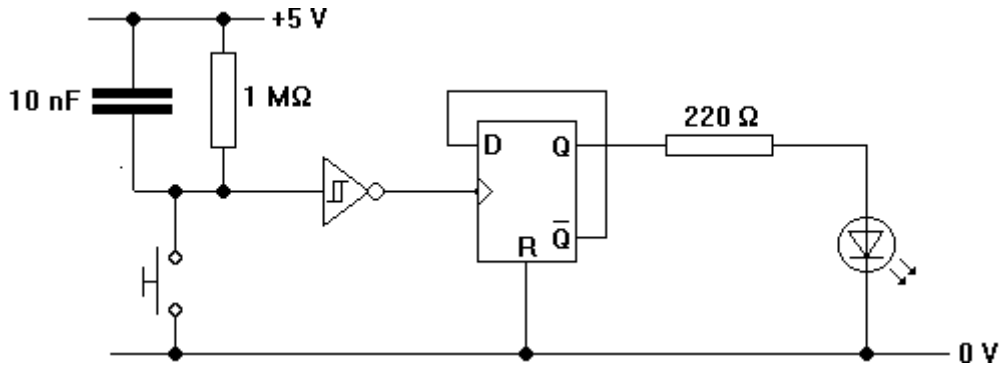
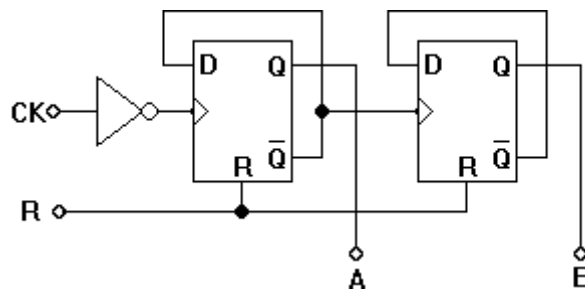


Simple counters

1. Start off by assembling the one-bit counter and pulse generator shown below. Use one of the flip-flops on a 4013 i.c. Remember to pull the S input low.



2. If all is well, the LED should change state every time you close the switch. Releasing the switch should have no effect.
3. Remove the 10 nF capacitor. The counter should now behave erratically when you press or release the switch. Why?
4. Now add the second flip-flop to make a two-bit up-counter, as shown below. Check that the system counts up correctly in binary.



5. Finally, alter the circuit so that it counts down instead of up. It would be a good idea to use drivers to control the LEDs as you will probably want access to the signals at A and B.