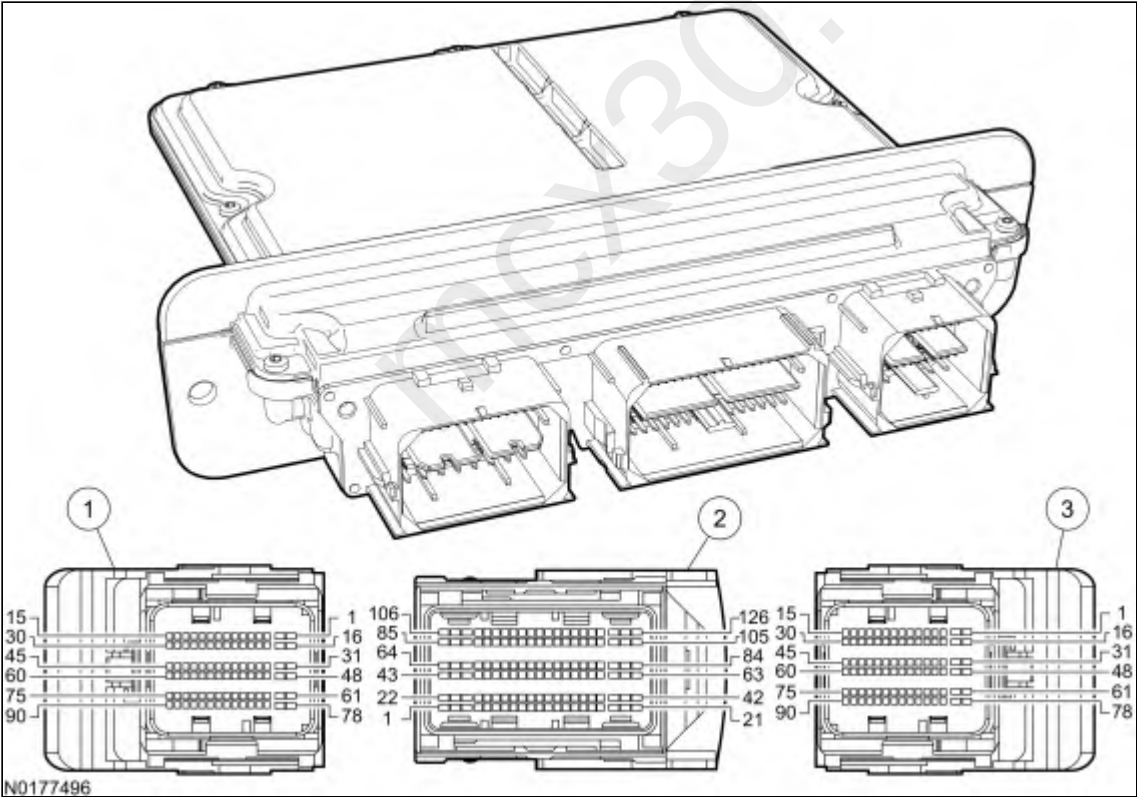


Powertrain Control Hardware

Powertrain Control Module (PCM) And Location

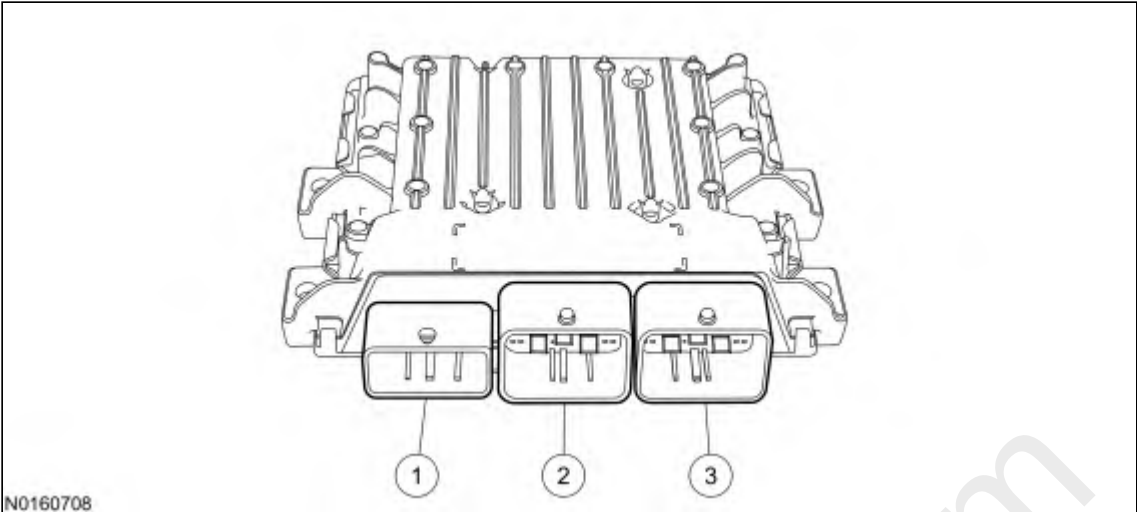
The PCM is the control center for the engine powertrain system. The PCM monitors the information from various sensors, and controls the systems that affect the vehicles performance and emissions. The PCM and the transmission control module (TCM) are stand-alone modules. The PCM and the TCM communicate through the control area network (CAN). The F-650 / F-750 PCM has a 3 pocket connector assembly with a total of 222 pins. F-Series Super Duty has a 3 pocket connector assembly with a total of 306 pins. The 74 pin connector is dedicated to chassis related inputs, outputs, powers and grounds. The 98 pin connector is dedicated to engine control related inputs, outputs such as the fuel injectors, camshaft, crankshaft sensors and the turbocharger systems. The 50 pin connector is dedicated to the exhaust aftertreatment components. The Transit PCM has a 3 pocket connector assembly with a total of 154 pins. The 53 pin B connector is dedicated to chassis related inputs, outputs, powers and grounds. The 48 pin E connector is dedicated to engine control related inputs, outputs such as the fuel injectors, camshaft, crankshaft sensors and the turbocharger systems. The 53 pin T connector is dedicated to the exhaust aftertreatment components. The PCM receives input from sensors and other electronic components (switches and relays) and places this information into random access memory (RAM) or the electronically erasable programmable read only memory (EEPROM). Based on information programmed into its read only memory (ROM), the PCM generates output signals to control various relays, solenoids, and actuators. The PCM controls these output circuits by controlling the ground or the power feed circuit through the transistors or an output driver module.

F-Series Super Duty



Item	Number	Description
1	—	B Connector
2	—	E Connector
3	—	T Connector

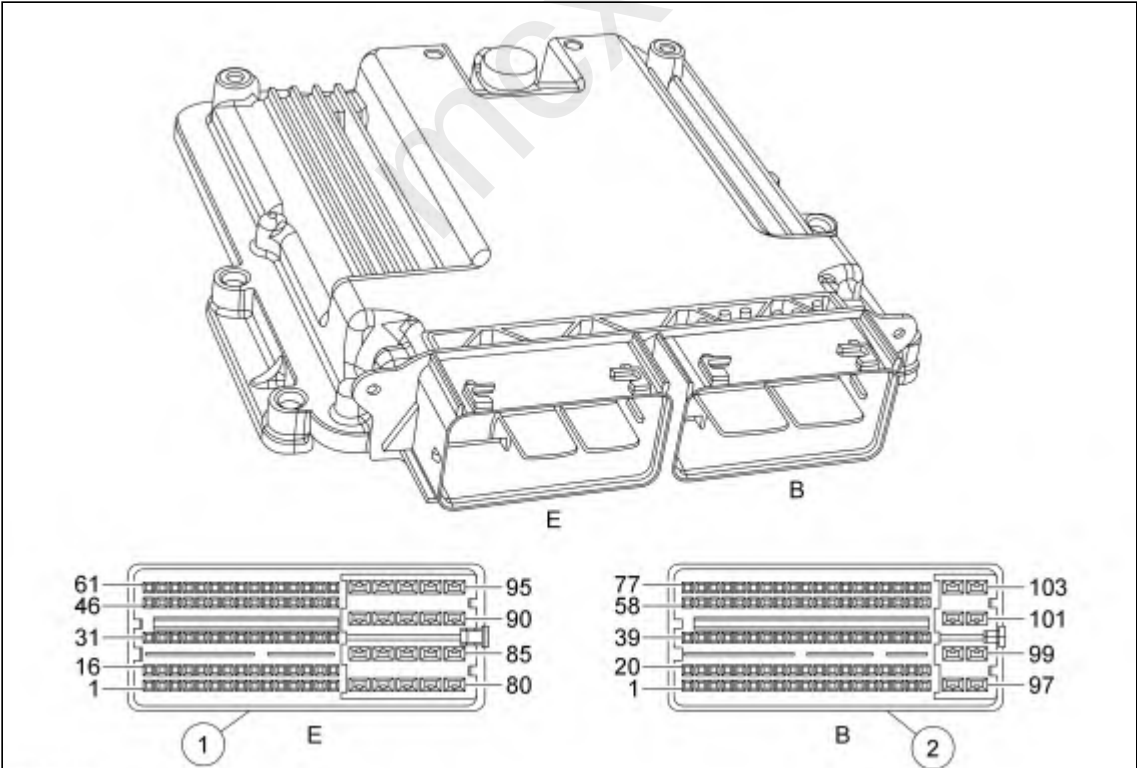
Transit



N0160708

Item	Number	Description
1	—	E Connector
2	—	T Connector
3	—	B Connector

Transit Connect

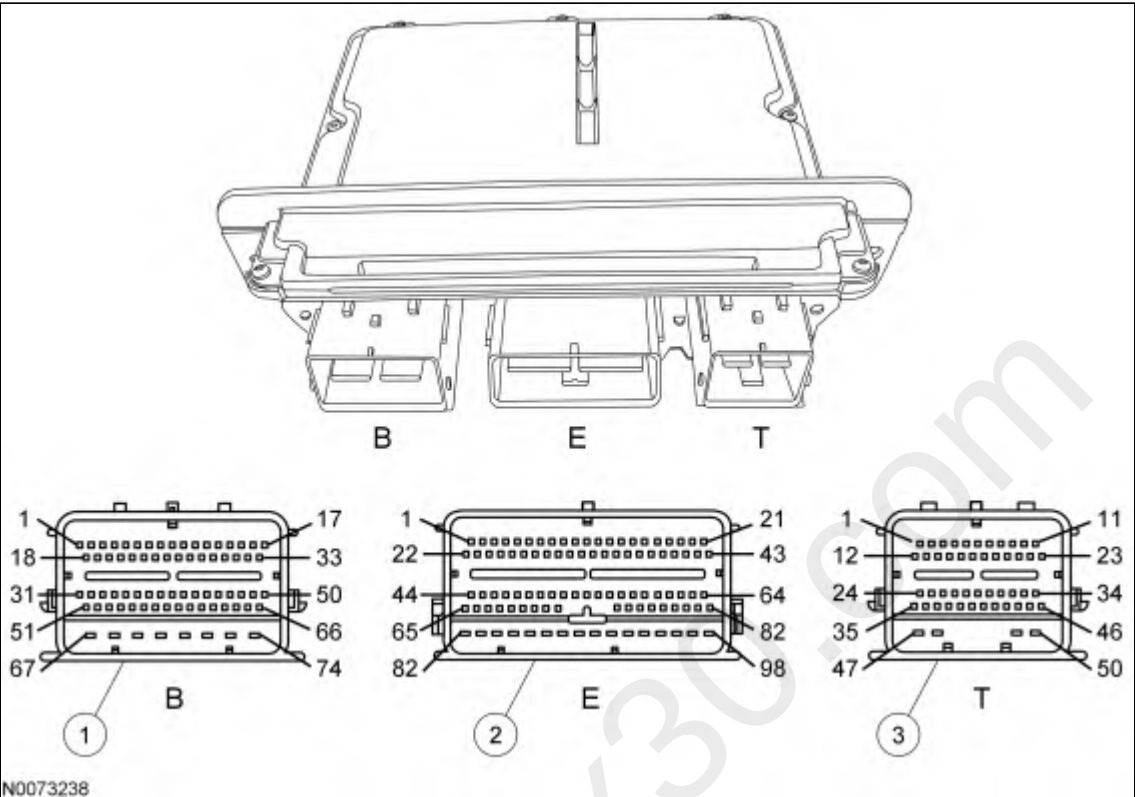


N0123761

Item	Number	Description
------	--------	-------------

1	—	E Connector
2	—	B Connector

All Others



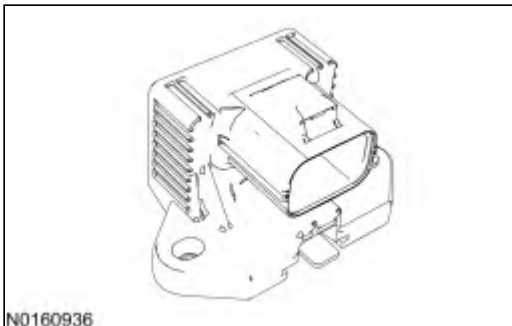
Item	Number	Description
1	—	B Connector
2	—	E Connector
3	—	T Connector

PCM Locations

For PCM location, removal and installation procedures, refer to the Workshop Manual Section 303-14, Electronic Engine Controls.

Fuel Pump Control Module

The fuel pump control module receives a duty cycle signal from the PCM and controls the fuel pump operation in relation to this duty cycle. The fuel pump control module controls the fuel pump by switching the fuel pump power circuit ON and OFF at the required duty cycle. The fuel pump control module sends diagnostic information to the PCM on the FPM circuit. For additional information on the fuel pump control and the fuel pump monitor, refer to Fuel Systems in this section.



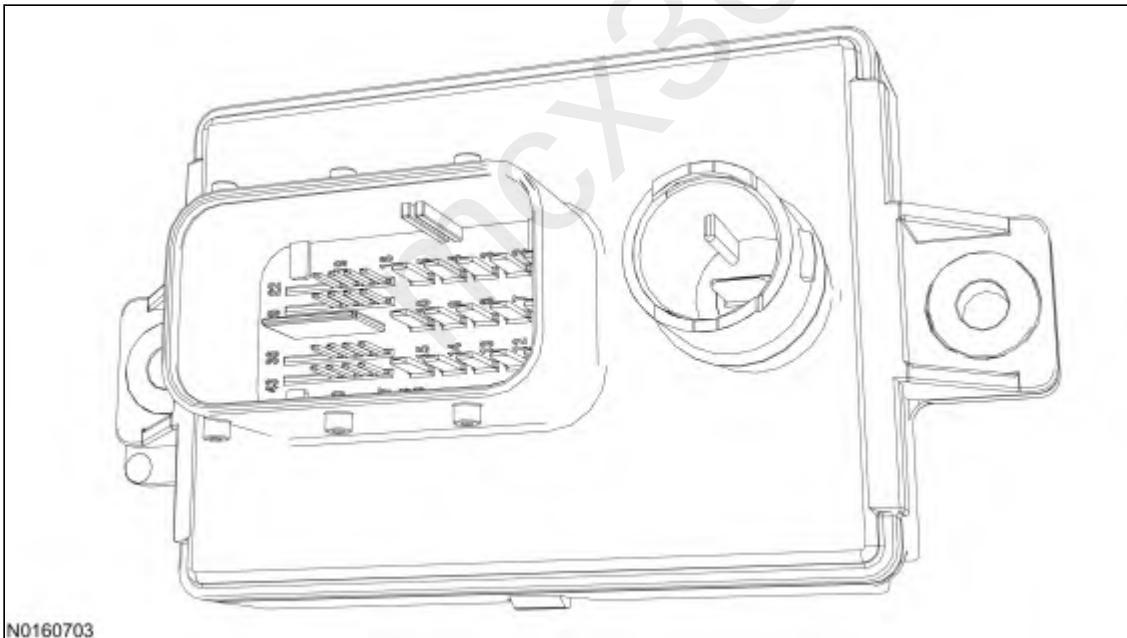
Typical Fuel Pump Control Module

Glow Plug Control Module (GPCM)

Note: *The wait to start indicator on time is controlled by the PCM and is independent from the GPCM on time.*

Glow Plug Control Module (GPCM) — Transit

The glow plug system consists of a GPCM, glow plugs, and the associated wiring harnesses. The glow plug on time is controlled by the GPCM and functions on the basis of the engine RPM, engine torque, engine coolant temperature, air temperature, BARO sensor and battery voltage. The GPCM is located behind the left hand side front wheel well cover near the firewall. The GPCM supplies voltage to the individual glow plugs, which it does by duty cycling direct battery voltage. Glow plug on time normally varies depending on battery voltage and the engine coolant temperature and ambient air temperatures. The voltage to the glow plugs is provided through the GPCM five high current drivers from the vehicle battery. Battery voltage is supplied to the GPCM, the power distribution box, then through the vehicle harness, which connects to the GPCM. The metallic instant start glow plugs can operate up to 8 minutes. The GPCM may activate the glow plugs during an extended idle at cold ambient temperatures. The GPCM provides battery voltage for approximately 2 seconds to heat the glow plugs, and then modulates the voltage to a lower setpoint to maintain optimal glow plug tip temperature. The GPCM monitors and detects individual glow plug functionality and control. Concerns detected by the GPCM are transmitted to the PCM over the controller area network 2 (CAN2) circuits.

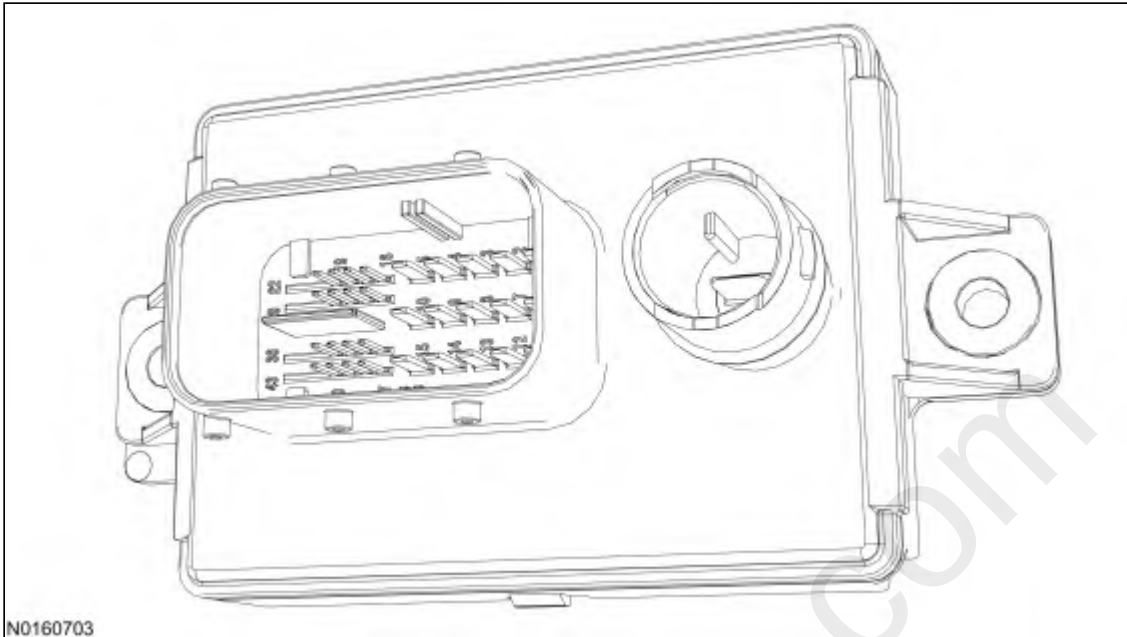


GPCM (Transit)

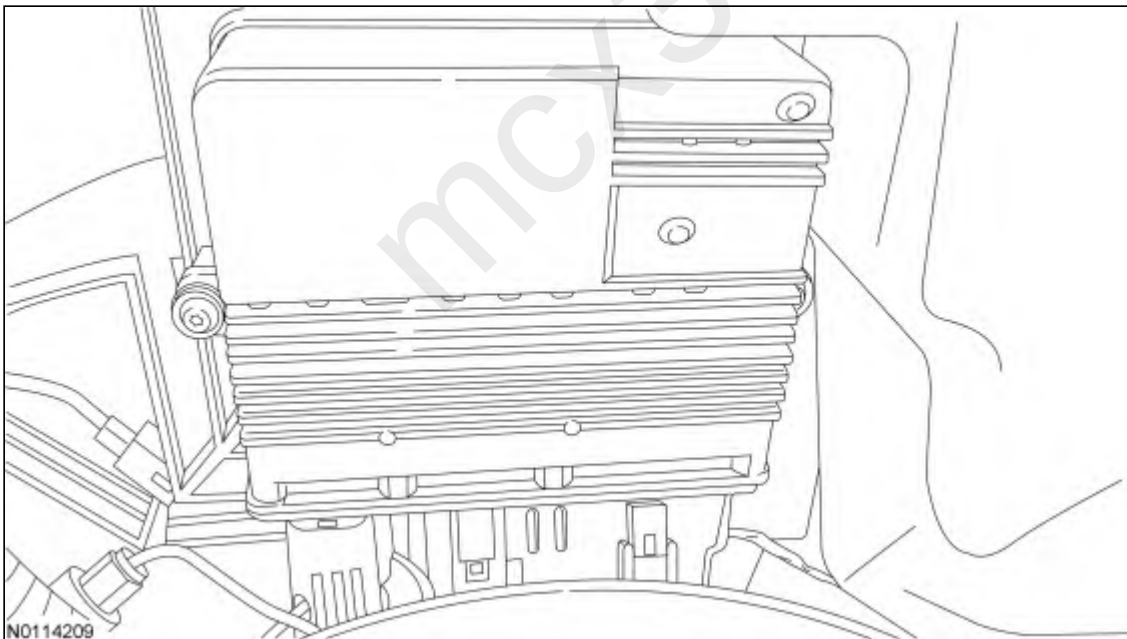
Glow Plug Control Module (GPCM) — All Others

The glow plug system consists of a GPCM, glow plugs, and the associated wiring harnesses. The glow plug on time is controlled by the GPCM and functions on the basis of the engines RPM, engines torque, engine coolant temperature, air temperature, BARO sensor and battery voltage. The GPCM is located behind the right hand side front wheel well cover. The GPCM supplies voltage to the individual glow plugs, which it does by duty cycling direct battery voltage. Glow plug on time normally varies depending on battery voltage and the engine coolant temperature. The voltage to the glow plugs is provided through the GPCM eight high current drivers from the vehicle battery. Battery voltage is supplied to the GPCM,

the power distribution box, then through the vehicle harness, which connects to the GPCM. The ceramic instant start glow plugs can operate up to 20 minutes. The GPCM may activate the glow plugs during an extended idle at cold ambient temperatures. The GPCM provides battery voltage for approximately 2 seconds to heat the glow plugs, then modulates the voltage to 7 volts to maintain temperature. The module also contains three drivers for the reductant heating system. The GPCM monitors and detects individual glow plug functionality and control. Concerns detected by the GPCM are transmitted to the PCM over the controller area network 2 (CAN2) circuits.



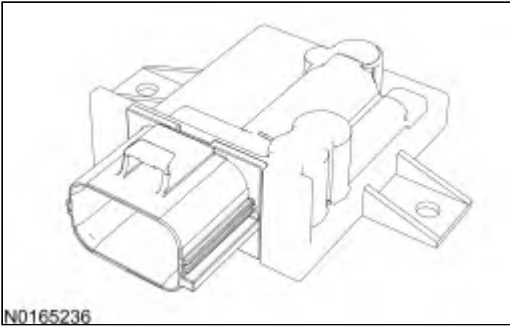
GPCM (F-Series Super Duty)



Typical GPCM (All Others)

Reductant Pump Control Module

The reductant pump control module receives a duty cycle signal from the PCM and controls the reductant pump operation in relation to this duty cycle. The reductant pump control module controls the reductant pump by energizing the pump motor three phase drive circuits at the required speed in the required direction, as commanded by the PCM. The reductant pump control module sends diagnostic information to the PCM.



Typical Reductant Pump Control Module

Electronically Erasable Programmable Read Only Memory (EEPROM)

The PCM stores information in the EEPROM (a memory integrated circuit chip) about vehicle operating conditions, and then uses this information to compensate for component variability.

Power and Ground Signal Circuits

Gold and Silver Plated Pins

Note: When installing new terminals make sure new gold plated terminals are used where they were originally used.

Some engine control hardware components have gold plated pins within the connectors and mating harness connectors to improve electrical stability for low current draw circuits and to enhance corrosion resistance.

Keep Alive Power (KAPWR)

The KAPWR circuit supplies a constant battery voltage (B+) input to the PCM to maintain memory contents when the ignition is in the OFF position.

Power Ground (PWRGND)

The PWRGND circuits are directly connected to the battery negative terminal. The PWRGND circuits provide a return path for the PCM vehicle power (VPWR) circuits.

Reference Voltage (VREF)

The VREF is a consistent positive voltage (4.4 to 5.5 volts) provided by the PCM. The VREF is typically used by 3-wire sensors and some digital input signals.

Signal Return (SIGRTN)

The SIGRTN circuits are a dedicated return path for applied components.

Vehicle Buffered Power (VBPWR)

The VBPWR is a regulated voltage supplied by the PCM to vehicle sensors. These sensors require a constant 12 volts for operation and cannot withstand VPWR voltage variations. The VBPWR is regulated to VPWR minus 1.5 volts and is also current limited to protect the sensors.

Vehicle Power (VPWR)

The VPWR is the primary source of PCM power. The VPWR is switched through the PCM power relay and is controlled by the PCM. With the ignition in the START or RUN position, voltage is supplied to the PCM through the ISP-R circuit. When the PCM senses that the ignition is in the START or RUN position, the PCM grounds the PCMRC circuit to energize the relay and close the internal contacts. With the relay contacts closed, VPWR is supplied to the PCM.

mcx30.com