

LAB 6

TIMER & COUNTER PROGRAMMING

OBJECTIVES:

- To program the 8051 timer.
- To generate a square wave using the 8051 timer.

REFERENCE:

- Mazidi and Mazidi, "The 8051 Microcontroller and Embedded Systems,".

MATERIALS:

- 8051 board
- 8051 assembler
- Oscilloscope

ACTIVITY 1

Write a program using timer 0 to generate a 500 Hz square wave frequency on one of the pins of P1. Then examine the frequency using the oscilloscope. Modify the count value to make sure that the frequency is exactly 500 Hz.

ACTIVITY 2

Write a program using timer 1 to generate a 1 kHz square wave frequency on one of the pins of P1. Then examine the frequency using the oscilloscope. Modify the count value to make sure that the frequency is exactly 1 kHz.

For this lab you need an external source of the square wave. This can be from a signal generator (function generator).

ACTIVITY 3

Connect the square wave to pin P3.4 for timer 0 and set the frequency to 1 Hz. Write and run a program for counter/timer 0 to count up from 00 to a maximum of 255 (FFH) as each pulse is fed into the 8051. The count is displayed on the LCD (or sent to a PC monitor via the serial port). Notice that the numbers displayed for the count must be in decimal (00 -255). That means that the counter value must be converted from hex to decimal and then made into ASCII to be displayed on the LCD (or PC monitor).

If you do not have access to a square wave generator you can use a debounce switch to generate each pulse by pressing the push-button switch.

LAB 6 WORKSHEET

ACTIVITY 4

Modify and run the program from Activity 1 to count from 100 to 255 instead of 00 to 255. Since upon reset TL1=0, you must set TL1= -100 in addition to TH1= -100.

ACTIVITY 5

Connect a 60Hz square wave to timer/counter 1 (pin P3.5) and write and run a program to generate a clock to keep time. The time is in the form hr:min:sec. The time displayed on the LCD (or PC screen) always starts from a fixed time, e.g., 01:00:00.