

A Ten Transistor Transparent Latch

The transparent latch designs used up to now require at least 18 transistors. In this problem, you will design and use a ten transistor implementation.

Part A Design a 2-to-1 multiplexer using only six transistors. Label the inputs IN_0 , IN_1 , and $Select$. Label the output OUT . If you use pass gates, you must hook up both control inputs.

Part B Now design a static transparent latch using only ten transistors. **Your design should never produce contention.** If you use the multiplexer from part A, redraw the circuit rather than using an icon. Label the signals In , Out , and $Enable$. (Hint #1: The minimum storage device is two cross-coupled inverters.) (Hint #2: How did the register use a 2 to 1 MUX?)

Part C Complete the timing diagram for circuit below based on the specified inputs. Assume all latch values are initially zero.

