

TO: Profs. J. Hung and V. Nelson  
FROM: "The A-Team", Albert Smith and Lizzie Jones  
SECTION: Tuesday 12:30  
DATE: 14 January 2013  
SUBJECT: Keypad interface

The objective of the lab was to make a working keypad interface using the microcontroller.

Our complete program listing is attached (4 pages).

When we got to lab, we reviewed the lab notes and designed our program. Then I entered the code into Codewarrior while my partner Lizzie wired up the keypad. We turned on the breadboard power, but the keypad didn't work right. We spent the remainder of lab debugging the code. At one point the code completely quit working, so I rewired the keypad.

The code problems were frustrating, but at least the microcontroller is detecting buttons being pressed. I'm rusty with C programming, but I am sure that we'll get things working by next week.

#### COMMENTS:

- Selection of supporting data can be improved. Four pages of program listing -- lots of paper, yet not concise communication.
- Detailed chronology of lab activity (second paragraph) is not always desirable. Focus on presenting actual data and results.
- Vague description of results: "didn't work right"
- Subjective conclusions. Frustration, relationship between C proficiency and progress
- First person (I, we) point of view -- less acceptable, because it tends to feel more subjective. Is the writer "fair and balanced?"
- Score from JYH: Writing 3/4, Progress 3/4

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The keypad interface program was developed and debugged using Codewarrior; the button scanning routine is based on the Monday lecture notes. The interface circuit in Fig. 1 was breadboarded, and microcontroller output lines Port A0-A3 were measured using the Waveforms logic analyzer.

### *Testing Procedure*

Each keypad button 0-9 was pressed (remaining six buttons ignored), and the binary value of the microcontroller Port A0-A3 lines was observed on the logic analyzer bus lines D8-D11. The experiment was repeated 3 times.

### *Results*

Table A shows the relations between keys pressed and the displayed output values.

### *Summary*

The data suggests that there may be a timing problem in the scan algorithm, because the value displayed is consistently the button in an adjacent keypad column. Next week, a time delay will be inserted in the keypad scanning interrupt service routine. The software design will also be done before lab.

### COMMENTS:

- Better selection of supporting data: circuit schematic, table of data
- Clear description of the experiments being conducted (Testing Procedure)
- Experimental results presented clearly (Table A)
- Conclusions (Summary) are drawn from data -- no subjective ideas.
- Memo is written from the third person point of view, which helps to promote a sense of objectivity (balance and detachment)
- Score from JYH: Writing 4/4, Progress 3.6/4

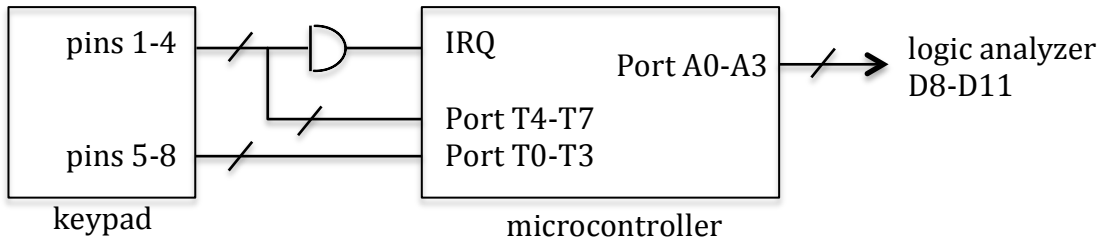


Fig. 1. Keypad interface schematic

Figures and tables are labeled and captioned.

Table A. Keypad interface test results. Displayed values are from logic analyzer lines D8-D11

Button pressed	Displayed value
0	#
1	A
2	1
3	2
4	B
5	4
6	5
7	C
8	7
9	8