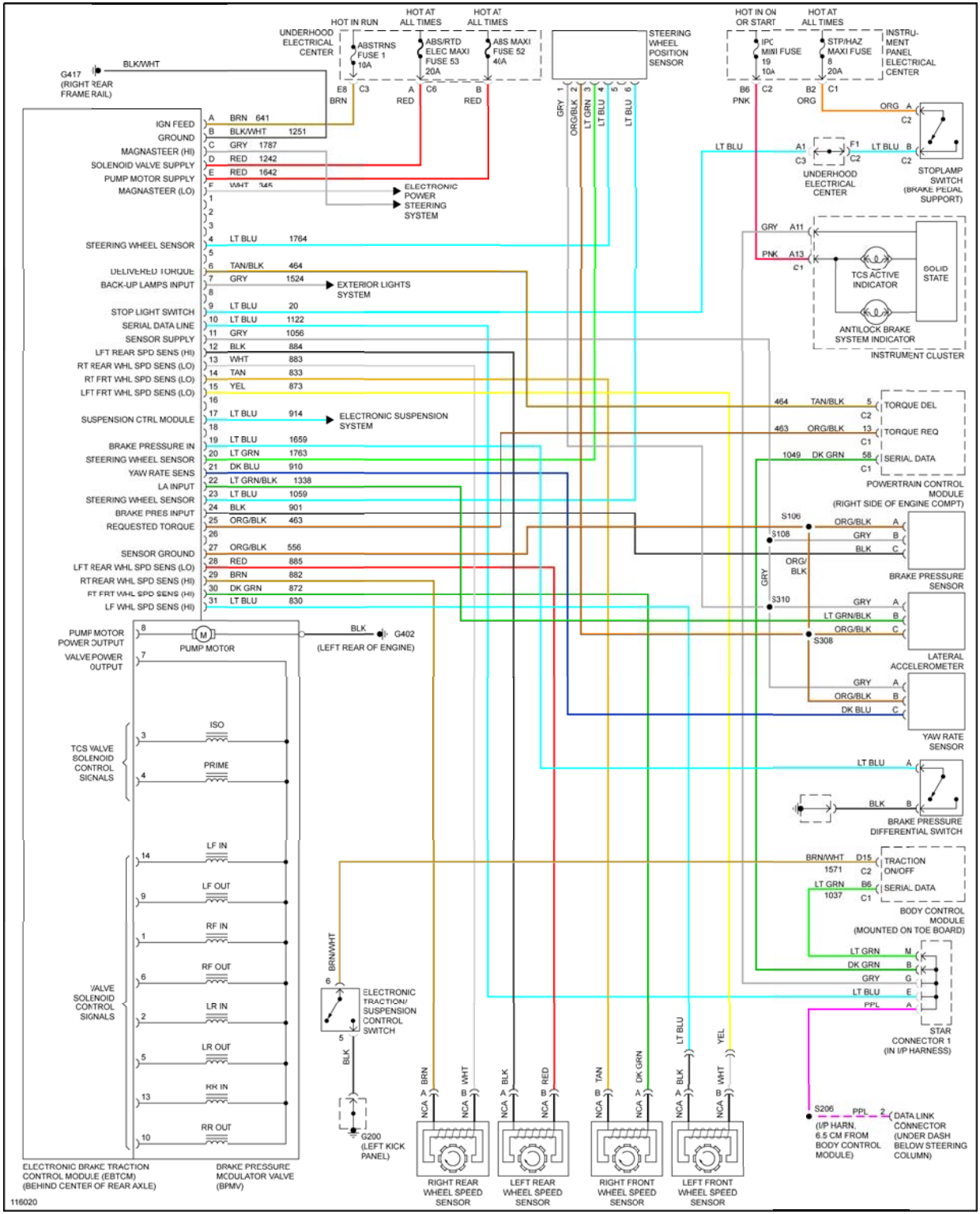
HOT IN RUN
HOT AT ALL TIMES
HOT AT ALL TIMES
UNDERHOOD ELECTRICAL CENTER
ABSTRNS FUSE 1 10A
ABS/RTD ELEC MAXI FUSE 53 20A
ABS MAXI FUSE 52 40A
STEERING WHEEL POSITION SENSOR
HOT IN ON OR START
HOT AT ALL TIMES
IPC MINI FUSE 19 10A
STP/HAZ MAXI FUSE 6 20A
INSTRU-MENT PANEL ELECTRICAL CENTER
G417 (RIGHT REAR FRAME RAIL)
BLK/WHT
IGN FEED
GROUND
MAGNASTEER (HI)
SOLENOID VALVE SUPPLY
PUMP MOTOR SUPPLY
MAGNASTEER (LO)
ELECTRONIC POWER STEERING SYSTEM
STEERING WHEEL SENSOR
DELIVERED TORQUE
BACK-UP LAMPS INPUT
EXTERIOR LIGHTS SYSTEM
STOP LIGHT SWITCH
SERIAL DATA LINE
SENSOR SUPPLY
LFT REAR SPD SENS (HI)
RT REAR WHL SPD SENS (LO)
RT FRT WHL SPD SENS (LO)
LFT FRT WHL SPD SENS (LO)
SUSPENSION CTRL MODULE
ELECTRONIC SUSPENSION SYSTEM
BRAKE PRESSURE IN
STEERING WHEEL SENSOR
YAW RATE SENS
LA INPUT
STEERING WHEEL SENSOR
BRAKE PRES INPUT
REQUESTED TORQUE
SENSOR GROUND
LFT REAR WHL SPD SENS (LO)
RT REAR WHL SPD SENS (HI)
RT FRT WHL SPD SENS (HI)
LF WHL SPD SENS (HI)
PUMP MOTOR POWER OUTPUT
PUMP MOTOR
BLK
G402 (LEFT REAR OF ENGINE)
VALVE POWER OUTPUT
TCS VALVE SOLENOID CONTROL SIGNALS
ISO
PRIME
VALVE SOLENOID CONTROL SIGNALS
LF IN
LF OUT
RF IN
RF OUT
LR IN
LR OUT
RR IN
RR OUT
ELECTRONIC BRAKE TRACTION CONTROL MODULE (EBTCM) (BEHIND CENTER OF REAR AXLE)
BRAKE PRESSURE MODULATOR VALVE (BPMV)
BRN/WHT
ELECTRONIC TRACTION/ SUSPENSION CONTROL SWITCH
BLK
G200 (LEFT KICK PANEL)
RIGHT REAR WHEEL SPEED SENSOR
LEFT REAR WHEEL SPEED SENSOR
RIGHT FRONT WHEEL SPEED SENSOR
LEFT FRONT WHEEL SPEED SENSOR
STOPLAMP SWITCH (BRAKE PEDAL SUPPORT)
UNDERHOOD ELECTRICAL CENTER
TCS ACTIVE INDICATOR
SOLID STATE
ANTILOCK BRAKE SYSTEM INDICATOR
INSTRUMENT CLUSTER
TORQUE DEL
TORQUE REQ
SERIAL DATA
POWERTRAIN CONTROL MODULE (RIGHT SIDE OF ENGINE COMPT)
BRAKE PRESSURE SENSOR
LATERAL ACCELEROMETER
YAW RATE SENSOR
BRAKE PRESSURE DIFFERENTIAL SWITCH
TRACTION ON/OFF
SERIAL DATA
BODY CONTROL MODULE (MOUNTED ON TOE BOARD)
STAR CONNECTOR 1 (IN I/P HARNESS)
S206
PPL
DATA LINK CONNECTOR (UNDER DASH BELOW STEERING COLUMN)
(I/P HARN, 6.5 CM FROM BODY CONTROL MODULE)
116020

Fig. 2: Anti-Lock Brake/Traction Control System Wiring Diagram (1999 Corvette w/Active Handling)

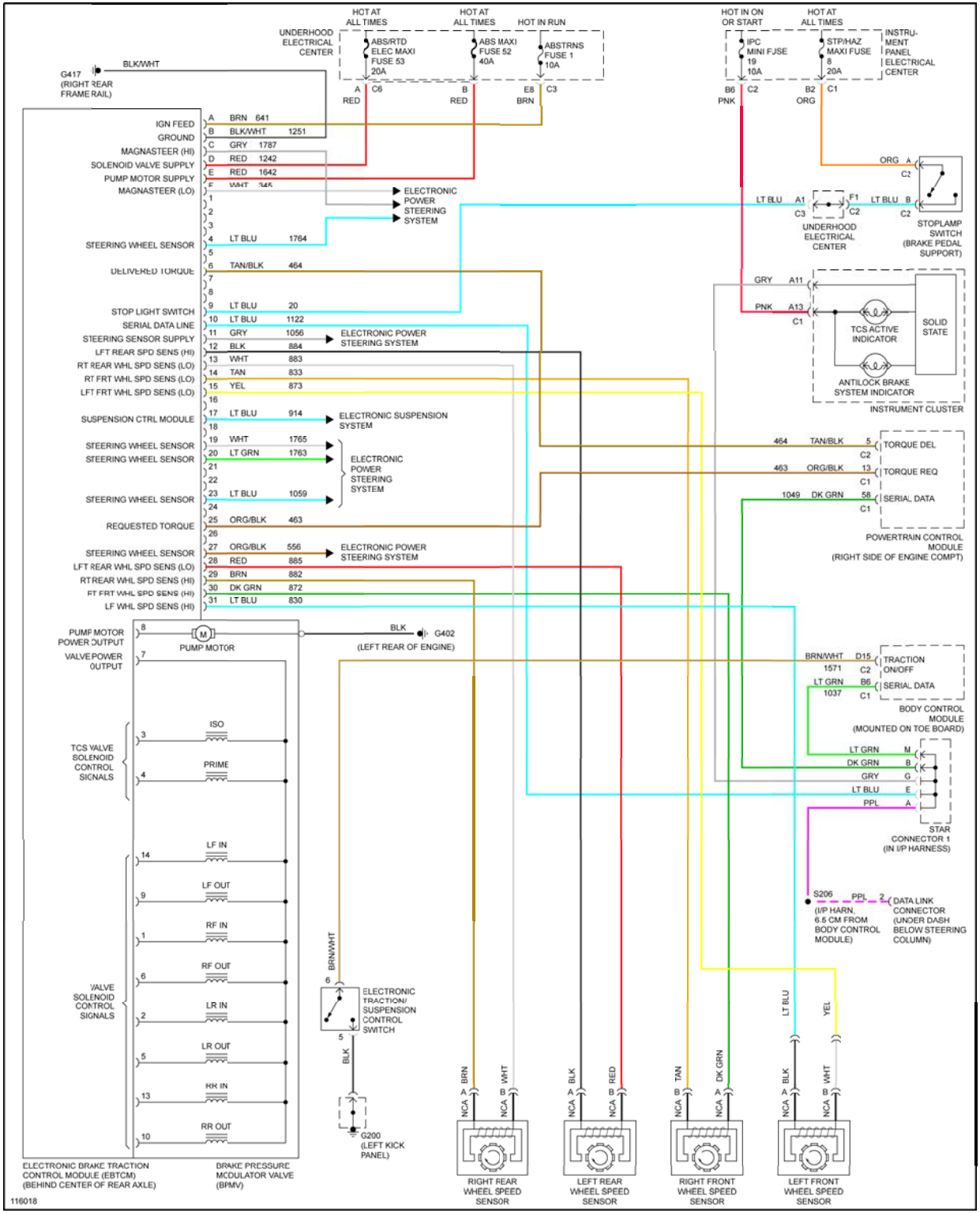
HOT AT ALL TIMES
HOT AT ALL TIMES
HOT IN RUN
UNDERHOOD ELECTRICAL CENTER
ABS/RTD ELEC MAXI FUSE 53 20A
ABS MAXI FUSE 52 40A
ABSTRNS FUSE 1 10A
HOT IN ON OR START
HOT AT ALL TIMES
IPC MINI FUSE 19 10A
STP/HAZ MAXI FUSE 6 20A
INSTRU-MENT PANEL ELECTRICAL CENTER
G417 (RIGHT REAR FRAME RAIL)
BLK/WHT
IGN FEED
GROUND
MAGNASTEER (HI)
SOLENOID VALVE SUPPLY
PUMP MOTOR SUPPLY
MAGNASTEER (LO)
STEERING WHEEL SENSOR
DELIVERED TORQUE
STOP LIGHT SWITCH
SERIAL DATA LINE
STEERING SENSOR SUPPLY
LFT REAR SPD SENS (HI)
RT REAR WHL SPD SENS (LO)
RT FRT WHL SPD SENS (LO)
LFT FRT WHL SPD SENS (LO)
SUSPENSION CTRL MODULE
STEERING WHEEL SENSOR
STEERING WHEEL SENSOR
STEERING WHEEL SENSOR
REQUESTED TORQUE
STEERING WHEEL SENSOR
LFT REAR WHL SPD SENS (LO)
RT REAR WHL SPD SENS (HI)
RT FRT WHL SPD SENS (HI)
LF WHL SPD SENS (HI)
ELECTRONIC POWER STEERING SYSTEM
ELECTRONIC SUSPENSION SYSTEM
ELECTRONIC POWER STEERING SYSTEM
ELECTRONIC POWER STEERING SYSTEM
STOPLAMP SWITCH (BRAKE PEDAL SUPPORT)
UNDERHOOD ELECTRICAL CENTER
TCS ACTIVE INDICATOR
SOLID STATE
ANTILOCK BRAKE SYSTEM INDICATOR
INSTRUMENT CLUSTER
TORQUE DEL
TORQUE REQ
SERIAL DATA
POWERTRAIN CONTROL MODULE (RIGHT SIDE OF ENGINE COMPT)
PUMP MOTOR POWER OUTPUT
VALVE POWER OUTPUT
PUMP MOTOR
BLK
G402
(LEFT REAR OF ENGINE)
TCS VALVE SOLENOID CONTROL SIGNALS
ISO
PRIME
VALVE SOLENOID CONTROL SIGNALS
LF IN
LF OUT
RF IN
RF OUT
LR IN
LR OUT
RR IN
RR OUT
BRN/WHT
ELECTRONIC TRACTION/ SUSPENSION CONTROL SWITCH
BLK
G200
(LEFT KICK PANEL)
TRACTION ON/OFF
SERIAL DATA
BODY CONTROL MODULE (MOUNTED ON TOE BOARD)
STAR CONNECTOR 1 (IN I/P HARNESS)
S206
DATA LINK CONNECTOR (UNDER DASH BELOW STEERING COLUMN)
(I/P HARN, 6.5 CM FROM BODY CONTROL MODULE)
ELECTRONIC BRAKE TRACTION CONTROL MODULE (EBTCM) (BEHIND CENTER OF REAR AXLE)
BRAKE PRESSURE MODULATOR VALVE (BPMV)
RIGHT REAR WHEEL SPEED SENSOR
LEFT REAR WHEEL SPEED SENSOR
RIGHT FRONT WHEEL SPEED SENSOR
LEFT FRONT WHEEL SPEED SENSOR
116018

Fig. 3: Anti-Lock Brake/Traction Control System Wiring Diagram (1999 Corvette w/o Active Handling)