Lab 7

Ex.No.7: DAC and ADC Interface

7.1Introduction:

Write a program to interface a Digital to Analog (DAC) with 8086.

7.2 Hardware Requirement:

The 8086 Microprocessor kit, D/A and A/D add on card, interface cable, Power supply.

7.3 Program Logic:

The physical quantities like temperature, pressure etc. is required for the electronic circuit for data processing. The electrical equivalents of such parameters are obtained by the use of transducers. It is difficult to process or store the analog values so there is a conversion of analog signals to the digital domain for the ease of processing and again converting it into the analog domain for the real time output. This is of course achieved by the use of converters. The circuit which is used to convert a digital value into a analog value is a digital to analog converter.

7.3.1 Digital to Analog Converter:

A digital number can be converted to an analog voltage by selectively adding voltage which is proportional to the weight of each binary digit. The module finds a great use in feedback system, like output of a channel is fed to a control circuit to contain output in the form of signal is observed at an oscilloscope or for a hard copy fed to an X-Y Recorder/X-T Recorder. Different wave forms can be generated by using this DAC-0800 module.

7.3.2 Circuit description:

Port A & port B are connected to channel 1 and channel 2 respectively. A reference voltage of 8V is generated using 723 and is given to verify points of the DAC 0800. The standard output voltage will be 7.98V when FF is outputted and will be 0v when 00 is outputted. The output of DAC-0800 is fed to the operational amplifier to get the final output as X out and Y out. Several interesting waveforms can be generated and observed on oscilloscope.

Hardware installation:

- Connect DAC-0800 interfacing module to 8255-I of 8085/8051/80865 trainer kit through 26 pin FRC cable.
- Be sure about the direction of the cable i.e. pin No.1 of module should be connected to pin No.1 of 8255 connector.
- Connect +12V, -12V & GND from the trainer kit.

7.4 PROGRAM:

DIGITAL TO ANALOG CONVERTER

7.4.1 Square wave generation

The basic idea behind the generation of the waveform is the continuous generation of analog output at DAC. With 00(hex) as the input to the DAC_2, the analog value is -5v. Similarly, with FF (hex) as input, the output of the DAC is +5v. Outputting the digital data 00 and FF at regular intervals at DAC_2, results in a square wave generation.

Program:

ADDRESS	LABEL	MNEMONICS	OPCODE	COMMENTS
		MOV AL,00		
		OUT C8,AL		
		CALL 1010		
		MOV AL,FF		
		OUT C8,AL		
		CALL 1010		
		JMP 1000		
		MOV CX, 05FF		
		LOOP 1013		
		RET		

7.4.2 Sawtooth wave generation

Output digital data from 00 to FF in constant steps of 01 to DAC_1.Repeat this sequence again and again. As a result a saw tooth is generated at DAC_1 output.

ADDRESS	LABEL	MNEMONICS	OPCODE	COMMENTS
	START	MOV AL,00		
	L1	OUT CO,AL		
		INC AL		
		JNZ L1		

		JMP START		

7.4.3 TRIANGLE WAVE GENERATION

ADDRESS	LABEL	MNEMONICS	OPCODE	COMMENTS
	START	MOV BL,00		
	L1	MOV AL,BL		
		OUT C0,AL		
		INC BL		
		JNZ 1002		
		MOV BL,FF		
	L2	MOV AL,BL		
		OUT C0,AL		
		DEC BL		
		JNZ 100C		
		JMP 1000		

7.5 Pre-Lab Questions:

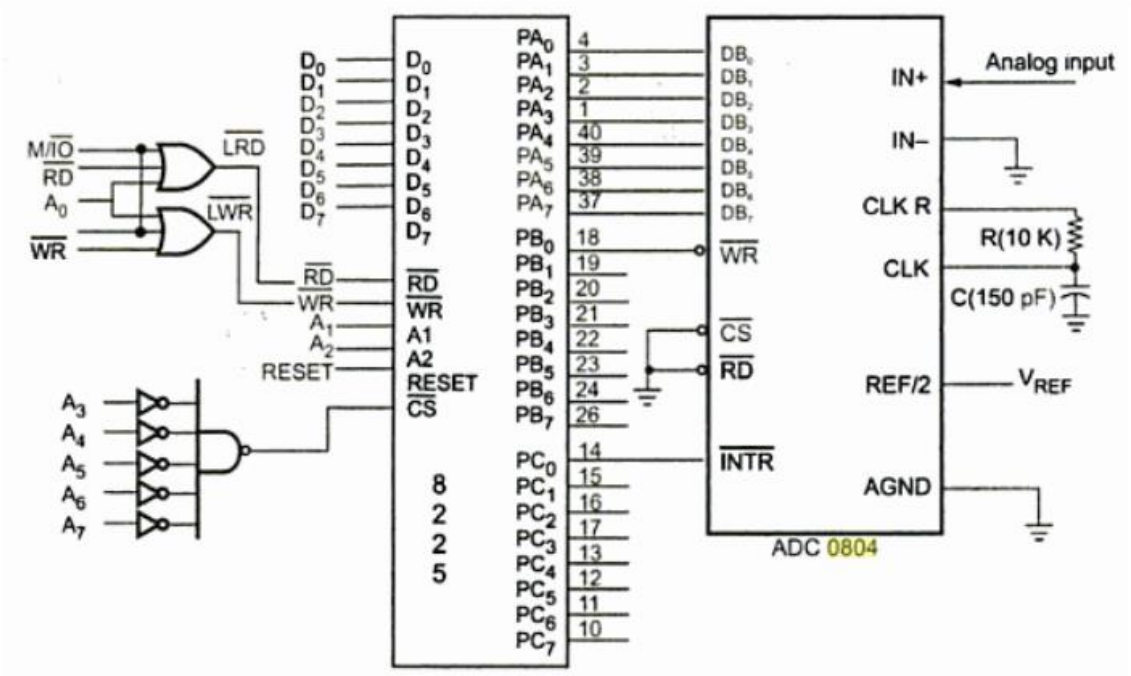
1. Why Analog to Digital conversion?
2. Why DAC is interfaced with 8086?
3. State any two applications where DAC is used?
4. How many waveforms are generated in the program stated above?
5. Is it possible to generate a sine wave using a DAC?

7.6 Post-Lab Questions:

1.Write a program to generate a triangular wave

2. Write a general algorithm for interfacing ADC with 8086.

3. Figure shows the interfacing of ADC 0804 to the 8086 microprocessor. Write an assembly language program to read the converted digital data through data bus.


M/IO
RD
A0
WR
LRD
LWR
D0
D1
D2
D3
D4
D5
D6
D7
RD
WR
A1
A2
RESET
CS
A3
A4
A5
A6
A7
8
2
2
5
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
4
3
2
1
40
39
38
37
18
19
20
21
22
23
24
26
14
15
16
17
13
12
11
10
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
WR
CS
RD
INTR
IN+
IN–
CLK R
CLK
REF/2
AGND
Analog input
R(10 K)
C(150 pF)
VREF
ADC 0804