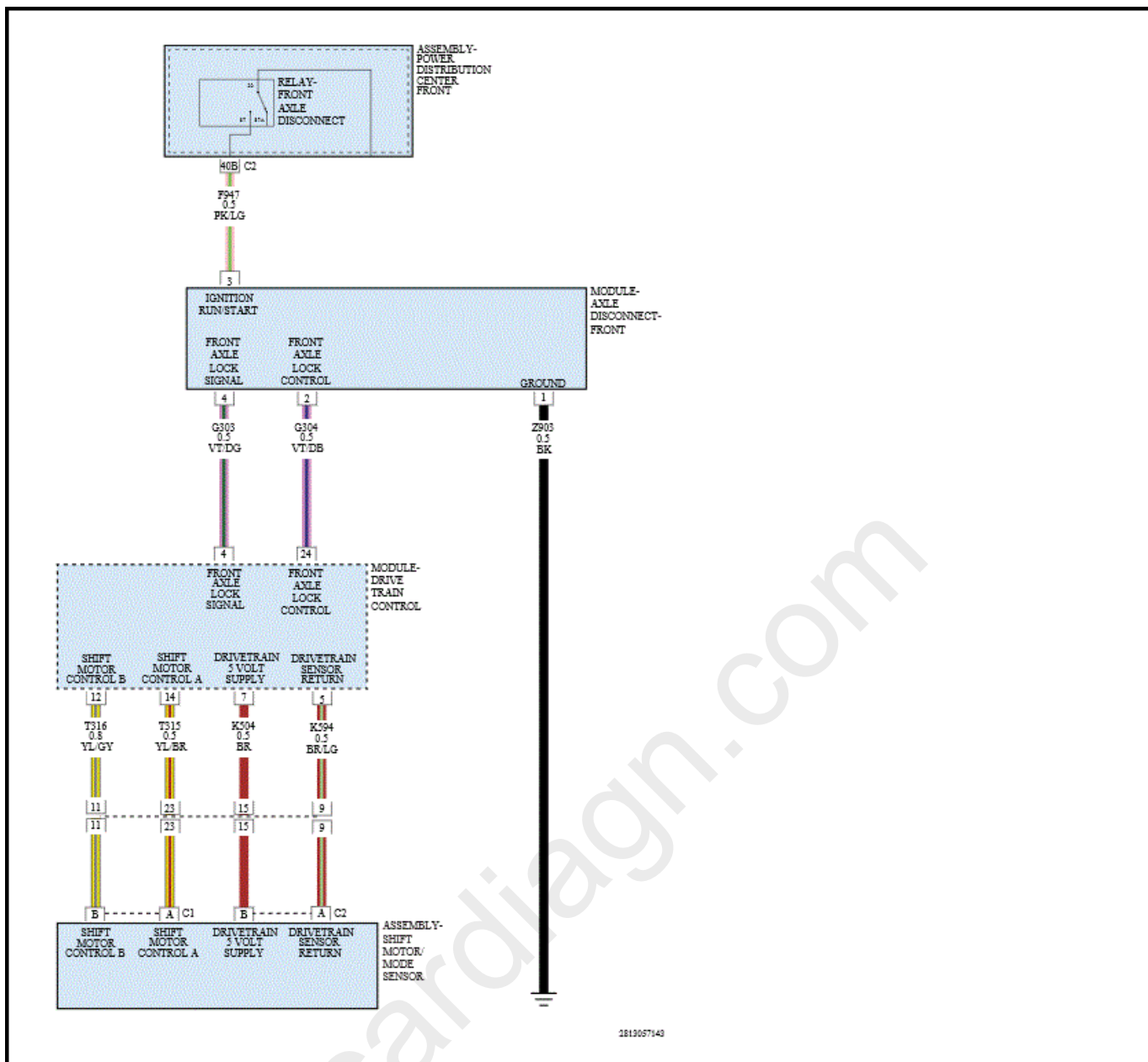




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WHEN MONITORED

This diagnostic runs continuously when the following condition is met:

- Ignition is on.

SET CONDITION

- The Drivetrain Control Module (DTCM) detects that the Front Axle Lock Signal circuit voltage is out of range.

POSSIBLE CAUSES

Possible Causes
FRONT AXLE DISCONNECT (FAD) RELAY
(F348) FAD RELAY COIL CONTROL CIRCUIT OPEN OR HIGH RESISTANCE
FRONT AXLE LOCK SIGNAL CIRCUIT SHORTED TO VOLTAGE

Possible Causes
FRONT AXLE LOCK SIGNAL CIRCUIT OPEN
FRONT AXLE LOCK SIGNAL CIRCUIT SHORTED TO GROUND
FRONT AXLE LOCK CONTROL CIRCUIT OPEN OR HIGH RESISTANCE
SHIFT MOTOR CONTROL A CIRCUIT SHORTED TO VOLTAGE
SHIFT MOTOR CONTROL B CIRCUIT SHORTED TO VOLTAGE
PDC
DTCM

Always perform the **PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE** before proceeding. Refer to **PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE** .

DIAGNOSTIC TEST

1. CHECK FOR AN ACTIVE DTC

1. With the scan tool, read DTCs and record on the repair order.
2. Record the Environmental Data.
3. With the scan tool, erase DTCs.
4. Using the recorded Environmental Data, along with the When Monitored and Set Conditions above, operate the vehicle in the conditions that set the DTC.
5. With the scan tool, read Drivetrain Control Module (DTCM) DTCs.

Did the DTC return?

Yes

- Go To [2](#)

No

- Perform the TESTING FOR AN INTERMITTENT CONDITION procedure. Refer to **TESTING FOR AN INTERMITTENT CONDITION** .

2. CHECK VOLTAGE AT (F915) FAD RELAY SWITCHED OUTPUT CIRCUIT

1. Disconnect the FAD Actuator Solenoid harness connector.
2. Turn the ignition on and operate the FAD so the relay will be commanded on.
3. Measure the voltage on the (F915) FAD Relay Switched output circuit at the FAD Actuator Solenoid harness connector.

Is the voltage about equal to Battery voltage?

Yes

- Go To [3](#)

No

- Go To [10](#)

3. CHECK THE (G303) FRONT AXLE LOCK SIGNAL CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

1. Turn the ignition off.
2. Disconnect the DTCM harness connector.
3. Measure the resistance of the (G303) Front Axle Lock Signal circuit between the DTCM harness connector and the FAD Actuator Solenoid harness connector.

Is the resistance below 3.0 Ohms?

Yes

- Go To [4](#)

No

- Repair the (G303) Front Axle Lock Signal circuit for an open or high resistance.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

4. CHECK THE (G303) FRONT AXLE LOCK SIGNAL CIRCUIT FOR A SHORT TO GROUND

1. Turn the ignition off.
2. Check for continuity between ground and the (G303) Front Axle Lock Signal circuit at the FAD Actuator Solenoid harness connector.

Is there continuity between ground and the (G303) Front Axle Lock Signal circuit?

Yes

- Repair the (G303) Front Axle Lock Signal circuit for a short to ground.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

No

- Go To [5](#)

5. CHECK THE (G303) FRONT AXLE LOCK SIGNAL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

1. Check for continuity between the (G303) Front Axle Lock Signal circuit and all other circuits at the DTCM harness connector.

Is there continuity between the (G303) Front Axle Lock Signal circuit and any other circuit?

Yes

- Repair the (G303) Front Axle Lock Signal circuit for a short to another circuit.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

No

- Go To [6](#)

6. CHECK THE (G304) FRONT AXLE LOCK CONTROL CIRCUIT FOR AN OPEN OR HIGH RESISTANCE

1. Measure the resistance of the (G304) Front Axle Lock Control circuit between the DTCM harness connector and the FAD Actuator Solenoid harness connector.

Is the resistance below 3.0 Ohms?

Yes

- Go To [7](#)

No

- Repair the (G304) Front Axle Lock Control circuit for an open or high resistance.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

7. CHECK THE (T315) SHIFT MOTOR CONTROL A CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

1. Disconnect the Shift Motor/Mode Sensor harness connector.
2. Check for continuity between the (T315) Shift Motor Control A circuit and all other circuits at the DTCM harness connector.

Is there continuity between the (T315) Shift Motor Control A circuit and any other circuit?

Yes

- Repair the (T315) Shift Motor Control A circuit for a short to another circuit.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

No

- Go To

8. CHECK THE (T316) SHIFT MOTOR CONTROL B CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT

1. Check for continuity between the (T316) Shift Motor Control B circuit and all other circuits at the DTCM harness connector.

Is there continuity between the (T316) Shift Motor Control B circuit and any other circuit?

Yes

- Repair the (T316) Shift Motor Control B circuit for a short to another circuit.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

No

- Go To [9](#)

9. REPLACE THE FAD ACTUATOR SOLENOID AND RETEST FOR DTCS

1. Replace the FAD Actuator Solenoid in accordance with the Service Information. Refer to [DISCONNECT, FRONT AXLE, REMOVAL](#).
2. Connect the FAD Actuator Solenoid and DTCM harness connectors.
3. Turn the ignition on.
4. With the scan tool, erase DTCs.
5. Using the recorded Environmental Data and the When Monitored conditions, operate the vehicle in the conditions that set the DTC.

6. With the scan tool, read DTCs.

Did the DTC return?

Yes

- Go To [24](#)

No

- The new FAD Actuator Solenoid repaired the problem.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

10. CHECK FOR DTCS RELATED TO OTHER RELAYS THAT SUPPLY THE FAD RELAY COIL WITH VOLTAGE

1. Using the recorded information, check for other DTCs related to any other relays that supply voltage to the FAD Relay coil.

NOTE: The Run/Start Relay is a good example of a relay that could supply other relay coils with voltage. Refer to the wiring diagrams for more information.

Are any related DTCs set?

Yes

- Refer to the appropriate diagnostic procedure.

No

- Go To [11](#)

11. DETERMINE RELAY/PDC CONFIGURATION

1. Check the Power Distribution Center (PDC) layout in the wiring information to determine if the FAD Relay is removable or if it is embedded on the Printed Circuit Board (PCB) of the PDC.

Is the Relay removable or is it embedded on the PCB?

Removable.

- Go To [12](#)

Embedded on PCB.

- Go To [18](#)

12. CHECK FOR OTHER RELAYS THAT SUPPLY THE FAD RELAY COIL WITH VOLTAGE

1. Check the Power Distribution Center (PDC) layout in the wiring information to determine if the FAD Relay coil is supplied voltage by another relay.

Is the FAD Relay coil supplied voltage by another relay?

Yes

- Go To [13](#)

No

- Go To [14](#)

13. REMOVE THE SUPPLY RELAY AND INSTALL A FUSED JUMPER WIRE ACROSS THE SWITCHED INPUT AND OUTPUT TERMINALS AT THE RELAY SOCKET AND CHECK FOR DTC TO RETURN

NOTE: Installing a jumper wire across the relay terminals in this step will supply the next relay coil with voltage causing it to turn on. Any components controlled by this relay will also turn on. If necessary, disconnect the component(s) to avoid damage and for safety.

1. Remove the supply relay and install a fused jumper wire across the supply input and switched output terminals 30 and 87 at the relay socket in the PDC.
2. With the scan tool, erase the DTCs.
3. Using the recorded Environmental Data and the When Monitored Conditions, operate the vehicle in the conditions that set the DTC.

Did the DTC return?

Yes

- Go To [14](#)

No

- Replace the supply Relay in accordance with the Service Information.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

14. CHECK VOLTAGE ON THE FAD RELAY COIL (+) SUPPLY CIRCUIT WITH THE RELAY REMOVED

NOTE: If a jumper wire was installed in the previous step, leave the jumper wire connected for this test.

1. Turn the ignition off.
2. Remove the FAD Relay from the PDC.
3. With a test light connected to ground, probe the Relay Coil (+) Supply circuit at the PDC Relay socket.

NOTE: The Relay Coil (+) Supply circuit is typically wired directly to the battery. In some cases, this circuit may need to be turned on. This can be accomplished by turning the ignition on, manually activating a switch, using a scan tool output control, or operating the vehicle in a manner that allows a device (e.g. ECU) to turn the circuit on.

Is the test light illuminated and bright?

Yes

- Go To [15](#)

No

- Check related fuses. If a fuse is open, check associated wiring for shorts. If necessary, repair or replace the PDC in accordance with the Service Information.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

15. CHECK THE FAD RELAY COIL (LSD) CONTROL CIRCUIT OPERATION

1. Connect a test light between the Relay Coil (+) Supply circuit and the Relay Coil (LSD) Control circuit at the PDC Relay socket.

NOTE: In the following step, use whatever means necessary to turn the Relay Coil Control circuit on. This can be accomplished by turning on the ignition, manually activating a switch, using a scan tool output control, or operating the vehicle in a manner that allows a device (e.g. ECU) to turn the circuit on.

2. Turn the Relay Coil (LSD) Control circuit on.

Is the test light illuminated and bright?

Yes

- Replace the FAD relay in accordance with the Service Information.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

No

- Go To [16](#)

16. CHECK THE FAD RELAY COIL (LSD) CONTROL CIRCUIT FOR AN OPEN/HIGH RESISTANCE BETWEEN THE RELAY SOCKET AND THE ECU HARNESS CONNECTOR

1. The ignition must be off when checking the continuity of a circuit.
2. Isolate the circuit by disconnecting the Electronic Control Unit (ECU) and the component harness connector containing the circuit being tested. **Note:** Use the wiring diagram as a guide to follow the path of the circuit.
3. Before measuring the resistance of any circuit, first measure the resistance between the two leads of the DVOM. **Note:** The meter leads can add resistance to the measurement value.
4. Connect one lead of the DVOM to the circuit being tested at the component harness connector.
5. Connect the other lead to the circuit being tested at the ECU harness connector and measure the resistance of the circuit.

NOTE: When probing a circuit at an ECU harness connector, always use an appropriate back probing tool to prevent any possible damage to the terminals.

Is the resistance below 3.0 Ohms?

Yes

- Go To [17](#)

No

- Repair the circuit for an open or high resistance. Use the wiring diagram as a guide to trace the circuit and look for any in-line connectors to help isolate the location of the open or high resistance.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#)

17. CHECK THE FAD RELAY COIL (LSD) CONTROL CIRCUIT FOR A SHORT TO GROUND BETWEEN THE RELAY SOCKET AND THE DTCM HARNESS CONNECTOR

1. The ignition must be off when checking a circuit for continuity to ground.
2. Isolate the circuit by disconnecting the Electronic Control Unit (ECU) and each component harness connector containing the circuit being tested. **Note:** Use the wiring diagram as a guide to follow the path of the circuit.
3. Connect the negative lead of the DVOM to a known good ground.
4. With the positive lead of the DVOM, probe the circuit being tested at the component harness connector and check for continuity between the circuit and ground.

NOTE: When probing a circuit at an ECU harness connector, always use an appropriate back probing tool to prevent any possible damage to the terminals.

Is there continuity between ground and the circuit being tested?

Yes

- Repair the circuit for a short to ground. Use the wiring diagram as a guide to trace the circuit and look for any in-line connectors to help isolate the location of the short.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

No

- Go To [24](#)

18. CHECK FOR OTHER RELAYS THAT SUPPLY THE FAD RELAY COIL WITH VOLTAGE

1. Check the Power Distribution Center (PDC) layout in the wiring information to determine if the FAD Relay coil is supplied voltage by another relay.

Is the FAD Relay coil supplied voltage by another relay?

Yes

- Go To [19](#)

No

- Go To [20](#)

19. REMOVE THE SUPPLY RELAY AND INSTALL A FUSED JUMPER WIRE ACROSS THE SUPPLY INPUT AND SWITCHED OUTPUT TERMINALS AT THE RELAY SOCKET AND CHECK FOR DTC TO RETURN

NOTE: Installing a jumper wire across the relay terminals in this step will supply related components with voltage possibly causing them to turn on. If necessary, disconnect the component(s) to avoid damage and for safety.

1. Remove the supply relay and install a fused jumper wire across the supply input and switched output terminals 30 and 87 at the relay socket in the PDC.
2. With the scan tool, erase the DTCs.
3. Using the recorded Environmental Data and the When Monitored Conditions, operate the vehicle in the conditions that set the DTC.

Did the DTC return?

Yes

- Go To [20](#)

No

- Replace the supply Relay in accordance with the Service Information.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

20. CHECK THE RESISTANCE OF THE FAD RELAY COIL AND INTERNAL PDC CIRCUITS

NOTE: If a jumper wire was installed in the previous step, leave the jumper wire connected for this test.

1. Disconnect and isolate the negative battery cable. If equipped with an Intelligent Battery Sensor (IBS), disconnect the IBS connector first before disconnecting the negative battery cable.
2. Disconnect the B+ and the other cables from the PDC main bus.
3. Disconnect the PDC harness connector that contains the FADRelay coil (LSD) Control circuit.
4. Measure the resistance between the PDC B+ battery cable connection and the FAD Relay coil (LSD) Control circuit at the PDC connector interface.

Is the resistance between 72 and 114 Ohms?

Yes

- Go To [21](#)

No

- Replace the PDC in accordance with the Service Information.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

21. CHECK THE FAD RELAY COIL AND INTERNAL PDC CIRCUITS FOR A SHORT TO GROUND

1. Measure resistance between ground and the FAD Relay coil (LSD) Control circuit at the PDC connector interface.

Is there continuity between ground and the circuit being tested?

Yes

- Replace the PDC in accordance with the Service Information.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

No

- Go To [22](#)

22. CHECK THE FAD RELAY COIL (LSD) CONTROL CIRCUIT (HARNESS SIDE) FOR AN OPEN/HIGH RESISTANCE

1. The ignition must be off when checking the continuity of a circuit.
2. Isolate the circuit by disconnecting the Electronic Control Unit (ECU) and the component harness connector containing the circuit being tested. **Note:** Use the wiring diagram as a guide to follow the path of the circuit.
3. Before measuring the resistance of any circuit, first measure the resistance between the two leads of the DVOM. **Note:** The meter leads can add resistance to the measurement value.
4. Connect one lead of the DVOM to the circuit being tested at the component harness connector.
5. Connect the other lead to the circuit being tested at the ECU harness connector and measure the resistance of the circuit.

NOTE: When probing a circuit at an ECU harness connector, always use an appropriate back probing tool to prevent any possible damage to the terminals.

Is the resistance below 3.0 Ohms?

Yes

- Go To [23](#)

No

- Repair the circuit for an open or high resistance. Use the wiring diagram as a guide to trace the circuit and look for any in-line connectors to help isolate the location of the open or high resistance.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

23. CHECK THE FAD RELAY COIL (LSD) CONTROL CIRCUIT (HARNESS SIDE) FOR A SHORT TO GROUND

1. The ignition must be off when checking a circuit for continuity to ground.
2. Isolate the circuit by disconnecting the Electronic Control Unit (ECU) and each component harness connector containing the circuit being tested. **Note:** Use the wiring diagram as a guide to follow the path of the circuit.
3. Connect the negative lead of the DVOM to a known good ground.
4. With the positive lead of the DVOM, probe the circuit being tested at the component harness connector and check for continuity between the circuit and ground.

NOTE: When probing a circuit at an ECU harness connector, always use an appropriate back probing tool to prevent any possible damage to the terminals.

Is there continuity between ground and the circuit being tested?

Yes

- Repair the circuit for a short to ground. Use the wiring diagram as a guide to trace the circuit and look for any in-line connectors to help isolate the location of the short.
- Perform the DTCM VERIFICATION TEST. Refer to **DTCM VERIFICATION TEST**.

No

- Go To [24](#)

24. CHECK RELATED HARNESS CONNECTIONS

1. Disconnect all DTCM harness connectors.
2. Disconnect all related in-line harness connections (if equipped).
3. Disconnect the related component harness connectors.
4. Inspect harness connectors, component connectors, and all male and female terminals for the following conditions:
 - Proper connector installation.
 - Damaged connector locks.
 - Corrosion.
 - Other signs of water intrusion.
 - Weather seal damage (if equipped).
 - Bent terminals.
 - Overheating due to a poor connection (terminal may be discolored due to excessive current draw).
 - Terminals that have been pushed back into the connector cavity.
 - Perform a terminal drag test on each connector terminal to verify proper terminal tension.

Repair any conditions that are found.

5. Reconnect all DTCM harness connectors. Be certain that all harness connectors are fully seated and the connector locks are fully engaged.
6. Reconnect all in-line harness connectors (if equipped). Be certain that all connectors are fully seated and the connector locks are fully engaged.
7. Reconnect all related component harness connectors. Be certain that all connectors are fully seated and the connector locks are fully engaged.
8. With the scan tool, erase DTCs.
9. Using the recorded Environmental Data, along with the When Monitored and Set Conditions above, operate the vehicle in the conditions that set the DTC.
10. With the scan tool, read DTCM DTCs.

Did the DTC return?

Yes

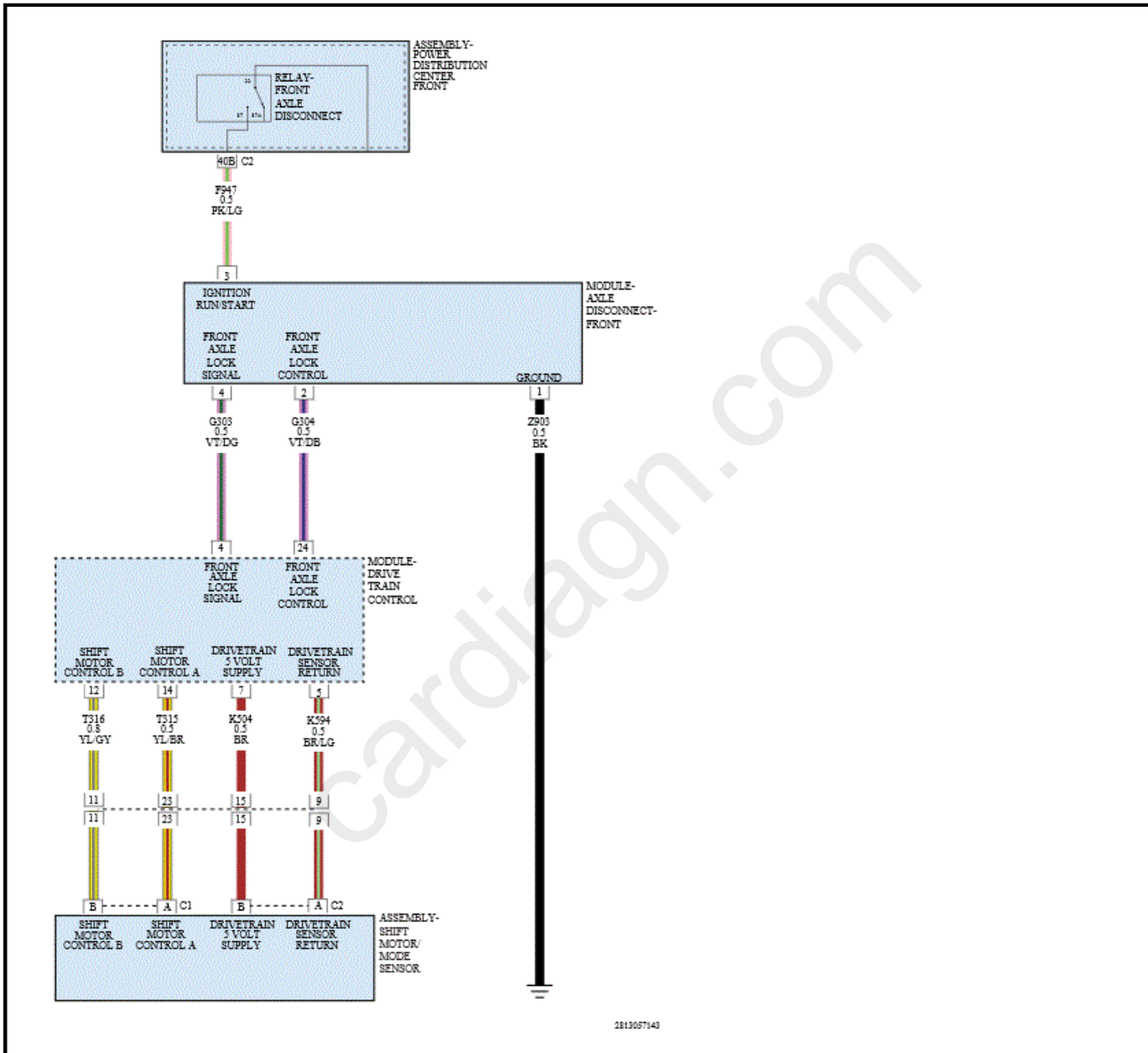
- Replace the DTCM in accordance with the Service information. Refer to **MODULE, DRIVETRAIN CONTROL (DTCM), REMOVAL**.

- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

No

- The wiring or poor connection problem has been repaired.
- Perform the DTCM VERIFICATION TEST. Refer to [DTCM VERIFICATION TEST](#).

C147C-FRONT AXLE DISCONNECT POWER CIRCUIT - LOW



WHEN MONITORED

This diagnostic runs continuously when the following condition is met:

- Ignition is on.

SET CONDITION