

2018 ACCESSORIES & EQUIPMENT

Immobilizer - Traverse

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

NOTE:

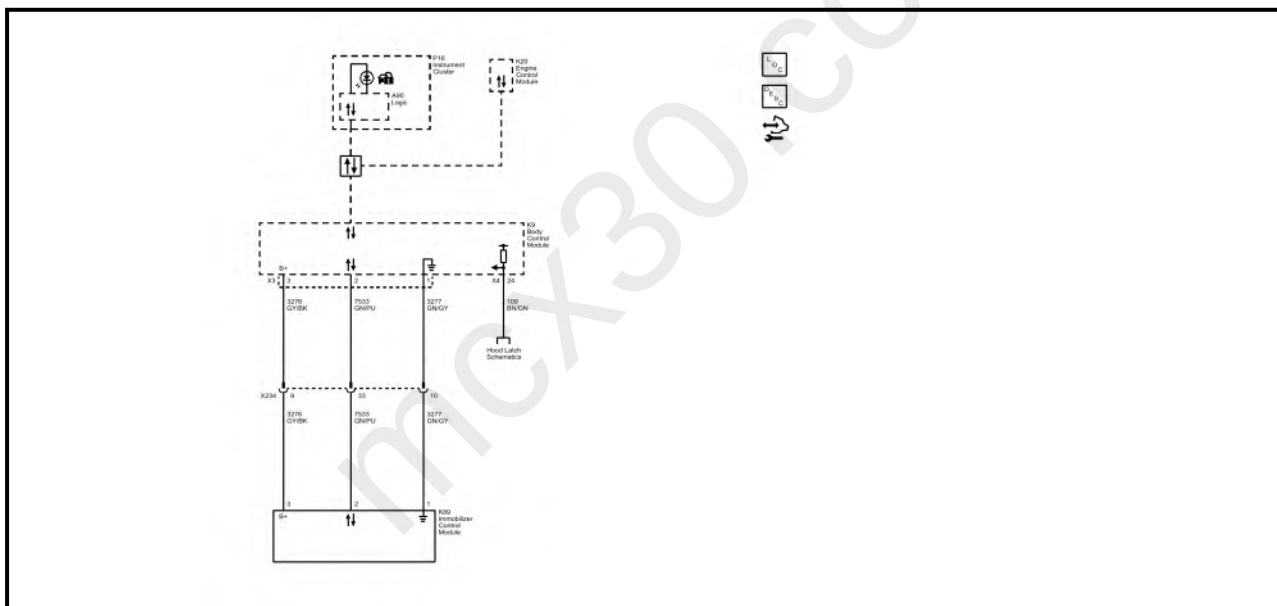
All fasteners listed in this table can be reused after removal.

Application	Specification
	Metric (English)
Theft Deterrent Module Bolt	1 N.m (9 lb in)

SCHEMATIC WIRING DIAGRAMS

IMMOBILIZER WIRING SCHEMATICS

Immobilizer



DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B0996

Diagnostic Instructions

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

DTC Descriptor

DTC B0996 00

Vehicle Electronic Control Unit (ECU) VIN Check Error

Circuit/System Description

After a loss of battery power has been restored, the theft deterrent module (TDM) will perform a check on the stored vehicle identification number (VIN). If the VIN is CORRECT, the TDM will run the VIN Timer for a programmable length of time, typically 10 minutes. The TDM will send a message via the serial data circuit to the instrument panel cluster (IPC) to illuminate the SECURITY indicator. After the VIN Timer has timed out, the security indicator will turn OFF. If the VIN is INCORRECT, the TDM will send the fuel disable password to the engine control module (ECM), via the serial data circuit. The immobilizer system considers this to be a tamper and will not allow the vehicle to start. The TDM will send a message via the serial data circuit to the IPC to flash the SECURITY indicator.

Conditions for Running the DTC

Ignition ON

Conditions for Setting the DTC

- The VIN check flag of the TDM is true.
- The TDM has determined that the battery has been reconnected after a battery disconnect.

Action Taken When the DTC Sets

- The vehicle will not start.
- The TDM sends the fuel disable message via the serial data circuit to the ECM.
- The TDM will run the VIN Timer for a programmable length of time, typically 10 minutes.
- The TDM sends a message to the IPC to illuminate the SECURITY indicator.

Conditions for Clearing the DTC

The TDM clears the current DTC when the correct VIN information is present.

Reference Information

Schematic Reference

Immobilizer Wiring Schematics

Connector End View Reference

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Description and Operation

Immobilizer Description and Operation

Electrical Information Reference

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

Scan Tool Reference

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

Circuit/System Verification

1. With a scan tool, verify that any module which stores the vehicle VIN matches the actual vehicle VIN:
 - If any modules stored VIN does not match the actual VIN, perform the setup procedure for that module. If the stored VIN does not match after setup, replace the module.
2. If all modules VIN match, replace the TDM.

Repair Instructions

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

[Control Module References](#) for control module replacement, setup, and programming

DTC B2955

Diagnostic Instructions

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

DTC Descriptor

DTC B2955

Security Sensor Data Circuit

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	B2955 00	B2955 00	-	-
Serial Data	B2955 00	B2955 00	B2955 00	B2955 00
Low Reference	-	B2955 00	-	-

Circuit/System Description

When a keyless entry transmitter is inserted into the transmitter pocket/slot and the ignition mode switch is pressed, the transponder embedded in the transmitter is energized by the immobilizer antenna exciter coil. The transponder transmits a signal to the body control module (BCM). The BCM then compares this value to a value stored in memory. If the value is correct, the BCM will send the prerelease password via the serial data circuit to the engine control module (ECM). If the learned key code does not match or a transponder value is not received, the BCM 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 BCM detects a circuit fault on the immobilizer antenna circuits.

Action Taken When the DTC Sets

- Vehicle starting will be disabled.
- The security indicator in the instrument cluster will be illuminated. A service message will be displayed in the driver information center.

Conditions for Clearing the DTC

- A current DTC will be cleared when the condition for setting the DTC are no longer present.
- A history DTC will be cleared after 100 malfunction-free ignition cycles.

Reference Information

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Connector End View Reference

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K89 Immobilizer Control Module. It may take up to 2 min for all vehicle systems to power down.
2. Verify a test lamp illuminates between the low reference circuit terminal 1 and B+.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for less than 2 Ω in the low reference circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **Go to next step: If the test lamp illuminates**
3. Ignition ON.

NOTE: In some instances, the K9 Body Control Module may only apply voltage for 3 s immediately after the ignition is turned ON. It may be necessary to monitor the DMM while turning the ignition ON to observe the voltage.

4. Test for greater than 9 V between the ignition circuit terminal 3 and ground.
 - **If 9 V or less**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the ignition circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.
 - If less than 2 Ω , replace the K9 Body Control Module.
 - **Go to next step: If greater than 9 V**
5. Ignition ON.
6. Test for 10 - 13 V between the serial data circuit terminal 2 and ground.
 - **If less than 10 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the serial data circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - Go to next step: If infinite resistance
 3. Test for less than 2 Ω in the serial data circuit end to end.
 - If 2 Ω or greater, repair the open/high resistance in the circuit.

- If less than 2 Ω , replace the K9 Body Control Module.
- **If greater than 13 V**
 1. Ignition OFF, disconnect the harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V, replace the K9 Body Control Module.
- **Go to next step: If between 10 - 13 V**
- 7. Replace the K89 Immobilizer Control Module.
- 8. Verify DTC B2955 does not set while operating the vehicle under the conditions for running the DTC.
 - **If DTC B2955 is set**
 Replace the K9 Body Control Module.
 - **Go to next step: If DTC B2955 is not set**
- 9. All OK.

Repair Instructions

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

[Control Module References](#) for body control module or immobilizer control module replacement, programming, and setup

DTC B302A

Diagnostic Instructions

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

DTC Descriptor

DTC B302A 00

Telematic Requested Immobilization

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 Running the DTC

The TDM continuously monitors for this DTC.

Conditions for Setting the DTC

A start disable message has been received from the telematics module.

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 telematics start disable request is no longer received.
- 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 immobilizer or telematics system.
- To remove the start disable request, the vehicle account must be updated with the OnStar stolen vehicle team. This will require that a law enforcement agency or the customer contact OnStar to indicate that the vehicle has been successfully and safely recovered.
- If the OnStar system has been disabled or damaged during a theft attempt, the system will not be able to communicate and the start disable request will not be removed. OnStar must be functioning properly for the start disable request to be removed.

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify the OnStar system is not damaged and is functioning properly with no DTCs set.
 - If the OnStar system is damaged, inoperative, or any OnStar DTCs are set, these concerns must be corrected before the start disable can be removed.
2. Press the blue OnStar button and ask the advisor to be transferred to the stolen vehicle team to verify the vehicle account has been updated.
3. Verify that OnStar is aware the vehicle has been recovered and that the vehicle account has been updated as such.
 - If OnStar has not been notified that the vehicle has been recovered, contact the customer and advise them that for security purposes, they must contact OnStar and the law enforcement agency to update the vehicle account.
4. After the vehicle account has been updated and the start disable request has been removed, DTC B302A will transition to a history DTC. Clear the history DTC.

DTC B3031

Diagnostic Instructions

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

DTC Descriptor

Security Controller In Learn Mode Malfunction

Circuit/System Description

When learning a keyless entry transmitter, the body control module (BCM) 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 transmitter is learned, learn mode will be exited and the DTC cleared. If the BCM does not exit learn mode, B3031 will remain current and indicate a fault. The instrument cluster security indicator will illuminate and the driver information center will display a message.

Conditions for Running the DTC

The immobilizer system is learn mode.

Conditions for Setting the DTC

The DTC will set any time the BCM enters the learn mode.

Action Taken When the DTC Sets

The security indicator will illuminate. The driver information center will display a message.

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

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Immobilizer Wiring Schematics

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- [Wiring Repairs](#)

Scan Tool Reference

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

Circuit/System Verification

1. Verify all available keyless entry transmitters are correct for the vehicle. This can be accomplished by comparing the part number that is laser etched on the transmitter to the part number listed in the parts catalog.
 - **If a transmitter is not correct**
Replace the transmitter.

- **Go to next step: If all transmitters are correct**
- 2. Verify the scan tool Immobilizer data displays two or more keys learned to the vehicle.
 - **If two or more keys are not displayed**

Add one additional key
 - **Go to next step: If two or more keys are learned to the vehicle**
- 3. Perform the Replacing Transmitters procedure. Refer to [Remote Control Door Lock and Theft Deterrent Transmitter Programming](#).
- 4. Verify the K9 Body Control Module learns the transmitter and exits the learn mode. The scan tool Master Keys Learned parameter should increment to 1.
 - **If the K9 Body Control Module does not exit the learn mode after the programming attempt**

Replace the K9 Body Control Module.
 - **Go to next step: If the K9 Body Control Module exits the learn mode after the programming attempt**
- 5. All OK.

Repair Instructions

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

[Control Module References](#) for replacement, programming, and setup

DTC B3055

Diagnostic Instructions

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

DTC Descriptor

DTC B3055 00

No Transponder Modulation or No Transponder

Circuit/System Description

When a keyless entry transmitter is inserted into the transmitter pocket/slot and the ignition mode switch is pressed, the transponder embedded in the transmitter is energized by the immobilizer antenna exciter coil. The transponder transmits a signal to the body control module (BCM). The BCM then compares this value to a value stored in memory. If the value is correct, the BCM will send the prerelease password via the serial data circuit to the engine control module (ECM). If the learned key code does not match or a transponder value is not received, the BCM 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 BCM is unable to measure the transponder value.

Action Taken When the DTC Sets

- Vehicle starting will be disabled.
- The security indicator will illuminate. A service message will be displayed in the driver information center.

Conditions for Clearing the DTC

- A current DTC will be cleared when the BCM detects a valid transponder value from the transmitter.
- A history DTC will be cleared after 100 malfunction-free ignition cycles.

Diagnostic Aids

- Because DTC B3055 may be caused by a malfunctioning keyless entry transmitter, it is necessary to have all available transmitters at the time of diagnosis. A possible scenario would be a customer leaving the vehicle with a spare transmitter during the service visit, but the transmitter which they use everyday, not the spare transmitter, is the cause of the DTC. Not having all available transmitters in this instance would result in the customer concern not being duplicate or a misdiagnosis.
- Ensure that the immobilizer control module is properly installed and fully seated. An audible and/or tactile click will indicate that the immobilizer control module is fully seated. To ensure proper transponder communication, the transmitter must be in a specific location in relation to the immobilizer control module. If the immobilizer control module is not fully seated, transponder communication may not occur and DTC B3055 will set.

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- [Wiring Repairs](#)

Scan Tool Reference

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

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC B1370, B1380, or B1441 is not set.

- **If any of the DTCs are set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **Go to next step: If none of the DTCs are set**

3. Verify the scan tool body control module Accessory parameter changes between Active and Inactive when turning the ignition ON and OFF.

- **If the parameter does not change**

Refer to [Vehicle Will Not Change Power Mode](#) .

- **Go to next step: If the parameter changes**

4. Verify all available keyless entry transmitters are correct for the vehicle. This can be accomplished by comparing the part number that is laser etched on the transmitter to the part number listed in the parts catalog.

- **If a transmitter is not correct**

Replace the transmitter.

- **Go to next step: If all transmitter are correct**

5. Remove the battery from each of the available keyless entry transmitters.

6. Verify that DTC B3055 does not set while attempting to start the vehicle with each available keyless entry transmitter. To start the vehicle with the transmitter battery removed, the transmitter must be placed in the transmitter pocket/slot.

- **If DTC B3055 sets when attempting to start the vehicle with only one of the available transmitters**

Replace the appropriate transmitter.

- **If DTC B3055 sets when attempting to start the vehicle with all of the available transmitters**

Replace the K89 Immobilizer Control Module.

- **Go to next step: If DTC B3055 does not set**

7. All OK.

Repair Instructions

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

[Control Module References](#) for immobilizer control module replacement, programming, and setup

DTC B305C

Diagnostic Instructions

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

DTC Descriptor

DTC B305C

Immobilizer Transponder of Wrong Type Programmed

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

Circuit/System Description

Without BTM and/or ATH/ATS

When an ignition key is inserted into the ignition lock cylinder and the ignition is switched ON, the transponder embedded in the key is energized by the exciter coil surrounding the ignition lock cylinder. The transponder transmits a signal to the immobilizer control module. The immobilizer control module translates this signal to a serial data message which is sent to the body control module (BCM). The BCM then compares this value to a value stored in memory. If the value is correct, the BCM will send the prerelease password via the serial data circuit to the engine control module (ECM). If the learned key code does not match or a transponder value is not received, the BCM will send the start disable password to the ECM.

With BTM and/or ATH/ATS

When a ignition key is inserted into the key pocket/slot and the ignition mode switch is pressed, the transponder embedded in the key is energized by the immobilizer antenna exciter coil. The transponder transmits a signal to the immobilizer control module. The immobilizer control module translates this signal to a serial data message which is sent to the body control module (BCM). The BCM then compares this value to a value stored in memory. If the value is correct, the BCM will send the prerelease password via the serial data circuit to the engine control module (ECM). If the learned key code does not match or a transponder value is not received, the BCM will send the start disable password to the ECM.

Conditions for Running the DTC

- Ignition is in the Accessory or Run position
- Battery voltage is greater than 9 volts
- Transponder authentication has occurred

Conditions for Setting the DTC

- The programed transponder type does not match the equipped system on the vehicle.
- A transponder used for vehicles without BTM and/or ATH/ATS has been programmed to a vehicle with BTM and/or ATH/ATS.
- A transponder used for vehicles with BTM and/or ATH/ATS has been programmed to a vehicle without BTM and/or ATH/ATS.

Action Taken When the DTC Sets

No action is taken.

Conditions for Clearing the DTC

- A current DTC will be cleared when the BCM detects a programed transponder type that matches the equipped system on the vehicle.
- A history DTC will be cleared after 100 malfunction-free ignition cycles.

Reference Information

Schematic Reference

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.

2. Verify all available keys/transmitters are correct for the vehicle. This can be accomplished by comparing the part number that is laser etched on the key to the part number listed in the parts catalog.
 - **If a key is not correct**

Replace the appropriate key.
 - **Go to next step: If all keys are correct**
3. Verify the scan tool Key Part Number parameter displays a Key Part Number when turning the ignition ON with each key.
 - **If a Key Part Number is not read**

Replace the appropriate key.
 - **Go to next step: If a Key Part Number is read for each key**
4. All OK.

DTC B3060

Diagnostic Instructions

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

DTC Descriptor

DTC B3060 00

Unprogrammed Transponder Identification Code Received Malfunction

Circuit/System Description

When a keyless entry transmitter is inserted into the transmitter pocket/slot and the ignition mode switch is pressed, the transponder embedded in the transmitter is energized by the immobilizer antenna exciter coil. The transponder transmits a signal to the body control module (BCM). The BCM then compares this value to a value stored in memory. If the value is correct, the BCM will send the prerelease password via the serial data circuit to the engine control module (ECM). If the learned key code does not match or a transponder value is not received, the BCM 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 BCM is incorrect or not learned to the vehicle.

Action Taken When the DTC Sets

- Vehicle starting will be disabled.
- The security indicator in the instrument cluster will be illuminated. The driver information center will display a service message.

Conditions for Clearing the DTC

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

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Perform the Replacing Transmitters procedure. Refer to Remote Control Door Lock and Theft Deterrent Transmitter Programming .
2. Verify the K9 Body Control Module learns the transmitter. The scan tool Master Keys Learned parameter should increment to indicate another key has been learned.
 - **If the K9 Body Control Module does not learn the transmitter**
Replace the appropriate transmitter.
 - **Go to next step: If the K9 Body Control Module learns the transmitter**
3. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

Remote Control Door Lock and Theft Deterrent Transmitter Programming

DTC B389A

Diagnostic Instructions

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

DTC Descriptor

DTC B389A

Environment Identification

For symptom byte information, refer to Symptom Byte List .

Circuit/System Description

When certain modules are programmed and configured during installation, the module learns a specific environment identifier which is unique to the vehicle. The environment identifier is used to prevent the swapping modules between vehicles. The body control module (BCM) is the keeper of the environment

identifier. The Instrument Cluster, Electronic Brake Control Module, HVAC Control Module, Inflatable Restraint Sensing and Diagnostic Module, engine control module (ECM), and Steering Column Lock Module (if equipped) each learn the environment identifier during their configuration process. During vehicle operation, the BCM sends the immobilizer identifier as a challenge and each module responds to the challenge by sending the environment identifier back to the BCM. If the BCM sends an incorrect immobilizer identifier or a specific number of incorrect environment identifiers are received, vehicle starting is disabled.

Conditions for Running the DTC

Ignition is in the ACCESSORY or RUN position.

Conditions for Setting the DTC

An incorrect immobilizer identifier was broadcast by the BCM.

Action Taken When the DTC Sets

- The security indicator in the instrument cluster will illuminate.
- Vehicle starting will be disabled.

Conditions for Clearing the DTC

A current DTC will be cleared when the BCM broadcasts a correct immobilizer identifier.

Diagnostic Aids

If BCM programming is not completed after BCM replacement, the immobilizer identifier will not be learned. If DTC B389A sets immediately after the replacement and programming of a BCM, perform the programming procedure again.

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Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify DTC B389A did not set immediately following the replacement and programming of the K9 Body Control Module.
 - **If the DTC set immediately after the replacement and programming of the K9 Body Control Module**

The immobilizer learn procedure was not properly completed. Perform the BCM immobilizer learn using the body control module IMMO Function with Existing Transponder or Remote Key in SPS. Refer to [Immobilizer System Component Programming](#).

- **Go to next step: If the DTC did not set immediately after the replacement and programming of the K9 Body Control Module**

2. Verify DTC B3902 is not set in any of the control modules listed below:

- K20 Engine Control Module
- K36 Inflatable Restraint Sensing and Diagnostic Module
- K17 Electronic Brake Control Module
- K33 HVAC Control Module
- P16 Instrument Cluster
- K60 Steering Column Lock Module (if equipped)
- **If DTC B3902 is set in any of the modules**

Refer to [DTC B3902](#).

- **Go to next step: If DTC B3902 is not set in any of the modules**

3. Perform the K9 Body Control Module immobilizer learn using body control module IMMO Function with Existing Transponder or Remote Key in SPS. Refer to [Immobilizer System Component Programming](#).

4. Verify DTC B389A does not set after programming.

- **If the DTC sets after programming**

Replace the K9 Body Control Module.

- **Go to next step: If the DTC does not set after programming**

5. All OK.

Repair Instructions

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

[Control Module References](#) for body control module replacement, programming, and setup.

DTC B3902

Diagnostic Instructions

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

DTC Descriptor

DTC B3902

Incorrect Immobilizer Identifier Received

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

Circuit/System Description

When certain modules are programmed and configured during installation, the module learns a specific environment identifier which is unique to the vehicle. The environment identifier is used to prevent the swapping modules between vehicles. The body control module (BCM) is the keeper of the environment identifier. The instrument cluster, electronic brake control module, HVAC control module, inflatable restraint sensing and diagnostic module, engine control module (ECM), and steering column lock module (if equipped) each learn the environment identifier during their configuration process. During

vehicle operation, the BCM sends the immobilizer identifier as a challenge and each module responds to the challenge by sending the environment identifier back to the BCM. If the BCM sends an incorrect immobilizer identifier or a specific number of incorrect environment identifiers are received, vehicle starting is disabled.

Conditions for Running the DTC

Ignition is in the ACCESSORY or RUN position.

Conditions for Setting the DTC

The control module's environment identifier does not match the environment identifier stored by the BCM.

Action Taken When the DTC Sets

- The security indicator in the instrument cluster will illuminate.
- Vehicle starting will be disabled.

Conditions for Clearing the DTC

A current DTC will be cleared when the module learns a correct environment identifier.

Reference Information

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- [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. Perform the Programming and Setup procedure for the control module that set DTC B3902.

NOTE: When performing the following step, Immobilizer System Component Programming, the module may also need to be reset by using the SPS function Prepare For Removal.

2. Perform the Immobilizer System Component Programming [Immobilizer System Component Programming](#).
3. Verify DTC B3902 does not set after programming.
 - **If the DTC sets after programming**

Replace the control module that set the DTC.

- Go to next step: If the DTC does not set after programming

4. All OK.

Repair Instructions

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

[Control Module References](#) for instrument cluster, electronic brake control module, HVAC control module, inflatable restraint sensing and diagnostic module, engine control module, or steering column lock module replacement, programming, and setup.

DTC B3924, B3925, B3926, B3927, OR B3928

Diagnostic Instructions

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

DTC Descriptor

DTC B3924

Incorrect Environmental Identifier Received From Inflatable Restraint Sensing and Diagnostic Module

DTC B3925

Incorrect Environmental Identifier Received From HVAC Control Module

DTC B3926

Incorrect Environmental Identifier Received From Instrument Cluster

DTC B3927

Incorrect Environmental Identifier Received From Electronic Brake Control Module

DTC B3928

Incorrect Environmental Identifier Received From Telematics Communication Interface Control Module

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

Circuit/System Description

When certain modules are programmed and configured during installation, the module learns a specific environment identifier which is unique to the vehicle. The environment identifier is used to prevent the swapping of control modules between vehicles. The body control module (BCM) is the keeper of the environment identifier. The instrument cluster, electronic brake control module, HVAC control module, inflatable restraint sensing and diagnostic module, and telematics communication interface control module each learn the environment identifier during their configuration process. During vehicle operation, the BCM sends the immobilizer identifier as a challenge and each module responds to the challenge by sending the environment identifier back to the BCM. If the BCM sends an incorrect immobilizer identifier or a specific number of incorrect environment identifiers are received, vehicle starting is disabled.

Conditions for Running the DTC

Ignition is in the ACCESSORY or RUN position.

Conditions for Setting the DTC

The control module's environment identifier does not match the environment identifier stored by the BCM.

Action Taken When the DTC Sets

- The security indicator in the instrument cluster will illuminate.
- Vehicle starting will be disabled.

Conditions for Clearing the DTC

A current DTC will be cleared when the module learns a correct environment identifier.

Reference Information

Schematic Reference

Immobilizer Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

Control Module References for scan tool information

Circuit/System Verification

1. Perform the Programming and Setup procedure for the control module that set the DTC.
2. Verify the DTC does not set after programming.
 - **If the DTC sets after programming**

Replace the control module that set the DTC.
 - **Go to next step: If the DTC does not set after programming**
3. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for instrument cluster, electronic brake control module, HVAC control module, inflatable restraint sensing and diagnostic module, or telematics communication interface control module replacement, programming, and setup.

DTC B3935

Diagnostic Instructions

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

DTC Descriptor

DTC B3935 00

Transponder Authentication Error

Circuit/System Description

When a keyless entry transmitter is inserted into the transmitter pocket/slot and the ignition mode switch is pressed, the transponder embedded in the transmitter is energized by the immobilizer antenna exciter coil. The transponder transmits a signal to the body control module (BCM). The BCM then compares this value to a value stored in memory. If the value is correct, the BCM will send the prerelease password via the serial data circuit to the engine control module (ECM). If the learned key code does not match or a transponder value is not received, the BCM 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 BCM memory.
- The transponder calculation of the challenge from the BCM does not match the BCM calculation.

Action Taken When the DTC Sets

- Vehicle starting will be disabled.
- The security indicator will illuminate. The driver information center will display a service message.

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.

Reference Information

Schematic Reference

Immobilizer Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

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

Circuit/System Verification

1. Replace the suspected inoperative or malfunctioning transmitter.

2. Verify DTC B3935 is not set as current.

- **If the DTC is set as current**

Replace the K9 Body Control Module.

- **Go to next step: If the DTC is set as history**

3. All OK.

Repair Instructions

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

- [Remote Control Door Lock and Theft Deterrent Transmitter Programming](#)
- [Control Module References](#) for body control module replacement, programming, and setup

DTC B3976

Diagnostic Instructions

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

DTC Descriptor

DTC B3976 00

Unconfigured Transponder

Circuit/System Description

When a keyless entry transmitter is inserted into the transmitter pocket/slot and the ignition mode switch is pressed, the transponder embedded in the transmitter is energized by the immobilizer antenna exciter coil. The transponder transmits a signal to the body control module (BCM). The BCM then compares this value to a value stored in memory. If the value is correct, the BCM will send the prerelease password via the serial data circuit to the engine control module (ECM). If the learned key code does not match or a transponder value is not received, the BCM will send the start disable password to the ECM.

Conditions for Running the DTC

- Ignition is in the Accessory or Run position.
- The BCM is in the learn coded key state.

Conditions for Setting the DTC

The BCM has determined the current transmitter is not configured as a proper transmitter.

Action Taken When the DTC Sets

- Vehicle starting will be disabled.
- The security indicator in the instrument cluster will be illuminated. A service message will be displayed in the driver information center.

Conditions for Clearing the DTC

- A current DTC will be cleared when the BCM detects a properly configured transmitter.
- 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 Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

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

Circuit/System Verification

1. Verify the engine starts with each available transmitter.
 - **If the engine does not start with a transmitter**
Replace the transmitter.
 - **Go to next step: If the engine starts with all transmitters**
2. All OK.

Repair Instructions

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

Remote Control Door Lock and Theft Deterrent Transmitter Programming

DTC B3978, B3979, B3980, B3981, OR B3982

Diagnostic Instructions

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

DTC Descriptor

DTC B3978

Incorrect Environmental Identifier Received From Inflatable Restraint Sensing and Diagnostic Module

DTC B3979

Incorrect Environmental Identifier Received From HVAC Control Module

DTC B3980

Incorrect Environmental Identifier Received From Instrument Cluster

DTC B3981

Incorrect Environmental Identifier Received From Electronic Brake Control Module

DTC B3982

Incorrect Environmental Identifier Received From Telematics Communication Interface Control Module

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

Circuit/System Description

When certain modules are programmed and configured during installation, the module learns a specific environment identifier which is unique to the vehicle. The environment identifier is used to prevent the swapping of control modules between vehicles. The body control module (BCM) is the keeper of the environment identifier. The instrument cluster, electronic brake control module, HVAC control module, inflatable restraint sensing and diagnostic Module, and telematics communication interface control module each learn the environment identifier during their configuration process. During vehicle operation, the BCM sends the immobilizer identifier as a challenge and each module responds to the challenge by sending the environment identifier back to the BCM. If the BCM sends an incorrect immobilizer identifier or a specific number of incorrect environment identifiers are received, vehicle starting is disabled.

Conditions for Running the DTC

Ignition is in the ACCESSORY or RUN position.

Conditions for Setting the DTC

An incorrect environment identifier was received by the BCM.

Action Taken When the DTC Sets

- The security indicator in the instrument cluster will illuminate.
- Vehicle starting will be disabled.

Conditions for Clearing the DTC

A current DTC will be cleared when the module learns a correct environment identifier and it is received by the BCM.

Reference Information

Schematic Reference

Immobilizer Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

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

Circuit/System Verification

1. Perform the Programming and Setup procedure for the control module that set the DTC.
2. Verify the DTC does not set after programming.
 - **If the DTC sets after programming**

Replace the control module that set the DTC.
 - **Go to next step: If the DTC does not set after programming**
3. All OK.

Repair Instructions

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

[Control Module References](#) for instrument cluster, electronic brake control module, HVAC control module, inflatable restraint sensing and diagnostic Module, or telematics communication interface control module replacement, programming, and setup.

DTC B3984

Diagnostic Instructions

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

DTC Descriptor

DTC B3984

Device 1 Environment Identifier Not Programmable

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

Circuit/System Description

When certain modules are programmed and configured during installation, the module learns a specific environment identifier which is unique to the vehicle. The environment identifier is used to prevent the swapping modules between vehicles. The body control module (BCM) is the keeper of the environment identifier. The instrument cluster, electronic brake control module, HVAC control module, inflatable restraint sensing and diagnostic module, engine control module (ECM), and steering column lock module (if equipped) each learn the environment identifier during their configuration process. During vehicle operation, the BCM sends the immobilizer identifier as a challenge and each module responds to the challenge by sending the environment identifier back to the BCM. If the BCM sends an incorrect immobilizer identifier or a specific number of incorrect environment identifiers are received, vehicle starting is disabled.

Conditions for Running the DTC

Ignition is in the ACCESSORY or RUN position.

Conditions for Setting the DTC

An incorrect environment identifier is programmed or no environment identifier is programmed.

Action Taken When the DTC Sets

- The security indicator in the instrument cluster will illuminate.
- Vehicle starting will be disabled.

Conditions for Clearing the DTC

A current DTC will be cleared when the module learns a correct environment identifier.

Reference Information

Schematic Reference

Immobilizer Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

Control Module References for scan tool information

Circuit/System Verification

1. Perform the Programming and Setup procedure for the control module that set DTC B3984.
2. Verify DTC B3984 does not set after programming.
 - **If the DTC sets after programming**

Replace the control module that set the DTC.
 - **Go to next step: If the DTC does not set after programming**
3. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for instrument cluster, electronic brake control module, HVAC control module, inflatable restraint sensing and diagnostic module, engine control module, and steering column lock module replacement, programming, and setup.

DTC P0513

Diagnostic Instructions

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

DTC Descriptor

DTC P0513

Theft Deterrent Key Incorrect

Circuit/System Description

The theft deterrent module (TDM) sends the prerelease password to the engine control module (ECM) via the serial data circuit. The ECM then sends a challenge to the TDM. 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 ACCESSORY or 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 P0513 will be cleared 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

Schematic Reference

Immobilizer Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

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

Circuit/System Verification

1. Verify the following BCM DTCs are not present:

- U1814
- U2099
- B1428
- B1370
- B1380
- B1440
- B1441
- If any listed DTC is present, refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) to diagnose that DTC prior to this diagnostic.

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.

2. Perform the 10-Minute Immobilizer Relearn procedure. Refer to [Immobilizer System Component Programming](#). 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 Instructions

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

[Control Module References](#) for ECM replacement, setup, and programming

DTC P0633

Diagnostic Instructions

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

DTC Descriptor

DTC P0633

Theft Deterrent Key Not Programmed

Circuit/System Description

When learning the prerelease 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 when the engine is successfully started. 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 Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

Control Module References for scan tool information

Circuit/System Verification

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.

IMPORTANT: DTC P0633 will clear upon a successful engine start. Any malfunction that will cause a no-start condition will prevent DTC P0633 from clearing. Prior to diagnosing DTC P0633, ensure that all power moding and engine control systems are operating properly and all conditions that may cause a no-start have been corrected. Do not replace the ECM. Replacing the ECM will not correct the no-start condition.

1. Ignition in the CRANK position, verify the scan tool Ignition Run/Crank parameter is Active.
 - If not the specified value, refer to Power Mode Mismatch .
2. Perform the 10-Minute Immobilizer Relearn procedure. Refer to Immobilizer System Component Programming. 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, an undiagnosed no-start condition exists. Refer to the appropriate subsection and diagnostic to correct the no-start condition.

DTC P1629

Diagnostic Instructions

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

DTC Descriptor

DTC P1629

Theft Deterrent Fuel Enable Signal Not Received

Circuit/System Description

The theft deterrent module (TDM) sends the prerelease password to the engine control module (ECM) via the serial data circuit. The ECM then sends a challenge to the TDM. 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 ACCESSORY or 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 the required amount of time.

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 DTCs.

Diagnostic Aids

DTC P1629 is an indicator that the challenge/response was not received within the required time. 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 Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

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

DTC P162B

Diagnostic Instructions

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

DTC Descriptor

DTC P162B

Circuit/System Description

When a remote slow-down request is sent from OnStar, the vehicle communication interface module sends a serial data message to the engine control module (ECM) indicating that reduced vehicle speed has been requested. Once the request is active, the ECM begins reducing engine torque to match requested vehicle speed and the REDUCED ENGINE POWER message is displayed.

Conditions for Running the DTC

- The engine run time is greater than 5 s.
- A remote slow-down request is received by the ECM.

Conditions for Setting the DTC

- The VIN embedded in the slow-down request does not match the VIN stored in the ECM.
- The rolling code counter embedded in the slow-down request does not increment for ten consecutive messages.

Action Taken When the DTC Sets

- ECM ignores all reduced vehicle speed request messages from the vehicle communication interface module.
- The ECM stores DTC P162B in history.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A history DTC will clear after 40 malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

OnStar/Telematics Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

Description and Operation

Remote Vehicle Speed Limiting Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify the vehicle is equipped with OnStar (RPO UE1) and DTC P162B is set
 - **If the vehicle is not equipped with OnStar (RPO UE1) and DTC P162B is set**
Replace the ECM.

- **Go to next step: If the vehicle is equipped with OnStar (RPO UE1) and DTC P162B is set**
- 2. Perform the Stolen Vehicle Slow-Down Reset procedure with the scan tool.
- 3. Verify DTC P162B is not set.
 - **If DTC P162B is set**
 1. Reprogram the ECM. Refer to [Control Module References](#).
 2. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - If the DTC sets, replace the ECM. If the DTC continues to set after ECM replacement, replace the vehicle communication interface module.
 - Go to next step: If the DTC does not set
 3. All OK.
 - **Go to next step: If DTC P162B is not set**
- 4. All OK.

Repair Instructions

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

[Control Module References](#) for vehicle communication interface module and ECM replacement, programming, and setup

DTC P1631

Diagnostic Instructions

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

DTC Descriptor

DTC P1631

Theft Deterrent Fuel Enable Signal Not Correct

Circuit/System Description

The theft deterrent module (TDM) sends the prerelease password to the engine control module (ECM) via the serial data circuit. The ECM then sends a challenge to the TDM. 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 ACCESSORY or RUN position.

Conditions for Setting the DTC

The ECM receives an incorrect prerelease 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 clear DTCs.

Reference Information

Schematic Reference

Immobilizer Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

Control Module References for scan tool information

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.

Perform the 10-Minute Immobilizer Relearn procedure. Refer to Immobilizer System Component Programming. 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 Instructions

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for ECM replacement, setup and programming

DTC P1649

Diagnostic Instructions

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

DTC Descriptor

DTC P1649

Immobilizer Security Code Not Programmed

Circuit/System Description

When learning the security code, as well as the challenge and response sequence, the engine control module (ECM) is placed in learn mode. Once the security code and challenge/response are learned, learn mode will be exited when the engine is successfully started.

Conditions for Running the DTC

The ECM is in learn mode.

Conditions for Setting the DTC

The ECM has not learned a security code.

Action Taken When the DTC Sets

The security indicator in the instrument cluster will illuminate.

Conditions for Clearing the DTC

- A current DTC 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.

Reference Information

Schematic Reference

Immobilizer Wiring Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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

Control Module References

Circuit/System Verification

1. Verify there are no immobilizer DTCs set in the K9 Body Control Module.
 - **If any immobilizer DTCs are set in the K9 Body Control Module**
Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .
 - **Go to next step: If no immobilizer DTCs are set in the K9 Body Control Module**
2. Perform the K20 Engine Control Module immobilizer learn using the engine control module IMMO Learn in SPS. Refer to [Immobilizer System Component Programming](#).
3. Verify the engine starts after the K20 Engine Control Module completes the learn procedure.
 - **If the engine does not start**
Replace the K20 Engine Control Module.
 - **Go to next step: If the engine starts**
4. All OK.

Repair Instructions

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

[Control Module References](#) for engine control module replacement, programming, and setup.

SYMPTOMS - IMMOBILIZER

IMPORTANT: The following steps must be completed before using the symptom tables.

1. Perform the [Diagnostic System Check - Vehicle](#) before using the symptom tables in order to verify that all of the following are true:
 - There are no DTCs set.
 - The control modules can communicate via the serial data links.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to [Immobilizer Description and Operation](#).

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the systems. Refer to [Checking Aftermarket Accessories](#).
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to [Testing for Intermittent Conditions and Poor Connections](#).

Symptom List

Refer to [OnStar Stolen Vehicle Slowdown Active](#) to diagnose the symptom.

ONSTAR STOLEN VEHICLE SLOWDOWN ACTIVE

Diagnostic Instructions

NOTE: This procedure is not used in Brazil.

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

Circuit/System Description

When a remote slow-down request is sent from OnStar, the Telematics Communication Interface Control Module sends a serial data message to the engine control module (ECM) indicating that reduced vehicle speed has been requested. Once the request is active, the ECM begins reducing engine torque to match requested vehicle speed and the REDUCED ENGINE POWER message is displayed.

Reference Information

Schematic Reference

[OnStar/Telematics Wiring Schematics](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX](#)

Description and Operation

[Remote Vehicle Speed Limiting Description and Operation](#)

Electrical Information Reference

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

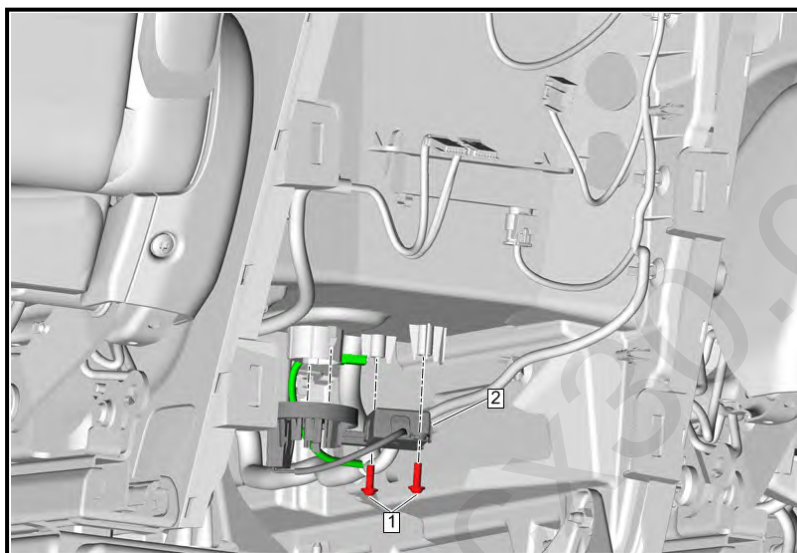
Control Module References for scan tool information

Circuit/System Verification

1. Verify the vehicle is not in the OnStar initiated Stolen Vehicle Slowdown mode. This can be accomplished by verifying the scan tool Telematics Enhanced Service Immobilization parameter is No.
 - **If the scan tool Telematics Enhanced Service Immobilization parameter is Yes**
 1. Perform the Remote Vehicle Speed Limiting Reset procedure with the scan tool.
 2. Press the blue OnStar button and inform the advisor that you need to be transferred to the stolen vehicle team to update the vehicle account.
 - **Go to next step: If the scan tool BCM Telematics Enhanced Service Immobilization parameter is No**
2. All OK.

REPAIR INSTRUCTIONS

THEFT DETERRENT MODULE REPLACEMENT



Callout	Component Name
Preliminary Procedure <u>Front Floor Console Rear Trim Panel Replacement</u>	
1	Theft Deterrent Module Bolt [2x] CAUTION: <u>Fastener Caution</u> Tighten 1 N.m (9 lb in)
2	Theft Deterrent Module Procedure 1. Disconnect the electrical connector. 2. Release the retaining tabs.

IMMOBILIZER SYSTEM COMPONENT PROGRAMMING

This procedure will learn the immobilizer function and require greater than 15 minutes to complete. If the battery voltage is low, charge the battery before proceeding with the learn. If the body control

module (BCM) or engine control module (ECM) have been replaced, they must be programmed before performing this learn procedure.

Depending on the immobilizer function being learned or the component replaced, different learn functions are required to be performed. These learn functions are as follows:

Function name on SPS tool:	Function description:	When the function should be used:	Notes:
Body Control Module IMMO Function with Existing Transponder or Remote Key	The BCM will relearn the immobilizer passwords and data while reusing the existing vehicle keys	The BCM has been replaced and the existing vehicle keys are being reused or a diagnostic has instructed to perform the learn	-
Body Control Module IMMO Function with New Transponder or Remote Key	The BCM will relearn the immobilizer passwords and data while using new vehicle keys	The BCM has been replaced and new vehicle keys are being reused	-
Engine Control Module IMMO Learn	The ECM will relearn the immobilizer passwords and data	The ECM has been replaced or a diagnostic has instructed to perform the learn	-
Engine Control Module and Body Control Module IMMO Learn	The ECM and BCM will learn new immobilizer passwords and data	Both the ECM and BCM have been replaced (this selection will REQUIRE new vehicle keys be used)	Because both the ECM and BCM have been replaced and are learning new immobilizer passwords and data, all vehicle keys must also be replaced
Program Transponder or Remote Key (Add)	A new vehicle key will learn the immobilizer passwords and data	A new vehicle key is being added (does not affect other vehicle keys)	This function may not be available in all sales regions
Program Transponder or Remote Key (Delete)	All existing vehicle keys will be invalidated and any desired keys are relearned	All vehicle keys are desired to be invalidated and certain keys relearned or a diagnostic has instructed to perform the learn	This procedure may be used if a customer has had their keys lost or stolen and wishes to invalidate the keys, making them unable to start the vehicle

1. Connect a scan tool to the vehicle and access SPS.
2. Turn ON the ignition, with the engine OFF.
3. Ensure that all power consuming devices are turned OFF on the vehicle.
4. Select SPS application and follow the on-screen instructions.
5. Select Reprogram ECU.
6. Select IMMO Immobilizer Learn - Setup.
7. Select the appropriate programming function based on the component that was replaced or is being programmed. Refer to the table at the top of this document for assistance in choosing the correct programming function.

NOTE:

- **At multiple times during the learn procedure, SPS will instruct you to turn the ignition to the run position. Make sure the vehicle is actually in the run mode before continuing on the SPS terminal. If the ignition is not in the run mode, the learn**

procedure will fail. To verify the vehicle is in Run mode, verify the green LED is illuminated on the ignition mode switch.

- The key pocket is located inside the front center console storage area under the liner.

8. Follow the on-screen instructions.

NOTE: If the programming does not complete or hangs during the programming operation, refer to Unable to Complete Programming below.

9. After programming all keys "Programming Complete" is displayed.
10. Press and hold the ignition mode switch for 15 seconds.
11. Press the lock and unlock button on each transmitter that was programmed. This will awaken each transmitter and allow passive and active keyless entry functions to be established.
12. With a scan tool, clear any DTCs.
13. Verify each key is operating properly. Operate each of the keyless entry functions using the buttons on the transmitter and then start the vehicle. When verifying operation, make sure that no other keys are near the vehicle.

Unable to Complete Programming

When attempting to program immobilizer components, various conditions may prevent the programming operation from completing. These conditions may be caused by normal system operation, a system malfunction, or an external influence. Common symptoms of an incomplete programming are receiving an error message during the attempt or having the SPS application become unresponsive.

- DTCs are set in the body control module (BCM)

The immobilizer system is a function of the BCM software. If immobilizer DTCs are set in the BCM, such as DTC B2955, a fault has been identified in the immobilizer system. If this is not corrected before attempting to program components, the programming may not complete. Correct all immobilizer DTCs before attempting to program any immobilizer components.

- The key has been programmed to another vehicle or is not the correct type for the vehicle

A key can only be programmed to a single vehicle. Once a key is programmed to a vehicle, it is paired for the life of the key. The key can be learned to the same vehicle again and again, but it cannot be programmed to a different vehicle.

Many vehicles are available with both a base keyless entry system and an optional passive entry system. These keys typically look identical but cannot be substituted for one another. To verify the key is correct, compare the part number that is etched on the key to the part number identified in the parts catalog. The key should be correct for the system installed in the vehicle.

- The theft deterrent module is not properly secured or the key is not properly positioned in the pocket/slot.

A theft deterrent module that is not fully seated or is otherwise not properly secured may prevent a coupling between the transponder located in the key and the theft deterrent module. Being out of place by as little as 1 mm may prevent programming from completing. Make sure the theft deterrent module is properly installed and fully seated in its clip.

The key should be positioned in the proper orientation so that it lays flat in the pocket. If a large key ring or other item attached to the key prevents the key from laying flat, remove the key ring.

To determine if the theft deterrent module is properly secured, remove the battery from the key and place the key into the pocket/slot. Attempt to change the vehicle mode by pressing the vehicle ON/OFF switch. The vehicle should change modes. If the NO REMOTE DETECTED message is displayed on the DIC, the theft deterrent module may not be properly secured.

- External interference is interrupting the programming operation

External RF interference and EMI may interrupt the low frequency coupling between the key and theft deterrent module. This interference may come from many different locations. Devices plugged into the vehicle power outlets such as cell phone chargers, laptop computers, GPS devices, etc. may cause interference. Vehicle location may also cause interference. Locations near airports and military installations may cause interference. Remove all customer installed devices and, if necessary, move the vehicle if interference is suspected.

KEY WITH INTEGRATED TRANSMITTER PROGRAMMING

Keys can be programmed in various ways using the procedures outlined below. Using the Replacing Keys procedure will first erase all the known keys from the vehicle. Any existing keys and any new keys will then be programmed. This procedure should be used any time a key is required to be unlearned or erased from a vehicle. If a new key is being learned to a vehicle to replace a damaged, inoperative, missing, or stolen key, the Replacing Keys procedure must be used. This ensures that the old key cannot be used to access or start the vehicle after programming.

The Adding Keys procedure does not erase any keys prior to programming. The procedure will simply program the key into the next available slot. The Adding Keys procedure should only be used when adding an additional key to the vehicle. The Adding Keys procedure should never be used to program a key to a vehicle that is having a key replaced, regardless of the cause for the replacement.

Replacing Keys (Without SPS)

NOTE:

- This procedure will unlearn all previously learned keys. All keys that are to be programmed must be with the vehicle.
- A total of eight keys may be learned to a single vehicle.
- This procedure will only learn the vehicle key information. This procedure will not learn any immobilizer information between the body control module (BCM) and engine control module (ECM).
- This procedure may be used with or without existing learned keys being present. If existing keys are present, keep the keys away from the vicinity of the vehicle. Failure to keep learned keys away from the vehicle will result in the learn changing to the Adding Keys procedure.
- The keys to be learned must duplicate the mechanical cut of the current key.

1. Insert the mechanical key of the new key into the key lock cylinder located on the outside of the driver door and turn the key to the unlock position five times within ten seconds. The Driver Information Center (DIC) will display Remote Learn Pending, Please Wait.
2. After ten minutes, the DIC will display Press Engine Start Button To Learn. Press the ignition mode switch. The DIC will again display Remote Learn Pending, Please Wait.
3. Repeat Step 2 two additional times, for a total of thirty minutes. All previously known keys have now been unlearned. Remaining keys can be learned during the next steps. The DIC display will now display Ready For Remote # 1.

NOTE: The key slot is located inside the front center console storage area under the liner.

4. Place the new key into the key pocket.

NOTE: If the programming does not complete or hangs during the programming operation, refer to Unable to Complete Programming below.

5. Press the ignition mode switch. When the key is learned the DIC will indicate that it is ready to program the next key.

6. Remove the key from the key pocket and press the unlock button. To program additional keys, repeat Steps 4 through 6.
7. When all additional keys are programmed, press and hold the ignition mode switch for 5 seconds to exit programming mode.

Replacing Keys (With SPS)

NOTE:

- This procedure will unlearn all previously learned keys. All keys that are to be programmed must be with the vehicle.
- This procedure may be used with or without existing learned keys being present. If no existing keys are available, this procedure must be used.
- A total of eight keys may be learned to a single vehicle.
- This procedure will only learn the vehicle key information. This procedure will not learn any immobilizer information between the body control module (BCM) and engine control module (ECM).
- If the battery voltage is low, charge the battery before continuing with the procedure.

1. Connect a scan tool to the vehicle and access SPS.
2. Ensure that all power consuming devices are turned OFF on the vehicle.
3. Select the SPS application and follow the on-screen instructions.
4. Select Reprogram ECU.
5. Select IMMO Immobilizer Learn - Setup.
6. Select the Program Transponder or Remote Key (Delete) function.

NOTE:

- At multiple times during the learn procedure, SPS will instruct you to turn the ignition to the run position. Make sure the vehicle is actually in the run mode before continuing on the SPS terminal. If the ignition is not in the run mode, the learn procedure will fail.
- The key slot is located inside the front center console storage area under the liner.

7. Follow the on-screen instructions.

NOTE:

If the programming does not complete or hangs during the programming operation, refer to Unable to Complete Programming below.

8. After programming all keys, Programming Complete, is displayed.
9. Press and hold the ignition mode switch for 15 seconds.
10. Press the lock and unlock button on each key that was programmed. This will awaken each key and allow passive and active keyless entry functions to be established.
11. With a scan tool, clear any DTCs.
12. Verify each key is operating properly. Operate each of the keyless entry functions using the buttons on the key and then start the vehicle. When verifying operation, make sure that no other keys are near the vehicle.

Adding Keys (Without SPS)

NOTE:

- To initiate, this procedure requires that 2 learned keys be available. If attempted with only 1 key, the procedure will fail and all keys will be lost requiring reprogramming using the Replacing Keys procedure.

- **A total of eight keys maybe be learned 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.**

1. Place both recognized keys in the vehicle cupholder.
2. Insert the mechanical key of the new key into the key lock cylinder located on the outside of the driver door and turn the key to the unlock position five times within ten seconds. The Driver Information Center (DIC) will display Ready For Remote #2, 3, 4 or 5.

NOTE: **The key slot is located inside the front center console storage area under the liner.**

3. Place the new key into the key pocket.
4. Press the ignition mode switch. When the key is learned the DIC will indicate that it is ready to program the next key.

NOTE: **If the programming does not complete or hangs during the programming operation, refer to Unable to Complete Programming below.**

5. Remove the key from the key pocket and press the unlock button. To program additional keys, repeat Steps 3 through 5.
6. When all additional keys are programmed, press and hold the ignition mode switch for 5 seconds to exit programming mode.

Adding Keys (With SPS)

NOTE:

- **This procedure may be used with or without existing learned keys being present. If no existing keys are available, this procedure must be used.**
- **A total of eight keys maybe be learned to a single vehicle.**
- **This procedure will only learn the vehicle key information.**
- **If the battery voltage is low, charge the battery before continuing with the procedure.**

1. Connect a scan tool to the vehicle and access SPS.
2. Ensure that all power consuming devices are turned OFF on the vehicle.
3. Select the SPS application and follow the on-screen instructions.
4. Select Reprogram ECU.
5. Select IMMO Immobilizer Learn - Setup.
6. Select the Program Transponder or Remote Key (Add) function.

NOTE:

- **At multiple times during the learn procedure, SPS will instruct you to turn the ignition to the run position. Make sure the vehicle is actually in the run mode before continuing on the SPS terminal. If the ignition is not in the run mode, the learn procedure will fail.**
- **The key slot is located inside the front center console storage area under the liner.**

7. Follow the on-screen instructions.

NOTE: If the programming does not complete or hangs during the programming operation, refer to Unable to Complete Programming below.

8. After programming all keys, Programming Complete, is displayed.
9. Press and hold the ignition mode switch for 15 seconds.
10. Press the lock and unlock button on each key that was programmed. This will awaken each key and allow passive and active keyless entry functions to be established.
11. With a scan tool, clear any DTCs.
12. Verify each key is operating properly. Operate each of the keyless entry functions using the buttons on the key and then start the vehicle. When verifying operation, make sure that no other keys are near the vehicle.

Unable to Complete Programming

When attempting to program immobilizer components, various conditions may prevent the programming operation from completing. These conditions may be caused by normal system operation, a system malfunction, or an external influence. Common symptoms of a incomplete programming is receiving an error message during the attempt or having the SPS application become unresponsive.

- DTCs are set in the body control module (BCM)

The immobilizer system is a function of the BCM software. If immobilizer DTCs are set in the BCM, such as DTC B2955, a fault has been identified in the immobilizer system. If this is not corrected before attempting to program components, the programming may not complete. Correct all immobilizer DTCs before attempting to program any immobilizer components.

- The key has been programmed to another vehicle or is not the correct type for the vehicle

A key can only be programmed to a single vehicle. Once a key is programming to a vehicle, it is paired for the life of the key. The key can be learned to the same vehicle again and again, but it is not able to be programmed to a different vehicle.

Many vehicle are available with both a base keyless entry system and an optional passive entry system. These keys typically look identical but cannot be substituted for one another. To verify the key is correct, compare the part number that is etched on the key to the part number identified in the parts catalog. The key should be correct for the system installed in the vehicle.

- The theft deterrent module is not properly secured or the key is not properly positioned in the pocket/slot.

A theft deterrent module that is not fully seated or is otherwise not properly secured may prevent a coupling between the transponder located in the key and the theft deterrent module. Being out of place by as little as 1 mm may prevent programming from completing. Make sure the theft deterrent module is properly installed and fully seated in it's clip.

The key should be positioned in the proper orientation so that it is inserted vertically in the pocket. If a large key ring or other item attached to the key prevents the key from being properly placed, remove the key ring.

To determine if the theft deterrent module is properly secured, remove the battery from the key and place the key into the pocket/slot. Attempt to change the vehicle mode by pressing the vehicle ON/OFF switch. The vehicle should change modes. If the NO REMOTE DETECTED message is displayed on the DIC, the theft deterrent module may not be properly secured.

- External interference is interrupting the programming operation

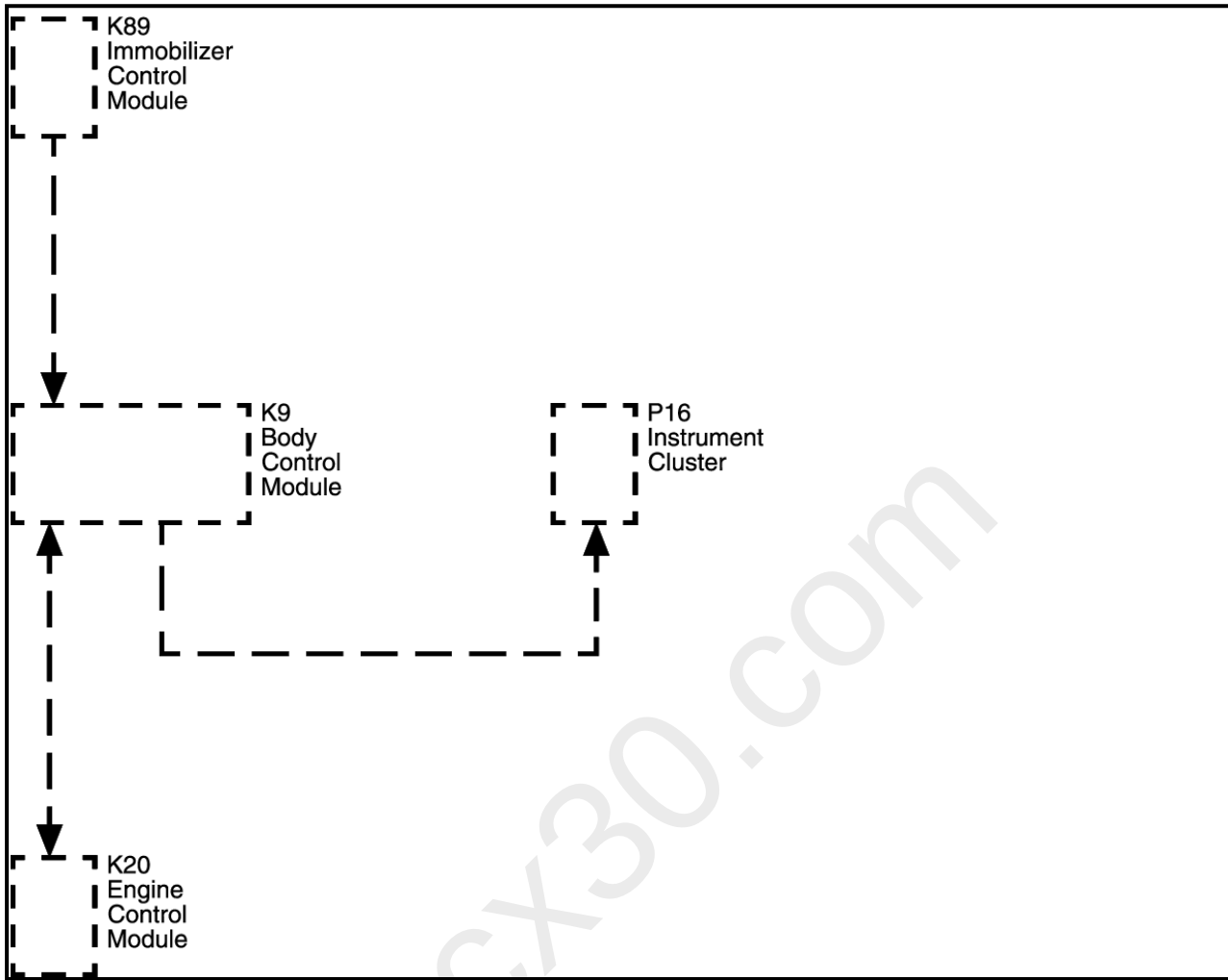
External RF interference and EMI may interrupt the low frequency coupling between the key and theft deterrent module. This interference may come from many different locations. Devices plugged into the vehicle power outlets such as cell phone chargers, laptop computers, GPS devices, etc. may cause interference. Vehicle location may also cause interference. Locations near

airports and military installations may cause interference. Remove all customer installed devices and, if necessary, move the vehicle if interference is suspected.

DESCRIPTION AND OPERATION

IMMOBILIZER DESCRIPTION AND OPERATION

Without BTM



The immobilizer system functions are provided by the Immobilizer Control Module, the Body Control Module (BCM) and the Engine Control Module (ECM), as well as any modules which store and report the environment identifier.

When an ignition key is inserted into the ignition lock cylinder and the ignition is turned ON, the transponder in the key is energized by the immobilizer coil surrounding the ignition lock cylinder. This immobilizer coil is part of the Immobilizer Control Module. The transponder transmits a signal that contains its unique value, which is received by the BCM through the Immobilizer Control Module. The BCM then compares this value to a value stored in memory. The BCM also monitors various control modules to determine if the stored environment identifiers match.

If both the environment identifier and the value received from the transponder match, the BCM will send the prerelease password via serial data to the ECM. If the encrypted code's unique value is incorrect or the environment identifier does not match, the BCM will send the fuel disable message to the ECM.

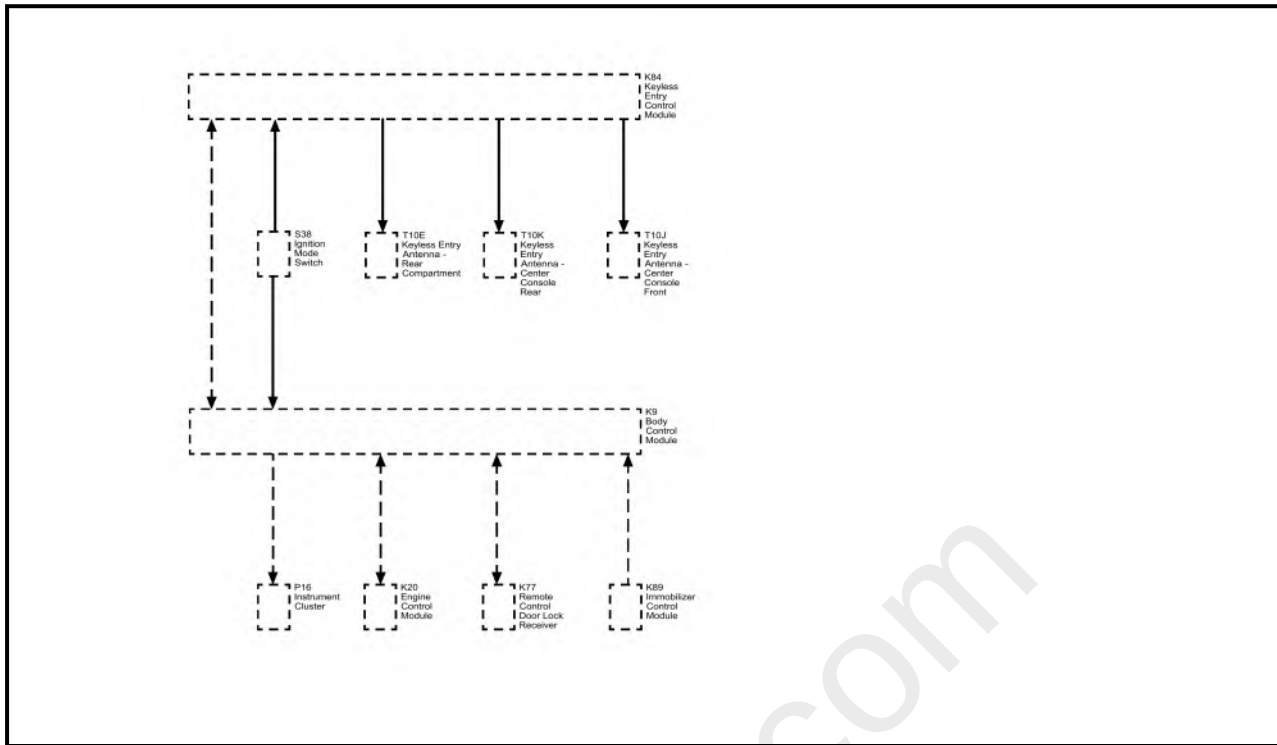
When the ECM receives the BCM prerelease password, the ECM will challenge the password. The ECM sends this challenge to the BCM via serial data. Both the ECM and BCM perform a calculation on this challenge. If the BCM calculated response to the challenge equals the calculation performed by the ECM, the ECM will allow vehicle starting.

The components of the immobilizer system are as follows:

- BCM
- ECM

- Immobilizer Control Module
- Ignition key
- Security indicator
- Various control modules which store and report the environment identifier

With BTM



The immobilizer system functions are provided by the Keyless Entry Control Module, the Remote Control Door Lock Receiver, the Immobilizer Control Module, the Body Control Module (BCM) and the Engine Control Module (ECM), as well as any control modules which store and report the environment identifier. The Keyless Entry Control Module uses low frequency antennas in three different locations on the vehicle to determine the location of the transmitter. Multiple antenna are used to ensure complete coverage of the vehicle interior and rear compartment.

When the vehicle ON/OFF switch is pressed, the low frequency antennas emit a challenge to the keyless entry transmitter. The transmitter receives this challenge and emits it's response as an RF message. The transmitter transmits a signal that contains its unique value, which is received by the BCM through the Remote Control Door Lock Receiver. The BCM then compares this value to a value stored in memory. The BCM also monitors various control modules to determine if the stored environment identifiers match.

If both the environment identifier and the value received from the transponder match, the BCM will send the prerelease password via serial data to the ECM. If the encrypted code's unique value is incorrect or the environment identifier does not match, the BCM will send the fuel disable message to the ECM.

When the ECM receives the BCM prerelease password, the ECM will challenge the password. The ECM sends this challenge to the BCM via serial data. Both the ECM and BCM perform a calculation on this challenge. If the BCM calculated response to the challenge equals the calculation performed by the ECM, the ECM will allow vehicle starting.

If RF communication is interrupted, a "No Remote Detected" message will be displayed on the DIC. In these cases, the transmitter can be placed in the transmitter slot/slot. The Immobilizer Control Module is located in the immediate vicinity of the transmitter pocket/slot. Placing the transmitter in the pocket/slot will create a low powered coupling between the transmitter and Immobilizer Control Module, allowing communications to occur and enabling vehicle starting.

The components of the immobilizer system are as follows:

- BCM
- ECM

- Remote Control Door Lock Receiver
- Immobilizer Control Module
- Low frequency antenna
- Ignition key/Keyless entry transmitter
- Security indicator
- Various control modules which store and report the environment identifier

Body Control Module (BCM)

The immobilizer system is an integral part of the BCM and is controlled internally within the BCM. The BCM can learn up to 8 keys (transponder values).

The BCM uses the following inputs:

- Environment identifier exchange with various modules
- Encrypted code from the vehicle key, received by the Immobilizer Control Module
- Encrypted code from the vehicle key, received by the Remote Control Door Lock Receiver (with BTM)

The BCM uses the following outputs:

- Prerelease password communication with ECM
- Challenge/response with ECM

When a transponder value is received by the BCM, the BCM will compare this value to the learned key code stored in memory. The BCM then performs one of the following functions:

- If the encrypted code value matches the values stored in the BCM memory, the BCM will send the prerelease password to the ECM via serial data.
- If the encrypted code unique value does not match the value stored in the BCM, the BCM will send the start disable message to the ECM via serial data.
- If the BCM is unable to measure the ignition key encrypted code value, the BCM will not send any messages to the ECM.

Engine Control Module (ECM)

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

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

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

Immobilizer Control Module

The Immobilizer Control Module contains an immobilizer coil which surrounds the ignition cylinder (without BTM) or is located near the transmitter pocket/slot (with BTM). The coil passively powers the transponder located in the ignition key. When powered, the key transmits its unique value to the Immobilizer Control Module, which is then relayed to the BCM via a LIN serial data circuit. The Immobilizer Control Module also receives B+ and ground from the BCM.

The Immobilizer Control Module is used to:

1. Learn keys

2. To start vehicle with or without RF interference

3. To start vehicle when key battery is dead

Keyless Entry Control Module (with BTM)

The Keyless Entry Control Module uses low frequency antennas in three different locations on the vehicle to determine the location of the transmitter. Multiple antenna are used to ensure complete coverage of the vehicle interior and rear compartment. The Keyless Entry Control Module monitors the ignition mode switch. When the ignition mode is changed, the Keyless Entry Control Module will command, or "ping", the low frequency antenna.

Low Frequency Antenna (with BTM)

When commanded, or "pinged", the low frequency antenna broadcast a challenge to the keyless entry transmitter. Because of the low power of the antenna, this challenge is only broadcast in an approximate three meter range of the antenna. Multiple antenna are used to ensure complete coverage of the vehicle interior and rear compartment.

Remote Control Door Lock Receiver (with BTM)

When the keyless entry transmitter is challenged by a low frequency antenna, it responds by emitting a response as an RF message. The transmitter transmits a signal that contains its unique value, which is received by the Remote Control Door Lock Receiver. The Remote Control Door Lock Receiver relays this information to the BCM via a discreet serial data circuit.

Ignition Key or Keyless Entry Transmitter

Each ignition key or keyless entry transmitter contains a transponder with a unique encrypted value. The transponder's encrypted value is fixed and unable to be changed. The immobilizer system uses the ignition key transponder value to determine if a valid ignition key is being used to start the vehicle.

Environment Identifier

Various modules throughout the vehicle learn a specific environment identifier during the module programming process. The environment identifier is learned by each individual module and matches the environment identifier stored in the BCM. Prior to starting after a battery disconnect, each of the modules which store a environment identifier will compare their identifier to that of the identifier stored in the BCM. If all the identifiers match, the engine starting process will continue. If the environment identifiers do not match, engine starting will be disabled.

Security Indicator

The BCM will command the Instrument Cluster to illuminate the security indicator when the ignition key is in the ON position to indicate a fault has occurred within the immobilizer system and when the engine starting is disabled.

REMOTE VEHICLE SPEED LIMITING DESCRIPTION AND OPERATION

Certain vehicles equipped with OnStar[®] now have an additional feature that allows for remote limiting of the vehicle's speed. This OnStar[®] feature is called Stolen Vehicle Slow-Down and is now part of the OnStar[®] Stolen Vehicle Assistance service. This feature, when used in conjunction with local law enforcement and strict guidelines at the OnStar[®] Call Center, will slow the vehicle by interacting with the engine control system.

When the engine control system receives a valid request from the OnStar[®] telematics communications interface module, it will enter into a reduced engine power/vehicle speed limiting mode, which will decelerate the vehicle. Once the request is active the engine control module begins reducing engine torque to match requested vehicle speed and a REDUCED ENGINE POWER indication is displayed. No DTCs will be set during this process.

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