

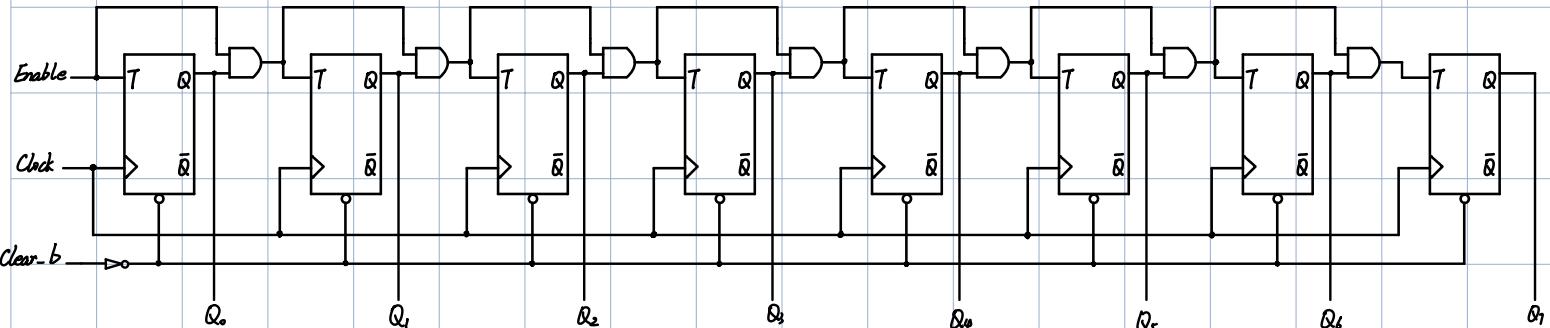
CSC258 Lab5 Pre-Lab Report

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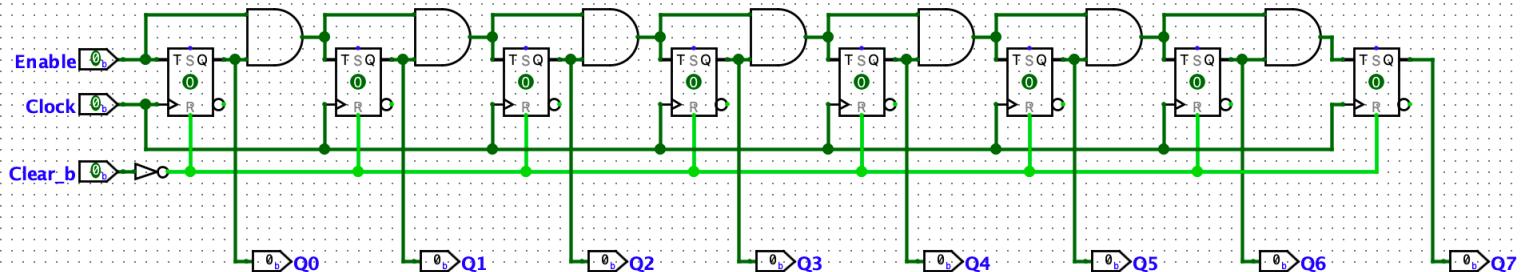
Student #: 1003942326

Part I

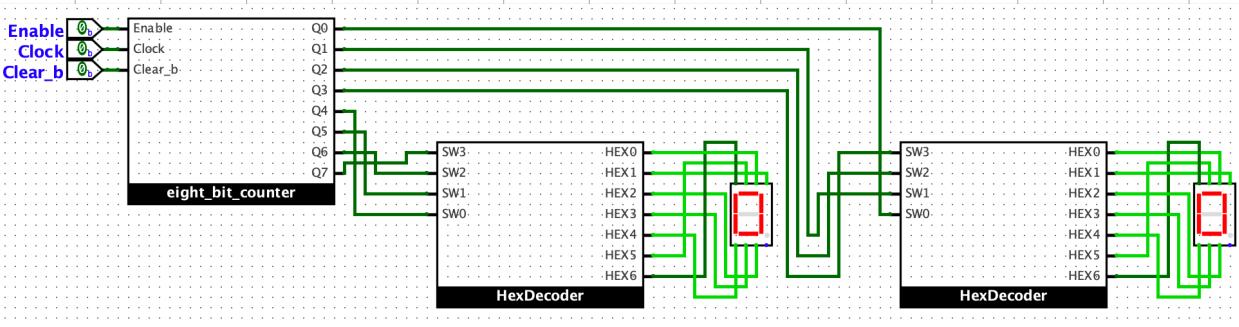
1. & 2.



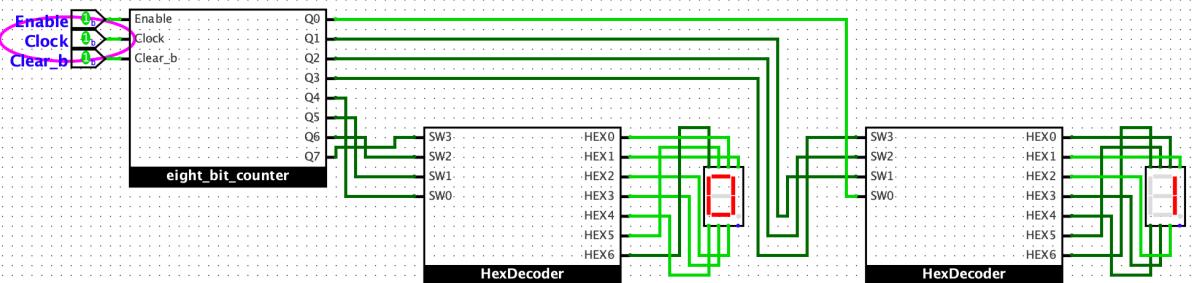
3.



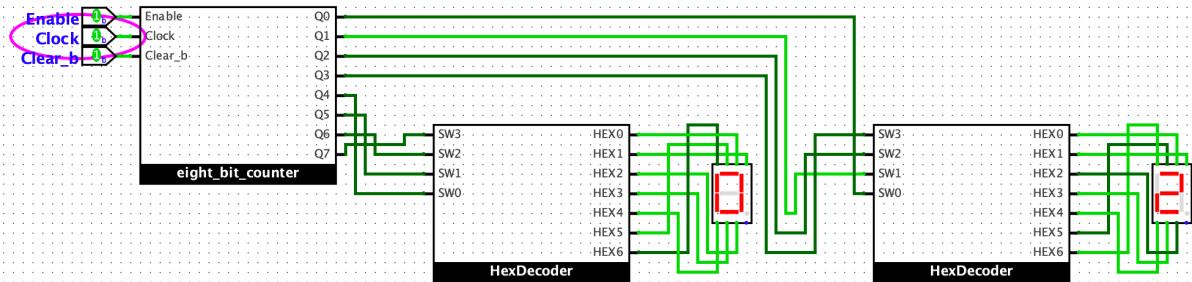
4.



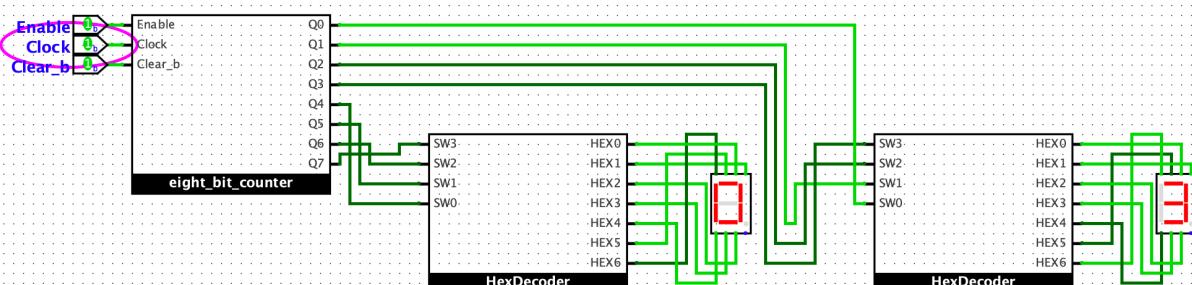
5.



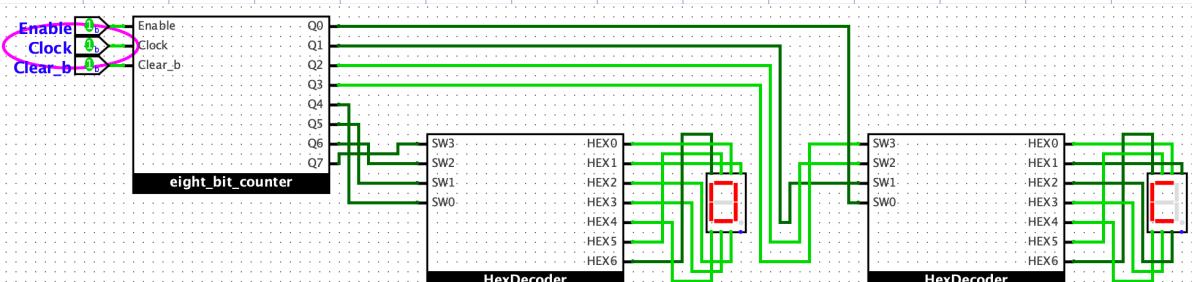
1



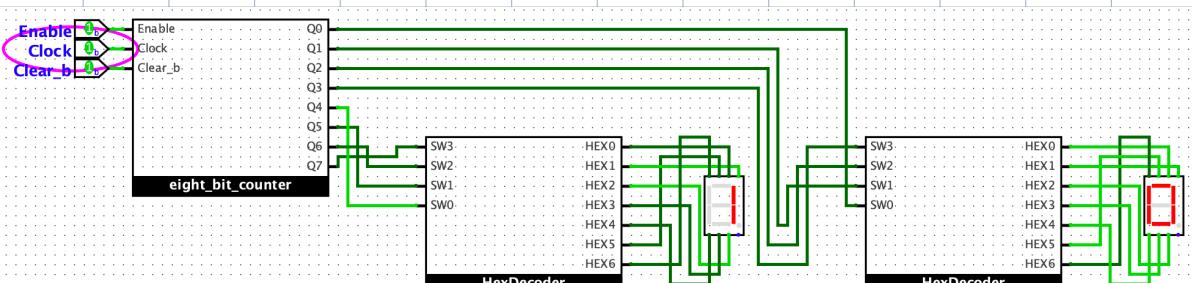
2



3



12



16

5 Part II

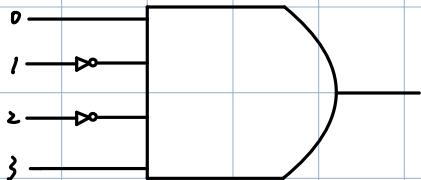
5.1 The Counter Device

1. When the counter reaches the max value '1111', the AND gate will give an output of 1 as an input of the OR gate on the left, which will make M1 become high, and then reload a new value in the bottom left.

That is, it will reload when it reaches the max value.

2. If we want to count up to 9, which is '1001', we need to add two NOT gates.

For example,



which will reload when the counter reaches maximum 9.

① wrap around: if the counter exceeds the maximum value, it will be set back to 0.

② stay at value: if the counter exceeds the maximum value, it will remain at the maximum value.

③ continue counting: if the counter exceeds the maximum value, it will continue increment over the max

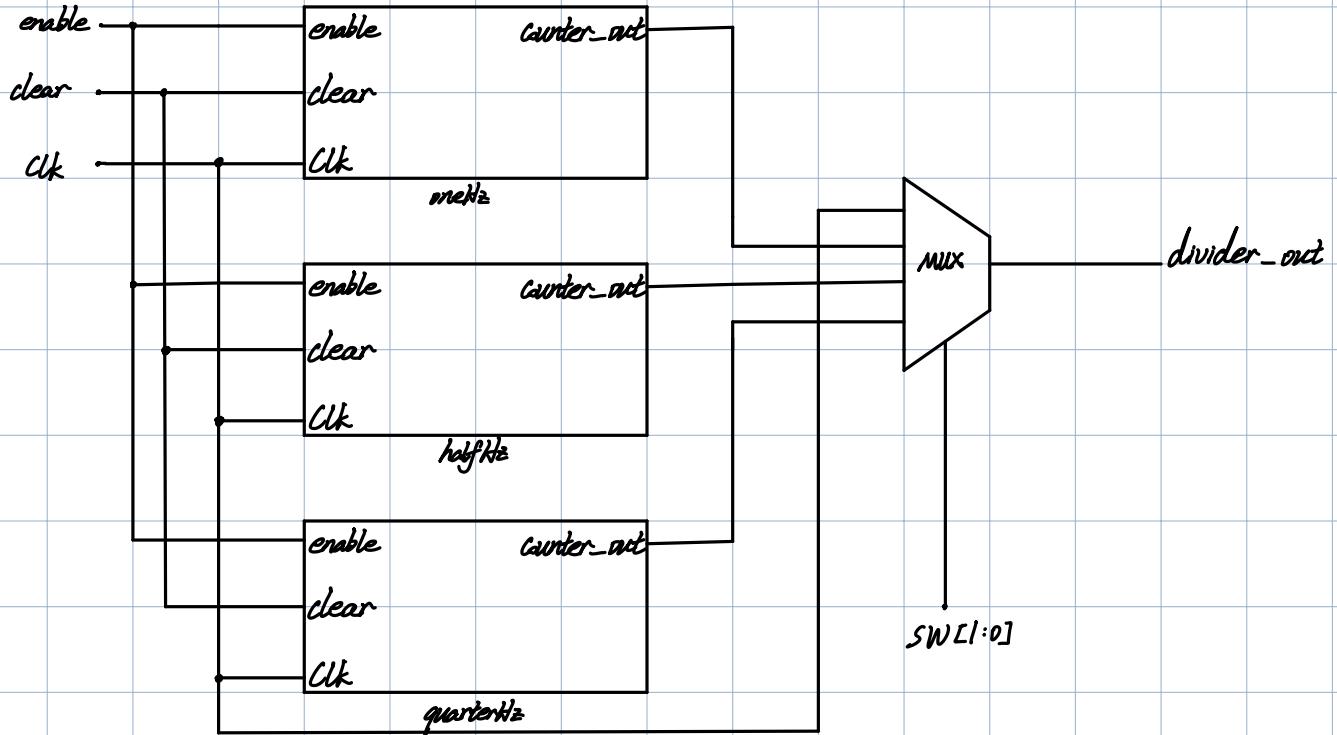
④ load next value: if the counter exceeds the maximum value, the next value will be loaded from input.

5.2 The Rate Divider and the Display Counter

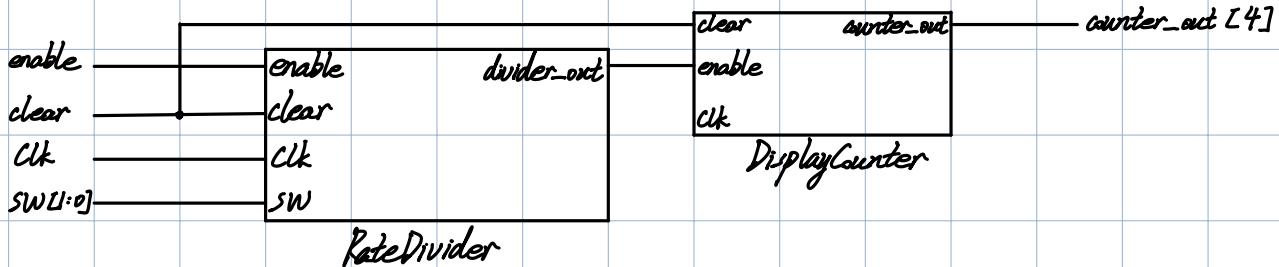
$$\text{the number of binary bits needed} = \log_2 50000000 = 26$$

5.3 What you need to do

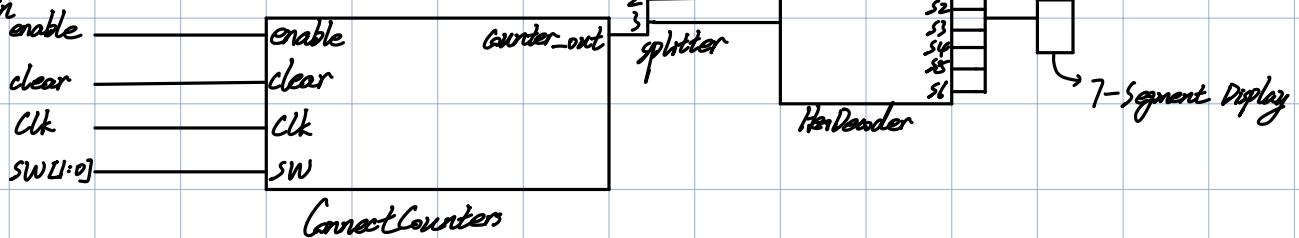
1. ① RateDivider



② ConnectCounters

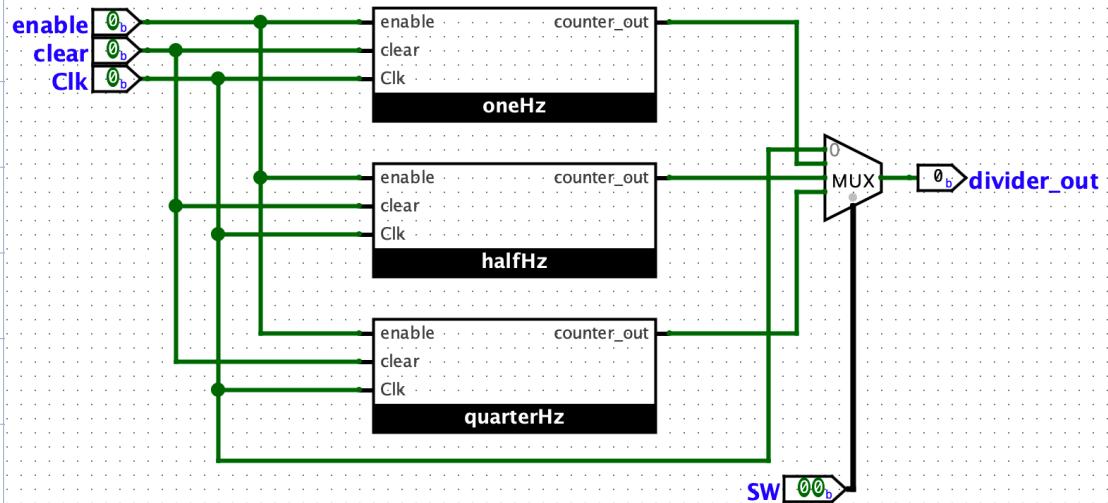


③ main

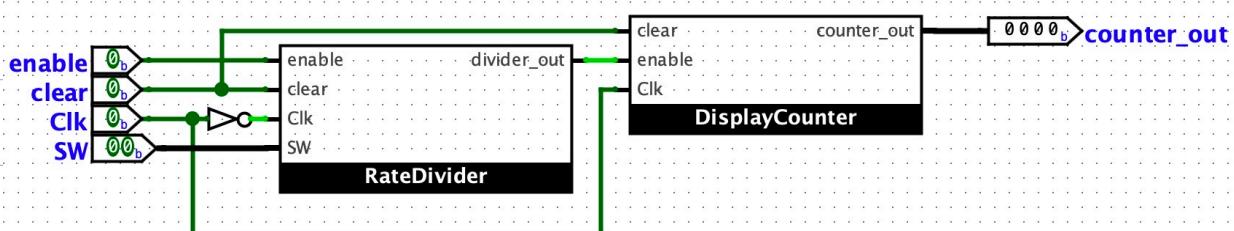


2.

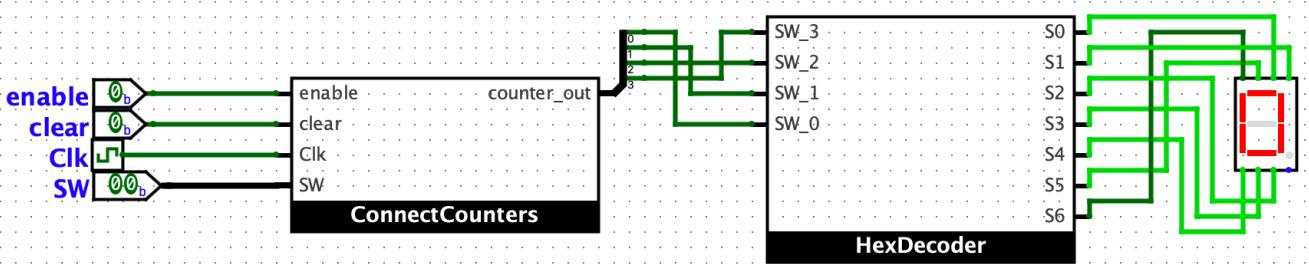
① RateDivider



② ConnectCounters



③ main



3.

SW[1]	SW[0]	Speed
0	0	Full (32 Hz)
0	1	1 Hz
1	0	0.5 Hz
1	1	0.25 Hz

32 cycles per second

1 cycle per second ✓

2 seconds for one cycle ✓

4 seconds for one cycle ✓

6 Part III

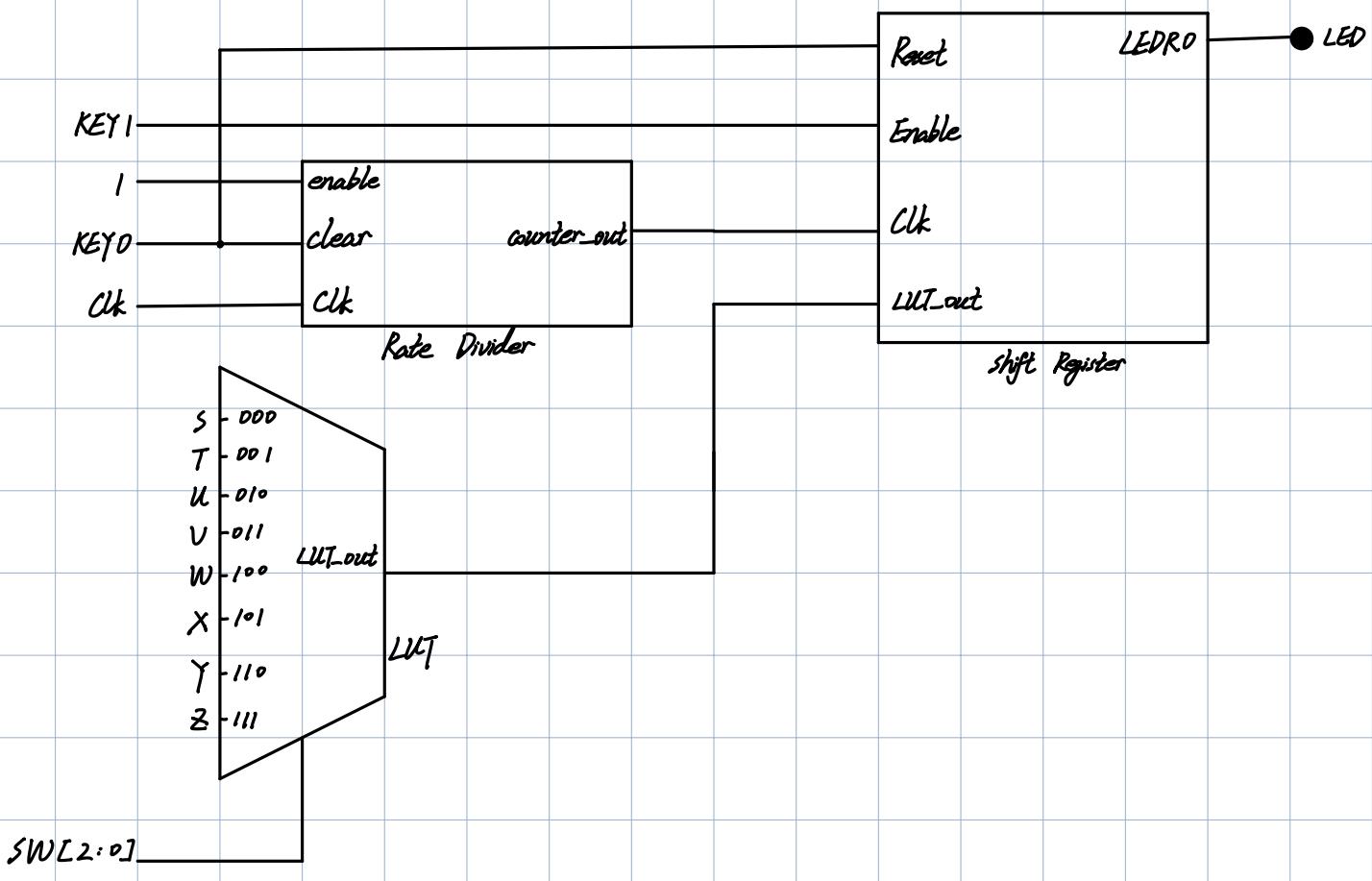
6.2 The Lookup Table (LUT)

Letter	Morse Code	Pattern Representation (sequence length is 14 bits)
S	• • •	1 0 0 / 0 0 0 0 0 0 0 0 0
T	—	1 / 1 0 0 0 0 0 0 0 0 0 0 0 0
U	• • —	1 0 0 1 / 1 0 0 0 0 0 0 0 0 0
V	• • • —	1 0 0 1 0 0 1 1 0 0 0 0 0
W	• — —	1 0 1 1 1 0 1 1 1 0 0 0 0 0
X	— • • —	1 1 1 0 1 0 1 1 0 1 0 0 0 0 0
Y	— • — —	1 1 1 0 1 0 1 1 0 1 1 1 0
Z	— — • •	1 1 1 0 1 1 1 0 1 0 0 0

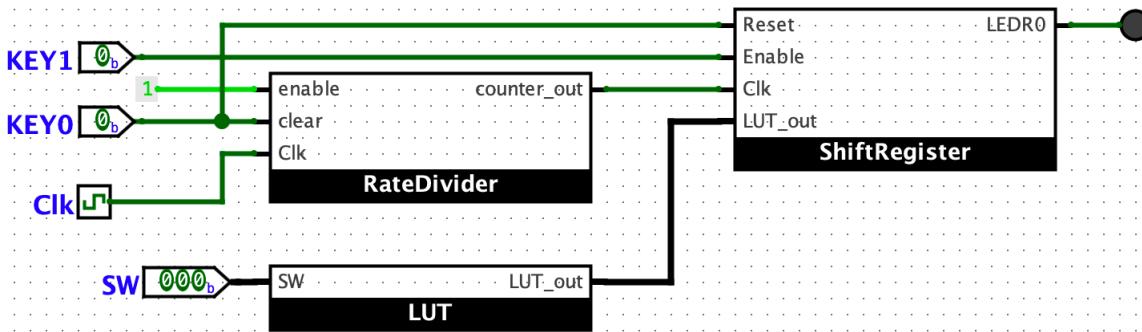
Table 1: Morse Pattern Representation with fixed bit-width (**PRELAB**)

6.4 What you need to do

2. Schematic



3.



4.

Simulate LUT with test vectors

Test Vector LUT of lab5_part3

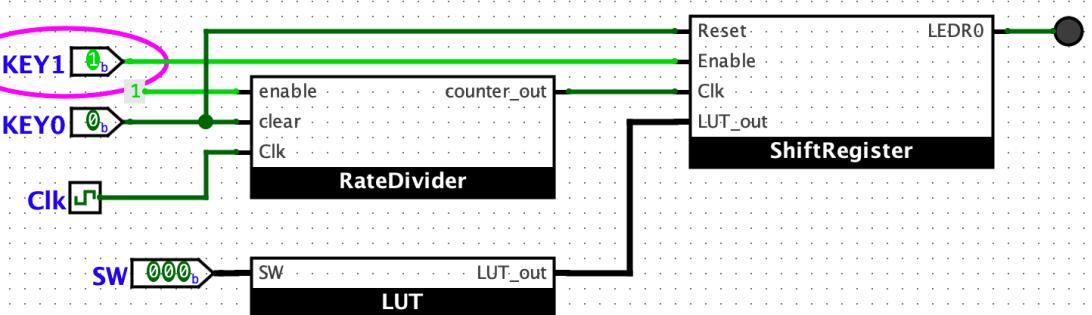
Passed: 8 Failed: 0

Status	SW	LUT_out
pass	000	10 1010 0000 0000
pass	001	11 1000 0000 0000
pass	010	10 1011 1000 0000
pass	011	10 1010 1110 0000
pass	100	10 1110 1110 0000
pass	101	11 1010 1011 1000
pass	110	11 1010 1110 1110
pass	111	11 1011 1010 1000

Load Vector Run Stop Reset Close Window

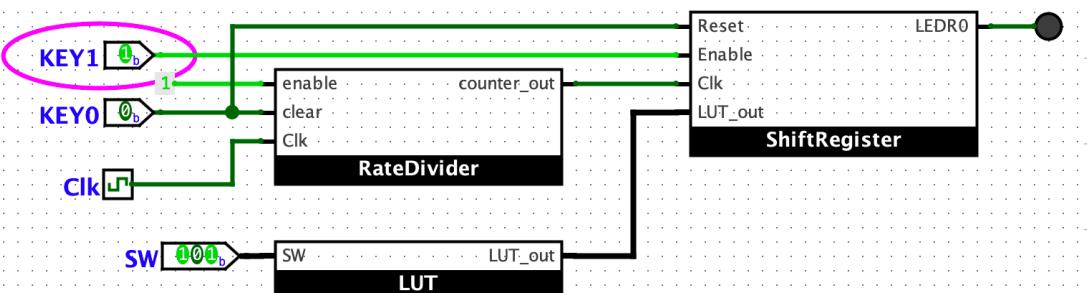
Test with Poke:

① Test s 000 : 0.5 short 0.5 short short



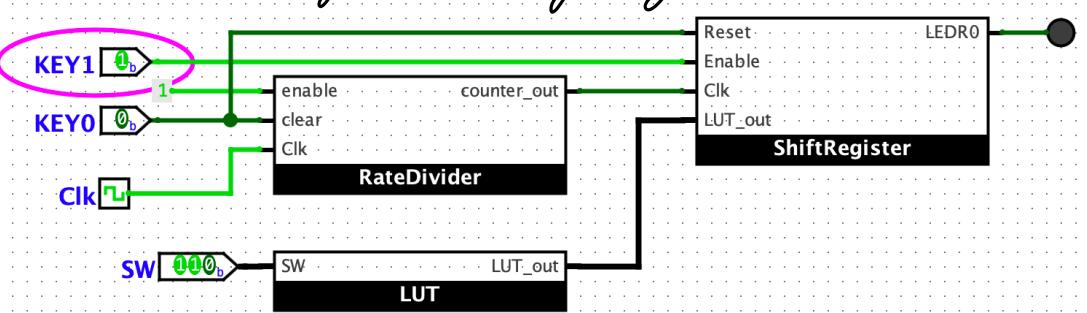
② Test X 101 :

1.5 long 0.5 short 0.5 short 1.5 long



③ Test Y 110 :

1.5 long 0.5 short 1.5 long 1.5 long



④ Test Z 111 :

1.5 long 1.5 long 0.5 short 0.5 short

