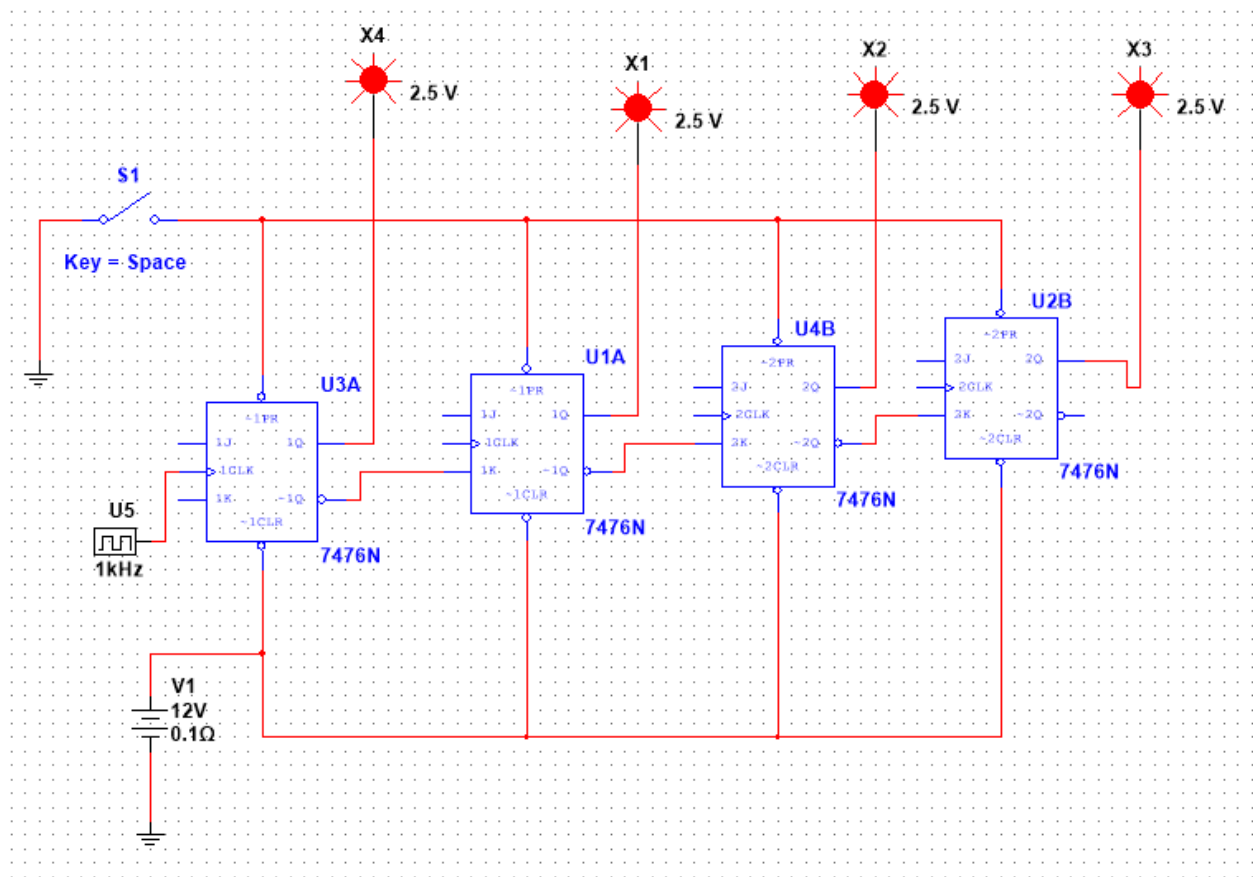


DOWN COUNTER:

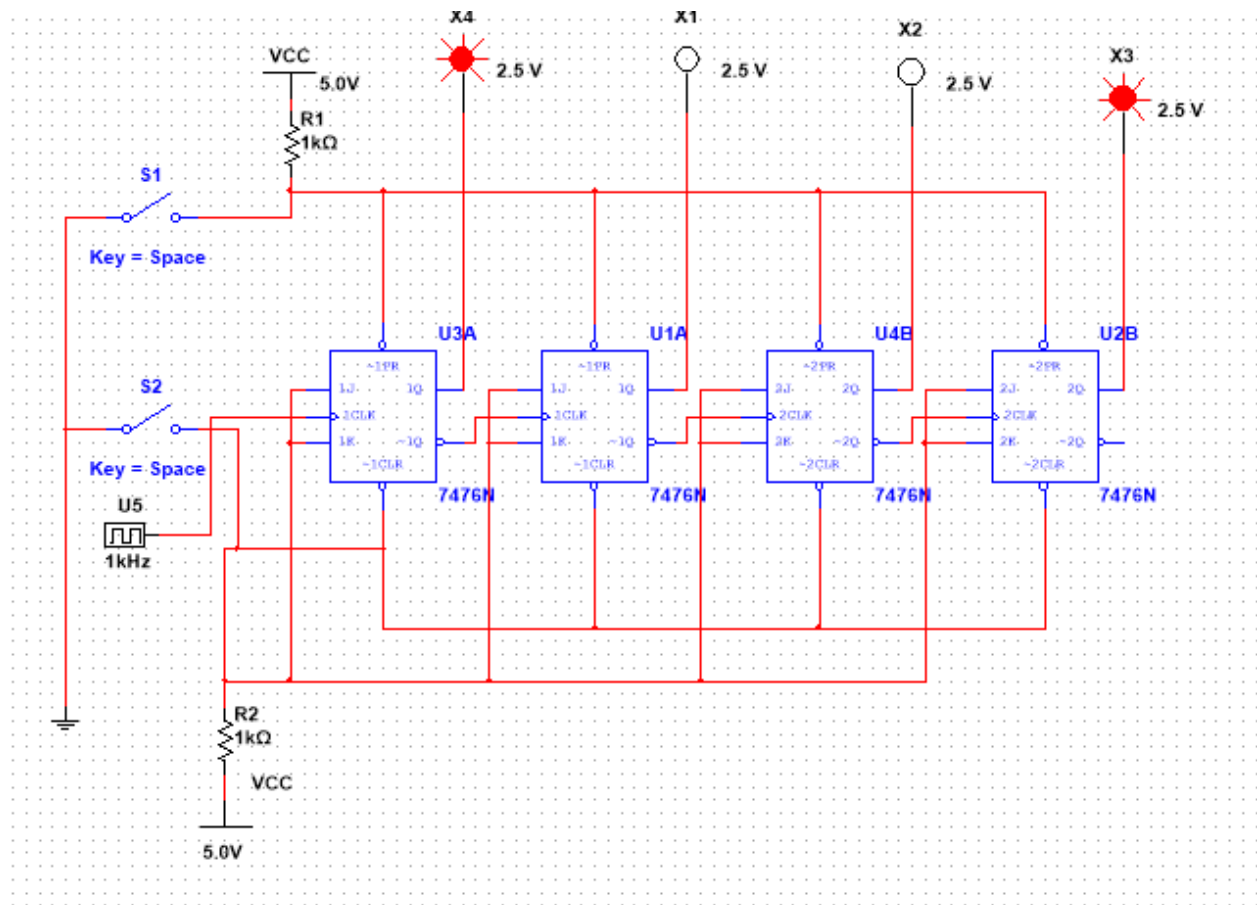
- 1- It sets all the outputs to 1.
- 2- FlipFlop A responds by switching its output for every count pulse.
- 3- FlipFlop C responds by switching its output whenever B changes from 1 to 0.
- 4- the reason is because Given FlipFlop is Negative Edge triggered JK FlipFlop.



INPUT COUNT	D	C	B	A	DECIMAL
1	1	1	1	1	15

2	1	1	1	0	14
3	1	1	0	1	13
4	1	1	0	0	12
5	1	0	1	1	11
6	1	0	1	0	10
7	1	0	0	1	9
8	1	0	0	0	8
9	0	1	1	1	7
10	0	1	1	0	6
11	0	1	0	1	5
12	0	1	0	0	4
13	0	0	1	1	3
14	0	0	1	0	2
15	0	0	0	1	1
16	0	0	0	0	0
17	1	1	1	1	15
18	1	1	1	0	14
19	1	1	0	1	13
20	1	1	0	0	12
21	1	0	1	1	11

UP COUNTER:



1-The counter responds to the clear input by clearing all the flipflops, and making the count to 0/zero

2-Flipflop A responds by changing at each negative edge of the clock pulse.

3-Flipflop B responds to the output of flipflop A by changing at each negative edge of the output of flip-flop A

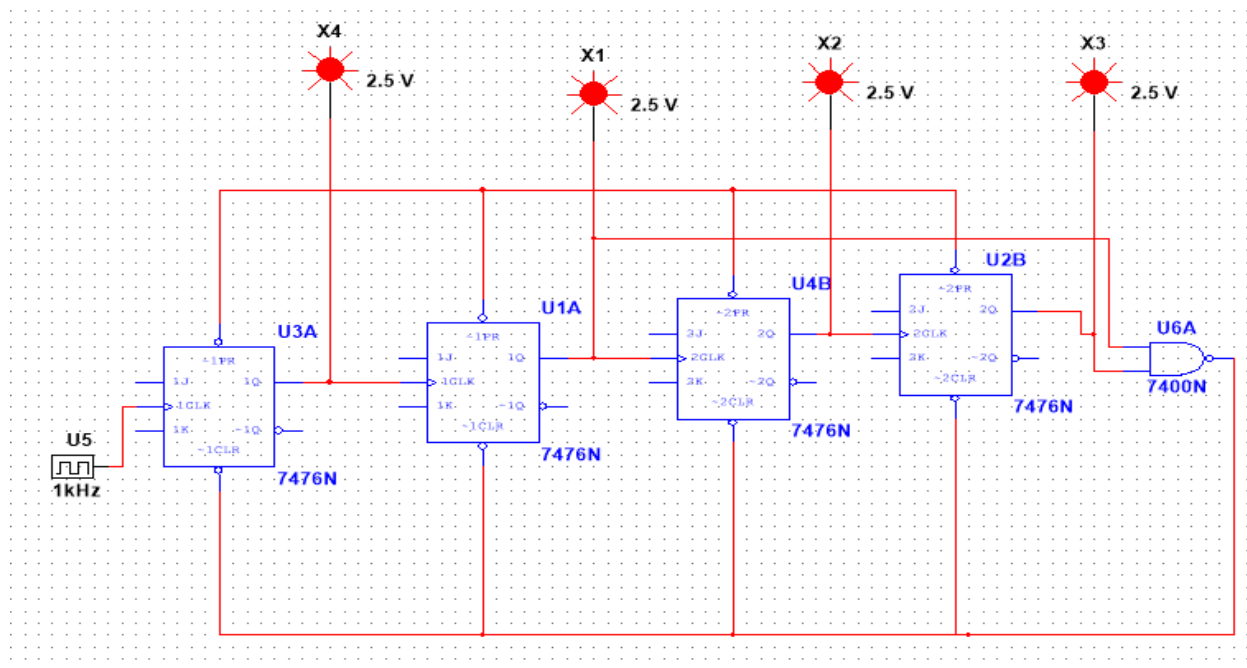
4-Flipflop D responds to the output of flipflop C by changing or switching whenever there is a negative edge at the output of flip-flop A

5-The maximum count of this counter is 1111

6- the flip flop would need the count of the 365, and that would require 9 flipflops

7- based on my circuit the only behavior i noticed is that it was switching

Decade counter:



1. The up counter can count from 0000 to 1111, whereas the decade counter can count from 0000 to 1001 and then back to 0000.
2. When DCBA = 1010, the output of NAND gate will be 0 which is applied to the CLEAR active/ low input of all flip-flops, then all the flip flops will get cleared and the count will turn into 0000
3. We modify the counter to get the sequences by letting C, B and A to get applied as input to the NAND gate and rest circuit will stay the same, and Whenever we get 0111, the output of the NAND gate will be 0 which will get us the count of 0000

INPUT COUNT	D	C	B	A	DECIMAL
0	0	0	0	0	0
1	0	0	0	1	1
2	0	0	1	0	2

3	0	0	1	1	3
4	0	1	0	0	4
5	0	1	0	1	5
6	0	1	1	0	6
7	0	1	1	1	7
8	1	0	0	0	8
9	1	0	0	1	9
10	1	0	1	0	0
11	1	0	1	1	1
12	1	1	0	0	2
13	1	1	0	1	3
14	1	1	1	0	4
15	1	1	1	1	5
16					