

## Starting System

### Inspection and Verification



**WARNING:**

**MAKE SURE THE VEHICLE IS IN NEUTRAL OR PARK FOR VEHICLES WITH AUTOMATIC TRANSMISSION, NEUTRAL FOR VEHICLES WITH MANUAL TRANSMISSION, AND APPLY THE PARKING BRAKE. FAILURE TO FOLLOW THIS INSTRUCTION MAY RESULT IN PERSONAL INJURY.**

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage, correct fitment, etc.

### Visual Inspection Chart

Mechanical	Electrical
<ul style="list-style-type: none"><li>• Starter Motor</li><li>• Flywheel Ring Gear</li><li>• Engine Seized</li></ul>	<ul style="list-style-type: none"><li>• Battery condition, state of charge</li><li>• Starter Motor</li><li>• Fuse 3 of the EMS fuse box</li><li>• High power protection module</li><li>• Starter relay</li><li>• Ignition switch</li><li>• Wiring harness(es)</li><li>• Damaged, loose or corroded connectors</li><li>• Body processor module (BPM)</li><li>• Engine Control Module (ECM)</li></ul>

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the concern is not visually evident, refer to the Diagnostic trouble code (DTC) index.



**CAUTION:**

**When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00. Failure to follow this instruction may result in damage to the vehicle.**

**NOTE:**

When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

**NOTE:**

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

### Symptom Chart

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Symptom (general)	Symptom (specific)	Possible source	Action
Non-Start	Engine does not crank	<ul style="list-style-type: none"> <li>• Engine siezed</li> <li>• Battery and/or cables</li> <li>• Inhibitor circuit</li> <li>• Starter motor</li> <li>• Starter relay</li> <li>• Ignition switch</li> <li>• ECM relay</li> <li>• Body processor module</li> </ul>	Check that the engine turns. Check the battery condition and state of charge. For starter motor and cable tests, Goto <<A>>
	Engine cranks too fast/slow	<ul style="list-style-type: none"> <li>• Battery and/or cables</li> <li>• Starter motor</li> <li>• Cylinder compression</li> </ul>	Check the battery condition and state of charge. For starter motor and cable tests, Goto <<A>>. Check compressions.

## Diagnostic Trouble Code (DTC) Index

DTC	Description	Possible Source	Action
P1245	Engine crank signal low voltage	<ul style="list-style-type: none"> <li>• Starter relay coil to ECM/BPM circuit open circuit</li> </ul>	For starter relay circuit tests, Goto <<B>>
P1246	Engine crank signal high voltage	<ul style="list-style-type: none"> <li>• Starter relay coil to ECM/BPM circuit short circuit to B+ voltage</li> <li>• BPM failure</li> </ul>	For starter relay circuit tests, Goto <<B>>

## Pinpoint Tests

### A : CHECK THE POWER SUPPLY, GROUND AND TRIGGER TO THE STARTER CIRCUIT

#### NOTE:

During cranking with the engine disabled, observe the engine cranking speed. A cranking speed as low as 90 RPM is acceptable, but will be difficult to measure. A degree of discretion must be used as to when an engine is cranking too slowly.

### A1 : CHECK THE VOLT DROP ACROSS THE STARTER CIRCUIT

1. Measure the volt drop across the circuit between the battery positive terminal and the starter motor terminal, ST10.

•Is the volt drop greater than 1 volt?

-> Yes

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CHECK the battery connections, cable connections at false bulkhead stud connector, and starter motor. Make sure all connections are in good condition and secure. If all connections are sound, INSTALL a new battery lead. <<414-01>> TEST the system for normal operation.

-> **No**  
Goto <<A2>>

### **A2 : CHECK THE VOLT DROP ACROSS THE STARTER CIRCUIT (CRANKING)**

1. Disable the fuel or ignition system to prevent the engine starting.
2. Turn the ignition switch to the **CRANK** position.
3. Measure the volt drop across the circuit between the battery positive terminal and the starter motor terminal, ST10.

•Is the volt drop greater than 1 volt?

-> **Yes**  
CHECK the battery connections, cable connections at false bulkhead stud connector, and starter motor. Make sure all connections are in good condition and secure. If all connections are sound, INSTALL a new battery lead. <<414-01>> TEST the system for normal operation.

-> **No**  
Goto <<A3>>

### **A3 : CHECK THE GROUND TO THE STARTER MOTOR**

1. Measure the resistance between the engine GROUND lead and the starter motor body.

•Is the resistance greater than 5 ohms?

-> **Yes**  
Clean the connection between the starter motor body and it's fittings, recheck the resistance. TEST the system for normal operation.

-> **No**  
Goto <<A4>>

### **A4 : CHECK THE STARTER SIGNAL FROM THE STARTER RELAY**

1. Remove the fuel pump relay.
2. Disconnect the starter motor signal electrical connector, ST03 (WR).
3. Turn the ignition switch to the **CRANK** position.
4. Measure the voltage between ST03 (WR) and GROUND.

•Is the voltage less than 10 volts?

-> **Yes**  
Goto <<A5>>

-> **No**  
INSTALL a new starter motor. <<Starter Motor - >> TEST the system for normal operation.

### **A5 : CHECK THE STARTER SIGNAL CIRCUIT FOR HIGH RESISTANCE**

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1. Remove the starter relay.
2. Measure the resistance between the starter relay base, pin 05 and ST03 (WR).
  - Is the resistance greater than 5 ohms?
    - > **Yes**  
REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC.  
TEST the system for normal operation.
    - > **No**  
Goto <<B1>>

### **B : DTC P1245, P1246; ENGINE CRANK SIGNAL HIGH/LOW VOLTAGE**

#### **B1 : CHECK THE STARTER RELAY 'ACTIVATE' SIGNAL AT THE RELAY BASE**

1. Remove the starter relay.
2. Turn the ignition switch to the **CRANK** position.
3. Measure the resistance between the relay base, pin 02 and GROUND.
  - Is the resistance greater than 5 ohms?
    - > **Yes**  
Goto <<B2>>
    - > **No**  
Check the starter relay supply circuits and relay operation. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

#### **B2 : CHECK THE STARTER RELAY 'ACTIVATE' SIGNAL AT THE ECM**

1. Disconnect the ECM electrical connector, EM11.
2. Turn the ignition switch to the **CRANK** position.
3. Measure the resistance between EM11, pin 06 (GO) and GROUND.
  - Is the resistance greater than 5 ohms?
    - > **Yes**  
Goto <<B3>>
    - > **No**  
INSTALL a new starter relay. TEST the system for normal operation.

#### **B3 : CHECK THE STARTER RELAY/ECM/BPM CIRCUIT FOR HIGH RESISTANCE**

1. Disconnect the battery negative terminal.
2. Disconnect the BPM electrical connector, FC14.
3. Measure the resistance between the relay base, pin 02 and EM11, pin 06 (GO).
4. Measure the resistance between the relay base, pin 02 and FC14, pin 73 (GO).
  - Is either resistance greater than 5 ohms?

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-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

Goto <<B4>>

### **B4 : CHECK THE STARTER RELAY/ECM/BPM CIRCUIT FOR SHORT TO HIGH VOLTAGE**

1. Reconnect the battery negative terminal.
2. Measure the voltage between the relay base, pin 02 and GROUND.

•Is the voltage greater than 6 volts?

-> **Yes**

REPAIR the short circuit to high voltage. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

Goto <<B5>>

### **B5 : CHECK THE IGNITION SWITCHED GROUND TO THE BPM**

1. Turn the ignition switch to the **CRANK** position.
2. Measure the resistance between FC14, pin 41 (RW) and GROUND.

•Is the resistance greater than 5 ohms?

-> **Yes**

Goto <<B6>>

-> **No**

Contact dealer technical support for advice on possible BPM failure.

### **B6 : CHECK THE IGNITION SWITCHED GROUND CIRCUIT TO THE BPM FOR HIGH RESISTANCE**

1. Disconnect the ignition switch electrical connector, fC04.
2. Measure the resistance between FC14, pin 41 (RW) and FC04, pin 01 (RW).

•Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. TEST the system for normal operation.

-> **No**

INSTALL a new ignition switch. CLEAR the DTC. TEST the system for normal operation.