

HARDWARE 5:

SHIFT REGISTER

STUDENT RUBRIC

DEMO RUBRIC

The debouncer in this circuit is a source of confusion for many students. Make sure you understand how it works, first and foremost, so that you know how to test your circuit. All 8 of your switches will be occupied with the PRE and CLR functions of the 4 D flip flops, so the input and the clock will probably be controlled by loose wires.

I have also seen students use one switch for clearing all registers so that they can have the switch for input. A loose wire is still required for the clock, however.

Completion Requirements:

- ✓ Implement the debouncer. The NAND (7400) form is suggested (see lab instructions).
- ✓ The registers can be set and cleared in parallel.
- ✓ Data can be entered sequentially, and previous inputs are shifted right with each clock.

Testing Procedure:

1. Serially input 1, 0, 1, 0 (result is DCBA = 0101).
2. Clear everything, then input DCBA = 1011 using SET operations.
3. Clear the registers by inputting sequential zeroes.
4. Using serial inputs, make DCBA = 0001, then use a SET operation to change D to 1.

REPORT RUBRIC

Scoring (out of 3 points):

- ✓ **[1 point]** Theory:
 - **[0.7]** What are shift registers? How do we input values serially and in parallel?
 - **[0.3]** Why do we need a debouncer circuit?
- ✓ **[0.7 points]** Deliverables:
 - **[0.7]** Include the table described in the deliverables section of the lab instructions. Specifically, *imagine* an 8-bit register. Take the last two digits of your PeopleSoft number and convert them both to Binary Coded Decimal (BCD). Concatenate these two values, then input them to the imaginary shift register from LSB to MSB (recall that inputs start at the MSB and are shifted right with each clock in this lab's implementation).
 - Assuming that the shift register starts out cleared, create a table that indicates the parallel output at each step, and find the decimal representation of that 8-bit sequence. Example for PS#=39 below...

STEP	INPUT	REGISTERS	DECIMAL
0	N/A	00000000	0
1	1	10000000	128
2	0	01000000	64
3	0	00100000	32
4	1	10010000	144
ETC.			

- ✓ **[0.4 points] Discussion section.** Should conform to standard lab report guidelines.
- ✓ **[0.5 points] Question 1: Registers**
 - What are the main functional purposes of a register?
- ✓ **[0.4 points] Question 2: SN54XX**
 - Is a SN5474 the same as a SN7474? If not, what are the differences?