Condition	Possible Sources	Actions
The remote start has poor range performance	• Passive Key or battery • After market systems • High power devices • TV/radio transmission towers • RTM	Diagnose The RKE Transmitter Has Poor Range Performance, REFER to: Locks, Latches and Entry Systems (501-14 Handles, Locks, Latches and Entry Systems, Diagnosis and Testing).

Symptom Chart: Auto-Start-Stop System

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

Symptom Chart

Condition	Possible Sources	Actions
Auto-Start-Stop System is inoperative or does not operate correctly	One or more required criteria required for Auto-start-stop operation has not been met.	REFER to owners manual Refer to Powertrain Control/Emissions Diagnosis (PC/ED) manual. for proper system operation.
	Electronic Control Modules	• RETRIEVE all Continuous Memory Diagnostic Trouble Codes (CMDTCs). • For PCM Diagnostic Trouble Codes (DTCs), REFER to PCM DTC Chart in this section. • For BCM Diagnostic Trouble Codes (DTCs), REFER to BCM DTC Chart in this section. • For all other Diagnostic Trouble Codes (DTCs), REFER to: Diagnostic Trouble Code Charts (100-00 General Information, Diagnosis and Testing).
	Vehicle Battery	Refer to Powertrain Control/Emissions Diagnosis (PC/ED) manual. Section 3 Symptom Charts.
Auto-Start-Stop System cannot be disabled by driver	• Wiring, terminals or connectors • Auto-start-stop disable switch • FCIM	• Refer to Wiring Diagrams Cell 40 for schematic and connector information. • REFER to BCM DTC Chart in this section. • Refer to the appropriate section in Group 415 for the procedure.
All Other concerns	â€”	Refer to Powertrain Control/Emissions Diagnosis (PC/ED) manual.

Pinpoint Test(s)

Engine Does Not Crank

Refer to Wiring Diagrams Cell 20 for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Starting System - System Operation and Component Description (303-06A Starting System - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Description and Operation).

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P06E9	Engine Starter Performance	No engine rotation detected during crank event

Possible Sources

- Battery
- Battery cables
- IPC
- Starter motor
- BJB starter relay

Visual Inspection and Diagnostic Pre-checks

- Inspect the Run/start relay.
- Inspect the high current BJB connections.
- Verify the BJB fuse 84 (30A).
- Verify the BCM fuse 18 (5A).
- Inspect the Integrated Keyhead Transmitter (IKT).

PINPOINT TEST A : ENGINE DOES NOT CRANK

A1 PERFORM INSPECTION AND VERIFICATION

- Perform Inspection and Verification procedure in this section.

Was an obvious cause for an observed or reported concern found?

Yes	Correct the cause as necessary.
No	GO to A2

A2 CHECK FOR NO KEY DETECTED MESSAGE IN THE MESSAGE CENTER

- **NOTE:** *There are certain areas inside the vehicle where the IA key may not be detected and the message center displays NO KEY DETECTED. If the IA key is in the far outside edges of the interior (like in a door map pocket or above a sun visor) it might not be detected. Move the IA key to a different location and try to start the vehicle again.*

  Check the message displayed in the message center while pressing the ignition switch - push button start.

Is NO KEY DETECTED displayed?

Yes	Diagnose the NO KEY DETECTED concern. REFER to: Passive Anti-Theft System (PATS) (419-01B Passive Anti-Theft System (PATS) - Vehicles With: Keyless Vehicle System, Diagnosis and Testing).
No	GO to A3

A3 VERIFY THE BCM (BODY CONTROL MODULE) AND PCM (POWERTRAIN CONTROL MODULE) PASS THE NETWORK TEST

- Ignition ON.
- Using a diagnostic scan tool, perform the Network Test.

Did the BCM and PCM pass the Network Test?

Yes	GO to A4
No	REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).

A4 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

- Using a diagnostic scan tool, perform BCM and PCM self-tests.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	For all BCM Diagnostic Trouble Codes (DTCs), refer to the BCM DTC Chart in this section. For PCM DTC P06E9 GO to A5 For all other PCM Diagnostic Trouble Codes (DTCs), REFER to: Electronic Engine Controls (303-14A Electronic Engine Controls - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Diagnosis and Testing).
No	GO to A5

A5 CHECK THE OPERATION OF THE STOPLAMPS

- While observing the stoplamps, apply the brake pedal.

Do the stoplamps illuminate?

Yes	GO to A6
No	Diagnose All the Stoplamps are inoperative. REFER to: Stoplamps (417-01 Exterior Lighting, Diagnosis and Testing).

A6 CHECK THE BRAKE PEDAL POSITION (BOO1) PID (PARAMETER IDENTIFICATION)

- Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs)
- Monitor the PCM B001 PID while applying the brake pedal.

Does the PID read On?

Yes	GO to A8
No	GO to A7

A7 CHECK THE BPP (BRAKE PEDAL POSITION) SWITCH CIRCUIT FOR VOLTAGE AT THE PCM (POWERTRAIN CONTROL MODULE)

- Ignition OFF.
- Disconnect PCM C1381B .
- While applying the brake pedal, measure:

POWERTRAIN CONTROL MODULE (PCM)	

Positive Lead	Measurement / Action	Negative Lead
C1381B-11		Ground

Is the voltage greater than 11 volts?

Yes	GO to A21
No	REPAIR the circuit.

A8 CHECK BCM (BODY CONTROL MODULE) IGN_SW_STATE PID (PARAMETER IDENTIFICATION)

- Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).
- Make sure the transmission is in PARK or NEUTRAL.
- Monitor the BCM PID IGN_SW_STATE while pressing the ignition switch - push button start and the brake pedal.

Does the PID change from Off to Start when the ignition switch - push button start and the brake pedal are pressed?

Yes	GO to A9
No	DIAGNOSE No power in Start. REFER to: Steering Wheel and Column Electrical Components (211-05 Steering Wheel and Column Electrical Components, Diagnosis and Testing).

A9 CHECK THE PCM (POWERTRAIN CONTROL MODULE) IN GEAR-TRANSMISSION IS APPLYING A LOAD TO ENGINE (IN_GEAR) PID (PARAMETER IDENTIFICATION)

- Using a diagnostic scan tool, view the PCM Parameter Identifications (PIDs).
- Monitor the PCM PID IN_GEAR, while placing the gear selector in PARK and then NEUTRAL.

Does the PID read No in both positions?

Yes	REFER to: Transmission Park by Wire Manual Release (307-05 Automatic Transmission External Controls, General Procedures).
No	GO to A10

A10 CHECK THE PCM (POWERTRAIN CONTROL MODULE) ENGINE CRANKING (ENG_CRANK) PID (PARAMETER IDENTIFICATION)

- Make sure the transmission is in PARK or NEUTRAL.
- Using a diagnostic scan tool, view the PCM Parameter Identifications (PIDs).
- Monitor the PCM PID ENG_CRANK while pressing the ignition switch - push button start and the brake pedal.

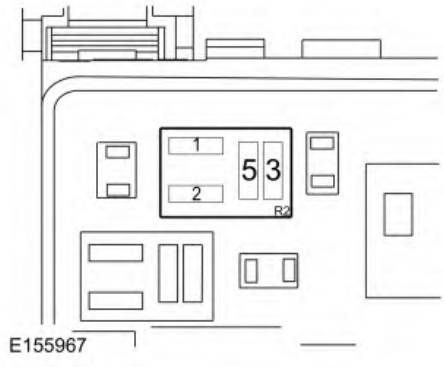
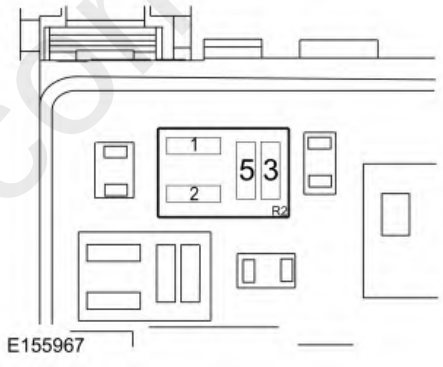
Does the PID change from Inactive to Active?

Yes	GO to A11
No	GO to A21

A11 CHECK THE STARTER RELAY CONTROL OPERATION

NOTICE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this section. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

- Remove the BJB starter relay.
- Measure:

Positive Lead	Measurement / Action	Negative Lead
 BJB starter relay pin 2		 BJB starter relay pin 1

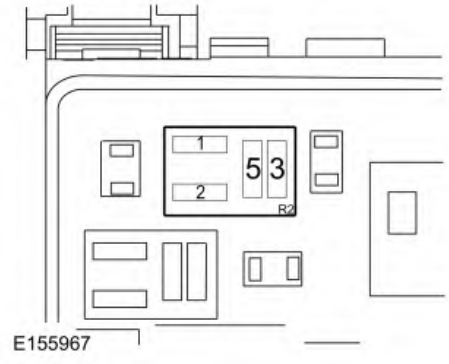
- Make sure the transmission is in PARK or NEUTRAL.
- While pressing the ignition switch - push button start and the brake pedal, observe the test light.

Does the test light illuminate when the ignition switch - push button start is pressed?

Yes	GO to A12
No	GO to A19

A12 CHECK THE VOLTAGE TO THE STARTER RELAY

- Measure:

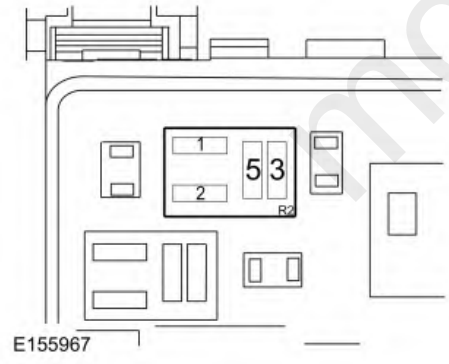
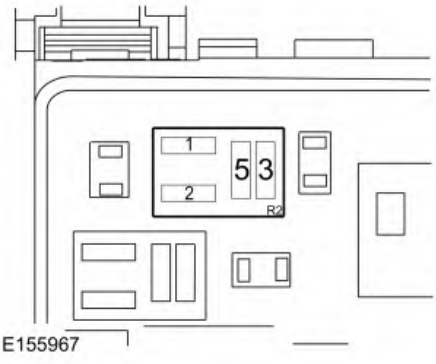
Positive Lead	Measurement / Action	Negative Lead
 BJB starter relay pin 3		Ground

Is the voltage greater than 11 volts?

Yes	GO to A13
No	VERIFY BJB fuse 84 (30A) is OK. If OK, REPAIR the circuit for an open. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

A13 CHECK THE STARTER MOTOR OPERATION AT THE STARTER RELAY

- Ignition OFF.
- With the transmission in PARK or NEUTRAL, momentarily connect a fused jumper wire:

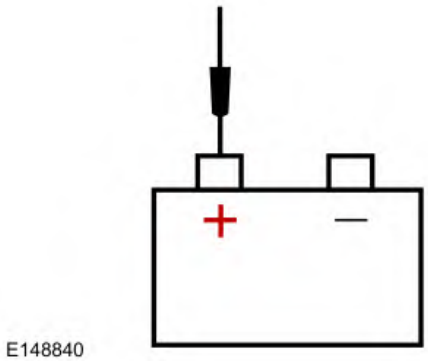
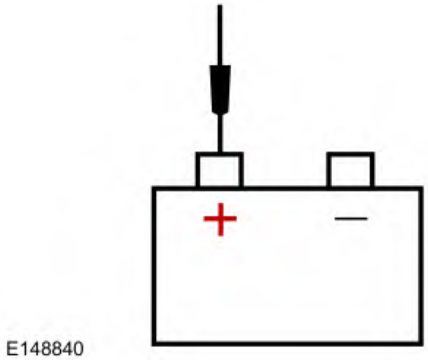
Positive Lead	Measurement / Action	Negative Lead
 BJB starter relay pin 3		 BJB starter relay pin 5

Did the starter engage and the engine crank?

Yes	INSTALL a new starter relay.
No	GO to A14

A14 CHECK THE BATTERY GROUND CABLES

- Measure:

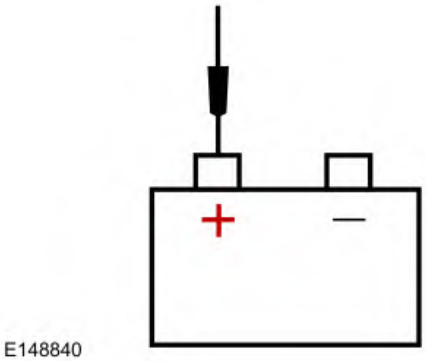
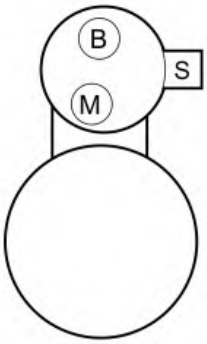
Positive Lead	Measurement / Action	Negative Lead
 E148840	V	Ground G105
 E148840	V	Ground G106

Are the voltages greater than 11 volts?

Yes	GO to A15
No	CLEAN or INSTALL new negative battery cables as necessary. REFER to: Battery Cables - 2.0L EcoBoost (184kW/250PS) â€“ MI4 (414-01 Battery, Mounting and Cables, Removal and Installation).

A15 CHECK THE STARTER MOTOR GROUND

- Measure:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148837 Starter motor case

Is the voltage greater than 11 volts?

Yes	GO to A16
No	CLEAN the starter motor mounting flange and MAKE SURE the starter motor is correctly mounted. REFER to: Starter Motor (303-06A Starting System - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Removal and Installation).

A16 CHECK THE VOLTAGE TO THE STARTER MOTOR

- Measure:

STARTER MOTOR	

Positive Lead	Measurement / Action	Negative Lead
C197B-1 ("B" terminal)		Ground

Is the voltage greater than 11 volts?

Yes	GO to A17
No	INSTALL a new positive battery cable. REFER to: Battery Cables - 2.0L EcoBoost (184kW/250PS) â€“ MI4 (414-01 Battery, Mounting and Cables, Removal and Installation).

A17 CHECK THE STARTER MOTOR FOR CORRECT OPERATION

- Perform Starter Motor - Positive Circuit Test in this section.

Was an obvious cause found?

Yes	Correct the cause as necessary.
No	GO to A18

A18 CHECK FOR START INPUT AT THE STARTER

- Connect BJB starter relay.
- Disconnect Starter solenoid C197A .
- While holding the key in the START position, measure:

STARTER MOTOR	

Positive Lead	Measurement / Action	Negative Lead
C197A-1 ("S" terminal)	V	Ground

Is the voltage greater than 11 volts?

Yes	CLEAN the starter solenoid "S" terminal and starter solenoid connector. CHECK the wiring and the starter motor for a loose or intermittent connection.
No	REPAIR the circuit for an open.

A19 CHECK THE PCM (POWERTRAIN CONTROL MODULE) STARTER RELAY CONTROL CIRCUITS FOR A SHORT TO GROUND

- Ignition OFF.
- Disconnect PCM C1381B .
- Measure:

POWERTRAIN CONTROL MODULE (PCM)	

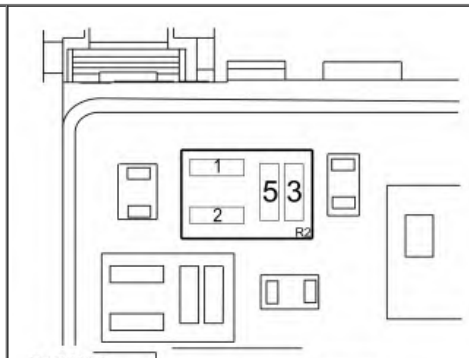
Positive Lead	Measurement / Action	Negative Lead
C1381B-69	Ω	Ground
C1381B-71	Ω	Ground

Are the resistances greater than 10,000 ohms?

Yes	GO to A20
No	REPAIR the affected circuit.

A20 CHECK THE PCM (POWERTRAIN CONTROL MODULE) STARTER RELAY CIRCUITS FOR AN OPEN

- Measure:

POWERTRAIN CONTROL MODULE (PCM)	

Positive Lead	Measurement / Action	Negative Lead
C1381B-69	Ω	BJB starter relay pin 1
C1381B-71	Ω	BJB starter relay pin 2

Are the resistances less than 3 ohms?

Yes	GO to A21
No	REPAIR the affected circuit.

A21 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect all PCM connectors.
- Repair:
  - corrosion (install new connectors or terminals - clean module pins)
  - damaged or bent pins - install new terminals/pins
  - pushed-out pins - install new pins as necessary
- Reconnect the PCM connectors. Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable service articles: TSB, GSB, SSM or FSA. If a service article exists for this concern, DISCONTINUE this test and FOLLOW the service article instructions. If no service articles address this concern, Click here to access Guided Routine (PCM).
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Unusual Starter Noise

Normal Operation and Fault Conditions

Correct starter operation relies on correct mounting of the starter to the engine, alignment of the starter ring gear to the flexplate and correct functioning of the starter assembly (internal gears, bearings).

Possible Sources

- Engine
- Starter motor
- Starter motor mounting

Visual Inspection and Diagnostic Pre-checks

- Inspect the starter motor.
- Inspect the starter motor mounting.

PINPOINT TEST B : UNUSUAL STARTER NOISE

B1 CHECK THE STARTER MOUNTING
• Inspect the starter mounting bolts for looseness. **Is the starter motor mounted correctly?**

Yes	GO to B2
No	INSTALL the starter motor correctly. REFER to: Starter Motor (303-06A Starting System - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Removal and Installation).

B2 CHECK FOR STARTER NOISE
• Ignition OFF. • Connect a remote starter switch between the starter solenoid C197B-1 ("B" terminal) and C197A-1 ("S" terminal). • Engage the starter and verify the noise is due to starter operation. **Is the noise due to the starter engagement?**

Yes	REFER to: Starter Motor Drive Gear and Flywheel Ring Gear Inspection (303-06A Starting System - 2.0L EcoBoost (184kW/250PS) â€“ MI4, General Procedures).
No	REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing). to continue diagnosis.

C113A:11, C113A:15

Refer to Wiring Diagrams Cell 23 for schematic and connector information.

Normal Operation and Fault Conditions

The wake-up control circuit wakes up the PCM prior to the engine cranking. The PCM needs to wake up prior to a crank request so it has time to go through its initialization. The wake-up control circuit is controlled by the BCM. The BCM activates the wake-up control circuit when the driver door is opened, the BCM detects a passive key, or when the engine start/stop button is pressed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C113A:11	PCM Wake-up Signal: Circuit Short to Ground	Set by the BCM when a short to ground is detected on the wake-up control circuit.
C113A:15	PCM Wake-up Signal: Circuit Short to Battery or Open	Set by the BCM when a short to voltage or an open is detected on the wake-up control circuit.

Possible Sources

- BCM
- PCM
- Wiring, terminals or connectors

PINPOINT TEST C : C113A:11, C113A:15

C1 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

- Ignition ON.
- Using a diagnostic scan tool, perform the BCM self-test.

Is DTC C113A:11 present?

Yes	GO to C2
No	If DTC C113A:15 is present, GO to C4 For all other BCM Diagnostic Trouble Codes (DTCs), REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing).

C2 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR A SHORT TO GROUND

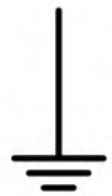
- Ignition OFF.
- Disconnect PCM C1381B .
- Ignition ON.
- Using a diagnostic scan tool, clear the BCM Diagnostic Trouble Codes (DTCs).
- Using a diagnostic scan tool, perform the BCM self-test.

Is BCM DTC C113A:11 present?

Yes	GO to C3
No	GO to C7

C3 CHECK THE PCM (POWERTRAIN CONTROL MODULE) WAKE-UP SIGNAL CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.
- Measure:

POWERTRAIN CONTROL MODULE (PCM)	

Positive Lead	Measurement / Action	Negative Lead
C1381B-52	Ω	Ground

Is the resistance greater than 10,000 ohms?

Yes	GO to C7
No	REPAIR the circuit.

C4 CHECK THE PCM (POWERTRAIN CONTROL MODULE) WAKE-UP SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition OFF.
- Disconnect PCM C1381B if necessary.
- Disconnect BCM C2280C .
- Ignition ON.
- Measure:

POWERTRAIN CONTROL MODULE (PCM)	

Positive Lead	Measurement / Action	Negative Lead
C1381B-52		Ground

Is any voltage present?

Yes	REPAIR the circuit.
No	GO to C5

C5 CHECK THE PCM (POWERTRAIN CONTROL MODULE) WAKE-UP SIGNAL CIRCUIT FOR AN OPEN

- Ignition OFF.
- Measure:

POWERTRAIN CONTROL MODULE (PCM)	BODY CONTROL MODULE (BCM)

Positive Lead	Measurement / Action	Negative Lead
C1381B-52	Ω	C2280C-18

Is the resistance less than 3 ohms?

Yes	GO to C6
No	REPAIR the circuit.

C6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect all BCM connectors.
- Repair:
  - corrosion (install new connectors or terminals - clean module pins)
  - damaged or bent pins - install new terminals/pins
  - pushed-out pins - install new pins as necessary
- Reconnect the BCM connectors. Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCM. REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Removal and Installation).
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

C7 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect all PCM connectors.
- Repair:
  - corrosion (install new connectors or terminals - clean module pins)
  - damaged or bent pins - install new terminals/pins
  - pushed-out pins - install new pins as necessary
- Reconnect the PCM connectors. Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) (303-14A Electronic Engine Controls - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Removal and Installation).
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

P2535

Refer to Wiring Diagrams Cell 24 for schematic and connector information.

Normal Operation and Fault Conditions

When the engine start/stop switch has been pressed, the PCM receives a voltage signal on the crank detect circuit. The PCM then supplies voltage and ground to the starter relay coil when the required inputs have been received.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P2535	Ignition Switch Run/Start Position Circuit High	This DTC sets when the PCM detects voltage on the crank detect circuit while the engine is running.

Possible Sources

- BCM
- Ignition switch - Push Button Start
- PCM
- Wiring, terminals or connectors

PINPOINT TEST D : DTC P2535

D1 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

- Ignition ON.
- Using a diagnostic scan tool, perform PCM self-tests.

Is DTC P2535 recorded?

Yes	GO to D2
No	For all PCM Diagnostic Trouble Codes (DTCs), refer to the PCM DTC Chart in this section.

D2 CHECK THE CRANK DETECT CIRCUIT FOR A SHORT TO VOLTAGE WITH PCM (POWERTRAIN CONTROL MODULE) DISCONNECTED

- Ignition OFF.
- Disconnect PCM C1381B .
- Ignition ON.
- Measure:

POWERTRAIN CONTROL MODULE (PCM)	

Positive Lead	Measurement / Action	Negative Lead
C1381B-45	V	Ground

Is any voltage present?

Yes	GO to D3
No	GO to D5

D3 CHECK THE CRANK DETECT CIRCUIT FOR A SHORT TO VOLTAGE WITH IGNITION SWITCH - PUSH BUTTON START DISCONNECTED

- Ignition OFF.
- Disconnect Ignition switch - Push Button Start C2195 .
- Measure:

POWERTRAIN CONTROL MODULE (PCM)	

Positive Lead	Measurement / Action	Negative Lead
C1381B-45		Ground

Is any voltage present?

Yes	GO to D4
No	INSTALL a new ignition switch - push button start. REFER to: Ignition Switch - Vehicles With: Keyless Vehicle System (211-05 Steering Wheel and Column Electrical Components, Removal and Installation).

D4 CHECK THE CRANK DETECT CIRCUIT FOR A SHORT TO VOLTAGE WITH BCM (BODY CONTROL MODULE) DISCONNECTED

- Ignition OFF.
- Disconnect BCM C2280G .
- Measure:

POWERTRAIN CONTROL MODULE (PCM)	

Positive Lead	Measurement / Action	Negative Lead
C1381B-45		Ground

Is any voltage present?

Yes	REPAIR the circuit.
No	GO to D6

D5 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

- Disconnect and inspect all PCM connectors.
- Repair:
  - corrosion (install new connectors or terminals - clean module pins)
  - damaged or bent pins - install new terminals/pins
  - pushed-out pins - install new pins as necessary
- Reconnect all connectors. Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) (303-14A Electronic Engine Controls - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Removal and Installation).
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

D6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

- Disconnect and inspect all BCM connectors.
- Repair:
  - corrosion (install new connectors or terminals - clean module pins)
  - damaged or bent pins - install new terminals/pins
  - pushed-out pins - install new pins as necessary
- Reconnect all connectors. Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

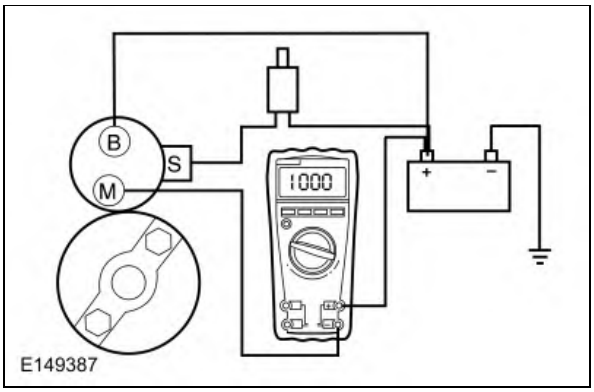
Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCM. REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Removal and Installation).
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Component Test(s)

Starter Motor - Positive Circuit Test

NOTE: *Always make the multimeter connection at the component terminal rather than at the wiring end of the connector. Making a connection at the wiring end of the connector could result in false readings because the meter will not pick up a high resistance between the wiring connector and component.*

1. Make sure the battery is fully charged.
   REFER to: Battery (414-01 Battery, Mounting and Cables, Diagnosis and Testing).
2. Perform a battery drain test.
   REFER to: Battery Drain Check (414-01 Battery, Mounting and Cables, General Procedures).
3. Connect a remote starter switch between starter solenoid â€œSâ€ terminal and the battery positive terminal.
4. Connect the multimeter positive lead to the battery positive post. Connect the negative lead to the starter solenoid "M" terminal.

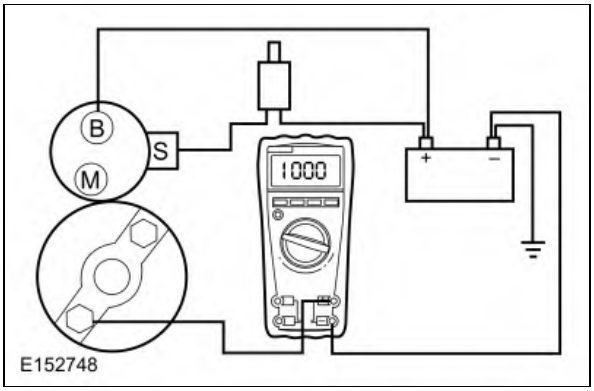


5. Place gear selector lever in Park or Neutral.
6. Engage the remote starter switch. Read and record the voltage. The voltage reading should be 0.5 volt or less.
7. If the voltage reading is 0.5 volt or less, perform Starter Motor - Ground Circuit Test in this section.
8. A voltage reading greater than 0.5 volt is an indication of excessive resistance in the connections, the positive battery cable or in the starter solenoid. Remove the cables from the solenoid "B", "S" and "M" terminals. Clean the cables and connections and reinstall the cables to the correct terminals. Repeat Steps 3 through 6.
9. If the voltage reading is still greater than 0.5 volt when checked at the "M" terminal, move the multimeter negative lead to the starter solenoid â€œBâ€ terminal.
10. With the gear selector lever in Park or Neutral, engage the remote starter switch. Read and record the voltage.
11. If the voltage reading at the "B" terminal is lower than 0.5 volt, the concern is in the connections at the starter solenoid or in the solenoid contacts. Install a new starter motor.
    REFER to: Starter Motor (303-06A Starting System - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Removal and Installation).
12. If the voltage reading taken at the solenoid "B" terminal is greater than 0.5 volt after cleaning the cables and connections at the solenoid, the concern is in the positive battery cable connection or in the positive battery cable itself. Clean the positive battery cable connection. If this does not resolve the concern, install a new positive battery cable.
    REFER to: Battery Cables - 2.0L EcoBoost (184kW/250PS) â€“ MI4 (414-01 Battery, Mounting and Cables, Removal and Installation).

Starter Motor - Ground Circuit Test

A slow cranking condition can be caused by resistance in the ground or return portion of the cranking circuit. This procedure checks the voltage drop in the ground circuit.

1. Connect a remote starter switch between starter solenoid "S" terminal and the battery positive terminal.
2. Connect the multimeter positive lead to the starter motor housing (the connection must be clean and free of rust or grease). Connect the negative lead to the negative battery terminal.
3. Place gear selector lever in Park or Neutral.
4. Engage the remote starter switch and crank the engine. Read and record the voltage reading. The reading should be 0.5 volt or less.



5. If the voltage reading is greater than 0.5 volt, clean the negative cable connections at the battery, the body ground connections and the starter ground connection. Retest.
6. If the voltage reading is greater than 0.5 volt, install a new negative battery cable.
    REFER to: Battery Cables - 2.0L EcoBoost (184kW/250PS) â€“ MI4 (414-01 Battery, Mounting and Cables, Removal and Installation).

7. If the voltage reading is less than 0.5 volt and the engine still cranks slowly, install a new starter motor.
   REFER to: Starter Motor (303-06A Starting System - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Removal and Installation).

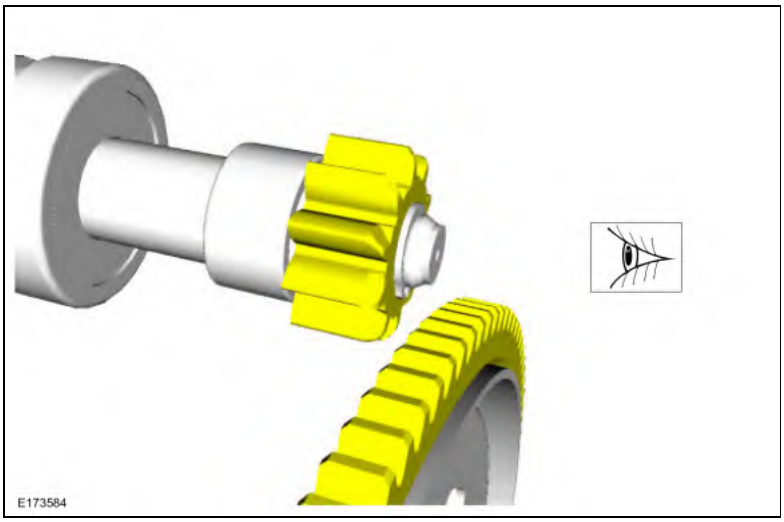
General Procedures

Starter Motor Drive Gear and Flywheel Ring Gear Inspection

Inspection

1. Remove the starter motor.
   Refer to: Starter Motor (303-06A Starting System - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Removal and Installation).

2. Check the wear patterns on the starter motor drive gear and the flywheel or flexplate ring gear. If the wear pattern is normal, then install the starter motor.
   Refer to: Starter Motor (303-06A Starting System - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Removal and Installation).



3. If the starter motor drive gear and the flywheel or flexplate ring gear are not fully engaging and the starter motor drive gear is scored or damaged, then install a new starter motor.
   Refer to: Starter Motor (303-06A Starting System - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Removal and Installation).

4. If the teeth on the flywheel or flexplate ring gear are scored or damaged, then install a new flywheel or flexplate.
   Refer to: Flexplate (303-01A Engine - 2.0L EcoBoost (184kW/250PS) â€“ MI4, Removal and Installation).