

**USER MANUAL
& OPERATIONAL DESCRIPTION
of IM900 Immobilizer**

S&T DAEWOO CO., LTD.

Title : User manual of IM900 Immobilizer	Spec. No. : N/A
Written by : SUNG HUN AHN	Rev. No. : Revision A
Date :2007.11.07	Page : 1 / 10

Revision	Description	DATE	Written By	Checked By
Revision A	Preliminary Release	07.11.07	S.H. AHN	

Compliance Statement
<p>THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES</p> <p>Operating is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept ant interference received, including interference that may cause undesired operation.</p> <p>CAUTION: Changes or modifications not expressly approved by the part responsible for compliance could void the user' s authority to operate the equipment.</p>

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1 Introduction

This document is user manual & description of function of immobilizer with crypto transponder based on the GM GMLAN Global Architecture immobilizer system consist of Pass Key III Plus. IM900 (hereinafter Immobilizer or ICU) is designed to meet the GM global architecture requirements.

The purpose of the DPI Immobilizer System is to provide additional theft deterrence to the vehicle in which it is installed and to prevent it from being driven by unauthorized users. The verification of the user authorization is done by using an Accessory key with integrated transponder.

2 System Description

The Immobilizer system consist of

- a maximum of 10 Accessory keys is learned with integrated transponder,
- the Coil Antenna for energizing and reading the transponder mounted at the Accessory lock,
- the Immobilizer control unit(ICU) with :
 - the external LED provided by instrument cluster or clock module status message for displaying the Immobilizer status,
- the serial data link between Immobilizer, Gateway and ECM and

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3 System Function

3.1 Immobilizing Function

- **Immobilizer at Accessory ON :**

Turning on the Accessory triggers the Immobilizer to read out the transponder data and to compare the red code with the valid key codes stored in the Immobilizer EEPROM. Until the end of Transponder reading the Immobilizer is active state

- **ECM at Accessory ON ECM :**

After turning on the Accessory the ECM will control the engine in a normal way for starting and running while waiting for a valid response message from the Immobilizer

- **Immobilizer at Accessory OFF:**

The inactive state of the Immobilizer (valid key / invalid key) ends with turning off the Accessory.

- **ECM at Accessory OFF:**

The immobilizing state of the ECM (released/blocked) ends with turning off the Accessory or with removing the battery voltage.

3.2 Functions for Protection against Manipulation

3.2.1 Challenge and Response by SECT Algorithm

The Challenge and Response 4 byte data is calculated by the Immobilizer and ECM using a SECT Algorithm provided by NXP.

The ciphered Challenge is transmitted by ECM through Gateway to Immobilizer in the serial message communication in case of accessory was triggered. If user key is previously learned by learn coded key procedure, immobilizer response with valid 4 byte data to the ECM through the Gateway. But without authorized key is not learned by immobilizer invalid response is existed on the serial communication.

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4. System Components

4.1 Accessory Key with Integrated Transponder

4.1.1 Transponder Mounting

The transponder is placed invisible inside the Accessory key. A second Accessory key with integrated transponder on the bunch doesn't affect the reading process.

4.1.2 Transponder Function

The transponder is a read/write RF transponder. The transponder contains an implementation of a crypto-algorithm with user configurable secret-key contained in EEPROM. It also provides a unique device identification that can never be modified

4.1.3 Transponder Specification

*. Electrical data

- | | |
|-------------------------------|----------------------|
| - Nominal resonance frequency | RF = 125kHz +/- 3kHz |
| - Bit Period | 256us at RF = 125kHz |
| - Bitcoding | Manchester |
| - Modulation | AM |

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4.2 Coil Antenna

4.2.1 Coil Antenna Mounting

The Coil Antenna is mounted at the Accessory lock in front of the key barrel. It is integrated to the ICU housing package with a body of the coil to improve the performance of transponder reading and EMC.

4.2.2 Coil Antenna Function

The Coil Antenna and receiving coil inside the transponder built a transformer. During the reading process the coil induces energy into the transponder. The transponder charges the field and generates an amplitude modulated signal with the Manchester coded data. This charge of the field is demodulated inside the Immobilizer.

4.2.3 Electrical Spec. of Coil Antenna

- Operating temperature	-40℃ to +90℃
- Turns	80
- Inductance (not on Accessory lock)	1073uH +/- 5 u measured at 125 KHz
- DC resistance	11 Ohm +/- 5%
- Cu-wire (diameter)	0.28 mm

4.2.4 Coil Driver

The Immobilizer contains the coil driver hardware for direct connection of the Coil Antenna.

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4.3 Immobilizer Electronic Control Unit (ICU)

4.3.1 Tasks

The function of the Immobilizer System is shared between the ICU, Gateway and ECM.
The tasks of the Immobilizer Electronic Control Unit are executed.

4.3.2 Function

4.3.2.1 Normal Operation

- In the sleep mode of Immobilizer the LED on the IPC or clock is turned OFF.
- When Accessory is turned on, the system wakes up and tries to read out the transponder in the learning enable mode.
- In case of the detection of a valid key, the response message communication with the ECM takes place. The status LED off that means user key is learned and vial key.
- In case of the detection of a invalid key, the ICU will send LED flashing message ‘Tamper Detected’ and will change to Tamper. The status LED displays the Immobilizer state ‘invalid key’.
- After turning off the Accessory (Accessory OFF detection similar to the ECM Accessory OFF detection), the Immobilizer changes to the Learn more standby status incase of 10 key was not coded.

4.3.2.2 ALDL-mode

During Accessory ON the Immobilizer ALDL-mode can be activated with one of the defined Immobilizer ALDL-Function modes.

4.3.2.3 VIN-code Handling

The VIN-code is stored in the Immobilizer EEPROM. At the end of the electronic unit The VIN-code is a 8 byte value 0FFh.

4.3.3 Terminal of ICU

The Immobilizer has one connector. The terminal function is shown in the following table:

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Terminal No	Function	Type
A1	Battery	Input, Battery Power
A2	Accessory	Input, Accessory
A3	GND	Body ground
A4	Serial data link (GMLAN)	Bidirectional data
A5	Serial data link (GMLAN)	Bidirectional data

4.3.4 General Specification

Test item	Contents
Nominal voltage	12V
Test voltage	13.5V +/- 0.1V
Operating voltage	8 - 16 V
Undervoltage protection	Reset if U < 6V
Overvoltage protection	18V+/-0.1V 1hr, 24V 2min
Reverse battery protection	-13V+/-0.1V, 2min
Standby current	< 600 uA (by using mask controller)
Operation current	< 150mA
Storage temperature range	-40℃ to +90℃
Operating temperature range	-40℃ to +90℃
Installation position	Passenger compartment
Resonance capacitance	adjusted to the Coil Antenna
Outputs	All outputs are short circuit protected
LED driver current Ipeak	3.3 mA