

Immobilizer Description and Operation

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

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

The components of the theft system are as follows:

- TDM
- ECM
- Ignition key (Transponder)
- Security indicator

Theft Deterrent Module (TDM)

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

The TDM uses the following inputs:

- Battery voltage
- Ignition switched voltage
- Ground circuit

The theft deterrent control module uses the following outputs:

- Password exchange
- Challenge/response with the engine control module (ECM)

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

- If the transponder value matches the values stored in the TDM memory, the TDM will send

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the prerelease password to the ECM via the serial data circuit.

- If the transponders unique value does not match the value stored in the TDM, the TDM will send the fuel disable message to the ECM via the serial data circuit.
- If the TDM is unable to measure the ignition key transponder value, the TDM will not send any messages to the ECM.

Engine Control Module (ECM)

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

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

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

The Ignition Key (Transponder)

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

Master Keys

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

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

Valet Keys

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

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

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

Fleet Keys

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

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

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

Security Indicator

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