

When the brake pedal is pressed, the stoplamp switch closes and a voltage is sent to the PCM. The PCM then sends a message over the High Speed Controller Area Network (HS-CAN) to the ABS module indicating that the brake pedal has been pressed. DTCs set in the ignition cycle can only be cleared by cycling the ignition off and on once the fault has been corrected.

- DTC C116A (ABS Pressure Transducer / Brake Switch Mismatch) — this DTC sets in every ignition cycle if, during normal operation, the stoplamp switch message does not match the HCU transducer, both signals have to agree about whether the brakes are being applied or not.
- DTC C1440 (Pressure Transducer Main/Primary Signal Faulted) — this DTC sets in every ignition cycle if the signal that the pressure transducer sends to the ABS module does not agree with the stoplamp switch position.

This pinpoint test is intended to diagnose the following:

- HCU
- ABS module

PINPOINT TEST G: DTCs C116A, C1440

NOTICE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step	Result / Action to Take
G1 MONITOR THE ABS MODULE BRAKE ON/OFF (BOO_ABS) PID <ul style="list-style-type: none"> • Connect the scan tool. • Ignition ON. • Enter the following diagnostic mode on the scan tool: DataLogger — ABS Module . • Press and release the brake pedal while monitoring the BOO_ABS PID. • Does the PID display ON with the brake pedal applied and OFF with the brake pedal released? 	Yes GO to G3 . No GO to G2 .
G2 MONITOR THE PCM BRAKE ON/OFF (BOO1) PID <ul style="list-style-type: none"> • Enter the following diagnostic mode on the scan tool: DataLogger — PCM . • Press and release the brake pedal while monitoring the BOO1 PID. • Does the PID display ON with the brake pedal applied and OFF with the brake pedal released? 	Yes REFER to Section 418-00 to continue diagnosis of the <u>HS-CAN</u> . No REFER to Section 417-01 to continue diagnosis of the stoplamp switch fault.
G3 MONITOR THE INITIAL (BRAKE PEDAL NOT APPLIED) BRAKE PRESSURE USING THE ABS MODULE BRAKE PRESSURE (BRAKPRES) PID <ul style="list-style-type: none"> • Enter the following diagnostic mode on the scan tool: DataLogger — ABS Module . • With the brake pedal not applied, record the pressure displayed by the BRAKPRES PID. • Is the initial brake pressure less than 275 kPa (40 psi) with the brake pedal not applied? 	Yes GO to G4 . No INSTALL a new <u>HCU</u> . REFER to Hydraulic Control Unit (HCU) in this section.

G4 MONITOR THE BRAKPRES PID WHILE APPLYING THE BRAKE PEDAL	
<ul style="list-style-type: none"> • Enter the following diagnostic mode on the scan tool: DataLogger — ABS Module . • Firmly press and release the brake pedal while monitoring the BRAKPRES PID. • Does the PID increase with firm pressure on the brake pedal and then decrease with the brake pedal released? 	<p>Yes The system is operating correctly at this time. TEST the system for normal operation.</p> <p>No INSTALL a new HCU. REFER to Hydraulic Control Unit (HCU) in this section.</p>

Pinpoint Test I: DTCs C109D, C109E and C109F

Refer to Wiring Diagrams Cell [42](#), Vehicle Dynamic Systems for schematic and connector information.

Normal Operation

The ABS module uses the vacuum sensor to determine if hydraulic pump intervention is necessary due to a severe loss of vacuum in the booster. The ABS module sends a 5-volt reference voltage to the sensor and the sensor compares the pressure in the booster to the ambient air pressure in the engine compartment and sends a varying voltage back to the ABS module based on the difference between the pressures. Normally, the pressure in the booster is much lower than ambient air pressure. As the pressure in the booster gets higher (closer to matching ambient air pressure), the lower the voltage sent back to the ABS module becomes.

- DTC C109D (Low Vacuum Condition Detected) — this DTC sets in continuous memory and every ignition cycle when the vacuum in the brake booster goes below a predetermined threshold and does not necessarily indicate a concern with the vacuum sensor, the related wiring or the ABS module. This DTC indicates a vacuum concern in the brake booster, engine and any related vacuum hoses/tubes. High altitude locations with low ambient air temperatures can cause a low vacuum condition to exist in the booster until the engine compartment warms up.
- DTC C109E (Vacuum Sensor Circuit Fault) — this DTC sets in continuous memory and every ignition cycle if during normal operation or the ABS module on-demand self-test, the ABS module detects an open circuit, a short to voltage or a short to ground on the vacuum sensor circuits or a failure of the vacuum sensor.
- DTC C109F (Vacuum Sensor Signal Fault) — this DTC sets in continuous memory and every ignition cycle if the vacuum sensor ambient air pressure inlet ports, or the vacuum sensor ports become restricted or clogged.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Vacuum sensor
- ABS module

PINPOINT TEST I: DTCs C109D, C109E AND C109F

NOTICE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step	Result / Action to Take