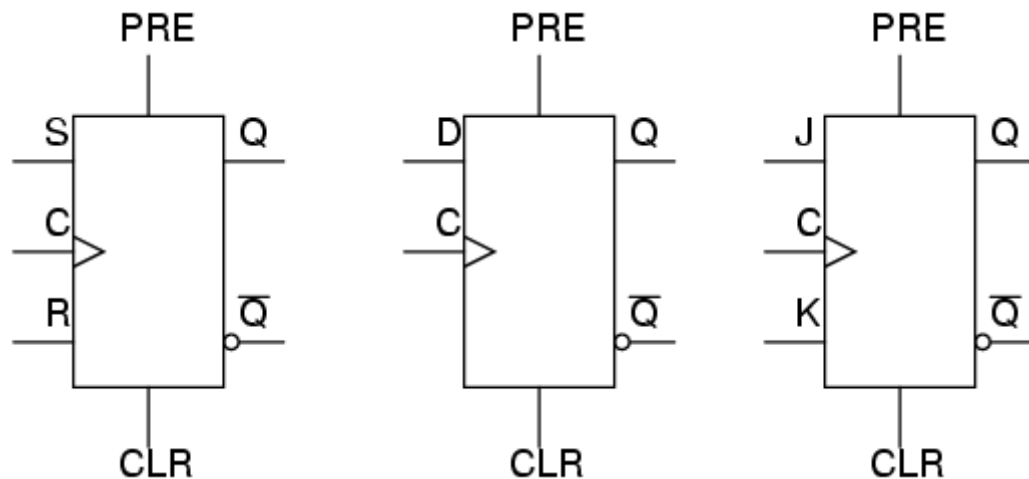


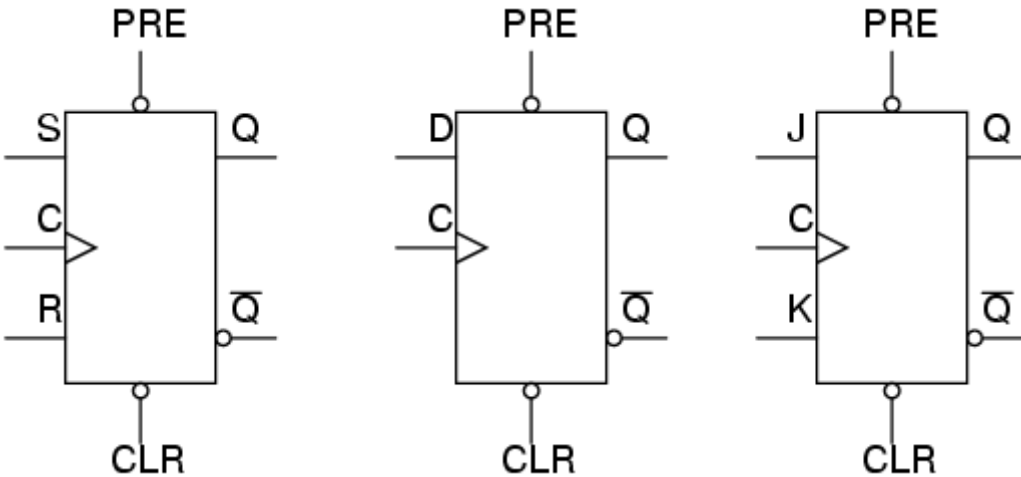
# Asynchronous flip flop inputs

The normal data inputs to a flip flop (D, S and R, or J and K) are referred to as *synchronous* inputs because they have effect on the outputs (Q and not-Q) only in step, or in sync, with the clock signal transitions. These extra inputs that I now bring to your attention are called *asynchronous* because they can set or reset the flip-flop regardless of the status of the clock signal. Typically, they're called *preset* and *clear*:

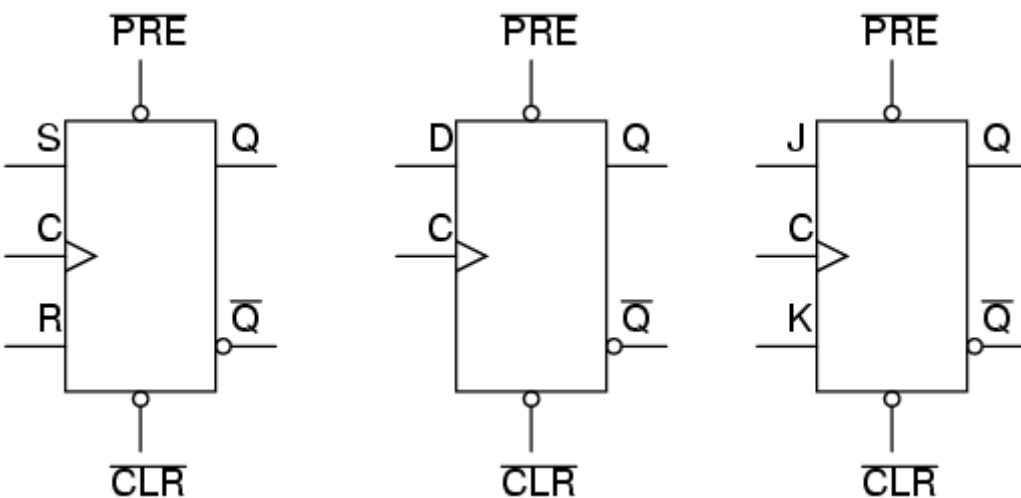


When the preset input is activated, the flip-flop will be set ( $Q=1$ ,  $\text{not-}Q=0$ ) regardless of any of the synchronous inputs or the clock. When the clear input is activated, the flip-flop will be reset ( $Q=0$ ,  $\text{not-}Q=1$ ), regardless of any of the synchronous inputs or the clock. So, what happens if both preset and clear inputs are activated? Surprise, surprise: we get an invalid state on the output, where Q and not-Q go to the same state, the same as our old friend, the S-R latch! Preset and clear inputs find use when multiple flip-flops are ganged together to perform a function on a multi-bit binary word, and a single line is needed to set or reset them all at once.

Asynchronous inputs, just like synchronous inputs, can be engineered to be active-high or active-low. If they're active-low, there will be an inverting bubble at that input lead on the block symbol, just like the negative edge-trigger clock inputs.



Sometimes the designations "PRE" and "CLR" will be shown with inversion bars above them, to further denote the negative logic of these inputs:



**REVIEW:**

- *Asynchronous* inputs on a flip-flop have control over the outputs (Q and not-Q) regardless of clock input status.
- These inputs are called the *preset* (PRE) and *clear* (CLR). The preset input drives the flip-flop to a set state while the clear input drives it to a reset state.
- It is possible to drive the outputs of a J-K flip-flop to an invalid condition using the asynchronous inputs, because all feedback within the multivibrator circuit is overridden.

Source: [http://www.allaboutcircuits.com/vol\\_4/chpt\\_10/7.html](http://www.allaboutcircuits.com/vol_4/chpt_10/7.html)