

Charging System - 2.7L EcoBoost (238kW/324PS)/3.5L EcoBoost (272kW/370PS)

Inspection and Verification

1. Verify the customer concern by operating the charging system.
2. Before diagnosing or repairing the charging system inspect the following items:
 - Check the battery for loose, damaged or corroded connections.
 - Check the generator for loose, damaged or corroded connections.
 - Check engine and battery grounds for loose, damaged or corroded connections.
 - Check high current BJB for loose or corroded connections.
 - Verify fuses or fusible links.
 - Inspect wiring, terminals and connectors.
3. Inspect the FEAD system. REFER to 303-05.
4. Check the battery condition and state of charge.
REFER to: [Battery](#) (414-01 Battery, Mounting and Cables, Diagnosis and Testing).
5. Check for abnormal ignition-off current drain(s).
REFER to: [Battery Drain Check](#) (414-01 Battery, Mounting and Cables, General Procedures).
6. If an obvious cause for an observed or reported concern is found, repair as necessary (if possible) before proceeding.
7. Using the diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs). Refer to the appropriate DTC Chart in this section.

DTC Charts

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).

BCM DTC Chart

NOTE: Diagnose all PCM DTCs first.

DTC	Description	Action
B11DB:02	Battery Monitoring Module "A": General Signal Failure	GO to Pinpoint Test E
B11DB:08	Battery Monitoring Module "A": Bus Signal / Message Failure	GO to Pinpoint Test E
B11DB:11	Battery Monitoring Module "A": Circuit Short To Ground	GO to Pinpoint Test E
B11DB:49	Battery Monitoring Module "A": Internal Electronic Failure	CLEAR the diagnostic trouble codes (DTCs). REPEAT the BCM self-test. If DTC B11DB:49 is retrieved, INSTALL new battery monitoring sensor. REFER to: Battery Monitoring Sensor (414-01 Battery, Mounting and Cables) .
B11DB:55	Battery Monitoring Module "A": Not Configured	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. INSTALL As-Built data from Professional Technician Society (PTS) following diagnostic scan tool instructions under Module Programming>As-Built.
B11DB:9A	Battery Monitoring Module "A": Component or System Operating Conditions	GO to Pinpoint Test E
B1489:11	Battery Monitoring System (BMS) Sensor Power Circuit Short To Ground	GO to Pinpoint Test E
All Other DTCs	—	REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules) .

PCM DTC Chart

DTC	Description	Action
P0562	System Voltage Low	GO to Pinpoint Test B
P0563	System Voltage High	GO to Pinpoint Test A
P0620	Generator Control Circuit	GO to Pinpoint Test G
P0625	Generator Field/F Terminal Circuit Low	GO to Pinpoint Test H
P0626	Generator Field/F Terminal Circuit High	GO to Pinpoint Test H
P065B	Generator Control Circuit Range/Performance	GO to Pinpoint Test G
P0A5A	Generator Current Sensor Circuit Range/Performance	GO to Pinpoint Test F
P0A5B	Generator Current Sensor Circuit Low	GO to Pinpoint Test F
P0A5C	Generator Current Sensor Circuit High	GO to Pinpoint Test F
P1397	System Voltage Out Of Self-Test Range	If combined with P0562, GO to Pinpoint Test B If combined with P0563, GO to Pinpoint Test A

All Other DTCs	—	REFER to: Electronic Engine Controls (303-14 Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS)) . REFER to: Electronic Engine Controls (303-14C Electronic Engine Controls - 3.5L EcoBoost (272kW/370PS), Diagnosis and Testing).
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Symptom Chart(s)

Symptom Chart: Charging 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
System voltage high	Refer to the Pinpoint Test	GO to Pinpoint Test A
System voltage low or battery is discharged	Refer to the Pinpoint Test	GO to Pinpoint Test B
The generator is noisy	Refer to the Pinpoint Test	GO to Pinpoint Test C
Radio interference	Refer to the Pinpoint Test	GO to Pinpoint Test D
Charging system warning indicator is never or always on	• IPC • Generator • PCM • Wiring, terminals or connectors	RETRIEVE Diagnostic Trouble Codes (DTCs) from all modules. If any Diagnostic Trouble Codes (DTCs) are found, Refer to DTC Chart in this section. If no Diagnostic Trouble Codes (DTCs) are found, REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes) .
Load Shed Message Displays in IPC message center and/or centerstack infotainment display	Refer to the Pinpoint Test	GO to Pinpoint Test I
Battery Saver - System Off displays in centerstack infotainment display	Refer to the Pinpoint Test	GO to Pinpoint Test I

Pinpoint Tests

System Voltage High

Refer to Wiring Diagrams Cell 12 for schematic and connector information.

NOTE: Diagnostic Trouble Code (DTC) P0563 can set if the vehicle has been recently jump started or the battery has been recently charged. The battery may become discharged due to excessive load(s) on the charging system from aftermarket accessories or if vehicle accessories have been operating for an extended period of time without the engine running.

Normal Operation and Fault Conditions

With the engine running, the charging system supplies voltage to the battery and the vehicle electrical system through the high current BJB and battery B+ cable. The voltage that is supplied to the vehicle electrical system is used for the operation of the various vehicle systems and modules. Many modules monitor this voltage and if it rises above or below their calibrated setpoints, a DTC sets.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0563	System Voltage High	This DTC sets in the PCM when the PCM detects voltage from the charging system greater than 15.9-volts with vehicle speed above 8 km/h (5 mph).
P1397	System Voltage Out of Self-Test Range	This DTC sets in the PCM if the voltage rises above or drops below the calibrated setpoint. This DTC may also set if the vehicle has been recently jump started or has had a discharged battery.

Possible Sources

- Battery
- Generator
- Engine, generator or battery ground
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect BJB fuse F38 (10A).
- Inspect grounds G105, G106, and G107 for loose, damaged or corroded connections.
- Inspect the high current BJB for loose or corroded connections.

PINPOINT TEST A : SYSTEM VOLTAGE HIGH	
NOTE: Make sure battery voltage is greater than 12.2-volts prior to and during this pinpoint test.	
NOTE: Do not have a battery charger attached during vehicle testing.	
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	REPAIR as necessary.
No	GO to A2

A2 RETRIEVE THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

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

Is DTC P0620, P0625 or P0626 present?

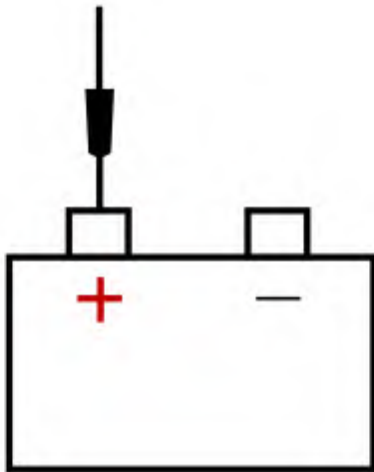
Yes	For DTC P0620, GO to Pinpoint Test G For Diagnostic Trouble Codes (DTCs) P0625 and P0626, GO to Pinpoint Test H
No	GO to A3

A3 COMPARE THE GENERATOR VOLTAGE DESIRED (GENVDS) PID (PARAMETER IDENTIFICATION) WITH BATTERY VOLTAGE

- With the engine still running at idle, measure and record:

Positive Lead	Measurement / Action	Negative Lead

E148840



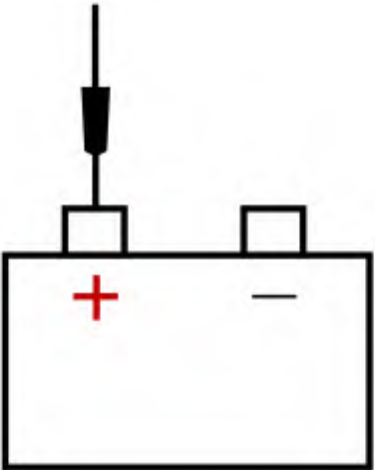
- Using a diagnostic scan tool, view the PCM PID GENVDSD.

Is the recorded battery voltage within ± 0.5 volt of the PID?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.
No	GO to A4

A4 MEASURE THE "A" SENSE VOLTAGE

- Ignition OFF.
- Disconnect Generator C102A.
- Ignition ON.
- Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

Is the "A" sense voltage equal to the recorded battery voltage?

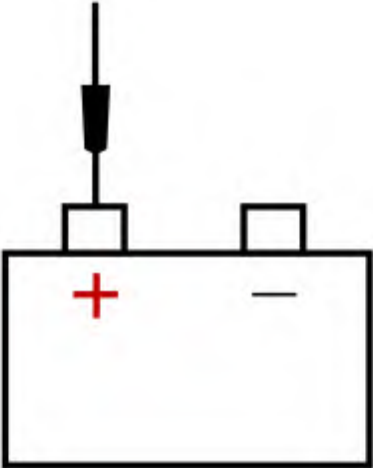
Yes	GO to A5
No	VERIFY high current BJB fuse F38 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

A5 "A" SENSE CIRCUIT LOAD TEST

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.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

- Ignition ON.
- Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

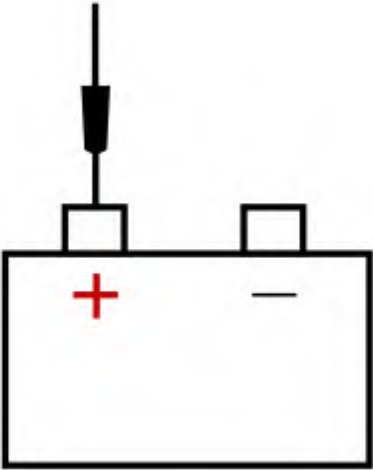
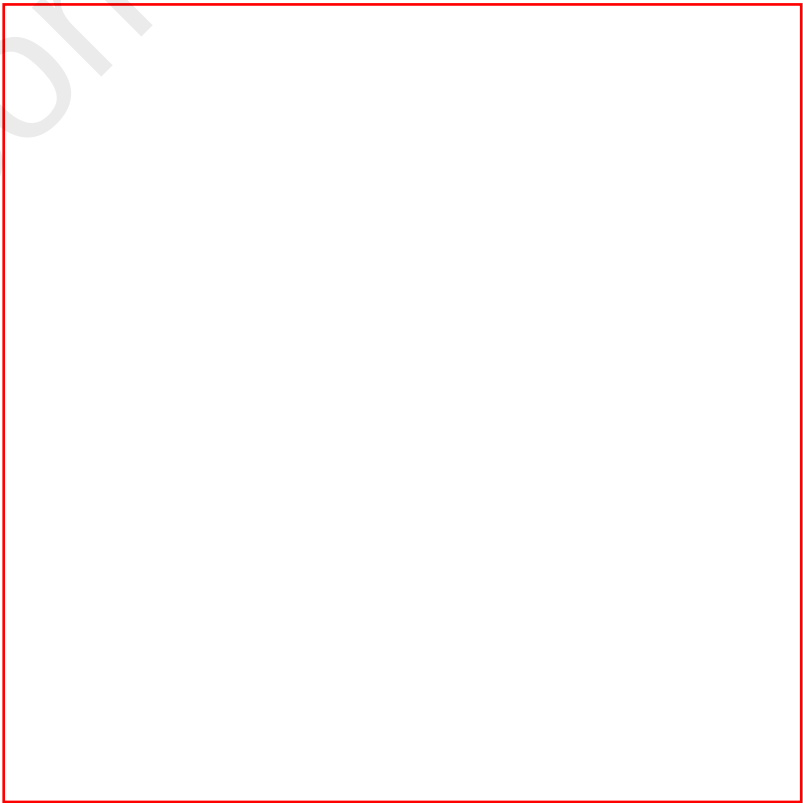
Is the "A" sense voltage within ± 0.5 volt of the recorded battery voltage?

Yes	GO to A6
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No	VERIFY the BJB fuse 38 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.
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A6 CHECK FOR INTERMITTENT IN THE REGULATOR CIRCUIT

- Connect Generator C102A.
- Start the engine.
- With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

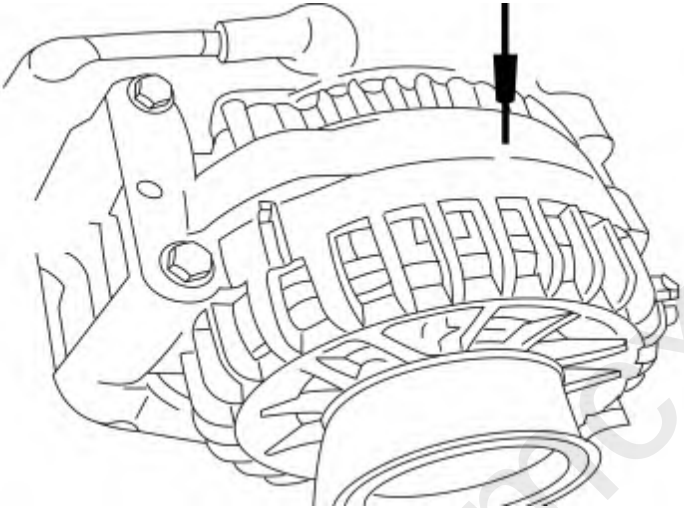
- Perform a wiggle test on the generator wiring and following connections while measuring voltage:
 - Generator C102A
 - Inline C146

Does battery voltage change more than 0.5 volt?

Yes	INSPECT and REPAIR any corrosion in the generator B+ circuit, positive battery cable and C102A connections.
No	GO to A7

A7 CHECK THE VOLTAGE DROP IN THE VEHICLE GROUNDS

- Connect Generator C102A.
- Start the engine.
- With the engine still running at idle, headlamps on and heater blower on high, measure:

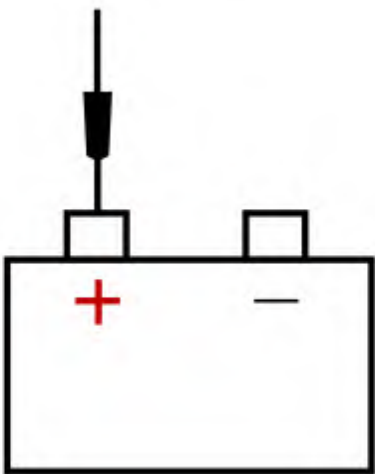
Positive Lead	Measurement / Action	Negative Lead
 Generator case		

Is the voltage drop less than 0.5 volt?

Yes	GO to A8
No	INSPECT and REPAIR the engine ground, generator ground or the battery ground for corrosion.

A8 CHECK THE GENERATOR OUTPUT

- Increase the engine rpm until the generator starts to generate output.
- With the engine running, measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		Ground

Is the voltage above 15.2-volts?

Yes	INSTALL a new generator. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation).
No	GO to A9

A9 MONITOR THE GENERATOR COMMAND (GENCMD), GENERATOR MONITOR (GENMON) AND GENERATOR VOLTAGE DESIRED (GENVDS) PARAMETER IDENTIFICATIONS (PIDS)

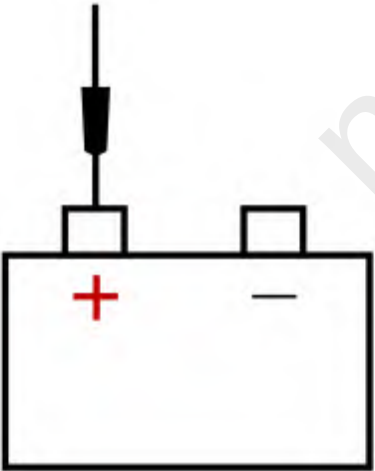
- Ignition OFF.
- Disconnect Generator C102A.
- Start the engine.
- Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).
- Using the active command, set the PID GENVDSD to 14-volts.
- Monitor the PCM Parameter Identifications (PIDs) GENMON and GENCMD.

Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	GO to A10
No	GO to A13

A10 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE PID (PARAMETER IDENTIFICATION) TO BATTERY VOLTAGE

- With the engine running at idle, measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

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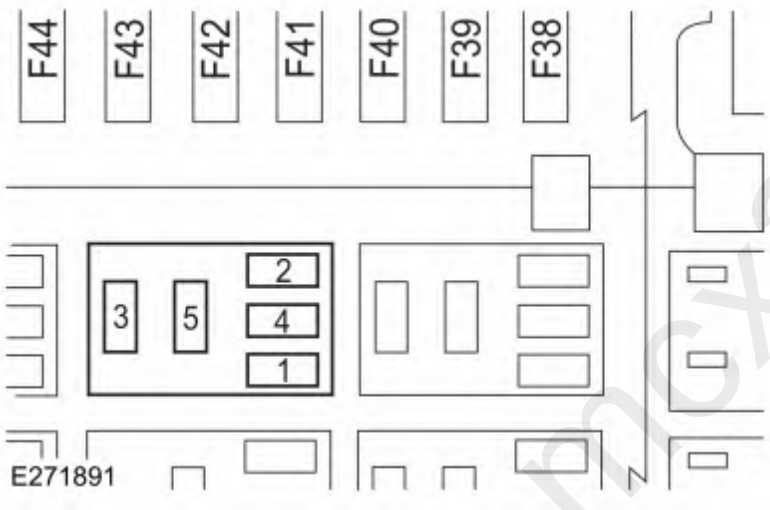
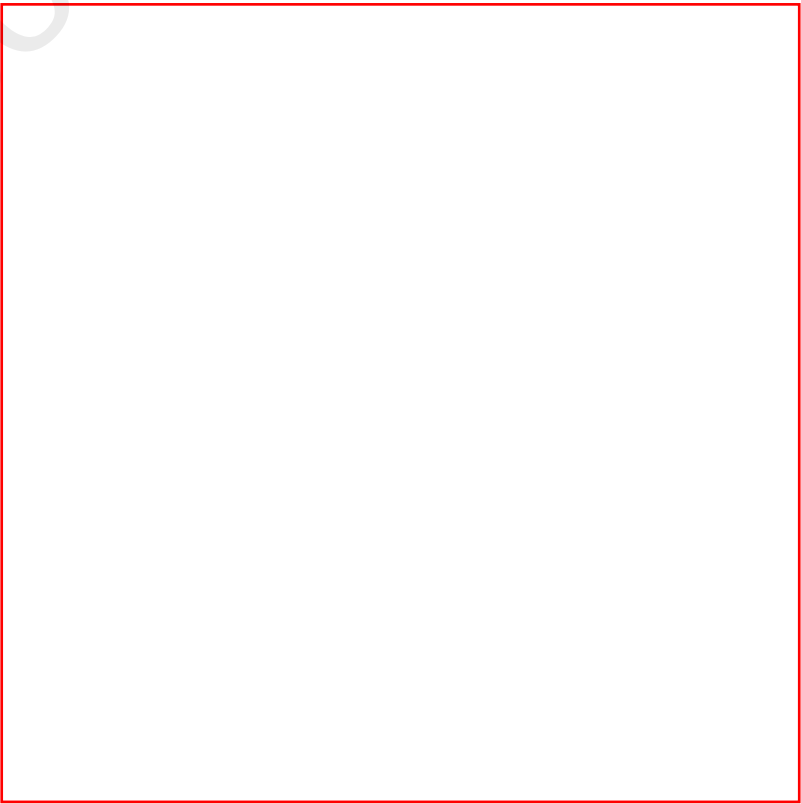
- Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).
- Monitor the PCM PID VPWR.

Does the PID accurately display battery voltage within ±0.5 volt of the recorded battery voltage?

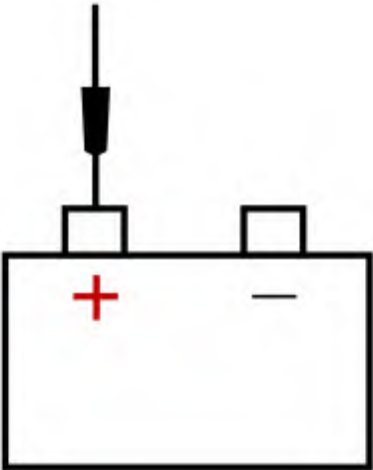
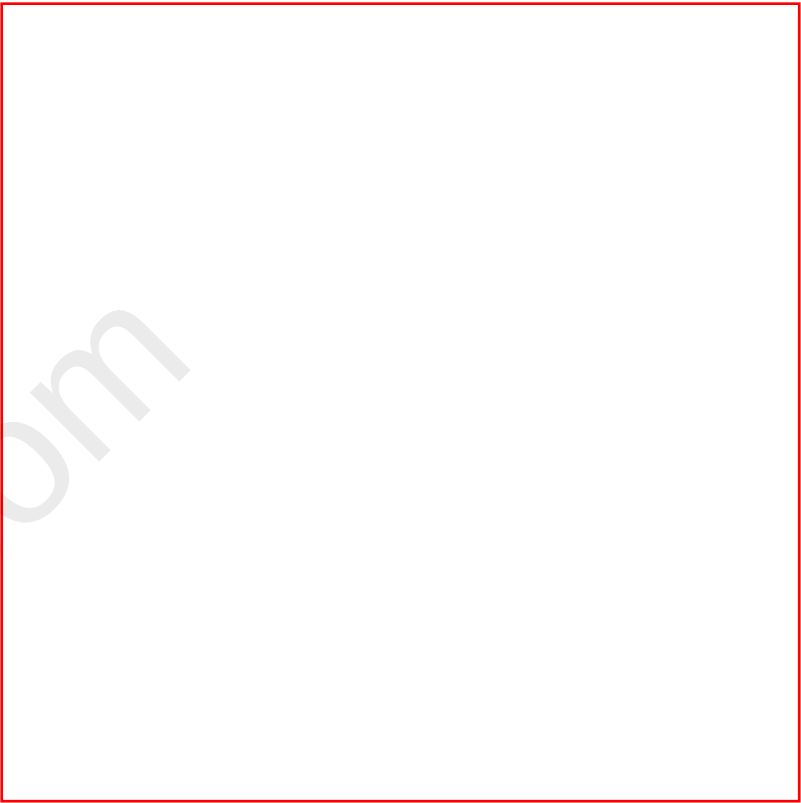
Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new generator. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation).
No	GO to A11

A11 CHECK PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE CIRCUITS

- Turn the headlamps and heater blower off.
- Ignition OFF.
- Remove the fused jumper wire.
- Disconnect BJB PCM power relay.
- Disconnect PCM C1232B (2.7L EcoBoost).
- Disconnect PCM C175B (3.5L EcoBoost).
- Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
 BJB PCM Relay pin 3		 BJB PCM Relay pin 5

- Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

- **NOTE:** The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

Connect the load to a suitable ground connection.

- Connect the load to each circuit and measure:

Click to display connectors

For 2.7L EcoBoost, measure:

Positive Lead	Measurement / Action	Negative Lead
C1232B-101		Ground

C1232B-102		Ground
C1232B-103		Ground

- Connect the load to each circuit and measure:

Click to display connectors

For 3.5L EcoBoost, measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-101		Ground
C175B-102		Ground
C175B-103		Ground

Are the voltages within 0.5 volt of the recorded battery voltage?

Yes	Remove the fused jumper wire and GO to A12
No	REPAIR the affected circuit(s).

A12 CHECK PCM (POWERTRAIN CONTROL MODULE) GROUND FOR HIGH RESISTANCE

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

- Connect the load to a suitable 12 volt power connection.
- Connect the load to each circuit and measure:

Click to display connectors

For 3.5L EcoBoost, measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-96		Ground
C175B-97		Ground
C175B-98		Ground
C175B-99		Ground

Is the voltage drop less than 0.5 volt?

Yes	GO to A13
No	REPAIR the affected circuit(s).

A13 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect all PCM connectors.
- Repair:
 - corrosion (install new connector 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) (303-14 Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS)) . For 3.5L EcoBoost,REFER to: Powertrain Control Module (PCM) (303-14C Electronic Engine Controls - 3.5L EcoBoost (272kW/370PS), 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.

System Voltage Low or Battery is Discharged

Refer to Wiring Diagrams Cell 12 for schematic and connector information.

Normal Operation and Fault Conditions

With the engine running, the charging system supplies voltage to the battery and the vehicle electrical system through the high current BJB and battery B+ cable. The PCM monitors this B+ voltage through its own voltage supply circuit.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0562	System Voltage Low	This DTC sets in the PCM after 30 seconds if the voltage drops 1.5-volts or more below the desired generator voltage (calculated by the PCM).

P1397	System Voltage Out of Self-Test Range	This DTC sets in the PCM if the voltage rises above or drops below the calibrated setpoint. This DTC may also set if the vehicle has been recently jump started or has had a discharged battery.
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Possible Sources

- Battery
- Fuses or fusible links
- Generator
- PCM
- High current BJB
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect for abnormal ignition-off current drain(s).
- Inspect the battery.
- Inspect the FEAD system.
- Verify BJB fuse 38 (10A).
- Verify high current BJB MEGA fuse (300A).
- Inspect the high current BJB for loose or corroded connections.
- Inspect the generator clutch.

PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED

NOTE: Make sure battery voltage is greater than 12.2-volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

B1 PERFORM INSPECTION AND VERIFICATION

- Perform Inspection and Verification procedure in this section.

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

Yes	REPAIR as necessary.
No	GO to B2

B2 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

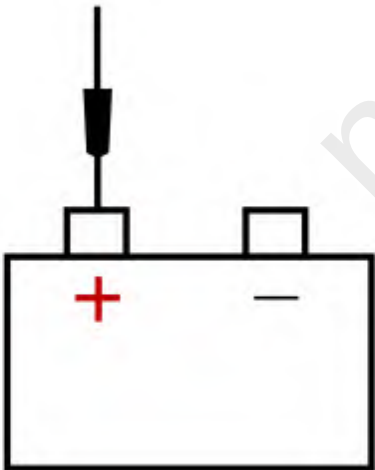
- Using a diagnostic scan tool, perform the PCM self-test.

Is DTC P0620, P0625 or P0626 present?

Yes	For DTC P0620, GO to Pinpoint Test G For Diagnostic Trouble Codes (DTCs) P0625 and P0626, GO to Pinpoint Test H
No	GO to B3

B3 CHECK THE GENERATOR CONNECTIONS

- Ignition OFF.
- Disconnect all of the generator connectors and inspect for:
 - corrosion (install new connector or terminals – clean module pins)
 - damaged or bent pins – install new terminals/pins
 - pushed-out pins – install new pins as necessary
- Reconnect the generator connectors. Make sure they seat and latch correctly.
- Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to B4
No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). VERIFY high current BJB MEGA fuse (300A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

B4 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

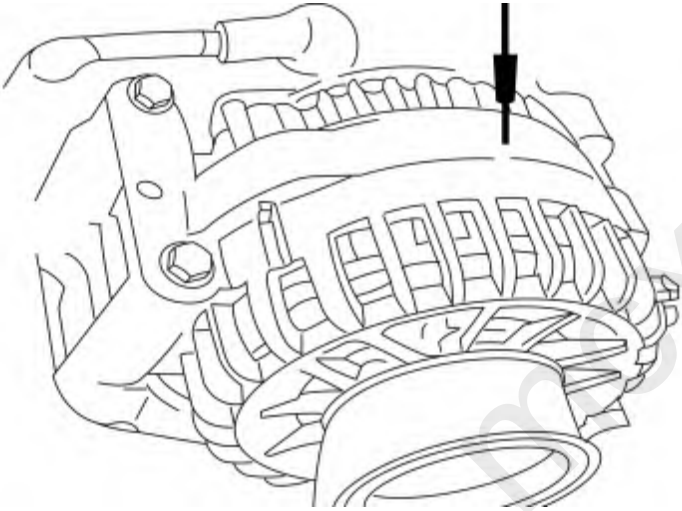
- Start the engine.
- Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

Yes	GO to B5
No	INSPECT and REPAIR any corrosion in the generator B+ circuit and positive battery cable connections.

B5 CHECK THE VOLTAGE DROP IN THE VEHICLE GROUNDS

- With the engine still running at idle, headlamps on and heater blower on high, measure:

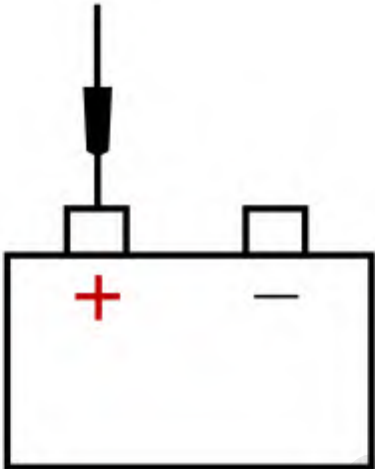
Positive Lead	Measurement / Action	Negative Lead
 Generator case		

Is the voltage drop less than 0.5 volt?

Yes	GO to B6
No	INSPECT and REPAIR the engine ground, generator ground or the battery ground for corrosion.

B6 MONITOR THE GENERATOR VOLTAGE DESIRED (GENVDSD) PID (PARAMETER IDENTIFICATION) WHILE COMMANDED

- Using a diagnostic scan tool, view the PCM GENVDSD PID.
- Using a diagnostic scan tool active command, set the PCM PID GENVDSD to 14-volts.
- With the engine still running at idle, measure battery voltage and record:

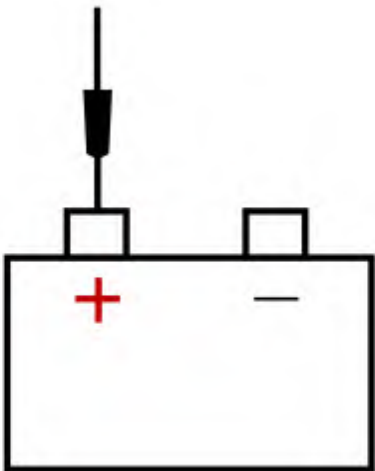
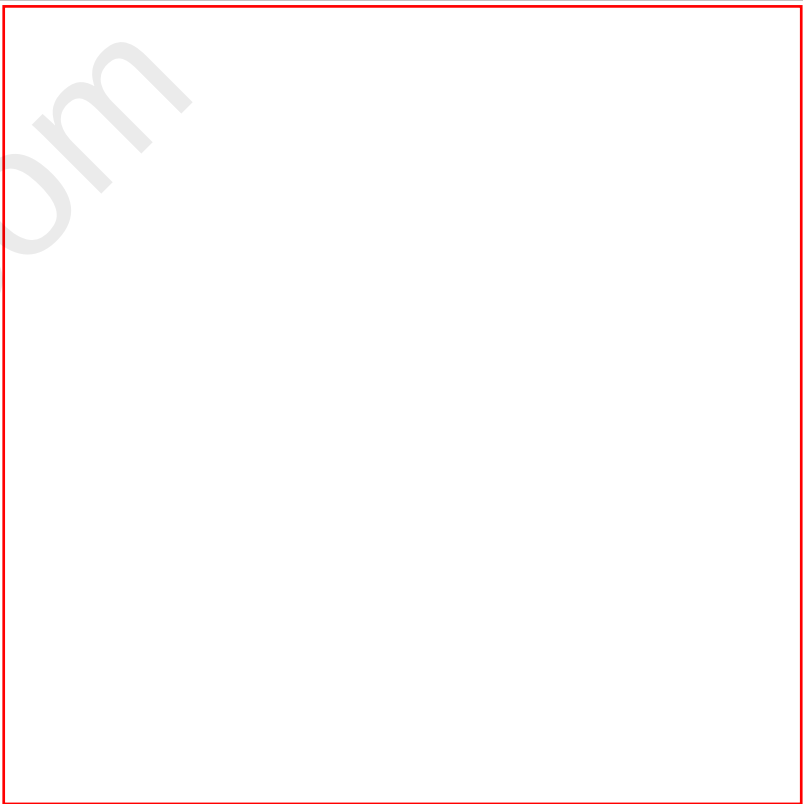
Positive Lead	Measurement / Action	Negative Lead
 E148840		

Is the recorded battery voltage within ± 0.5 volt of the PID?

Yes	GO to B7
No	GO to B13

B7 COMPARE THE SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION) TO BATTERY VOLTAGE

- With the engine still running at idle, headlamps on and blower on high, measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

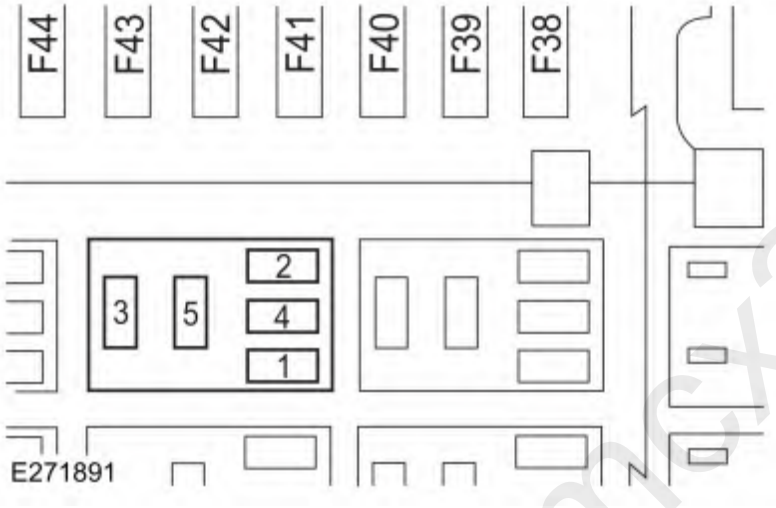
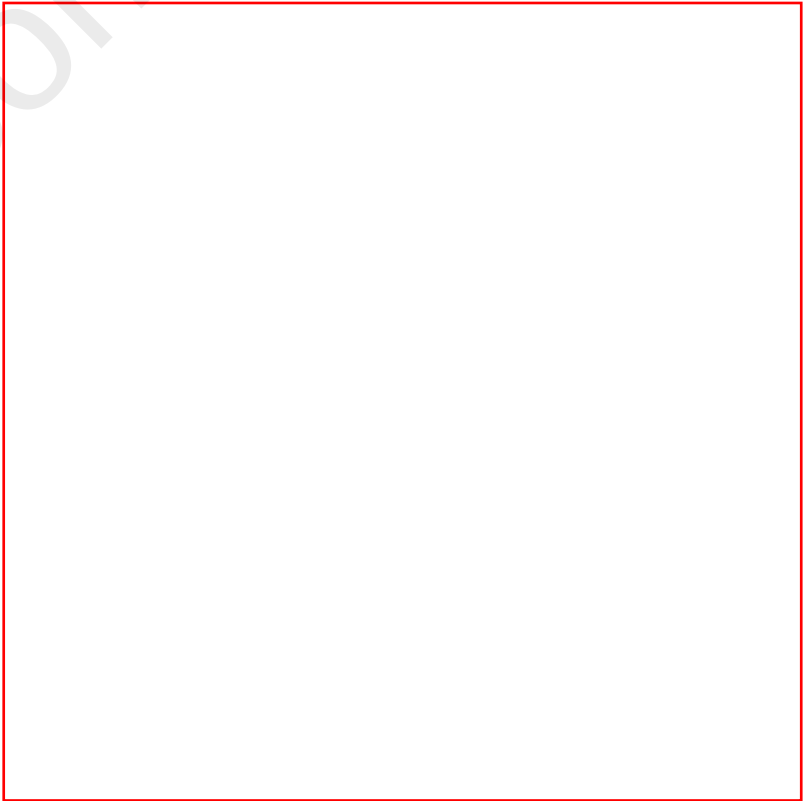
- Using a diagnostic scan tool, view the PCM PID VPWR.

Does the PID accurately display battery voltage within ± 0.5 volt of the recorded battery voltage?

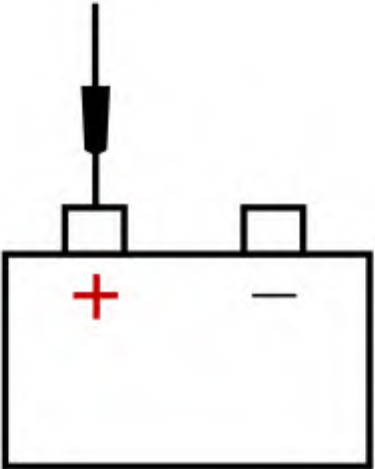
Yes	GO to B8
No	REPAIR high resistance or loose connections in the affected PCM power circuit(s).

B8 CHECK PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE CIRCUITS

- Ignition OFF.
- Disconnect BJB PCM power relay.
- Disconnect PCM C1232B (2.7L EcoBoost).
- Disconnect PCM C175B (3.5L EcoBoost).
- Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
 BJB PCM Relay pin 3		 BJB PCM Relay pin 5

- Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

- NOTE:** The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

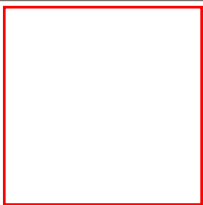
Connect the load to a suitable ground connection.

- Connect the load to each circuit and measure:

Click to display connectors

For 2.7L EcoBoost, measure:

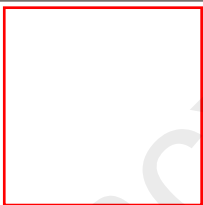
Positive Lead	Measurement / Action	Negative Lead
C1232B-101		Ground

C1232B-102		Ground
C1232B-103		Ground

- Connect the load to each circuit and measure:

Click to display connectors

For 3.5L EcoBoost, measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-101		Ground
C175B-102		Ground
C175B-103		Ground

Are the voltages within 0.5 volt of the recorded battery voltage?

Yes	REMOVE the fused jumper wire and INSTALL BJB PCM power relay. GO to B9
No	REPAIR the affected circuit(s).

B9 CHECK PCM (POWERTRAIN CONTROL MODULE) GROUND FOR HIGH RESISTANCE

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

- Connect the load to a suitable 12 volt power connection.
- Connect the load to each circuit and measure:

Click to display connectors

For 2.7L EcoBoost, measure:

Positive Lead	Measurement / Action	Negative Lead
C1232B-96		Ground
C1232B-97		Ground
C1232B-98		Ground
C1232B-99		Ground

- Connect the load to each circuit and measure:

Click to display connectors

For 3.5L EcoBoost, measure:

Positive Lead	Measurement / Action	Negative Lead

C175B-96		Ground
C175B-97		Ground
C175B-98		Ground
C175B-99		Ground

Is the voltage drop less than 0.5 volt?

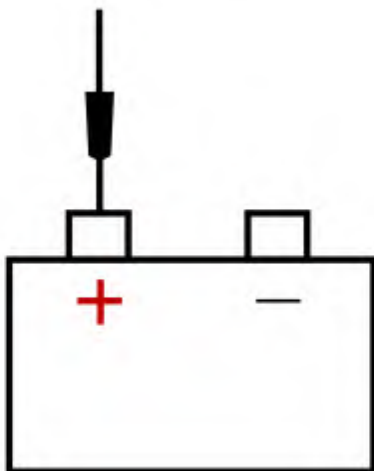
Yes	GO to B10
No	REPAIR the affected circuit(s).

B10 CHECK BCM (BODY CONTROL MODULE) SUPPLY VOLTAGE CIRCUITS

- Ignition OFF.
- Disconnect all of the BCM connectors.
- Measure and record:

Positive Lead	Measurement / Action	Negative Lead

E148840



- **NOTE:** The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

Connect the load to a suitable ground connection.

Are the voltages within 0.5 volt of the recorded battery voltage?

Yes	GO to B11
No	REPAIR the affected circuit(s).

B11 CHECK BCM (BODY CONTROL MODULE) GROUND FOR HIGH RESISTANCE

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

- Connect the load to a suitable 12 volt power connection.

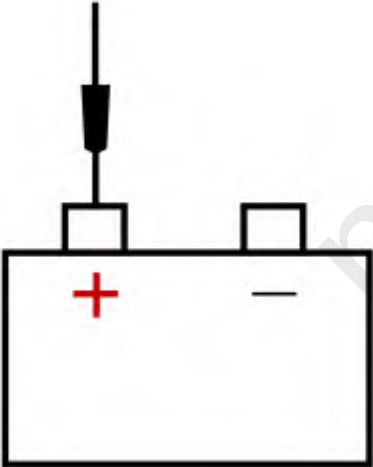
Is the voltage drop less than 0.5 volt?

Yes	GO to B12
No	REPAIR the affected circuit(s).

B12 MONITOR THE SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION)

- Start the engine.
- **NOTE:** Measure battery voltage at the battery.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

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- Using a diagnostic scan tool, view PCM PID VPWR and record.
- Momentarily accelerate the engine to Wide Open Throttle (WOT) and release. Repeat this step 4-5 times while continuing to monitor the PID.

Does the PID stay within 0.5 volt of the recorded battery voltage when the engine Revolutions Per Minute (RPM) are increased?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. INSPECT and REPAIR any connector or pin issues found. If no connector or pin issues are found, Perform the battery drain test. REFER to: Battery Drain Check (414-01 Battery, Mounting and Cables, General Procedures).
No	GO to B14

B13 CHECK GENERATOR CLUTCH OPERATION

- Ignition OFF.
- Perform the generator clutch component test. [GO to Pinpoint Test J](#)

Is the generator clutch OK?

Yes	INSTALL a new generator. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation).
No	INSTALL a new generator clutch. REFER to: Generator Pulley (414-02 Generator and Regulator, Removal and Installation).

B14 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect all PCM connectors.
- Repair:
 - corrosion (install new connector 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) (303-14 Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS)) . For 3.5L EcoBoost,REFER to: Powertrain Control Module (PCM) (303-14C Electronic Engine Controls - 3.5L EcoBoost (272kW/370PS), Removal and Installation).
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

Normal Operation and Fault Conditions

The generator is belt-driven by the engine FEAD system. Generator noise may be caused by bearing noise, electrical fault noise, generator or belt pulley misalignment. A generator with certain types of diode or stator failures can also produce an audible noise.

Possible Sources

- FEAD belt
- Loose bolts/brackets
- Generator/pulleys

Visual Inspection and Diagnostic Pre-checks

- Inspect the FEAD belt.
- Inspect for loose bolts/brackets.
- Inspect the generator/pulley.

PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE

C1 CHECK FOR ACCESSORY DRIVE BELT NOISE AND LOOSE MOUNTING BRACKETS

- Ignition OFF.
- Check the FEAD belt and tensioner for damage and correct installation.
REFER to: [Accessory Drive](#) (303-05A Accessory Drive - 2.7L EcoBoost (238kW/324PS), Diagnosis and Testing).
REFER to: Accessory Drive (303-05 Accessory Drive - 3.5L EcoBoost (272kW/370PS)) .

Is the accessory drive OK?

Yes	GO to C2
No	REPAIR as necessary.

C2 CHECK THE GENERATOR MOUNTING

- Check the generator mounting for loose bolts or misalignment.

Is the generator mounted correctly?

Yes	GO to C3
No	REPAIR as necessary.

C3 CHECK THE GENERATOR FOR NOISE

- Start the engine.
- With the engine running, use a stethoscope or equivalent listening device to probe the generator and the accessory drive area for unusual mechanical noise.

Is the generator the source of the noise?

Yes	GO to C4
No	DIAGNOSE the source of the engine noise. REFER to: Engine (303-00 Engine System - General Information) .

C4 CHECK GENERATOR CLUTCH OPERATION

- Ignition OFF.
- Perform the generator clutch component test. [GO to Pinpoint Test J](#)

Is the generator clutch OK?

Yes	INSTALL a new generator. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation).
No	INSTALL a new generator clutch. REFER to: Generator Pulley (414-02 Generator and Regulator, Removal and Installation).

Radio Interference

Refer to Wiring Diagrams Cell 12 for schematic and connector information.

Normal Operation and Fault Conditions

The generator radio suppression equipment reduces interference transmitted through the speakers by the vehicle electrical system.

NOTE: *If the Original Equipment Manufacturer (OEM) Audio Control Module (ACM) has been replaced with an aftermarket unit, the vehicle may not pass this test. Return the vehicle to Original Equipment Manufacturer (OEM) condition before following this pinpoint test.*

NOTE: *Make sure the engine rpm stays below 2,000 Revolutions Per Minute (RPM) when the generator is disconnected. If it rises above 2,000 Revolutions Per Minute (RPM) the generator may self-excite. If this occurs, turn the ignition to the OFF position and start the test over again.*

NOTE: *Inspect for any aftermarket accessories that have been added to the vehicle. Check the wiring for these accessories and be sure they have not been attached to the generator circuits and are positioned away from the generator wiring.*

Possible Sources

- Generator
- In-vehicle entertainment system
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the generator.
- Inspect the in-vehicle entertainment system.

PINPOINT TEST D : RADIO INTERFERENCE

D1 VERIFY THE GENERATOR IS THE SOURCE OF THE AUDIO SYSTEM INTERFERENCE
• Start the engine. • Allow the engine to idle. • Tune the audio system to a station where interference is present. • Ignition OFF. • Disconnect Generator C102A. • Disconnect Generator C102B. • Start the engine. • Allow the engine to idle.

Is the interference present with the generator disconnected?

Yes	DIAGNOSE the audio system. Refer to the appropriate section in Group 415 for the procedure.
No	INSTALL a new generator. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation).

Battery Monitoring Sensor Faults

Refer to Wiring Diagrams Cell 12 for schematic and connector information.

Normal Operation and Fault Conditions

The BCM monitors the battery state of charge using the battery monitoring sensor attached to the negative battery cable. Battery voltage is hardwired to the battery monitoring sensor and data is transferred from the battery monitoring sensor to the BCM via a LIN circuit.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B11DB:02	Battery Monitoring Module "A": General Signal Failure	This DTC sets if the BCM receives corrupted data from the battery monitoring sensor over the LIN.
B11DB:08	Battery Monitoring Module "A": Bus Signal / Message Failure	This DTC sets if the BCM receives corrupted data from the battery monitoring sensor over the LIN.
B11DB:11	Battery Monitoring Module "A": Circuit Short To Ground	This DTC sets if the BCM detects low voltage on the battery monitoring sensor LIN.
B11DB:9A	Battery Monitoring Module "A": Component or System Operating Conditions	This DTC sets if the BCM receives corrupted data from the battery monitoring sensor over the LIN.
B1489:11	Battery Monitoring System (BMS) Sensor Power Circuit Short To Ground	This DTC sets if the BCM receives no data from the battery monitoring sensor over the LIN.

Possible Sources

- Battery monitoring sensor
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the battery monitoring sensor.
- Inspect the battery monitoring sensor connector.

PINPOINT TEST E : BATTERY MONITORING SENSOR FAULTS

NOTE: Make sure battery voltage is greater than 12.2-volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

E1 CHECK ELECTRICAL CONNECTOR CONDITION

- Disconnect Battery Monitoring Sensor C1689.
- Check the battery monitoring sensor electrical connections for security, damage and corrosion.
- Check the battery cable connections.
- Connect Battery Monitoring Sensor C1689.

Are all connectors clean and connected properly?

Yes	GO to E2
No	REPAIR any corrosion in the battery cable connections. REPAIR any damaged, bent or pushed-out pins.

E2 RETRIEVE BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

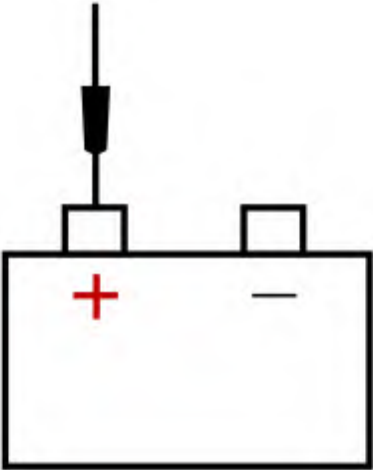
- Ignition ON.
- Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) in all modules.
- Using a diagnostic scan tool, perform the BCM self-test.

Did the DTC return?

Yes	GO to E3
No	The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

E3 CHECK THE BATTERY MONITORING SENSOR VOLTAGE

- Ignition OFF.
- Disconnect Battery Monitoring Sensor C1689.
- Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to E4
No	REPAIR the circuit.

E4 CHECK THE BATTERY MONITORING SENSOR LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition ON.

Is the voltage greater than 10-volts?

Yes	REPAIR the circuit.
No	GO to E5

E5 CHECK THE BATTERY MONITORING SENSOR LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.
- Disconnect BCM C2280F.

Is the resistance greater than 10,000 ohms?

Yes	GO to E6
No	REPAIR the circuit.

E6 CHECK THE BATTERY MONITORING SENSOR LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR AN OPEN

Is the resistance less than 3 ohms?

Yes	INSTALL a new battery monitoring sensor. REFER to: Battery Monitoring Sensor (414-01 Battery, Mounting and Cables) . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the DTC returns, GO to GO to E7
No	REPAIR the circuit.

E7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect all BCM connectors.
- Repair:
 - corrosion (install new connector 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,   Click here to access Guided Routine (BCM).
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.

Generator Current Sensor Faults

Refer to Wiring Diagrams Cell 12 for schematic and connector information.

Normal Operation and Fault Conditions

The generator current sensor is a Hall-effect sensor attached to the generator B+ cable. It is supplied a 5 volt reference and ground from the PCM. The PCM reads the generator current sensor feedback voltage to determine how much current is flowing through the generator B+ cable.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0A5A	Generator Current Sensor Circuit Range/Performance	This DTC sets in the PCM when the PCM does not detect current through the generator current sensor and there are no generator current sensor circuit Diagnostic Trouble Codes (DTCs) set.
P0A5B	Generator Current Sensor Circuit Low	This DTC sets in the PCM when the PCM senses lower than expected voltage on the generator current sensor feedback circuit, indicating an open or a short directly to ground.

P0A5C	Generator Current Sensor Circuit High	This DTC sets in the PCM when the PCM senses higher than expected voltage on the generator current sensor feedback circuit, indicating a short directly to voltage.
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Possible Sources

- Generator clutch
- Generator current sensor
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the generator current sensor.
- Inspect the generator current sensor connector.

PINPOINT TEST F : GENERATOR CURRENT SENSOR FAULTS

NOTE: Make sure battery voltage is greater than 12.2-volts prior to and during this pinpoint test.	
NOTE: Do not have a battery charger attached during vehicle testing.	
F1 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)	
• Ignition ON. • Using a diagnostic scan tool, perform the PCM self-test.	
Is DTC P0562 present?	
Yes	GO to Pinpoint Test B
No	For DTC P0A5A, GO to F2 For DTC P0A5B, GO to F3 For DTC P0A5C, GO to F5
F2 CHECK THE GENERATOR CURRENT SENSOR	

- Ignition OFF.
- Inspect the generator current sensor connector for:
 - disconnected from generator current sensor
 - loose connection
 - physical damage
- Disconnect the generator current sensor connector and inspect for:
 - physical damage
 - corrosion (install new connector or terminals – clean pins)
 - damaged or bent pins – install new terminals/pins
 - pushed-out pins – install new pins as necessary
 - sensor disconnected from generator B+ cable
 - debris between the generator current sensor and the generator B+ cable

Are any of these conditions found during inspection?

Yes	REPAIR as necessary or INSTALL a new generator current sensor. REFER to: Generator Current Sensor (414-01 Battery, Mounting and Cables) .
No	GO to F9

F3 CHECK THE GENERATOR CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect Generator current sensor C1645.
- Ignition ON.

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to F4
No	If the voltage is less than 4.8-volts, REPAIR the circuit for an open or high resistance. If the voltage is greater than 5.2-volts, REPAIR the circuit for a short to voltage.

F4 CHECK THE GENERATOR CURRENT SENSOR SIGNAL RETURN CIRCUIT FOR AN OPEN

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to F5
No	REPAIR the circuit for an open or high resistance.

F5 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition OFF.
- Disconnect PCM C1232B (2.7L EcoBoost).
- Disconnect PCM C175B (3.5L EcoBoost) .
- Ignition ON.

Is any voltage present?

Yes	REPAIR the circuit.
No	GO to F6

F6 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.

Is the resistance greater than 10,000 ohms?

Yes	GO to F7
No	REPAIR the circuit.

F7 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO THE SIGNAL RETURN OR VOLTAGE REFERENCE CIRCUIT

- Ignition OFF.

Are the resistances greater than 10,000 ohms?

Yes	GO to F8
No	REPAIR the affected circuit.

F8 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

- Measure:

Click to display connectors

For 3.5L EcoBoost

Positive Lead	Measurement / Action	Negative Lead
C175B-91	Ω	C1645-3

Is the resistance less than 3 ohms?

Yes	GO to F9
No	REPAIR the circuit.

F9 CHECK THE GENERATOR CURRENT SENSOR CONNECTION

- Ignition OFF.
- Disconnect Generator Current Sensor C1645 (if not previously disconnected).
- Inspect the generator current sensor connector for the following:
 - corrosion (install new connector or terminals – clean module pins)
 - damaged or bent pins – install new terminals/pins
 - pushed-out pins – install new pins as necessary
- Connect and correctly seat the generator current sensor connector.
- Ignition ON.

- Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) in all modules.
- Using a diagnostic scan tool, perform the PCM self-test.

Did the DTC return?

Yes	REPAIR as necessary or INSTALL a new generator current sensor. REFER to: Generator Current Sensor (414-01 Battery, Mounting and Cables) . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the DTC returns, GO to F10
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

F10 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect all PCM connectors.
- Repair:
 - corrosion (install new connector 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) (303-14 Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS)) . For 3.5L EcoBoost,REFER to: Powertrain Control Module (PCM) (303-14C Electronic Engine Controls - 3.5L EcoBoost (272kW/370PS), 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.

Refer to Wiring Diagrams Cell 12 for schematic and connector information.

Normal Operation and Fault Conditions

The PCM monitors the generator output via the generator monitor (GENMON) circuit. The PCM uses the generator command (GENCMD) circuit to command the generator to either increase or decrease output. If the GENCMD circuit (generator control circuit) or the "A" sense circuit are open or shorted to ground, the PCM will not be able to control the generator output. When the engine speed is greater than 2,000 rpm, the generator defaults to a steady voltage output of 13.5-volts and the PCM sends a request to the IPC to illuminate the charging system warning indicator. A GENCMD circuit fault can be confirmed by viewing the PCM PID generator command line fault (GENCMD_LF) (YES status indicator fault).

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0620	Generator Control Circuit	The PCM sets this DTC if the GENCMD circuit, "A" sense circuit, or B+ circuit is open or shorted to ground.
P065B	Generator Control Circuit Range/performance	The PCM sets this DTC when the generator reports an internal regulator failure.

Possible Sources

- Fuses
- Generator
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Verify BJB fuse 38 (10A).
- Verify high current BJB MEGA fuse (300A).
- Inspect the high current BJB for loose or corroded connections.

PINPOINT TEST G : DTC P0620, P065B

NOTE: Make sure battery voltage is greater than 12.2-volts prior to and during this pinpoint test.
NOTE: Do not have a battery charger attached during vehicle testing.
G1 PERFORM INSPECTION AND VERIFICATION

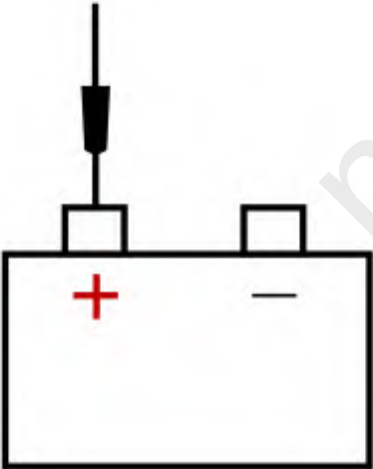
- Perform Inspection and Verification procedure in this section.

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

Yes	REPAIR as necessary.
No	GO to G2

G2 CHECK THE GENERATOR CONNECTIONS

- Ignition OFF.
- Disconnect all of the generator connectors and inspect for:
 - corrosion (install new connector or terminals – clean module pins)
 - damaged or bent pins – install new terminals/pins
 - pushed-out pins – install new pins as necessary
- Reconnect the generator connectors. Make sure they seat and latch correctly.
- Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to G3
No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation). VERIFY high current BJB MEGA fuse (300A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

G3 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

- Start the engine.
- Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

Yes	GO to G4
No	INSPECT and REPAIR any corrosion in the generator B+ circuit and positive battery cable connections.

G4 "A" SENSE CIRCUIT LOAD TEST

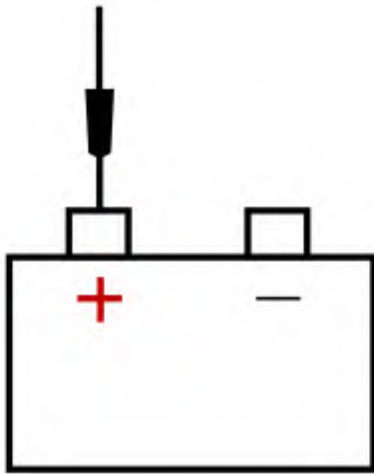
NOTICE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this section. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the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

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

- Ignition OFF.
- Disconnect Generator C102A.
- Ignition ON.
- Measure and record:

Positive Lead	Measurement / Action	Negative Lead

E148840



Is the "A" sense voltage within ± 0.5 volt of the recorded battery voltage?

Yes	GO to G5
No	VERIFY high current BJB fuse 38 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

G5 CHECK THE GENERATOR COMMAND CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition OFF.
- Disconnect PCM C1232B (2.7L EcoBoost).
- Disconnect PCM C175B (3.5L EcoBoost).
- Ignition ON.

Is any voltage present?

Yes	REPAIR the circuit.
No	GO to G6

G6 CHECK THE GENERATOR COMMAND CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.

Is the resistance greater than 10,000 ohms?

Yes	GO to G7
No	REPAIR the circuit.

G7 CHECK THE GENERATOR COMMAND CIRCUIT FOR AN OPEN

- Measure:

Click to display connectors

For 2.7L EcoBoost

Positive Lead	Measurement / Action	Negative Lead
C1232B-59	Ω	C102A-2

- Measure:

Click to display connectors

For 3.5L EcoBoost

Positive Lead	Measurement / Action	Negative Lead
C175B-61	Ω	C102A-2

Is the resistance less than 3 ohms?

Yes	GO to G8
No	REPAIR the circuit.

G8 COMPARE THE GENERATOR MONITOR (GENMON) AND GENERATOR COMMAND (GENCMD) PARAMETER IDENTIFICATIONS (PIDS)

- Ignition OFF.
- Connect PCM C1232B (2.7L EcoBoost).
- Connect PCM C175B (3.5L EcoBoost).
- Start the engine.
- Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).
- Monitor the PCM Parameter Identifications (PIDs) GENMON and GENCMD.
- Perform a wiggle test of the generator wiring and connections.

Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	REMOVE the fused jumper wire. INSTALL a new generator. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation).
No	REMOVE the fused jumper wire. GO to G9

G9 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect all PCM connectors.
- Repair:
 - corrosion (install new connector 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) (303-14 Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS)) . For 3.5L EcoBoost,REFER to: Powertrain Control Module (PCM) (303-14C Electronic Engine Controls - 3.5L EcoBoost (272kW/370PS), 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.

DTC P0625, P0626

Refer to Wiring Diagrams Cell 12 for schematic and connector information.

Normal Operation and Fault Conditions

The PCM monitors the generator output via the generator monitor (GENMON) circuit (generator field terminal circuit). If the PCM cannot read the GENMON circuit due to an open or short to ground, when the engine speed is greater than 2,000 rpm, the generator defaults to a steady voltage of 13.5-volts and the PCM sends a request to the IPC to illuminate the charging system warning indicator. A GENMON duty cycle of 3% or less indicates a short to ground fault is present and results in DTC P0625 setting in the PCM. A GENMON duty cycle of 98% or more indicates an open or short to voltage fault is present and results in DTC P0626 setting in the PCM.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions

P0625	Generator Field/F Terminal Circuit Low	The PCM sets this DTC if the GENMON circuit is shorted to ground, the "A" sense circuit is open or the B+ circuit is open. This DTC also sets by a faulted PCM or generator.
P0626	Generator Field/F Terminal Circuit High	The PCM sets this DTC if the GENMON circuit is open or shorted to power. This DTC can also be set by a faulted PCM or generator.

Possible Sources

- Battery
- Fuses or fusible links
- Generator
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect for abnormal ignition-off current drain(s).
- Inspect the high current BJB for loose or corroded connections.

PINPOINT TEST H : DTC P0625, P0626

H1 PERFORM INSPECTION AND VERIFICATION

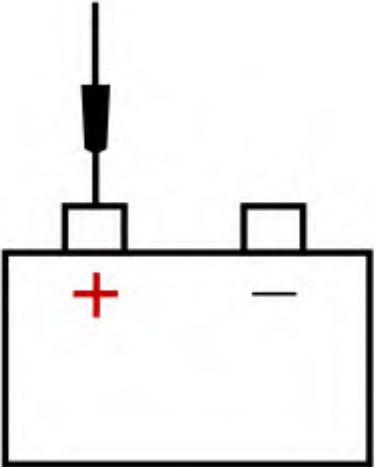
- Perform Inspection and Verification procedure in this section.

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

Yes	REPAIR as necessary.
No	GO to H2

H2 CHECK THE GENERATOR CONNECTIONS

- Ignition OFF.
- Disconnect all of the generator connectors and inspect for:
 - corrosion (install new connector or terminals – clean module pins)
 - damaged or bent pins – install new terminals/pins
 - pushed-out pins – install new pins as necessary
- Reconnect the generator connectors. Make sure they seat and latch correctly.
- Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to H3
-----	--------------------------

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation). VERIFY high current BJB MEGA fuse (300A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.
-----------	---

H3 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

- Start the engine.
- Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

Yes	For DTC P0625, GO to H4 For DTC P0626, GO to H5
No	INSPECT and REPAIR any corrosion in the generator B+ circuit and positive battery cable connections.

H4 "A" SENSE CIRCUIT LOAD TEST

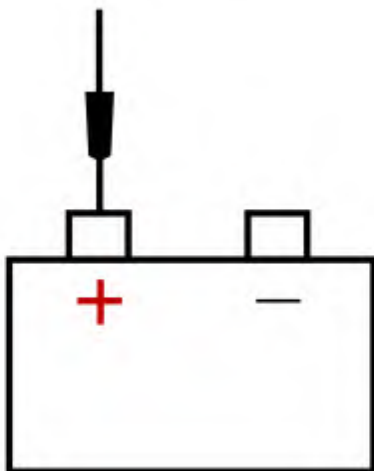
NOTICE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this section. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the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

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

- Ignition OFF.
- Disconnect Generator C102A.
- Ignition ON.
- Measure and record:

Positive Lead	Measurement / Action	Negative Lead

E148840



Is the "A" sense voltage within ± 0.5 volt of the recorded battery voltage?

Yes	GO to H5
No	VERIFY high current BJB fuse 38 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.

H5 CHECK THE GENERATOR MONITOR CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition OFF.
- Disconnect PCM C1232B For 2.7L EcoBoost.
- Disconnect PCM C175B For 3.5L EcoBoost.
- Ignition ON.

Is any voltage present?

Yes	REPAIR the circuit.
No	GO to H6

H6 CHECK THE GENERATOR MONITOR CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.

Is the resistance greater than 10,000 ohms?

Yes	GO to H7
No	REPAIR the circuit.

H7 CHECK THE GENERATOR MONITOR CIRCUIT FOR AN OPEN

- Measure:

Click to display connectors

For 2.7L EcoBoost

Positive Lead	Measurement / Action	Negative Lead
C1232B-26	Ω	C102A-1

- Measure:

Click to display connectors

For 3.5L EcoBoost

Positive Lead	Measurement / Action	Negative Lead
C175B-26	Ω	C102A-1

Is the resistance less than 3 ohms?

Yes	GO to H8
No	REPAIR the circuit.

H8 CHECK THE GENERATOR B+ INTERNAL RESISTANCE

- Disconnect Generator C102A.
- Disconnect Generator C102B.
- Measure generator component side:

Click to display connectors

Positive Lead	Measurement / Action	Negative Lead
Generator B+ (Component side)	Ω	Generator case

Is the resistance greater than 25K ohms?

Yes	GO to H9
No	INSTALL a new generator. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation).

H9 CHECK THE COMPONENT SIDE RESISTANCE OF THE VOLTAGE REGULATOR INTERNAL CIRCUITS TO GROUND

- Measure generator component side:

Click to display connectors

Positive Lead	Measurement / Action	Negative Lead
C102A-1 (Component Side)	Ω	Generator case
C102A-2 (Component Side)		Generator case
C102A-3 (Component Side)		Generator case

Are the resistances greater than 10,000 ohms?

Yes	GO to H10
No	INSTALL a new generator. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation).

H10 COMPARE THE GENMON PID (PARAMETER IDENTIFICATION) AND THE GENCMD PID (PARAMETER IDENTIFICATION)

- Connect PCM C1232B (2.7L EcoBoost).
- Connect PCM C175B (3.5L EcoBoost).
- Start the engine.
- Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).
- Using the active command, set the PID GENVDSD to 14-volts.
- Monitor the PCM Parameter Identifications (PIDs) GENMON and GENCMD.
- Perform a wiggle test of the generator wiring and connections.

Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	REMOVE the fused jumper wire. INSTALL a new generator. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation).
No	REMOVE the fused jumper wire. GO to H11

H11 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect all PCM connectors.
- Repair:
 - corrosion (install new connector 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) (303-14 Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS)) . REFER to: Powertrain Control Module (PCM) (303-14C Electronic Engine Controls - 3.5L EcoBoost (272kW/370PS), 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.

Load Shed Message Displays in Message Center

Refer to Wiring Diagrams Cell 12 for schematic and connector information.

Normal Operation and Fault Conditions

When the engine is off and the key is in on or accessory mode, and the BCM determines the battery state of charge is below 50%, or 45 minutes have elapsed, a load shed

message is sent over the CAN. This message turns off the audio/navigation system to save the remaining battery charge. Under this condition the a load shed message will be displayed to notify the driver that battery protection actions are active:

- System Off to Save Battery Turn Ignition Off displays on the FCDIM (without touchscreen controls)
- SYSTEM OFF TO SAVE BATTERY PLEASE TURN IGNITION OFF OR START ENGINE displays on the FDIM (with touchscreen controls)
- Battery Saver - System Off displays on the FDIM (with Sync)

These messages displaying may be normal operation and not indicate a fault. Refer to the Owner Literature and REFER to: [Charging System - 2.7L EcoBoost \(238kW/324PS\)/3.5L EcoBoost \(272kW/370PS\) - System Operation and Component Description](#) (414-00 Charging System - General Information, Description and Operation). Load shed messages displaying with the **engine running** or only on the FCDIM or the FDIM (with touchscreen controls) indicates the audio system has detected a fault.

Possible Sources

- Normal operation
- Audio system
- Battery
- BCM
- Fuses or Fusible Links
- Generator
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.
- Inspect the battery for loose or corroded connections.
- Inspect the generator for loose or corroded connections.
- Inspect the BJB for loose or corroded connections.
- Inspect the high current BJB for loose or corroded connections.
- Inspect C146 for loose or corroded connections.
- Inspect battery and engine grounds for loose or corroded connections.

PINPOINT TEST I : LOAD SHED MESSAGE DISPLAYS IN MESSAGE CENTER

I1 PERFORM INSPECTION AND VERIFICATION	
• Perform Inspection and Verification procedure in this section.	
Was an obvious cause for an observed or reported concern found?	
Yes	REPAIR as necessary.
No	GO to I2

I2 VERIFY THE CUSTOMER CONCERN

- Verify the customer concern by operating the charging system.

Did the customer indicate battery saver message only appeared in the centerstack with the engine running?

Yes	Without SYNC, REFER to: Information and Entertainment System (415-00 Information and Entertainment System - General Information - Vehicles Without: SYNC) . SYNC Without Touchscreen, REFER to: Information and Entertainment System (415-00 Information and Entertainment System - General Information - Vehicles With: SYNC Without Touchscreen) . With touchscreen, REFER to: Information and Entertainment System (415-00 Information and Entertainment System - General Information - Vehicles With: Touchscreen Display) . With Sony Audio, REFER to: Information and Entertainment System (415-00 Information and Entertainment System - General Information - Vehicles With: Sony Audio System) . With Ford Telematics, REFER to: Information and Entertainment System (415-00 Information and Entertainment System - General Information - Vehicles With: Ford Telematics) .
No	GO to I3

I3 VERIFY THE NETWORK

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

Did the APIM, BCM, and PCM pass the Network Test?

Yes	GO to I4
No	REFER to: Communications Network (418-00 Module Communications Network) .

I4 PERFORM PCM (POWERTRAIN CONTROL MODULE) SELF TEST

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

Were any battery or charging system related Diagnostic Trouble Codes (DTCs) retrieved?

Yes	REFER to PCM DTC chart in this section.
No	GO to 15

I5 RETRIEVE ALL CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

- Ignition ON.
- Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCS).

Were any battery or charging system related Diagnostic Trouble Codes (DTCs) retrieved?

Yes	For BCM Diagnostic Trouble Codes (DTCs) refer to BCM DTC chart in this section. For APIM or ACM Diagnostic Trouble Codes (DTCs), Refer to the appropriate section in Group 415 for the procedure. For other battery or charging system related Diagnostic Trouble Codes (DTCs), REFER to: Diagnostic Trouble Code Charts (100-00 General Information) .
No	GO to 16

I6 CHECK BCM (BODY CONTROL MODULE) BAT_ST_CHRG PID (PARAMETER IDENTIFICATION)

- Ignition ON.
- Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).
- Monitor the BCM BAT_ST_CHRG PID.

Does the PID indicate 50% or more?

Yes	GO to 18
No	GO to 17

I7 RELEARN BATTERY STATE OF CHARGE

NOTE: The battery state of charge is too low and needs to be relearned. Refer to the Description and Operation in this section for more information on battery state of charge.

- Remove all accessories from the lighter, all power outlets and DC/AC inverter (if equipped).
- **NOTE:** The key should not be left in the vehicle but should be left in a secure location away from the vehicle such as a lock box.

Allow vehicle to sit undisturbed for at least 6 hours.

- Ignition ON.
- Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).
- Monitor the BCM BAT_ST_CHRG PID.

Does the PID indicate 50% or more?

Yes	The concern may have been caused by too low of a battery state of charge. REVIEW Energy Management operation with customer and return vehicle to customer.
No	GO to 18

I8 VERIFY INLINE CONNECTOR

- Inspect inline connector C146 for secure connection.
- Disconnect Inline connector C146.
- Inspect for:
 - corrosion (install new connector or terminals – clean module pins)
 - damaged or bent pins – install new terminals/pins
 - pushed-out pins – install new pins as necessary

Were any concerns present?

Yes	REPAIR as necessary.
No	GO to 19

I9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect all BCM connectors.
- Repair:
 - corrosion (install new connector 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,   Click here to access Guided Routine (BCM).
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.

Generator Clutch Component Test

Refer to Wiring Diagrams Cell 12 for schematic and connector information.

Normal Operation and Fault Conditions

The generator clutch allows the generator rotor to continue to rotate when the engine or FEAD system slows. The clutch should slip freely and smoothly in a clockwise direction. It should not rotate freely in the counterclockwise direction. A loose FEAD belt or a weak or binding tensioner can cause the pulley to overheat.

REFER to: [Charging System - 2.7L EcoBoost \(238kW/324PS\)/3.5L EcoBoost \(272kW/370PS\) - System Operation and Component Description](#) (414-00 Charging System - General Information, Description and Operation).

PINPOINT TEST J : GENERATOR CLUTCH COMPONENT TEST

J1 INSPECT THE GENERATOR CLUTCH

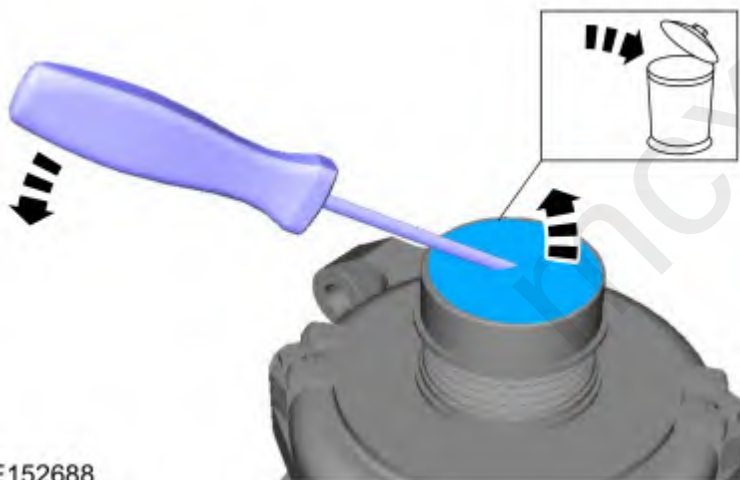
- Remove the generator.
REFER to: [Generator - 2.7L EcoBoost \(238kW/324PS\)](#) (414-02 Generator and Regulator, Removal and Installation).
REFER to: [Generator - 3.5L EcoBoost \(272kW/370PS\)](#) (414-02 Generator and Regulator, Removal and Installation).
- Inspect the generator clutch for heat damage.

Is there evidence of heat damage?

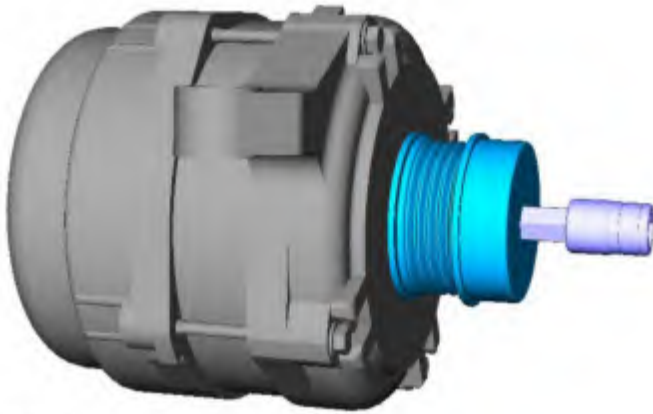
Yes	INSTALL a new generator clutch. REFER to: Generator Pulley (414-02 Generator and Regulator, Removal and Installation). INSPECT the FEAD system. REFER to: Accessory Drive (303-05A Accessory Drive - 2.7L EcoBoost (238kW/324PS), Diagnosis and Testing). or REFER to: Accessory Drive (303-05 Accessory Drive - 3.5L EcoBoost (272kW/370PS)) .
No	GO to J2

J2 CHECK THE GENERATOR CLUTCH FOR SMOOTH ROTATION

- Using a small screwdriver or similar tool, insert the tool through the rubber button on the center of the pulley cap and pry off the cap. Discard the cap. A new cap must be installed.



- E152688
- Using a 17 mm hex tool bit (such as a Snap-on® SAM17E2 or equivalent) and socket wrench, insert the 17 mm hex tool bit into the end of the clutch shaft.



E152689

- While holding the clutch pulley firmly by hand, turn the clutch shaft clockwise. The clutch shaft should rotate smoothly and freely.

Does the clutch shaft rotation feel rough or seized?

Yes	INSTALL a new generator clutch. REFER to: Generator Pulley (414-02 Generator and Regulator, Removal and Installation).
No	GO to J3

J3 CHECK FOR REVERSE ROTATION RESISTANCE

- While holding the clutch pulley firmly by hand, turn the clutch shaft counterclockwise.

Is there some resistance (a spring feel)?

Yes	GO to J4
No	INSTALL a new generator clutch. REFER to: Generator Pulley (414-02 Generator and Regulator, Removal and Installation).

J4 CHECK FOR REVERSE ROTATION

- While holding the clutch pulley firmly by hand, turn the clutch shaft counterclockwise.

Does the clutch shaft rotate freely?

Yes	INSTALL a new generator clutch. REFER to: Generator Pulley (414-02 Generator and Regulator, Removal and Installation).
No	INSTALL a new generator. REFER to: Generator - 2.7L EcoBoost (238kW/324PS) (414-02 Generator and Regulator, Removal and Installation). REFER to: Generator - 3.5L EcoBoost (272kW/370PS) (414-02 Generator and Regulator, Removal and Installation).