

# Keypad Board C & Assembly Strategy

## Introduction

This document will suggest basic strategies for creating 'C' and Assembly code for the Keypad E-Block.

The keypad E-Block has 7 pins on the connector, which correspond to a 4x3 matrix of switches (3 columns and 4 rows). The 3 columns are connected to pins 1-3 of the connector and the 4 rows to pins 5-8 (for a PICmicro with this E-Block connected to Port B, this would mean that B0-2 correspond to the columns and B4-7 correspond to the rows).

When a single key is pressed on the keypad, this closes a particular switch in the matrix. For example, if the button "6" is held down, this would close the switch between column 3 and row B.

## Implementing a strategy

The following strategy is specific for a PICmicro microcontroller, but should be adaptable to any upstream device.

### Scanning the keypad

The basic strategy behind using the keypad is to implement a scanning routine that checks to see which switch has been held down. This can be done a number of ways, but here we will set each column to a logic '1' in turn and check the input from each of the rows. That way we can work out which key has been pressed. Here's a basic procedure, assuming that the keypad is connected to Port B of a PICmicro:

- 1) Set B0-2 as outputs (these are the columns)
- 2) Set B4-7 as inputs (these are the rows)
- 3) Set B0 high and B1 & B2 low - we are initially checking column 1
- 4) If any of B4-7 are high, this indicates that the corresponding switch in column 1 is held down
  - If B4 is high, button "1" is down
  - If B5 is high, button "4" is down
  - If B6 is high, button "7" is down
  - If B7 is high, button "\*" is down
- 5) Set B1 high and B0 & B2 low - now we are looking at column 2
- 6) Again check the state of B4-7 to see if any are high
  - Now we are looking at buttons "2", "5", "8", and "0"
- 7) Set B2 high and B1 & B0 low - column 3
- 8) Again check the state of B4-7 to see if any are high
  - Now we are looking at buttons "3", "6", "9", and "+"

### Other suggestions

On a PICmicro, pins 4-7 on Port B can be set up to cause an interrupt when any of these pin's states changes. Advances users can take advantage of this by enabling this interrupt and setting B0-2 high so that whenever a key is pressed, the state of pins 4-7 will change causing the interrupt to occur.

The keypad can then be scanned as described above to indicate which particular key has been pressed. This means that your program does not need to continually scan the keypad to see if a key has been pressed - it will only need to check the keypad when a key has actually been pressed.