

BRAKES

Parking Brake - CTS Sedan

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Electronic Parking Brake Control Module Bolt	7 N.m	62 lb in
Electronic Parking Brake Control Module Bracket Bolt	9 N.m	80 lb in
Parking Brake Cable Bolt	9 N.m	80 lb in
Parking Brake Intermediate Cable Nut	6 N.m	53 lb in

SCHEMATIC WIRING DIAGRAMS

PARKING BRAKE SYSTEM WIRING SCHEMATICS

Electric Parking Brake System

Fig. 1: Electric Parking Brake

Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
<u>DTC C028A, C028B, or C028F</u>	DTC C028A 00 Park Brake Motor Circuit Malfunction DTC C028A 01 Park Brake Motor Circuit Short to Battery DTC C028A 02 Park Brake Motor Circuit Short to Ground DTC C028A 04 Park Brake Motor Circuit Open Circuit DTC C028A 05 Park Brake Motor Circuit Short to Battery or Open Circuit DTC C028A 08 Park Brake Motor Circuit Performance - Signal Invalid DTC C028A 28 Park Brake Motor Circuit Performance - Incorrect Frequency DTC C028A 61 Park Brake Motor Circuit Actuator Stuck DTC C028B 08 Park Brake Motor Position Sensor Signal Performance - Signal Invalid DTC C028B 26 Park Brake Motor Position Sensor Signal Low Frequency DTC C028B 29 Park Brake Motor Position Sensor Signal Too Few Pulses DTC C028B 2A Park Brake Motor Position Sensor Signal Too Many Pulses DTC C028F 01 Park Brake Solenoid Actuator Circuit Short to Battery DTC C028F 02 Park Brake Solenoid Actuator Circuit Short to Ground DTC C028F 08 Park Brake Solenoid Actuator Circuit Performance - Signal Invalid
<u>DTC C027D or C028D</u>	DTC C027D 64 Park Brake Slip Detected DTC C028D 00 Replace Park Brake Pad
<u>DTC C028E</u>	DTC C028E 05 Park Brake Solenoid Actuator Current Sensor Circuit Short to Battery or Open Circuit DTC C028E 08 Park Brake Solenoid Actuator Current Sensor Circuit Performance - Signal Invalid
<u>DTC C0293</u>	DTC C0293 00 Park Brake Switch Circuit Malfunction DTC C0293 01 Park Brake Switch Circuit Short to Battery DTC C0293 02 Park Brake Switch Circuit Short to Ground DTC C0293 04 Park Brake Switch Circuit Open DTC C0293 06 Park Brake Switch Circuit Low Voltage/Open DTC C0293 08 Park Brake Switch Circuit Performance - Signal Invalid
<u>DTC C0298</u>	DTC C0298 00 Park Brake Unlatch Switch Circuit Malfunction DTC C0298 01 Park Brake Unlatch Switch Circuit Short to Battery DTC C0298 02 Park Brake Unlatch Switch Circuit Short to Ground DTC C0298 04 Park Brake Unlatch Switch Circuit Open DTC C0298 08 Park Brake Unlatch Switch Circuit Performance - Signal Invalid
<u>DTC C0558</u>	DTC C0558 55 Calibration Data Too Few Transitions

	DTC C0558 5A Calibration Data Not Plausible
<u>DTC C0561</u>	DTC C0561 71 System Disabled Information Stored Invalid Data
<u>DTC C056D</u>	DTC C056D 00 Electronic Control Unit Hardware Malfunction DTC C056D 34 Electronic Control Unit Hardware RAM Malfunction DTC C056D 35 Electronic Control Unit Hardware ROM Malfunction DTC C056D 36 Electronic Control Unit Hardware EEPROM Performance/Malfunction DTC C056D 37 Electronic Control Unit Hardware Software Malfunction DTC C056D 38 Electronic Control Unit Hardware Supervision Software Malfunction DTC C056D 39 Electronic Control Unit Hardware Internal Malfunction DTC C056D 3B Electronic Control Unit Hardware Internal Self - Test Malfunction DTC C056D 3C Electronic Control Unit Hardware Internal Communication Malfunction
<u>DTC C056E</u>	DTC C056E 41 Electronic Control Unit Software Not Programmed DTC C056E 42 Electronic Control Unit Software Calibration Not Programmed DTC C056E 47 Electronic Control Unit Software VIN Not Programmed DTC C056E 5A Electronic Control Unit Software Not Plausible DTC C056E 71 Electronic Control Unit Software Invalid Data
<u>DTC C0574</u>	DTC C0574 00 Printed Circuit Board Temperature Sensor Malfunction DTC C0574 01 Printed Circuit Board Temperature Sensor Short to Battery DTC C0574 02 Printed Circuit Board Temperature Sensor Short to Ground DTC C0574 54 Printed Circuit Board Temperature Sensor High

DTC C028A, C028B, OR C028F: PARKING BRAKE MOTOR/PARKING BRAKE SOLENOID

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** provide an overview of each diagnostic category.

DTC Descriptors

DTC C028A 00

Park Brake Motor Circuit Malfunction

DTC C028A 01

Park Brake Motor Circuit Short to Battery

DTC C028A 02

Park Brake Motor Circuit Short to Ground

DTC C028A 04

Park Brake Motor Circuit Open Circuit

DTC C028A 05

Park Brake Motor Circuit Short to Battery or Open Circuit

DTC C028A 08

Park Brake Motor Circuit Performance - Signal Invalid

DTC C028A 28

Park Brake Motor Circuit Performance - Incorrect Frequency

DTC C028A 61

Park Brake Motor Circuit Actuator Stuck

DTC C028B 08

Park Brake Motor Position Sensor Signal Performance - Signal Invalid

DTC C028B 26

Park Brake Motor Position Sensor Signal Low Frequency

DTC C028B 29

Park Brake Motor Position Sensor Signal Too Few Pulses

DTC C028B 2A

Park Brake Motor Position Sensor Signal Too Many Pulses

DTC C028F 01

Park Brake Solenoid Actuator Circuit Short to Battery

DTC C028F 02

Park Brake Solenoid Actuator Circuit Short to Ground

DTC C028F 08

Park Brake Solenoid Actuator Circuit Performance - Signal Invalid

Circuit/System Description

The parking brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The parking brake control module also contains the logic for applying and releasing the parking brake when commanded by the park brake control switch. When the parking brake control module receives a signal from the switch, the internal circuit board temperature is checked to verify it is within operating range before the control module performs the requested operation.

The parking brake control module will diagnose the internal park brake motor circuit to verify it is functioning properly. The park brake motor circuit is used to command motor operation, apply and release tension on the parking brake cable, which will apply and release the parking brake. The park brake will self diagnose the internal park brake motor circuit. This circuit is used to drive the motor, which pulls on the park brake cable, ultimately applying and releasing the park brake.

The parking brake control module contains an internal park brake motor position sensor which monitors the park brake motor position. The parking brake control module contains an internal park brake solenoid actuator, and performs diagnostics on the solenoid actuator circuitry to verify it is functioning properly.

Conditions for Running the DTC

- Ignition OFF, ACCESSORY, or RUN mode.
- Battery voltage is between 9 - 16 V

Conditions for Setting the DTC

DTC C028A

The parking brake control module detects an internal motor malfunction.

DTC C028B

The parking brake control module detects an internal motor position sensor signal malfunction.

DTC C028F

The parking brake control module detects an internal park brake solenoid malfunction.

Action Taken When the DTC Sets

DTC C028A

- The parking brake is disabled.
- A message and/or a warning indicator may be displayed.

DTC C028B

- The parking brake is disabled, one release allowed.
- A message and/or a warning indicator may be displayed.

OR

- The parking brake functionality is degraded.
- A message and/or a warning indicator may be displayed.

DTC C028F

- The parking brake is disabled, one release allowed.
- A message and/or a warning indicator may be displayed.

Conditions for Clearing the DTC

- The parking brake control module will clear the DTC after 40 consecutive ignition on/off cycles with at least one test pass in each ignition cycle and no test fail result.
- The condition for the DTC is no longer present.

Reference Information

Schematic Reference

Park Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

Electronic Parking Brake Control Module Description

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 DTC C028A, C028B, or C028F is not set.
 - **If any of the DTCs are set**
 1. Program the K83 Parking Brake Control Module. Refer to **Electronic Parking Brake Control Module Programming and Setup** .
 2. Ignition ON.
 3. Apply and release the park brake.
 4. Verify the DTC is not set.
 - If the DTC is set, replace the K83 Parking Brake Control Module.
 - If the DTC is not set
 5. All OK.
 - **If none of the DTC are set**
3. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for parking brake control module replacement, programming and setup.

DTC C027D OR C028D: PARK BRAKE SLIP/REPLACE PARKING BRAKE PAD

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** provide an overview of each diagnostic category.

DTC Descriptors

DTC C027D 64

Park Brake Slip Detected

DTC C028D 00

Replace Park Brake Pad

Circuit/System Description

The parking brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The parking brake control module also contains the logic for applying and releasing the park brake when commanded by the park brake control switch. When the parking brake control module receives a signal from the switch, the internal circuit board temperature is checked to verify it is within operating range before the

parking brake control module performs the requested operation. The parking brake control module checks for rear wheel speeds after applying the parking brake to check for mechanical faults.

Conditions for Running the DTC

Ignition OFF, ACCESSORY, or RUN mode.

Conditions for Setting the DTC

C027D 64

The parking brake control module has detected wheel speed on the rear wheels with the parking brake applied.

C028D 00

The parking brake control module has an internal counter which keeps track of dynamic applies. When the counter reaches the threshold value this DTC will set.

Action Taken When the DTC Sets

A message and/or a warning indicator may be displayed.

Conditions for Clearing the DTC

- The parking brake control module will clear the DTC after 100 consecutive ignition on/off cycles with at least one test pass in each ignition cycle and no test fail result.
- Adjust or replace the park brake pads.

Reference Information

Schematic Reference

Park Brake System Schematics

Connector End View Reference

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Description and Operation

Electronic Parking Brake Control Module Description

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 no additional DTCs are set in other control modules.
 - **If additional DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle**

- **If no additional DTCs are set**
3. Verify that DTC C027D or C028D is not set.
 - **If the DTC is set**
 1. Verify the park brake cable is connected properly. Refer to **Park Brake System Diagnosis**
 2. Check park brake pads for excessive wear. Refer to **Disc Brake System Diagnosis**
 3. Program the K83 Parking Brake Control Module. Refer to **Electronic Parking Brake Control Module Programming and Setup** .
 4. Ignition ON. Apply and release the park brake.
 5. Verify the DTC is not set.
 - If the DTC is set, replace the K83 Parking Brake Control Module.
 - If the DTC is not set
 6. All OK.
 - **If the DTC is not set**
 - 4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for parking brake control module replacement, programming and setup.

DTC C028E: PARK BRAKE SOLENOID ACTUATOR

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** provide an overview of each diagnostic category.

DTC Descriptors

DTC C028E 05

Park Brake Solenoid Actuator Current Sensor Circuit Short to Battery or Open Circuit

DTC C028E 08

Park Brake Solenoid Actuator Current Sensor Circuit Performance - Signal Invalid

Circuit/System Description

The parking brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The parking brake control module also contains the logic for applying and releasing the parking brake when commanded by the park brake control switch. When the parking brake control module receives a signal from the switch, the internal circuit board temperature is checked to verify it is within operating range before the control module performs the requested operation.

The parking brake control module will diagnose the internal park brake motor circuit to verify it is functioning properly. The park brake motor circuit is used to command motor operation, apply and release tension on the parking brake cable, which will apply and release the parking brake. The park brake will self diagnose the internal park brake motor circuit. This circuit is used to drive the motor, which pulls on the park brake cable, ultimately applying and releasing the park brake.

The parking brake control module contains an internal park brake motor position sensor which monitors the park brake motor position. The parking brake control module contains an internal park brake solenoid actuator, and performs diagnostics on the solenoid actuator circuitry to verify it is functioning properly.

Conditions for Running the DTC

- Ignition OFF, ACCESSORY, or RUN mode.
- Battery voltage is between 9 - 16 V

Conditions for Setting the DTC

The parking brake control module detects an internal park brake current sensor malfunction.

Action Taken When the DTC Sets

- The parking brake will apply very slowly to avoid wheel lock up.
- A message and/or a warning indicator may be displayed.

Conditions for Clearing the DTC

- The parking brake control module will clear the DTC after 40 consecutive ignition on/off cycles with at least one test pass in each ignition cycle and no test fail result.
- The condition for the DTC is no longer present.

Reference Information

Schematic Reference

Park Brake System Schematics

Connector End View Reference

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Description and Operation

Electronic Parking Brake Control Module Description

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 no additional DTCs are set in other control modules.
 - **If additional DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If no additional DTCs are set**
3. Verify DTC C028E is not set.
 - **If the DTC is set**

Refer to Circuit/System Testing.

- **If the DTC is not set**
4. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness at the K83 Parking Brake Control

Module. It may take up to 2 min for all vehicle systems to power down.

2. Test for less than 10 ohms between the ground circuit terminal H and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open high/resistance in the circuit.
 - If less than 2 ohms, repair open high/resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify that a test lamp illuminates between the B+ circuit terminal A and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open high/resistance in the circuit.
 - If less than 2 ohms, 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.
 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 the test lamp illuminates**
5. Connect the harness connector at the K83 Parking Brake Control Module.
6. Verify the park brake cable is connected properly. Refer to **Park Brake System Diagnosis**
 - **If park brake cable is not connected properly**

Repair as necessary.

 - **If park brake cable is connected properly**
7. Ignition ON.
8. Apply and release the park brake.
9. Verify DTC C028E is not set.
 - **If the DTC set**

Replace the K83 Parking Brake Control Module.

 - **If the DTC is not set**
10. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for parking brake control module replacement, programming and setup.

DTC C0293: PARK BRAKE SWITCH

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** provide an overview of each diagnostic category.

DTC Descriptors

DTC C0293 00

Park Brake Switch Circuit Malfunction

DTC C0293 01

Park Brake Switch Circuit Short to Battery

DTC C0293 02

Park Brake Switch Circuit Short to Ground

DTC C0293 04

Park Brake Switch Circuit Open

DTC C0293 06

Park Brake Switch Circuit Low Voltage/Open

DTC C0293 08

Park Brake Switch Circuit Performance - Signal Invalid

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+ Terminal 1	C0293 02, C0293 06	C0293 04, C0293 06	C0293 01	C0293 00, C0293 08
B+ Terminal 4	C0293 02, C0293 06	C0293 04, C0293 06	C0293 01	C0293 00, C0293 08
B+ Terminal 5	C0293 02, C0293 06	C0293 04, C0293 06	C0293 01	C0293 00, C0293 08

Signal Terminal 2	C0293 02, C0293 06	C0293 04, C0293 06	C0293 01	C0293 00, C0293 08
Signal Terminal 3	C0293 02, C0293 06	C0293 04, C0293 06	C0293 01	C0293 00, C0293 08
Signal Terminal 7	C0293 02, C0293 06	C0293 04, C0293 06	C0293 01	C0293 00, C0293 08

Circuit/System Description

The parking brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The parking brake control module also contains the logic for applying and releasing the parking brake when commanded by the park brake control switch. The parking brake control module will perform diagnostics on the park brake control switch and its wiring harness to verify it is functioning properly. When the parking brake control module receives a signal from the switch, the internal circuit board temperature is checked to verify it is within operating range before the control module performs the requested operation.

The park brake control switch diagnostic checks for failure conditions in the park brake control switch and associated wiring into the parking brake control module.

Conditions for Running the DTC

Ignition OFF, ACCESSORY, or RUN mode.

Conditions for Setting the DTC

The parking brake control module detects a short to battery, short to ground, open circuit, or an internal parking brake control switch malfunction. The parking brake control module detects the apply or release button was activated for more than 90 seconds.

Action Taken When the DTC Sets

- The parking brake is disabled.
- A message and/or a warning indicator may be displayed.

Conditions for Clearing the DTC

- The parking brake control module will clear the DTC after 40 consecutive ignition on/off cycles with at least one test pass in each ignition cycle and no test fail result.
- The condition for the DTC is no longer present.
- The park brake control switch button is INACTIVE using the scan tool without the switch being activated.

Reference Information

Schematic Reference

Park Brake System Schematics

Connector End View Reference

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Description and Operation

Electronic Parking Brake Control Module Description

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 scan tool Park Brake Status parameter changes between Released and Apply while pressing and releasing the S91 Park Brake Control Switch.
 - **If the parameter does not change**

Refer to Circuit/System Test.
 - **If the parameter changes**
3. All OK.

Circuit/System Test

1. Ignition OFF, disconnect the harness connector at the K83 Parking Brake Control Module.
2. Test for less than 10 ohms between the ground circuit terminal H and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify a test lamp illuminates between the B+ circuit terminal A and ground.

- **If the test lamp does not illuminate and the circuit fuse is good**
- 1. Ignition OFF.
- 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, 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.
- 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 K83 Parking Brake Control Module.
- **If the test lamp illuminates**
- 5. Verify a test lamp illuminates between the ignition circuit terminal P and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 - 1. Ignition OFF.
 - 2. Test for less than 2 ohms in the ignition circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is OK and there is voltage at the fuse. Refer to **Power Mode Mismatch**
 - **If the test lamp does not illuminate and the circuit fuse is open**
 - 1. Ignition OFF.
 - 2. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K83 Parking Brake Control Module.
 - **If the test lamp illuminates**
- 6. Test for less than 1 V between the circuit terminals listed below and ground;
 - Terminal B
 - Terminal C
 - Terminal D
 - Terminal N
 - Terminal R
 - Terminal S
 - **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 circuit terminals listed below and ground;
 - Terminal B

- Terminal C
- Terminal D
- Terminal N
- Terminal R
- Terminal S
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **If infinite resistance**

9. Test for less than 5 ohms between the circuit terminal D and the circuit terminal R.
 - **If 5 ohms or greater**
 1. Ignition OFF, disconnect the harness connector at the S91 Park Brake Control Switch.
 2. Test for less than 2 ohms in the circuits end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the S91 Park Brake Control Switch.
 - **If less than 5 ohms**
10. Test for less than 5 ohms between the circuit terminal B and the circuit terminal S.
 - **If 5 ohms or greater**
 1. Ignition OFF, disconnect the harness connector at the S91 Park Brake Control Switch.
 2. Test for less than 2 ohms in the circuits end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the S91 Park Brake Control Switch.
 - **If less than 5 ohms**
11. Test for less than 5 ohms between the circuit terminal C and the circuit terminal N.
 - **If 5 ohms or greater**
 1. Ignition OFF, disconnect the harness connector at the S91 Park Brake Control Switch.
 2. Test for less than 2 ohms in the circuits end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the S91 Park Brake Control Switch.
 - **If less than 5 ohms**
12. Test for less than 5 ohms between the circuit terminal N and the circuit terminal R while closing the switch.
 - **If 5 ohms or greater**

Replace the S91 Park Brake Control Switch.
 - **If less than 5 ohms**
13. Test for less than 5 ohms between the circuit terminal N and the circuit terminal S while closing the switch.

- **If 5 ohms or greater**

Replace the S91 Park Brake Control Switch.

- **If less than 5 ohms**

14. Replace the K83 Parking Brake Control Module.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Parking Brake Switch Replacement**
- **Control Module References** for parking brake control module replacement, programming and setup.

DTC C0298: PARK BRAKE UNLATCH SWITCH

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** provide an overview of each diagnostic category.

DTC Descriptors

DTC C0298 00

Park Brake Unlatch Switch Circuit Malfunction

DTC C0298 01

Park Brake Unlatch Switch Circuit Short to Battery

DTC C0298 02

Park Brake Unlatch Switch Circuit Short to Ground

DTC C0298 04

Park Brake Unlatch Switch Circuit Open

DTC C0298 08

Park Brake Unlatch Switch Circuit Performance - Signal Invalid

Diagnostic Fault Information

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+ Terminal 1	C0298 08	C0298 08	-	C0293 00, C0293 08
B+ Terminal 5	C0298 02	C0298 04	C0298 01	C0293 00, C0293 08
Signal Terminal 2	C0298 08	C0298 08	-	C0293 00, C0293 08
Signal Terminal 3	C0298 02	C0298 04	C0298 01	C0293 00, C0293 08

Circuit/System Description

The parking brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The parking brake control module also contains the logic for applying and releasing the parking brake when commanded by the park brake control switch. When the parking brake control module receives a signal from the switch, the internal circuit board temperature is checked to verify it is within operating range before the control module performs the requested operation.

Conditions for Running the DTC

Ignition OFF, ACCESSORY, or RUN mode.

Conditions for Setting the DTC

The parking brake control module detects a short to battery, short to ground, open circuit, or an internal parking brake switch malfunction. The parking brake control module detects the apply or release button was activated for more than 90 seconds.

Action Taken When the DTC Sets

A message and/or a warning indicator may be displayed.

Conditions for Clearing the DTC

- The parking brake control module will clear the DTC after 40 consecutive ignition on/off cycles with at least one test pass in each ignition cycle and no test fail result.
- The condition for the DTC is no longer present.
- The park brake control switch button is INACTIVE using the scan tool without the switch being activated.

Diagnostic Aids

Check if the park brake control switch is stuck in the apply or release position which may cause the DTC to set.

Reference Information

Schematic Reference

Park Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

Electronic Parking Brake Control Module Description

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 scan tool Park Brake Status parameter changes between Released and Apply while pressing and releasing the S91 Park Brake Control Switch.
 - **If the parameter does not change**

Refer to Circuit/System Test.
 - **If the parameter changes**
3. All OK.

Circuit/System Test

1. Ignition OFF, disconnect the harness connector at the K83 Parking Brake Control Module.
2. Test for less than 10 ohms between the ground circuit terminal H and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.

- **If less than 10 ohms**
- 3. Ignition ON.
- 4. Verify a test lamp illuminates between the B+ circuit terminal A and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, 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.
 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 K83 Parking Brake Control Module.
 - **If the test lamp illuminates**
- 5. Verify a test lamp illuminates between the ignition circuit terminal P and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ignition circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is OK and there is voltage at the fuse. Refer to **Power Mode Mismatch**
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K83 Parking Brake Control Module.
 - **If the test lamp illuminates**
- 6. Test for less than 1 V between the circuit terminals listed below and ground;
 - Terminal B
 - Terminal C
 - Terminal D
 - Terminal N
 - Terminal R
 - Terminal S
 - **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 circuit terminals listed below and ground;

- Terminal B
- Terminal C
- Terminal D
- Terminal N
- Terminal R
- Terminal S
- **If less than infinite resistance**

Repair the short to ground on the circuit.

- **If infinite resistance**

9. Test for less than 5 ohms between the circuit terminal D and the circuit terminal R.

- **If 5 ohms or greater**

1. Ignition OFF, disconnect the harness connector at the S91 Park Brake Control Switch.
2. Test for less than 2 ohms in the circuits end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the S91 Park Brake Control Switch.

- **If less than 5 ohms**

10. Test for less than 5 ohms between the circuit terminal B and the circuit terminal S.

- **If 5 ohms or greater**

1. Ignition OFF, disconnect the harness connector at the S91 Park Brake Control Switch.
2. Test for less than 2 ohms in the circuits end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the S91 Park Brake Control Switch.

- **If less than 5 ohms**

11. Test for less than 5 ohms between the circuit terminal C and the circuit terminal N.

- **If 5 ohms or greater**

1. Ignition OFF, disconnect the harness connector at the S91 Park Brake Control Switch.
2. Test for less than 2 ohms in the circuits end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the S91 Park Brake Control Switch.

- **If less than 5 ohms**

12. Test for less than 5 ohms between the circuit terminal N and the circuit terminal R while closing the switch.

- **If 5 ohms or greater**

Replace the S91 Park Brake Control Switch.

- **If less than 5 ohms**

13. Test for less than 5 ohms between the circuit terminal N and the circuit terminal S while closing the switch.

- **If 5 ohms or greater**

Replace the S91 Park Brake Control Switch.

- **If less than 5 ohms**

14. Replace the K83 Parking Brake Control Module.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Parking Brake Switch Replacement**
- **Control Module References** for parking brake control module replacement, programming and setup.

DTC C0558: PARKING BRAKE CALIBRATION DATA

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** provide an overview of each diagnostic category.

DTC Descriptors

DTC C0558 55

Calibration Data Too Few Transitions

DTC C0558 5A

Calibration Data Not Plausible

Circuit/System Description

The parking brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The parking brake control module also contains the logic for applying and releasing the parking brake when commanded by the park brake control switch. When the parking brake control module receives a signal from the switch, the internal circuit board temperature is checked to verify it is within operating range before the control module performs the requested operation.

Conditions for Running the DTC

Ignition OFF, ACCESSORY, or RUN mode.

Conditions for Setting the DTC

C0558 55

The parking brake control module detects a calibration malfunction.

C0558 5A

The parking brake control module detects mechanical problems with the parking brake system.

Action Taken When the DTC Sets

C0558 55

- The parking brake is disabled, switch command will not be accepted.
- A message and/or a warning indicator may be displayed.

C0558 5A

- The parking brake is disabled, one release allowed.
- A message and/or a warning indicator may be displayed.

OR

- The parking brake functionality is degraded.
- A message and/or a warning indicator may be displayed.

Conditions for Clearing the DTC

- The parking brake control module will clear the DTC after 40 consecutive ignition on/off cycles with at least one test pass in each ignition cycle and no test fail result.
- Calibrate the parking brake control module after mechanical repairs are made.

Diagnostic Aids

- Verify the parking brake control module software and calibrations are the newest available versions.
- Verify the parking brake cable and related hardware is not broken, seized or pinched.

Reference Information

Schematic Reference

Park Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

Electronic Parking Brake Control Module Description

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 DTC C0558 55 is not set.
 - **If DTC C0558 55 is set**
 1. Program the K83 Parking Brake Control Module. Refer to **Electronic Parking Brake Control Module Programming and Setup**.
 2. Ignition ON.
 3. Apply and release the park brake.
 4. Verify the DTC is not set.
 - If the DTC is set, replace the K83 Parking Brake Control Module.
 - If the DTC is not set
 5. All OK.
 - **If DTC C0558 55 is not set**
3. Verify the scan tool Park Brake Cable Position parameter is less than 1251 counts.
 - **If 1251 counts or greater**
 1. Verify the park brake cable is connected properly. Refer to **Park Brake System Diagnosis**
 2. Check park brake pads for excessive wear. Refer to **Disc Brake System Diagnosis**
 - **If less than 1251 counts**
4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for parking brake control module replacement, programming and setup.

DTC C0561: PARKING BRAKE SYSTEM DISABLED INFORMATION

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** provide an overview of each diagnostic category.

DTC Descriptors

DTC C0561 71

System Disabled Information Stored Invalid Data

Circuit/System Description

The parking brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The parking brake control module also contains the logic for applying and releasing the parking brake when commanded by the park brake control switch. When the parking brake control module receives a signal from the switch, the internal circuit board temperature is checked to verify it is within operating range before the control module performs the requested operation. The parking brake module will verify it has a valid signal from other modules before it performs the requested operation.

Conditions for Running the DTC

- Ignition OFF, ACCESSORY, or RUN mode.
- Battery voltage is between 9-16V.

Conditions for Setting the DTC

The parking brake control module receives an invalid serial data message or does not receive a serial data message from another module.

Action Taken When the DTC Sets

- A message and/or a warning indicator may be displayed.
- The parking brake functionality is degraded.

Conditions for Clearing the DTC

- The parking brake control module will clear the DTC after 40 consecutive ignition on/off cycles with at least one test pass in each ignition cycle and no test fail result.
- The parking brake control module receives valid signals from other modules.

Reference Information

Schematic Reference

Park Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

Electronic Parking Brake Control Module Description

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 no additional DTCs are set in other control modules.
 - **If additional DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle**

- **If no additional DTCs are set**
3. Verify the scan tool Park Brake Control Module Invalid Signal Identification parameters are all Valid.
 - **If any parameter is Invalid**

Refer to the appropriate subsection in which the failure occurred. Refer to **Symptoms - Vehicle**

- **If all parameters are Valid**
4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

DTC C056D: ELECTRONIC CONTROL UNIT

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** provide an overview of each diagnostic category.

DTC Descriptors

DTC C056D 00

Electronic Control Unit Hardware Malfunction

DTC C056D 34

Electronic Control Unit Hardware RAM Malfunction

DTC C056D 35

Electronic Control Unit Hardware ROM Malfunction

DTC C056D 36

Electronic Control Unit Hardware EEPROM Performance/Malfunction

DTC C056D 37

Electronic Control Unit Hardware Software Malfunction

DTC C056D 38

Electronic Control Unit Hardware Supervision Software Malfunction

DTC C056D 39

Electronic Control Unit Hardware Internal Malfunction

DTC C056D 3B

Electronic Control Unit Hardware Internal Self - Test Malfunction

DTC C056D 3C

Electronic Control Unit Hardware Internal Communication Malfunction

Circuit/System Description

The parking brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The parking brake control module also contains the logic for applying and releasing the parking brake when commanded by the park brake control switch. When the parking brake control module receives a signal

from the switch, the internal circuit board temperature is checked to verify it is within operating range before the control module performs the requested operation. The parking brake module will perform diagnostics on the modules internal hardware to verify it is functioning properly

Conditions for Running the DTC

Ignition OFF, ACCESSORY, or RUN mode.

Conditions for Setting the DTC

The parking brake control module detects an internal hardware malfunction.

Action Taken When the DTC Sets

DTC C056D 00, C056D 34, C056D 35, C056D 36, C056D 37, C056D 38, C056D 3B, or C056D 3C

- The parking brake is disabled.
- A message and/or a warning indicator may be displayed.

DTC C056D 39

- The parking brake is disabled, one release allowed.
- A message and/or a warning indicator may be displayed.

Conditions for Clearing the DTC

- The parking brake control module will clear the DTC after 40 consecutive ignition on/off cycles with at least one test pass in each ignition cycle and no test fail result.
- The condition for the DTC is no longer present.
- The latest software and calibrations are programmed into the parking brake control module.

Reference Information

Schematic Reference

Park Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

Electronic Parking Brake Control Module Description

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 DTC C056D 36 is not set.
 - **If DTC C056D 36 is set**
 1. Program the K83 Parking Brake Control Module. Refer to **Electronic Parking Brake Control Module Programming and Setup** .
 2. Ignition ON.
 3. Apply and release the park brake.
 4. Verify the DTC is not set.
 - If the DTC is set, replace the K83 Parking Brake Control Module.
 - If the DTC is not set
 5. All OK.
 - **If DTC C056D 36 is not set**
3. Perform the Parking Brake Motor Reset procedure with a scan tool for the Parking Brake Control Module.
4. Verify DTC C056D is not set.
 - **If DTC C056D is set**

Replace the K83 Parking Brake Control Module.
 - **If DTC C056D is not set**
5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for parking brake control module replacement, programming and setup.

DTC C056E: ELECTRONIC CONTROL UNIT SOFTWARE

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** provide an overview of each diagnostic category.

DTC Descriptors

DTC C056E 41

Electronic Control Unit Software Not Programmed

DTC C056E 42

Electronic Control Unit Software Calibration Not Programmed

DTC C056E 47

Electronic Control Unit Software VIN Not Programmed

DTC C056E 5A

Electronic Control Unit Software Not Plausible

DTC C056E 71

Electronic Control Unit Software Invalid Data

Circuit/System Description

The parking brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The parking brake control module also contains the logic for applying and releasing the park brake when commanded by the park brake control switch. When the parking brake control module receives a signal from the switch, the internal circuit board temperature is checked to verify it is within operating range before the parking brake control module performs the requested operation.

Conditions for Running the DTC

Ignition OFF, ACCESSORY, or RUN mode.

Conditions for Setting the DTC

The parking brake module has detected missing calibration data, calibration procedure not run or completed, missing VIN, or internal software malfunction.

Actions Taken When DTC Sets

C056E 41 or C056E 5A

- The parking brake is disabled.
- A message and/or a warning indicator may be displayed.

C056E 42

- The parking brake functionality is degraded or disabled.
- A message and/or a warning indicator may be displayed.

C056E 47 or C056E 71

The parking brake will function normally.

Conditions for Clearing the DTC

- The parking brake control module will clear the DTC after 40 consecutive ignition on/off cycles with at least one test pass in each ignition cycle and no test fail result.
- The condition for the DTC is no longer present.
- The latest software and calibrations are programmed into the parking brake control module.

Reference Information

Schematic Reference

Park Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

Electronic Parking Brake Control Module Description

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 DTC C056E is not set.
 - **If the DTC is set**
 1. Program the K83 Parking Brake Control Module. Refer to **Electronic Parking Brake Control Module Programming and Setup** .
 2. Verify the DTC is not set.
 - If the DTC is set, replace the K83 Parking Brake Control Module.
 - If the DTC is not set
 3. All OK.
 - **If the DTC is not set**
3. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for parking brake control module replacement, programming and setup.

DTC C0574: PRINTED CIRCUIT BOARD TEMPERATURE SENSOR

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** provide an overview of each diagnostic category.

DTC Descriptors

DTC C0574 00

Printed Circuit Board Temperature Sensor Malfunction

DTC C0574 01

Printed Circuit Board Temperature Sensor Short to Battery

DTC C0574 02

Printed Circuit Board Temperature Sensor Short to Ground

DTC C0574 54

Printed Circuit Board Temperature Sensor High

Circuit/System Description

The parking brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The parking brake control module also contains the logic for applying and releasing the parking brake when commanded by the park brake control switch. When the parking brake control module receives a signal from the switch, the internal circuit board temperature is checked to verify it is within operating range before the control module performs the requested operation.

Conditions for Running the DTC

Ignition OFF, ACCESSORY, or RUN mode.

Conditions for Setting the DTC

C0574 01 or C0574 02

The parking brake control module detects a short to battery or a short to ground.

C0574 00 or C0574 54

The parking brake control module has detected an internal temperature that is above the allowed value.

Action Taken When the DTC Sets

- A message and/or a warning indicator may be displayed.
- The park brake is disabled, one release allowed.

Conditions for Clearing the DTC

- The parking brake control module clears the history DTC when a current DTC is not detected in 40 ignition cycles.
- The parking brake control module is replaced or the internal temperature drops below the allowed temperature.

Diagnostic Aids

- Check for debris on the parking brake control module which may cause the module to overheat.
- Diagnose all other parking brake control module system related faults before performing this diagnostic. Other faults may cause the circuit board to overheat. Do not attempt to apply the park brake.

Reference Information

Schematic Reference

Park Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

Electronic Parking Brake Control Module Description

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 no additional DTCs are set in other control modules.
 - **If additional DTCs are set**

Refer to Diagnostic Trouble Code (DTC) List - Vehicle

- **If no additional DTCs are set**
3. Verify that DTC C0574 01 or C0574 02 is not set.
 - **If DTC C0574 01 or C0574 02 is set**
 1. Ignition OFF. Remove the parking brake control module fuse and reinstall. Ignition ON.
 2. Verify DTC C0574 01 or C0574 02 is not set.
 - If the DTC is set, replace the K83 Parking Brake Control Module.
 - If the DTC is not set
 - 3. All OK.
 - **If DTC C0574 01 or C0574 02 is not set**
 4. Allow the K83 Parking Brake Control Module to cool down for 15 minutes.
 5. Verify the scan tool Calculated System Temperature parameter is less than 105° C.
 - **If 105° C or greater**

Replace the K83 Parking Brake Control Module.

- **If less than 105° C**
6. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for parking brake control module replacement, programming and setup.

SYMPTOMS - PARK BRAKE

IMPORTANT: Review the system operation in order to familiarize yourself with the system functions.

Refer to **Electronic Parking Brake Control Module Description**.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the park brake system.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

Park Brake Will Not Hold or Release

PARK BRAKE WILL NOT HOLD OR RELEASE

Park Brake Will Not Hold or Release

Step	Action	Yes	No
1	Were you sent here from the Park Brake Symptom table?	Go to Step 2	Go to <u>Diagnostic Starting Point - Vehicle</u>
2	Inspect the park brake system for proper operation. Refer to <u>Park Brake System Diagnosis</u> . Did you find and correct a condition?	Go to Step 7	Go to Step 3
3	Is the vehicle equipped with an integral park brake?	Go to Step 4	Go to Step 5
4	Inspect the disc brake system for proper operation. Refer to <u>Disc Brake System Diagnosis</u> . Did you find and correct a condition?	Go to Step 7	Go to Step 6
5	Inspect the parking brake adjustment. Refer to <u>Parking Brake Adjustment</u> . Did you find and correct a condition?	Go to Step 7	Go to <u>Diagnostic Starting Point - Vehicle</u>
6	Inspect the hydraulic brake system for proper operation. Refer to <u>Hydraulic Brake System Diagnosis</u> . Did you find and correct a condition?	Go to Step 7	Go to <u>Diagnostic Starting Point - Vehicle</u>
	Road test the vehicle in order to confirm proper operation. Refer to <u>Brake System Vehicle Road</u>		

7	Test . Is the condition still present?	Go to Step 2	System OK
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PARK BRAKE SYSTEM DIAGNOSIS

Park Brake System Diagnosis

Step	Action	Yes	No
DEFINITION: This diagnostic table is designed to diagnose ONLY the mechanical components of the PARK brake system in order to determine if the PARK brake system is operating properly. You will be directed by the appropriate Symptom table to go to other brake system diagnostic tables as appropriate.			
1	Were you sent here from a Hydraulic Brake Symptom table?	Go to Step 4	Go to Step 2
2	Were you sent here from a Park Brake Symptom table?	Go to Step 4	Go to Step 3
3	1. Raise and support the vehicle with the rear axle supported by jack stands. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. With the park brake RELEASED, attempt to rotate the rear wheels to check the rear brakes for a significant amount of drag. Do the rear brakes have a significant amount of drag?	Go to Step 8	Go to Step 4
4	1. Apply the park brake. 2. Attempt to rotate the rear wheels to check the rear brakes for a significant amount of drag. Do the rear brakes have a significant amount of drag?	Go to Step 14	Go to Step 5
5	Visually inspect the park brake cable connections and the cables that are accessible on the UNDERSIDE of the vehicle for disconnections and/or damage. Were any of the park brake cables disconnected and/or damaged?	Go to Step 6	Go to Step 7
6	Reconnect or replace the park brake cables as necessary. Refer to <u>Parking Brake Intermediate Cable Replacement</u> , or <u>Parking Brake Rear Cable Replacement</u> . Did you complete the repair and/or replacement?	Go to Step 14	-
7	Is the vehicle equipped with an integral parking brake?	Go to Step 8	Go to Step 10
	1. Disconnect the rear park brake cables from the equalizer and from the brake caliper piston apply levers. Refer to <u>Parking Brake Intermediate Cable Replacement</u> , or <u>Parking Brake Rear Cable Replacement</u> . 2. Have an assistant apply and maintain the caliper piston apply lever to apply the caliper piston.		

8	3. Attempt to rotate the rear wheels to check the rear brakes for a significant amount of drag. 4. Release the caliper piston apply lever. 5. Repeat steps 2-4 for the opposite caliper piston apply lever. 6. Rotate the rear wheels to check the brake for a significant reduction of drag. Did the brake calipers apply and release properly?	Go to Step 11	Go to Step 9
9	Replace the appropriate rear brake caliper. Refer to <u>Rear Brake Caliper Replacement</u> . Did you complete the replacement?	Go to Step 14	-
10	Inspect the parking brake adjustment. Did you find and correct a condition?	Go to Step 14	Go to Step 11
11	With the aid of an assistant, apply and release the parking brake while observing the cables for free movement. Did the park brake cables move freely?	Go to Step 13	Go to Step 12
12	Replace any of the park brake cables inspected that do not have free movement. Refer to <u>Parking Brake Intermediate Cable Replacement</u>, or <u>Parking Brake Rear Cable Replacement</u>. Did you complete the replacement?	Go to Step 14	-
13	Inspect the electronic parking brake control module for proper operation and replace if necessary. Refer to <u>Electronic Parking Brake Control Module Replacement</u>. Did you complete the replacement?	Go to Step 14	-
14	Install or connect any components that were removed or disconnected during diagnosis. Did you complete the operation?	Park Brake System OK	-

PARK BRAKE HARDWARE INSPECTION

WARNING: Refer to **Brake Dust Warning** .

- With the brake rotors removed, visually inspect the upper return/adjuster actuator spring and the lower return spring for the following:
 - Excessive corrosion
 - Excessive stretching
 - Broken hook ends
 - Twisting or binding

2. If any of the conditions listed were found, which could lead to improper park brake apply and/or release, the adjuster hardware and/or return springs require replacement.
3. Visually inspect the adjuster and the adjuster actuator lever for the following:
 - Misalignment with the park brake lever
 - Misalignment with the park brake shoes
 - Broken or bent adjuster actuator lever
 - Bent adjuster actuator lever pivot pin
4. If any of the conditions listed were found, which could lead to improper park brake apply and/or release, the adjuster hardware requires repair or replacement.
5. Inspect the park brake lever for the following:
 - Bent
 - Broken pivot pin
 - Seized at the pivot pin
 - Broken at park brake cable attachment
 - Improper contact with the adjuster
6. If any of the conditions listed were found, which could lead to improper park brake apply and/or release, the park brake lever requires repair or replacement.
7. Visually inspect the park brake cable for the following:
 - Improper mounting to the backing plate
 - Improper mounting at the park brake lever
 - Broken or missing cable end lug
8. If any of the conditions listed were found, which could lead to improper park brake apply and/or release, the park brake cable requires repair or replacement.
9. Apply the park brake lever/pedal three clicks.
10. Visually inspect the park brake cable for the following:
 - Unequal travel between the left and the right park brake systems
 - No travel on one or both of the park brake systems
11. If any of the conditions listed were found, which could lead to improper park brake apply and/or release, the park brake cable requires replacement and/or adjustment.
12. Release the park brake lever/pedal.
13. Visually inspect the park brake cable for the following:
 - Unequal release between the left and the right park brake systems
 - No release at one or both of the park brake systems
14. If any of the conditions listed were found, which could lead to improper park brake apply and/or release, the park brake cable requires replacement and/or adjustment.

PARKING BRAKE SHOE INSPECTION

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the rear tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

3. Remove the rear brake caliper. Refer to **Rear Brake Caliper Replacement** .
4. Remove the rear brake caliper bracket. Refer to **Rear Brake Caliper Bracket Replacement** .
5. Remove the rear brake rotor. Refer to **Rear Brake Rotor Replacement** .
6. Inspect and replace the park brake shoe and lining if any of the following conditions are found:
 - Excessive wear indicated by the park brake lining being worn down to the shoe
 - Brake lining cracking
 - Oil or fluid contamination of the brake lining
7. Adjust the park brake shoe. Refer to **Parking Brake Adjustment**.
8. Install the rear brake rotor. Refer to **Rear Brake Rotor Replacement** .
9. Install the rear brake caliper bracket. Refer to **Rear Brake Caliper Bracket Replacement** .
10. Install the rear brake caliper. Refer to **Rear Brake Caliper Replacement** .
11. Install the rear tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
12. Lower the vehicle.

REPAIR INSTRUCTIONS

ELECTRONIC PARKING BRAKE CONTROL MODULE REPLACEMENT

Removal Procedure

1. Block the drive wheels.
2. Disable the parking brake cable adjuster. Refer to **Parking Brake Cable Adjuster Disabling**
3. Place the ignition in the OFF position.
4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

Fig. 2: Electronic Parking Brake Control Module Bolts
Courtesy of GENERAL MOTORS COMPANY

5. Remove the electronic parking brake control module bolts (1).
6. Position the electronic parking brake control module to access the electrical connector.
7. Disconnect the electronic parking brake control module electrical connector.

Fig. 3: Parking Brake Intermediate Cable Nut
Courtesy of GENERAL MOTORS COMPANY

8. Disconnect the parking brake intermediate cable nut (1).

Fig. 4: Electronic Parking Brake Control Module Bracket Bolts
Courtesy of GENERAL MOTORS COMPANY

9. Remove the electronic parking brake control module bracket bolts (1).
10. Separate the electronic parking brake control module from the bracket.

Fig. 5: Electronic Parking Brake Control Module
Courtesy of GENERAL MOTORS COMPANY

11. Maneuver and remove the electronic parking brake control module (1).

Installation Procedure

Fig. 6: Electronic Parking Brake Control Module
Courtesy of GENERAL MOTORS COMPANY

1. Position the electronic parking brake control module (1) to the electronic parking brake control module bracket.
2. Inspect the O-ring seals on the spindle and the intermediate cable for damage and correct positioning and replace, if necessary.

Fig. 7: Parking Brake Intermediate Cable Nut
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

NOTE: When installing the electronic park brake intermediate cable nut to the electronic park brake module spindle, hold the spindle housing securely to avoid distorting the housing.

3. Install the parking brake intermediate cable nut (1) and tighten to 6 (53 lb in).
4. Maneuver and install the electronic parking brake control module and bracket to the rear suspension support.
5. Connect the electronic parking brake control module electrical connector.

Fig. 8: Electronic Parking Brake Control Module Bracket Bolts
Courtesy of GENERAL MOTORS COMPANY

6. Install the electronic parking brake control module bracket bolts (1) and tighten to 9 (80 lb in).

Fig. 9: Electronic Parking Brake Control Module Bolts
Courtesy of GENERAL MOTORS COMPANY

7. Install the electronic parking brake control module bolts (1) and tighten to 7 (62 lb in).
8. Program the electronic parking brake control module. Refer to **Electronic Parking Brake Control Module Programming and Setup** .

PARKING BRAKE SHOE REPLACEMENT

Removal Procedure

WARNING: Refer to **Brake Dust Warning** .

1. Turn the ignition OFF.
2. Block the rear drive wheels.
3. Release the park brake lever, if equipped.

4. Disable the parking brake cable adjuster. Refer to **Parking Brake Cable Adjuster Disabling**.
5. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
6. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
7. Remove the rear brake rotor. Refer to **Rear Brake Rotor Replacement** .

Fig. 10: Parking Brake Shoe Upper Return Spring
Courtesy of GENERAL MOTORS COMPANY

8. Remove the parking brake shoe upper return spring (1).

Fig. 11: Parking Brake Shoe Adjuster
Courtesy of GENERAL MOTORS COMPANY

9. Remove the parking brake shoe adjuster (1).

Fig. 12: Parking Brake Shoe Hold Down Springs
Courtesy of GENERAL MOTORS COMPANY

10. Remove the parking brake shoe hold down springs (1) by compressing the hold down springs and rotating the spring 1/4 turn and removing the hold down spring pins.

Fig. 13: Parking Brake Shoe Lower Return Spring
Courtesy of GENERAL MOTORS COMPANY

11. Remove the parking brake shoe lower return spring (1).
12. Remove the parking brake shoes from the rear brake backing plate.
13. Lubricate the park brake shoe to backing plate contact points with high temperature brake lubricant.

Installation Procedure

1. Install the parking brake shoes to the rear brake backing plate.
2. Position the lower portion of the parking brake shoes into the notches of the parking brake shoe actuator lever.

Fig. 14: Parking Brake Shoe Lower Return Spring
Courtesy of GENERAL MOTORS COMPANY

3. Install the parking brake shoe lower return spring (1).

Fig. 15: Parking Brake Shoe Hold Down Springs
Courtesy of GENERAL MOTORS COMPANY

4. Install the parking brake shoe hold down springs (1) by compressing the hold down springs and rotating the spring 1/4 turn and installing the hold down spring pins.

Fig. 16: Parking Brake Shoe Adjuster
Courtesy of GENERAL MOTORS COMPANY

5. Rotate the parking brake shoe adjuster to the fully retracted position and install the parking brake shoe adjuster (1).

Fig. 17: Parking Brake Shoe Upper Return Spring
Courtesy of GENERAL MOTORS COMPANY

6. Install the parking brake shoe upper return spring (1).
7. Adjust the parking brake. Refer to **Parking Brake Adjustment**.
8. Install the rear brake rotor. Refer to **Rear Brake Rotor Replacement** .
9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
10. Enable the parking brake cable adjuster. Refer to **Parking Brake Cable Adjuster Enabling**.

PARKING BRAKE SWITCH REPLACEMENT

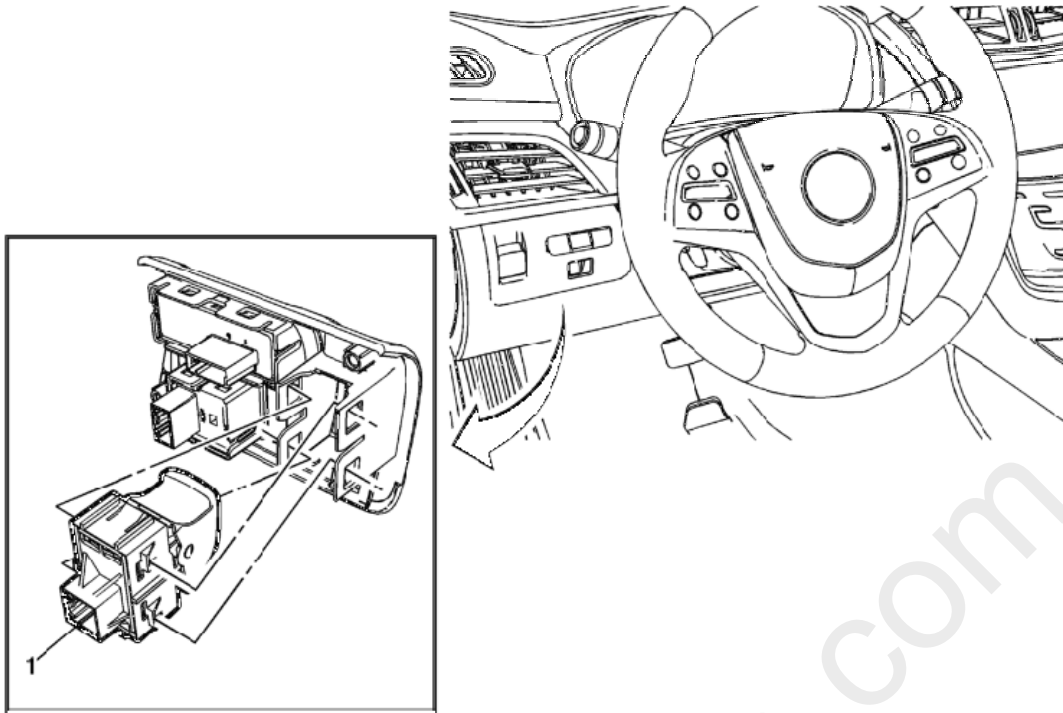


Fig. 18: Parking Brake Switch
Courtesy of GENERAL MOTORS COMPANY

Parking Brake Switch Replacement

Callout	Component Name
Preliminary Procedure Remove the instrument panel knee bolster. Refer to <u>Instrument Panel Knee Bolster Replacement</u> .	
1	Parking Brake Switch Procedure Release tabs on switch to remove from the bezel.

PARKING BRAKE INTERMEDIATE CABLE REPLACEMENT

Special Tools

CH-37043 Parking Brake Cable Release Tool

For equivalent regional tools, refer to **Special Tools**.

Removal Procedure

1. Block the drive wheels.
2. Disable the parking brake cable adjuster. Refer to **Parking Brake Cable Adjuster Disabling**
3. Place the ignition in the OFF position.
4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

5. Remove the right rear tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
6. Remove the right rear brake rotor. Refer to **Rear Brake Rotor Replacement** .

Fig. 19: Electronic Parking Brake Control Module Bolts
Courtesy of GENERAL MOTORS COMPANY

7. Remove the electronic parking brake control module bolts (1).
8. Position the electronic parking brake control module to access the parking brake intermediate cable nut.

Fig. 20: Parking Brake Intermediate Cable Nut
Courtesy of GENERAL MOTORS COMPANY

9. Disconnect the parking brake intermediate cable nut (1).

Fig. 21: Rear Park Brake Cable

Courtesy of GENERAL MOTORS COMPANY

10. Disconnect the rear park brake cable (1) from the parking brake intermediate cable equalizer.

Fig. 22: Parking Brake Intermediate Cable
Courtesy of GENERAL MOTORS COMPANY

11. Using the **CH-37043** Parking Brake Cable Release Tool , release the parking brake intermediate cable from the bracket on the rear frame.

Fig. 23: Parking Brake Intermediate Cable Bracket
Courtesy of GENERAL MOTORS COMPANY

12. Feed the parking brake intermediate cable through the bracket (1) on the rear frame.

Fig. 24: Parking Brake Intermediate Cable Bolt
Courtesy of GENERAL MOTORS COMPANY

13. Remove the parking brake intermediate cable bolt (1).

Fig. 25: Parking Brake Shoe Actuator Lever Spring
Courtesy of GENERAL MOTORS COMPANY

14. Lift the parking brake shoe actuator lever spring (1).
15. Using a small tool, lift the parking brake intermediate cable over and off of the parking brake cable actuator lever.
16. Remove the parking brake intermediate cable from the vehicle.

Installation Procedure

1. Install the parking brake intermediate cable to the vehicle.
2. Insert the parking brake intermediate cable end into the rear brake backing plate.
3. Grasp the parking brake intermediate cable and push the cable into the rear brake backing plate until the cable end seats in the parking brake shoe actuator lever.
4. Ensure the parking brake cable end is fully seated in the parking brake shoe actuator lever by attempting to pull the cable from the rear brake backing plate.

Fig. 26: Parking Brake Intermediate Cable Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

5. Install the parking brake intermediate cable bolt (1) and tighten to 9 (80 lb in).

Fig. 27: Parking Brake Intermediate Cable Bracket
Courtesy of GENERAL MOTORS COMPANY

6. Feed the parking brake intermediate cable through the bracket (1) on the rear frame.

Fig. 28: Parking Brake Intermediate Cable
Courtesy of GENERAL MOTORS COMPANY

7. Install the parking brake intermediate cable (1) to the bracket on the rear frame.
8. Ensure the parking brake intermediate cable locking tabs are fully engaged to the parking brake cable bracket on the rear frame.

Fig. 29: Rear Park Brake Cable

Courtesy of GENERAL MOTORS COMPANY

9. Connect the parking brake rear cable (1) to the intermediate parking brake cable equalizer.

Fig. 30: Parking Brake Intermediate Cable Nut
Courtesy of GENERAL MOTORS COMPANY

NOTE: When installing the electronic park brake intermediate cable nut to the electronic park brake module spindle, hold the spindle housing securely to avoid distorting the housing.

10. Install the parking brake intermediate cable nut (1) and tighten to 6 (53 lb in).

Fig. 31: Electronic Parking Brake Control Module Bolts
Courtesy of GENERAL MOTORS COMPANY

11. Install the electronic parking brake control module bolts (1) and tighten to 7 (62 lb in).
12. Install the right rear brake rotor. Refer to **Rear Brake Rotor Replacement** .
13. Install the right rear tire and wheel assembly. Refer to **Lifting and Jacking the Vehicle**
14. Enable the parking brake cable adjuster. Refer to **Parking Brake Cable Adjuster Enabling**.

PARKING BRAKE REAR CABLE REPLACEMENT

Special Tools

CH-37043 Parking Brake Cable Release Tool

For equivalent regional tools, refer to **Special Tools**.

Removal Procedure

WARNING: Refer to Brake Dust Warning .

1. Block the drive wheels.
2. Disable the parking brake cable adjuster. Refer to **Parking Brake Cable Adjuster Disabling**.
3. Turn the ignition OFF.
4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
5. Remove the left rear tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
6. Remove the left rear brake rotor. Refer to **Rear Brake Rotor Replacement** .

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Fig. 32: Rear Park Brake Cable

Courtesy of GENERAL MOTORS COMPANY

7. Disconnect the parking brake rear cable (1) from the intermediate parking brake cable equalizer.

Fig. 33: Rear Parking Brake Cable
Courtesy of GENERAL MOTORS COMPANY

8. Using the **CH-37043** Parking Brake Cable Release Tool , release the rear parking brake cable (1) from the bracket on the rear frame.

Fig. 34: Rear Parking Brake Cable Bracket
Courtesy of GENERAL MOTORS COMPANY

9. Feed the rear parking brake cable through the bracket (1) on the rear frame.

Fig. 35: Parking Brake Cable Bolt
Courtesy of GENERAL MOTORS COMPANY

10. Remove the parking brake cable bolt (1).

Fig. 36: Parking Brake Shoe Actuator Lever Spring
Courtesy of GENERAL MOTORS COMPANY

11. Lift the parking brake shoe actuator lever spring (1).
12. Using a small tool, lift the rear parking brake cable over and off of the parking brake cable actuator lever.
13. Remove the rear parking brake cable from the vehicle.

Installation Procedure

1. Install the rear parking brake cable to the vehicle.
2. Insert the rear parking brake cable end into the rear brake backing plate.
3. Grasp the rear parking brake cable and push the cable into the rear brake backing plate until the cable end seats in the parking brake shoe actuator lever.
4. Ensure the parking brake cable end is fully seated in the parking brake shoe actuator lever by attempting to pull the cable from the rear brake backing plate.

Fig. 37: Parking Brake Cable Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

5. Install the parking brake cable bolt (1) and tighten to 9 (80 lb in).

Fig. 38: Rear Parking Brake Cable Bracket
Courtesy of GENERAL MOTORS COMPANY

6. Feed the rear parking brake cable through the bracket (1) on the rear frame.

Fig. 39: Rear Parking Brake Cable
Courtesy of GENERAL MOTORS COMPANY

7. Install the rear parking brake cable (1) to the bracket on the rear frame.
8. Ensure the rear parking brake cable locking tabs are fully engaged to the parking brake cable bracket on the rear frame.

Fig. 40: Rear Park Brake Cable

Courtesy of GENERAL MOTORS COMPANY

9. Connect the parking brake rear cable (1) to the intermediate parking brake cable equalizer.
10. Install the left rear brake rotor. Refer to **Rear Brake Rotor Replacement** .
11. Install the left rear tire and wheel assembly. Refer to **Lifting and Jacking the Vehicle**
12. Enable the parking brake cable adjuster. Refer to **Parking Brake Cable Adjuster Enabling**.

PARKING BRAKE CABLE ADJUSTER DISABLING

The park brake cable tension is controlled by the electronic park brake (EPB) module. Tension can be fully released from the park brake cables to allow for service of the park brake system. Perform one of the following three methods to fully release cable tension.

Electronic Parking Brake Cable Tension Release

With Scan Tool - Preferred Method

1. Block the drive wheels.
2. Install a scan tool to the vehicle.
3. Turn the ignition switch to the ON/RUN position with the engine OFF.
4. Select Control Functions from the electronic parking brake control module menu.
5. Follow the instructions on the scan tool.

Without Scan Tool - Optional Method

1. Block the drive wheels.
2. Turn the ignition switch to the ON/RUN position with the engine OFF.
3. Place the automatic transmission in PARK or manual transmission in NEUTRAL, as equipped.
4. Apply and hold the brake pedal. The brake pedal must remain applied throughout the park brake cable tension release process.
5. Press and hold down the electronic park brake (EPB) switch approximately 10 seconds.
6. Observe the PARK BRAKE lamp on the instrument cluster.
7. When the PARK BRAKE lamp flashes, release then immediately press and release the EPB switch.

The parking brake cable tension is fully released.

8. Release the brake pedal.

Manual Parking Brake Cable Tension Release

In the event the above methods to release the parking brake cable tension are unsuccessful, the following procedure may be necessary to release the parking brake cable tension.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Reposition the electronic parking brake control module. Refer to **Electronic Parking Brake Control Module Replacement**.

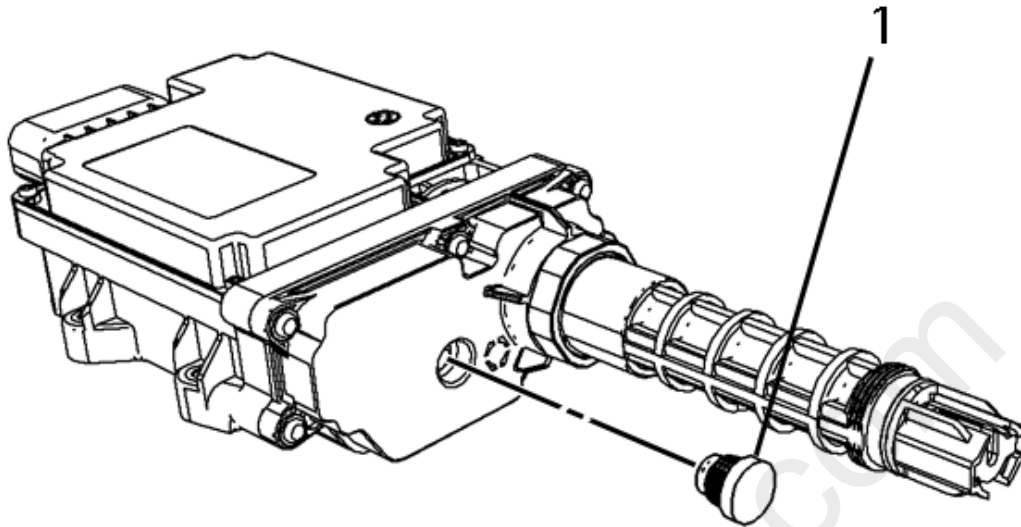


Fig. 41: EPB Manual Release Protective Plug
Courtesy of GENERAL MOTORS COMPANY

NOTE: The protective plug for the manual release is located near the electrical connector.

3. Remove the protective plug (1) from the EPB manual release.

NOTE: Do NOT use power tools or exceed 5 (44 lb in) of force to rotate the release mechanism. Excessive force can damage the EPB module gear drive mechanism.

4. Using an appropriate square-drive tool, rotate the mechanism clockwise until the tension is fully released from the parking brake cables.

Up to 50 cycles may be required until the parking brake cable tension is fully released.

5. Install the protective plug to the EPB module.

PARKING BRAKE CABLE ADJUSTER ENABLING

The park brake cable tension is controlled by the electronic park brake (EPB) module. Cable tension needs to be set and the EPB module needs to be calibrated following the cable tension disabling procedure. Perform one of the following two methods to fully restore cable tension.

Electronic Parking Brake Cable Tensioning

1. Block the drive wheels.
2. Install a scan tool to the vehicle.
3. Turn the ignition switch to the ON/RUN position with the engine OFF.
4. Select Configuration/Reset Functions from the electronic parking brake control module menu.
5. Perform the parking brake calibration procedure. Refer to **Electronic Parking Brake Control Module Programming and Setup** .

REAR PARKING BRAKE ACTUATOR LEVER REPLACEMENT

Removal Procedure

WARNING: Refer to **Brake Dust Warning** .

1. Turn the ignition OFF.
2. Block the rear drive wheels.
3. Disable the parking brake cable adjuster, if equipped. Refer to **Parking Brake Cable Adjuster Disabling**.
4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
5. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
6. Remove the parking brake shoes. Refer to **Parking Brake Shoe Replacement**.

Fig. 42: Parking Brake Shoe Actuator Lever Spring
Courtesy of GENERAL MOTORS COMPANY

7. Lift the parking brake actuator lever spring clip (1).
8. Disconnect the park brake cable from the actuator.

Fig. 43: Parking Brake Actuator Lever
Courtesy of GENERAL MOTORS COMPANY

9. Remove the parking brake actuator lever (1).

Installation Procedure

Fig. 44: Parking Brake Actuator Lever
Courtesy of GENERAL MOTORS COMPANY

1. Install the parking brake actuator lever (1).

Fig. 45: Parking Brake Shoe Actuator Lever Spring
Courtesy of GENERAL MOTORS COMPANY

2. Lift the parking brake actuator lever spring clip (1).
3. Connect the park brake cable to the actuator.
4. Install the parking brake shoes. Refer to **Parking Brake Shoe Replacement**.
5. Adjust the parking brake. Refer to **Parking Brake Adjustment**.
6. Enable the parking brake cable adjuster, if equipped. Refer to **Parking Brake Cable Adjuster Enabling**.
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

REAR PARKING BRAKE ANCHOR BACKING PLATE REPLACEMENT

Removal Procedure

WARNING: Refer to **Brake Dust Warning** .

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the parking brake shoes. Refer to **Parking Brake Shoe Replacement**.

Fig. 46: Parking Brake Cable Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Remove the parking brake cable bolt (1).

Fig. 47: Parking Brake Shoe Actuator Lever Spring
Courtesy of GENERAL MOTORS COMPANY

5. Lift the parking brake actuator lever spring (1).
6. Using a small tool, lift the parking brake cable over and off of the parking brake actuator lever.
7. Remove the parking brake cable from the rear parking brake anchor backing plate and position aside.
8. Remove the rear wheel bearing and hub assembly. Refer to **Rear Wheel Bearing and Hub Replacement** .

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Fig. 48: Rear Parking Brake Anchor Backing Plate
Courtesy of GENERAL MOTORS COMPANY

9. Remove the rear parking brake anchor backing plate (1).

Installation Procedure

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Fig. 49: Rear Parking Brake Anchor Backing Plate
Courtesy of GENERAL MOTORS COMPANY

1. Install the rear parking brake anchor backing plate (1).
2. Install the rear wheel bearing and hub assembly. Refer to **Rear Wheel Bearing and Hub Replacement** .
3. Insert the parking brake cable end into the rear parking brake anchor backing plate.

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Fig. 50: Parking Brake Shoe Actuator Lever Spring
Courtesy of GENERAL MOTORS COMPANY

4. Lift the parking brake actuator lever clip (1).
5. Grasp the parking brake cable and push the cable into the rear parking brake anchor backing plate until the cable end seats in the parking brake shoe actuator lever.
6. Ensure the parking brake cable end is fully seated in the parking brake shoe actuator lever by attempting to pull the cable from the rear brake backing plate.

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Fig. 51: Parking Brake Cable Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

7. Install the parking brake cable bolt (1) and tighten to 9 (80 lb in).
8. Install the parking brake shoes. Refer to **Parking Brake Shoe Replacement**.
9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

PARKING BRAKE ADJUSTMENT

Special Tools

CH-21177-A Drum To Brake Shoe Clearance Gauge

For equivalent regional tools, refer to **Special Tools**.

1. Adjustments to the parking brake shoes are not necessary after replacing the electronic parking brake control module or parking brake cable.
2. Disable the parking brake cable adjuster. Refer to **Parking Brake Cable Adjuster Disabling**.
3. Verify that the parking brake releases completely.
4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
5. Remove the rear tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .

NOTE: Do not operate the electronic parking brake with the rear disc brake rotor (s) removed.

6. Remove the rear brake rotors. Refer to **Rear Brake Rotor Replacement** .

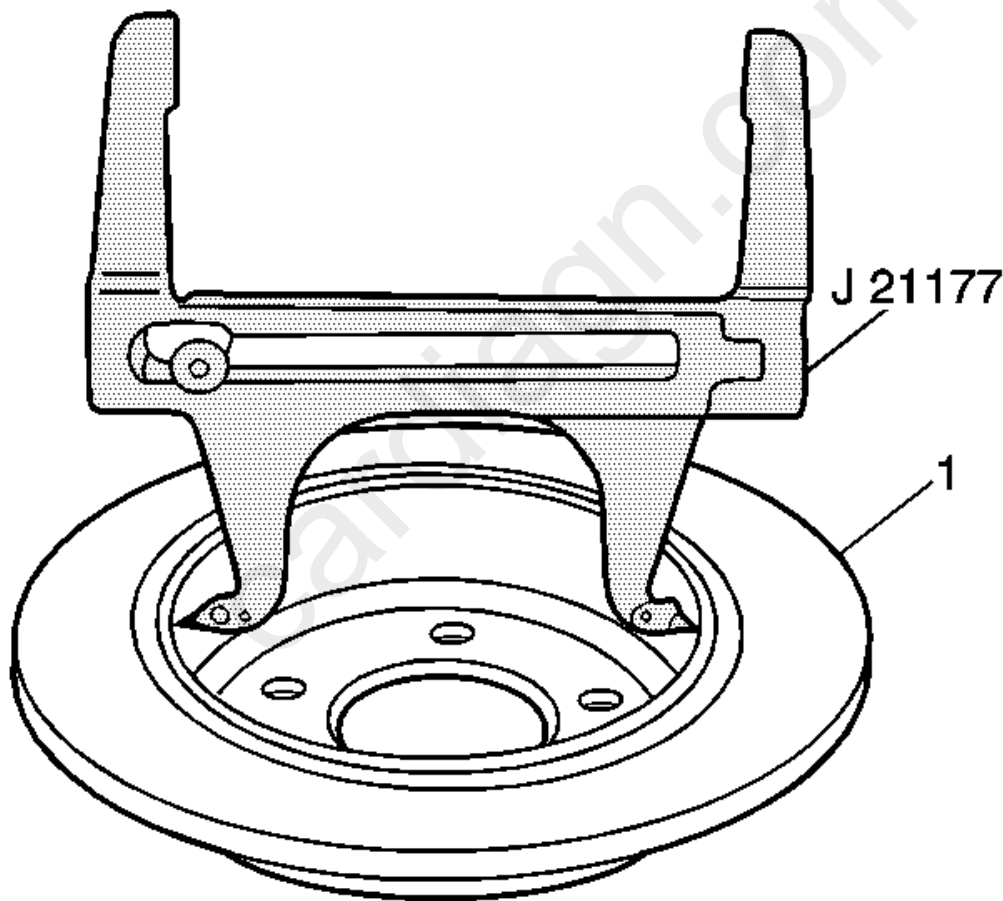


Fig. 52: Measuring Inside Of Rotor
Courtesy of GENERAL MOTORS COMPANY

7. Set the **CH-21177-A** drum to brake shoe clearance gauge inside of the parking brake drum at the widest point.

- Place the contacts of the tool at the widest point of the parking brake drum portion of the rotor (1).
- Tighten the set screw on the tool to ensure the proper measurement when removing the tool from the drum.

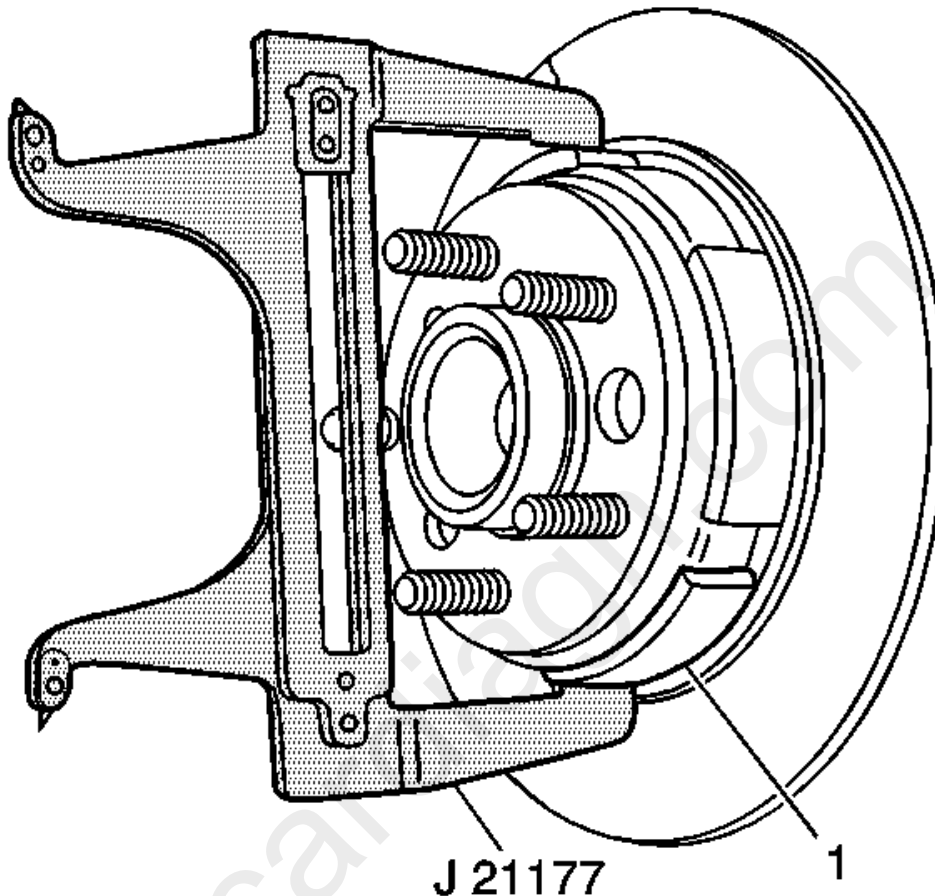


Fig. 53: Adjusting Parking Brake Shoes Using Special Tool
Courtesy of GENERAL MOTORS COMPANY

8. Position the **CH-21177-A** drum to brake shoe clearance gauge over the parking brake shoes (1) at the widest point.
9. Turn the parking brake shoe adjuster until the parking brake shoes just contact the **CH-21177-A** drum to brake shoe clearance gauge.
10. Repeat steps 7 through 9 for the opposite side.
11. Install the rear brake rotors. Refer to **Rear Brake Rotor Replacement** .
12. Install the rear tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
13. Lower the vehicle to curb height.
14. Enable the parking brake cable adjuster. Refer to **Parking Brake Cable Adjuster Enabling**.

NOTE: If the rear wheels rotate during the following test, readjust the parking brake shoes.

15. Apply the parking brake. Inspect the rotation of the rear wheels:
 - The wheels should not rotate forward.
 - The wheels should not rotate rearward.
16. Release the parking brake. Verify that the wheels rotate freely.
17. Lower the vehicle.

DESCRIPTION AND OPERATION

ELECTRONIC PARKING BRAKE CONTROL MODULE DESCRIPTION

Fig. 54: Electronic Parking Brake Schematic Flow
Courtesy of GENERAL MOTORS COMPANY

Vehicles with the electric parking brake have a switch in the center console, which takes the place of the manual parking brake system, the foot pedal and release handle. In case of insufficient electrical power, the electric parking brake cannot be applied or released.

Electric Parking Brake Control Module

The parking brake control module has an internal motor, apply actuator, release actuator, and temperature sensor. The parking brake control module also contains the logic for applying and releasing the parking brake

when commanded by the park brake control switch. When the parking brake control module receives a signal from the switch the internal circuit board temperature is checked to verify it is within operating range before the control module performs the requested operation.

The electric parking brake module receives hard wired signals from the apply/release switch and communication enable. The electric parking brake module receives wheel speed sensor signals, engine torque, gear information, brake pedal signal, and etc. through GM-LAN.

Electric Parking Brake Apply

The electric parking brake can be applied any time the vehicle is stopped or in motion. The electric parking brake is applied by momentarily lifting up on the park brake control switch. The red park brake light will momentarily flash while the parking brake is being applied. Once fully applied, the red park brake light will turn on. If the electric parking brake is applied while the vehicle is in motion, a chime will sound, and the message "Release Park Brake Switch" will be displayed.

If the red park brake light is flashing, the electric parking brake is only partially applied or released, or there is a problem with the electric parking brake. The message "Service Park Brake" will be displayed.

Electric Parking Brake Release

To release the electric parking brake, turn the ignition switch to the ON or RUN position, apply and hold the brake pedal, and push down momentarily on the park brake control switch. When the electric parking brake is released the red park brake light turns off.

The electric parking brake can be used to prevent roll back for vehicles with a manual transmission taking off on a hill. In a situation where no roll back is desired, an applied electric parking brake will allow both feet to be used for the clutch and accelerator pedals in preparation for starting the vehicle moving in the intended direction. In this situation, perform the normal clutch and accelerator actions required to begin moving the vehicle. There is no need to push the switch to release the electric parking brake. To disable this feature lift and hold the park brake control switch while the vehicle is in motion, this will keep the electric parking brake applied.

Manual Parking Brake Cable Tension Release

If the park brake cable tension cannot be released under normal mode of operation, it can be released manually. The manual release capability will make it possible for the driver to transfer the vehicle into a movable state in the case of a failure of the electric parking brake system. The procedure can be found in the Repair Instructions, Parking Brake Cable Adjuster Disabling procedure.

PARK BRAKE SYSTEM DESCRIPTION AND OPERATION

System Component Description

The park brake system consists of the following:

Electronic Parking Brake Control Module

Electronically transfers park brake system apply input force to the park brake cable system. Refer to **Electronic Parking Brake Control Module Description**.

Park Brake Cables

Transfers input force, through park brake cable equalizer, to park brake apply lever.

Park Brake Cable Equalizer

Evenly distributes input force to both the left and right park brake units.

Park Brake Apply Lever

Multiplies and transfers input force to park brake actuator.

Park Brake Actuator/Adjuster

Uses multiplied input force from apply lever to expand park brake shoe toward the friction surface of the drum-in-hat portion of the rear brake rotor.

Threaded park brake actuators are also used to control clearance between the park brake shoe and the friction surface of the drum-in-hat portion of the rear brake rotor.

Park Brake Shoe

Applies mechanical output force from park brake actuator to friction surface of the drum-in-hat portion of the rear brake rotor.

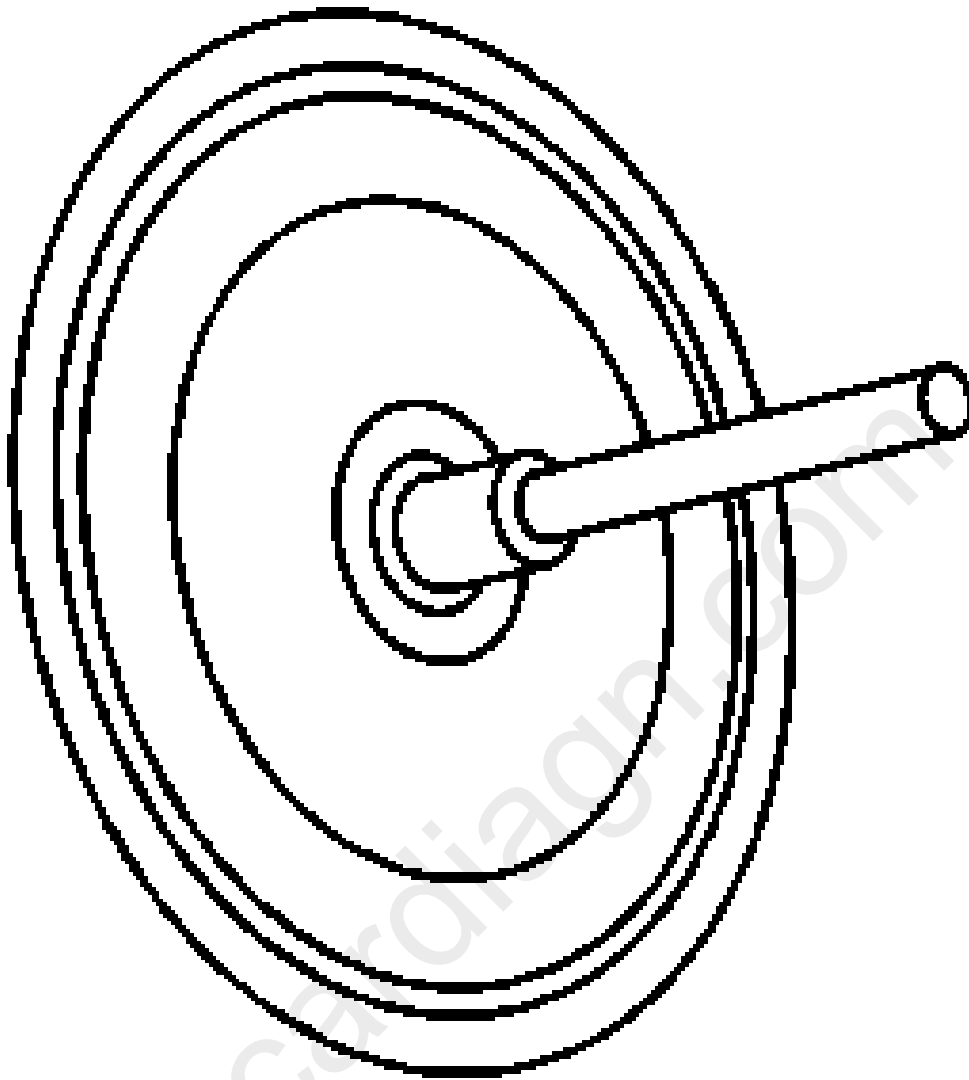
System Operation

Park brake apply input force is transferred and evenly distributed, through the park brake cables and the park brake cable equalizer, to the left and right park brake apply levers. The park brake apply levers multiply and transfer the apply input force to the park brake actuators which expand the park brake shoe toward the friction surface of the drum-in-hat portion of the rear brake rotor in order to prevent the rotation of the rear tire and wheel assemblies. The park brake lever/pedal assembly, if equipped, releases an applied park brake system when it is depressed again.

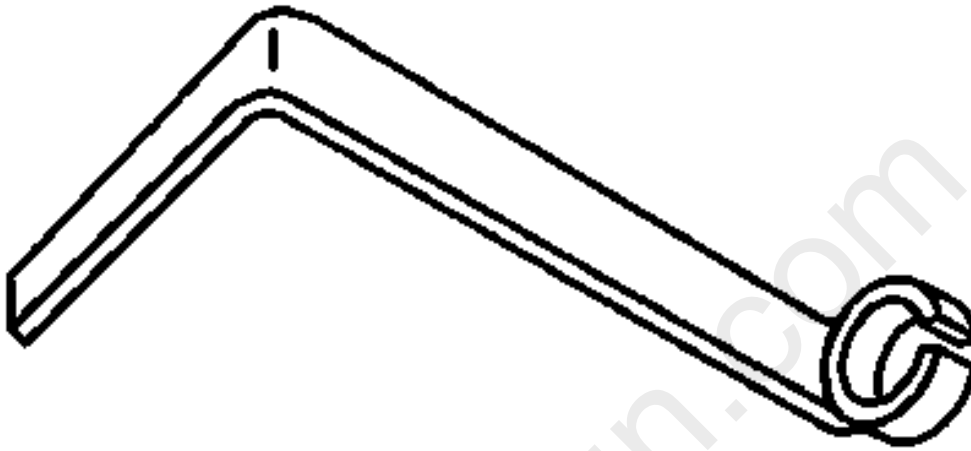
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description



CH 21177
J 21177
Drum To
Brake Shoe
Clearance
Gauge



CH 37043
J 37043
Parking
Brake
Cable
Release
Tool