

Embedded Systems Lab Experiment 5

Waveform Generation in ATMega 32 microcontroller

Program an ATMega32 to output different waveforms
using DAC

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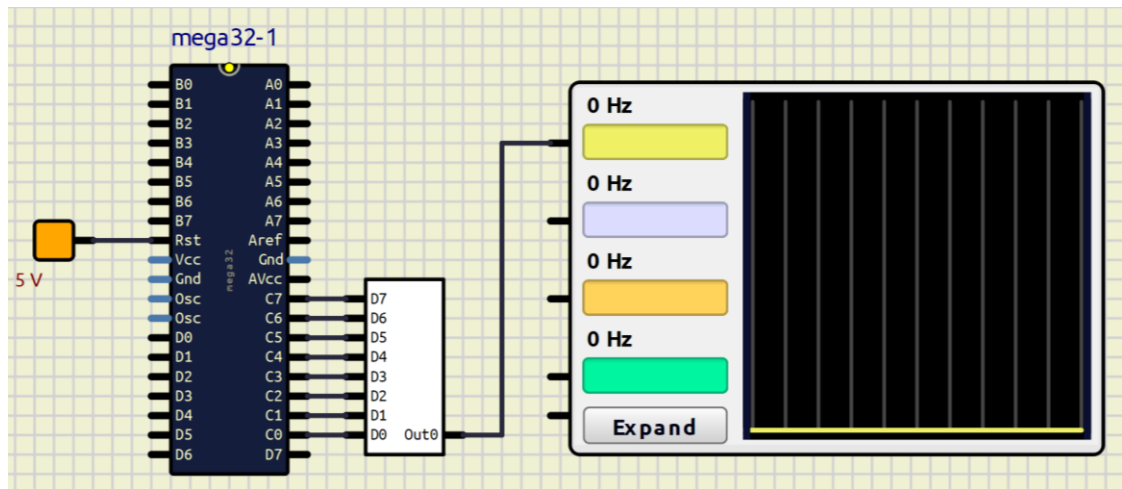
• Waveform generation by AT Mega 32 through DAC and LM358.

SHEET NO. 1

• Objectives: To program an AT Mega 32 through to output different waveforms using a Digital Analog Converter

• Apparatus reqd.:

Name	Specification	Qty/Quantity
1. AT Mega. μ C	—	1
2. DAC	DAC08008	1
3. Oscilloscope	—	1



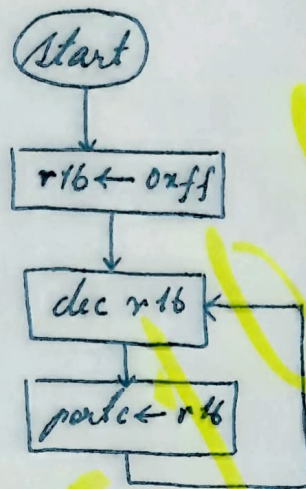
Schematic used for Assignment 1,2,3

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SHEET NO 2

➤ Assignment 1:

(i) Flowchart:



(ii) Code:

// ~~the~~ basic imports;

ldi r16, 0xff → r16 ← 0xff

out ddrc, r16 → portc as output

main: r16 → main label.

dec r16 → r16--;

out portc, r16 → portc ← r16.

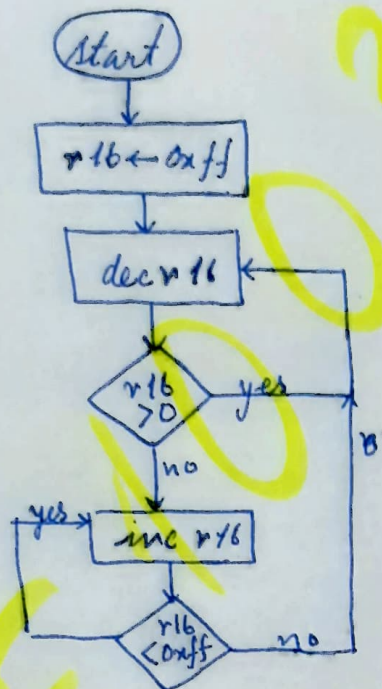
jmp main → unconditional jump to main

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SHEET NO. 3

→ Assignment 2:

(i) Flowchart:



(ii) Code:

// basic imports

ldi r16, 0xff

out ddre, r16 → portc as output.

incr:

out portc, r16 → portc ← r16

inc r16 → r16++

brvs decr → if not overflow, decrement

jmp incr → else jump increment.

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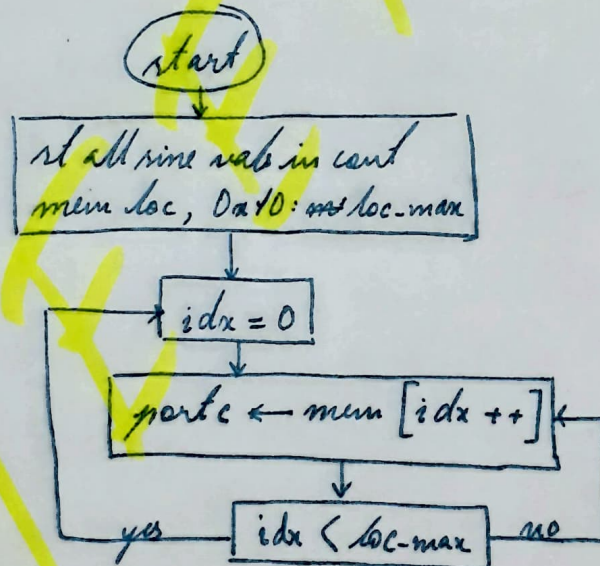
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SHEET NO. 4

decr: decr	→	
out portc, r16	→	portc ← r16
dec r16	→	r16--
breq incr	→	if r16 == 0 => increment
jmp decr	→	else decrement.

→ Assignment 3:

① Flowchart:



② Code:

```

// basic imports
ldi r16, 0xff --
out ddrC, r16
  
```


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SHEET NO. 5

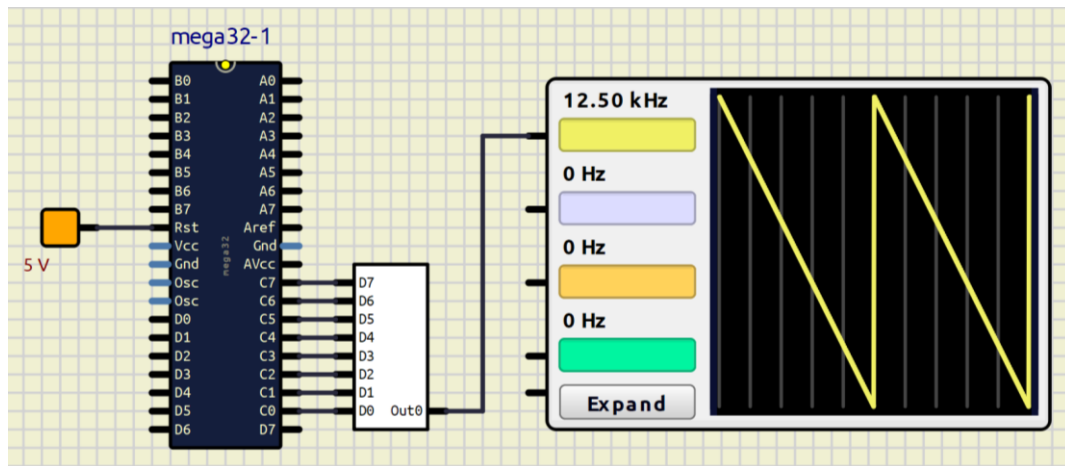
ldi r16, 128 → } store all sine value is contiguous
 r16, r16 → } mem locations
 ...

main:

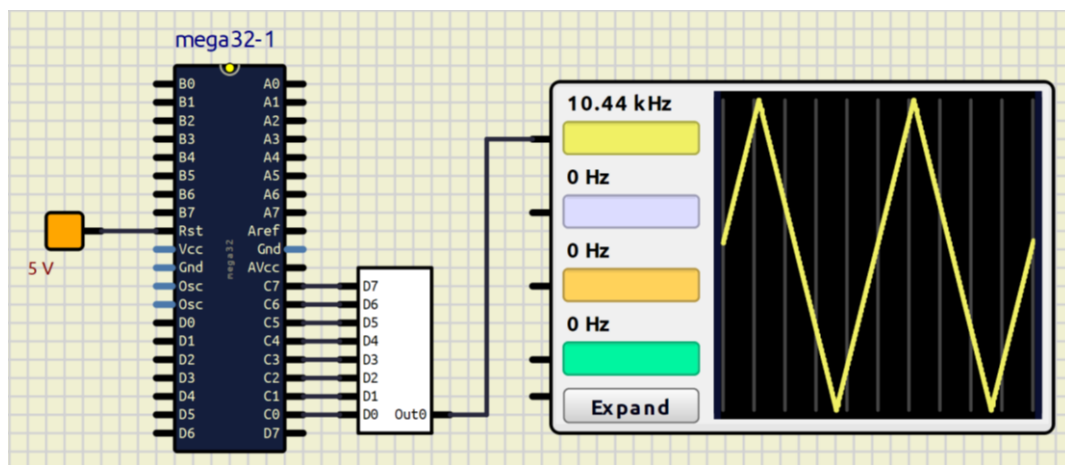
ldi yh, 0x01 → } Loop controller
 ldi yl, 0xf4 → }
 ldi yrh, 1 → } used for accessing mem locations
 ldi rl, 0 → }

nt:

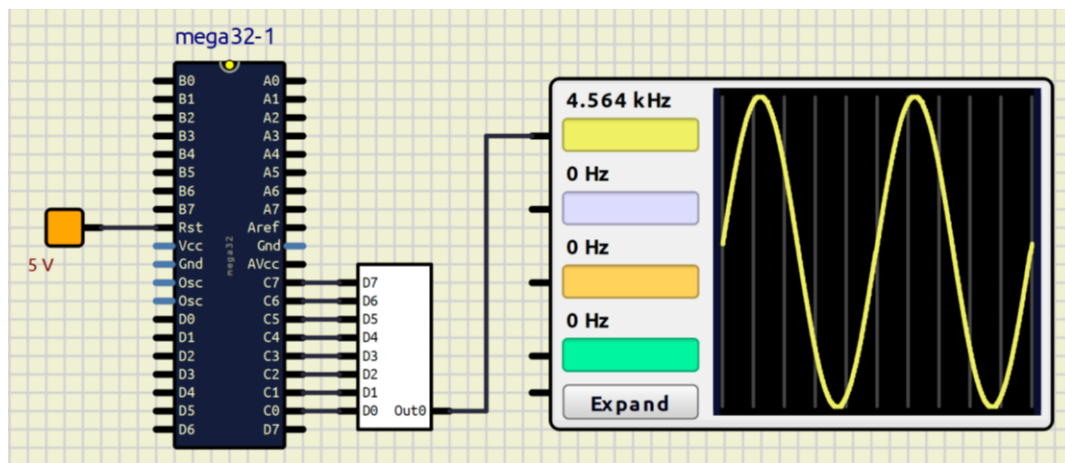
ld r16, x → for every itr fetch: r16 ← mem[x]
 addw x, 1 → x++
 out portc, r16 → portc ← r16
 sbw y, 1 → y--
 bne nt → if y = 0 ⇒ jmp nt
 jmp main → an inf loop.



Simulation of the 1st assignment



Simulation of the 2nd assignment



Simulation of the 3rd assignment