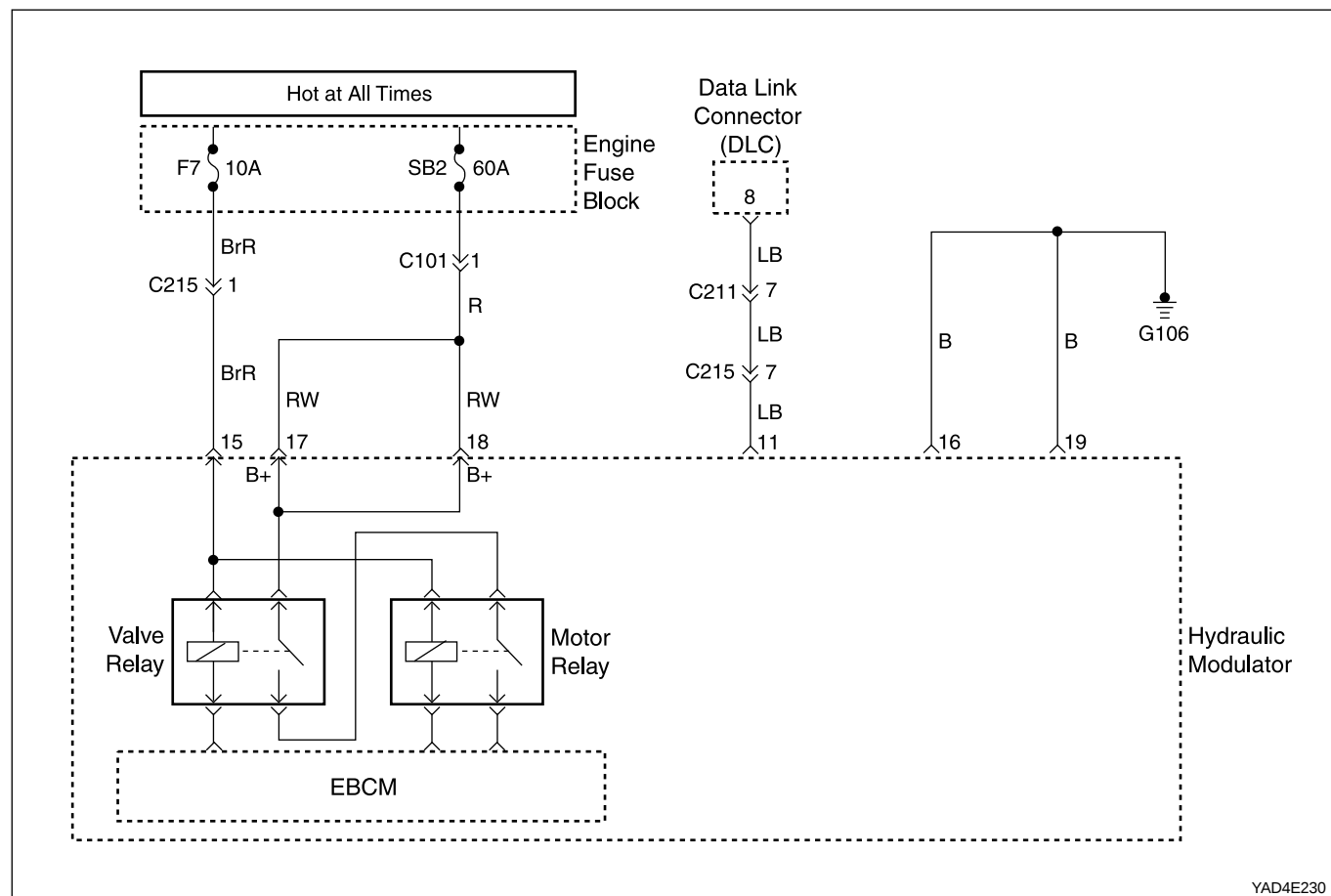




YAD4E230

DIAGNOSTIC TROUBLE CODED (DTC) 141/146 - LEFT REAR PRIME LINE AND TRACTION CONTROL SYSTEM (TCS) PILOT VALVE FAULT

Circuit Description

The solenoid valve coil circuits are supplied with power from the battery when the valve relay is energized. Switched ground is provided by the electronic brake control module (EBCM) to each coil.

Diagnosis

This procedure checks whether the left rear TCS valves are functioning.

Cause(s)

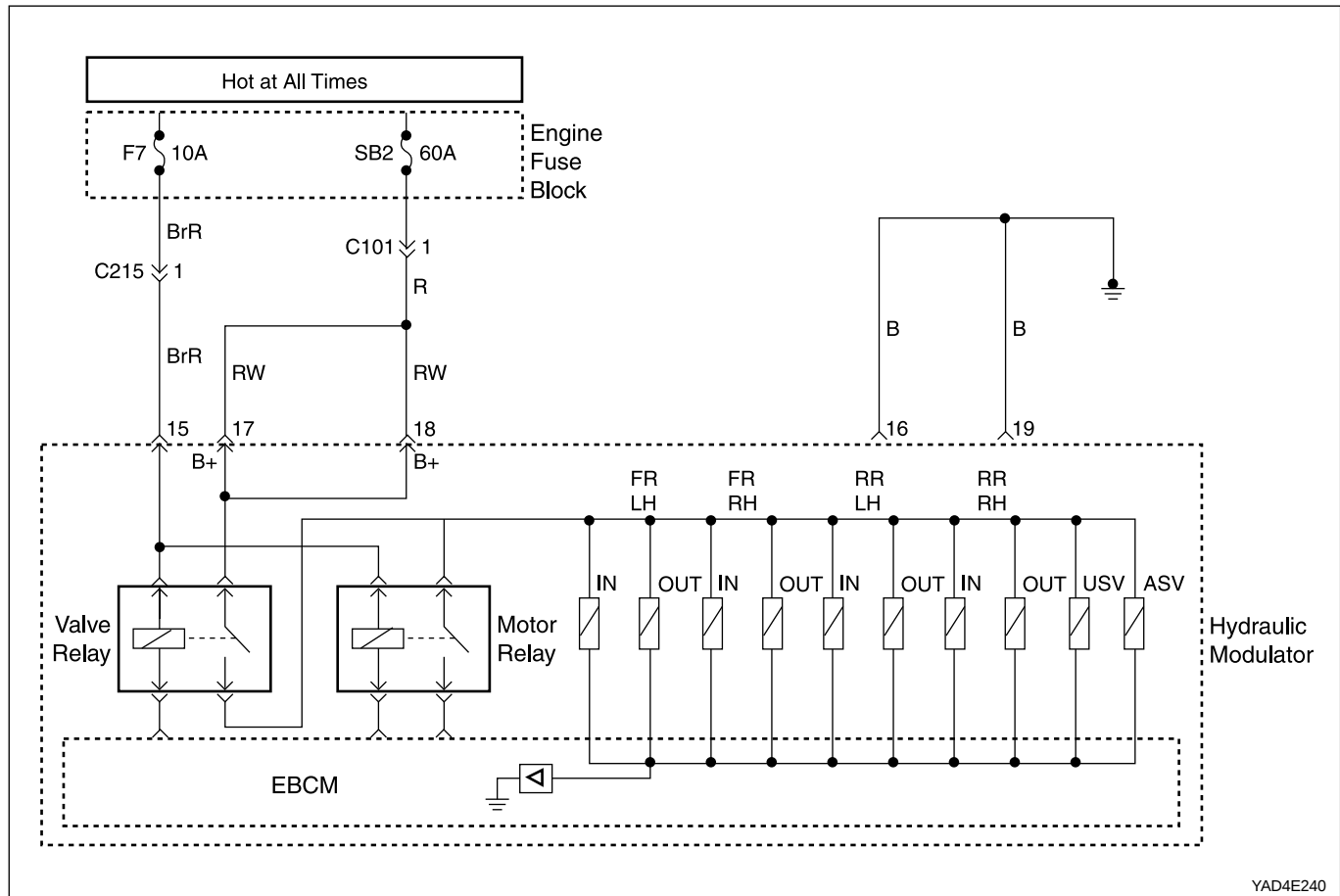
- A solenoid coil is open or shorted.

Action Taken When the DTC Sets

Antilock brake system (ABS) is disabled, and the ABS warning lamp is turned ON for the remainder of the ignition cycle. If the failure is intermittent, the EBCM will enable the system at the next ignition cycle and set a history DTC.

DTC 141/146 - Left Rear Prime Line and TCS Pilot Valve Fault

Step	Action	Value	Yes	No
1	1. Raise and suitably support the vehicle at the corner being tested. 2. Turn the ignition to ON. Important: Do not step on the brake pedal at any time during this test. 3. Install the scan tool to the data link connector (DLC). 4. Select the TCS function and "Wheel rear left" to begin the solenoid tests at that wheel. This will test both the prime and pilot valves. 5. When the scan tool indicates a pressure increase, attempt to rotate the wheel. Can the wheel be rotated?	-	Go to Step 6	Go to Step 2
2	When the scan tool indicates that the prime valve was turned OFF, attempt to rotate the wheel again. Can the wheel be rotated now?	-	Go to Step 6	Go to Step 3
3	When the scan tool indicates that the pilot valve and the pump motor were switched OFF, attempt to rotate the wheel again. Can the wheel be rotated?	-	Go to Step 4	Go to Step 6
4	1. Clear all DTCs. 2. Road test the vehicle. Does the DTC set again?	-	Go to Step 6	Go to Step 5
5	1. Check the wiring harness and connector terminals for an intermittent problem. 2. Repair any problem found. Is the repair complete?	-	System OK	-
6	Replace the ABS unit. Is the repair complete?	-	System OK	-



DIAGNOSTIC TROUBLE CODE (DTC) 121 - VALVE RELAY CIRCUIT FAULT

Circuit Description

When the ABS is active, the valve relay provides voltage to actuate the solenoid valves. The valves do not use this voltage unless the ABS control module provides the ground for each solenoid coil.

DTC 12 will set if the valve relay voltage is low or if the relay supply line is at 12 volts when the ABS control module is not requesting it. This DTC will also set if the ABS control module detects three or more solenoid valve circuits are open or shorted during the self-test.

Diagnosis

This procedure checks whether there is a poor ground connection for the electronic brake control module (EBCM).

Cause(s)

- A connector terminal is corroded.
- The wiring harness is damaged.
- The ground terminal is not conducting properly.
- The valve relay is defective.
- The EBCM is defective.

Action Taken When the DTC Sets

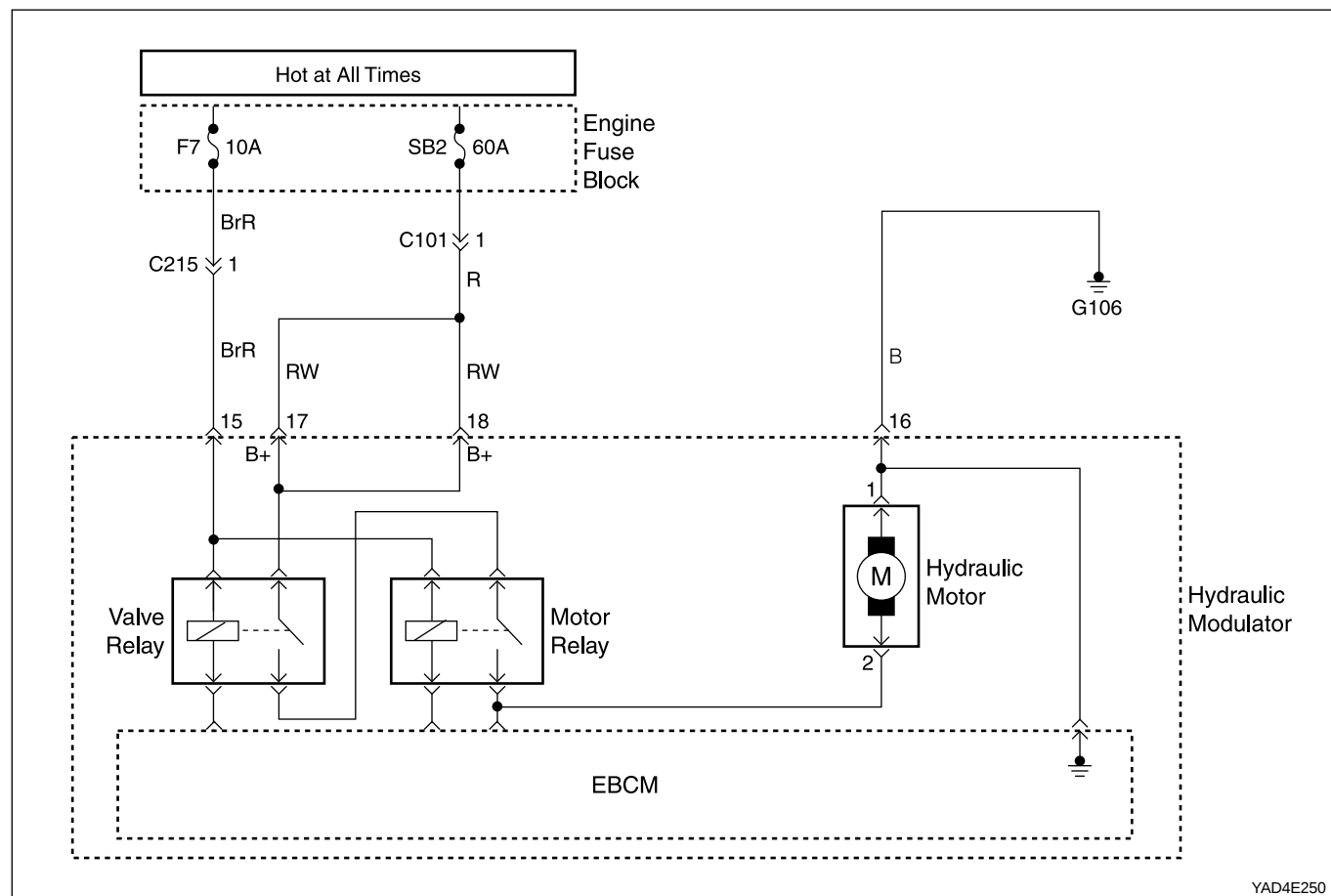
ABS/TCS is disabled, and the ABS warning lamp is turned ON for the remainder of the ignition cycle. If the failure is intermittent, the control module will enable the system at the next ignition cycle and set a history DTC 12.

Diagnostic Aids

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

DTC 121 - Valve Relay Circuit Fault

Step	Action	Value	Yes	No
1	1. Use a scan tool to clear all DTCs. 2. Road test the vehicle. Does DTC 121 set again?	-	Go to Step 3	Go to Step 2
2	1. Check all system wiring harness connectors and terminals, especially the electronic brake control module (EBCM), for any problem that could cause an intermittent condition. 2. Repair any intermittent problem found. Is the repair complete?	-	System OK	-
3	Check fuse SB2. Is fuse SB2 blown?	-	Go to Step 4	Go to Step 5
4	1. Check for a short circuit and repair it, if necessary. 2. Replace fuse SB2. Is the repair complete?	-	System OK	-
5	1. Disconnect the valve relay. 2. Check the voltage between the valve relay connector terminal 15 and ground of EBCM. Is the voltage equal to the specified value?	11 - 14 V	Go to Step 7	Go to Step 6
6	Repair the open circuit between the valve relay connector terminal 15 and terminal SB2 of EBCM. Is the repair complete?	-	System OK	-
7	Replace the hydraulic modulator. Is the repair complete?	-	System OK	-



DIAGNOSTIC TROUBLE CODE (DTC) 110 - RETURN PUMP MOTOR CIRCUIT FAULT

Circuit Description

When the electronic brake control module (EBCM) grounds the pump motor relay, it closes and provides battery voltage to the pump motor. The EBCM senses the voltage applied to the pump motor verify motor operation.

Diagnosis

This DTC sets when the EBCM detects B+ without motor relay activation or if the EBCM does not detect B+ after motor relay activation.

Cause

- There is a faulty terminal in the pump motor connector.
- There is faulty terminal in EBCM connector.
- There is high resistance in the chassis ground.
- The EBCM defective.
- There is a problem in the wiring from the pump motor connector to the motor.

Action Taken When the DTC Sets

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

Test Description

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

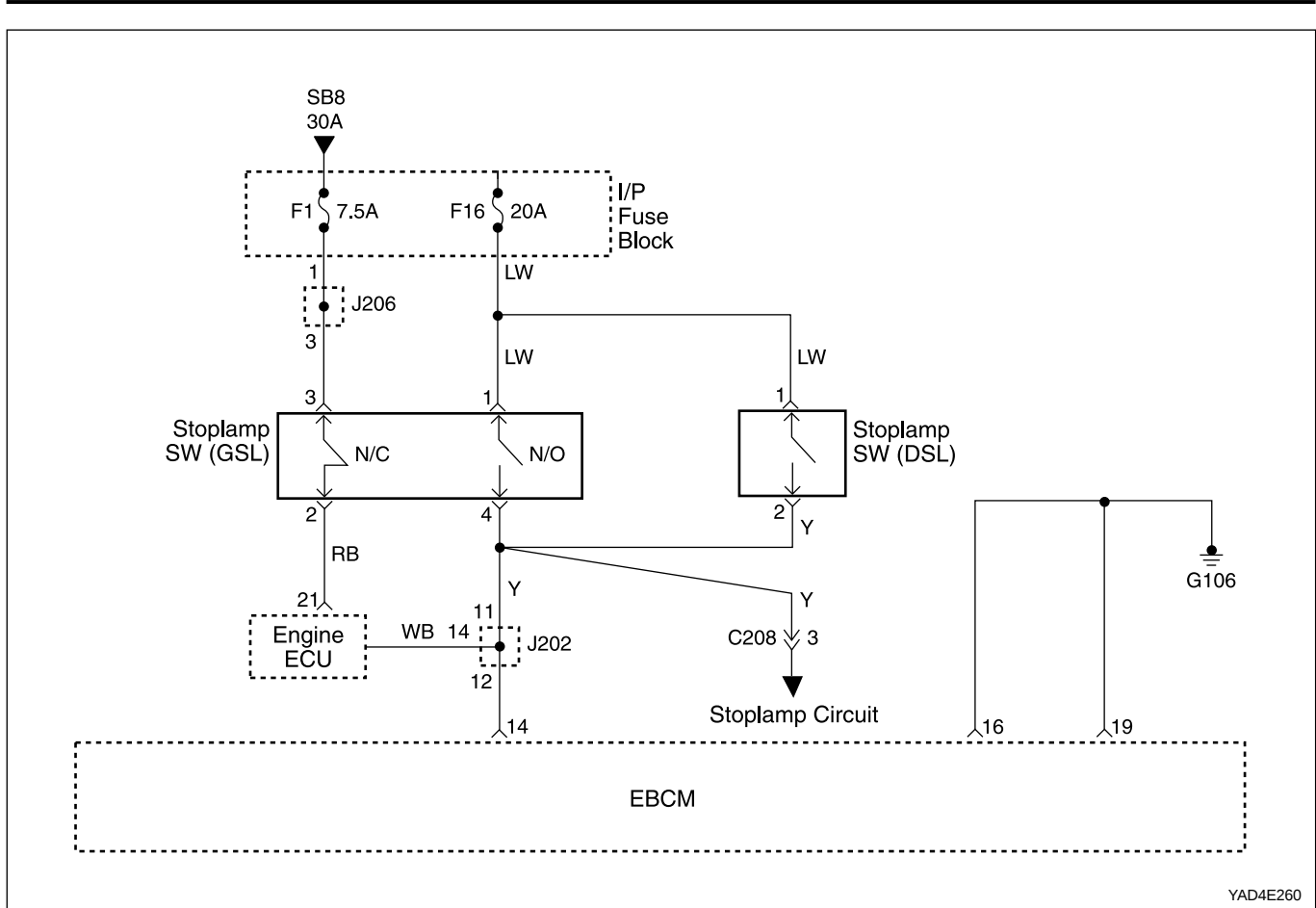
2. This step checks for poor connection.
5. This step checks for the motor relay.
13. This step checks for the hydraulic modulator.

Diagnostic Aids

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

DTC 110 - Pump Motor or Pump Motor Relay Fault

Step	Action	Value	Yes	No
1	1. Use a scan tool to clear all DTCs. 2. Road test the vehicle. Does DTC 110 set again?	-	Go to Step 3	Go to Step 2
2	1. Check all system wiring harness connectors and terminals, especially the electronic brake control module (EBCM), for any problem that could cause an intermittent condition. 2. Repair any intermittent problem found. Is the repair complete?	-	System OK	-
3	Check fuse SB2. Is fuse SB2 blown?	-	Go to Step 4	Go to Step 5
4	1. Check for a short circuit and repair it, if necessary. 2. Replace fuse SB2. Is the repair complete?	-	System OK	-
5	1. Disconnect the motor relay. 2. Check the resistance between the motor relay connector terminal 17 and terminal 18 of EBCM. Is the resistance equal to the specified value?	11 - 14 V	Go to Step 7	Go to Step 6
6	Repair the open circuit between the motor relay connector terminal 17 and fuse SB2 of EBCM. Is the repair complete?	-	System OK	-
7	1. Turn the ignition to ON. 2. Check the voltage between the motor relay connector terminal 15 and ground of EBCM. Is the voltage equal to the specified value?	11 - 14 V	Go to Step 9	Go to Step 8
8	1. Repair the open circuit between the motor relay connector terminal 87 and terminal 14 of hydraulic modulator. 2. Road test the vehicle Does DTC 110 clear?	-	System OK	Go to Step 9
9	1. Replace the hydraulic modulator/EBCM. 2. Road test the vehicle Does DTC 110 clear?	-	System OK	-



Inspect the wiring and the connectors carefully and thoroughly. Failure to do so could result in misdiagnosis, causing part replacement with the reappearance of the malfunction.

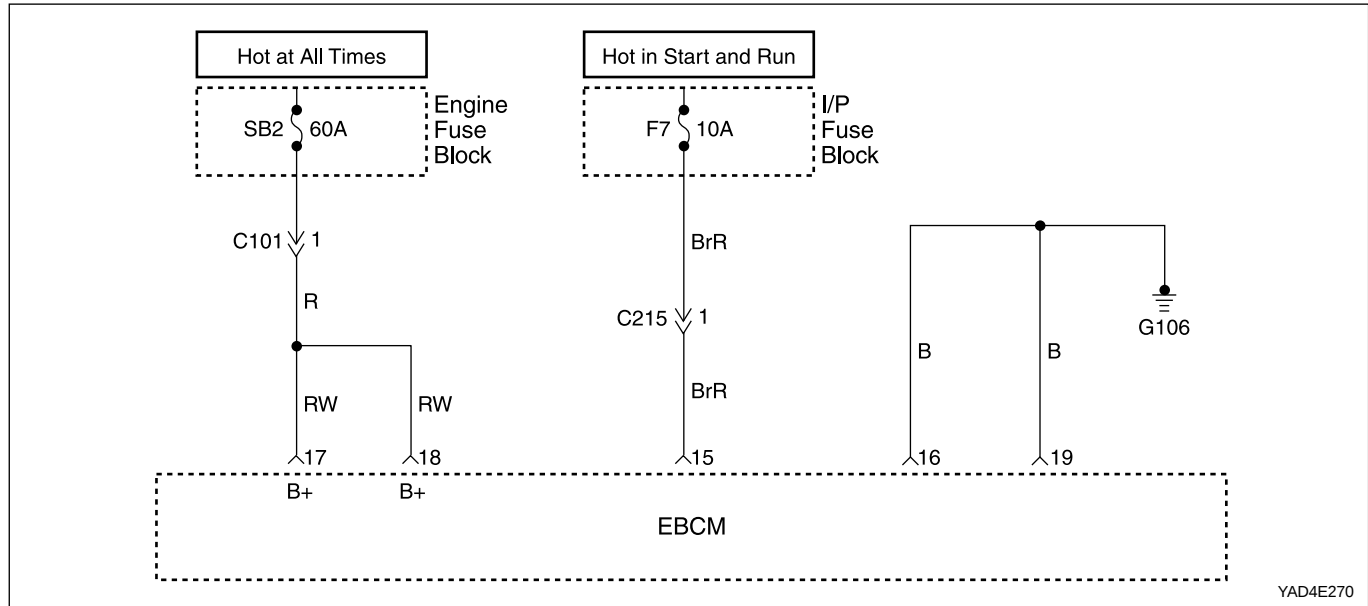
DTC 161 - Stoplamp Switch Fault

Step	Action	Value	Yes	No
1	Observe the stoplamps when the brakes are applied. Do the stoplamps turn on?	-	Go to Step 12	Go to Step 2
2	Check fuse SB8. Is fuse SB8 blown?	-	Go to Step 3	Go to Step 4
3	1. Check for a short circuit and repair it, if necessary. 2. Replace fuse SB8. Is the repair complete?	-	System OK	-
4	Check the voltage at fuse SB8. Is the voltage equal to the specified value?	11 - 14 V	Go to Step 6	Go to Step 5
5	Repair the power supply circuit for fuse SB8. Is the repair complete?	-	System OK	-
6	Check the voltage at fuse F16. Is fuse F16 blown?	-	Go to Step 7	Go to Step 8
7	1. Check for a short circuit between terminal SB8 and fuse F16 in the I/P fuse block and repair it, if necessary. 2. Replace fuse F16. Is the repair complete?	-	System OK	-
8	Check the voltage at terminal 1 of the stoplamps switch. Is the voltage equal to the specified value?	11 - 14 V	Go to Step 10	Go to Step 9
9	Repair the open circuit between fuse F16 and terminal 1 of the stoplamp switch. Is the repair complete?	-	System OK	-
10	With the brakes applied, check the voltage at terminal 2 or 4 of the stoplamp switch. Is the voltage equal to the specified value?	11 - 14 V	Go to Step 12	Go to Step 11
11	Replace the stoplamp switch. Is the repair complete?	-	System OK	-
12	1. Disconnect the electronic brake control module (EBCM) connector. 2. Visually inspect the EBCM and its connector for damaged pins or terminals. Are there any damaged pins or terminals?	-	Go to Step 13	Go to Step 14
13	Repair the damaged pins or terminals. Is the repair complete?	-	System OK	-
14	1. With the EBCM connector disconnected, applied the brake. 2. Check the voltage at terminal 14 of the EBCM. Is the voltage equal to the specified value?	11 - 14 V	Go to Step 16	Go to Step 15
15	Repair the open circuit between 1 of the stoplamp switch and terminal 14 of the EBCM connector. Is the repair complete?	-	System OK	-
16	With the EBCM disconnected, use an ohmmeter to measure the resistance between ground and terminal 16 of the EBCM connector. Is the resistance equal to the specified value?	$\approx 0 \Omega$	Go to Step 18	Go to Step 17

DTC 161 - Stoplamp Switch Fault (Cont'd)

Step	Action	Value	Yes	No
17	Repair the open circuit between ground and terminal 14 of the EBCM. Is the repair complete?	-	System OK	-
18	Replace the ABS unit. Is the repair complete?	-	System OK	-

BLANK



DIAGNOSTIC TROUBLE CODE (DTC) 800 - LOW VOLTAGE FAULT

Circuit Description

Proper operation of the electronic brake control module (EBCM) requires a certain minimum voltage. The EBCM monitors the ignition feed circuit to determine if the voltage falls below a minimum level.

Diagnosis

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

Cause

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

Action Taken When the DTC Sets

ABS action is disabled during the period of low voltage, and the ABS warning lamp is ON for the remainder of the ignition cycle. If the failure is intermittent, the EBCM will enable the system at the next ignition cycle and set a history DTC 800.

Test Description

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

1. This step determines whether there is voltage at the battery and at the high current source.
7. This step checks for voltage at the ignition 1 source.
15. This step begins the check for voltage at the EBCM end of the ABS harness.

Diagnostic Aids

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

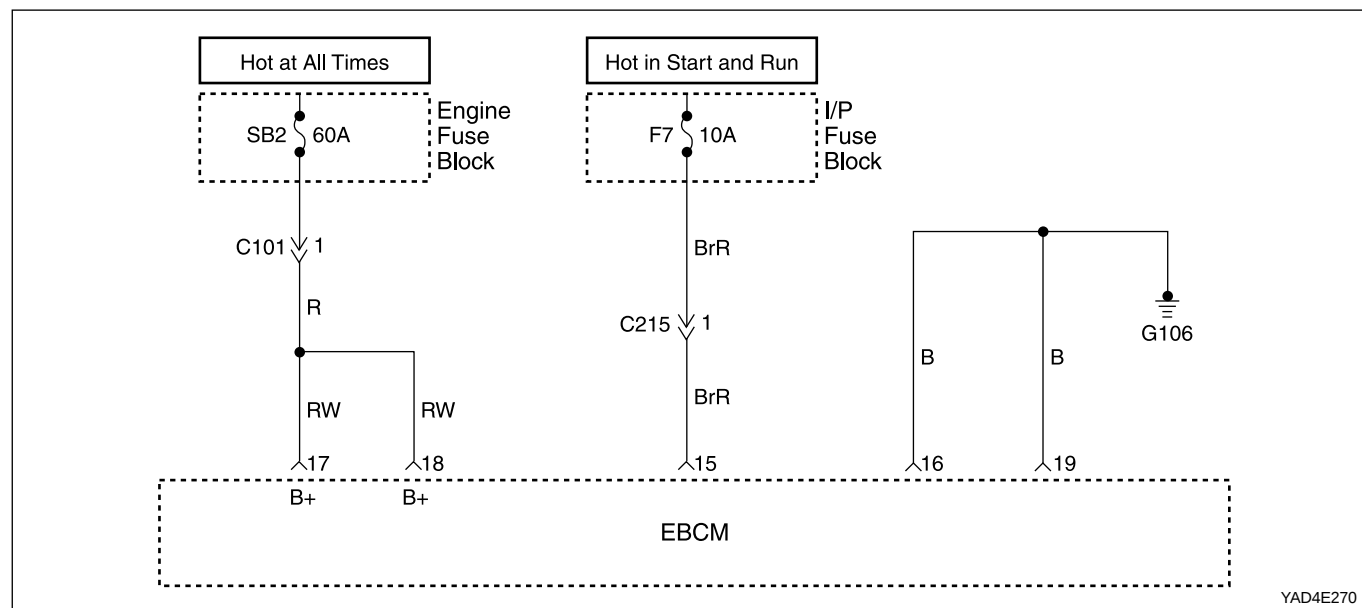
DTC 800 - Low Voltage Fault

Step	Action	Value	Yes	No
1	Check the voltage at the battery. Is the voltage within the specified value?	11 - 14 V	Go to Step 3	Go to Step 2
2	Charge or replace the battery, as required. Is the repair complete?	-	System OK	-
3	Check fuse SB2 in the engine fuse block. Is the fuse blown?	-	Go to Step 4	Go to Step 7
4	1. Replace fuse SB2. 2. Turn the ignition to ON. Does the fuse blow again?	-	Go to Step 5	Go to Step 6
5	1. Turn the ignition to OFF. 2. Trace the wires in the ABS wiring harness from terminal SB2 at the engine fuse block to the terminal 17, 18 in EBCM. 3. Repair any short circuit found along this path. Is the repair complete?	-	System OK	-
6	1. Turn the ignition to OFF. 2. Install the scan tool. 3. Clear all DTCs. 4. Road test the vehicle. Does DTC 800 reset?	-	System OK	-
7	Check terminal 1 in the C101 connector. Is the connection good?	-	Go to Step 8	Go to Step 10
8	Repair the terminal. Is the repair complete?	-	System OK	Go to Step 9
9	1. Turn the ignition to OFF. 2. Install the scan tool. 3. Clear all DTCs. 4. Road test the vehicle. Does DTC 800 reset?	-	System OK	-
10	Check fuse F7 in the I/P fuse block. Is fuse F7 blown?	-	Go to Step 11	Go to Step 14
11	1. Replace fuse F7. 2. Turn the ignition to ON. Does fuse F7 blow again?	-	Go to Step 12	Go to Step 13
12	1. Turn the ignition to OFF. 2. Trace the WHT/RED wires in the ABS wiring harness from fuse F7 to terminal 15 of the EBCM connector. 3. Repair any short circuit found along this path. Is the repair complete?	-	System OK	-
13	1. Turn the ignition to OFF 2. Install the scan tool. 3. Clear all DTCs. 4. Road test the vehicle. Does DTC 800 reset?	-	System OK	-

DTC 800 - Low Voltage Fault (Cont'd)

Step	Action	Value	Yes	No
14	1. Disconnect the connector from the EBCM. 2. Turn the ignition to ON. 3. Check the voltage between ground and terminal 17, and between ground and terminal 18. Is the voltage within the specified value?	11 - 14 V	Go to Step 16	-
15	1. Turn the ignition to OFF. 2. Trace the WHT/RED wires between terminals 17 and 18 of the EBCM connector to fuse F7 and SB2 in the I/P fuse block. 3. Repair the open in this circuit. Is the repair complete?	-	System OK	-
16	1. Turn the ignition ON. 2. Check the voltage at fuse SB2. Is the voltage within the specified value?	11 - 14 V	Go to Step 18	-
17	Repair the power supply circuit for fuse SB2. Is the repair complete?	-	System OK	Go to Step 17
18	1. Turn the ignition to OFF. 2. Check the resistance between ground and terminals 16 and 19 of the ABS harness EBCM connector. Is the resistance equal to the specified value?	0 Ω	Go to Step 19	-
19	Examine terminals 15, 16, 17, 18 and 19 of the EBCM connector. Is there a defective terminal?	-	Go to Step 20	Go to Step 21
20	Repair the defective terminal or replace the connector or wiring harness, as required. Is the repair complete?	-	System OK	Go to Step 22
21	Repair the defective ground connection. Is the repair complete?	-	System OK	-
22	1. Install the scan tool. 2. Clear all DTCs. 3. Road test the vehicle. Does DTC 800 set again?	-	Go to Step 23	Go to Step 24
23	Replace the ABS unit. Is the repair complete?	-	System OK	-
24	1. Examine the wiring harness and connectors for causes of intermittent problems. 2. Repair any intermittent problem found. Is the repair complete?	-	System OK	-

BLANK



YAD4E270

DIAGNOSTIC TROUBLE CODE (DTC) 550 - EBCM INTERNAL FAULT

Circuit Description

The ABS control module performs various diagnostic checks on itself. If it finds a problem, it sets DTC 550.

Diagnosis

This procedure checks whether there is a poor ground connection for the electronic brake control module (EBCM).

Cause

- A connector terminal is corroded.
- The EBCM is malfunctioning.

Action Taken When the DTC Sets

ABS is disabled, and the ABS warning lamp is turned ON. If the failure is intermittent, the control module will enable the system at the next ignition cycle and will store a history DTC 550.

Test Description

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

3. This step begins the testing for a poor voltage or ground connection.

Diagnostic Aids

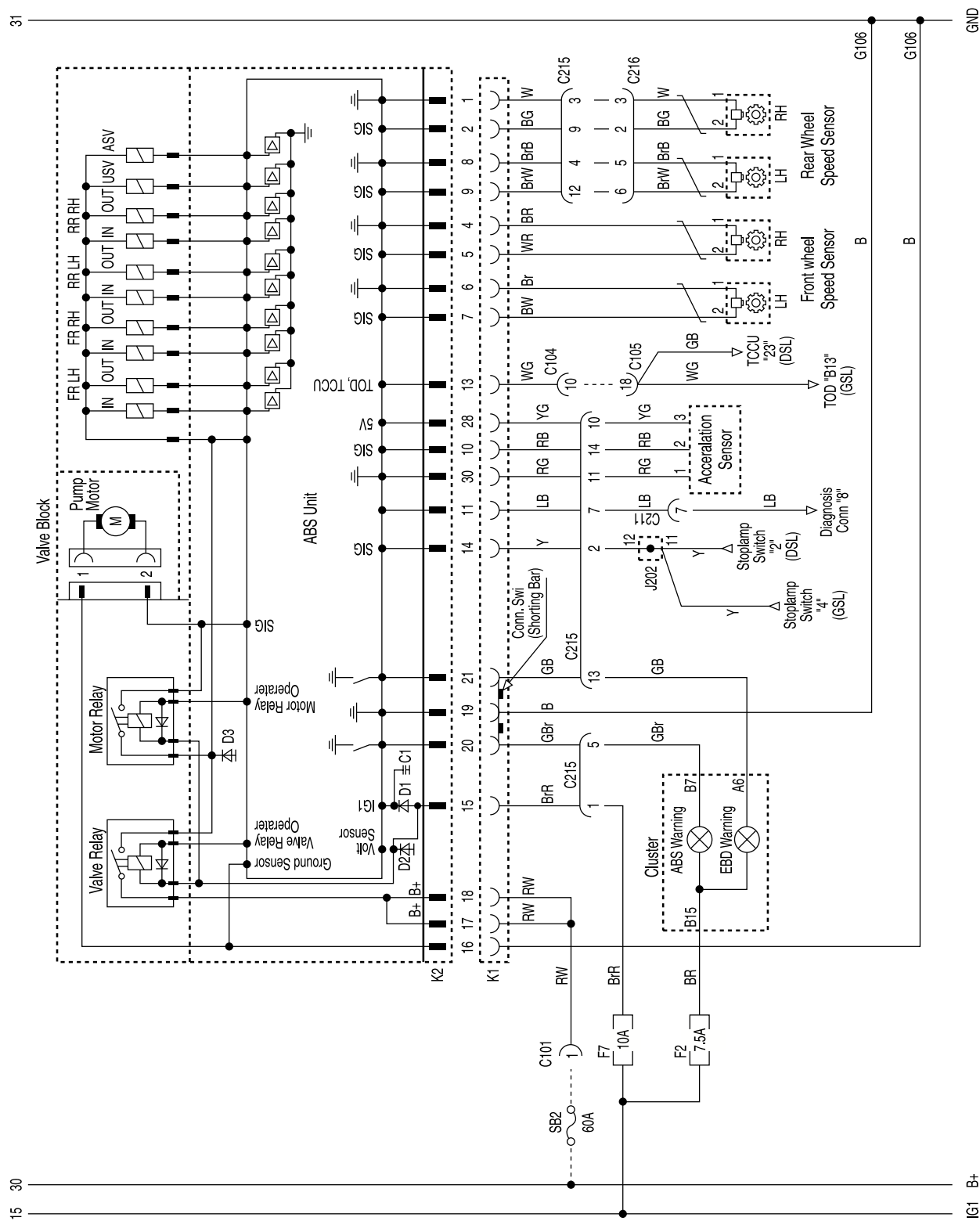
It is very important to perform a thorough inspection of the wiring and the connectors. Failure to inspect the wiring and the connectors carefully and completely may result in misdiagnosis, causing part replacement with the reappearance of the malfunction.

DTC 550 - EBCM Internal Fault

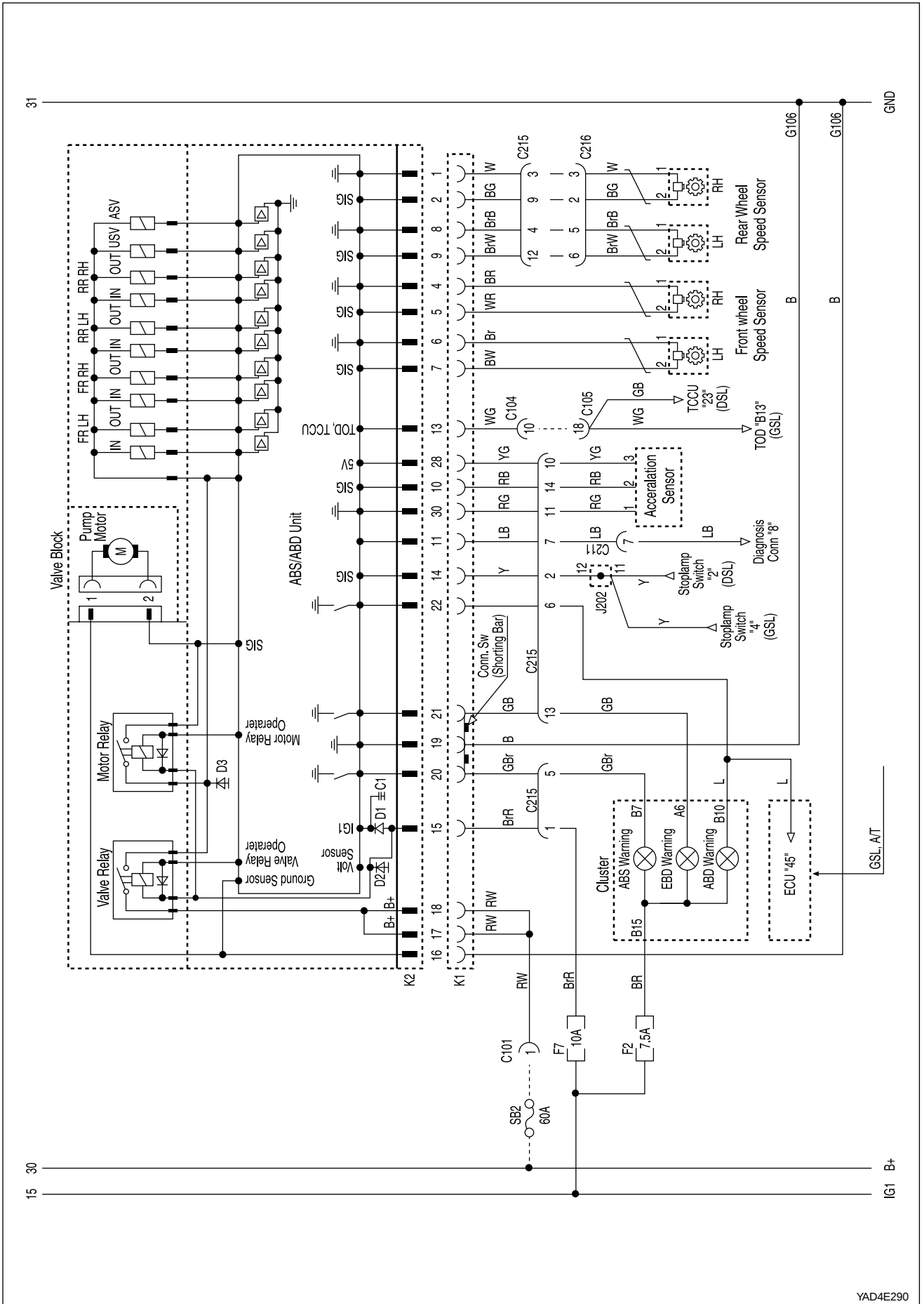
Step	Action	Value	Yes	No
1	Use the scan tool to determine if any other DTCs are set. Are other DTCs set?	-	Go to the applicable Diagnostic Table	Go to Step 2
2	Clear all DTCs and road test the vehicle. Does DTC 550 set again?	-	Go to Step 4	Go to Step 3
3	1. Check all wiring harness connectors and terminals, especially those at the EBCM, for any condition that could cause an intermittent. 2. Repair any problems found. Is the repair complete?	-	System OK	-
4	1. Turn the ignition to OFF. 2. Disconnect the EBCM connector. 3. Turn the ignition to ON. 4. Measure the voltage between ground and terminals 15, 17 and 18 of the EBCM harness connector. Is the voltage equal to the specified value?	11 - 14 V	Go to Step 6	Go to Step 5
5	1. Check the voltage supply and the ground connections to the EBCM. 2. Repair any open or high resistance found. Is the repair complete?	-	System OK	-
6	Check the EBCM connector for any damaged terminals. Are there any problems?	-	Go to Step 7	Go to Step 8
7	Repair any connector problem found. Is the repair complete?	-	System OK	-
8	Clear all DTCs and road test the vehicle. Does DTC 550 set again?	-	Go to Step 9	System OK
9	Replace the EBCM. Is the repair complete?	-	System OK	-

SCHEMATIC AND ROUTING DIAGRAMS

ABS 5.3 CIRCUIT

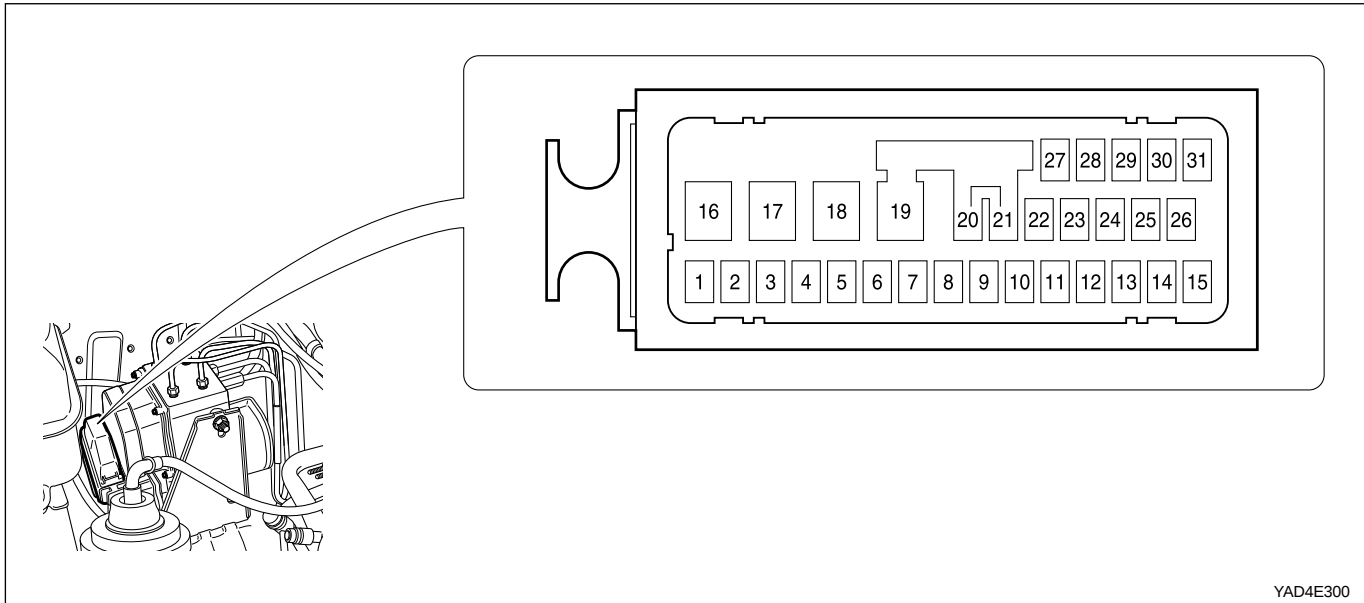


ABD 5.3 CIRCUIT



CONNECTOR END VIEWS

EBCM (HYDRAULIC MODULATOR/UNIT INTEGRATED)



YAD4E300

Pin	Wire Color	Circuit
1	WHT	Right Rear Speed Sensor Ground
2	BLK/GRN	Right Rear Speed Sensor
3	-	Not Used
4	BLK/RED	Right Front Speed Sensor Ground
5	WHT/RED	Right Front Speed Sensor
6	BRN	Left Front Speed Sensor Ground
7	BLK/WHT	Left Front Speed Sensor
8	BRN/BLK	Left Rear Speed Sensor Ground
9	BRN/WHT	Left Rear Speed Sensor
10	RED/BLK	Acceleration Sensor Signal
11	BLU/BLK	Data Link Connector
12	-	Not Used
13	WHT/GRN	TOD
14	YEL	Stoplamp SW
15	BRN/RED	Ignition
16	BLK	Ground

Pin	Wire Color	Circuit
17	RED/WHT	Battery
18	RED/WHT	Battery
19	BLK	Ground
20	GRN/BRN	ABS Warning Lamp
21	GRN/BLK	EBD Warning Lamp
22	BLU	TCS Warning Lamp
23	YEL/GRN	Acceleration Sensor Supply Voltage (5V)
24	-	Not Used
25	-	Not Used
26	-	Not Used
27	-	Not Used
28	RED/GRN	Acceleration Sensor Ground
29	-	Not Used
30	-	Not Used
31	-	Not Used

REPAIR INSTRUCTIONS

ON-VEHICLE SERVICE

SERVICE PRECAUTIONS

Caution: *Brake Fluid may irritate eyes and skin. In case of contact, take the following actions:*

- Eye contact - rinse thoroughly with water.
- Skin contact - wash with soap and water.
- Ingestion - consult a physician immediately.

Caution : *To help avoid personal injury due to poor braking. DO NOT Tap into the vehicle's brake system to operate a trailer brake system.*

Notice : When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound will be called out. The correct torque values must be used when installing fasteners that require them. If the above procedures are not followed, parts or system damage could result.

Notice : Use only DOT-3 equivalent hydraulic brake fluid. The use of DOT-5 (silicone) brake fluid is not recommended. Reduced brake performance or durability may result.

Notice : Avoid spilling brake fluid on any the vehicle's painted surfaces, wiring, cables or electrical connectors. Brake fluid will damage paint and electrical connections. If any fluid is spilled on the vehicle, flush the area with water to lessen the damage.

Electronic System Service Precautions

Take care to avoid electronic brake control module (EBCM) circuit overloading. In testing for opens or shorts, do not ground or apply voltage to any circuit unless instructed to do so by the diagnostic procedure.

Test circuits only with a high-impedance multi-meter. Never remove or apply power to any control module with the ignition switch in the ON position. Always turn the ignition to the OFF position before removing or connecting battery cables, fuses or connectors.

General Service Precautions

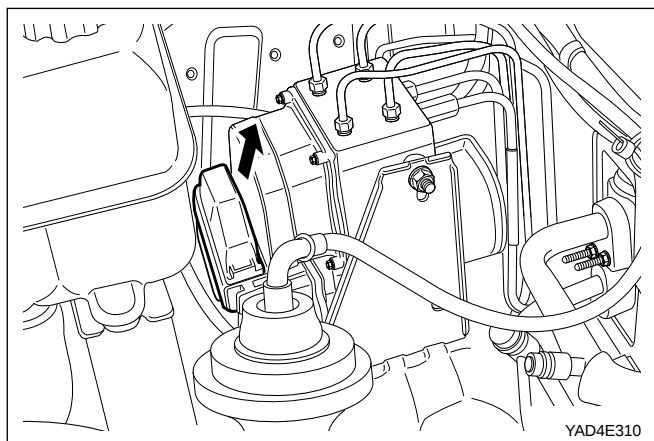
Disconnect the EBCM connector before performing any vehicle welding work using an electric arc welder.

Do not attempt to disassemble any component designated as nonserviceable. The hydraulic modulator and the EBCM can be separated from each other and replaced separately but cannot be serviced. They have no replaceable parts, and there is no replaceable parts, and there is no access to the components they contain.

Bleeding System

Replacement modulators are shipped already filled and bled. In normal procedures requiring removal of the modulator, such as to replace the EBCM, air will not enter the modulator, and normal bleeding will be all that is needed.

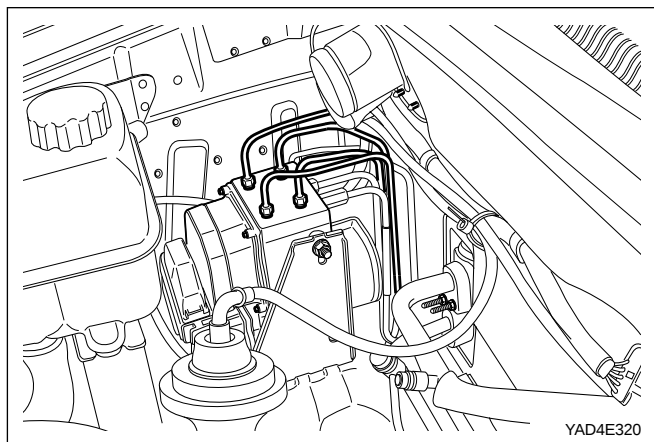
If air enters the hydraulic modulator, or if an unfilled modulator is installed, use the brake bleeding program in the scan tool to bleed the modulator. Manual bleeding of the hydraulic modulator is not possible.



HYDRAULIC MODULATOR/EBCM ASSEMBLY

Removal & Installation Procedure

1. Disconnect the negative battery cable.
2. Disconnect the ABS wiring harness connector from its socket on the EBCM.
3. Cover the connector and the socket with shop cloths to protect them from brake fluid.

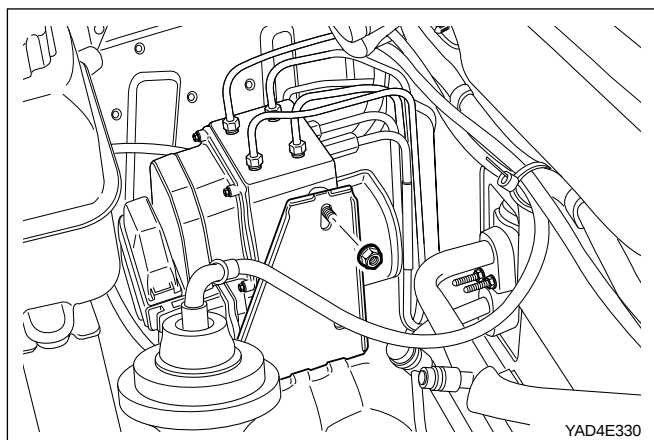


Notice: Take care not to allow air into the hydraulic modulator. If air gets into the hydraulic unit, it will require a bleeding procedure using a scan tool programmed for the ABS 5.3 system. As long as no air enters the hydraulic unit, a simple bleeding procedure is all the system will require.

4. Remove the brake pipes from the hydraulic modulator.

Installation Notice

Tightening Torque	14 N•m (124 lb-in)
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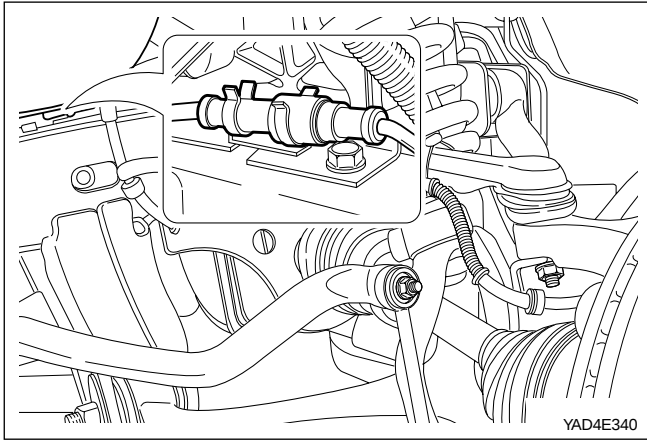


5. Loosen the mounting nuts on the hydraulic unit.
6. Move the brake pipes aside far enough to allow for lifting the ABS 5.3 unit out of the mounting bracket.
7. Cap the brake pipes.

Installation Notice

Tightening Torque	6 N•m (53 lb-in)
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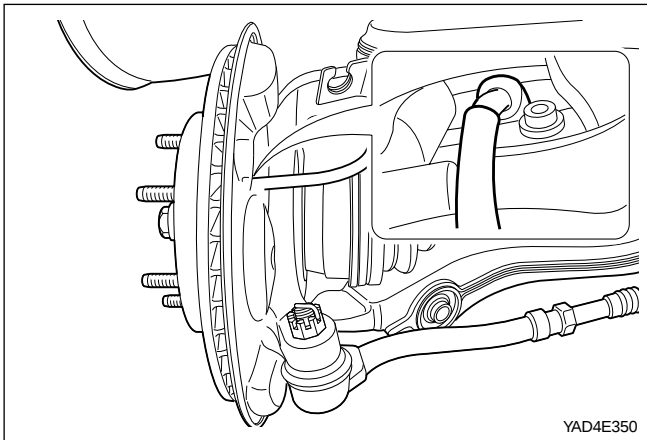
- Bleed the hydraulic system.
8. Installation should follow the removal procedure in the reverse order.



FRONT WHEEL SPEED SENSOR

Removal & Installation Procedure

1. Disconnect the negative battery cable.
2. Disconnect the front wheel speed sensor electrical connector.

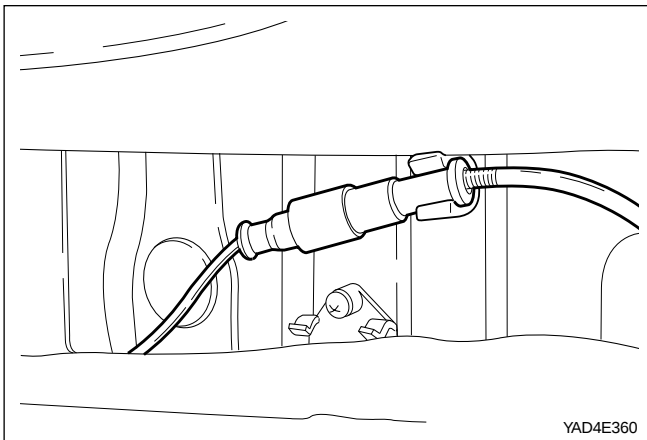


3. Raise and suitably support the vehicle.
4. Turn the steering wheel to expose the front wheel speed sensor. It is located at the rear of the steering knuckle near tie rod end.
5. Remove the bolt and the front wheel speed sensor from the steering knuckle.

Installation Notice

Tightening Torque	7 N•m (62 lb-in)
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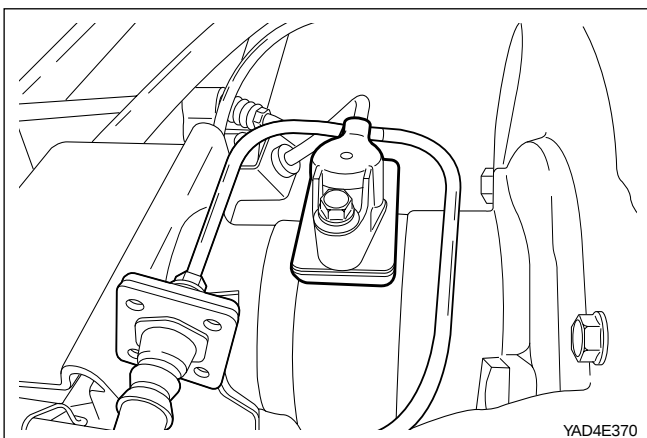
6. Installation should follow the removal procedure in the reverse order.



REAR WHEEL SPEED SENSOR

Removal & Installation Procedure

1. Disconnect the negative battery cable.
2. Disconnect the rear wheel speed sensor electrical connector.



3. Raise and suitably support the vehicle.
4. Remove the rear wheel speed sensor.

Installation Notice

Tightening Torque	7 N•m (62 lb-in)
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5. Installation should follow the removal procedure in the reverse order.

ACCELERATION SENSOR

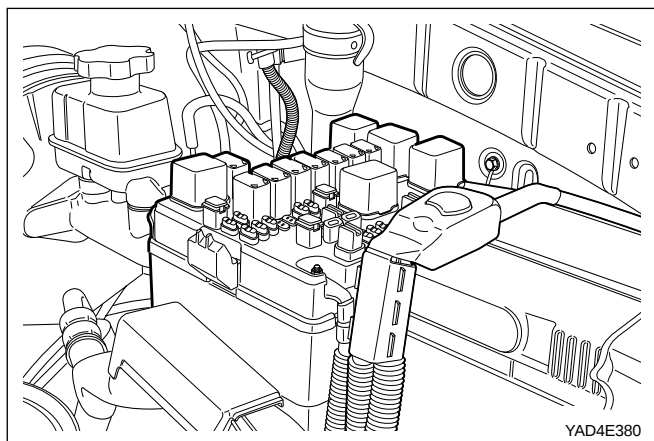
Removal & Installation Procedure

1. Disconnect the negative battery cable.
2. Disconnect the acceleration sensor connector.
3. Remove the acceleration sensor mounting bolts.

Installation Notice

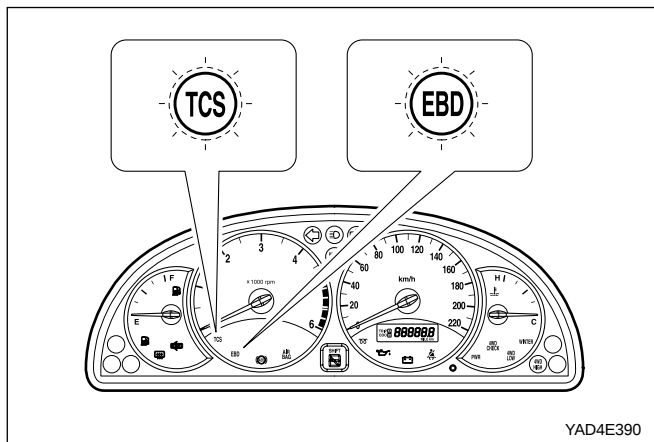
Tightening Torque	7 N•m (62 lb-in)
-------------------	------------------

4. Installation should follow the removal procedure in the reverse order.



SYSTEM FUSE

The ABS/TCS system fuse, SB2, is located in the engine fuse block. Counting from the battery toward the surge tank, it is the first system fuse in the row.



INDICATORS

The indicator lamps ABS and TCS are part of the instrument cluster.

UNIT REPAIR

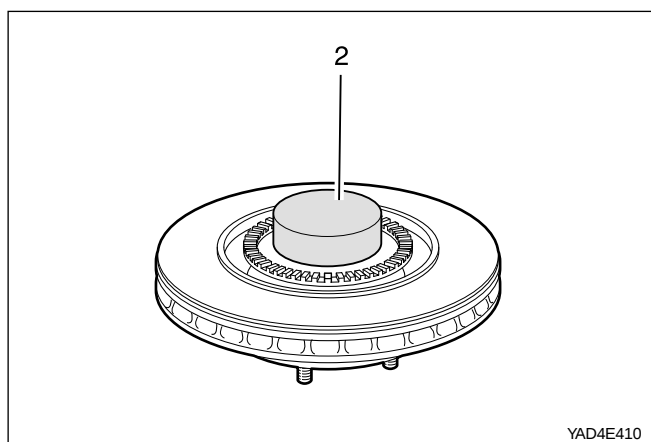
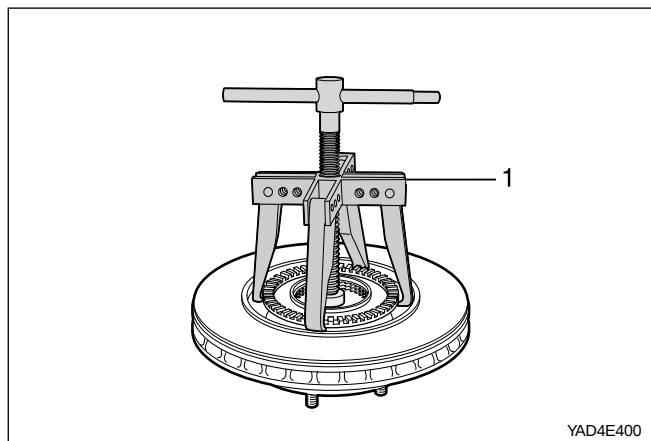
ABS FRONT TOOTH WHEEL

Tool Requires

661 589 16 33 00 ABS Tooth Wheel Puller

Removal Procedure

1. Remove the disc brake rotor. Refer to Front Disc Brakes Section.
2. Remove the ABS front toothed wheel using the ABS tooth wheel puller 661 589 16 33 00.

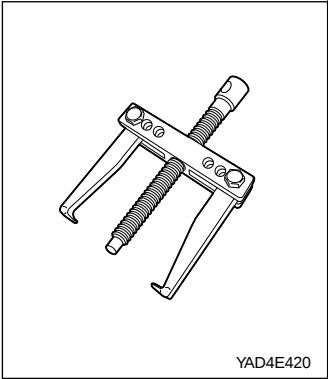


Installation Procedure

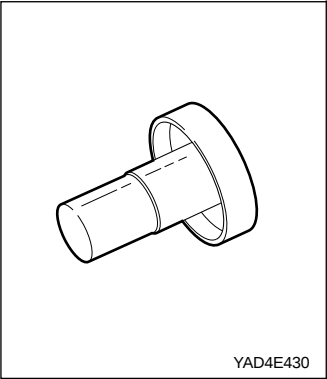
1. Install the ABS front toothed wheel using the ABS tooth wheel installer 661 589 17 33 00.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS TABLE



661 589 16 33 00
ABS Tooth Wheel Puller



661 589 17 33 00
ABS Tooth Wheel
Installer