MICROCONTROLLER AND ITS APPLICATIONS

VARUN AGARWAL

16BEC0450

Slot : L37+38

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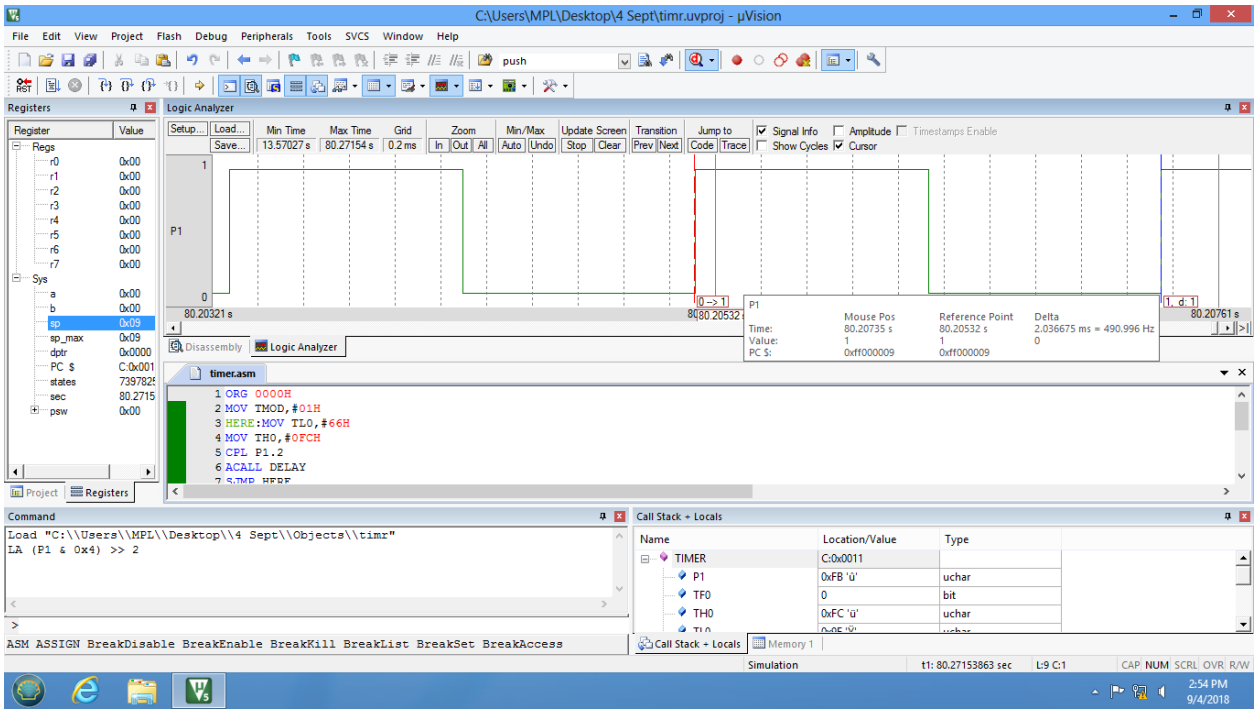
Program 1

Write a program using timer 0 to generate a 500 Hz square wave frequency on one of the pins of P1.0 Then examine the frequency using the KEIL IDE inbuilt Logic Analyzer.

PROGRAM:

```
ORG 0000H
MOV TMOD,#01H
HERE:MOV TL0,#66H
MOV TH0,#0FCH
CPL P1.0
ACALL DELAY
SJMP HERE
    DELAY:SETB TR0
    AGAIN:JNB TF0,AGAIN
    CLR TF0
    CLR TR0
    RET
    END
```

OUTPUT:



INFERENCE:

1. Delay of the TIMER is defined by the oscillating frequency, generally set as 11.0592M Hz.

2. Count for the timer is calculated at this frequency only.

3. Timer start from the count FC64 reaches value FFFFH, after it roll over and becomes 0000H, and TF = 1, where we stop the timer and clears TF bit.

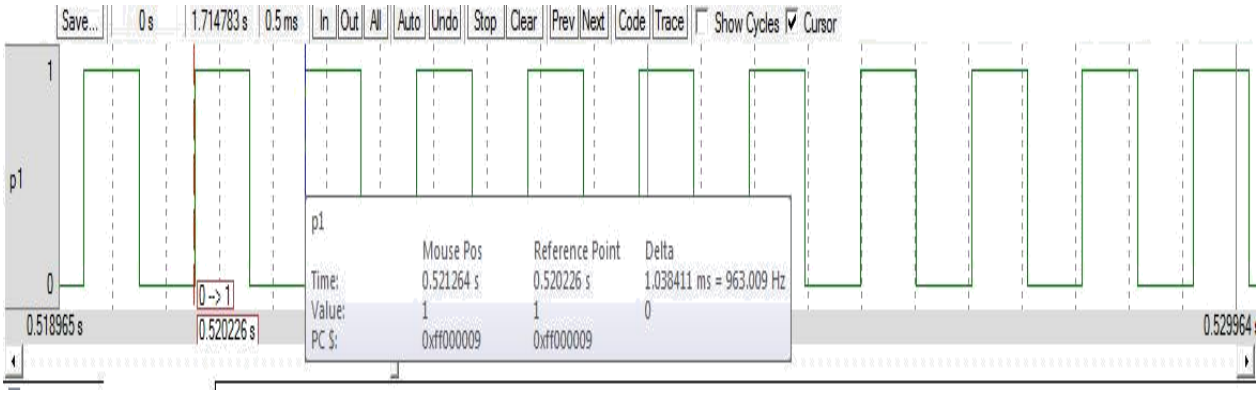
Program 2

- 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 KEIL IDE inbuilt Logic Analyzer.

PROGRAM:

```
ORG 0000H
MOV TMOD,#20H
MOV TH0,#26
HERE:MOV R5,#2
ACALL DELAY
CPL P1
SJMP HERE
    DELAY:SETB TR1
    AGAIN:JNB TF1,AGAIN
    CLR TF1
    CLR TR1
    DJNZ R5,DELAY
    RET
    END
```

OUTPUT:



INFERENCE:

1. Delay of the TIMER is defined by the oscillating frequency, generally set as 11.0592M Hz.

2. Count for the timer is calculated this frequency only.
3. Timer start from the count FE32 reaches value FFFFH, after it roll over and becomes 0000H, and TF = 1, where we stop the timer and clears TF bit.

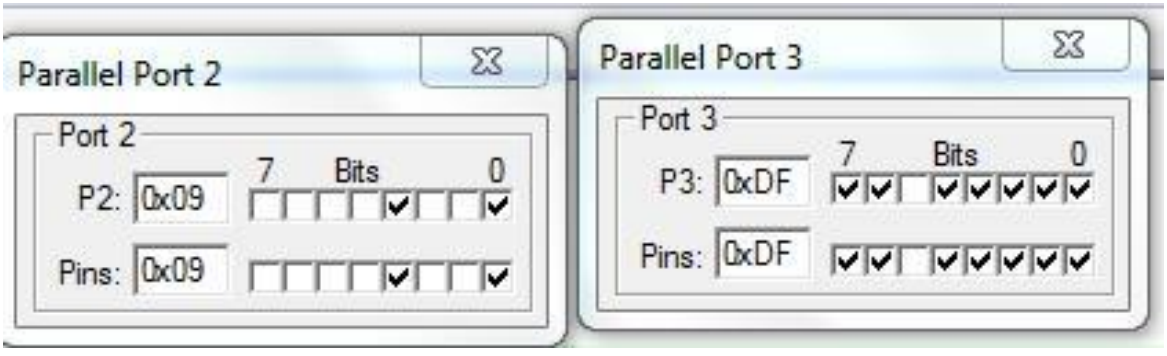
Program 3

Assuming that clock pulses are fed into pin T1, write a program for counter 1 in mode 2 to count the pulses and display the state of the TL1 count on P2, which connects to 8 LEDs.

PROGRAM:

```
ORG 0000H
MOV TMOD,#60H
SETB P3.5
MOV TH1,#00H
HERE: SETB TR1
BACK: MOV A,TL1
MOV P2,A
JNB TF1,BACK
CLR TF1
SJMP HERE
END
```

OUTPUT:

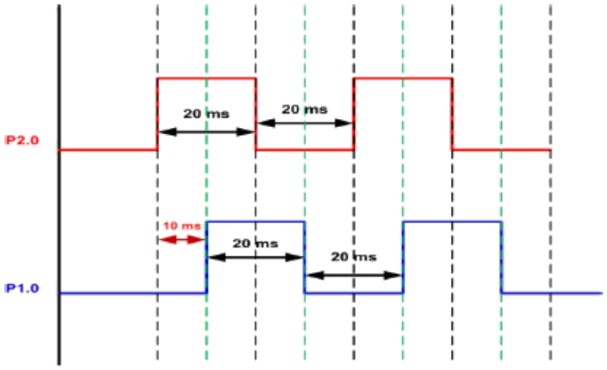


INFERENCE:

As we change the bit of P3.5 externally, it counts and the count value is displayed in binary form in port.

Task 3A

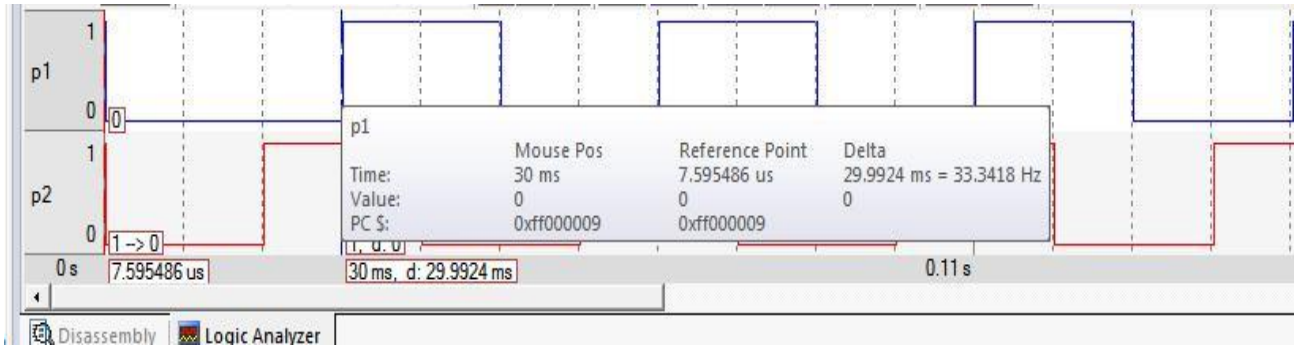
Develop an 8051 ALP / C program to generate square waves as shown below. examine the same using the KEIL IDE inbuilt Logic Analyzer.



PROGRAM:

```
ORG 0000H
MOV TMOD,#01H
MOV TH0,#0b7H
MOV TL0,#0FeH
CPL P1.0
CPL P2.0
SETB TR0
back1:JNB TF0,BACK1
CLR TR0
CLR TF0
HERE:
MOV TH0,#0dcH
MOV TL0,#00H
CPL P2.0
ACALL DELAY
MOV TH0,#0dcH
MOV TL0,#00H
CPL P1.0
ACALL DELAY
SJMP HERE
DELAY: SETB TR0
BACK: JNB TF0,BACK
CLR TR0
CLR TF0
RET
END
```

OUTPUT:



INFERENCE:

The expected graph is obtained by initially plotting 20 ms and then as per the graph changing the values by the count of 10 ms.

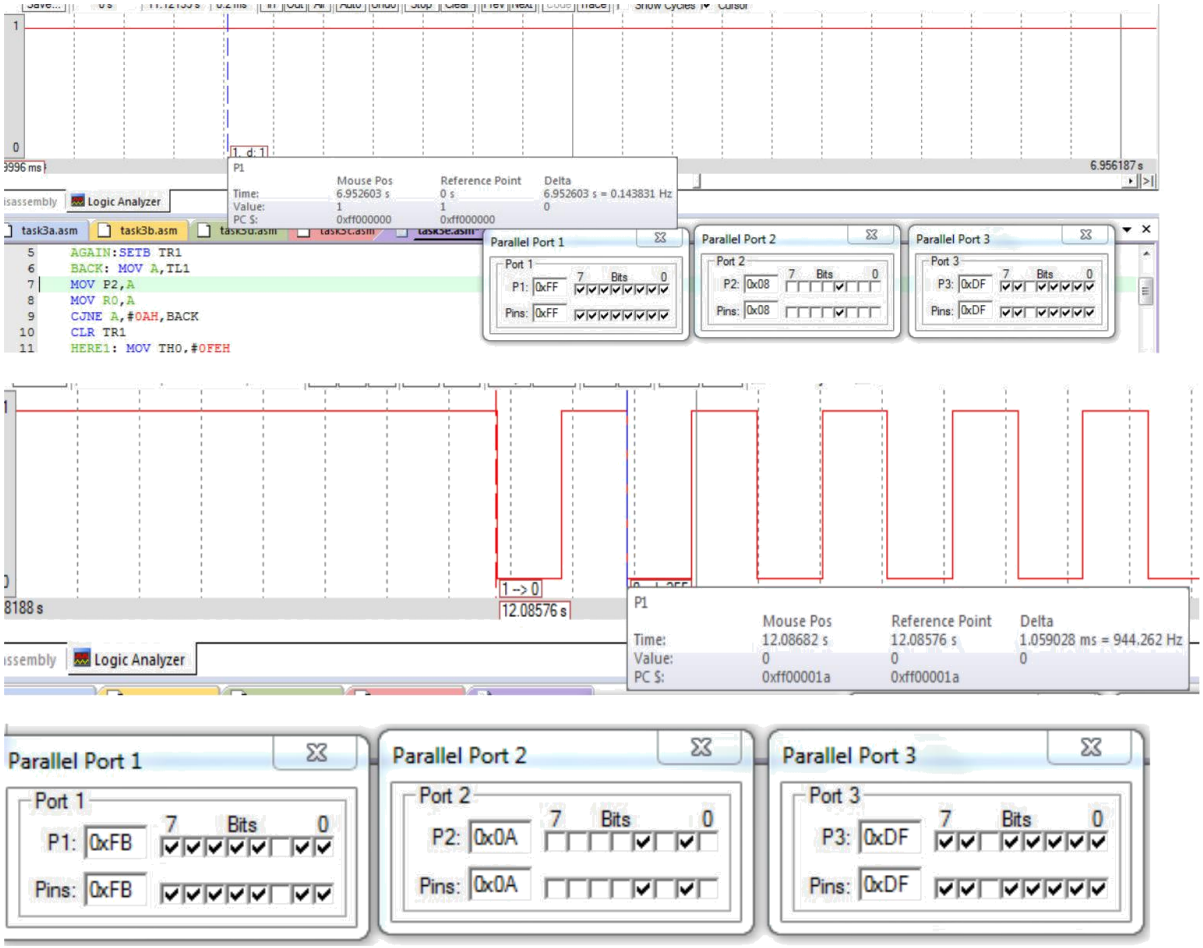
Task 3B

Use Counter 1 in mode 2 and after 10 number of counts on TL1, generate a SQUARE waveform of 1 KHz on P1.2 by using Timer 0 in mode 1, also show the counts in TL1 on port 2.

PROGRAM:

```
ORG 0000H
    MOV TMOD,#61H
    SETB P3.5
    MOV TH1,#0H
    AGAIN:SETB TR1
    BACK: MOV A,TL1
    MOV P2,A
    MOV R0,A
    CJNE A,#0AH,BACK
    CLR TR1
    HERE1: MOV TH0,#0FEH
    MOV TL0,#32H
    CPL P1.2
    ACALL DELAY
    SJMP HERE1
    DELAY:SETB TR0
    BACK1:JNB TF0,BACK1
    CLR TR0
    CLR TF0
    CLR TR1
    CLR TF1
    SJMP AGAIN
    RET
    END
```

OUTPUT:



INFERENCE:

For count less than 10 there is no square wave generated but as soon as the count of pulse reaches 10 required square wave is generated.