



Zagazig University

3rd Year

Computer and Systems Engineering Department



Faculty of Engineering

CSE 324 - Computer Integrated Circuits

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Part 1: Automatic School Bell System Simulation on Proteus.

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Part 1: Automatic School Bell System Simulation on Proteus

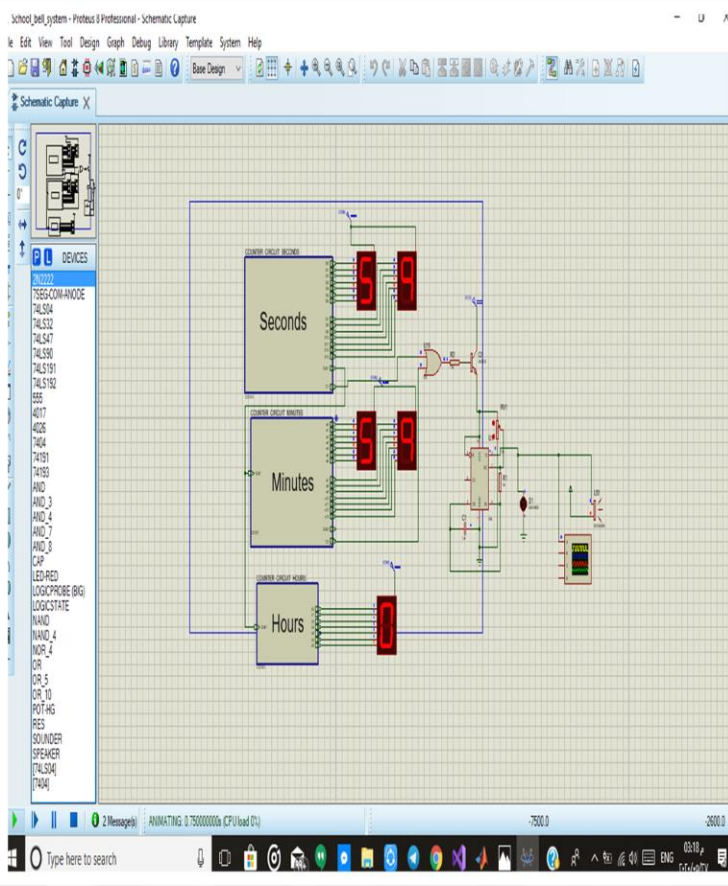
Explaining the design:

This design is a school bell system that:

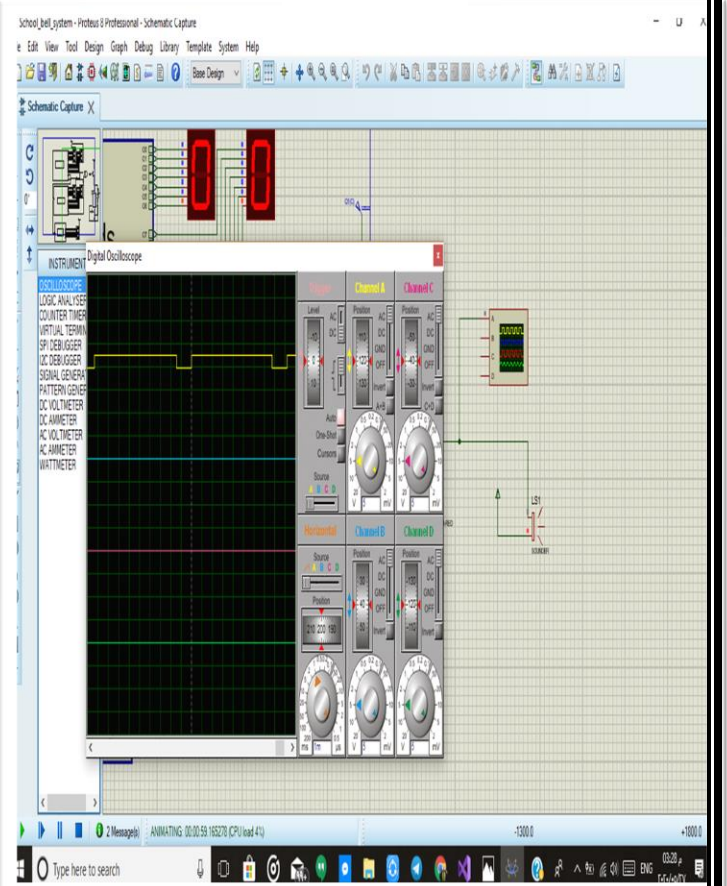
- 1- The bell is supposed to ring every 1 hour but I made it ring every hour and every minute to test it & ensure that the design is working well.
- 2- The remaining time until the next bell is displayed on a three 7-seg one for seconds and one for minutes and the last one for hours as shown in figures below.
- 3- I added an Oscilloscope to show the sound signal.
- 4- I also added a potentiometer to the 555 timer in the sound circuit to change the ring sound as the user want.

In the beginning 0 hours and 59 minutes and 59 seconds and the time will count down until reaching 0 hours and 0 minutes and 0 seconds, when the time is up the sound signal will be generated by the Sound circuit (555 timer) and the Oscilloscope will display the audio signal.

Figure(1)



Figure(2)



Explaining blocks:

1- blocks (Seconds and Minutes):

they are responsible for generating 60 seconds and 59 minutes and displaying them on four 7-Segs,

block consists of:

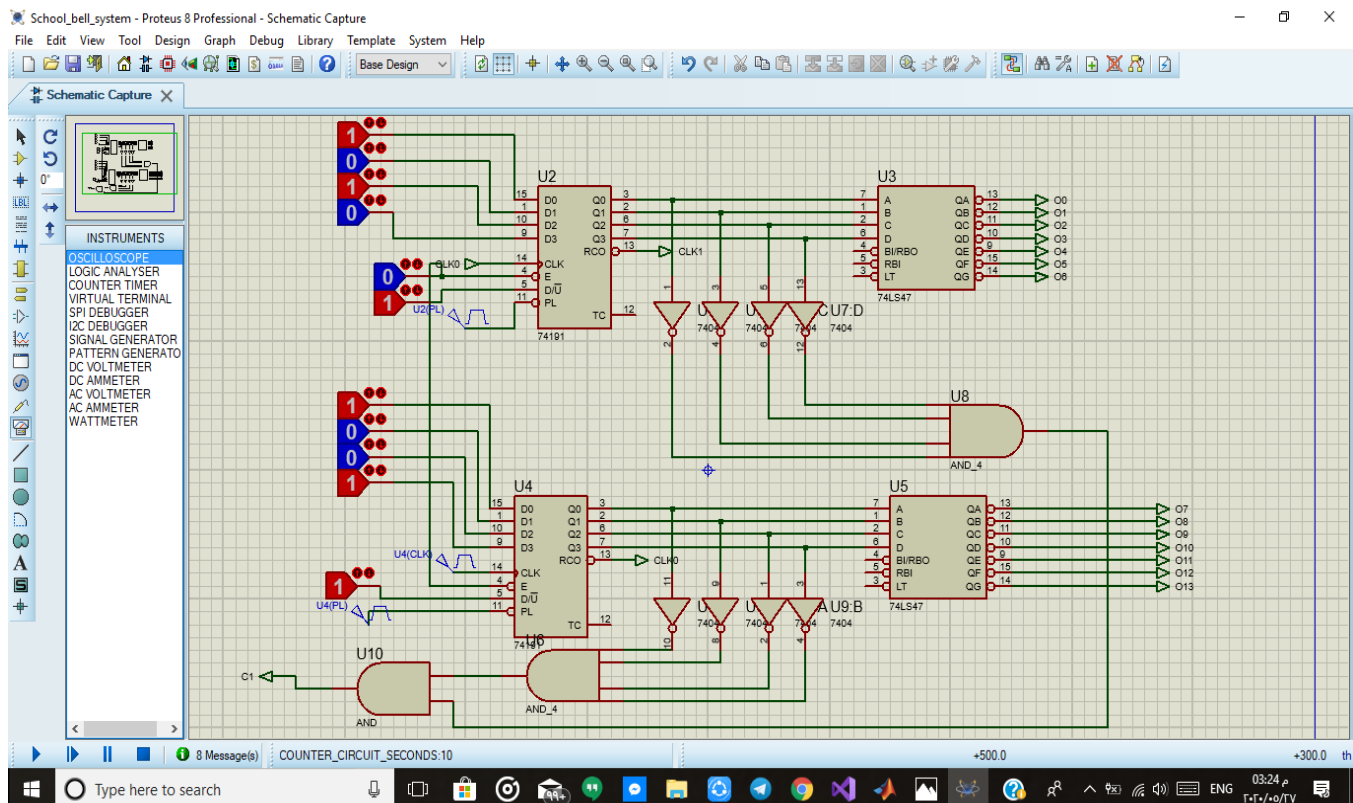
2 up down counters (74191) to count down until 0 (generating second counting)

2 decoders (7447) to decode the logic signals and display them on the 7-Segs

And the Not & And gates they make a conditional circuit that if the counter reaches zero they send a clock signal to the next block (minutes).

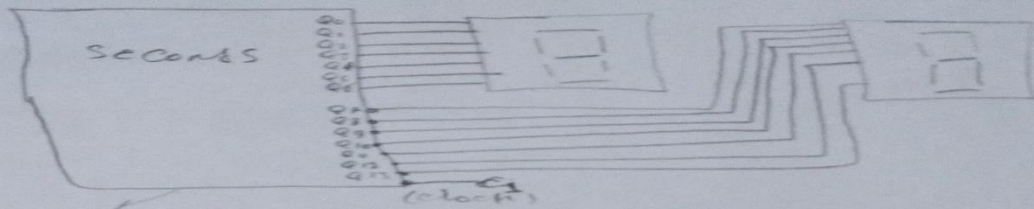
And same as for the other block (Minutes), the difference between second block and minute block is the frequency, in the second the frequency = 1, but in minute block the frequency comes from the clock of the second block.

In the beginning 0 hours and 59 minutes and 59 seconds and the time will count down until reaching 00 seconds and 00 minutes, then it is supposed to reset and be 59 second and 59 minutes.

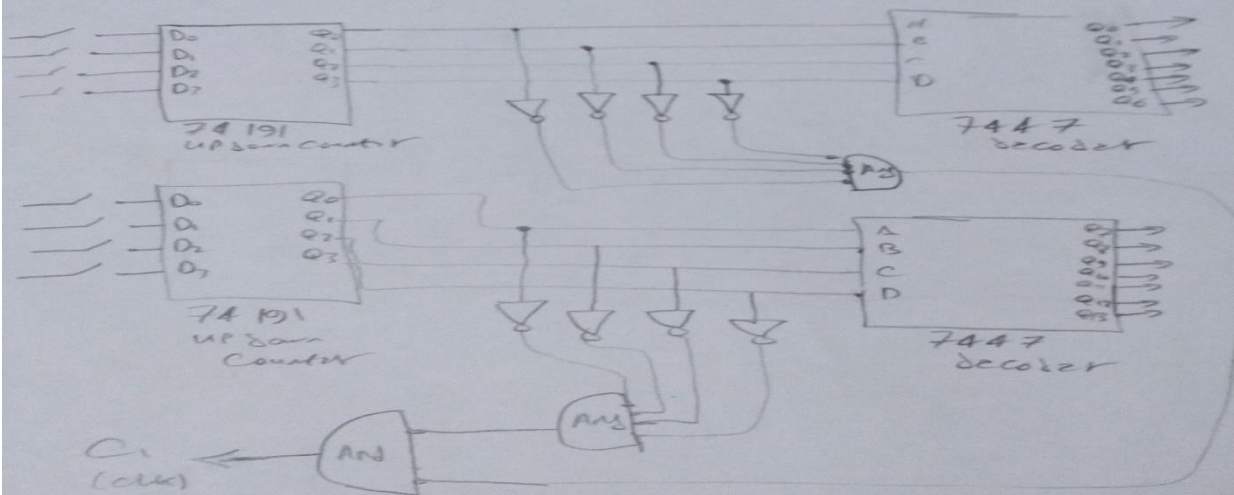


Blocks and truth table: Blocks (seconds & minutes):

Block 1 (Seconds)

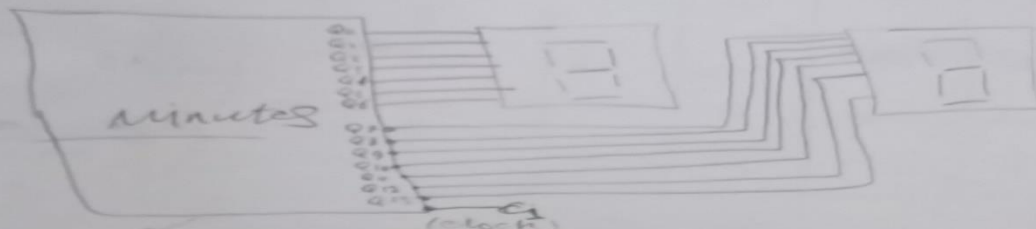


This block consists of:

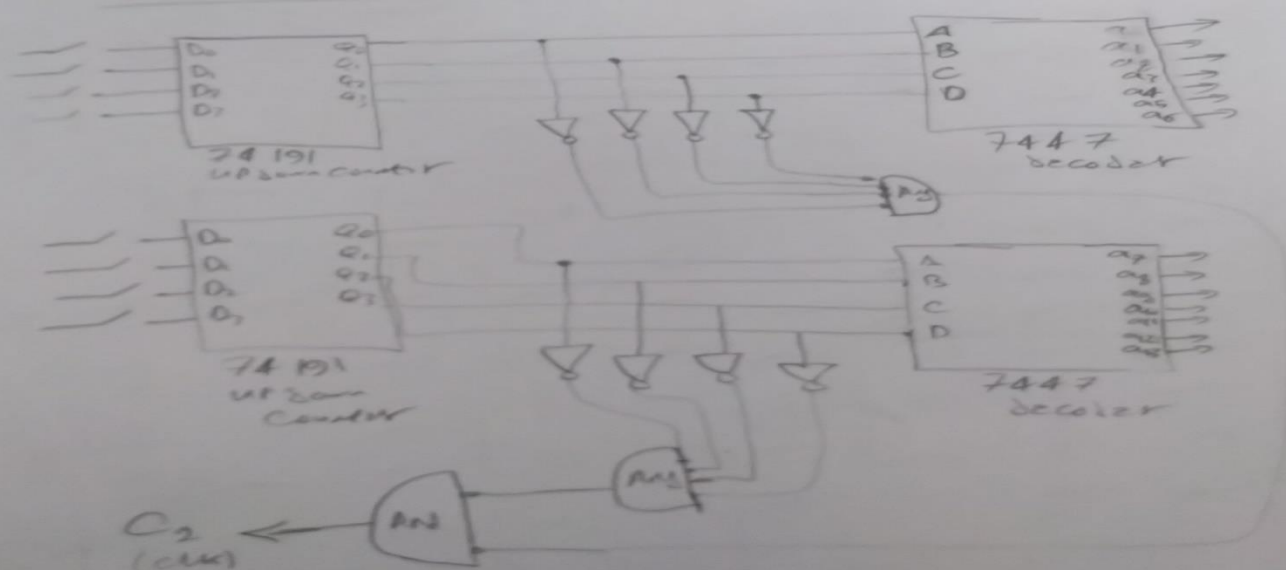


Block 2 (minutes)

Abdelaziz



This block consists of:



Truth table:

Up Down Counter				clock	decoder	7-Seg								
Q_3	Q_2	Q_1	Q_0	C_1	A B C D	Q_A	Q_B	Q_C	Q_D	Q_E	Q_F	Q_G		
9	1	0	0	1	0	1	0	0	1	1	1	1	0	$\frac{a}{1} \frac{b}{1} \frac{c}{1}$
8	1	0	0	0	0	1	0	0	0	1	1	1	1	$\frac{a}{1} \frac{b}{1} \frac{c}{1}$
7	0	1	1	1	0	0	1	1	1	1	1	1	1	$\frac{a}{1} \frac{b}{1} \frac{c}{1}$
6	0	1	1	0	0	0	1	1	0	1	1	1	1	$\frac{a}{1} \frac{b}{1} \frac{c}{1}$
5	0	1	0	1	0	0	1	0	1	1	0	1	1	$\frac{a}{1} \frac{b}{1} \frac{c}{1}$
4	0	1	0	0	0	0	1	0	0	1	1	0	1	$\frac{a}{1} \frac{b}{1} \frac{c}{1}$
3	0	0	1	1	0	0	0	1	1	1	1	0	0	$\frac{a}{1} \frac{b}{1} \frac{c}{1}$
2	0	0	1	0	0	0	0	1	0	1	1	0	1	$\frac{a}{1} \frac{b}{1} \frac{c}{1}$
1	0	0	0	1	0	0	0	0	1	1	0	0	0	$\frac{a}{1} \frac{b}{1} \frac{c}{1}$
0	0	0	0	0	1	0	0	0	0	1	1	1	1	$\frac{a}{1} \frac{b}{1} \frac{c}{1}$

2- block (Hours):

hours block consists of:

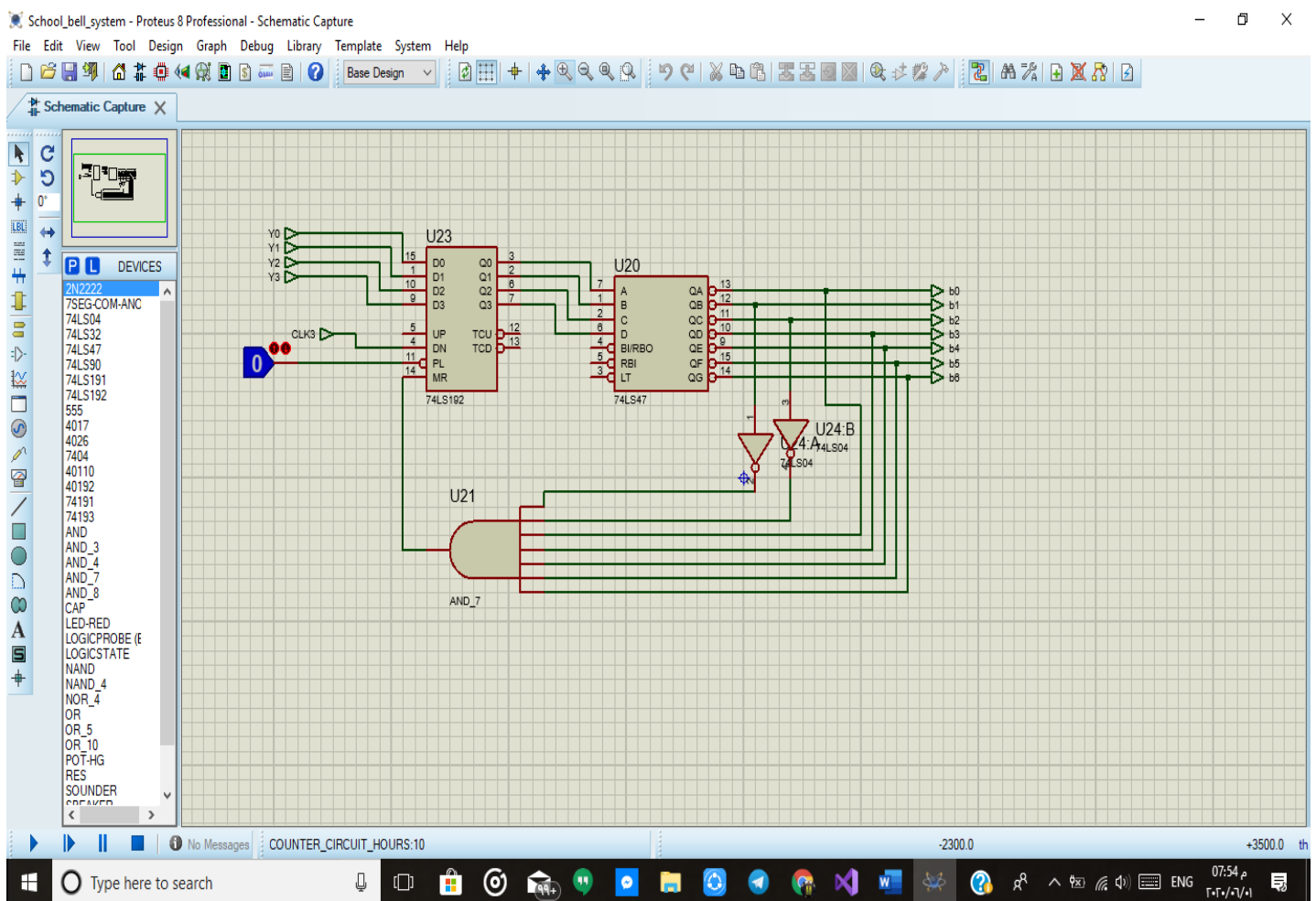
40192 up down counter

7447 decoder

And gate

3 Not gates

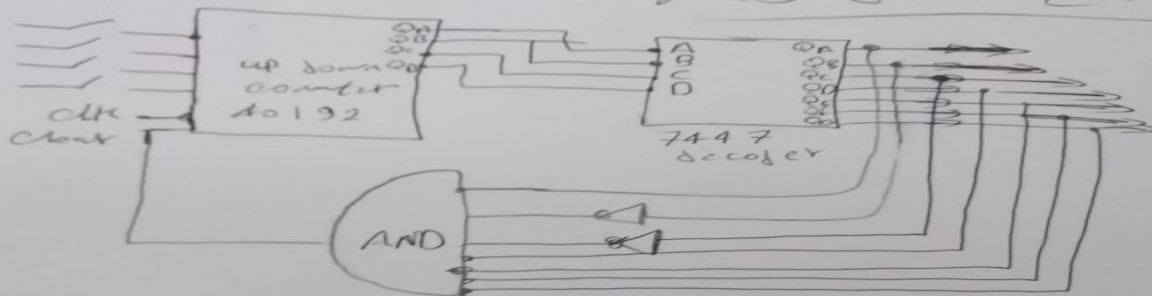
In the beginning it will be 0 hours and 59 minutes and 59 seconds when the time is up it the counter is supposed to reset and it will be 1 hour and 00 minutes and 00 seconds and then become 0 hours and 59 minutes and 59 seconds.



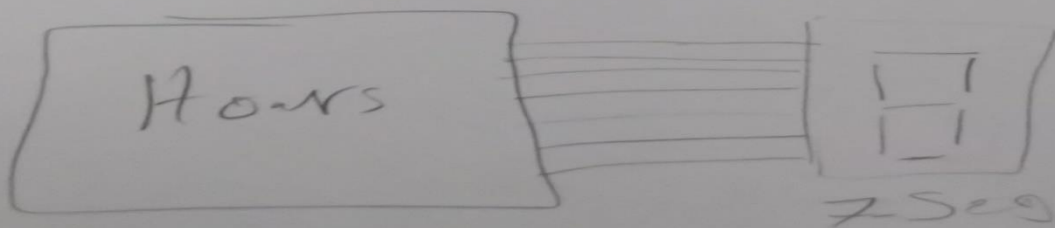
Blocks and truth table: Block (Hours):

Block 3 (Hours)

AG 106212



if the 7-seg displaying 1
Then clear the counter
and reset to be 0 again



Truth Table

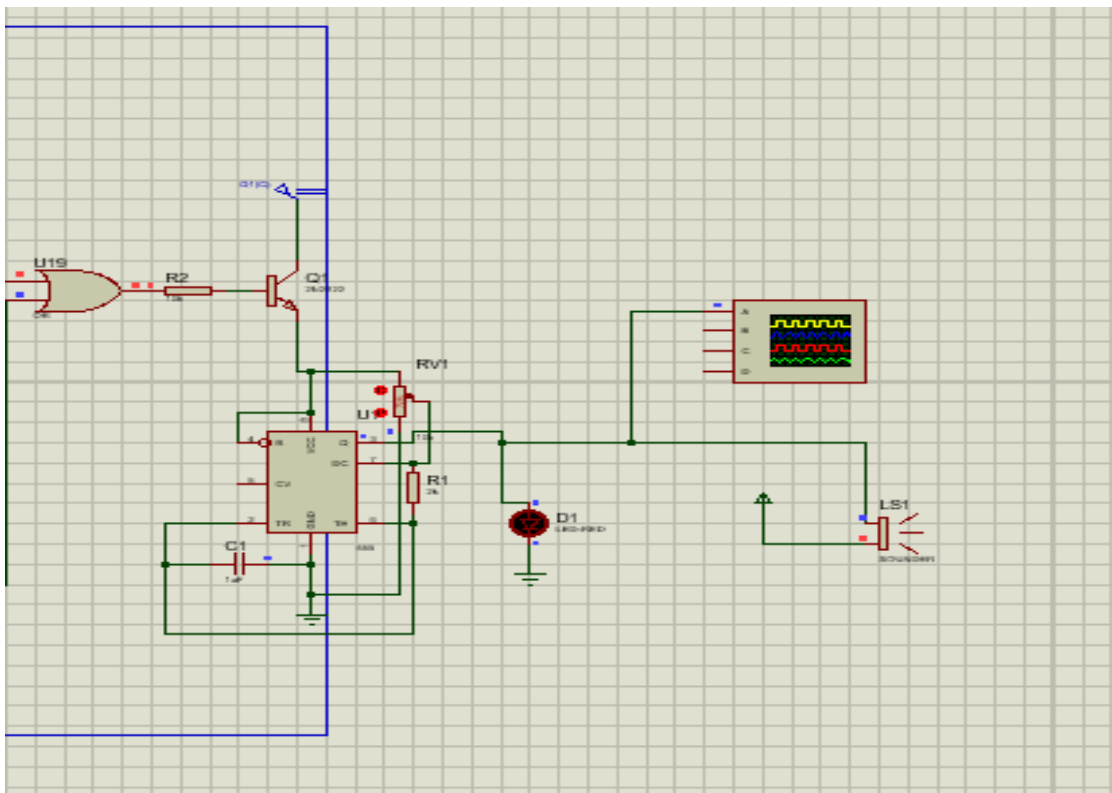
clk	up down Counter	decoder	7-seg
C	QD QC QB QA	DCBA	QA QB QC QD QE QF QG
0	0 0 0 0	0 0 0 0	1 1 1 1 1 1 0
1	0 0 0 1	0 0 0 1	0 1 1 0 0 0 0

3- The sound circuits:

It consists of timer 555 and resistors and capacitors and conditional circuit(Transistor and Or gates)

we can see that the 555 timer wired as an Astable multivibrator VCC (8th pin) and GND (1st pin) is connected to the power supply. Reset (RST – 4th pin) is connected directly to the positive power supply to avoid accidental reset of 555 timer. Control Voltage (CV – 5th pin) is not used, so to avoid high frequency noises we are connecting a capacitor (C1– 1 μ F) to the ground, and a potentiometer connected to pin7 and ground and Vcc to let the user choosing a tone for the ring

If the circuit becomes 0 hours and 0 minutes and 0 seconds the signal will get through the or gate to the base of the transistor and the sound circuit will generate a tone and the signal will displayed on the Oscilloscope.



Components used:

- 1- 74ls47 decoder *3
- 2- 7-Seg (common anode) *5
- 3- Timer 555
- 4- Potentiometer 10k
- 5- Resistors (10k, 2k)
- 6- Capacitor 1uF
- 7- Led (red)
- 8- Sounder (Speaker)
- 9- Oscilloscope
- 10- 74191 up down counter *6
- 11- Not gates (7404) *32
- 12- And gates (7408) *7
- 13- Or gates (7432) *1
- 14- Nor gate *1
- 15- Pulse generator
- 16- Dc source 5V
- 17- Switches (logic states)
- 18- Transistor (2N2222)

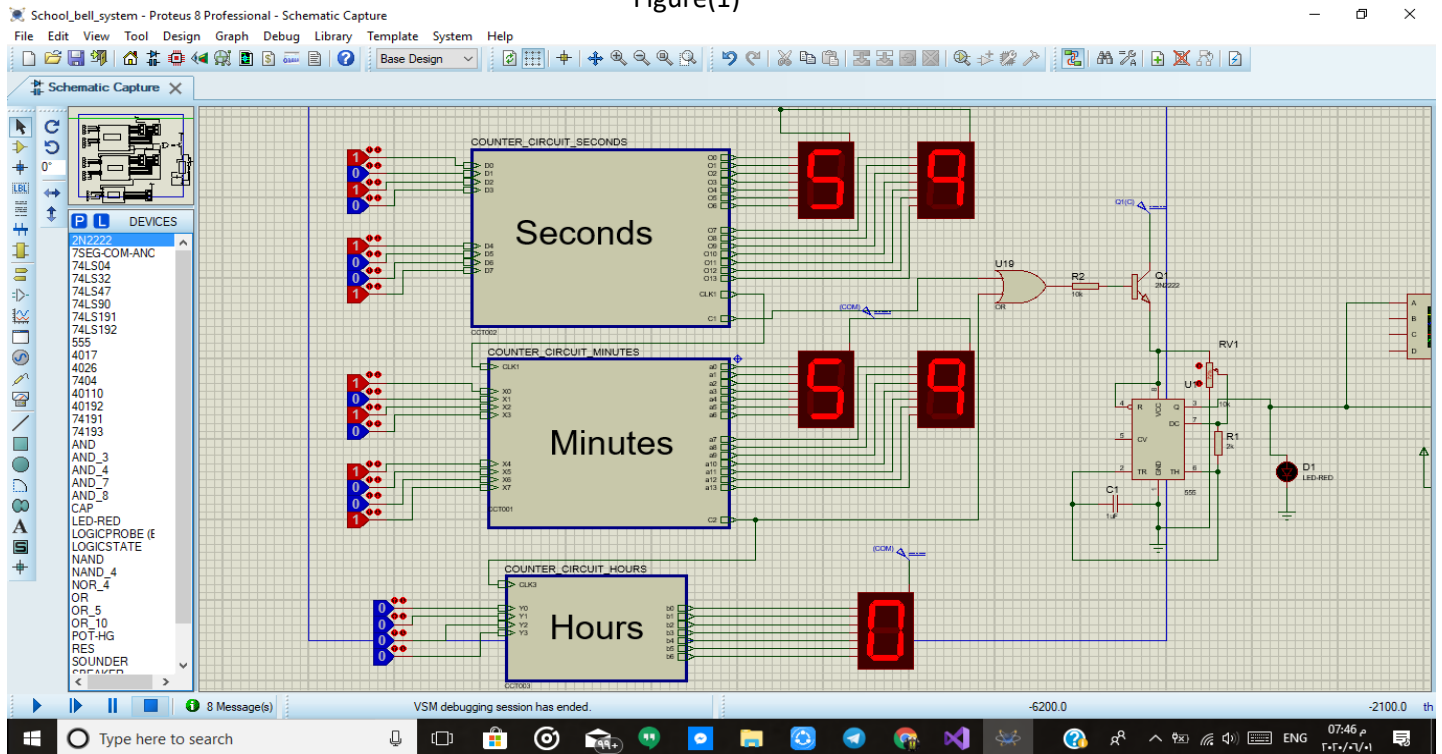
examples to show how the circuit works:

The circuit I designed the bell will ring as the user like every 1 hour but the user can change the time as he likes but he must set the time in binary bas shown in figures

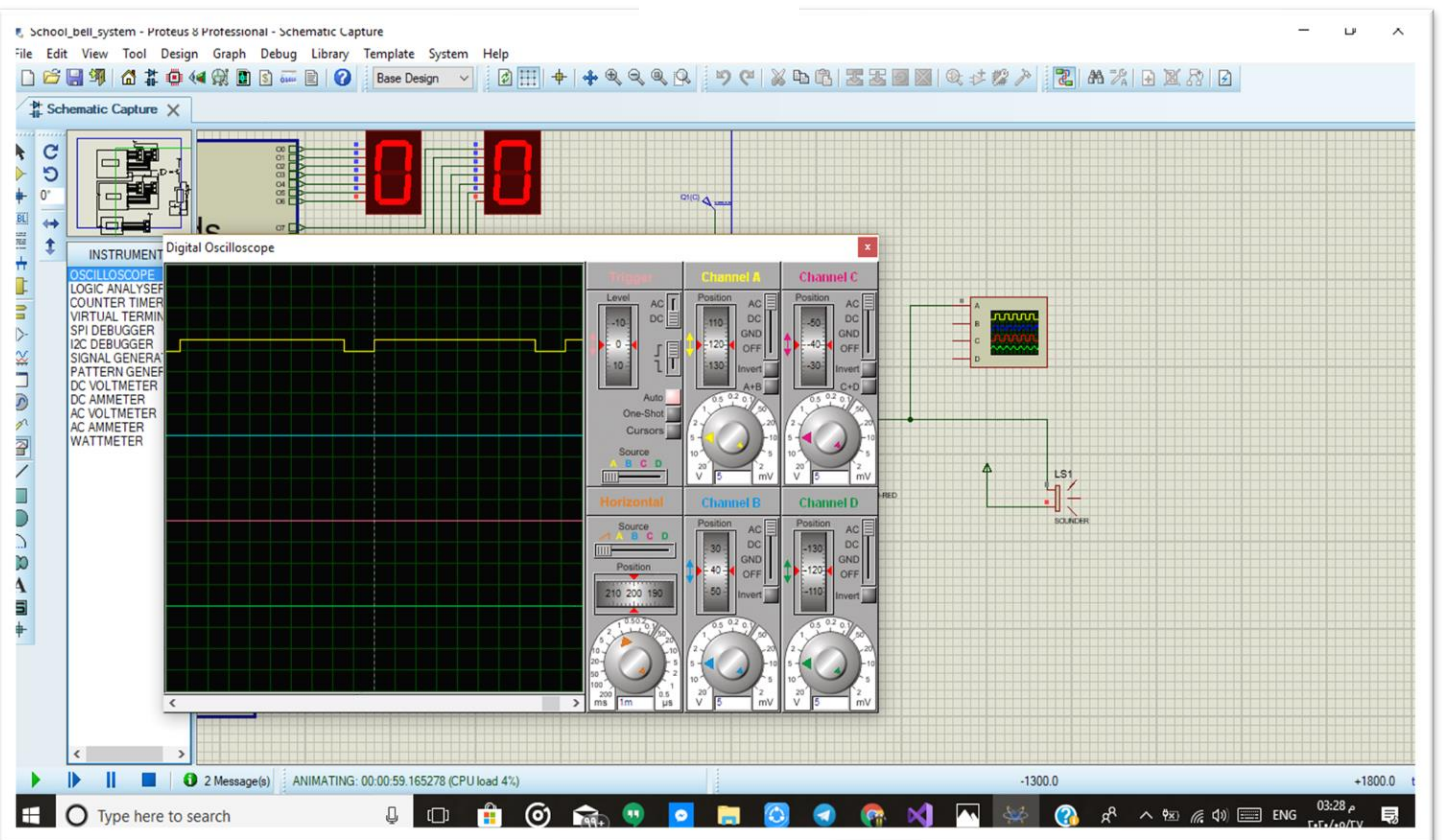
EX(1)

In this example I set the time to 59 minutes and 59 seconds and it will be counted down until it reaches 00 minutes and 00 seconds then the bell will ring as shown in figures 1 & 2 .

Figure(1)



Figure(2)



In this example I set the time to 1 hour and 01 minutes and 60 seconds and it will be counted down until it reaches 00 minutes and 00 seconds then the bell will ring.



In this example I set the time to 1 hour and 01 minutes and 60 seconds and it will be counted down until it reaches 00 minutes and 00 seconds then the bell will ring , and so.

