(DE3-2) Binary Counter

Aim of experiment

To demonstrate the operation and characteristics of a binary counter.

Apparatus

Prototyping Board– DC Power Supply 5V or 9V Battery – Light Emitting Diode (LEDs) – 74193 4 Bit Synchronous Binary Counters IC – 1 kΩ Resistor – Connection Wires.

Theory of experiment

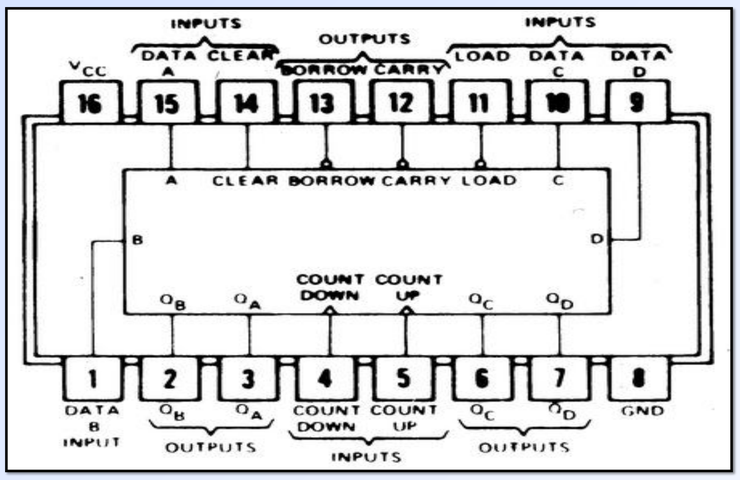
Digital circuits can be classified into two types: combinational, in which the circuit outputs are determined by the logical input states at any particular moment; and sequential, in which the outputs depend on logic input states and the prior states of outputs. There are two types of sequential circuit, synchronous and asynchronous. Synchronous types use a clock input to drive all the circuit operations. Asynchronous sequential circuits do not use a clock signal, Instead the circuit is driven by the pulses of the inputs.

This experiment will present one important example of sequential circuits which is binary counter. Binary counter is a sequential circuit that moves through a predefined sequence of states. The sequence of states may follow the binary number sequence as shown in the following Table, or an arbitrary manner (non-binary sequence). The simplest example of a counter is the binary counter, which follows the binary number sequence.

A_3	A_2	A_1	A_0
0	0	0	0
0	0	0	1
0	0	1	0
0	0	1	1
0	1	0	0
		⋮	
1	1	1	1

Table: Binary count sequence

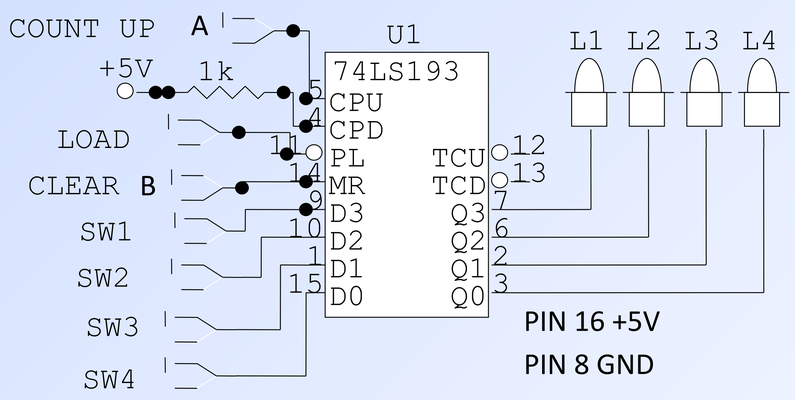
We can use the 74193 as a synchronous up-down 4-bit binary counter. It has a master reset (CLR), and it can be reset to any desired count with the parallel load inputs. Basically, it functions like any binary counter, except that is has two clock inputs, one for UP counting, and the other for DOWN counting.



74193 4 bit synchronous binary counters

Procedures

1. Connect the 74193 in the Prototyping board.
2. Connect the circuit as shown in the following figure.
3. Record the LEDs outputs (L_1, L_2, L_3, L_4) in the following table.



Results

CLk	L_1	L_2	L_3	L_4
0				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

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