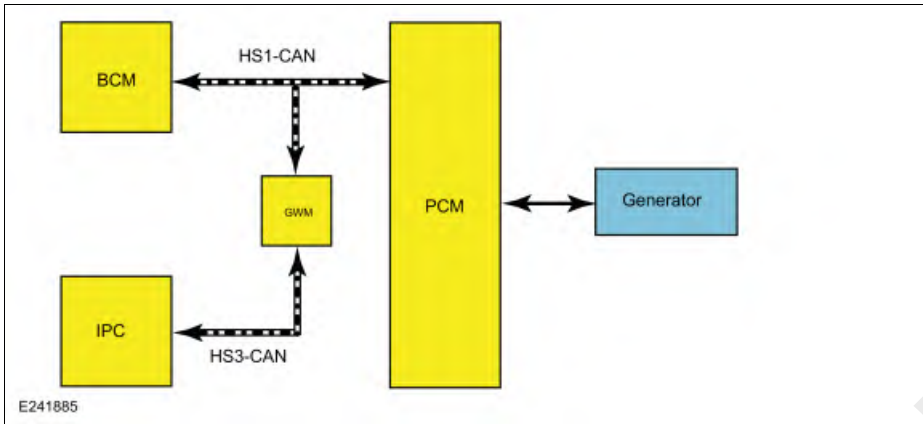


Charging System - System Operation and Component Description

System Operation

System Diagram



Item	Description
1	PCM
2	IPC
3	Generator
4	BCM
5	GWM

Network Message Chart

Module Network Input Messages – Body Control Module (BCM)

Broadcast Message	Originating Module	Message Purpose
Alternator fault	PCM	The PCM has detected a fault in the generator or generator circuits.

Module Network Input Messages – Instrument Panel Cluster (IPC)

Broadcast Message	Originating Module	Message Purpose
Power system status	BCM	Reports any generator/charging system faults. Used for charging system fault indicator.
Load Shed Request	BCM	Used to indicate what level of load shed is commanded.

Module Network Input Messages – Powertrain Control Module (PCM)

Broadcast Message	Originating Module	Message Purpose
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Broadcast Message	Originating Module	Message Purpose
Load Shed Request	BCM	Used to indicate what level of load shed is commanded.

Charging System

The PCM controlled Smart Charge charging system determines the optimal voltage setpoint for the charging system and communicates this information to the voltage regulator. The Smart Charge charging system sets Diagnostic Trouble Codes (DTCs) when a charging system fault is present. All of the Diagnostic Trouble Codes (DTCs) can set continuous faults, but not all Diagnostic Trouble Codes (DTCs) set as on-demand faults.

This system uses 2 communication lines between the PCM and the generator/voltage regulator: A generator communication (GENCOM) line communicates the desired setpoint from the PCM to the voltage regulator, and a generator monitor (GENMON) line communicates the generator load and error conditions to the PCM. Both of these use PWM. The PCM sends the GENCOM command only when it is necessary to adjust the voltage setpoint. If the setpoint does not need to be changed, several seconds may elapse between PCM GENCOM commands. This normal operation appears in the PID as occasional bursts of pulse-width commands. In addition to these two circuits, a third pin on the voltage regulator, the "A" circuit pin, is dedicated to monitor, or sense, the battery voltage.

The PCM simultaneously controls and monitors the generator output. When the current consumption is high or the battery is discharged, the PCM raises engine speed as needed to increase generator output. The generator charges the battery and at the same time supplies power for all of the electrical loads. The battery is more effectively charged with a higher voltage when the battery is cold and a lower voltage when the battery is warm.

The PCM turns off the generator during cranking to reduce the generator load and improve cranking speed. Once the engine starts, the PCM slowly increases generator output to the desired voltage.

The PCM reports any charging system faults and sends a message through the High Speed Controller Area Network (HS-CAN) to the BCM. The BCM controls the charging system warning indicator by sending a message over the Medium Speed Controller Area Network (MS-CAN) to the IPC. The IPC then controls charging system warning indication based on the message from the PCM through the BCM. The status of the PCM charging system warning indicator and/or message is confirmed by viewing PCM PID generator fault indicator lamp (GENFIL). Any charging system fault detected by the PCM results in 1 or more DTC being set and the PID GENFIL having a status of On. If equipped with a charging system warning indicator, the IPC turns the indicator on or off. If equipped with a message center, the IPC displays a CHECK CHARGING SYSTEM message. In some instances, the CHECK CHARGING SYSTEM message may not display if the ignition is on and the engine is off.

Under certain circumstances, the charging system may have a concern but still keeps the battery charged and the vehicle running. GENCOM normally initiates charging but with a fault in this circuit, the generator can self-excite and start charging on its own. The charging system warning indicator is illuminated and/or the CHECK CHARGING SYSTEM message is displayed, and the generator operates in a default mode (approximately 13.5 volts).

Dual Generators

Vehicles with the 7.3L 2V DEVCT engine may have dual generators. In dual generator systems, the PCM keeps the secondary generator in a standby state where it does not generate current unless the primary generator is generating full power and more current is needed to support the vehicle loads. The PCM monitors the output of the primary generator and adjusts the control setpoint of the secondary generator to cause it to provide additional current when needed.

Battery Charging

Refer to: Charging System - System Operation and Component Description (414-00 Charging System - General Information, Description and Operation).

Battery Current Sensor

The battery current sensor which only monitors current flow in/out of the battery, The battery current sensor is attached to the battery negative cable. It is supplied a 5-volt reference voltage and a ground from the BCM. The battery current sensor is a Hall-effect sensor that supplies an analog feedback signal to the BCM. The BCM reads the battery current sensor feedback voltage to determine how much current is flowing through the battery ground cable. The BCM uses this information for battery state of charge.

Battery Replacement

Refer to: Battery (414-01 Battery, Mounting and Cables, Removal and Installation).

Component Description

Generator

The generator is equipped with an electronic internal voltage regulator.

Powertrain Control Module (PCM)

The PCM monitors and controls the charging system.

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