

Theft Deterrent

cardiagn.com

Description and Operation

cardiagn.com

1. SAFETY AND SECURITY
2. THEFT DETERRENT
3. DESCRIPTION AND OPERATION
- 4.

## Theft Systems Description and Operation

### Immobilizer System

The purpose of the Immobilizer system is to provide additional theft deterrence to the vehicle in which it is installed and to prevent it from being stolen or driven by unauthorized users.

The verification of the user authorization is done by an ignition key with integrated transponder.

The external LED displays the Immobilizer status and has an additional theft deterrence function. To secure the communication, the status is exchanged between the Immobilizer and the ECM in a 5 byte of encoded data.

These 5 bytes are composed by a mixture of random data and two types of fixed codes are:

- A vehicle model identification number : MIN
- A vehicle specific identification : VIN

The MIN is known from the first supply of the system.

The VIN is realized by ICU on the special order from the key coding (reading of transponder code and storing it as valid key code in Immobilizer EEPROM).

A different random data is computed at each key transition.

All the immobilization communication between the ECM and ICU is made on K line (K line : Serial data line V7).

Due to the learning of the Vehicle specific identification Number, both ICU and ECM can stay in 3 stable modes

- Virgin mode (VIN not learnt)
- Learnt mode (VIN learnt)
- Neutral mode (for a new VIN learning)

In case of using valid key, the release message communication with the ECM take place and the LED displays the Immobilizer status valid key In case of using invalid key, the ECM disables the fuel injector circuit with coded intervention and sets Diagnostic Trouble Code (DTC).

The above conditions are maintained until the ignition is switched off.

An ECM without an immobilizer control unit cannot be interchanged for an ECM that is used with an immobilizer control unit system. The immobilizer control unit and ECM must have a matching ID code. ID coding and key coding are accomplished by using Scanner 100.

The immobilizer system consists of the following:

- A maximum of 5 ignition keys with integrated transponder
- The toroidal coil (Detection coil) for energizing and reading the transponder mounted at the ignition lock.
- The immobilizer control unit (ICU) with :
  - 
  - Power supply
  - Ignition input circuit
  - Transponder modulation and demodulation unit
  - EEPROM
  - Driver electronic for the external status led
  - Serial data link hardware
- The external status led for displaying the immobilizer status.

- The serial data link between immobilizer and ECM.

## Electronically Coded Keys

Each valid ignition key has an internal transponder which is a read/write transponder.

The transponder contains an implementation of a crypto algorithm with 96 bits of user configurable secret key contained in EEPROM and transmits data to the ICU by modulating the amplitude of the electromagnetic field, and receives data and commands in a similar way.

## Immobilizer Control Unit

The function of the immobilizer system is shared between the ICU and the ECM.

The task of the immobilizer electronic control unit (ICU) are:

- Reading of the input information 'ignition ON/OFF'
- Controlling the status LED
- Controlling the transponder read/write process (modulation, demodulation, decoding, comparison of the read code with the code of the valid keys).
- Communication with the ECM after ignition ON (receiving of the ECM request and transmission of release message).
- Special functions for calculation and handling of the VIN code.

The VIN code is calculated by the Immobilizer using a random generator.

The VIN code is transmitted from the Immobilizer in the release message communication only in case of using an authorized key. Without an authorized key it is not possible to get the system VIN code. In case of ECM internal state is in Virgin mode or neutral mode the ECM learns the system VIN code automatically after receiving the first release response message.

To get a synchronized Immobilizer system (same VIN code in Immobilizer and ECM, authorized key) the DLC test equipment has to be used for authorization of the keys (first key coding). The usage of this test equipment is restricted to authorized persons.

- Communication with the DLC test equipment. Main functions are the key coding procedure, the VIN code handling and the support for system test functions.
- Handling of the software watchdog

## Operation

In the active mode of immobilizer (engine OFF, IG key OFF) the status LED is not blinking as mode A. When ignition is turned ON, the system wakes up and tries to read out the transponder.

In case of the detection of a valid key, the release message communication with the ECM takes place. The status LED displays the Immobilizer state 'valid key'.

After turning off the ignition (ignition OFF detection similar to the ECM ignition OFF detection), the Immobilizer changes to the active mode. The status LED is blinking as Mode A.

## Data Link Connector (DLC) Mode

When the ignition is on, a scan tool can switch the immobilizer control unit to the DLC mode for diagnostics, key coding and ID coding.

- The status LED is turned off during DLC mode
- The Immobilizer will answer all correct messages, which are defined as Immobilizer messages.

## ID Code Handling

One of 65,535 VIN codes is stored in the immobilizer EEPROM. The VIN code can be erased by using 'Reset VIN code' command of the scan tool.

When the immobilizer control unit calculates a new VIN code, ECM VIN code should be reset to get identical with the immobilizer control unit's.

During diagnostic procedures, the VIN code can be read for comparison with the ECM VIN code by using the scan tool's 'Read immobilizer control unit VIN code' command.

## Serial Data Link

Serial data can be exchanged between a scan tool and the ECM and the Immobilizer control unit. The scan tool connection is the data link connector (DLC).

## Electronic Control Module (ECM)

- ECM in Virgin mode
- In this mode, the ECM knows only the model vehicle identifier code.
- The engine can be locked/unlocked.
- ECM requests to ICU the VIN number. As soon as the ECM receives two correct consecutive communication frames with the same VIN code the ECM learns it.
- The VIN code will be stored in non-volatile memory at the end of power latch phase. ECM enters in Learnt mode.
- ECM in Learnt mode
- In such a state, ECM checks on every communication, the correct encoding of the ICU.
- If the code received is not correct, then the vehicle is immobilized.
- The coded 5 bytes of data emitted by ECM are a mixture of MIN code and random.
- The coded 5 bytes of data emitted by ICU are a mixture of VIN code and random.
- ECM in Neutral mode
- This mode is a special intermediate mode, used for ICU replacement or immobilizer option installation.
- ECM request to ICU the VIN number. As soon as the ECM receives two correct consecutive communication frames with the same VIN code the ECM learns it.
- The VIN code will be stored in non-volatile memory at the end of power latch phase. ECM enters in Learnt mode.
- After turning on the ignition the ECM will control the engine in a normal way for starting and running while waiting for a valid release response message from the immobilizer.
- After receiving a response message including the information 'ICU in learnt mode' and the correct system VIN code.
- The ECM enters the release state, which allows to continue the running of the engine.
- After receiving a response message including the information 'ICU in learnt mode' and a wrong system VIN code.
- The ECM does not send a new request and enters the blocked state, which causes the activation of the immobilization actions of the engine.
- If the ECM does not receive a response message within a defined time from beginning of the release time period or the ECM receives a no release answer.
- The ECM enters the blocked state, which causes the activation of the immobilization actions of the engine.
- The inactive state of the Immobilizer (valid key/invalid key) ends with turning off the ignition.

## Security Indicator

There is a security indicator on the meter cluster.

Status LED

An external LED displays the immobilizer system status. The immobilizer contains the LED driver hardware for direct connection of one LED.

| Status LED | Immobilizer System Status | Note                                                                                         |
|------------|---------------------------|----------------------------------------------------------------------------------------------|
| Blink      | Active                    | Ignition OFF                                                                                 |
| Blink      | Active                    | <ul style="list-style-type: none"><li>• Invalid key detected</li><li>• Ignition ON</li></ul> |

| Status LED | Immobilizer System Status | Note                                                                                                                                 |
|------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| OFF        | Inactive                  | <ul style="list-style-type: none"> <li>• Invalid key detected</li> <li>• Ignition ON</li> </ul>                                      |
| Blink      | Active                    | <ul style="list-style-type: none"> <li>• VIN Code is different between ICU and ECM is learnt state</li> <li>• Ignition On</li> </ul> |
| ON         | Active                    | <ul style="list-style-type: none"> <li>• Transponder reading error</li> <li>• Ignition On</li> </ul>                                 |
| OFF        | Active                    | <ul style="list-style-type: none"> <li>• Reader exciter ASIC error</li> <li>• Ignition On</li> </ul>                                 |

cardiagn.com

Diagnostic Information and Procedures

cardiagn.com

1. SAFETY AND SECURITY
2. THEFT DETERRENT
3. DIAGNOSTIC INFORMATION AND PROCEDURES
- 4.

## **Symptoms - Theft Deterrent**

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 there are no DTCs set.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to [Theft Systems Description and Operation](#).

## **Visual/Physical Inspection**

- Inspect for aftermarket devices which could affect the operation of the Theft Deterrent System. Refer to [Checking Aftermarket Accessories](#).
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect that the transmitter is the correct model for the vehicle. An incorrect model will not operate the Theft Deterrent System.

## **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 the following list in order to diagnose the symptom:

- [Content Theft Deterrent Malfunction](#)
- [Alarm Siren Inoperative](#)
- [Security Indicator Malfunction](#)

1. SAFETY AND SECURITY
2. THEFT DETERRENT
3. DIAGNOSTIC INFORMATION AND PROCEDURES
- 4.

## **Content Theft Deterrent Malfunction**

### **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.

### **Circuit/System Description**

The content theft deterrent (CTD) system operates separately from the immobilizer system. The armed system activates by sounding the horn and intermittently cycling the lights in unison with the opening of the hood, rear compartment lid or any door. The remote control door lock receiver (RCDLR) senses the door opening through the door contact switch. The RCDLR senses the hood opening through the hood contact switch. This alarm can be armed with the windows either open or closed since the system activation is dependent on the door, hood, or rear compartment lid opening. The alarm disarms only when a door opens with the key or with the transmitter.

### **Reference Information**

Schematic Reference

[Theft Deterrent System Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Theft Systems Description and Operation](#)

Electrical Information Reference

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

Scan Tool Reference

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

### **Circuit/System Verification**

1. Ignition ON, individually open and close each vehicle door and liftgate while observing the door ajar indicator. The indicator should accurately transition between the door ajar and door closed state when each door is opened and closed.
2.
  - If the door ajar indicator/message does not properly transition when each door is opened and closed, refer to [Door Ajar Indicator Malfunction](#).
3. Ignition OFF, arm the CTD system using the keyless entry system by pressing the transmitter LOCK button twice. The CTD system should arm.
4.
  - if the alarm does not arm, refer to [Keyless Entry System Malfunction](#).
5. Completely lower the driver door window and close all vehicle doors.

6. Ignition OFF, arm the CTD system using the keyless entry system by pressing the transmitter LOCK button twice.
7. Without disarming the system, reach in through the open driver window, unlock and open the driver door. Verify the alarm activates
8.
  - If the alarm does not activate, replace the theft deterrent module.
9. Arm the CTD system using the keyless entry system by pressing the transmitter LOCK button twice.
10. With the door open, verify the vehicle alarm is sounding and the exterior lamps are flashing.
11.
  - If the alarm is not sounding, refer to [Alarm Siren Inoperative](#).
  - If the exterior lights are not flashing, refer to [Turn Signal Lamps and/or Indicators Inoperative](#).

## Repair Instructions

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

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

cardiagn.com

1. SAFETY AND SECURITY
2. THEFT DETERRENT
3. DIAGNOSTIC INFORMATION AND PROCEDURES
- 4.

## **Alarm Siren Inoperative**

### **Diagnostic Instructions**

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

### **Circuit/System Description**

When the content theft deterrent system is activated the theft deterrent module (TDM) supplies a ground signal to the theft deterrent alarm. Battery voltage is supplied from the HORN fuse.

### **Reference Information**

Schematic Reference

[Theft Deterrent System Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Theft Systems Description and Operation](#)

Electrical Information Reference

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

### **Circuit/System Verification**

1. Ignition OFF, disconnect the harness connector at the theft deterrent alarm.
2. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal and ground.
3.
  - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
4. Ignition OFF, connect the harness connector at the theft deterrent alarm. Disconnect the harness connector at the theft deterrent module.
5. Ignition ON, install a 3A fused jumper wire between the control circuit terminal and ground. Verify the alarm is sounding.
6.
  - If the alarm is not sounding, test the control circuit for an open/high resistance. If the circuit tests normal, replace the theft deterrent alarm.
7. If all circuits test normal replace the theft deterrent module.

### **Repair Instructions**

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

- [Control Module References](#) for TDM replacement, setup, and programming
- [Theft Deterrent Alarm Replacement](#)

cardiagn.com

1. SAFETY AND SECURITY
2. THEFT DETERRENT
3. DIAGNOSTIC INFORMATION AND PROCEDURES
- 4.

## **Security Indicator Malfunction**

### **Diagnostic Instructions**

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

### **Circuit/System Description**

The security indicator acts as a status indicator for the content theft deterrent (CTD) system when the ignition is OFF and as a fault indicator for the immobilizer system when the ignition is ON. When the theft deterrent module (TDM) requires the security indicator to be illuminated.

### **Reference Information**

Schematic Reference

[Theft Deterrent System Schematics](#)

Connector End View Reference

[Master Electrical Component List](#)

Description and Operation

[Theft Systems Description and Operation](#)

Electrical Information Reference

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

### **Circuit/System Verification**

1. Ignition OFF, disconnect the harness connector at the instrument panel cluster (IPC).
2. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal and ground.
3.
  - If the test lamp does not illuminate, test the ignition circuit for a short to ground or an open/high resistance.
4. Ignition OFF, connect the harness connector at the IPC. Disconnect the harness connector at the theft deterrent module.
5. Ignition ON, install a 3A fused jumper wire between the control circuit terminal and ground. Verify the security indicator is illuminated.
6.
  - If the indicator is not illuminated, test the control circuit for an open/high resistance. If the circuit tests normal, replace the IPC.
7. If all circuits test normal replace the theft deterrent module.

### **Repair Instructions**

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

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

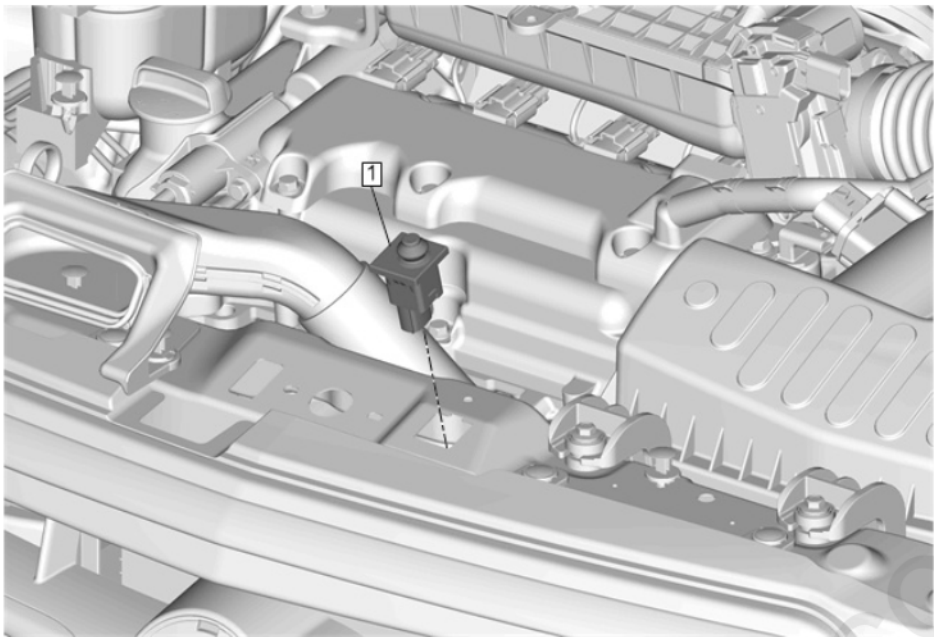
cardiagn.com

Repair Instructions

cardiagn.com

- 1. SAFETY AND SECURITY
- 2. THEFT DETERRENT
- 3. REPAIR INSTRUCTIONS
- 4.

Theft Deterrent Hood Switch Replacement



[Click here for full size](#)

| Callout                    | Component Name                                                                                                           |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Preliminary Procedure      |                                                                                                                          |
| Open and support the hood. |                                                                                                                          |
| 1                          | Theft Deterrent Hood Switch                                                                                              |
|                            | Procedure                                                                                                                |
|                            | 1. Disconnect the electrical connector.<br>2. Remove the theft deterrent hood switch from front end upper tie bar panel. |

Related Part Information

| Part Name                                                 | Catalog Name | Part Code |
|-----------------------------------------------------------|--------------|-----------|
| Theft Deterrent Hood Switch SWITCH,THEFT DTRNT HOOD 3480A |              |           |

**1. SAFETY AND SECURITY**

**2. THEFT DETERRENT**

**3. REPAIR INSTRUCTIONS**

4.

## **Programming Theft Deterrent System Components**

- Important:

The immobilizer cartridge software is included with the Tech2. Tech2 users will not be required to use immobilizer data cartridge during this step. Reprogram the identification (ID) code in the following situations:

- An immobilizer control unit has been replaced.
- An electronic control module (ECM) has been replaced.

## **Reprogramming Procedure**

1. Turn the ignition OFF. Reprogramming is not allowed while the engine is running.
2. Insert the immobilizer control unit cartridge into the scan tool.
3. Do not start the vehicle, but turn the ignition ON.
4. Enter the 4-digit password that enables service personnel to use the scan tool for ID code reprogramming.
5. Use the scan tool to command RESET ID CODE.
6. Turn the ignition OFF and ON again, but do not crank or start the engine. The ECM will reset the ECM ID code to match the new ID code that was calculated and sent by the immobilizer control unit when the ignition was first turned ON after the reset command.
7. Return the system to the normal mode.
8. Turn OFF the ignition.
9. Turn ON the ignition.
10. Start the engine.

After reprogramming the ID code, the scan tool SYSTEM DIAGNOSIS command can verify that the ECM ID code matches the immobilizer control unit ID code.

If the reprogramming procedure does not result in matching ID codes, check the electrical connectors for the serial data wire between the immobilizer control unit and the ECM.

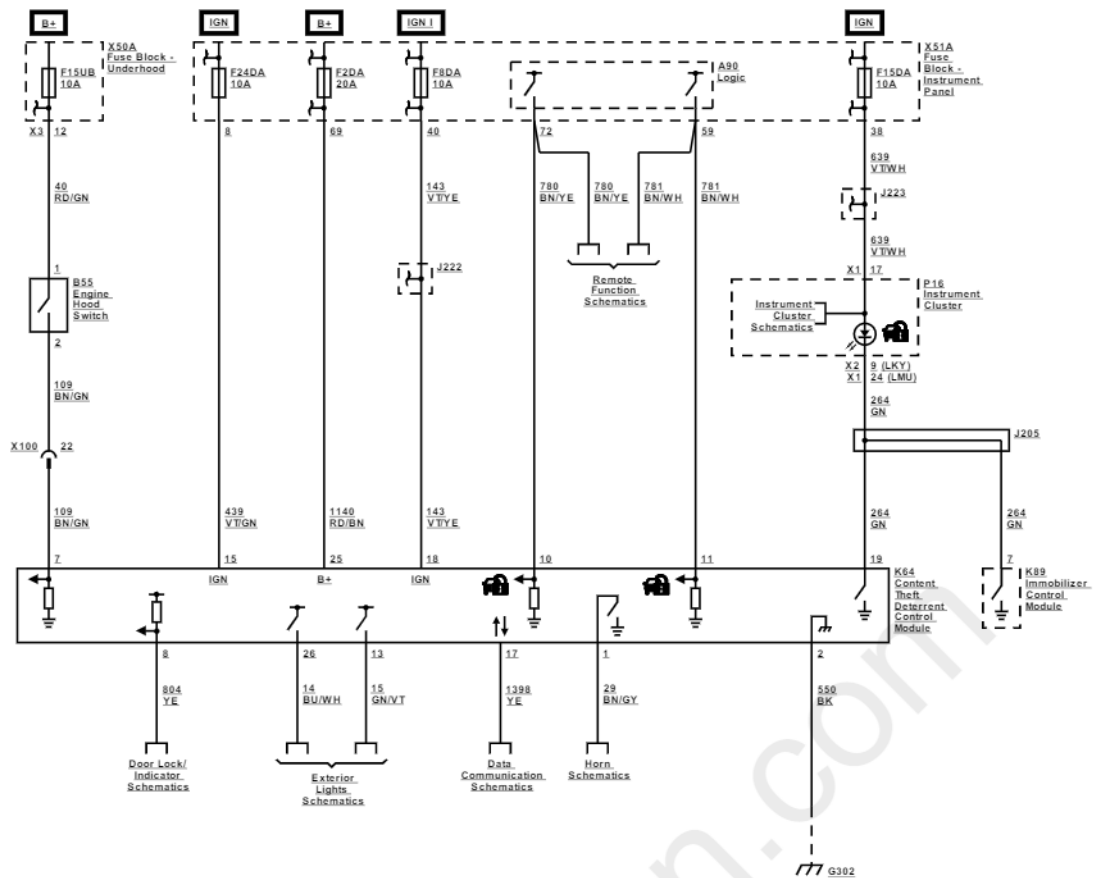
Schematic and Routing Diagrams

cardiagn.com

Theft Deterrent System Schematics

cardiagn.com

[Click here for full size](#)



SEATS

cardiagn.com