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Stop Clock Explanation

The device that I created is a stop watch. If it were not for the existence of the stop watch, many people would have trouble keeping records of time. For example, try to imagine the Olympics without a stop watch and all the chaos that would occur.

The first step to creating a stop watch is creating a four bit ripple counter. This is done so by having 4 T Flip-Flops. Attached to these flip-flops are 4 Toggle Switches, one to the Pre', T, >, and CLR'. Then you would have your output Q attached to a light bulb. When the light bulb is on that information is stored unless cleared by flipping the CLR' switch.

The second step is to integrate the circuit and I named it "4 bit ripple counter. From this point I had 2 toggle switches attached through the PRE' and > ports. Likewise, I had a clock attached to the other > port. From this point I made a connection from all of the out puts to a digital clock. At this point my digital clock would show seconds in hexadecimal. To change this I had to somehow have it limit its count to 9 and then start from zero again. To do this I had to make an additional connection from the 4 outputs, from the 4 bit ripple counter, to an AND gate with a 4 input count. To limit the number to nine I had to run the wires from 2^0 and 2^2 through a NOT gate, because when trying to make the number nine you use the value of 10 in binary and for which ever one of the outputs are 0 I ran through a NOT gate before connecting it to the AND gate.

In the next step I ran a wire from a push button and from the output of the previous AND gate through a AND gate that is connected to the Reset input, on the 4 bit ripple counter. The next couple of steps are really similar. The only thing that I would change is that instead of having a clock connect to the > input I used the 4 input AND gate. By repeating this process and adjusting my number limits by changing the not gates connected to my AND gates, I was able to create a clock that would keep time up to 59 Minutes.

To turn this digital clock into a stop watch I simply had 1 toggle switch connected to all of my > inputs. This gives me the ability to control the time. I can pause the time and have it stop when I want to. The last step was to have 1 clear button attached to where the other clear buttons were located, essentially replacing the 4 clear buttons with just one. At this point I have myself a fully functional stop watch that I can start, stop, and reset the time.