Experiment No. 03	**Batch: ____**	**Roll No.: _____**
Title : Interfacing of DAC 0808 with 89S52 to generate various waveforms		
Date of Performance :		
Date of Submission :		
Checked By (Sign and Date):		
Remarks:		

Experiment No. 3

AIM:- Interfacing of DAC 0808 with 89S52 to generate various waveforms (Square, Saw-toothed, Triangular and Sine waveform with 8051 assembly program.)

OBJECTIVES:

1. To interface DAC 0808
2. To generate various waveform for respective frequency and amplitude.

SOFTWARE REQUIRED:- KEIL µVision IDE, ISPPgm programmer
OPERATING SYSTEM: - WINDOWS 8/10/XP
HARDWARE MATERIAL REQUIRED:-
1. PC-256 RAM, 1.8GHZ, 40GB HDD loaded with above software.
2. AT89S52 Development board, DAC 0808 Board, DSO, DMM, Dual power supply, Connecting wires and power supply through USB port.

REFERENCES:

Mazidi, McKinlay, "The 8051 Microcontroller and Embedded Systems," and Datasheet DAC0808.

Interfacing Diagram

Program Statement 1: (LW)

1. **Write a Program in assembly language to interface DAC0808 with 89S52 and to generate square wave of 1 Khz.**

Algorithm:

Delay Calculations using simple loop for 1 Khz

Program Statement 2: (LW)

2. **Write a Program in assembly language to interface DAC0808 with 89S52 and to generate saw tooth waveform.**

Algorithm:

Program Statement 3: (LW)

3. Write a Program in assembly language to interface DAC0808 with 89S52 and to generate triangular waveform.

Algorithm:

Program Statement 3: (LW)

4. Write a Program in assembly language to interface DAC0808 with 89S52 and to generate sine waveform.

Algorithm:

Procedure Generation of Sine wave using DAC0808:

To generate a sine wave, first a table is designed whose values represent the amplitude of the sine of the angles between 0 and 360 degrees. The value of the sine function varies from -1.0 to +1.0. Therefore the table values are integer numbers representing the voltage magnitudes for the sine of theta. This method ensures that only integer numbers are output to the DAC by the MCU. To generate the sine wave, the output of DAC is assumed to be 10V. Full scale output of the DAC is achieved when all the data inputs of the DAC are high. Therefore to achieve the full-scale 10V output, we use following equation.

$$V_{out} = Vref/2 + (Vref/2*\sin\theta)$$

As Vref=10V $V_{out} = 5 + (5*\sin\theta)$

Calculate V_{out} of DAC for various angles

Angle Vs Voltage Magnitude for Sine wave				
Angle Ø	**Sin Ø**	**Vout (Voltage Magnitude) = 5V+(5V* Sin Ø)**	**Values sent to DAC = (Vref/256)*Vout**	**Hex Values**
0				
30				
60				
90				
120				
150				
180				
210				
240				
270				
300				
330				
360				

Circuit Testing

- To make sure the DAC circuit is constructed properly, make each bit of PORT0 (port at which DAC is connected) 1 , one by one.
- That is, assign PORT0 to 1 i.e."00000001" and check signal at the output of DAC.
- The resulting analog signal should have voltage 0.0390625V (10/256).
- If you get same voltage at the output then '0'th bit of PORT0 P0.0) is interfaced perfectly with DAC.
- Next assign PORT0 to 2 i.e."00000010" the resulting analog signal should have voltage 0.078125V (10/128).
- In this way check whether each and every bit gives correct analog voltage at the output of DAC.

Observation table which signifies binary port value and corresponding analog voltage at the output of DAC.

PORT Values	Analog Voltage	PORT Values	Analog Voltage
0000 0000		**0010 0000**	
0000 0010		**0100 0000**	
0000 0100		**1000 0000**	
0000 1000		**0111 1111**	
0001 0000		**1111 1111**	

Conclusion:_____

_____

_____

LAB 3
WORKSHEET

1. If the range of output voltage of a 6-bit DAC is 0 to 15 volts, what is the step voltage of the output?

A. 0.117 volt/step B. 0.234 volt/step
C. 2.13 volts/step D. 4.26 volts/step

2. If an analog signal is to be converted to an 8-bit resolution, how many comparators are used in a parallel-encoded ADC?

A. 127 B. 128 C. 255 D. 256

3. How many different voltages can be output from a DAC with a 6-bit resolution?

A. 6 B. 16 C. 32 D. 64

4. What is the resolution of a D/A converter?

A. the comparison between the actual output of the converter and its expected output
B. the reciprocal of the number of discrete steps in the D/A output
C. the deviation between the ideal straight-line output and the actual output of the converter
D. the ability to resolve between forward and reverse steps when sequenced over its entire range

5. What is the accuracy of a D/A converter?

A. It is the reciprocal of the number of discrete steps in the D/A output.
B. It is the comparison between the actual output of the converter and its expected output.
C. It is the converter's ability to resolve between forward and reverse steps when sequenced over its entire range of inputs.
D. It is the deviation between the ideal straight-line output and the actual output of the converter.

6. The DAC0808 and the MC1408 are very popular and inexpensive 8-bit D/A converters.

A. True B. False

7. A DAC is monotonic if its output increases as its binary input is incremented from one value to the next.

A. True B. False

8. Resolution in the analog output of a DAC is primarily dependent on the number of input binary bits.

A. True B. False

9. The time required to complete a conversion cycle is called conversion time.

A. True B. False

10. An eight-bit D/A converter has a resolution of 0.125.

A. True B. False