

BRAKES

Trailer Brake Controls - Canyon, Colorado

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

NOTE:

All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Trailer Brake Control Module Bolt	9 N.m (80 lb in)

SCHEMATIC WIRING DIAGRAMS

TRAILER BRAKE CONTROL WIRING SCHEMATICS

Trailer Brake (JL1)

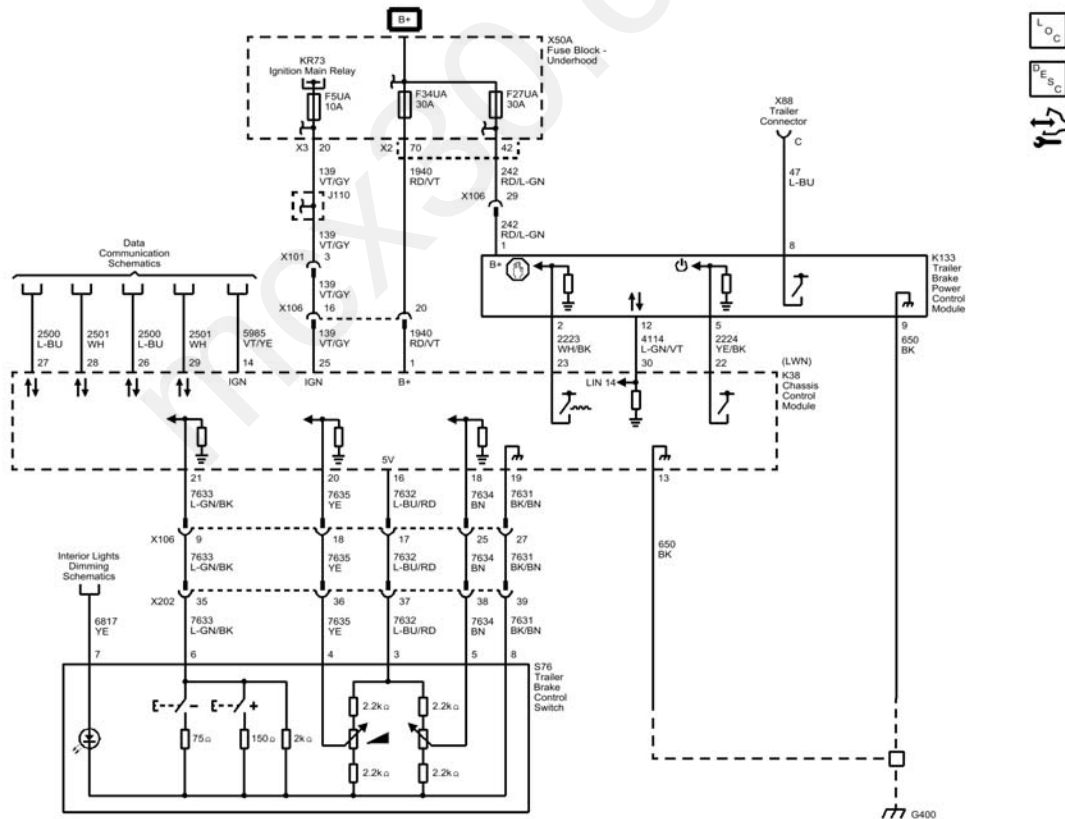


Fig. 1: Trailer Brake (JL1)

Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

R C1115-C1118: TRAILER BRAKE APPLY REQUEST SWITCH SIGNAL (DEVICE VOLTAGE REFERENCE OUTPUT 2)				
Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

DTC Descriptors

DTC C0880 00

Device Voltage Reference Output 2 Circuit - Malfunction

DTC C1115 08

Manual Trailer Brake Apply Request Switch Signal - Invalid

DTC C1115 5A

Manual Trailer Brake Apply Request Switch Signal - Plausibility Failure

DTC C1116 00

Manual Trailer Brake Apply Request Signal 1 - Malfunction

DTC C1117 00

Manual Trailer Brake Apply Request Signal 2 - Malfunction

DTC C1118 00

Trailer Brake Control Sensitivity Switch Circuit - Malfunction

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
5 V Reference	C0880 00, C1116 00, C1117 00	C1116 00, C1117 00	C0880 00, C1117 00	-
Manual Apply Signal	C1116 00	C1116 00	C1116 00, C1117 00	C1115 08, C1115 5A
Redundant Manual Apply Signal	C1117 00	C1117 00	C1117 00	C1115 08, C1115 5A
User Gain Switch Signal	C1118 00	C1118 00	C1118 00	-
Low Reference	-	C1116 00, C1117 00, C1118 00	-	-

Circuit/System Description

The trailer brake control system has a control panel with the trailer gain and manual apply switches. The switches are located on the instrument panel to the left of the steering column. The control panel and switches allow you to adjust the amount of output, referred to as trailer gain, available to the electric trailer brakes and allows you to

the trailer brakes. The trailer brake control panel, and switches are used along with the trailer brake display page on the driver information center to adjust and display power output to the trailer brakes.

Conditions for Running the DTC

- Battery voltage is 9-18 V.
- The module is powered up and completes initialization.

Conditions for Setting the DTC

C0880 00

The chassis control module detects the 5 V reference circuit voltage is less than 4.8 V or greater than 5.2 V.

C1115 08 or C1115 5A

- The chassis control module detects the manual apply switch is continuously applied for 30 seconds after ignition is cycled to ON.
- The chassis control module detects the manual apply switch is applied continuously for 3 minutes.
- The fault is detected if the difference between the manual apply switch input and redundant apply switch input exceeds a threshold for a calibrated amount of time.

C1116 00

- The chassis control module detects a short to ground, open or a short to voltage on the manual apply signal circuit.
- The chassis control module detects an open on the low reference circuit.

C1117 00

- The chassis control module detects a short to ground, open or a short to voltage on the redundant manual apply signal circuit.
- The chassis control module detects an open on the low reference circuit.

C1118 00

- The chassis control module detects a short to ground, open or a short to voltage on the user gain signal circuit.
- The chassis control module detects an open on the low reference circuit.

For symptom byte information, refer to [Symptom Byte List](#)

Action Taken When the DTC Sets

C0880 00

- The trailer brake control system is disabled for the rest of the ignition cycle.
- The trailer brakes will not apply when the vehicle's service brake pedal is applied.
- The driver information center displays a Service Trailer Brake System message.

C1115 08 or C1115 5A

- The manual apply lever located on the trailer brake control panel is disabled for the ignition cycle.
- The trailer brakes will still apply when using the vehicle's service brake pedal.

er information center will display a Service Trailer Brake System message.

C1116 00 or C1117 00

- The manual apply lever located on the trailer brake control panel is disabled as long as the fault is present.
- The trailer brakes will still apply when using the vehicle's service brake pedal.
- The driver information center will display a Service Trailer Brake System message as long as the fault is present.

C1118 00

- The trailer brake control system will be disabled as long as the fault is present.
- The trailer brakes will not apply when the vehicle's service brake pedal is applied.
- The driver information center will display a Service Trailer Brake System message as long as the fault is present.

Condition for Clearing the DTC

- The conditions for setting the DTC are no longer present.
- The chassis control module clears the history DTC when a current DTC is not detected in 40 consecutive drive cycles.

Reference Information

Schematic Reference

Trailer Brake Control Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Trailer Brake Controls Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the Service Trailer Brake System message is not displayed in the driver information center
 - **If the Service Trailer Brake System message is displayed and the customer's trailer is connected to the vehicle**

sconnect the customer's trailer.

2. Verify the Service Trailer Brake System message is not displayed in the driver information center.
 - If the Service Trailer Brake System message is not displayed after disconnecting the customer's trailer, the circuit fault causing the DTC to set is located in the customer's trailer wiring harness. This is not diagnosed in service information, nor is it covered by GM warranty.
 - If the Service Trailer Brake System message is displayed after disconnecting the customer's trailer
3. Refer to Circuit/System Testing.
- **If the Service Trailer Brake System message is displayed and the customer's trailer is not connected to the vehicle**

Refer to Circuit/System Testing.

- **If the Service Trailer Brake System message is not displayed**

3. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S76 Trailer Brake Control Switch. It may take up to 2 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the low reference circuit terminal 8 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF, disconnect the harness connector at the K38 Chassis Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K38 Chassis Control Module.
 - **If less than 10 Ω**
3. Ignition ON.
4. Test for 4.8-5.2 V between the 5 V reference circuit terminal 3 and ground.
 - **If less than 4.8 V**
 1. Ignition OFF, disconnect the harness connector at the K38 Chassis Control Module.
 2. Test for infinite resistance between the 5 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 Ω in the 5 V reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K38 Chassis Control Module.
 - **If greater than 5.2 V**
 1. Ignition Off, disconnect the harness connector at the K38 Chassis Control Module, ignition ON.
 2. Test for less than 1 V between the 5 V reference circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K38 Chassis Control Module.
 - **If between 4.8-5.2V**
5. Ignition OFF, disconnect the harness connector at the K38 Chassis Control Module, Ignition ON.
6. Test for less than 1 V between the signal circuit terminals listed below and ground:
 - S76 Trailer Brake Control Switch signal circuit terminal 4

- S76 Trailer Brake Control Switch signal circuit terminal 5
- S76 Trailer Brake Control Switch signal circuit terminal 6
- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **If less than 1 V**

7. Ignition OFF.

8. Test for infinite resistance between the signal circuit terminals listed below and ground:

- S76 Trailer Brake Control Switch signal circuit terminal 4
- S76 Trailer Brake Control Switch signal circuit terminal 5
- S76 Trailer Brake Control Switch signal circuit terminal 6
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **If infinite resistance**

9. Test for less than 2 Ω between the signal circuit terminals listed below:

- S76 Trailer Brake Control Switch signal circuit terminal 4 and the K38 Chassis Control Module signal circuit terminal 20
- S76 Trailer Brake Control Switch signal circuit terminal 5 and the K38 Chassis Control Module signal circuit terminal 18
- S76 Trailer Brake Control Switch signal circuit terminal 6 and the K38 Chassis Control Module signal circuit terminal 21
- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

10. Test or replace the S76 Trailer Brake Control Switch.

11. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.

- **If the DTC sets**

Replace the K38 Chassis Control Module.

- **If the DTC does not set**

12. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Trailer Brake Control Switch Replacement](#)
- [Control Module References](#) for chassis control module replacement, programming, and setup.

DTC C111A: TRAILER BRAKE POWER CONTROL MODULE

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.

[Strategy Based Diagnosis](#) for an overview of the diagnostic approach.

- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

DTC Descriptors

DTC C111A 43

Trailer Brake Power Control Module EEPROM Error

DTC C111A 54

Trailer Brake Power Control Module Temperature High

Circuit/System Description

The internal fault detection is handled inside the trailer brake power control module. No external circuits are involved.

Conditions for Running the DTC

The trailer brake power control module runs the program to detect an internal fault when power up is commanded. The only requirements are voltage and ground. This program runs even if the voltage is out of the valid operating range.

Conditions for Setting the DTC

DTC C111A 43

The trailer brake power control module has detected an internal malfunction.

DTC C111A 54

The trailer brake power control module has overheated due to an excessive current draw in the vehicle's trailer auxiliary supply voltage circuit or the customer's trailer.

For symptom byte information, refer to [Symptom Byte List](#)

Action Taken When the DTC Sets

DTC C111A is a type C DTC.

Conditions for Clearing the DTC

DTC C111A is a type C DTC.

Reference Information

Schematic Reference

[Trailer Brake Control Schematics](#)

Connector End View Reference

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- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Testing

1. Ignition ON.
2. Verify DTC C111A 54 or C1114 00 is not set.
 - **If DTC C111A 54 or C1114 00 is set**

Refer to the diagnostic procedure for DTC C1114 00 to diagnose this concern.

- **If DTC C111A 54 or C1114 00 is not set**
3. Verify DTC C111A 43 is not set
 - **If DTC C111A 43 is set**

Replace the K133 Trailer Brake Power Control Module

- **If DTC C111A 43 is not set**
4. All OK

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Trailer Brake Power Control Module Replacement](#)
- [Control Module References](#) for trailer brake power control module replacement, programming and setup.

DTC C111B OR C1112-C1114: TRAILER BRAKE POWER

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

DTC Descriptors

DTC C111B 03

Trailer Brake Power Control Module System Voltage - Voltage Below Threshold

DTC C111B 07

Trailer Brake Power Control Module System Voltage - Voltage Above Threshold

A Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Trailer Brake Power Control Module System Voltage - Plausibility Failure				

DTC C1112 00

Trailer Brake Signal to Trailer Brake Power Control Module Circuit - Malfunction

DTC C1113 01

Trailer Brake Power Control Module Enable Circuit - Short to Battery

DTC C1113 02

Trailer Brake Power Control Module Enable Circuit - Short to Ground

DTC C1114 00

Trailer Brake Control Solenoids Control Circuit - Malfunction

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Battery Positive Voltage	C111B 03	C111B 03	C111B 07	C111B 5A
Trailer Brake Control Signal	C1112 00	C1112 00	C1112 00	-
Trailer Brake Current Feedback Signal (LIN Communication Circuit)	U1505, U1556	U1505, U1556	U1505, U1556	U2504
Trailer Brake Enable Signal	C1113 02	C1113 02	C1113 01	-
Trailer Auxiliary Supply Voltage (Trailer Brake Output Signal)	C1114 00	C1114 00	C1114 00	C1114 00
Ground	-	C1112 00	-	-

Circuit/System Description

The chassis control module receives inputs from the trailer brake power control module; these inputs are used to determine trailer connection and the amount of voltage supplied to the trailer brakes.

Conditions for Running the DTC

- Ignition ON.
- Battery voltage is 9-18 V.
- The module is powered up and completes initialization.

Conditions for Setting the DTC

C111B 03

The trailer brake power control module detects a voltage below a calibrated threshold on the battery positive voltage circuit.

C111B 07

The power control module detects a voltage above a calibrated threshold on the battery positive voltage circuit.

C111B 5A

The trailer brake power control module monitors the battery positive voltage circuit.

C1112 00

The trailer brake power control module detects a short to ground, open or a short to voltage on the trailer brake control signal circuit.

C1113 01

The trailer brake power control module detects a short to voltage in the trailer brake enable signal circuit.

C1113 02

The trailer brake power control module detects a short to ground or an open in the trailer brake enable signal circuit.

C1114 00

The trailer brake power control module detects a short to ground, open, a short to voltage or a plausibility failure on the trailer brake output circuit.

For symptom byte information, refer to [Symptom Byte List](#)

Action Taken When the DTC Sets

C111B 03, C111B 07, C111B 5A

- The trailer brakes will be disabled as long as the fault is present.
- The driver information center (DIC) will display a Service Trailer Brake System message as long as the fault is present.

C1112 00, C1113 01, C1113 02, C1114 00

- The trailer brakes will be disabled for the remainder of the ignition cycle.
- The DIC will display a Service Trailer Brake System message for the remainder of the ignition cycle.

Condition for Clearing the DTC

- The conditions for setting the DTC are no longer present.
- The trailer brake power control module clears the history DTC when a current DTC is not detected in 40 consecutive drive cycles.

Diagnostic Aids

- The procedures used in this document are written to diagnose a concern with the customer's vehicle with no trailer connected. A concern with the customer's trailer may be the actual cause for a DTC setting or a circuit fault.
- Some customers may experience an intermittent "Check Trailer Wiring" message and/or a "Service Trailer Brake" message with DTC C1114. These concerns may be caused by a poor connection at the 7-way trailer connector. There are several manufacturers of 7-way (trailer side) connectors and many do not comply with

ty of Automotive Engineers (SAE) standard specifications. Some 7-way (trailer side) connector plugs may not properly engage the truck's 7-way connector socket and cause open circuits. Also, they may cause deformation and excessive wear of the terminals on the truck's 7-way connector socket. Over time, this will lead to poor terminal tension between the 7-way (trailer side) connector plug and the truck's 7-way connector socket. Since the trailer brake control module is always monitoring the vehicle and trailer circuits/components, a poor connection at the 7-way connector may cause a "Check Trailer Wiring" message on the driver information center.

- Engineering has recommended the use of Pollak Heavy Duty 7-way (trailer side) connector plugs. Pollak is the Original Equipment Manufacturer (OEM) of the truck's 7-way connector socket. The use of a Pollak Heavy Duty 7-way (trailer side) connector plug will ensure proper fit when the two connectors are mated.
- If the truck's 7-way connector socket terminals are deformed or have excessive wear, it will be necessary to replace the truck side connector (use Genuine GM Parts) along with the trailer's 7-way connector plug using Pollak HD connector plugs.
- Refer to PIT5311 for additional information.

Reference Information

Schematic Reference

Trailer Brake Control Schematics

Connector End View Reference

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Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that DTCs U1505, U1556, U2504, P2534, P2535, or any other communication DTCs are not set.
 - **If any of these DTCs are set**
Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .
 - **If none of these DTCs are set**
3. Verify the Service Trailer Brake System message is not displayed in the driver information center
 - **If the Service Trailer Brake System message is displayed and the customer's trailer is connected to the vehicle**
 1. Disconnect the customer's trailer.

rify the Service Trailer Brake System message is not displayed in the driver information center.

- If the Service Trailer Brake System message is not displayed after disconnecting the customer's trailer, the circuit fault causing the DTC to set is located in the customer's trailer wiring harness. This is not diagnosed in service information, nor is it covered by GM warranty.
- If the Service Trailer Brake System message is displayed after disconnecting the customer's trailer

3. Refer to Circuit/System Testing.

- **If the Service Trailer Brake System message is displayed and the customer's trailer is not connected to the vehicle**

Refer to Circuit/System Testing.

- **If the Service Trailer Brake System message is not displayed and the customer's trailer is available**

4. Verify the customer's trailer connection is recognized with a Trailer Connected message in the driver information center.

- **If the Trailer Connected message is not displayed when the customer's trailer is connected to the vehicle**

Refer to Circuit/System Testing.

- **If the Trailer Connected message is displayed when the customer's trailer is connected to the vehicle**

5. All OK.

Circuit/System Testing

NOTE:

- **You must perform the Circuit/System Verification before proceeding with the Circuit/System Testing.**
- **The following diagnostic procedure is for factory installed components and wiring on the customer's vehicle. It will not diagnose a concern with the components and wiring on the customer's trailer.**
- **The following diagnostic procedure is based on not having a trailer connected to the vehicle.**
- **Refer to PIT5311 for additional information before using this diagnostic procedure.**

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K133 Trailer Brake Power Control Module. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10 Ω between the ground circuit terminal 9 and ground.

- **If 10 Ω or greater**

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , repair the open/high resistance in the ground connection.

- **If less than 10 Ω**

3. Ignition ON.

test lamp illuminates between the B+ circuit terminal 1 and ground.

- **If the test lamp does not illuminate and the circuit fuse is good.**

1. Ignition OFF, remove the test lamp.
2. Test for less than 2 Ω in the B+ circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.

- **If the test lamp does not illuminate and the circuit fuse is open**

1. Ignition OFF, remove the test lamp.
2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K133 Trailer Brake Power Control Module.

- **If the test lamp illuminates**

5. Ignition OFF, disconnect the harness connector at the K38 Chassis Control Module, ignition ON.

6. Test for less than 1 V between the signal circuit terminals listed below and ground:

- K133 Trailer Brake Power Control Module signal circuit terminal 2
- K133 Trailer Brake Power Control Module signal circuit terminal 5
- K133 Trailer Brake Power Control Module signal circuit terminal 8
- K133 Trailer Brake Power Control Module signal circuit terminal 12
- K133 Trailer Brake Power Control Module signal circuit terminal 14
- **If 1 V or greater**

Repair the short to voltage on the circuit.

- **If less than 1 V**

7. Ignition OFF.

8. Test for infinite resistance between the signal circuit terminals listed below and ground:

- K133 Trailer Brake Power Control Module signal circuit terminal 2
- K133 Trailer Brake Power Control Module signal circuit terminal 5
- K133 Trailer Brake Power Control Module signal circuit terminal 8
- K133 Trailer Brake Power Control Module signal circuit terminal 12
- K133 Trailer Brake Power Control Module signal circuit terminal 14
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **If infinite resistance**

9. Test for less than 2 Ω between the signal circuit terminals listed below:

- K133 Trailer Brake Power Control Module signal circuit terminal 2 and the K38 Chassis Control Module signal circuit terminal 23
- K133 Trailer Brake Power Control Module signal circuit terminal 5 and the K38 Chassis Control Module signal circuit terminal 22
- K133 Trailer Brake Power Control Module signal circuit terminal 12 and the K38 Chassis Control Module signal circuit terminal 30
- K133 Trailer Brake Power Control Module signal circuit terminal 14 and the K38 Chassis Control Module signal circuit terminal 17

2 Ω or greater

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

10. Test for less than 2 Ω between the K133 Trailer Brake Power Control Module signal circuit terminal 8 and the Electric Brakes terminal in the trailer brake harness connector in the rear bumper. Refer to the diagram on the trailer brake harness connector cover for the terminal location.

- **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

- **If less than 2 Ω**

11. Test or replace the K133 Trailer Brake Power Control Module.
12. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.

- **If the DTC sets**

Replace the K38 Chassis Control Module.

- **If the DTC does not set**

13. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

[Control Module References](#) for chassis control module or trailer brake power control module replacement, programming and setup.

TRAILER CONNECTION NOT RECOGNIZED

Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

DTC Descriptors

DTC C111B 03

Trailer Brake Power Control Module System Voltage - Voltage Below Threshold

DTC C111B 07

Trailer Brake Power Control Module System Voltage - Voltage Above Threshold

DTC C111B 5A

Trailer Brake Power Control Module System Voltage - Plausibility Failure

DTC C1112 00

Trailer Brake Signal to Trailer Brake Power Control Module Circuit - Malfunction

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Trailer Brake Power Control Module Enable Circuit - Short to Battery				

DTC C1113 02

Trailer Brake Power Control Module Enable Circuit - Short to Ground

DTC C1114 00

Trailer Brake Control Solenoids Control Circuit - Malfunction

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Battery Positive Voltage	C111B 03	C111B 03	C111B 07	C111B 5A
Trailer Brake Control Signal	C1112 00	C1112 00	C1112 00	-
Trailer Brake Current Feedback Signal (LIN Communication Circuit)	U1505, U1556	U1505, U1556	U1505, U1556	U2504
Trailer Brake Enable Signal	C1113 02	C1113 02	C1113 01	-
Trailer Auxiliary Supply Voltage (Trailer Brake Output Signal)	C1114 00	C1114 00	C1114 00	C1114 00
Ground	-	C1112 00	-	-

Circuit/System Description

The chassis control module receives inputs from the trailer brake power control module; these inputs are used to determine trailer connection and the amount of voltage supplied to the trailer brakes.

Conditions for Running the DTC

- Ignition ON.
- Battery voltage is 9-18 V.
- The module is powered up and completes initialization.

Conditions for Setting the DTC

C111B 03

The trailer brake power control module detects a voltage below a calibrated threshold on the battery positive voltage circuit.

C111B 07

The trailer brake power control module detects a voltage above a calibrated threshold on the battery positive voltage circuit.

C111B 5A

The trailer brake power control module monitors the battery positive voltage circuit.

C1112 00

The power control module detects a short to ground, open or a short to voltage on the trailer brake control signal circuit.

C1113 01

The trailer brake power control module detects a short to voltage in the trailer brake enable signal circuit.

C1113 02

The trailer brake power control module detects a short to ground or an open in the trailer brake enable signal circuit.

C1114 00

The trailer brake power control module detects a short to ground, open, a short to voltage or a plausibility failure on the trailer brake output circuit.

For symptom byte information, refer to [Symptom Byte List](#)

Action Taken When the DTC Sets

C111B 03, C111B 07, C111B 5A

- The trailer brakes will be disabled as long as the fault is present.
- The driver information center (DIC) will display a Service Trailer Brake System message as long as the fault is present.

C1112 00, C1113 01, C1113 02, C1114 00

- The trailer brakes will be disabled for the remainder of the ignition cycle.
- The DIC will display a Service Trailer Brake System message for the remainder of the ignition cycle.

Condition for Clearing the DTC

- The conditions for setting the DTC are no longer present.
- The trailer brake power control module clears the history DTC when a current DTC is not detected in 40 consecutive drive cycles.

Diagnostic Aids

- The procedures used in this document are written to diagnose a concern with the customer's vehicle with no trailer connected. A concern with the customer's trailer may be the actual cause for a DTC setting or a circuit fault.
- Some customers may experience an intermittent "Check Trailer Wiring" message and/or a "Service Trailer Brake" message with DTC C1114. These concerns may be caused by a poor connection at the 7-way trailer connector. There are several manufacturers of 7-way (trailer side) connectors and many do not comply with the Society of Automotive Engineers (SAE) standard specifications. Some 7-way (trailer side) connector plugs may not properly engage the truck's 7-way connector socket and cause open circuits. Also, they may cause deformation and excessive wear of the terminals on the truck's 7-way connector socket. Over time, this will lead to poor terminal tension between the 7-way (trailer side) connector plug and the truck's 7-way connector socket. Since the trailer brake control module is always monitoring the vehicle and trailer circuits/components, a poor connection at the 7-way connector may cause a "Check Trailer Wiring" message on the driver information center.
- Engineering has recommended the use of Pollak Heavy Duty 7-way (trailer side) connector plugs. Pollak is the Original Equipment Manufacturer (OEM) of the truck's 7-way connector socket. The use of a Pollak

uty 7-way (trailer side) connector plug will ensure proper fit when the two connectors are mated.

- If the truck's 7-way connector socket terminals are deformed or have excessive wear, it will be necessary to replace the truck side connector (use Genuine GM Parts) along with the trailer's 7-way connector plug using Pollak HD connector plugs.
- Refer to PIT5311 for additional information.

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Connector End View Reference

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Circuit/System Verification

1. Ignition ON.
2. Verify that DTCs U1505, U1556, U2504, P2534, P2535, or any other communication DTCs are not set.
 - **If any of these DTCs are set**

Refer to Diagnostic Trouble Code (DTC) List - Vehicle .
 - **If none of these DTCs are set**
3. Verify the Service Trailer Brake System message is not displayed in the driver information center
 - **If the Service Trailer Brake System message is displayed and the customer's trailer is connected to the vehicle**
 1. Disconnect the customer's trailer.
 2. Verify the Service Trailer Brake System message is not displayed in the driver information center.
 - If the Service Trailer Brake System message is not displayed after disconnecting the customer's trailer, the circuit fault causing the DTC to set is located in the customer's trailer wiring harness. This is not diagnosed in service information, nor is it covered by GM warranty.
 - If the Service Trailer Brake System message is displayed after disconnecting the customer's trailer
3. Refer to Circuit/System Testing.

the Service Trailer Brake System message is displayed and the customer's trailer is not connected to the vehicle

Refer to Circuit/System Testing.

- **If the Service Trailer Brake System message is not displayed and the customer's trailer is available**

4. Verify the customer's trailer connection is recognized with a Trailer Connected message in the driver information center.

- **If the Trailer Connected message is not displayed when the customer's trailer is connected to the vehicle**

Refer to Circuit/System Testing.

- **If the Trailer Connected message is displayed when the customer's trailer is connected to the vehicle**

5. All OK.

Circuit/System Testing

NOTE:

- **You must perform the Circuit/System Verification before proceeding with the Circuit/System Testing.**
- **The following diagnostic procedure is for factory installed components and wiring on the customer's vehicle. It will not diagnose a concern with the components and wiring on the customer's trailer.**
- **The following diagnostic procedure is based on not having a trailer connected to the vehicle.**
- **Refer to PIT5311 for additional information before using this diagnostic procedure.**

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K133 Trailer Brake Power Control Module. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10 Ω between the ground circuit terminal 9 and ground.

- **If 10 Ω or greater**

1. Ignition OFF.

2. Test for less than 2 Ω in the ground circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , repair the open/high resistance in the ground connection.

- **If less than 10 Ω**

3. Ignition ON.

4. Verify a test lamp illuminates between the B+ circuit terminal 1 and ground.

- **If the test lamp does not illuminate and the circuit fuse is good.**

1. Ignition OFF, remove the test lamp.

2. Test for less than 2 Ω in the B+ circuit end to end.

- If 2 Ω or greater, repair the open/high resistance in the circuit.
- If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.

- **If the test lamp does not illuminate and the circuit fuse is open**

ition OFF, remove the test lamp.

2. Test for infinite resistance between the B+ circuit and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K133 Trailer Brake Power Control Module.

• **If the test lamp illuminates**

5. Ignition OFF, disconnect the harness connector at the K38 Chassis Control Module, ignition ON.

6. Test for less than 1 V between the signal circuit terminals listed below and ground:

- K133 Trailer Brake Power Control Module signal circuit terminal 2
- K133 Trailer Brake Power Control Module signal circuit terminal 5
- K133 Trailer Brake Power Control Module signal circuit terminal 8
- K133 Trailer Brake Power Control Module signal circuit terminal 12
- K133 Trailer Brake Power Control Module signal circuit terminal 14

• **If 1 V or greater**

Repair the short to voltage on the circuit.

• **If less than 1 V**

7. Ignition OFF.

8. Test for infinite resistance between the signal circuit terminals listed below and ground:

- K133 Trailer Brake Power Control Module signal circuit terminal 2
- K133 Trailer Brake Power Control Module signal circuit terminal 5
- K133 Trailer Brake Power Control Module signal circuit terminal 8
- K133 Trailer Brake Power Control Module signal circuit terminal 12
- K133 Trailer Brake Power Control Module signal circuit terminal 14

• **If less than infinite resistance**

Repair the short to ground on the circuit.

• **If infinite resistance**

9. Test for less than 2 Ω between the signal circuit terminals listed below:

- K133 Trailer Brake Power Control Module signal circuit terminal 2 and the K38 Chassis Control Module signal circuit terminal 23
- K133 Trailer Brake Power Control Module signal circuit terminal 5 and the K38 Chassis Control Module signal circuit terminal 22
- K133 Trailer Brake Power Control Module signal circuit terminal 12 and the K38 Chassis Control Module signal circuit terminal 30
- K133 Trailer Brake Power Control Module signal circuit terminal 14 and the K38 Chassis Control Module signal circuit terminal 17

• **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

• **If less than 2 Ω**

10. Test for less than 2 Ω between the K133 Trailer Brake Power Control Module signal circuit terminal 8 and the Electric Brakes terminal in the trailer brake harness connector in the rear bumper. Refer to the diagram on the trailer brake harness connector cover for the terminal location.

• **If 2 Ω or greater**

pair the open/high resistance in the circuit.

- **If less than 2 Ω**

11. Test or replace the K133 Trailer Brake Power Control Module.

12. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.

- **If the DTC sets**

Replace the K38 Chassis Control Module.

- **If the DTC does not set**

13. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for chassis control module or trailer brake power control module replacement, programming and setup.

REPAIR INSTRUCTIONS

TRAILER BRAKE CONTROL SWITCH REPLACEMENT

Removal Procedure

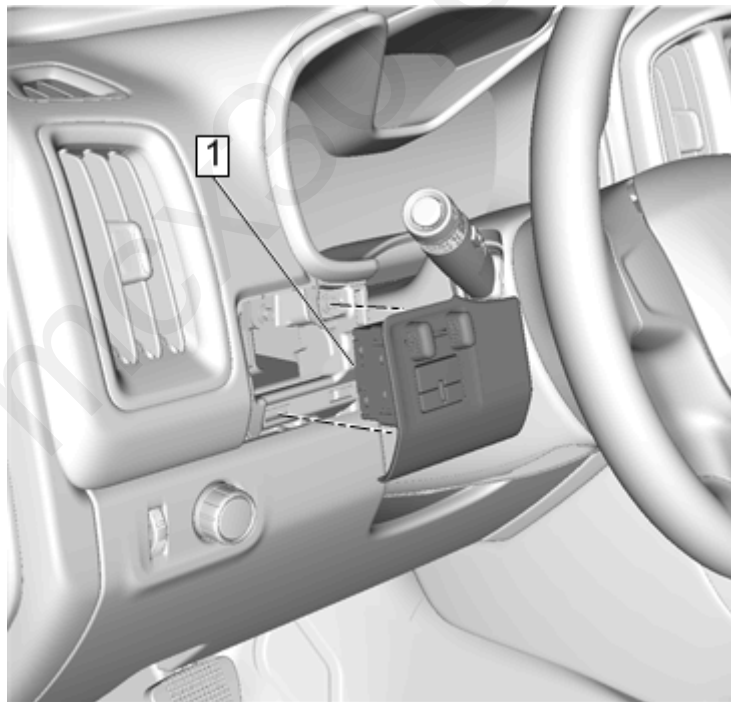


Fig. 2: Instrument Panel Compartment Toll Card Holder

Courtesy of GENERAL MOTORS COMPANY

NOTE: Use a flat bladed plastic trim too to remove the toll card holder.

1. Remove Instrument Panel Compartment Toll Card Holder (1).
2. Disconnect Electrical Connector

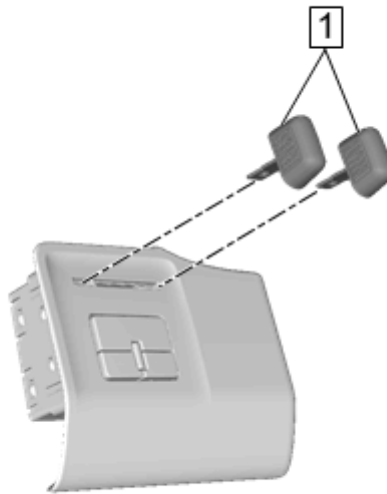


Fig. 3: Trailer Brake Control Switch Lever
Courtesy of GENERAL MOTORS COMPANY

3. Remove Trailer Brake Control Switch Lever (1).

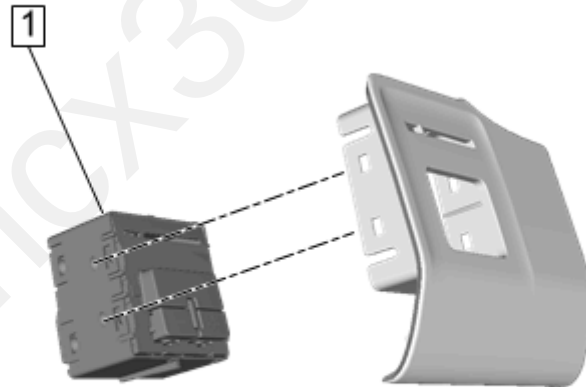


Fig. 4: Trailer Brake Control Switch
Courtesy of GENERAL MOTORS COMPANY

4. Remove Trailer Brake Control Switch (1)

Installation Procedure

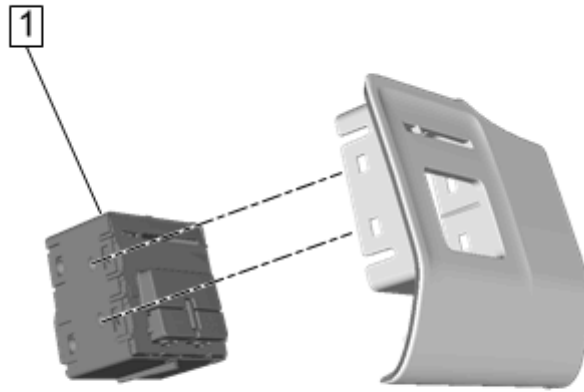


Fig. 5: Trailer Brake Control Switch
Courtesy of GENERAL MOTORS COMPANY

1. Install Trailer Brake Control Switch (1).

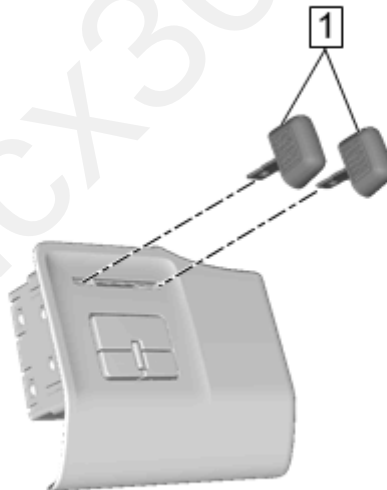


Fig. 6: Trailer Brake Control Switch Lever
Courtesy of GENERAL MOTORS COMPANY

2. Install Trailer Brake Control Switch Lever (1).
3. Connect Electrical Connector.

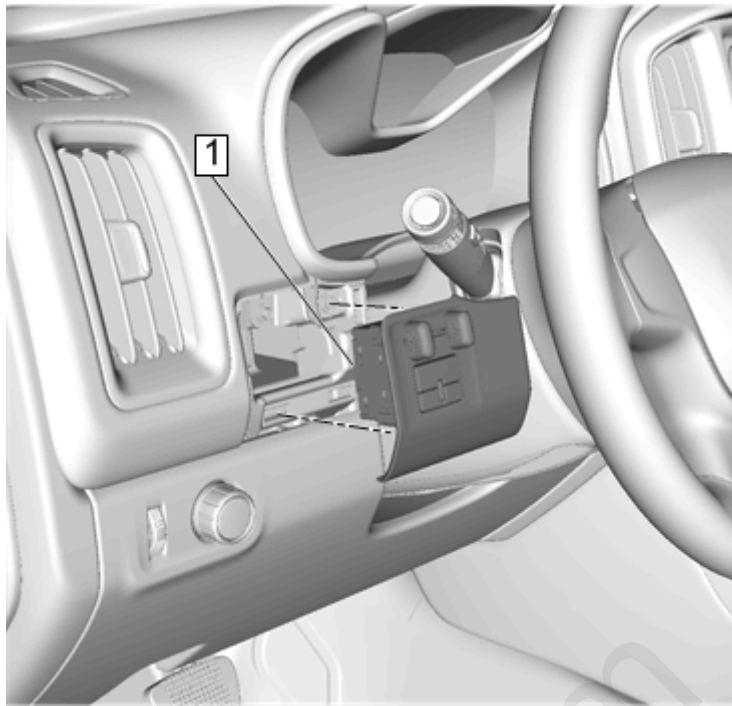


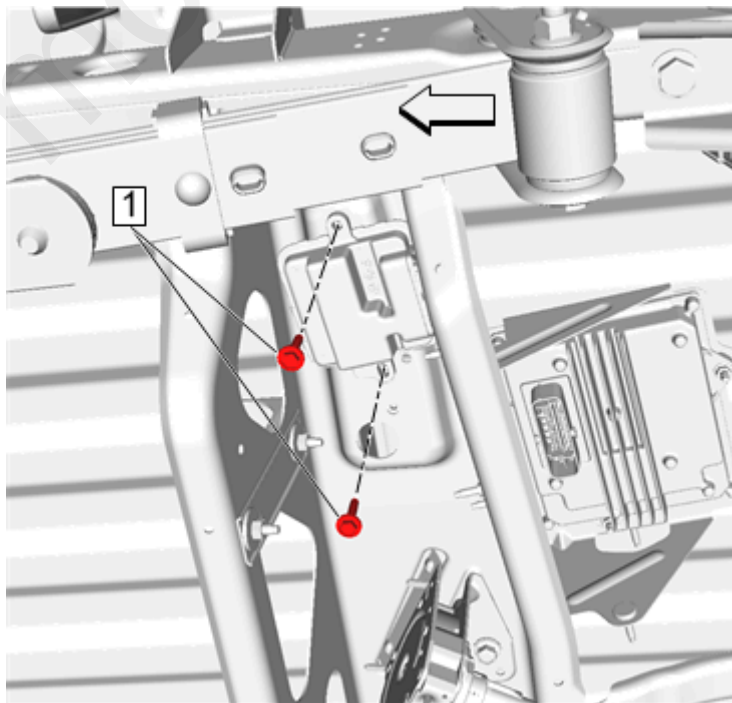
Fig. 7: Instrument Panel Compartment Toll Card Holder
 Courtesy of GENERAL MOTORS COMPANY

4. Install Instrument Panel Compartment Toll Card Holder (1)

TRAILER BRAKE POWER CONTROL MODULE REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove Spare Tire.
3. Disconnect the electrical connector.



railer Brake Power Control Module Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Remove Trailer Brake Power Control Module Bolt (1).

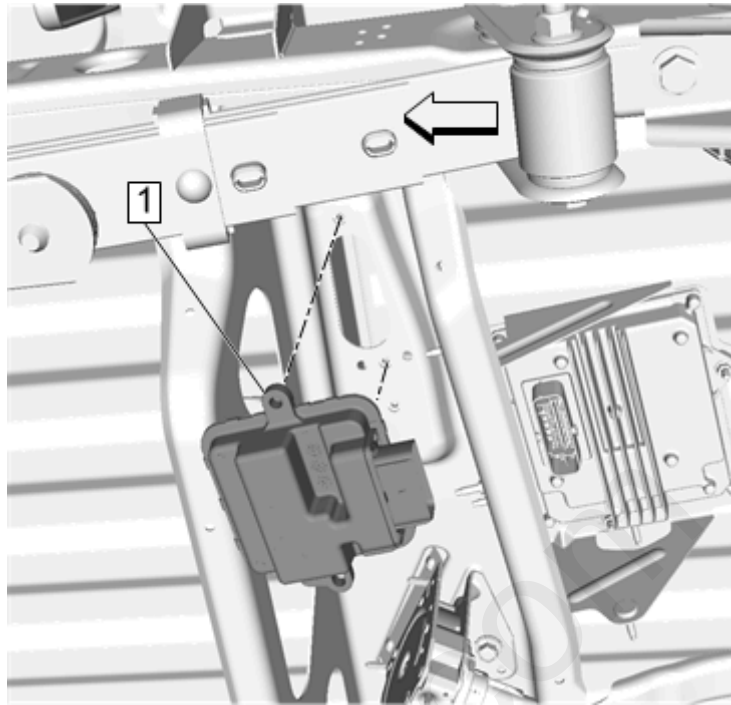


Fig. 9: Trailer Brake Power Control Module
Courtesy of GENERAL MOTORS COMPANY

5. Remove Trailer Brake Power Control Module (1).

Installation Procedure

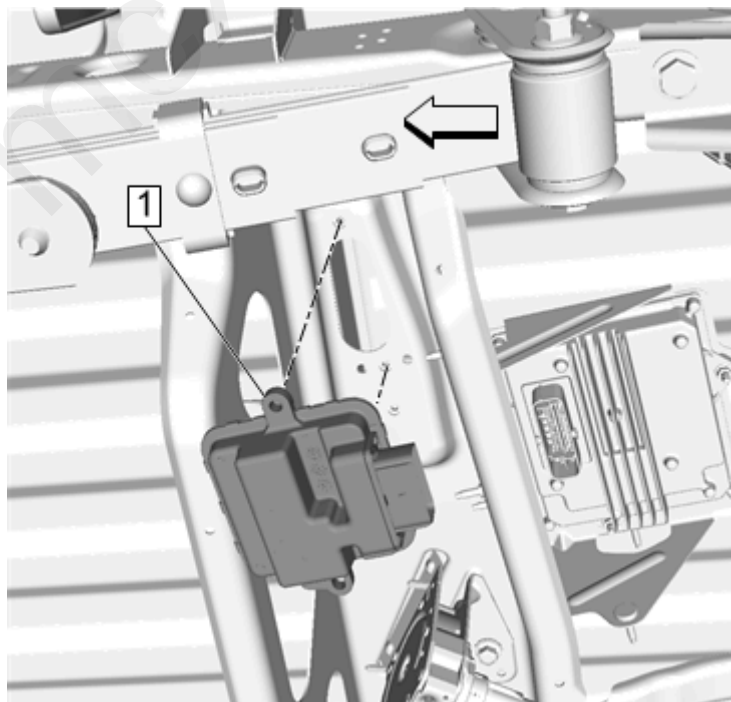


Fig. 10: Trailer Brake Power Control Module
Courtesy of GENERAL MOTORS COMPANY

Trailer Brake Power Control Module (1).

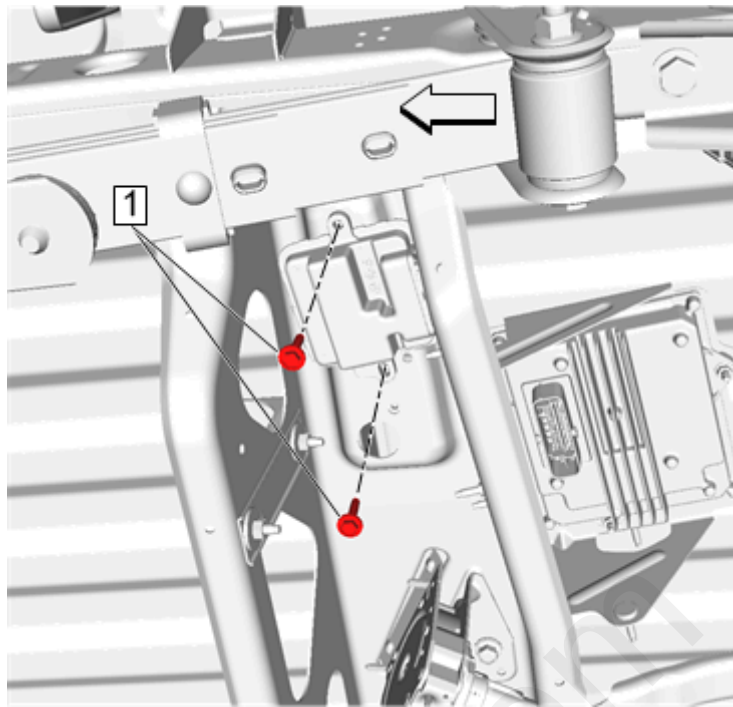


Fig. 11: Trailer Brake Power Control Module Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#) .

2. Install Trailer Brake Power Control Module Bolt (1) and tighten 9 N.m (80 lb in)
3. Connect the electrical connector.
4. Install Spare Tire
5. Program the trailer brake power control module. [Trailer Brake Power Module Programming and Setup](#)

WIRING HARNESS CONNECTOR REPLACEMENT - TRAILER BRAKE

Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Disconnect the wiring harness connector electrical connector.

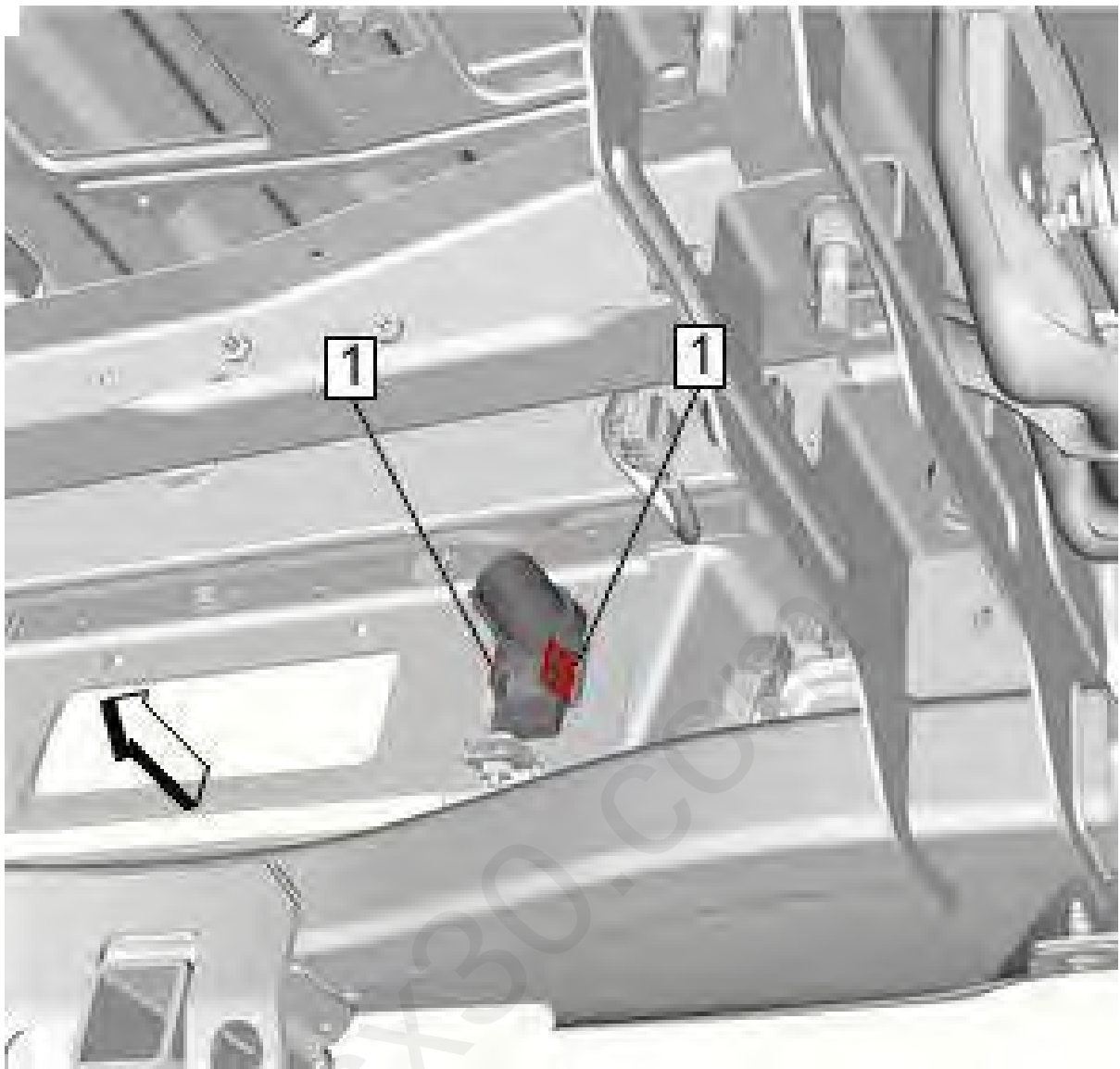


Fig. 12: Wiring Harness Connector Retainers
Courtesy of GENERAL MOTORS COMPANY

3. Release Retainer (1)



Fig. 13: Wiring Harness Connector
Courtesy of GENERAL MOTORS COMPANY

4. Remove Wiring Harness Connector (1).

Installation Procedure

1. Thoroughly clean the wiring harness electrical connector of corrosion.
2. Using a small brush, apply commercially available dielectric grease to the interior of the wiring harness electrical connector and connector terminal pins.



Fig. 14: Wiring Harness Connector
Courtesy of GENERAL MOTORS COMPANY

3. Install Wiring Harness Connector (1).

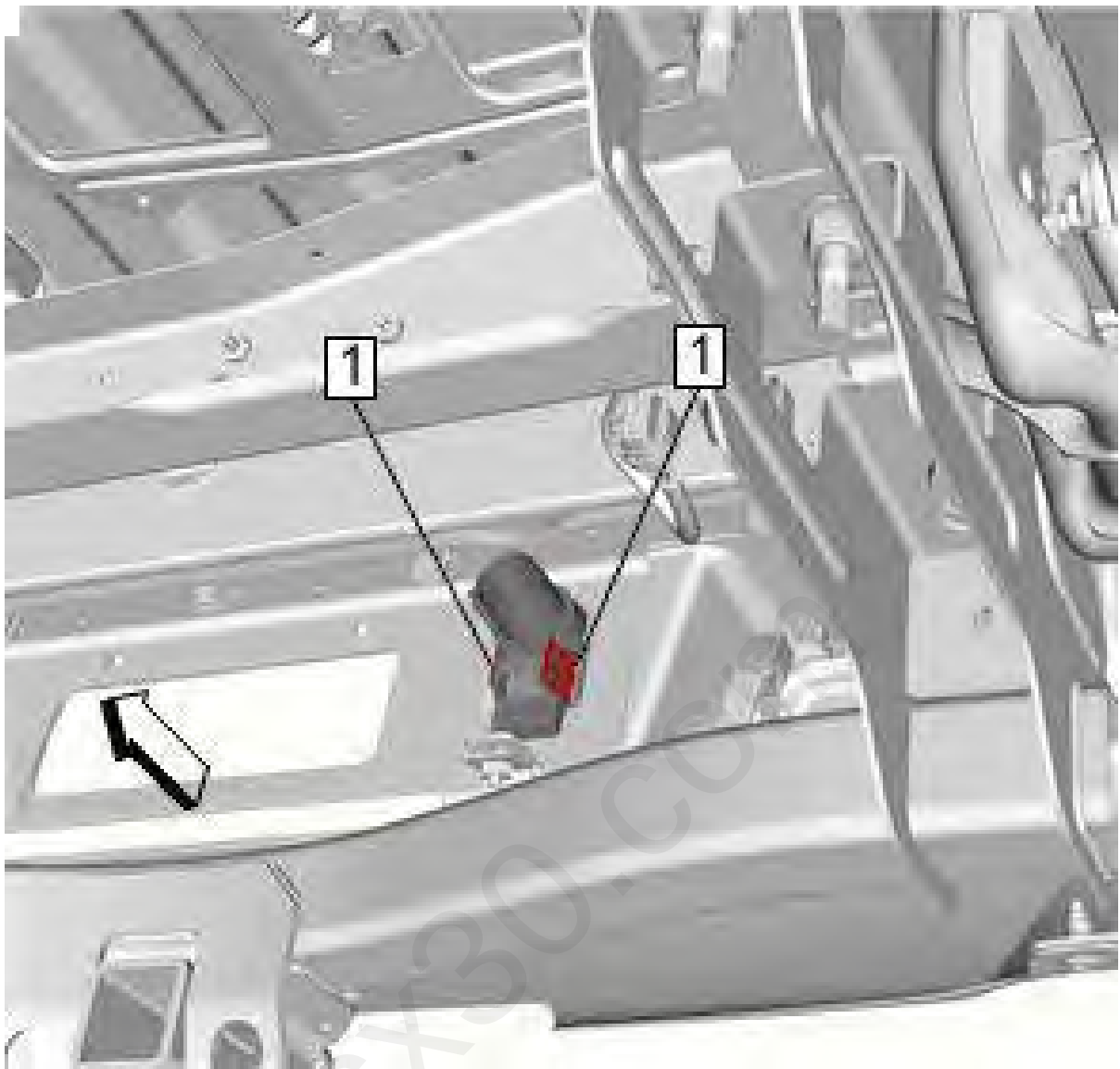


Fig. 15: Wiring Harness Connector Retainers
Courtesy of GENERAL MOTORS COMPANY

4. Engage Retainer (1).
5. Connect the wiring harness connector electrical connector.

DESCRIPTION AND OPERATION

TRAILER BRAKE CONTROLS DESCRIPTION AND OPERATION

A trailer brake control system is used to control the amount of trailer braking power that is made available to trailers with brakes that require a controlled electrical output signal for actuation.

The power output to the trailer brakes is based on both the amount of braking being applied by the vehicle's brake system and on the type of trailer brakes detected.

The Trailer Brake Control System is compatible with two types of Trailer Brake Systems as listed below:

1. **Electric Brakes** A controlled electrical output signal energizes an electric-magnet/lever arm assembly that directly actuates the brake mechanism. The GDS name for this system is "Electromagnetic Brakes".

Over Hydraulic Brakes A controlled electrical output signal energizes a remote, trailer mounted hydraulic pump to build brake pressure in a closed hydraulic system on the trailer. The hydraulic fluid pressure actuates the brake mechanism. The GDS name for this system is "Electrohydraulic Brakes".

Trailer Brake Output Versus Trailer Brake Type

- The trailer brake system characterizes the trailer brakes as either Electric Brake or Electric Over Hydraulic Brake automatically. This characterization may be affected by the number, type, and age of the trailer brake magnets, as well as any other devices installed on the trailer brakes (i.e. adapters for Electric Over Hydraulic brake functionality).
- The trailer brake system is fully operational with either characterization.
- Some features of the trailer brake system may be different based on the trailer brake type characterization. An example of this is at zero speed, where pressing the service brake pedal will produce output when the trailer brakes are characterized as Electric Brakes, but not when characterized as Electric Over Hydraulic Brakes.
- Sliding the manual trailer brake apply lever will produce output at zero speed for either characterization.

The user gain allows the driver to adjust the amount of trailer brake output to match the trailer load and road surface. The controller determines the desired trailer brake output and provides a control signal to the K133 Trailer Brake Power Control Module. The K133 Trailer Brake Power Control Module amplifies the signal and provides the output required to activate the Electric or Electric Over Hydraulic trailer brakes.

The trailer brake control can support up to a maximum of four axles with electric trailer brakes (8 brake magnets).

Connecting a trailer that is not compatible with the trailer brake system may result in reduced or complete loss of trailer braking. There may be an increase in stopping distance or trailer instability which could result in personal injury or damage to the vehicle, trailer or other property. An aftermarket controller may be available for use with trailers with surge or air trailer brake systems.

To determine the type of brakes on your trailer and the availability of controllers, check with your trailer manufacturer or dealer. Do not power up an aftermarket controller with the factory brake controller at the same time.

The vehicle is equipped with the following trailer braking components:

- K38 Chassis Control Module
- K133 Trailer Brake Power Control Module
- S76 Trailer Brake Control Panel
- Manual Trailer Brake Apply
- Trailer Gain Adjustment
- Trailer Brake Driver Information Center Display

Chassis Control Module

The K38 Chassis Control Module (CCM) is a serviceable GMLAN module. The chassis control module sends the low power commanded duty cycle signal to the trailer brake power control module. The trailer brake power control module amplifies the signal and provides an output that is required to drive the trailer brakes.

Trailer Brake Power Control Module

The K133 Trailer Brake Power Control Module (TBPM) is a solid state power switching module that supplies power to the trailer brakes at the input command duty cycle. Diagnostic messages are sent from the TBPM to the CCM on a dedicated LIN bus.

ontrol Panel

The S76 Trailer Brake Control Panel contains the trailer gain and manual apply switches. It is located on the instrument panel to the left of the steering column. Refer to the instrument panel overview for more information on the location. The control panel and switches allows you to adjust the amount of output, referred to as trailer gain, available to the Electric or Electric Over Hydraulic brakes. It also allows you to manually apply the trailer brakes. The trailer brake control panel and switches are used along with the trailer brake display page on the driver information center to adjust and display power output to the trailer brakes.

Manual Trailer Brake Apply

The manual trailer brake apply lever is located on the S76 Trailer Brake Control Panel and is used to apply the trailer's Electric or Electric Over Hydraulic brakes independent of the vehicle's brakes. This lever is used in the trailer gain adjustment procedure to properly adjust the power output to the trailer brakes.

Sliding the lever to the left will apply only the trailer brakes. The power output to the trailer is indicated in the trailer brake display page in the Driver Information Center (DIC). If the vehicle's service brakes are applied while using the manual trailer brake apply lever, the trailer output power will be the greater of the two.

The trailer and the vehicle's brake lamps will come on when either the vehicle's braking or manual trailer brakes are applied.

Trailer Gain Adjustment

Trailer gain should be set for a specific trailering condition and must be adjusted any time vehicle loading, trailer loading or road surface conditions change. It is important to re-adjust trailer gain any time the tow vehicle, trailer loading or road surface conditions change or if you notice trailer wheel lock-up at any time while you are towing.

Setting the trailer gain properly is needed for the best trailer stopping performance. A trailer that is over-gained may result in locked trailer brakes. A trailer that is under-gained may result in not enough trailer braking. Both of these conditions may result in poor stopping and stability of the vehicle and trailer.

Trailer Gain Adjustment Procedure

- Adjust trailer gain in 0.5 step increments up to 10 gain setting by using the gain adjustment +/- buttons on the trailer brake control panel switch. Pressing and holding a gain button will cause the trailer gain to continuously increment or decrement. To turn the output to the trailer off, set the gain to zero.
- Drive the tow vehicle and trailer combination on a level surface representative of the towing condition and free of traffic at approximately 32-40 km/h (20-25 mph) and fully apply the manual trailer brake apply lever mechanism located on the trailer brake control panel switch. Adjusting the trailer gain at slower speeds may result in an incorrect gain setting.
- Adjust the trailer gain to just below the threshold of trailer wheel lock-up. Trailer wheel lock-up may not occur if towing a heavily loaded trailer. In this case, adjust the trailer gain to the highest allowable setting for the towing condition.

Hill Start Assist

The hill start assist allows the driver to launch the vehicle without a roll back when the driver is moving their foot from the brake pedal to the accelerator pedal. Refer to the hill start assist system in the anti-lock brake system description and operation document for more information.

Trailer Sway Control

The trailer sway control can detect the vehicle yaw instability, caused by an attached trailer. Refer to the trailer sway control system in the anti-lock brake system description and operation document for more information.

ion Center Indicators and Messages

The following indicators are used to inform the driver of several different conditions:

Trailer Connected

This message will be briefly displayed when a trailer with Electric or Electric Over Hydraulic brakes is first connected to the vehicle. This message will automatically turn off in about ten seconds. The driver can also acknowledge this message before it automatically turns off.

Check Trailer Wiring

This message will be displayed if:

- The system detects that a trailer with Electric or Electric Over Hydraulic brakes is connected to the vehicle and then the trailer harness becomes disconnected from the vehicle.
- The trailer connection is recognized initially and then a disconnect occurs while the vehicle is stationary. This message will automatically turn off in about thirty seconds. This message will also turn off if the driver acknowledges this message off or if the trailer harness is reconnected.
- A disconnect of the trailer wiring harness occurs while the vehicle is moving. The Check Trailer Wiring message will continue until the ignition is turned off. The message will also turn off if the driver acknowledges this message off or if the trailer harness is re-connected or repairs are completed.
- There is an electrical fault in the wiring to the electric trailer brakes. The Check Trailer Wiring message will continue as long as there is an electrical fault in the trailer wiring. This message will also turn off if the driver acknowledges this message off.
- A poor connection at the 7-way connector may cause the Check Trailer Wiring message. Some aftermarket 7-way trailer side connector adapters or plugs may cause deformation or excessive wear to the vehicle's trailer terminals. It is recommended that you use an OEM or Pollak heavy duty 7-way trailer side connector adapter.

Service Trailer Brake System

This message will be displayed when there is a problem with the trailer brake control system. The trailer brake system may not be fully functional, or may not be functioning at all. The trailer brake system is designed to provide trailer braking, if possible, even when faults prevent it from being fully functional. This reduced functionality includes:

1. Providing trailer braking when the master cylinder pressure or brake pedal switch are faulted.
2. Providing trailer braking when hill start assist and trailer sway control communication is faulted.
3. Providing trailer braking when certain manual trailer brake apply lever faults are present.

These conditions should be repaired to allow the trailer brake system to be fully functional.

Trailer Gain and Output Display

This display menu can be accessed by scrolling through the DIC menu, or any time the trailer gain +/- button is depressed, or the manual trailer brake apply lever is actuated. The trailer output is displayed from 0 to full output and indicates the output power provided to the trailer brakes, relative to the gain setting.

After the electrical connection is made to a trailer equipped with electric brakes or electric over hydraulic brakes, the TRAILER CONNECTED message will be displayed momentarily on the DIC. The Trailer Brake Display Page can be selected on the DIC showing TRAILER GAIN and OUTPUT, after all vehicle related service messages are acknowledged by the driver. Depending on which instrument panel cluster is in the vehicle, the DIC may display

greyed out display, or it may be blank signifying a disconnected trailer or a trailer brake fault condition.

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