

Lab #7
Scrolling LEDs
Pre-lab

1. Assume P0 already has a bit pattern stored in it. Give the assembly commands that will scroll the LEDs one position to the left. The LEDs should wrap around (P0.7 goes to P0.0).
2. Scrolling speed will be modified in increments of 0.02 seconds. Calculate the number of times a timer increments in 0.02 seconds. Recall that the 8052 runs at 11.0592 Mhz and that 12 clocks ticks is 1 instruction cycle. An enabled timer increments once per instruction cycle.
3. We suggest you use timer2 in auto-reload mode for this lab. Show how to put timer 2 in auto-reload mode and start it running using the T2CON SFR.
4. In order to overflow every 0.02 seconds, you need to set the high and low byte of the reload value stored in RCAP2L and RCAP2H. Given the timer overflows when it reaches 65536, calculate the values to set in RCAP2L and RCAP2H to achieve the number of timer increments found in problem 2.

5. You want timer2 to cause an interrupt on overflow. Show the instructions needed to enable the timer2 interrupt using the IE SFR. Remember to globally enable interrupts.

6. You will also need to create an Interrupt Service Routine (ISR) triggered on event external0. Using the IE, IP, and TCON SFRs, show the instructions needed to enable a high-priority interrupt when a 1-0 transition occurs on P3.2.

7. Sketch out a high level design of the various parts of the program you intend to build. This should include an ISR for updating the LEDs, an ISR for responding to an external0 event, and the main program that responds to button pushes.