

## EE 371 LAB 7 - F05 Switch Debouncing

*OK, so what's the speed of dark?*

Schedule: Oct 26, 27: Do the lab  
Nov 2,3: Last time to demo lab.

Background: Bouncing switch contacts can be a big problem in some applications. (See actual image below.) Read *A Guide to Debouncing* by Jack Ganssle (you will find a link on the EE371 Home page <http://www.coe.montana.edu/ee/courses/ee/ee371/ee371hpg.htm>).

1. You need to demonstrate two programs. One that illustrates that switch bounce exists and is a problem and another that works correctly by eliminating switch bounce.

Each program is to display a 4-bit counter on the LEDs you used two weeks ago. A wire will need to be connected from the DIP switch SW1-1 to PT2 (pin 30 on the connector J6). The counter should be initialized to zero at the start of your program and then each time the switch is pressed from right to left (off to on) the count should be incremented by one and displayed. When the switch is pushed back the other way, the counter should not increment.

- a. Your first program is to demonstrate that the switch bounces.
- b. Your second program is to implement an integrating debouncer and to demonstrate that it solves the switch bouncing problem.

Helping Hand #1: To ensure that the counter increments only when the switch is changed from off to on, you should wait for the switch to change value, increment the counter, and then wait for the switch to be changed back by waiting for the opposite change.

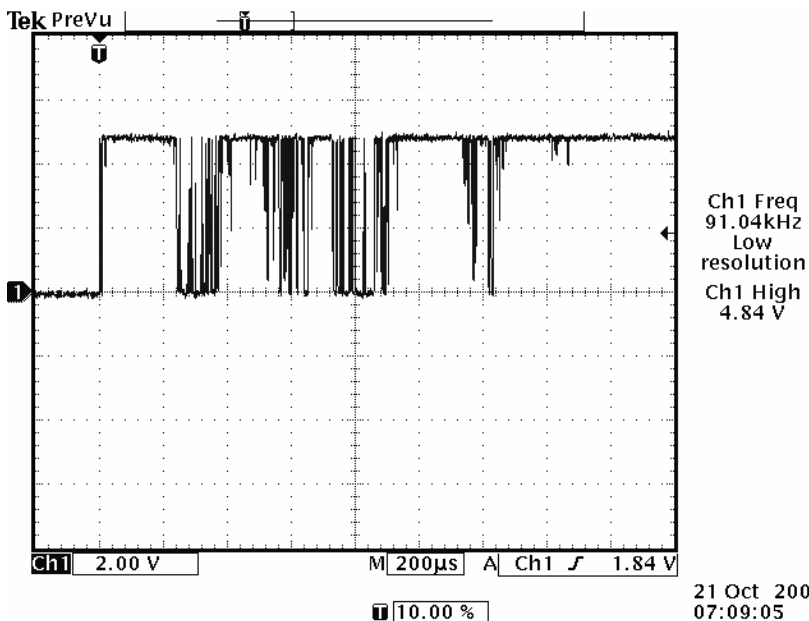
Helping Hand #2: We talked about the branch if bit set (BRSET) and branch if bit clear (BRCLR) instructions in class. The syntax for these is *BRSET (or BRCLR) what\_location,what\_bit,branch\_location* i.e.

SPIN: BRCLR PTT,BIT2,SPIN ; Branches until bit 2 on PTT is set.

Helping Hand #3: Software switch debouncing is discussed in section 7.6 in *Microcontrollers and Microcomputers* and in the Jack Ganssle reference listed above.

2. Grading: 10 points each program, 10 points listing

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Name \_\_\_\_\_  
Partner \_\_\_\_\_  
Demo (1a) \_\_\_\_\_  
Demo (2b) \_\_\_\_\_  
Listing \_\_\_\_\_