Functional Description of the U152 Transceiver

The **IPATS** (**I**ntegrated **P**assive **A**nti-**T**heft **S**ystems) Transceiver is a component within the immobilizer subsystem for Ford vehicles. The purpose of the subsystem is to prevent drive away vehicle theft by disabling the vehicle if an unauthorized user attempts to start the vehicle. The other components of the immobolizer subsystem are the Transponder/Key assembly, the Powertrain Control Module and the indicator LED. The Transceiver modulates signals sent by the Powertrain module and demodulates and decodes signals sent by the Transponder/Key.

Theory of Operation

The IPATS transceiver is controlled by, and communicates directly with, the PCM (Powertrain Control Module). When ignition (Run/Start) switch is turned on, the ignition voltage is sensed by the PCM.   The transmit control (TX_CNTL) input is then asserted low by the PCM, starting the charge phase. The charge phase and write phase are both controllable via the transmit control input. At the leading edge of the transmit control signal the mode control byte is written, and the transmit control signal remains low for the duration of the charge phase which will energize the transponder in the ignition key. During the charge phase, the IPATS transceiver will send a status byte to the PCM on the Rx (SCI-Out) output. After the charge phase, the PCM transmits a 48 bit cryptographic seed to the transceiver on the Transmit Control line. The transceiver modulates this data to communicate with the transponder, located in the ignition key, using the XCVR antenna as a magnetically coupled LF interface. The Transceiver modulates the PWM data into PWM-ASK (100% AM) bursts of nominally 134.2 kHz radiation. Subsequently the transponder will compute and transmit a unique code to the transceiver, based on the seed and its unique ID. The transmission protocol is Frequency Shift Keying (FSK). A Data Zero is generated from 16 cycles of 134.2 kHz and a Data One is generated from 16 cycles of 123.2 kHz. The code will be demodulated, and sent to the PCM in SCI (NRZ) format from the Rx output of the transceiver. Upon writing to the PCM, the process will be complete, and the transceiver will enter a sleep mode until the next ignition cycle.