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| **Computer Engineering Department**  **Course Name: Microprocessor Lab Number: 10636392**  **Lab Report Grading Sheet** |

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| Instructor: Dr.Manar Qamhieh | Experiment #: 6 |
| Academic Year: 2019/2020 | Experiment Name: ADC Analog-To-Digital Conversion |
| Semester: Summer |  |

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| **Students** | | | | | | | | |
| 1-Othman Othman | | | 2-Ashraf Habromman | | | | | |
| 3- | | | 4- | | | | | |
| Performed on: | | | Submitted on: | | | | | |
| **Report’s Outcomes** | | | | | | | | |
| ILO \_\_ =( ) % | ILO \_\_ =( ) % | ILO \_\_ =( ) % | | ILO \_\_ =( ) % | | ILO \_\_ =( ) % | | |
| **Evaluation Criterion** | | | | | **Grade** | | **Points** |
| Abstractanswers of 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 RecommendationsConclusions summarize the major findings from the experimental results with adequate specificity. Recommendations appropriate in light of 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 | |  |

Objectives :

* Dealing with an ADC system and converting the input into a storable form.
* Dividing 255 levels referenced to( 5V as 255 and 0v to 0 ) into a Decimal form with one floating-point.

Introduction :

With the development of I/O systems and the increase of computer usage in industry and multimedia. A computer handles more and more analog signals coming in and out as images, sounds or even a control signals of a production line. But as a digital system, This should not be happening. WHY? well, digital systems cannot handle analog signals.

Hence a digital system recognizes the input as ( 0, 1 or Z ), Analog signals lost their meaning. So there is a need to use an ADC System ( ***Analog to Digital Converter*** ). An ADC system converts the Analog digital from its form into a way that is acceptable for a digital system by dividing the capacitance of the voltage into levels, and representing the voltage of every sample by a level. A system quality depends on the number of levels ( more is better ) and the number of samples in a certain amount of time. So the signal now can be friendly handled and stored.

**NOTE:** To change the signal from a digital form into Analog we need a **DAC** that we will talk about in the next experiment.

Tool:

1- Microprocessor training kit (MML 8086K3 Microprocessor Trainer)

2- MML8086K3 software (dice8088) (Like IDE)

3- USB cable ( special to connect the PC to the kit)

4- Power supply

5- Cables

Procedure:

1- Turn on the kit.

2-Write assembly code:

Print Value Of Potentiometer

CODE SEGMENT

ASSUME CS:CODE

ORG 1000H

START:

mov dx, 0FF2BH ;control word register of 8255 module

mov al, 80h ;all port programmed as output

out dx,al

lp:

mov dx ,8000h

mov al, 00

out dx, al ;out configuration

mov cx,0fffh ;wait state to take configuration

delay :

nop

loop delay

in al, dx ;get bits data from ADC which connected to the

;microprocessor.

mov ah, 0 ;masking most significant byte of ax.

mov bl, 51 ;255value/5volt =~ 51

div bl

;integer result of division stored in al

lea si, numbers ;git address of numbers array

mov bx, ax

push bx ;save result of division in dx (Quotient and remainder)

and ax,00ffh ;masking again, because we use ax register in div.

add si, ax ;giving the address of the corresponding display code

;in the numbers array (each index corresponds its code).

mov dx, 0FF29H ;port B

mov al, 11111011b ;select which one of 7-segment displays I have to out on

out dx, al

mov al, [si]

;port A

mov dx, 0FF28H ;out the value of voltage into port A which connected to

out dx, al ;data bus of 7-segment display.

mov cx, 1000h ;wait state.

delay1:

loop delay1

mov dx, 0FF29H

mov al, 11111101b ;select second dipaly to appear fraction value on it.

out dx, al

pop bx ;get saved value of first division.

mov al, bh ;get remainder of result, (remainder:Quotient=ah:al).

mov ah, 0 ;masking.

mov bl,10

mul bl ;multiply remainder by 10 to print fraction,then divide it

;by 51.

mov bl, 51

div bl

;assume remainder equals to 0.5, so l have to print 5 instead of 0.5,

;51/2 \* X = 5, so X = 10/51. X explain factor that I want to multiply

;remainder with.

lea si, numbers

and ax,00ffh

add si, ax

mov al ,[si]

mov dx, 0FF28H ;port A

out dx, al

mov cx, 1000h

delay2:

nop

loop delay2

jmp lp

numbers db 0c0h,0f9h,0a4h,0b0h,99h,92h,82h,0b8h,80h,98h

END START

CODE ENDS

3- connect to a suitable device(COM2 in our case).

4- save code then from debug button click on **“compile load”.**

5- if the state of code is good and kit training is ready, one of the 7-segment display will flash abnormally, that’s mean that kit is ready if not you can press on RESET button on kit to become ready then load assembly code one more time.

Conclusion :

An ADC system converts the analog signal into storable digital values. by taking the value and converting it into another value related to reference voltage and a determined of binary digits.