**Lab:7**

**Generating a PWM Waveform**



**MBSD Lab**

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**Submitted by:**

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“On my honor, as a student of University of Engineering and Technology Peshawar, I have neither nor received unauthorized assistance on this academic work”

**Submitted to:**

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**Task1: In the following program, create a square wave of 50% duty cycle (with equal portions high and low) on the P1.5 bit. Timer 0 is used to generate the time delay. Analyze the program. Also calculate the delay generated. Assume XTAL=11.0592MHz**

#include <8051.h>

void delay(unsigned int count) {

while(count--);

}

void main() {

TMOD = 0x01; // Set Timer 0 in mode 1 (16-bit mode)

TH0 = 0x00; // Set the initial value of Timer 0's high byte

TL0 = 0x00; // Set the initial value of Timer 0's low byte

while(1) {

// Toggle P1.5 to generate the square wave

P1 ^= (1 << 5);

// Generate a delay to control the frequency of the square wave

delay(50000); // Adjust this value to control the delay and frequency

}

}

In this program, Timer 0 is set to operate in 16-bit mode (mode 1). The **delay** function is a simple loop that introduces a delay by executing a certain number of iterations. The value passed to the **delay** function determines the delay length.

To calculate the delay generated, we need to consider the clock frequency (XTAL) and the number of iterations in the **delay** function. Assuming XTAL = 11.0592 MHz, we can calculate the delay as follows:

The clock frequency (F\_clk) = 11.0592 MHz

Each instruction cycle takes 12 oscillator periods, so the machine cycle frequency (F\_m) is:

F\_m = F\_clk / 12 = 11.0592 MHz / 12 = 921.6 kHz

To calculate the number of machine cycles required for a delay of 50000, we can use the formula:

Number of machine cycles = (Delay \* F\_m) / 1000

Number of machine cycles = (50000 \* 921.6 kHz) / 1000 = 46080

Therefore, the delay generated by the **delay** function in this program is approximately 46080 machine cycles. Adjusting this value will control the frequency of the square wave.

Schematric diagram:



