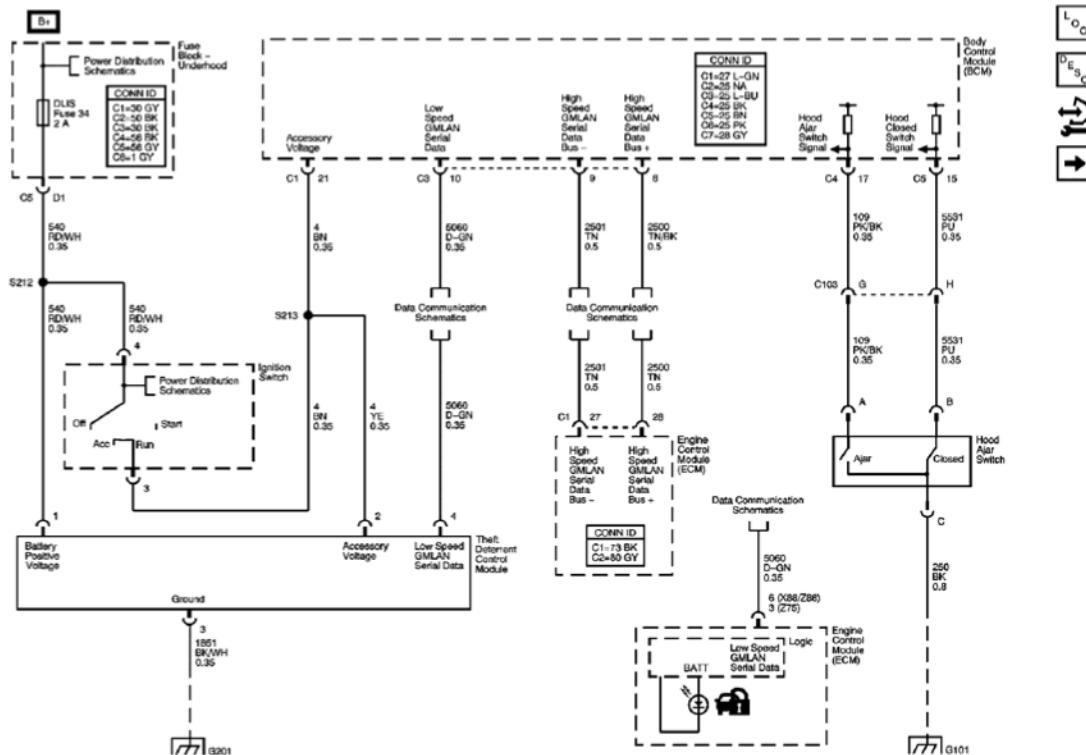


## Immobilizer - Avalanche, Escalade, Suburban, Tahoe & Yukon

## IMMOBILIZER SCHEMATICS



Courtesy of GENERAL MOTORS CORP.

## IMMOBILIZER COMPONENT VIEWS

## 2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Immobilizer - Avalanche, Escalade, Suburban, Tahoe & Yukon

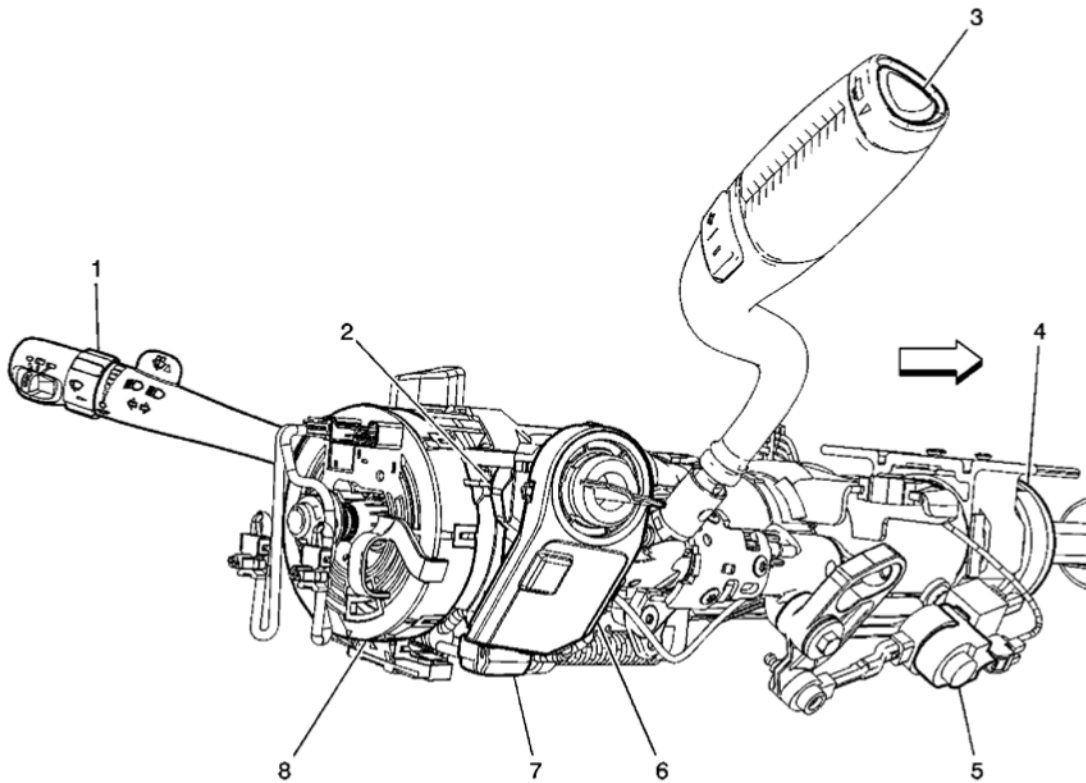


**Fig. 2: Steering Column Components**  
Courtesy of GENERAL MOTORS CORP.

### Callouts For Fig. 2

| Callout | Component Name                                  |
|---------|-------------------------------------------------|
| 1       | Turn Signal Multifunction Switch                |
| 2       | Ignition Lock Cylinder                          |
| 3       | Tow/Haul Switch                                 |
| 4       | Steering Angle Sensor                           |
| 5       | Shift Interlock Solenoid                        |
| 6       | Theft Deterrent Control Module                  |
| 7       | Ignition Switch                                 |
| 8       | Inflatable Restraint Steering Wheel Module Coil |

## VISUAL IDENTIFICATION

### IMMOBILIZER CONNECTOR END VIEWS

Hood Ajar Switch (AP3/AP8)

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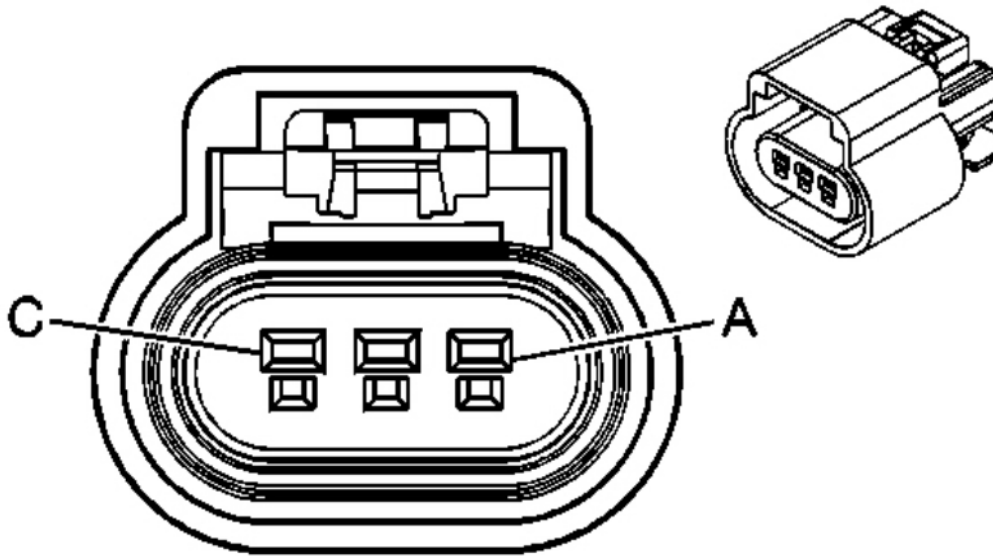


**Fig. 3: Hood Ajar Switch (AP3/AP8) Connector End View**  
Courtesy of GENERAL MOTORS CORP.

### Hood Ajar Switch (AP3/AP8) Connector Parts Information

#### Connector Part Information

- OEM: 15326808
- Service: See Catalog
- Description: 3-Way F GT 150 Series BK Sealed

#### Terminal Part Information

- Terminal/Tray: 12191819/8
- Core/Insulation Crimp: Pins A-B: E/A
- Core/Insulation Crimp: Pins C: 2/A
- Release Tool/Test Probe: 15315247/J-35616-2A (GY)

### Hood Ajar Switch (AP3/AP8) Connector Terminal Identification

| Pin | Wire Color | Circuit No. | Function                  |
|-----|------------|-------------|---------------------------|
| A   | PK/BK      | 109         | Hood Ajar Switch Signal   |
| B   | PU         | 5531        | Hood Closed Switch Signal |
| C   | BK         | 250         | Ground                    |

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### Theft Deterrent Control Module

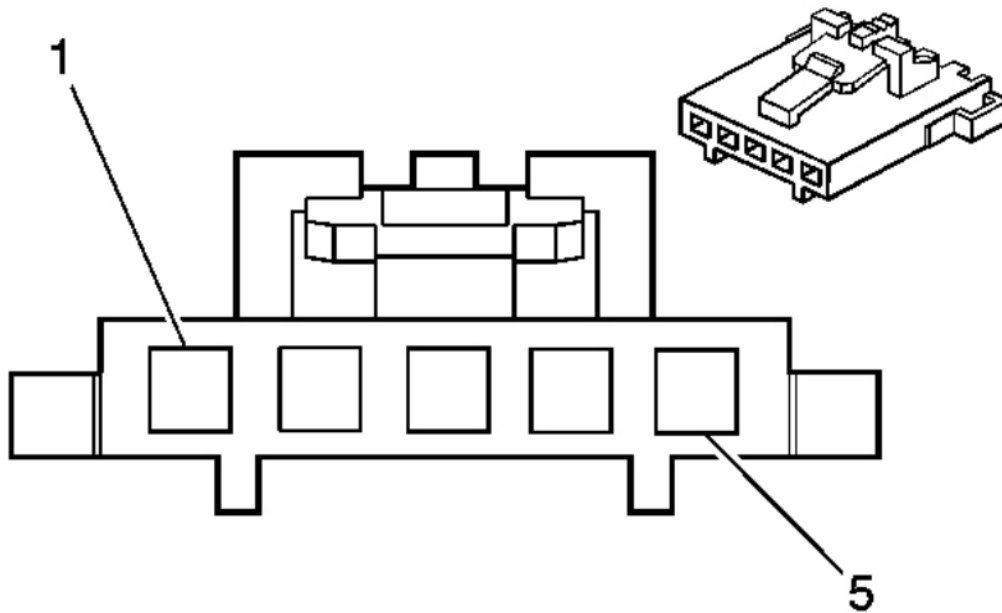


**Fig. 4: Theft Deterrent Control Module Connector End View**  
Courtesy of GENERAL MOTORS CORP.

### Theft Deterrent Control Module Connector Parts Information

#### Connector Part Information

- OEM: 15383337
- Service: 88988353
- Description: 5-Way F MISC (BK)

#### Terminal Part Information

- Terminal/Tray: 16-02-1110/20
- Core/Insulation Crimp: H/H
- Release Tool/Test Probe: J-38125-213/J-35616-64A (L-BU)

### Theft Deterrent Control Module Connector Terminal Identification

| Pin | Wire Color | Circuit No. | Function                 |
|-----|------------|-------------|--------------------------|
| 1   | RD/WH      | 540         | Battery Positive Voltage |
| 2   | YE         | 4           | Accessory Voltage        |

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|   |       |      |                             |
|---|-------|------|-----------------------------|
| 3 | BK/WH | 1851 | Ground                      |
| 4 | D-GN  | 5060 | Low Speed GMLAN Serial Data |
| 5 | -     | -    | Not Used                    |

## DIAGNOSTIC INFORMATION AND PROCEDURES

### DIAGNOSTIC CODE INDEX

### DIAGNOSTIC CODE INDEX

| DTC              | Description                                           |
|------------------|-------------------------------------------------------|
| <u>DTC B3006</u> | Hood Ajar Circuit Plausibility Failure                |
| <u>DTC B302A</u> | Telematic Requested Immobilization                    |
| <u>DTC B3031</u> | Security System Controller In Learn Mode              |
| <u>DTC B3055</u> | No Transponder Modulation or No Transponder           |
| <u>DTC B3060</u> | Unprogrammed Transponder Identification Code Received |
| <u>DTC B3935</u> | Transponder Authentication Error                      |
| <u>DTC P0513</u> | Theft Deterrent Key Incorrect                         |
| <u>DTC P0633</u> | Theft Deterrent Key Not Programmed                    |
| <u>DTC P1629</u> | Theft Deterrent Fuel Enable Signal Not Received       |
| <u>DTC P1631</u> | Theft Deterrent Fuel Enable Signal Not Correct        |
| <u>DTC P1632</u> | Theft Deterrent Fuel Disable Signal Received          |

### SCAN TOOL DATA LIST

#### Body Control Module (BCM)

| Scan Tool Parameter                           | Data List  | Units Displayed | Typical Data Value |
|-----------------------------------------------|------------|-----------------|--------------------|
| Operating Conditions: Ignition ON, Engine OFF |            |                 |                    |
| Theft LED                                     | Theft Data | On/Off          | Off                |

#### Engine Control Module (ECM)

| Scan Tool Parameter                           | Data List         | Units Displayed                  | Typical Data Value |
|-----------------------------------------------|-------------------|----------------------------------|--------------------|
| Operating Conditions: Ignition ON, Engine OFF |                   |                                  |                    |
| ECM Authentication Status                     | Engine Electrical | Unknown/Incorrect/Negative/Valid | Valid              |
| ECM Challenge Status                          | Engine Electrical | Valid/Invalid                    | Valid              |
| ECM Response Source                           | Engine Electrical | Normal/Remote Start              | Normal             |
| VTD Auto Learn Counter                        | Engine Electrical | Counts                           | Varies             |
| VTD Auto Learn Timer                          | Engine Electrical | Active/Inactive                  | Inactive           |
| VTD Password Learn Enabled                    | Engine Electrical | Yes/No                           | No                 |
| VTD Security Code Accepted                    | Engine Electrical | Yes/No                           | Yes                |
| VTD Security Code Lockout                     | Engine Electrical | Active/Inactive                  | Inactive           |
| VTD Security Code                             |                   |                                  |                    |

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|                              |                   |                                                                                                        |          |
|------------------------------|-------------------|--------------------------------------------------------------------------------------------------------|----------|
| Programmed                   | Engine Electrical | Yes/No                                                                                                 | Yes      |
| VTD Security Info Programmed | Engine Electrical | Yes/No                                                                                                 | Yes      |
| VTD System Status            | Engine Electrical | Standby/Fuel Disable/Dis. No Resp./Dis. Neg. Resp./Dis. Incor. Resp./Post Release/Pre-Release/Released | Released |

### Theft Deterrent Module (TDM)

| Scan Tool Parameter                                  | Data List         | Units Displayed                                                                                                                                        | Typical Data Value |
|------------------------------------------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>Operating Conditions: Ignition ON, Engine OFF</b> |                   |                                                                                                                                                        |                    |
| Auto Learn Counter                                   | TDM Data          | Counts                                                                                                                                                 | Varies             |
| Auto Learn Timer                                     | TDM Data          | Minutes                                                                                                                                                | Varies             |
| Battery Reconnect                                    | TDM Data          | Yes/No                                                                                                                                                 | No                 |
| Ignition Voltage Signal                              | TDM Data          | Present/Not Present                                                                                                                                    | Present            |
| Immobilization                                       | TDM Data          | Active/Inactive                                                                                                                                        | Inactive           |
| Immobilizer Programmed                               | Powertrain Status | Yes/No                                                                                                                                                 | Yes                |
| Master Keys Learned                                  | Learn Key Data    | Counts                                                                                                                                                 | Varies             |
| PCM Auto Learn Timer                                 | Powertrain Status | Active/Inactive                                                                                                                                        | Inactive           |
| PCM Password Learning                                | Powertrain Status | Disabled/Enabled                                                                                                                                       | Disabled           |
| Power Mode                                           | TDM Data          | Off/Accessory/Run/Crank Request                                                                                                                        | Run                |
| Powertrain DTC                                       | Powertrain Status | Yes/No                                                                                                                                                 | No                 |
| Previous TDM State                                   | TDM Data          | Asleep/Wakeup/Normal/Learn Passkey/Tamper/Monitor Key/Fail Pending/Lrn Keys Stdbby/Learn More Keys/Learn Pending/Auto Learn/Auto Lrn Done/No Coded Key | Varies             |
| Security Code Programmed                             | Powertrain Status | Yes/No                                                                                                                                                 | Yes                |
| Start Disabled                                       | TDM Data          | Yes/No                                                                                                                                                 | No                 |
| Telltale Status                                      | TDM Data          | Off/On/Flash/Invalid                                                                                                                                   | Off                |
| Tamper Status                                        | TDM Data          | Active/Inactive                                                                                                                                        | Inactive           |
| TDM State                                            | TDM Data          | Asleep/Wakeup/Normal/Learn Passkey/Tamper/Monitor Key/Fail Pending/Lrn Keys Stdbby/Learn More Keys/Learn Pending/Auto Learn/Auto Lrn Done/No Coded Key | Normal             |
| Theft Problem                                        | TDM Data          | Yes/No                                                                                                                                                 | No                 |
| Total Keys Learned                                   | Learn Key Data    | Counts                                                                                                                                                 | Varies             |
| Transponder Key                                      | Learn Key Data    | Present/Not Present                                                                                                                                    | Present            |

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|                      |                |        |     |
|----------------------|----------------|--------|-----|
| Valid Key            | Learn Key Data | Yes/No | Yes |
| VIN Message Received | TDM Data       | Yes/No | Yes |

### SCAN TOOL DATA DEFINITIONS

#### Auto Learn

The scan tool displays Enabled when the 30 minute auto learn reprogramming procedure is available as a valid programming option.

#### Auto Learn Counter

The scan tool displays the count value when using the 30 minute reprogramming procedure. Three 10 minute cycles, or three counts, are required to complete the 30 minute auto learn reprogramming procedure.

#### Auto Learn Timer

The scan tool displays the time in minutes remaining by the TDM to learn a valid code from the transponder using the 30 minute auto learn reprogramming procedure.

#### Battery Voltage

The scan tool displays battery voltage at the TDM.

#### ECM in VTD Fail Enable

The scan tool will display Yes when the ECM is fail enabled.

#### Ignition Voltage

The scan tool displays ignition voltage at the TDM.

#### Learned Keys Required

The scan tool displays the numbers of learned keys require to initialize the Adding Keys procedure. Domestic vehicles require 1 key, while export and Canadian vehicles require 2.

#### Master Keys Learned

The scan tool displays the number of learned master keys.

#### PCM Auto Learn Timer

The scan tool displays Active when the PCM is in auto learn.

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### PCM Fail Enable

The scan tool displays Active when the PCM is in the fail enable state.

### PCM Fuel Continue

The scan tool displays the status of vehicle fueling. An Inactive value would indicate an invalid or no fuel continue message was received. Vehicle starting is not allowed in this situation. An Active value would indicate a valid fuel continue message was received and vehicle starting is allowed.

### PCM Password Learning

The scan tool displays Enabled when the PCM is in learn mode.

### PCM Password Status

The scan tool displays the PCM's current response to the theft password.

### Power Mode

The scan tool displays the current vehicle power mode.

### Previous TDM State

The scan tool displays the TDM state of the last ignition cycle.

### Security Indicator Command

The scan tool displays the state of the BCM commanding the security indicator. The scan tool displays ON or, OFF, as commanded by the BCM.

### Tamper Status

The scan tool displays Active when a tamper condition is detected.

### Telltale Status

The scan tool displays the state of the body control module (BCM) commanding the security indicator. The scan tool displays ON, OFF, FLASH, or INVALID as commanded by the TDM.

### TDM State

The scan tool displays the TDM state for the current ignition cycle.

### Total Keys Learned

The scan tool displays the total number of learned keys.

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### Transponder Key

The scan tool displays Present when a transponder is present. This does not necessarily mean that this is a valid or learned transponder, but only that a transponder is present.

### Valid Key

The scan tool displays Yes when a valid transponder key is present.

### VTD Fuel Enabled

The scan tool displays Yes when engine starting is allowed.

### VTD Fuel Disabled

The scan tool displays Active when engine starting is not allowed.

### VTD Fuel Disable Until Ign Off

The scan tool will displays Yes when engine starting is not allowed for this ignition cycle.

### VTD Password Learned

The scan tool will display Yes when a valid theft password has been learned.

### VTD Auto Learn Timer

The scan too will display Active when auto learn is currently active.

## DIAGNOSTIC STARTING POINT - IMMOBILIZER

Begin the system diagnosis with the **Diagnostic System Check - Vehicle** . The Diagnostic System Check will provide the following information:

- The identification of the control modules which command the system
- The ability of the control modules to communicate through the serial data circuit
- The identification of any stored diagnostic trouble codes (DTCs) and their status

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

### DTC B3006

#### DTC Descriptor

### DTC B3006 5A

## 2007 Cadillac Escalade

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### Hood Ajar Circuit Plausibility Failure

#### Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

#### Circuit/System Description

The body control module (BCM) monitors the voltage input of the hood open switch signal circuit and the hood open closed switch signal circuit. During proper operation, the 2 separate voltage signals at the BCM should never be the same voltage with the hood opened or closed. If the 2 voltage signals should have the same voltage value DTC B3006 will set.

#### Conditions for Running the DTC

This DTC shall run when the Run/Crank Relay is enabled.

#### Conditions for Setting the DTC

If both the hood open switch signal circuit and the hood closed switch signal circuit are simultaneously in an active or inactive state.

#### Action Taken When the DTC Sets

- Remote start functions will be disabled.
- The hood ajar switch inputs will be ignored by content theft deterrent (CTD).

#### Conditions for Clearing the DTC

The DTC will clear when conditions for setting the DTC are no longer present.

#### Reference Information

#### Schematic Reference

#### Immobilizer Schematics

#### Connector End View Reference

#### Immobilizer Connector End Views

#### Description and Operation

#### Scan Tool Data List

#### Electrical Information Reference

## 2007 Cadillac Escalade

2007 ACCESSORIES & EQUIPMENT Immobilizer - Avalanche, Escalade, Suburban, Tahoe & Yukon

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

### Circuit/System Verification

Ignition ON, observe the scan tool Hood Open Switch and Hood Closed Switch parameters. With the hood open, the Hood Open Switch parameter should read Active and the Hood Closed Switch parameter should read Inactive. With the hood closed, the Hood Open Switch parameter should read Inactive and the Hood Closed Switch parameter should read Active.

### Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the hood ajar switch.
2. Ignition OFF, test for less than 1.0 ohm of resistance between the ground circuit terminal and ground.
  - If greater than the specified value, test the ground circuit for an open/high resistance.
3. Ignition ON, verify the scan tool Hood Closed Switch and Hood Open Switch parameters are Inactive.
  - If not the specified value, test the applicable signal circuit for a short to ground. If the circuit tests normal, replace the RIM.
4. Install a 3A fused jumper wire between the hood open switch signal circuit terminal and ground. Verify the scan tool Hood Open Switch parameter is Active.
  - If not the specified value, test the signal circuit for a short to voltage or and open/high resistance. If the circuit tests normal, replace the BCM.
5. Install a 3A fused jumper wire between the hood closed switch signal circuit terminal and ground. Verify the scan tool Hood Closed Switch parameter is Active.
  - If not the specified value, test the signal circuit for a short to voltage or and open/high resistance. If the circuit tests normal, replace the BCM.
6. If all circuits test normal, test or replace the hood ajar switch.

### Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Hood Latch Replacement**
- **Control Module References** for BCM replacement, programming and setup

### DTC B302A

#### DTC Descriptor

### DTC B302A

Telematic Requested Immobilization

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### Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

### Circuit/System Description

As part of the vehicle telematics enhanced services, a request may be sent to the theft deterrent module (TDM) to disable vehicle starting. If a valid message is received by the TDM requesting that starting be disabled, the start enable message will not be sent to the engine control module (ECM).

### Conditions for Setting the DTC

A valid start disable from telematics will set DTC B302A only as a history DTC.

### Action Taken When the DTC Sets

Vehicle starting will be suspended and the security indicator will be illuminated.

### Conditions for Clearing the DTC

- A current DTC will clear when the telematic start disable request is no longer seen.
- A history DTC will clear after 100 ignition cycles in which the telematic start disable request is not seen.

### Diagnostic Aids

DTC B302A is only an indicator that a start disable request has been received from the vehicle telematics system and does not indicate a fault in the vehicle theft deterrent system. B302A will only set as a history DTC. The only procedure required is to clear the DTC with a scan tool.

### Reference Information

### Schematic Reference

### Immobilizer Schematics

### Connector End View Reference

### Immobilizer Connector End Views

### Description and Operation

### Immobilizer Description and Operation

### Electrical Information Reference

- Circuit Testing
- Connector Repairs

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

### Scan Tool Reference

- **Scan Tool Data List**
- **Scan Tool Data Definitions**

### Circuit/System Verification

1. Verify the OnStar system is operating properly. Refer to **OnStar Symptom Diagnosis** .
2. With a master vehicle key, turn the ignition ON.
3. Observe the security indicator. After approximately 10 minutes, the indicator will turn off.
4. Turn the ignition OFF and wait 5 seconds.
5. Repeat steps 2-4 two more times for a total of 3 cycles or 30 minutes.
6. With a master vehicle key, turn the ignition ON. The start disable will now be cleared.
7. With a scan tool, clear any DTCs.

### DTC B3031

#### DTC Descriptor

### DTC B3031

Security System Controller In Learn Mode

#### Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

#### Circuit/System Description

When learning a coded key, the theft deterrent module (TDM) is placed in learn mode. DTC B3031 will set automatically as an indicator that the system is in learn mode and not as a fault indicator. Once the coded key is learned, learn mode will be exited and the DTC cleared. If the TDM does not exit learn mode, B3031 will remain current and indicate a fault.

#### Conditions for Running the DTC

The vehicle theft deterrent system is in learn mode.

#### Conditions for Setting the DTC

DTC B3031 will set any time the TDM enters learn mode

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### Action Taken When the DTC Sets

The security indicator will illuminate.

### Conditions for Clearing the DTC

- A current DTC B3031 will be cleared upon the successful exit of learn mode.
- A history DTC will be cleared after 100 malfunction free ignition cycles or when a scan tool is used to clear DTCs.

### Reference Information

#### Schematic Reference

#### Immobilizer Schematics

#### Connector End View Reference

#### Immobilizer Connector End Views

#### Description and Operation

#### Immobilizer Description and Operation

#### Electrical Information Reference

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

#### Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

#### Circuit/System Verification

**IMPORTANT:** When performing a 10 Minute or 30 Minute Relearn Procedure, all keys not learned at that time will be erased and not be recognized. Perform the Adding Keys procedure on all keys or instruct the customer how to perform the Adding Keys procedure should all keys not be present at the time of repair.

1. Verify DTC B3060 is not set as current.
  - If DTC B3060 is set as current, refer to **DTC B3060**.

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2. With a scan tool, verify the PCM Password Learning parameter displays Enabled.
  - If the PCM Password Learning parameter does not display Enabled, perform the 10 Minute Relearn Procedure for the powertrain system. Refer to **Theft Deterrent Control Module Programming and Setup**.
3. Perform the 10 Minute Relearn Procedure. Refer to **Theft Deterrent Control Module Programming and Setup**. The TDM should exit learn mode and DTC B3031 should clear.
  - If the TDM does not exit learn mode after the programming attempt, replace the TDM.

### Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Adding Keys**
- **Control Module References** for TDM replacement, setup and programming.

### DTC B3055

#### DTC Descriptor

### DTC B3055

No Transponder Modulation or No Transponder

#### Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

#### Circuit/System Description

When an ignition key is inserted into the ignition lock cylinder and the ignition is switched ON, the transponder embedded in the head of the key is energized by the exciter coils surrounding the ignition lock cylinder. The energized transponder transmits a signal that contains its unique value, which is received by the theft deterrent module (TDM). The TDM then compares this value to a value stored in memory. This stored value is the learned key code. If the value is correct, the TDM will send the start enable password via the serial data circuit to the engine control module (ECM). If either the transponders unique value or the calculation to the challenge is incorrect, the TDM will send the start disable password to the ECM.

#### Conditions for Running the DTC

Ignition is in the Accessory or Run position.

#### Conditions for Setting the DTC

The TDM is unable to measure the ignition key transponder value.

#### Action Taken When the DTC Sets

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- Vehicle starting will be disabled.
- The security indicator will be illuminated.

### Conditions for Clearing the DTC

- A current DTC will be cleared when the TDM detects a valid transponder value from the ignition key.
- A history DTC will be cleared after 100 malfunction free ignition cycles or when a scan tool is used to clear DTCs.

### Reference Information

#### Schematic Reference

#### Immobilizer Schematics

#### Connector End View Reference

#### Immobilizer Connector End Views

#### Description and Operation

#### Immobilizer Description and Operation

#### Electrical Information Reference

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

#### Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

#### Circuit/System Verification

**IMPORTANT:** When using this diagnostic, more than one vehicle key is required to ensure proper diagnosis. If more than one key is not available at the time of service, contact the customer and ask if any other keys can be provided for service. If unavailable, a new second key can be created.

1. Inspect all available vehicle keys that they are correct vehicle keys.
  - If not a correct vehicle key, replace the key.

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2. While viewing DTCs with a scan tool, attempt to start the vehicle using all of the available keys. The vehicle should start with all available keys.
  - If only one key results in inoperative starting and DTC B3055 is set as current, replace the suspect key.
  - If all available keys result in inoperative starting and DTC B3055 is set as current, replace the TDM.

### Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Replacing Keys**
- **Adding Keys**
- **Control Module References** for theft deterrent module replacement, setup, and programming

### DTC B3060

#### DTC Descriptor

#### DTC B3060

Unprogrammed Transponder Identification Code Received

#### Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

#### Circuit/System Description

When an ignition key is inserted into the ignition lock cylinder and the ignition is switched ON, the transponder embedded in the head of the key is energized by the exciter coils surrounding the ignition lock cylinder. The energized transponder transmits a signal that contains its unique value, which is received by the theft deterrent module (TDM). The TDM then compares this value to a value stored in memory. This stored value is the learned key code. If the value is correct, the TDM will send the start enable password via the serial data circuit to the engine control module (ECM). If either the transponders unique value or the calculation to the challenge is incorrect, the TDM will send the start disable password to the ECM.

#### Conditions for Running the DTC

Ignition is in the Accessory or Run position.

#### Conditions for Setting the DTC

The transponder value measured by the TDM is incorrect or not learned to the vehicle.

#### Action Taken When the DTC Sets

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- Vehicle starting will be disabled.
- The security indicator will be illuminated.
- The security indicator will flash (Canada only)

### Conditions for Clearing the DTC

- A current DTC will be cleared when the TDM detects a valid transponder value from the ignition key.
- A history DTC will be cleared after 100 malfunction free ignition cycles or when a scan tool is used to clear DTCs.

### Reference Information

#### Schematic Reference

#### Immobilizer Schematics

#### Connector End View Reference

#### Immobilizer Connector End Views

#### Description and Operation

#### Immobilizer Description and Operation

#### Electrical Information Reference

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

#### Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

#### Circuit/System Verification

**IMPORTANT:** When using this diagnostic, more than one vehicle key is required to ensure proper diagnosis. If more than one key is not available at the time of service, contact the customer and ask if any other keys can be provided for service. If unavailable, a new second key can be created.

1. Perform the replacing keys procedure. Refer to Replacing Keys.

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2. Attempt to start the vehicle. The vehicle should start with all available keys.
  - If any keys result in inoperative starting, replace the suspect key.

### Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Replacing Keys**
- **Adding Keys**
- **Control Module References** for theft deterrent module replacement, setup, and programming

### DTC B3935

#### DTC Descriptor

#### DTC B3935 57

Transponder Authentication Error

#### Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

#### Circuit/System Description

When an ignition key is inserted into the ignition lock cylinder and the ignition is switched ON, the transponder embedded in the head of the key is energized by the exciter coils surrounding the ignition lock cylinder. The energized transponder transmits a signal that contains its unique value, which is received by the theft deterrent module (TDM). The TDM then compares this value to a value stored in memory. This stored value is the learned key code. If the value is correct, the TDM sends the start enable password via the serial data circuit to the engine control module (ECM). If either the transponders unique value or the calculation to the challenge is incorrect, the TDM will send the start disable password to the ECM.

#### Conditions for Running the DTC

- Ignition is in the Accessory or Run position.
- A valid transponder value has been read.

#### Conditions for Setting the DTC

- The transponder value is valid and matches the value stored in the TDM memory.
- The transponder calculation to the challenge from the TDM does not match the TDMs calculation.

#### Action Taken When the DTC Sets

- Vehicle starting will be disabled.

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- The security indicator will be illuminated.

### Conditions for Clearing the DTC

- A current DTC will be cleared when a valid transponder value has been read and authenticated.
- A history DTC will be cleared after 100 malfunction free ignition cycles or when a scan tool is used to clear DTCs.

### Reference Information

### Schematic Reference

#### Immobilizer Schematics

### Connector End View Reference

#### Immobilizer Connector End Views

### Description and Operation

#### Immobilizer Description and Operation

### Electrical Information Reference

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

### Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

### Circuit/System Verification

Replace the suspected inoperative or malfunctioning key. DTC B3935 should not reset and the vehicle should start.

- If the replacement key results in the resetting of DTC B3935, replace the TDM.

### Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Replacing Keys

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- **Adding Keys**
- **Control Module References** for theft deterrent module replacement, setup, and programming.

### DTC P0513

#### DTC Descriptor

### DTC P0513

Theft Deterrent Key Incorrect

#### Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

#### Circuit/System Description

The theft deterrent module (TDM) sends the fuel enable password to the engine control module (ECM) via the serial data circuit. The ECM then challenges this password. Both the ECM and TDM perform a calculation on this challenge. If the calculated response from the TDM equals the calculation performed by the ECM, the ECM will allow vehicle starting.

#### Conditions for Running the DTC

Ignition is in the RUN position.

#### Conditions for Setting the DTC

The calculated response from the TDM does not equal the calculation performed by the ECM.

#### Action Taken When the DTC Sets

- The security indicator will illuminate.
- Vehicle starting will be disabled.

#### Conditions for Clearing the DTC

- A current DTC P1632 will be when a valid calculation is received.
- A history DTC will be cleared after 40 malfunction free ignition cycles or when a scan tool is used to clear DTCs.

#### Diagnostic Aids

The "key" referenced in the DTC descriptor does not refer to the vehicle key. In this case, "key" is referring to the challenge response.

#### Reference Information

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### Schematic Reference

#### Immobilizer Schematics

### Connector End View Reference

#### Immobilizer Connector End Views

### Description and Operation

#### Immobilizer Description and Operation

### Electrical Information Reference

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

### Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

### Circuit/System Verification

**IMPORTANT:** Because of normal system communications between the TDM and ECM, any theft deterrent B-codes must be diagnosed prior to the diagnosis of P-codes.

Program the theft deterrent module. Refer to Theft Deterrent Control Module Programming and Setup . The ECM should successfully complete the password learn and the vehicle should start.

- If the ECM does not complete the learn or vehicle starting remains disabled, replace the ECM.

### Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for ECM replacement, setup, and programming.

### DTC P0633

#### DTC Descriptor

### DTC P0633

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### Theft Deterrent Key Not Programmed

#### Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

#### Circuit/System Description

When learning the fuel enable password, as well as the challenge and response sequence, the engine control module (ECM) is placed in learn mode. DTC P0633 will set automatically as an indicator that the system is in learn mode and not as a fault indicator. Once the password and challenge/response are learned, learn mode will be exited and the DTC cleared. If the ECM does not exit learn mode, P0633 will remain current and indicate a fault.

#### Conditions for Running the DTC

The ECM is in learn mode.

#### Conditions for Setting the DTC

DTC P0633 will set any time the ECM enters learn mode.

#### Action Taken When the DTC Sets

The security indicator will illuminate.

#### Conditions for Clearing the DTC

- A current DTC P0633 will be cleared upon a successful engine start after exit of learn mode.
- A history DTC will be cleared after 100 malfunction free ignition cycles or when a scan tool is used to clear DTCs.

#### Diagnostic Aids

The "key" referenced in the DTC descriptor does not refer to the vehicle key. In this case, "key" is referring to the challenge response.

#### Reference Information

#### Schematic Reference

#### Immobilizer Schematics

#### Connector End View Reference

#### Immobilizer Connector End Views

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### Description and Operation

#### Immobilizer Description and Operation

#### Electrical Information Reference

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

#### Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

#### Circuit/System Verification

**IMPORTANT:** Because of normal system communications between the TDM and ECM, any theft deterrent B-codes must be diagnosed prior to the diagnosis of P-codes.

Program the theft deterrent module. Refer to Theft Deterrent Control Module Programming and Setup . The vehicle should start, the ECM should exit learn mode, and DTC P0633 should clear.

- If the ECM does not exit learn mode after the programming attempt, replace the ECM.

#### Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for ECM replacement, setup, and programming.

#### DTC P1629

#### DTC Descriptor

#### DTC P1629

Theft Deterrent Fuel Enable Signal Not Received

#### Diagnostic Fault Information

Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.

#### Circuit/System Description

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The theft deterrent module (TDM) sends the fuel enable password to the engine control module (ECM) via the serial data circuit. The ECM then challenges this password. Both the ECM and TDM perform a calculation on this challenge. If the calculated response from the TDM equals the calculation performed by the ECM, the ECM will allow vehicle starting.

### Conditions for Running the DTC

- Ignition is in the RUN position.
- The ECM is not in learn mode.

### Conditions for Setting the DTC

The ECM receives does not receive the challenge response from the TDM within 2 seconds.

### Action Taken When the DTC Sets

The security indicator will illuminate.

### Conditions for Clearing the DTC

- A current DTC P1629 will be cleared when a challenge response is received.
- A history DTC will be cleared after 40 malfunction free ignition cycles or when a scan tool is used to clear DTC's.

### Diagnostic Aids

DTC P1629 is an indicator that the challenge response was not received within the required 2 second window. This does not necessarily indicate a fault is present with the TDM or ECM. Factors such as a long engine crank, a delay in the serial data communication, or B-codes set in the TDM will cause DTC P1629 to set. This DTC should not be used as a fault indicator, but rather as a symptom to assist in the diagnosis of these other systems.

### Reference Information

#### Schematic Reference

#### Immobilizer Schematics

#### Connector End View Reference

#### Immobilizer Connector End Views

#### Description and Operation

#### Immobilizer Description and Operation

#### Electrical Information Reference

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

### Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

### DTC P1631

#### DTC Descriptor

### DTC P1631

Theft Deterrent Fuel Enable Signal Not Correct

#### Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

#### Circuit/System Description

The theft deterrent module (TDM) sends the fuel enable password to the engine control module (ECM) via the serial data circuit. The ECM then challenges this password. Both the ECM and TDM perform a calculation on this challenge. If the calculated response from the TDM equals the calculation performed by the ECM, the ECM will allow vehicle starting.

#### Conditions for Running the DTC

Ignition is in the RUN position.

#### Conditions for Setting the DTC

The ECM receives an incorrect fuel enable password from the TDM.

#### Action Taken When the DTC Sets

- The security indicator will illuminate.
- Vehicle starting will be disabled.

#### Conditions for Clearing the DTC

- A current DTC P1631 will be when a correct fuel enable password is received.
- A history DTC will be cleared after 40 malfunction free ignition cycles or when a scan tool is used to

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clear DTCs.

### Reference Information

### Schematic Reference

### Immobilizer Schematics

### Connector End View Reference

### Immobilizer Connector End Views

### Description and Operation

### Immobilizer Description and Operation

### Electrical Information Reference

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

### Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

### Circuit/System Verification

**IMPORTANT:** Because of normal system communications between the TDM and ECM, any theft deterrent B-codes must be diagnosed prior to the diagnosis of P-codes.

Program the theft deterrent module. Refer to Theft Deterrent Control Module Programming and Setup . The ECM should successfully complete the password learn and the vehicle should start.

- If the ECM does not complete the learn or vehicle starting remains disabled, replace the ECM.

### Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for ECM replacement, setup and programming.

### DTC P1632

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### DTC Descriptor

### DTC P1632

Theft Deterrent Fuel Disable Signal Received

### Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

### Circuit/System Description

The theft deterrent module (TDM) sends the fuel enable password to the engine control module (ECM) via the serial data circuit. The ECM then challenges this password. Both the ECM and TDM perform a calculation on this challenge. If the calculated response from the TDM equals the calculation performed by the ECM, the ECM will allow vehicle starting.

### Conditions for Running the DTC

Ignition is in the RUN position.

### Conditions for Setting the DTC

The calculated response from the TDM does not equal the calculation performed by the ECM.

### Action Taken When the DTC Sets

- The security indicator will illuminate.
- Vehicle starting will be disabled.

### Conditions for Clearing the DTC

- A current DTC P1632 will be when a valid calculation is received.
- A history DTC will be cleared after 40 malfunction free ignition cycles or when a scan tool is used to clear DTCs.

### Reference Information

### Schematic Reference

### Immobilizer Schematics

### Connector End View Reference

### Immobilizer Connector End Views

### Description and Operation

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### Immobilizer Description and Operation

#### Electrical Information Reference

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

#### Scan Tool Reference

- Scan Tool Data List
- Scan Tool Data Definitions

#### Circuit/System Verification

**IMPORTANT:** Because of normal system communications between the TDM and ECM, any theft deterrent B-codes must be diagnosed prior to the diagnosis of P-codes.

Program the theft deterrent module. Refer to Theft Deterrent Control Module Programming and Setup . The ECM should successfully complete the password learn and the vehicle should start.

- If the ECM does not complete the learn or vehicle starting remains disabled, replace the ECM.

#### Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for ECM replacement, setup and programming.

## REPAIR INSTRUCTIONS

### ADDING KEYS

#### **IMPORTANT:**

- To initiate, this procedures requires that a learned master key be available.
- A total of 10 master keys or valet keys may be programmed to a single vehicle.
- This procedure adds keys only. The procedure does not erase previously learned keys.
- The keys to be learned must duplicate the mechanical cut of the current key.
- If more than one valet key is to be learned, immediately precede each valet key with a learned master key.

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1. With a previously learned master key, turn ON the ignition, with the engine OFF.
2. Turn OFF the ignition and remove the key.
3. Within 10 seconds insert the key to be learned. Turn ON the ignition with the engine OFF. The vehicle has now learned the new key.

### REPLACING KEYS

When the correct number of learned master keys are not available to perform adding keys procedure the 10-minute re-learn procedure must be performed. Refer to **Theft Deterrent Control Module Programming and Setup**.

## DESCRIPTION AND OPERATION

### IMMOBILIZER DESCRIPTION AND OPERATION

The Theft Deterrent System functions are provided by the theft deterrent module (TDM) and the engine control module (ECM). When an ignition key is inserted into the ignition lock cylinder and the ignition is switched ON, the transponder embedded in the head of the key is energized by the exciter coil surrounding the ignition lock cylinder. This exciter coil is part of the TDM. The energized transponder transmits a signal that contains its unique value, which is received by the TDM. The TDM then compares this value to a value stored in memory. If the values match, the TDM will send the pre-release password via the serial data circuit to the ECM. If the transponders unique value is incorrect, the TDM will send the fuel disable password to the ECM.

When the ECM receives the TDM pre-release password, the ECM will challenge the password. The ECM sends this challenge back to the TDM via the serial data circuit. Both the ECM and TDM perform a calculation on this challenge. If the calculated response from the TDM equals the calculation performed by the ECM, the ECM will allow vehicle starting.

The components of the theft system are as follows:

- Theft Deterrent Module (TDM)
- Engine Control Module (ECM)
- Ignition key (Transponder)
- Security indicator

#### Theft Deterrent Module (TDM)

Vehicles with steering column mounted ignition switches have the exciter integral with the theft deterrent module (TDM), which is located within the steering column. The TDM can learn up to 10 keys (transponder values).

The TDM uses the following inputs: battery voltage, ignition switched voltage and ground circuit. The theft deterrent control module uses the following outputs: password exchange and challenge/response with the engine control module (ECM).

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When an ignition key is inserted into the ignition lock cylinder and the ignition is switched ON, the transponder embedded in the head of the key is energized by the exciter coils surrounding the ignition lock cylinder. The energized transponder transmits a signal that contains its unique value, which is received by the TDM. The TDM then compares this value to the learned key code stored in memory. The TDM then performs one of the following functions:

- If the transponder value matches the values stored in the TDM memory, the TDM will send the pre-release password to the ECM via the serial data circuit.
- If the transponder's unique value does not match the value stored in the TDM, the TDM will send the fuel disable message to the ECM via the serial data circuit.
- If the TDM is unable to measure the ignition key transponder value, the TDM will not send any messages to the ECM.

### Engine Control Module (ECM)

When the engine control module (ECM) receives the theft deterrent module (TDM) fuel enable password, the ECM will challenge the password. The ECM sends this challenge back to the TDM via the serial data circuit. Both the ECM and TDM perform a calculation on this challenge. If the calculated response from the TDM equals the calculation performed by the ECM, the ECM will allow vehicle starting.

The ECM will disable vehicle starting if any of the following conditions occur:

- The pre-release password is invalid.
- The fuel disable password is sent by the TDM.
- No passwords are received-There is no communication with the TDM.
- The TDM calculated response to the challenge does not equal the calculation performed by the ECM.

### The Ignition Key (Transponder)

The ignition key for Passkey III+ (PK3+) equipped vehicles is a standard ignition key with a transponder located in the plastic head of the key. The transponder value is fixed and unable to be changed. The Theft Deterrent System uses the ignition key transponder value to determine if a valid ignition key is being used to start the vehicle. There are approximately 3 trillion possible transponder values. There are no visible electrical contacts. The keys are identified by + symbol in a circle stamped into the steel shank of the key. Theft Deterrent Systems use the following types of ignition keys:

#### Master Keys

Master keys have a black plastic head for full access operation of the vehicle. Master keys may perform the following functions:

- Start the vehicle.
- Lock/unlock all of the door locks and rear compartment.
- Lock/unlock all of the storage compartments.

#### Valet Keys

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**IMPORTANT: Valet keys are NOT standard equipment on all GM vehicle lines.**

Valet keys have a gray plastic head and are for restricted operation of the vehicle. Valet keys may perform the following functions:

- Start the vehicle.
- Lock/unlock all of the door locks.

### Fleet Keys

**IMPORTANT: Fleet keys are NOT standard equipment on all GM vehicle lines.**

Fleets keys allow full access to the vehicle just as a master key would. However, unlike a master key which may only learn 10 keys to a particular vehicle, an unlimited number of fleet keys may be learned to the vehicle. Fleet keys are only used in vehicles configured for police fleet use with RPO 6E2 or 6E8.

- Start the vehicle.
- Lock/unlock all of the door locks and rear compartment.
- Lock/unlock all of the storage compartments.

### Security Indicator

The theft deterrent module (TDM) can command the instrument panel cluster (IPC) to illuminate the security indicator only when the ignition key is in the ON position. The TDM will command the security indicator be illuminated any time a fault is noted in the Theft Deterrent System and when the engine starting is disabled.