Control Word of 8255

Port C Lower PC3-PC0
1 = input, 0 = output
Port B
1 = input, 0 = output
Mode Selection
0 = Mode0, 1 = Mode1
Port C Upper PC7-PC4
1 = input, 0 = output
Port A
1 = input, 0 = output
Mode Selection
00 = Mode0, 01 = Mode1
1x = Mode 2
1 = I/O Mode
0 = BSR Mode

Criterion for Judging a DAC: Resolution
Resolution is a function of the number of binary inputs. Common ones are 8, 10, 12 pins.
The number of analog output levels is equal to \(2^n\), where \(n\) is the number of data inputs.
8-input DAC (MC1408) gives 256 discrete voltage/current levels of output.
12-input DAC gives 4096 voltage/current levels.
16-input DAC gives 65,536 voltage/current levels.

8255 Design Example

MC1480 DAC (or DAC 808)
In MC1480, the digital inputs are converted to current (Iout) and by connecting a resistor to the Iout pin, we convert the result to voltage.
The current provided by Iout is a function of binary numbers at D6-D7 and the reference current.
- \(I_{\text{ref}}\) is generally set to 2.0 mA.
- \(I_{\text{out}} = I_{\text{ref}} \times (D7/2 + D6/4 + D5/8 + D4/16 + D3/32 + D2/64 + D1/128 + D0/256)\).

Interface DAC to a PC
DAC (Digital-to-Analog Converter)
- Device used to convert digital pulses to analog signals.
- Two methods of making the DAC:
  - Binary weighted
  - \(R/2R\) ladder
  - The vast majority of IC use \(R/2R\) since it can achieve a much higher degree of precision.

Interface DAC to PC
Example1
- Interface MC1480 to Microprocessor through PPI 8255
Example2
- Interface AD558 directly to Microprocessor.

Interface MC1480 to Microprocessor through PPI 8255
MOV AL, 80H
OUT PCtrl, AL
MOV AL, 0
Cont: OUT PA, AL
INC AL
CMP AL, 0
JZ Stop
MOV CX, 0FFFFH
Here: LOOP Here
JMP Cont
Stop: INT 6
Interface AD558 to 8088
8-bit DAC Voltage Output

Interface ADC and Sensors to a PC
• AD558 is configured as “write only”
• VCC range +4.5 V ~ +16.5 V, normally +5 V
• Vout Range: 0 ~ 2.56 V, or 0 ~ 10 V
• Digital Input Code Output Voltage

<table>
<thead>
<tr>
<th>Binary Hex</th>
<th>Decimal</th>
<th>2.56V</th>
<th>10V</th>
</tr>
</thead>
<tbody>
<tr>
<td>00000000</td>
<td>00</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>00000001</td>
<td>01</td>
<td>0.01V</td>
<td>0.039V</td>
</tr>
<tr>
<td>00001111</td>
<td>0F</td>
<td>0.150V</td>
<td>0.586V</td>
</tr>
<tr>
<td>11111111</td>
<td>FF</td>
<td>2.55V</td>
<td>9.961V</td>
</tr>
</tbody>
</table>

(LSB) DB₉, 1  16  Vout
DB₁, 2  15  Vout (Sense)
DB₂, 3  14  Vout (Select)
DB₃, 4  13  GND
DB₄, 5  12  GND
DB₅, 6  11  +VCC
DB₆, 7  10  CS
(MSB) DB₇, 8  9  CE