An-Najah National University
Faculty of Engineering and IT

جامعة النجاح الوطنية
كلية الهندسة وتكنولوجيا المعلومات

Computer Engineering Department

Course Name: Microprocessor Lab Number: 10636392

Lab Report Grading Sheet

Instructor: Dr. Manar Qamhieh.	Experiment #: 6
Academic Year: 2023/2024	Experiment Name: DAC0832 digital-to-analog conversion
Semester: 1 (A)	
Students	
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Performed on: 26/3/2024	Submitted on: 1/4/2024

Report's Outcomes

ILO __ =( ) %	ILO __ =( ) %	ILO __ =( ) %	ILO __ =( ) %	ILO __ =( ) %

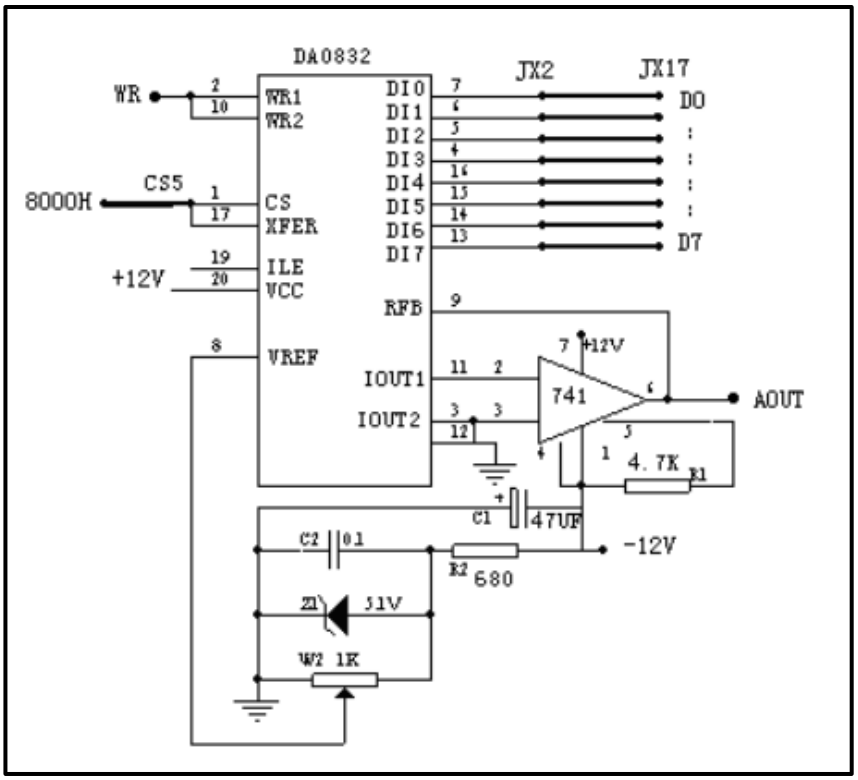
Evaluation Criterion	Grade	Points
Abstract answers to the questions: "What did you do? How did you do it? What did you find?"	0.5	
Introduction and Theory Sufficient, clear, and complete statement of objectives. In addition to Presents sufficiently the theoretical basis.	1.5	
Apparatus/ Procedure Apparatus sufficiently described to enable another experimenter to identify the equipment needed to conduct the experiment. Procedure sufficiently described.	2	
Experimental Results and Discussion (In-Lab Worksheet) Crisp explanation of experimental results. Comparison of theoretical predictions to experimental results, including discussion of accuracy and error analysis in some cases.	4	
Conclusions and Recommendations Conclusions summarize the major findings from the experimental results with adequate specificity. Recommendations appropriate considering conclusions. Correct grammar.	1	
Appearance Title page is complete, page numbers applied, content is well organized, correct spelling, fonts are consistent, good visual appeal.	1	
Total	10	

➢ Abstract:

• Understanding of the basic principles of digital/analog conversion and master the use of DAC0832 chips.
• To know the application of DAC0832.

➢ Introduction:

DAC (digital to analog converter) is a system that converts a digital signal into an analog signal. It is used in music players to convert digital data streams to analog audio signals. Also, televisions and mobile phones convert digital video data to analog video signals which connect to the screen drivers to display monochrome or color images.



➢ Tools:

- MML8086K3.
- MML8086K3 Software: 86PCI Debug Software.
- DAC0832.

➢ Procedure and Discussion:

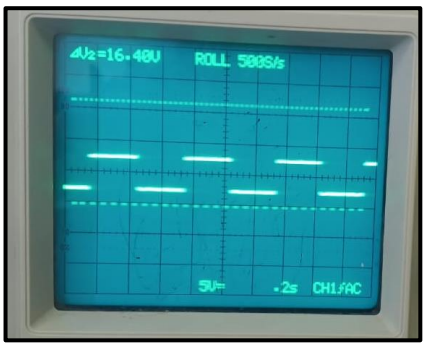
Generating square and sine waves using DAC:

- Square wave:

1. Connoting DAC at port 0ff80h.
2. Outing 0ffH to implement the high level then delay. Next outing 00h to implement the low level to the DAC in alternative way.
3. The delay value must depend on the frequency value, but we used approximate value 0ffh.
4. The code:

```
CODE SEGMENT
ASSUME CS:CODE
ORG 2000H
START:                ; Label for beginning of the program.
L:                    ; Label for the loop start.
MOV DX, 0FF80H        ; Load the DX with the address of the DAC.
MOV AL, 0FFH          ; Load the AL register with 0xFF Outing 0ffH to implement the high-level.
OUT DX, AL            ; Output  AL  to the port addressed by DX (DAC).
CALL DEL
MOV DX, 0FF80H      ; Again, Load the DX with the address of the DAC.
MOV AL, 0H            ; Load the AL register with 0xFF Outing 0ffH to implement the low-level.
OUT DX, AL            ; Output  AL  to the port addressed by DX (DAC).
CALL DEL              ; call delay procedure.
JMP L                 ; Jump back to the start of the loop to repeat.
DEL PROC
PUSH CX               ; Save the current value of CX register on the stack.
MOV CX, 0FFFFH        ; Load the CX register with 0xFFFF to use as a delay counter.
DEL: NOP              ; creating a delay
LOOP DEL              ; Decrease CX by 1 and loop back to DEL if CX is not zero.
POP CX                ; Restore the value of CX from stack.
RET
END START
CODE ENDS
```

5. The oscilloscope result:

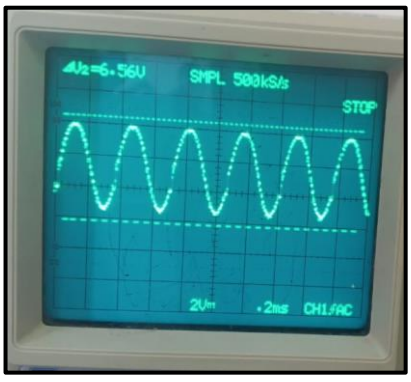


- Sine wave:

1. Connoting DAC at port 0ff80h.
2. Sine wave is continuous wave. Implementing it needs different angles.
3. Calculating the angles values using this equation f(a)=127+127*sin(Radians(a)).
4. Angles from 0 to 350 by increasing 10.
5. Storing the values in array.
6. The code:

```
CODE SEGMENT
ASSUME CS:CODE
ORG 2000H
START:                  ; Label OF the beginning.
L:                      ; Label for the loop start
MOV SI, OFFSET ANG      ; Load SI with the offset address of the ANG array (where sine values are stored)
MOV DX, 0FF80H          ; Load DX with the DAC port address 0FF80h.
MOV CX, 36              ; Initialize CX register with 36, the count of values to send to the DAC.
LBL:                    ; Label for the inner loop.
MOV AL, [SI]            ; Move the sine value pointed by SI into AL
OUT DX, AL              ; Output the value in AL to the DAC port (DX)
INC SI                  ; Increment SI to point to the next value angles.
LOOP LBL                ; Decrement CX and loop back to LBL if CX is not zero.
JMP L                   ; Jump to make Infinite loop.
; storing sine wave values, these values are calculated by 127 + 127 * sin(angle in radians)
; Angles increase by 10 degrees from 0 to 350 (36 points)
ANG DB
127,149,170,190,208,224,236,246,252,254,252,254,252,246,236,224,208,190,170,149,127,104,83,63,45,29,17
,7,1,0,1,7,17,29,45,63,83,104,127
END START
CODE ENDS
```

7. The oscilloscope result:



➢ Conclusion:

We learned from this experiment how to use DAC (digital to analog converter) to generate square and sine waves.