Re: Certification for Lear Corporation
Receiver, Model NG WCM
FCC ID: KOBDR06WA
IC: 3521A-DR06WA

DESCRIPTION OF OPERATION

GENERAL DESCRIPTION

The product for which certification is pursued will be manufactured for DaimlerChrysler Motor Company by Lear Corporation for automotive applications. The module is intended to perform three functions: Vehicle immobilization, RKE (Remote Keyless Entry) and TPM (Tire Pressure Monitoring). There is a version that will not have the LF circuit populated and thus will be an RKE only module. The receiver section of the design is identical between the two different versions. The receiver is to be mounted in the vehicle and will work in conjunction with the 315 MHz handheld transmitter and tire sensors. The receiver base-station is part of a keyless entry system that can be used to perform certain functions such as lock and unlock of the driver and passenger doors, open the trunk, etc… depending on how the receiver module is programmed. The receiver is also part of a tire pressure monitoring system that take be used to check the pressure and/or temperature of the vehicle's tires. There are different housings this receiver module will be mounted in and will have a DaimlerChrysler/Lear part number stamped on the back of the housing. The PCB, microprocessor and RF circuitry on all versions are identical.

TECHNICAL DESCRIPTION

When the buttons on the handheld transmitter is depressed, a RF modulated signal is generated that will only be recognized by a matched receiver matching the correct data protocol. The code is carried by 315 MHz carrier with AM OOK (on-off keying) modulation and demodulated by the receiver basestation. The data code is of a Manchester modulation format to express bits "0" and "1". RF detection is accomplished with an off-board wire antenna internal to the receiver base-station. The receiver is of a super-heterodyne, single conversion, narrow band architecture that demodulates the RF transmission present on the off-board antenna. Demodulated data is then made available to the system microprocessor that decodes the transmitted message and performs the desired function. The local oscillator is a PLL crystal-based system with a frequency tolerance of ± 16kHz.

When the tire sensors are actuated either by pressure, rotational force or triggered, a RF modulated signal is generated that will be recognized by a receiver matching the correct data protocol. The code is carried by 315 MHz carrier with FM FSK (frequency shift keying) modulation and demodulated by the receiver base-station. The data code is of a Manchester modulation format to express bits "0" and "1". RF detection is accomplished with an off-board wire antenna internal to the receiver base-station. The receiver is of a super-heterodyne, single conversion, narrow band architecture that demodulates the RF transmission present on the off-board antenna. Demodulated data is then made available to the system microprocessor that decodes the transmitted message and performs the desired function. The local oscillator is a PLL crystal-based system with a frequency tolerance of ± 16kHz.

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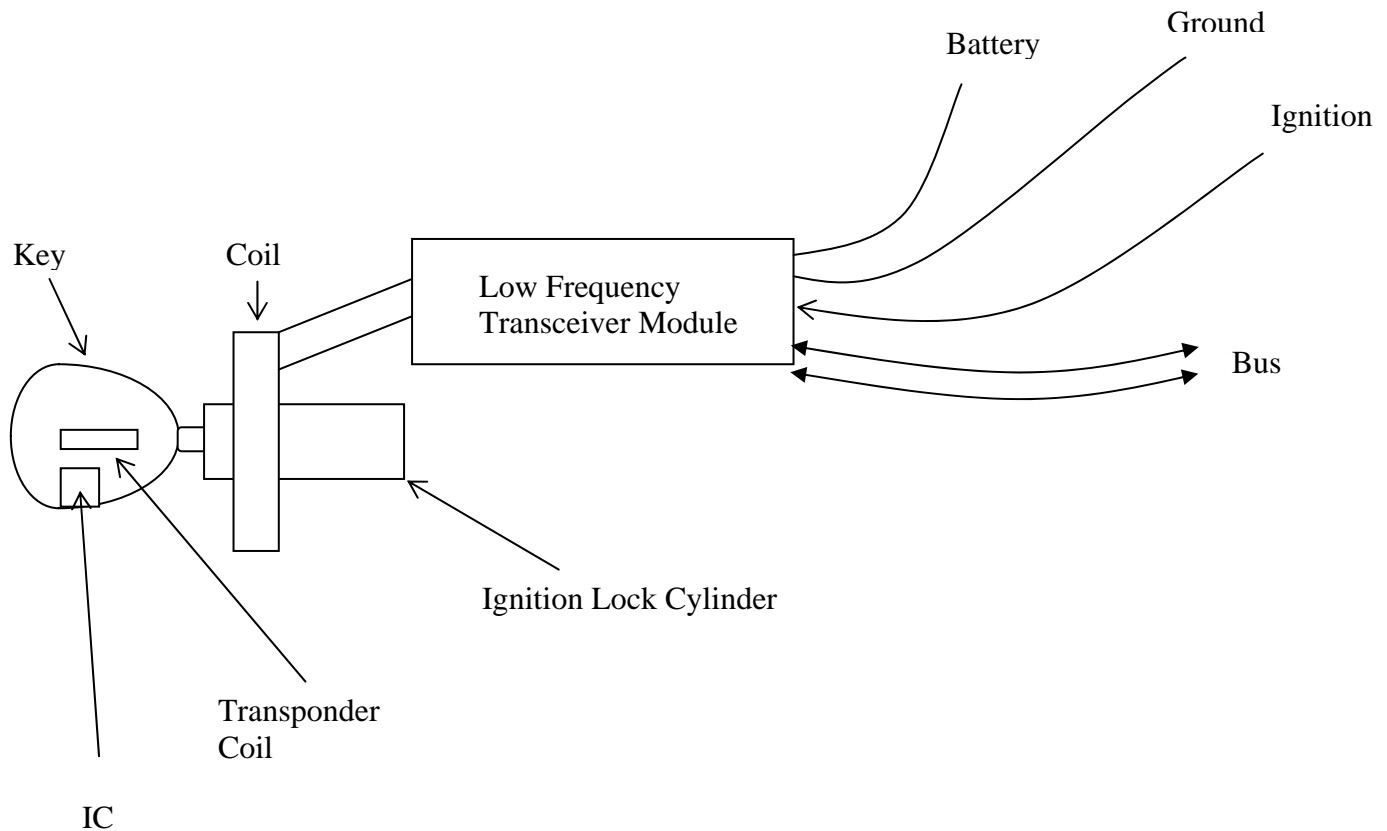FCC ID: KOBDR06WA
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The immobilization feature is based upon 125 kHz RFID technology. This feature is intended to ensure that the proper key is used to operate the vehicle. The encoder for the RKE function also contains the active circuitry for the immobilization feature. An on board parallel inductor/capacitor tank circuit acts as the 125 kHz receive antenna. When the key is placed into the ignition and turned, the receiver energizes a loop antenna resonant at 125 kHz +/- 7 kHz in order to power the immobilizer on the key (in the event that the cell in the key transmitter is depleted) and transfer data to the key's immobilizer circuitry. Information and commands are transferred to the key's circuitry by periodically interrupting the 125 kHz field for predetermined amounts of time. Information is transferred from the key's circuitry by periodically increasing the power consumption from the 125 kHz field, via a switched resistive load, for predetermined amounts of time. The circuitry in the receiver detects these minute fluctuations of loading and interprets them as digital data.

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Immobilizer Functional Description

The Skreem immobilizer module includes a passive anti-theft system whose purpose is to prevent the engine from starting if the module does not detect a valid key upon engine startup. The key contains a battery independent electronic chip (transponder) that derives its energy from the low frequency field. The key electronic device acts as a transceiver when communicating with the module. The module contains a 125 kHz transceiver, a microprocessor, and a vehicle bus transceiver.

Upon inserting the key in the ignition lock cylinder of the vehicle, the module is triggered to check the validity of the key by mutual authentication. The module sends a challenge to the key by modulating the 125 kHz carrier signal and then waiting for a response from the key while keeping the carrier on. If the challenge is valid, the key responds with its password by modulating the module carrier signal. The entire radio frequency communication process lasts 80 ms typically. The outcome of this authentication process is sent on the vehicle bus via the bus transceiver. The microprocessor controls the low frequency transceiver by encoding and decoding data to the key. It also handles the communication on the bus.

Block Diagram of Immobilizer System Operation