DLD Lab-13

Counters

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EL227 – Digital Logic Design-Lab

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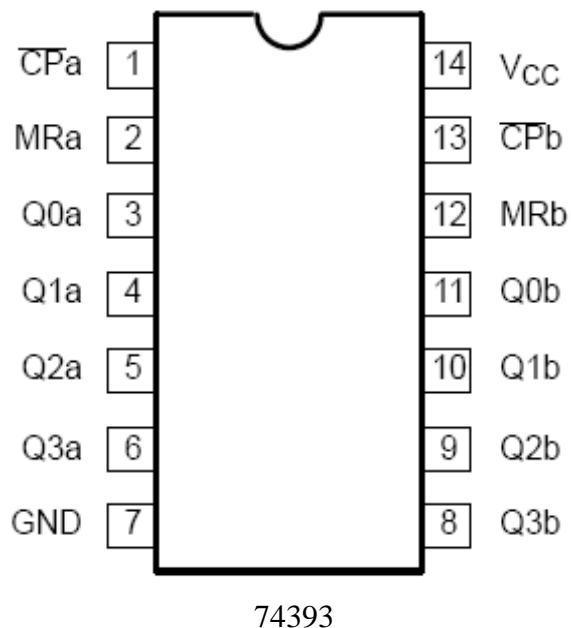
Contents

1. Counters

A register that goes through a prescribed sequence of states upon the application of input pulses is called a counter. The input pulses may be clock pulses or may originate from some other source, and they may occur at fixed intervals of time or random intervals. The sequence of states may follow the binary number sequence or any other sequence of states: A counter that follows the binary number sequence is called a binary counter.
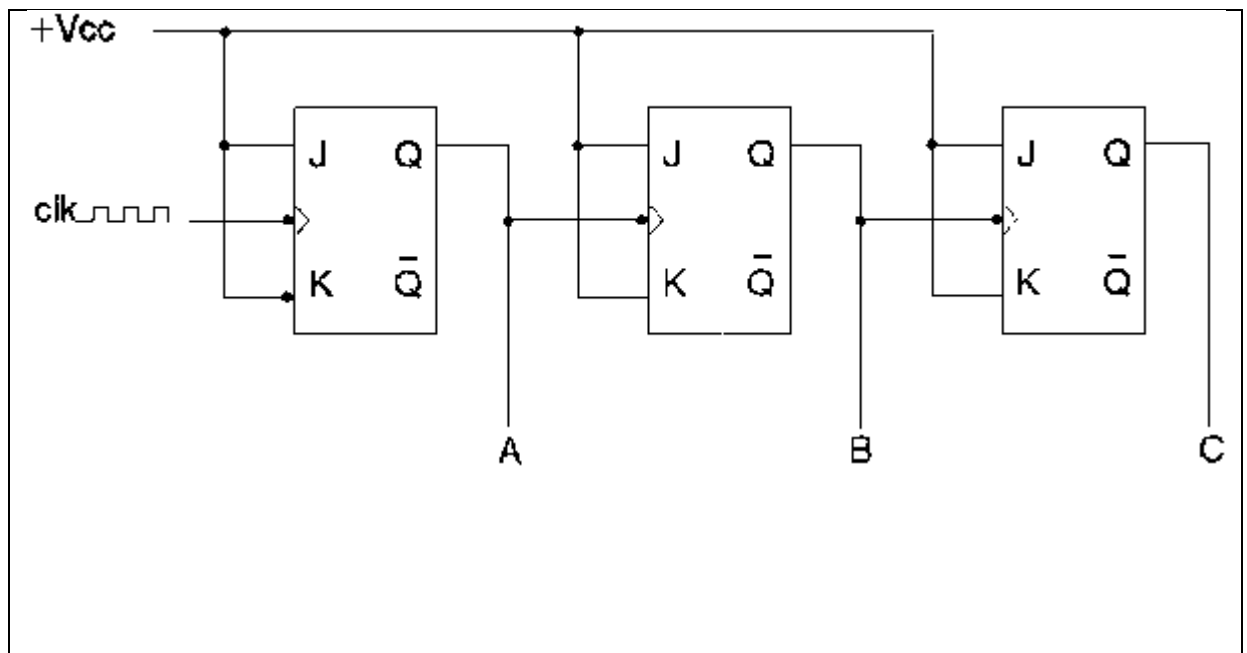
Counters are available in two categories: *ripple counters and synchronous counters*. In a ripple counter, the flip-flop output transition serves as a source for triggering other flip-flops. In other words, the clock inputs of some or all of the flip-flops are triggered not by the common clock pulses, but rather by the transition that occurs in other flip-flop outputs. In a synchronous counter, the clock inputs of all of the flip-flops receive the common clock pulse, and the change of state is determined from the present state of the counter.
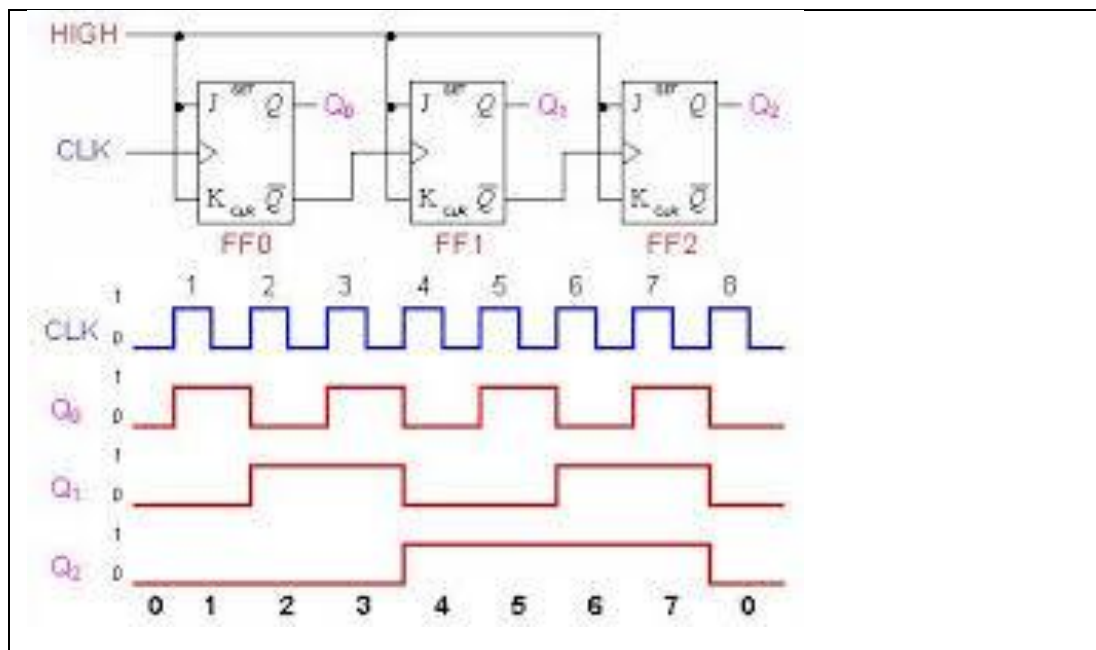
2. Pin Configuration of ICs

$\overline{CP}a$	1	14 V_{CC}
MRa	2	13 $\overline{CP}b$
Q0a	3	12 MRb
Q1a	4	11 Q0b
Q2a	5	10 Q1b
Q3a	6	9 Q2b
GND	7	8 Q3b

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3. Asynchronous Up Counter

Block Diagram:

Asynchronous Up Counter

Block Diagram:

4. Synchronous Counter (Up/Down)

Block Diagram:
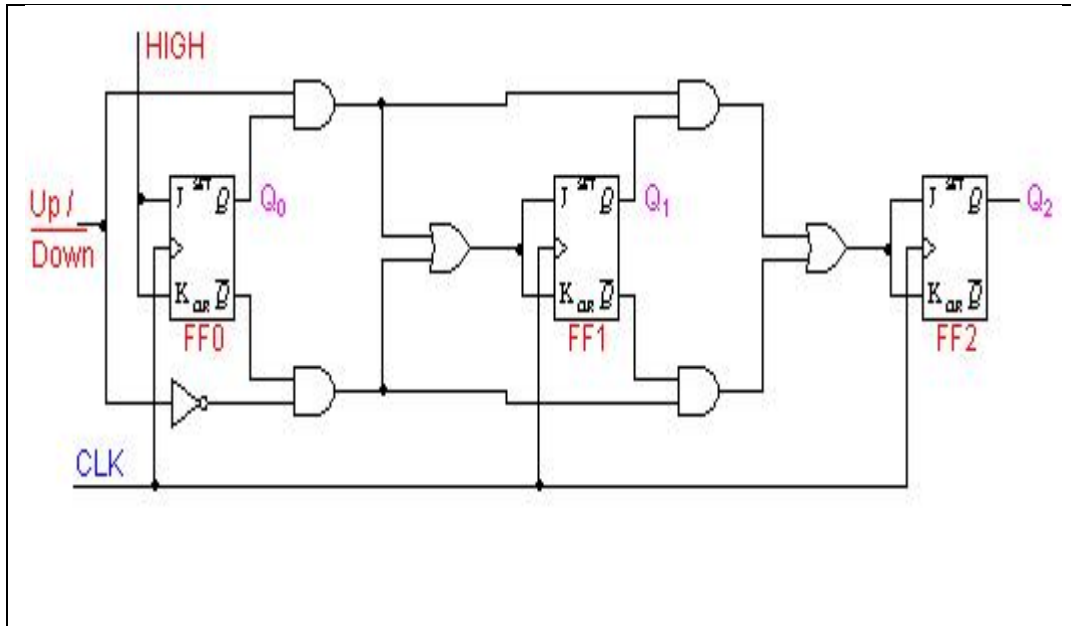
Counting Sequence

$\overline{\text{DOWN}}$/UP	Q0	Q1	Q2	
1	Count Up			
0	Count Down			

Procedure

    (a) Connect the trainer with the power supply

    (b) Supply the VCC and GND to the pin 16/14 and 8/7 respectively

    (c) Wire the pins of IC according to the diagram, refer to the pin configuration of ICs.

    (d) Drive Up/Down with the input switch on the trainer board and CP input from the clock on the trainer board. Connect output Q'sto LEDs.

    (e) Connect reset input to the switch. When high will reset the counter.

    (f) Observe and record the output on the LEDs.