

As we were required to toggle between lower-case and upper-case letters, we had to locate the MIF file and extend to address range 100h-1FFh and update the LCD codes. The address range is exactly h100 higher than their lower counterparts, and the LCD codes are 20 less. After all codes were updated, the PS2 controller is now able to type out uppercase letters.

To utilize the uppercase letters, we created a variable named `upper_lower` that tracks when the board should output uppercase letters or lowercase letters. The conditional that we set that to was that if the lowest significant switch was odd, then uppercase letters were outputted. On the other hand, if the lowest significant switch that is low is even, then lowercase letters would be outputted. This was done by using if and else if statements that set `upper_lower` to 1'b1 uppercase is triggered, and 1'b0 if lowercase is triggered. If no switches are low, the board will output lowercase letter. Within the `S_IDLE` state, the address is shifted h100 if `upper_lower` is set to 1'b1. Furthermore, using this method allows us to continue using one variable for both upper and lowercase letters, instead of creating another variable to toggle to.

To check for the “match” status, an if statement that checks if the first 8 characters match the second 8 characters is implemented while also checking if it is being typed in the first line through the `LCD_line` variable. If the if statement is true, a “d” will be displayed in the leftmost 7-segment display. This display will be cleared as soon as another character is typed by resetting the display in the code. The same code is implemented for “reverse match” status however the conditions are slightly altered to fit the conditional of it.