HYPERCOM, INC. POS DEVELOPMENT

900 MHz WIRELESS ICE TERMINAL
THEORY OF OPERATION

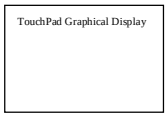
1. ICE GENERAL DESCRIPTION

The ICE unit will be used in Point of Sale "POS" type transactions as the direct interface to the card user. ICE as a product has been broken into many phases of which we are currently closing out the first phase. That is, the current ICE must communicate to a host terminal, whether by a tethered cord or by a wireless transmission, to complete a transaction. In future phases, peripheral devices will be added to increase the ICE functionality such that it can be utilized as a stand-alone unit, capable of doing full transactions.

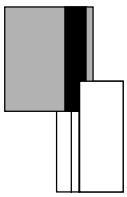
Standard features on the ICE unit will include a touch screen graphical display, a 12button keypad, track one and track two magnetic stripe card reader, and battery operation. Optional features include a SMART/Memory card reader, three SIMLocks, security processor, and a radio transceiver. These options will make the ICE unit very applicable to the specific needs of the customer. Future modules will be created that will increase the functionality of the ICE unit. They will attach to the ICE unit through a 60 pin connector on the back of the unit.

2. FUNCTIONAL BLOCKS

The ICE unit can be broken down into various functions. Those functions and their associated descriptions are as follows:



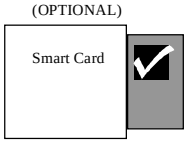
Touch Screen Graphical Display. The ICE unit contains a 160 by 80 pixel display with multiple font capability. Both text and graphics modes are present on the display. The display itself contains a command register and a data register, which the Z80 processor communicates to via the processor data bus. A back light is used on the display to increase visibility of the display in less than perfect lighting. A resistive touch pad is attached (glued) to the top of the display for signature capture and soft key functionality. When a person touches the display a resistance is created, which also creates a voltage on the x and y axes. From this voltage the software is able to determine the touch location.



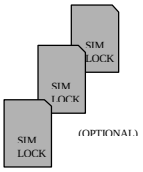
Track 1 and Track 2 Card Reader. Functionality of this block is to read the data stored in the magnetic stripe of a credit or debit card. Currently our ICE unit will read track 1 and 2 data. There will possibly be track 3 capability in the future, if needed.

KEYPAD

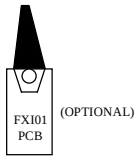
KEYPAD. The keypad on the ICE unit consists of ten numeric keys (0 through 9) and two special function keys. The special function keys are “CLEAR” and “ENTER”. Additional soft keys can be created using the touch screen display and software code. The OS code for the ICE unit continually scans the keypad for a key press during normal operation.



SMART/Memory Card Reader. Ice will be capable of reading both memory cards and SMART Cards. Memory cards and SMART cards look like a credit card in size, but instead of containing a magnetic stripe they containing a PROM element that must be powered up then read. The name Memory card speaks for itself. The SMART card on the other hand is used as a cash card. Its ultimate goal would be to replace cash. To make it more secure, it can be used in conjunction with the three SIMLocks.



SIMLocks. These devices are used in conjunction with SMART cards. A merchant card can be placed in each SIMLock. It then functions as a verification tool and cash register for the merchant when SMART cards are utilized. When a transaction takes place, the dollar amount is subtracted from the SMART card and added on to the Merchant card. At the end of the day the merchant can then call up the bank and transfer that amount into an account.

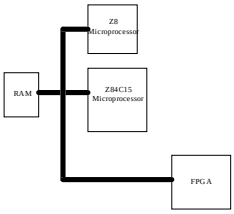


FXI01 Transceiver Board. In specific uses, it will be beneficial for the merchant to have a portable ICE unit. The FXI01 transceiver allows just that. Using a 900Mhz signal the radio ICE unit with the FXI01 and the proper software can communicate to a host terminal located at a central site. This allows the transaction to take place at any remote site within range of the host transceiver. **NOTE:** If the FXI01 used, the RJ11 has no use except for programming and the 60pin connector is blocked off with a plastic cover that is welded in place.

RS485/Power connector. Externally on the ICE is a RJ11 connector used to provide power (12 Volts) and RS485 communication only when tethered to a T7 terminal or other source. This port is also used for initial configuration load by the LP3 loader. During configuration the ICE terminal disables the RS485 port and allows the load to take place. Once completed the RS485 port can then be enabled.

60 Pin Connector. The ICE contains a 60pin connector that will be utilized as a peripheral expansion interface. Currently the data bus, as well as some key control signals, are present at this port to enable communication to some expansion modules currently being developed.

External Battery. Power for the ICE unit can be provided either through the RJ11 when tethered or through an external 4.0V battery. This external battery is keyed and fits into a slot on the side of the ICE unit. The lifetime of the battery is yet to be fully measured, but should fall in the range of two hours with normal operation when all power save modes are established by software. The battery also has a quick release for easy replacement.



ICE Control and Operation. The brains of the ICE unit are a Zilog Z84C15 microprocessor. Located on a secure module with a 4Mbit memory chip, the microprocessor is used to control all functionality and operation of the ICE unit. A Xilinx FPGA chip is used to reduce glue logic and for control registers needed to control internal and external peripherals. A Zilog Z8 microprocessor can be utilized if additional security is needed.

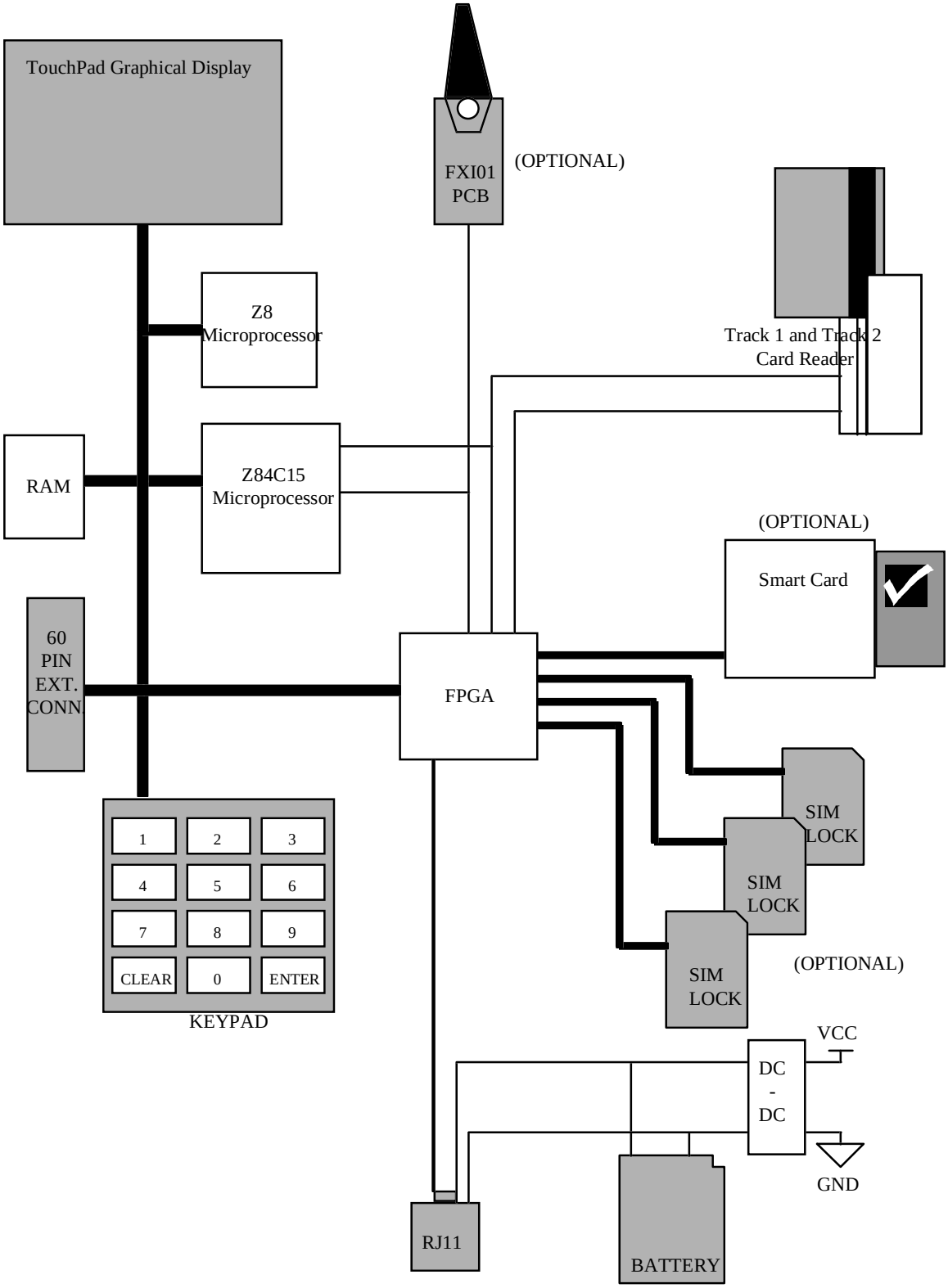


Figure 1. ICE FUNCTIONAL BLOCK DIAGRAM