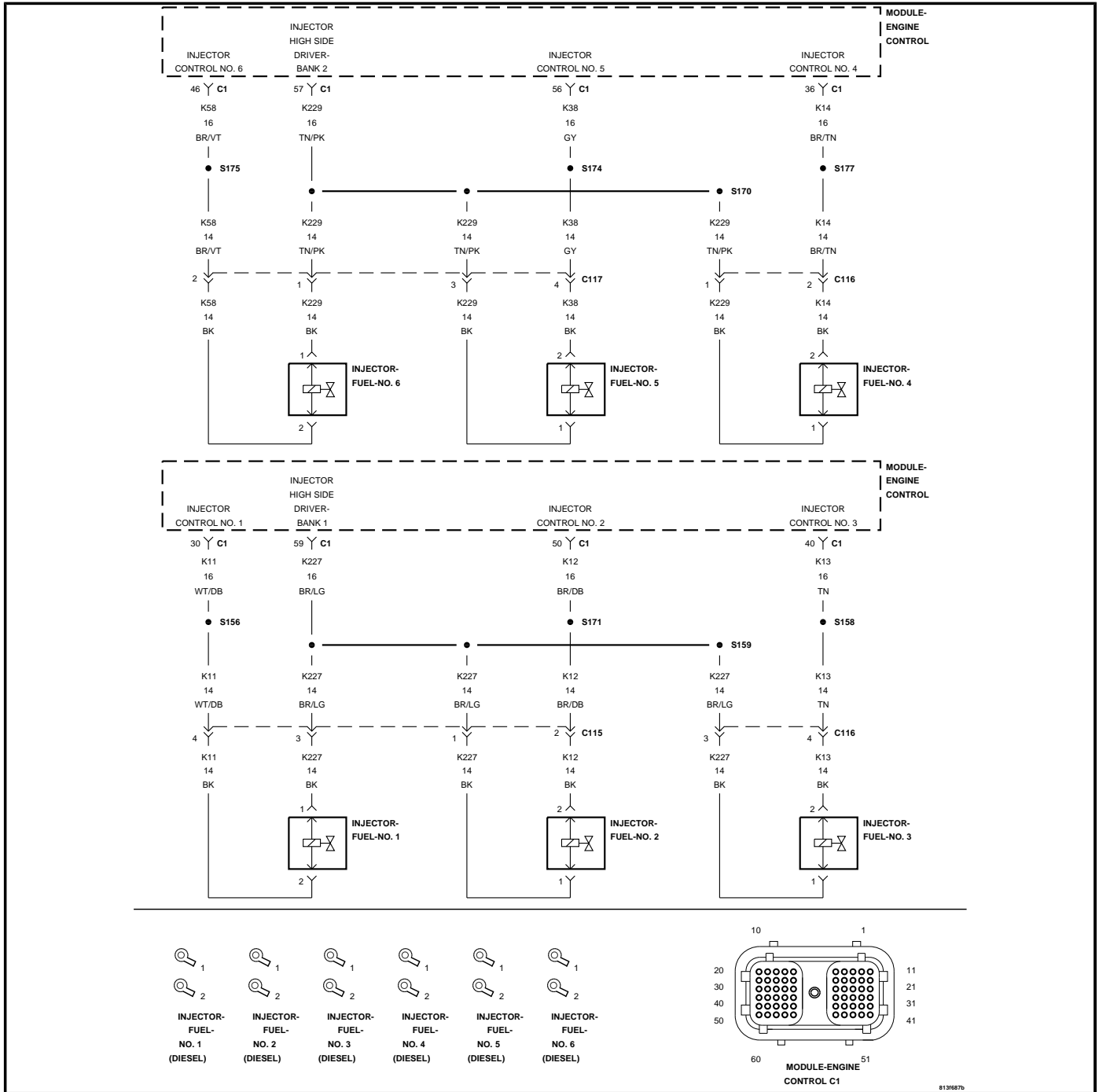


# P2146-BANK 1 (CYLINDERS 1-3) SHORTED HIGH OR LOW



For a complete wiring diagram Refer to the Wiring Information.

- **When Monitored:**

While the engine is running.

- **Set Condition:**

A circuit failure detected at cylinders 1, 2, or 3 or any combination of cylinders 1, 2, or 3.

### Possible Causes

#### OTHER DTC'S

HIGH SIDE DRIVER CIRCUIT OPEN

LOW SIDE DRIVER CIRCUIT OPEN

HIGH SIDE DRIVER SHORTED TO LOW SIDE DRIVER

HIGH SIDE DRIVERS SHORTED LOW

LOW SIDE DRIVER CIRCUIT SHORTED OTHER LOW SIDE DRIVER CIRCUIT

LOW SIDE DRIVERS SHORTED LOW

HIGH SIDE DRIVER SHORTED TO VOLTAGE

LOW SIDE DRIVER SHORTED TO VOLTAGE

LOW SIDE DRIVER CIRCUIT SHORTED IN INJECTOR HARNESS

INJECTOR

INJECTOR HARNESS

ECM

**Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)**

#### **1. OTHER DTC'S**

1. With the scan tool, read DTCs.

#### **Do you have any combination of DTC's P0201, P0202, or P0203?**

- Yes**
- Repair other DTC's first.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)
- No**
- Go To [2](#)

## 2. HIGH SIDE DRIVER CIRCUIT OPEN

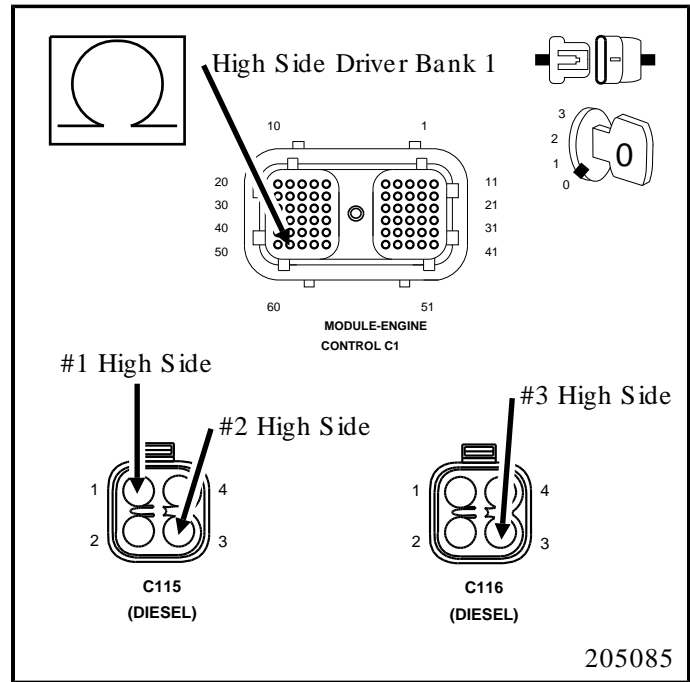
1. Turn the ignition off.
2. Disconnect the ECM harness connectors.
3. Disconnect the Injector 1-3 harness connector.

**NOTE:** Check connectors - Clean/repair as necessary.

4. Measure the resistance of the injector high side driver circuit between the Bank 1 high side driver circuit in the ECM harness connector and the high side driver circuit in the injector harness connectors for cylinders 1-3.

### Is the resistance less than 10 Ohms?

- Yes**
- Go To 3
- No**
- Repair the open high side driver circuit from ECM harness connector to the Injector harness connector.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)

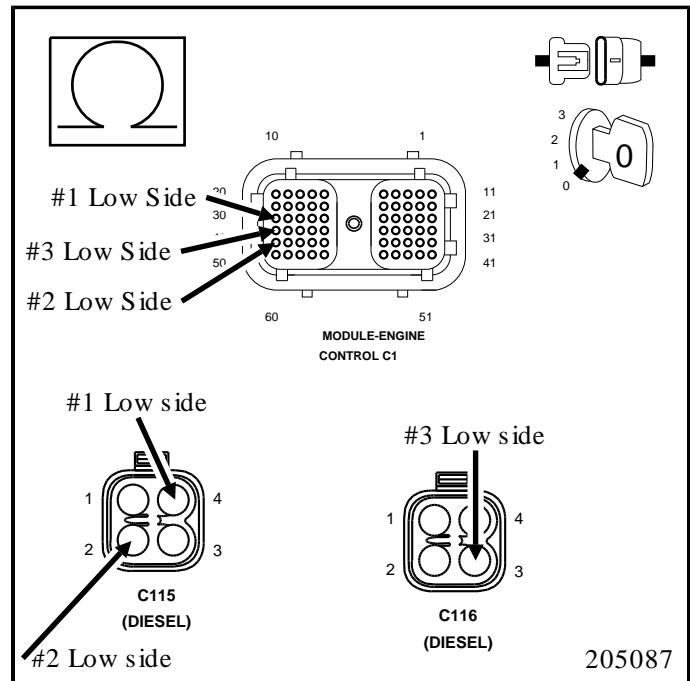


## 3. LOW SIDE DRIVER CIRCUIT OPEN

1. Measure the resistance of the 1, 2, and 3 injector low side driver circuits between the ECM harness connector and the injector harness connectors.

### Is the resistance less than 10 Ohms?

- Yes**
- Go To 4
- No**
- Repair the open low side driver circuit.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)

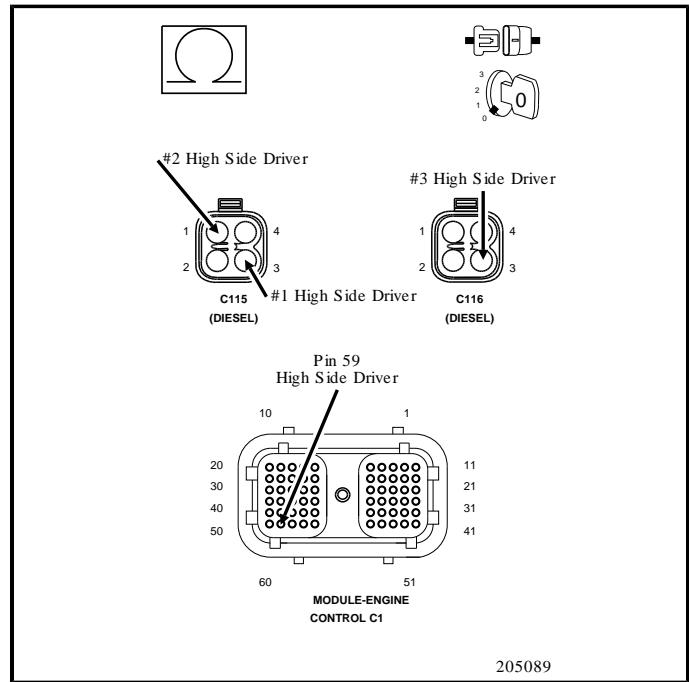


#### 4. HIGH SIDE DRIVER SHORTED TO LOW SIDE DRIVER

1. Measure the resistance between the Bank 1 high side driver circuit at the ECM harness connector and the low side driver circuit for injectors 1-3 at the ECM harness connector.

##### Is the resistance more than 100k Ohms?

- Yes**
- Go To [5](#)
- No**
- Repair the High side circuit shorted to the low side circuit.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)

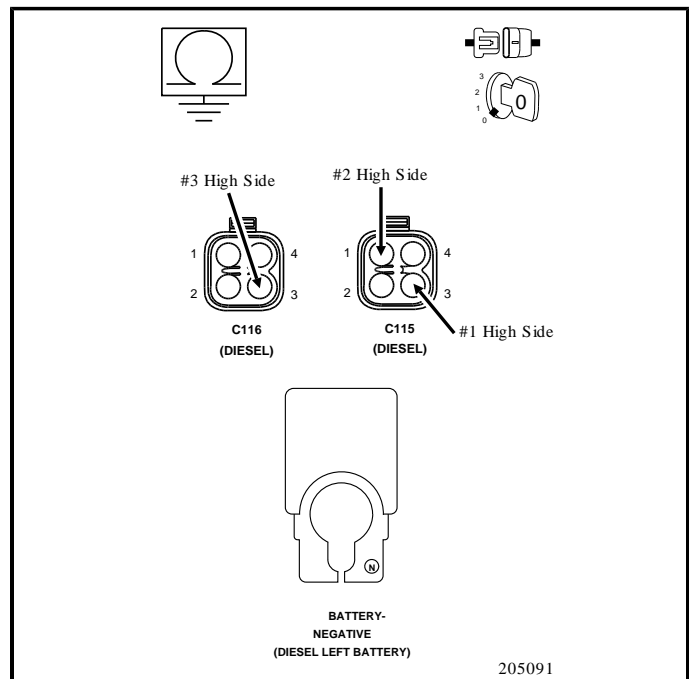


#### 5. HIGH SIDE DRIVERS SHORTED LOW

1. Measure the resistance of the injector harness connector high side driver circuits to battery negative for injectors 1-3.

##### Is the resistance more than 100k Ohms?

- Yes**
- Go To [6](#)
- No**
- Repair the High side driver shorted low in the harness.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)

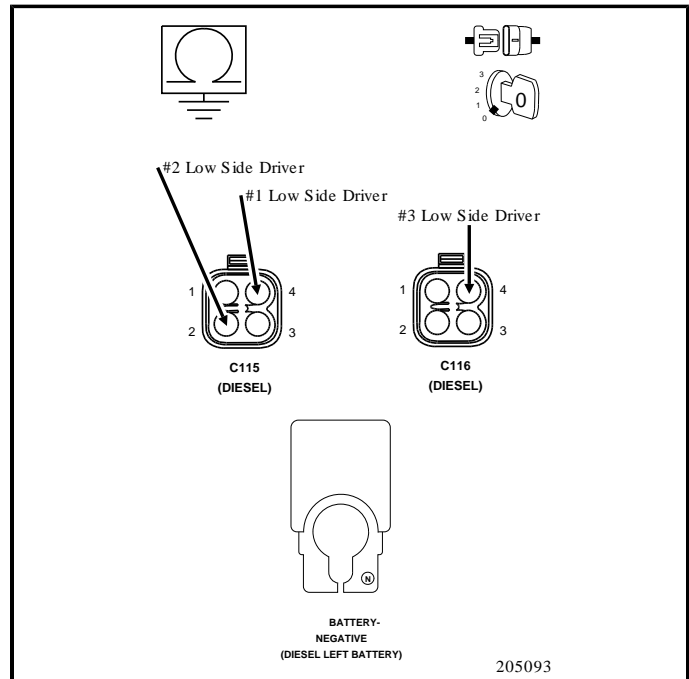


## 6. LOW SIDE DRIVERS SHORTED LOW

1. Measure the resistance of the injector harness connector Low side driver circuits to battery negative for injectors 1-3.

### Is the resistance more than 100k Ohms?

- Yes**
- Go To 7
- No**
- Repair the Low side driver shorted low in the harness.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)

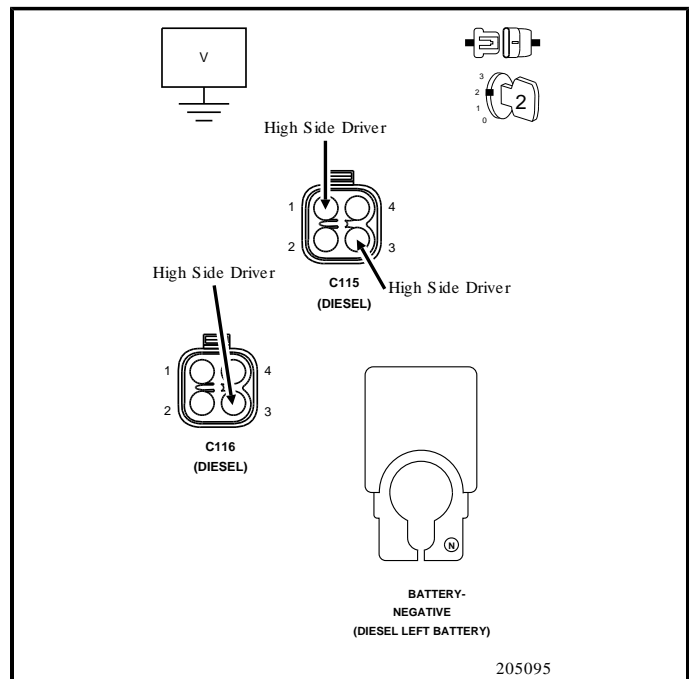


## 7. HIGH SIDE DRIVER SHORTED TO VOLTAGE

1. Measure the voltage between the high side driver circuit in the engine harness and battery negative.

### Is the voltage less than 1 volt?

- Yes**
- Go To 8
- No**
- Repair the high side driver shorted to voltage.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)

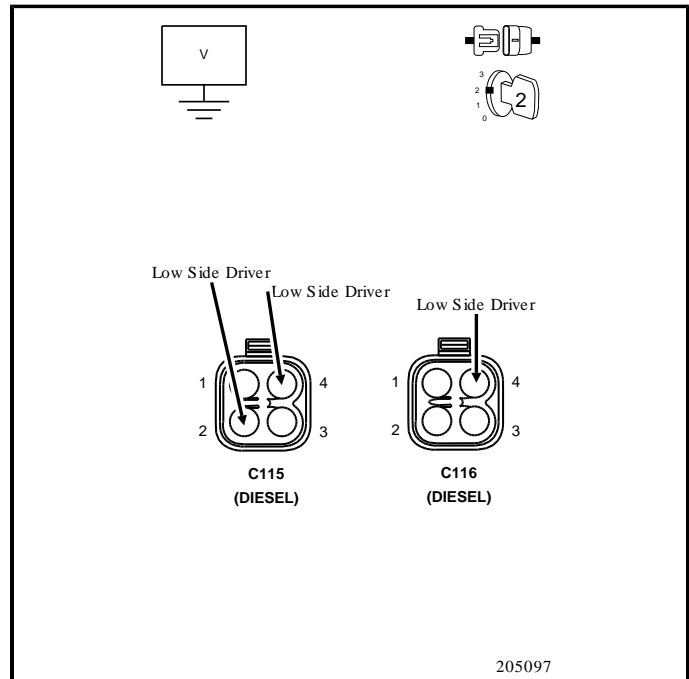


## 8. LOW SIDE DRIVER SHORTED TO VOLTAGE

1. Measure the voltage between the low side driver circuit in the engine harness and battery negative for cylinders 1-3.

**Is the voltage less than 1 volt?**

- Yes**
- Go To [9](#)
- No**
- Repair the low side driver shorted to voltage.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)

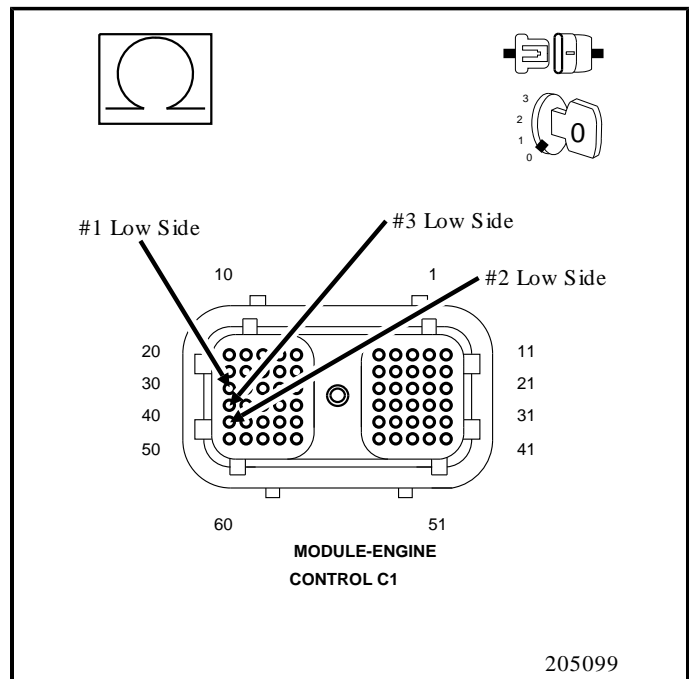


## 9. LOW SIDE DRIVER CIRCUIT SHORTED OTHER LOW SIDE DRIVER CIRCUIT

1. Measure the resistance of each of the Bank 1 low side driver circuit to all other Bank 1 low side driver circuits at the ECM harness connector.

**Is the resistance greater than 100k ohms?**

- Yes**
- Go To [10](#)
- No**
- Repair Low side driver circuit shorted to other Low side driver circuit.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)

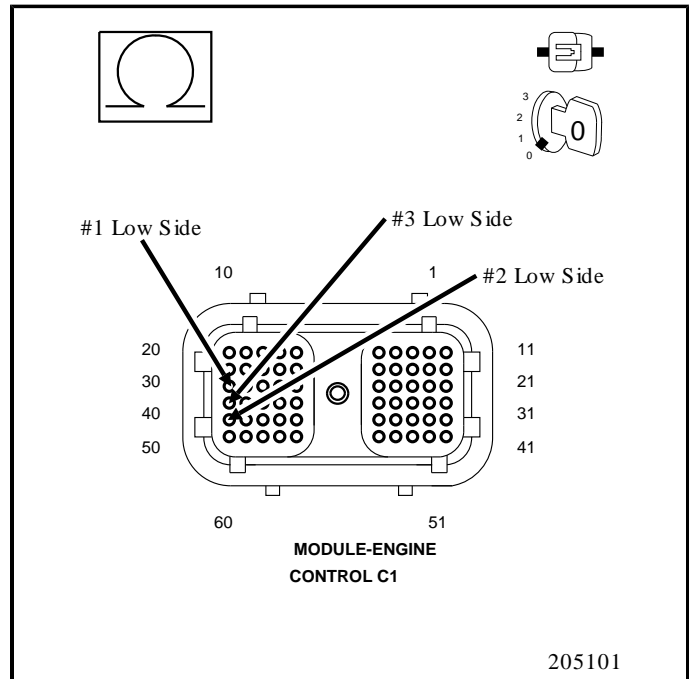


## 10. LOW SIDE DRIVER CIRCUIT SHORTED IN INJECTOR HARNESS

1. Reconnect the disconnected injector harness connector.
2. Measure the resistance of each of the Bank 1 low side driver circuit to all other Bank 1 low side driver circuit at the ECM harness connector.

**Is the resistance greater than 100k ohms?**

- Yes**
- Go To 11
- No**
- Replace the injector harness.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)



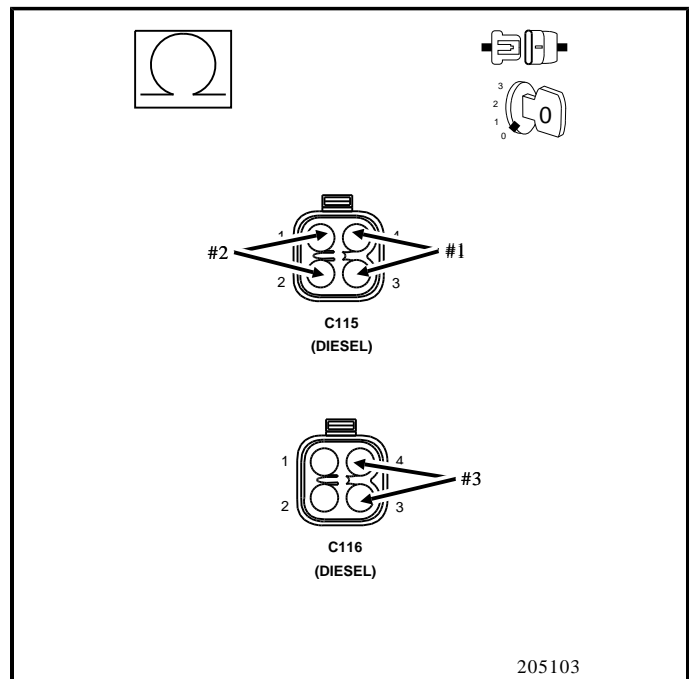
## 11. INJECTOR CIRCUITS SHORTED INSIDE ENGINE

1. Disconnect the injector through head harness connector.
2. Measure the resistance of each injector from the through head connector.

**NOTE:** Be sure to zero the ohm meter prior to checking the injector circuit.

**Is the resistance greater than 0 ohms and less than 1 ohm?**

- Yes**
- Go To 12
- No**
- Go To 14



## 12. INJECTOR

1. Disconnect the pigtail nuts from injectors 1-3.

**NOTE:** Check connectors - Clean/repair as necessary.

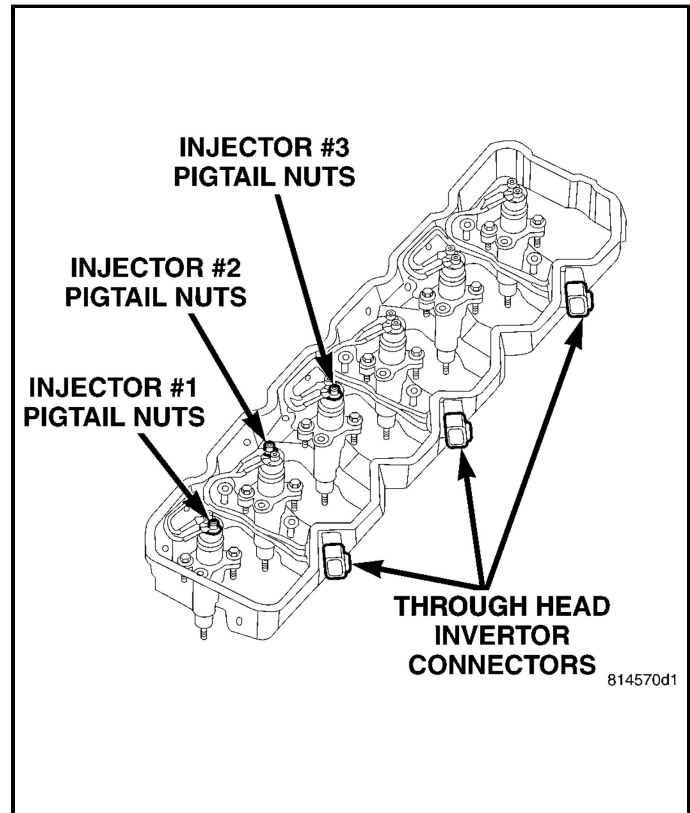
2. Measure the resistance between the solenoid posts of each injector.

**NOTE:** Be sure to zero the ohm meter prior to checking the injector circuit.

**Is the resistance less than 1 ohm and greater than 0 ohms?**

**Yes** • Go To **13**

- No**
- Replace the fuel injector or injectors.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)

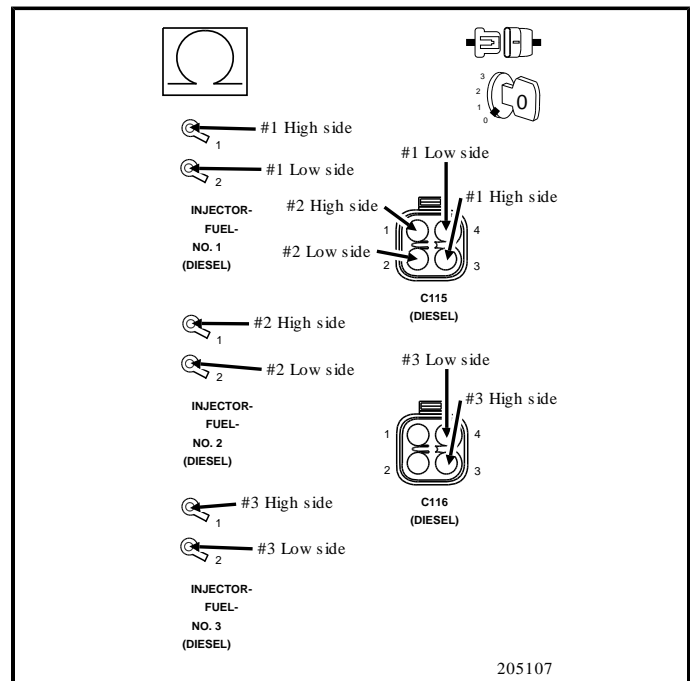


## 13. INJECTOR HARNESS

1. Measure resistance of each circuit in the injector harness from pigtail side to injector harness connector.

**Is resistance above 1 ohm?**

- Yes**
- Replace the injector harness.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)
- No**
- Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)



## 14. ECM

1. Reconnect the all injector pig tails harness connector.



2. Reconnect the ECM harness connector.
3. Reconnect the Injector harness connector.
4. Start the engine.
5. With the scan tool, read DTCs.

**Did the DTC return?**

- Yes**
- Replace and program the ECM in accordance with the Service Information.
  - Perform POWERTRAIN VERIFICATION TEST VER - 1 (DIESEL). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)
- No**
- Refer to the INTERMITTENT CONDITION Symptom (Diagnostic Procedure). (Refer to 28 - DTC-Based Diagnostics/MODULE, Engine Control (ECM) - Standard Procedure)