E-plex 5800 and E-plex 5900 Operational Description

The E-plex 5800 and E-plex 5900 are two physically identical products that basically only differs by their application firmware, in terms of access rules. They both share the same basic operation. Only the high level application access rules differs.

The E-plex 5800 works with Desfire and Fips cards while the E-plex 5900 works with Desfire cards only. The E-plex 5800 will use a commercially available hand-held maintenance unit for programming and auditing. The E-plex 5900 can use 3rd party software to program and audit the lock. Both locks use the exact same electronic and mechanics.

They are both ISO14443A,B readers and lock controllers combined. They are connected to an electrically shielded PCB antenna, which rest outside of the housing in a plastic cover, in order provide a RFID ISO1443A,B interface. The RFID antenna is a 4 loops center-tap antenna, electrically shielded on both sides, built on a 4 layer PCB, and measures approximately 2.5cm by 3.5cm. The Antenna is driven by an NXP MFRC523 ISO14443A,B reader. This chip is normally held in sleep.

Both locks also provide a keypad interface for the users as well as an IrDA communication interface for lock configuration and audit retrieval.

The circuitry is normally in sleep, except for the greyed blocks which are normally completely powered-off. The MSP430 microcontroller periodically awakens (6 to 10 times a second for less than a msec) and activate the RF field very briefly to verify if a card is present or not.

If no card is detected, it shuts down the MFRC523 again and goes back to sleep, without powering-up the rest of the circuit, until next time interval.

If a card is detected, the MSP430 shuts down the MFRC523 but then enables the DC-DC voltage regulator which powers up the rest of the circuitry. The MSP430 then hands over control to the Atmel AT91SAM7X ARM microcontroller, who will take over the MFRC523 to communicate with an ISO14443A,B card, verify credential and take actions (unlock or not). When the ARM microcontroller is done, it signals the MSP430 to power it back off until next event. Other events monitored by the MSP430 are interrupt-driven, and will immediately wake-up the MSP430 who will in turn, again, power-up the rest of the circuitry and transfer control to the Atmel to take action. When done, the greyed blocks are again completely powered-off, and the MSP430 goes back to it's sleep-periodic wake-up cycle for card detection.

Additional components on the boards includes a motor driver, indicators LEDs, 2 Tones buzzer, a serial Flash memory and an IrDA interface that talks to a Pocket PC maintenance unit special application for lock configuration and audit retrieval.