21BDS0340

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Microprocessors and Microcontrollers Lab

Task – III

Question 1

Aim:

Write an ALP 8051 program for timer 0 to generate a 200 Hz square wave frequency on P1.0. Examine the time using the KEIL IDE inbuilt Logic Analyzer

Tools Required:

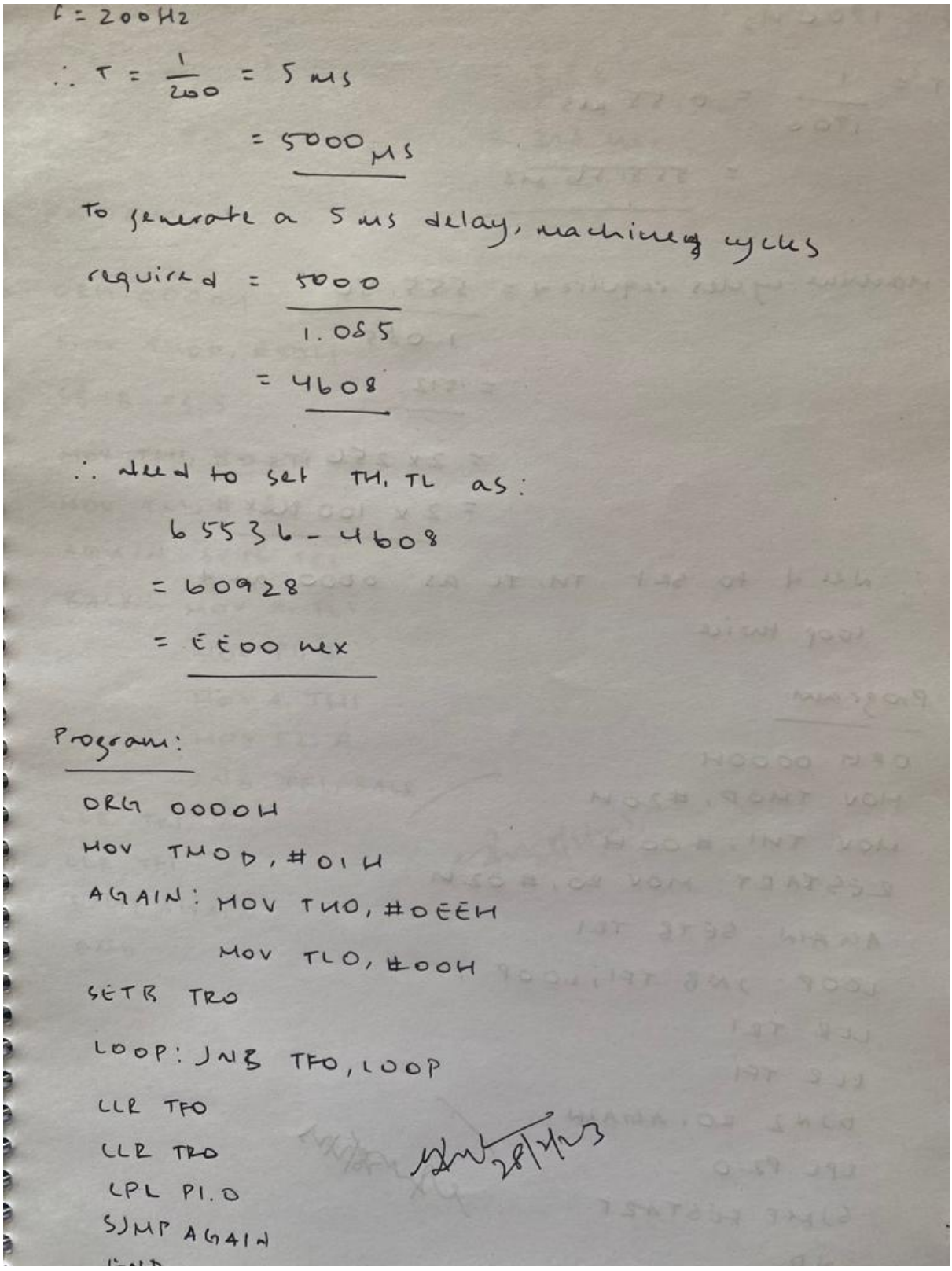
8051 microcontroller

Keil microcontroller software

Program:

Memory Locations	Label	Mnemonics	Comments
		ORG 0000H	
0000H		MOV TMOD, #01H	Timer 0, mode 1
0003H	AGAIN:	MOV TH0, #0EEH	Setting time limit
0006H		MOV TL0, #00H	
0009H		SETB TR0	Start timer 0
000BH	LOOP:	JNB TF0, LOOP	Loop till timer 0 flag is 1
000EH		CLR TF0	Clear timer 0 flag
0010H		CLR TR0	Clear timer 0 start
0012H		CPL P1.0	Complement P1.0 to create square wave
0014H		SJMP AGAIN	Loop to AGAIN to repeat
		END	

Manual Calculations:



$f = 200Hz$

$\therefore T = \frac{1}{200} = 5ms$

$= 5000\mu s$

To generate a 5 ms delay, machine cycles required $= \frac{5000}{1.085}$

$= 4608$

$\therefore$ need to set TH, TL as:

$65536 - 4608$

$= 60928$

$= EE00$ Hex

Program:

```
ORG 0000H
MOV TMOD, #01H
AGAIN: MOV TH0, #0EEH
       MOV TL0, #00H
SETB TR0
LOOP: JNB TF0, LOOP
CLR TF0
CLR TR0
CPL P1.0
SJMP AGAIN
```

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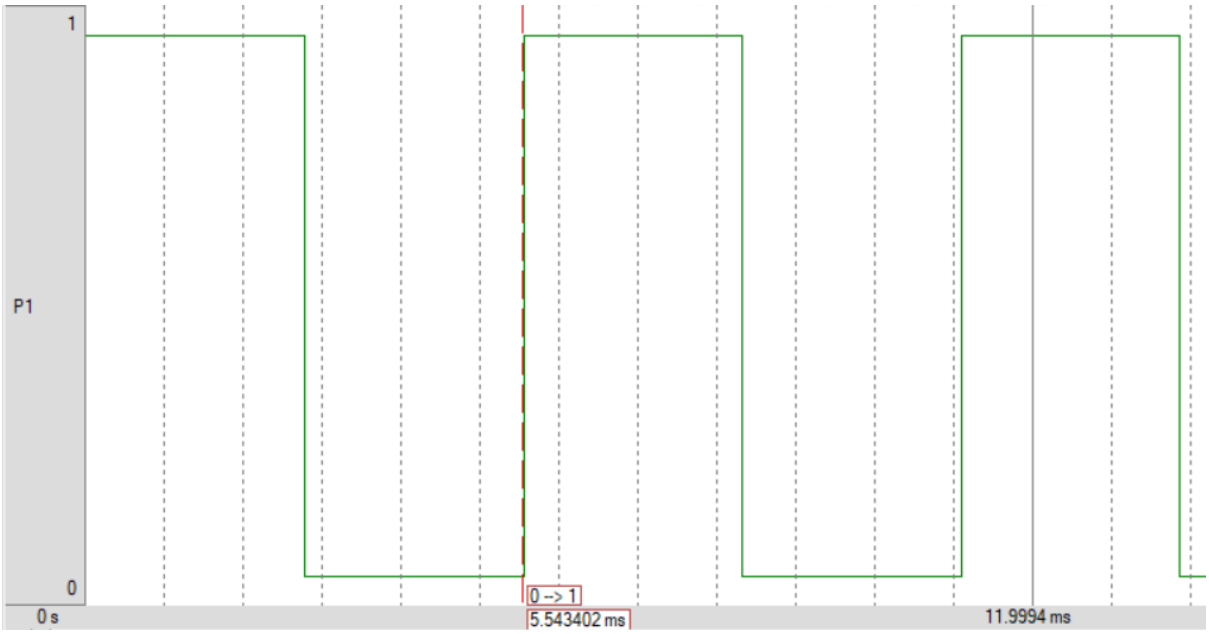
Output:



Result:

This program generates a square wave of frequency 200Hz on P1.0

Question 2

Aim:

Write an ALP 8051 program for timer 1 and 8-bit auto reload mode to generate a 1.8 kHz square wave frequency on P2.0. and examine the frequency using the KEIL IDE inbuilt Logic Analyzer

Tools Required:

8051 microcontroller

Keil microcontroller software

Program:

Memory Locations	Label	Mnemonics	Comments
		ORG 0000H	
0000H		MOV TMOD, #20H	Timer 1, mode 2
0003H		MOV TH1, #00H	Setting time limit
0006H	RESTART:	MOV R0, #02H	Need to run timer twice
0008H	AGAIN:	SETB TR1	Start timer 1
000AH	LOOP:	JNB TF1, LOOP	Loop till timer1 flag is 1
000DH		CLR TR1	Clear timer 1 start
000FH		CLR TF1	Clear timer 1 flag
0011H		DJNZ R0, AGAIN	Decrement R0 and go to AGAIN if not zero
0013H		CPL P2.0	Complement P2.0 to create square wave
0015H		SJMP RESTART	Loop to RESTART to repeat
		END	

Manual Calculations:

$f = 1800\ Hz$

$T = \frac{1}{1800} = 0.55\ ms$

$= 555.56\ \mu s$

Machine cycles required $= \frac{555.56}{1.085}$

$= .512$

$= 2 \times 256$

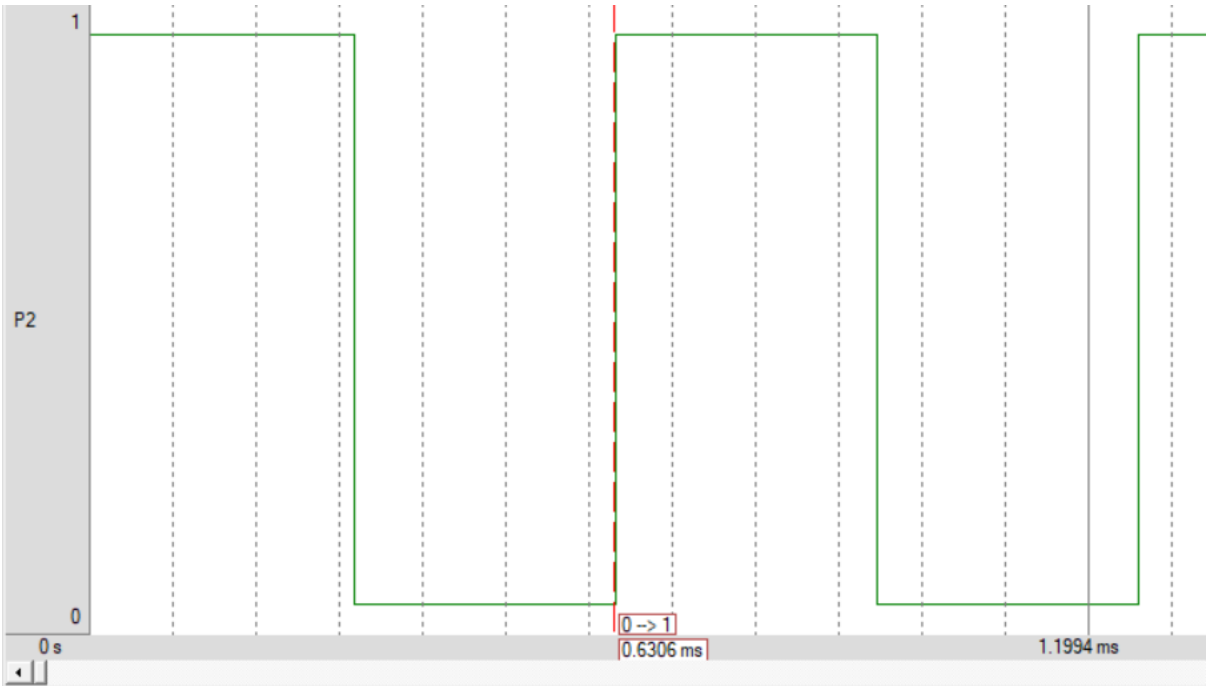
$= 2 \times 100\ hex$

∴ Need to set TH, TL as 0000 and loop twice

Program

```
ORG 0000H
MOV TMOD, #20H
MOV TH1, #00H
RESTART: MOV R0, #02H
AGAIN: SETB TR1
LOOP: JNB TF1, LOOP
CLR TR1
CLR TF1
DJNZ R0, AGAIN
CPL P2.0
SJMP RESTART
END
```

Output:



Result:

This program generates a square wave of frequency 1800Hz on P2.0

Question 3

Aim:

Write an ALP 8051 program for counter 1, mode1 and external pulse to count up to 65,000 and display the count on P2 and P1

Tools Required:

8051 microcontroller

Keil microcontroller software

Program:

Memory Locations	Label	Mnemonics	Comments
		ORG 0000H	
0000H		MOV TMOD, #50H	Counter 1, mode 1
0003H		SETB P3.5	Setting P3.5 as input
0005H		MOV TH1, #02H	Setting counter limit
0008H		MOV TL1, #18H	
000BH	AGAIN:	SETB TR1	Starting timer 1
000DH	BACK:	MOV A, TL1	Moving LSB of counter to P1
000FH		MOV P1, A	
0011H		MOV A, TH1	Moving MSB of counter to P1
0013H		MOV P2, A	
0015H		JNB TF1, BACK	Jump to BACK if timer flag 1 is not zero
0018H		CLR TR1	Clear timer 1 start
001AH		CLR TF1	Clear timer 1 flag
001CH		SJMP AGAIN	Loop to AGAIN to repeat
		END	

Manual Calculations:

Need to set TH1 TL as = 65536 - 65000

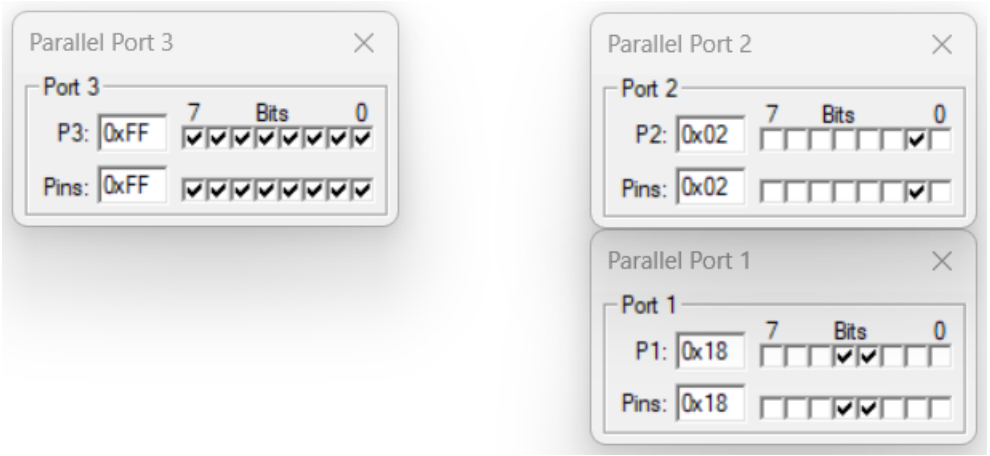
= 536

= 218 Hex

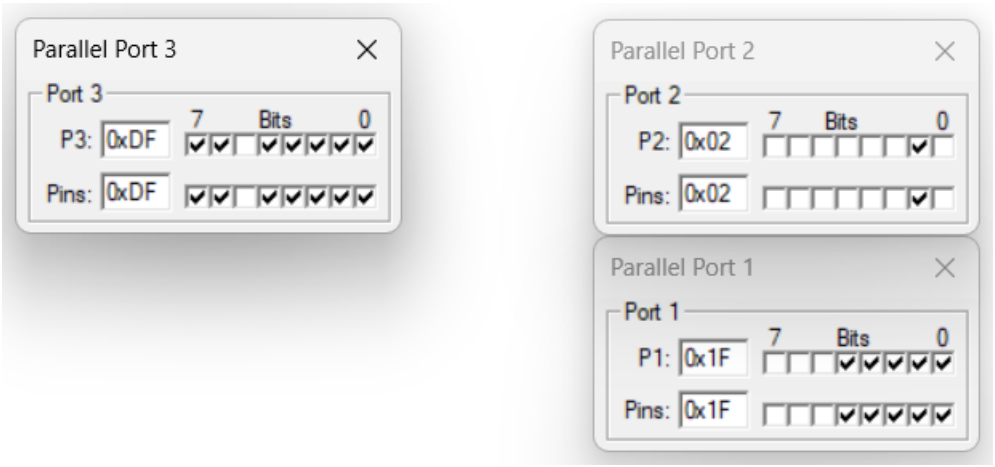
Program

```
ORG 0000H
MOV TMOD, #50H
SETB P3.5
MOV TH1, #02H
MOV TL1, #18H
AGAIN: SETB TR1
BACK: MOV A, TL1
      MOV P1, A
      MOV A, TH1
      MOV P2, A
      JNB TF1, BACK
CLR TR1
CLR TF1
SJMP AGAIN
END
```

Output:



After a few toggles of P3.5



Result:

This program creates a counter that can count to 65000 by input on P3.5 and displaying the current count on P2 and P1