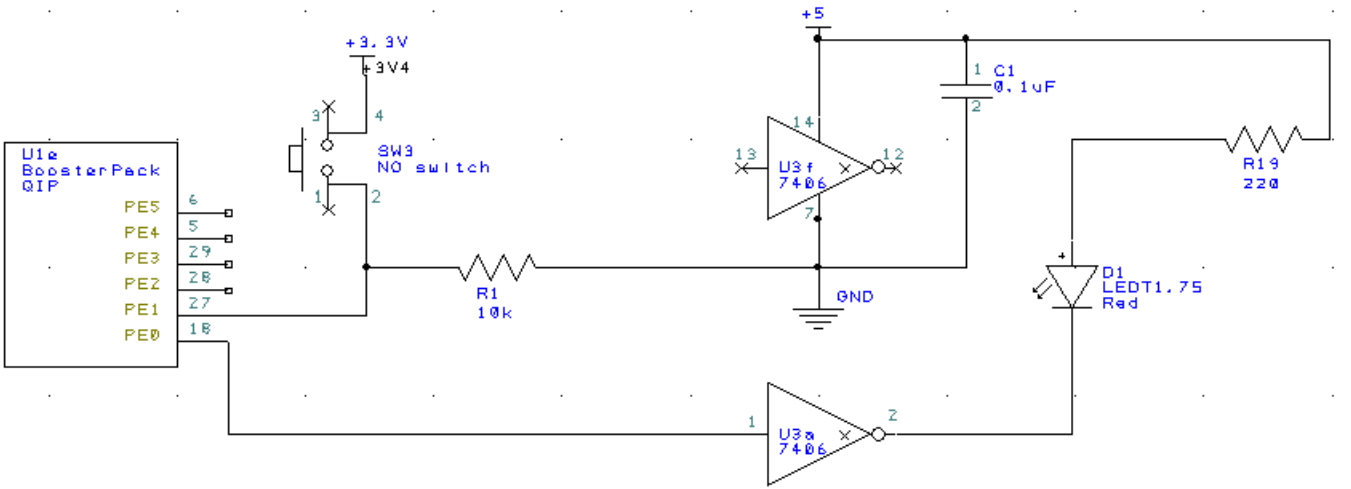
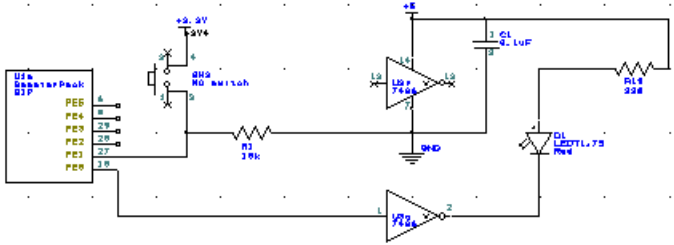
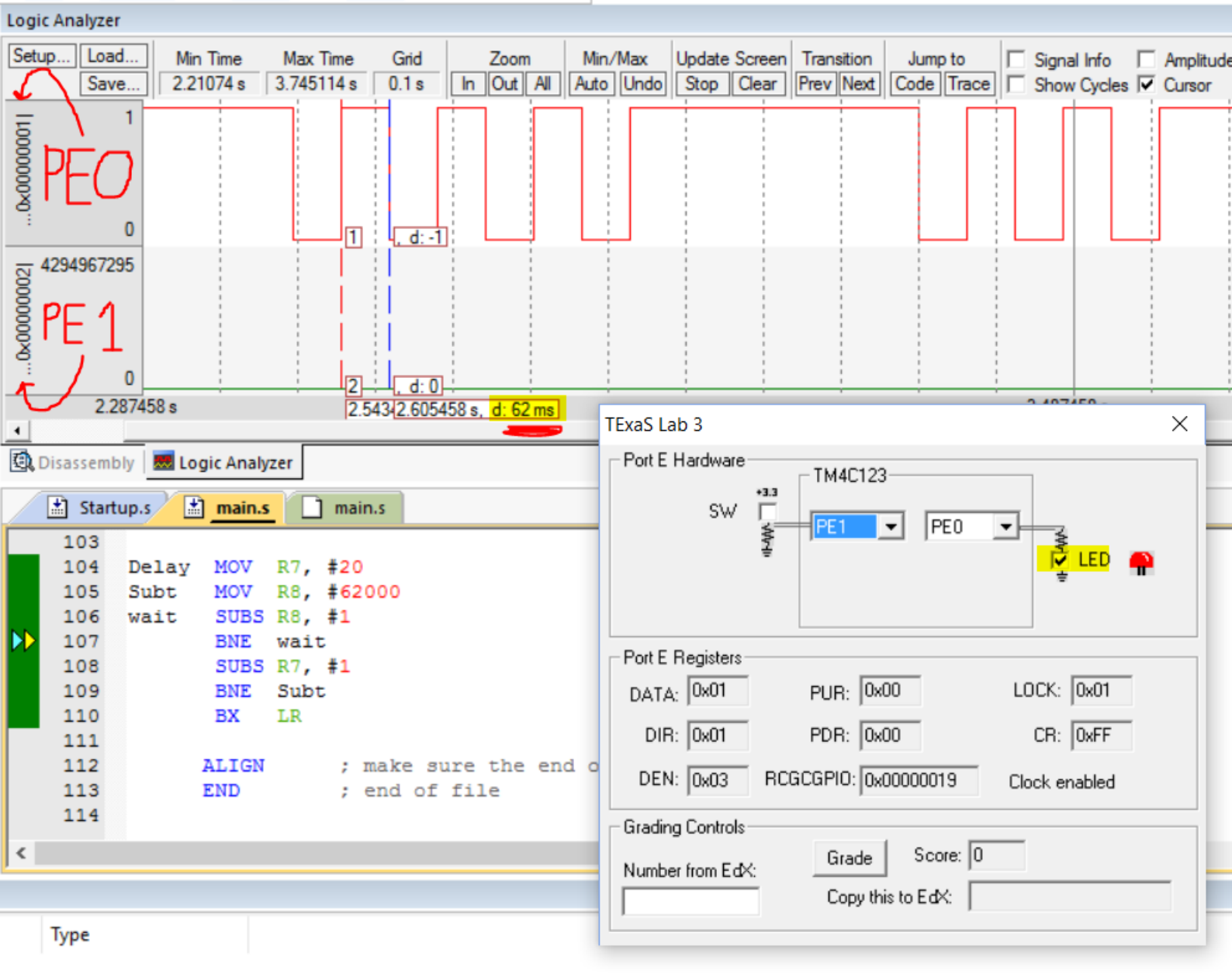

+3.3V
+3V4
U1e
BoosterPack
QIP
PE5
PE4
PE3
PE2
PE1
PE0
6
5
29
28
27
18
SW3
NO switch
3
4
1
2
R1
10k
+5
14
13
U3f
7406
12
7
GND
1
C1
0.1uF
2
R19
220
D1
LEDT1.75
Red
1
U3a
7406
2



University Of Texas At Austin	
Schematic Name: Lab 3	
Name(s): Kaela Todd and Megan Cooper	
Date: January 23, 2016	Semester: Spring 2016


Logic Analyzer
Setup...
Load...
Save...
Min Time
2.21074 s
Max Time
3.745114 s
Grid
0.1 s
Zoom
In
Out
All
Min/Max
Auto
Undo
Update Screen
Stop
Clear
Transition
Prev
Next
Jump to
Code
Trace
Signal Info
Show Cycles
Amplitude
Cursor
0x00000001
1
PE0
0
4294967295
0x00000002
PE1
0
1
, d: -1
2
, d: 0
2.287458 s
2.543
2.605458 s, d: 62 ms
Disassembly
Logic Analyzer
Startup.s
main.s
main.s
103
104 Delay MOV R7, #20
105 Subt MOV R8, #62000
106 wait SUBS R8, #1
107 BNE wait
108 SUBS R7, #1
109 BNE Subt
110 BX LR
111
112 ALIGN ; make sure the end o
113 END ; end of file
114
Type
TExaS Lab 3
Port E Hardware
TM4C123
SW
+3.3
PE1
PE0
LED
Port E Registers
DATA: 0x01
PUR: 0x00
LOCK: 0x01
DIR: 0x01
PDR: 0x00
CR: 0xFF
DEN: 0x03
RCGCGPIO: 0x00000019
Clock enabled
Grading Controls
Number from EdX:
Grade
Score: 0
Copy this to EdX:

Parameter	Value	Units	Conditions
Resistance of the 10kΩ resistor, R1	9.95kΩ	Ohms	With power off and disconnected from circuit (measured with ohmeter)
Supply Voltage $V_{+3.3}$	2.975 V	Volts	Powered (measured with voltmeter)
Input Voltage V_{PE1}	37 mV	Volts	Powered, but with switch not pressed (measured with voltmeter)
Resistor Current	0mA AND 0mA	mA	Powered, but switch not pressed I = V_{PE1}/R1 (calculated and measured with an anmeter)
Input Voltage V_{PE1}	2.93 V	Volts	Powered and with switch pressed (measured with voltmeter)
Resistor Current	Calculated: .37 mA Measured: 0.29 mA	mA	Powered and switch pressed I = V_{PE1}/R1 (calculated and measured with anmeter)

Row	Parameter	Value	Units	Conditions
1	Resistance of the 220Ω resistor R19	219.5Ω	Ohms	With power off and disconnected from circuit (measured with ohmeter)
2	+5 V power supply V_{+5}	4.95 V	Volts	(measured with voltmeter relative to ground, notice that the +5V power is not exactly +5 volts)
3	TM4C123 Output V_{PE0} Input to 7406	3.266 V	Volts	with **PE0** = 0 (measured with voltmeter relative to ground)
4	7406 Output V_{k-} LED k-	.59 V	Volts	with **PE0** = 0 (measured with voltmeter relative to ground)
5	LED a+, V_{a+} Bottom side of R19	2.43 V	Volts	with **PE0** = 0 (measured with voltmeter relative to ground)
6	LED Voltage	1.86 V	Volts	calculated as V_{a+} - V_{k-}
7	LED Current	Calculated: 11.48 mA Measured: 9.7 mA	mA	calculated as (V_{+5} - V_{a+})/R19 and measured with an anmeter

8	TM4C123 Output, V_{PE0} input to 7406	1.598 V	Volts	with **PE0** = 1 (measured with voltmeter relative to ground)
9	7406 Output, V_{k-} LED k-	2.378 V	Volts	with **PE0** = 1 (measured with voltmeter relative to ground)
10	LED a+, V_{a+} Bottom side of R19	3.695 V	Volts	with **PE0** = 1 (measured with voltmeter relative to ground)
11	LED voltage	1.32 V	Volts	calculated as V_{a+} - V_{k-}
12	LED current	Calculated: 11.45 mA Measured: 10.38 mA	mA	calculated as (V_{+5} - V_{a+})/R19 and measured with an ammeter

```
;****************** main.s ***************
; Program written by: ***Your Names**update this***
; Date Created: 1/22/2016
; Last Modified: 1/22/2016
; Section ***Tuesday 1-2***update this***
; Instructor: ***Ramesh Yerraballi**update this***
; Lab number: 3
; Brief description of the program
;   If the switch is presses, the LED toggles at 8 Hz
; Hardware connections
;  PE1 is switch input  (1 means pressed, 0 means not pressed)
;  PE0 is LED output (1 activates external LED on protoboard)
;Overall functionality of this system is the similar to Lab 2, with six changes:
;1-  the pin to which we connect the switch is moved to PE1,
;2-  you will have to remove the PUR initialization because pull up is no longer needed.
;3-  the pin to which we connect the LED is moved to PE0,
;4-  the switch is changed from negative to positive logic, and
;5-  you should increase the delay so it flashes about 8 Hz.
;6-  the LED should be on when the switch is not pressed
; Operation
;   1) Make PE0 an output and make PE1 an input.
;   2) The system starts with the LED on (make PE0 =1).
;   3) Wait about 62 ms
;   4) If the switch is pressed (PE1 is 1), then toggle the LED once, else turn the LED on.
;   5) Steps 3 and 4 are repeated over and over


GPIO_PORTE_DATA_R       EQU   0x400243FC
GPIO_PORTE_DIR_R        EQU   0x40024400
GPIO_PORTE_AFSEL_R      EQU   0x40024420
GPIO_PORTE_DEN_R        EQU   0x4002451C
GPIO_PORTE_AMSEL_R      EQU   0x40024528
GPIO_PORTE_PCTL_R       EQU   0x4002452C
SYSCTL_RCGCGPIO_R       EQU   0x400FE608
PE1                     EQU   0x40024008
PE0                     EQU   0x40024004

       IMPORT  TExaS_Init
       AREA    |.text|, CODE, READONLY, ALIGN=2
       THUMB
       EXPORT  Start
Start
 ; TExaS_Init sets bus clock at 80 MHz
      BL  TExaS_Init ; voltmeter, scope on PD3
; you initialize PE1 PE0
      LDR R0,= SYSCTL_RCGCGPIO_R
      LDR R1,[R0]
      ORR R1,#0x10
      STR R1,[R0]

      NOP
      NOP

      LDR R0,= GPIO_PORTE_DIR_R
      LDR R1,[R0]
      BIC R1,#0x02
      ORR R1,#0x01
      STR R1,[R0]

      LDR R0,= GPIO_PORTE_AFSEL_R
      LDR R1,[R0]
      BIC R1,#0x03
      STR R1,[R0]

      LDR R0,= GPIO_PORTE_DEN_R
      LDR R1,[R0]
      ORR R1,#0x03
      STR R1,[R0]


      CPSIE  I    ; TExaS voltmeter, scope runs on interrupts

```

```
 73          LDR R0,= PE0
 74          LDR R1,[R0]
 75          ORR R1,#0xFF
 76          STR R1,[R0]
 77
 78    loop
 79    ; you input output delay
 80          BL Delay
 81
 82
 83          LDR  R0,= PE1
 84          LDR  R2,= PE0
 85
 86          LDR  R1,[R0]
 87          CMP  R1,#0
 88          BNE  Toggle
 89          BEQ  StayOn
 90
 91
 92    Toggle LDR  R1,[R2]
 93           EOR  R1, R1, #0xFF
 94           STR  R1,[R2]
 95           B    loop
 96
 97    StayOn LDR  R1,[R2]
 98           ORR  R1,#0xFF
 99           STR  R1,[R2]
100
101
102           B    loop
103
104    Delay  MOV  R7, #20
105    Subt   MOV  R8, #62000
106    wait   SUBS R8, #1
107           BNE  wait
108           SUBS R7, #1
109           BNE  Subt
110           BX   LR
111
112         ALIGN      ; make sure the end of this section is aligned
113         END        ; end of file
114
```