I/O mapping

A I/O address range for

DATA WORD : 20

COMMAND WORD : 22

Seven segment display has seven segments of LED and a dot point total of 8 LEDs connected in common anode or common cathode mode.

Here for our 8279 interface card, common cathode display is used - ie, for a segment to glow or to be 'on', we have to apply logic high ie, 1.

So we have to find the hex code for the digit or letter to be displayed

for that, the 8 bit code for the segment is displayed in this order.

dp g f e d c b a where a is the LSB and dp or dotpoint is the MSB.

We have to write each code corresponding for our word to be displayed and to be stored in a memory location.

In this program we stored the hex data from location 500 onward

For the word HELLO, the code stored from 500 onwards are 76, 79, 38, 38 and 3F.

We have 7, seven segment displays on the board. If we write only 5 codes, the balance two seven segment may display unwanted letters or digits. So we have to blank that two

display. So for that we have to write the code for blank the display. ie, no segment should glow. For that the code is 00.

Static Display - HELLO

```
0400    MOV  AL, 00
0402    OUT  22, AL
```
} Control word for display mode setup to control register

```
0404    MOV  AL, 2D
0406    OUT  22, AL
```
} Control word for program clock divider to control register

```
0408    MOV  AL, 90
040A    OUT  22, AL
```
} Control word for write display RAM to control register.

```
040C    MOV  BX, 0500
```
segment decoder table starting location.

```
040F    MOV  SI, 0000
```

```
0412    MOV  CX, 0007
```
counter

```
0415  BACK: MOV  AL, [BX+SI]
```
Get segment code from 0500 onwards.

```
0417    OUT  20, AL
```
Write to display.

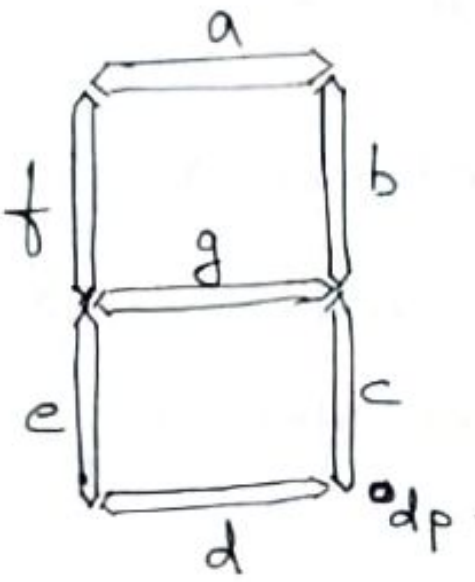
```
0419    INC  SI
```
Increment the memory location of segment decoder table.

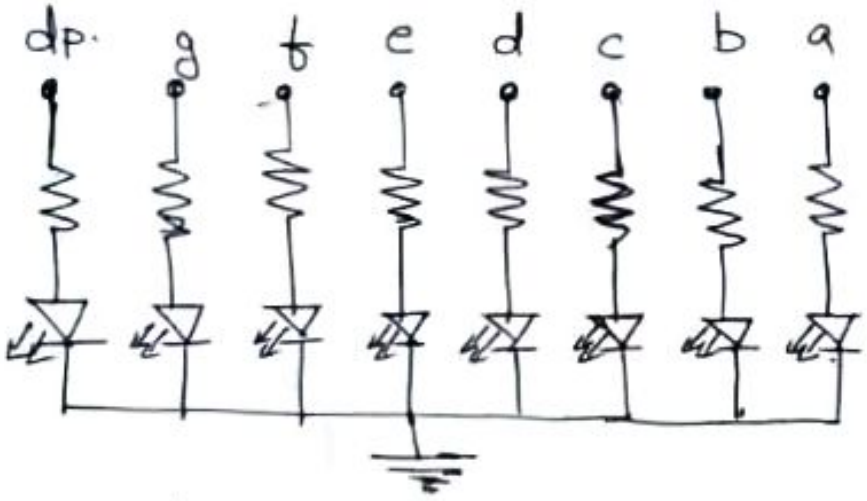
```
041A    LOOPNZ  BACK

041C  HERE: JMP  HERE
```

```
0500 : 76    0503 : 38    0506 : 00
0501 : 79    0504 : 3F
0502 : 38    0505 : 00
```

Seven Segment Display





	dp	g	f	e	d	c	b	a	hexcode
0	1	1	1	0	1	1	0	→ 76
0	1	1	1	1	0	0	1	→ 79
0	0	1	1	1	0	0	0	→ 38
0	0	1	1	1	0	0	0	→ 38
0	0	1	1	1	1	1	1	→ 3F

8279

* programmable keyboard display interface.
* clk pin of 8279 is connected from the system clock to generate timing.
* Pin A0 is used to select between data and command.
* If A0 is low, it indicates that the data bus contains data
* If A0 is high, it indicates that the data bus contains command.

① Keyboard / Display mode setup.

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
0	0	0	D	D	K	K	K

↑ DD stands for display

0 0 → Eight 8 bit character display - Left Entry

0 1 → Sixteen 8 bit character display - Left Entry

1 0 → Eight 8 bit character display - Right Entry

1 1 → Eight Sixteen 8 bit character display - Right Entry.

* In key rollover, suppose two keys are pressed almost simultaneously, both of them are debounced and their codes will be stored in FIFO RAM in the order in which they are pressed.

* Sensor matrix is a matrix of switch type sensors, the condition of which can be stored on the FIFO RAM (8×8 = 64 switch states).

(2) Program Clock.

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
0	0	1	P	P	P	P	P

* All timing and multiplexing signals for the the 8279 are generated by an internal prescaler.

* This pre-scaler divides the external clock by a programmable integer.

* PPPPP determine the value of this integer which ranges from 2 to 31.

* Choosing a divisor that yields 100kHz will give the specified scan and debounce times.

Left Entry - like a typewriter

* first character is displayed in the left most position and the second one will be displayed right of the first one and so on.

Right Entry - like calculators

* first entry is placed on the right most position.
* for the second entry, the earlier one is shifted left and the new character is placed again at the right most position and so on.

↑ KKK stands for keyboard.

000 → Encoded Scan Keyboard - 2 Key Lock Out
001 → Decoded Scan keyboard - 2 key lock out
010 → Encoded scan keyboard - N key Roll over
011 → Decoded scan keyboard - N key Roll over.
100 → Encoded Scan sensor matrix.
101 → Decoded Scan sensor matrix
110 → Strobed Input, Encoded Display Scan
111 → Strobed i/p, Decoded Display Scan

* Two key lockout happens when the keys are such that only if the first key is released, will the second key be considered at all.

* For example if 8279 is clocked by a 2 MHz signal, PPPPP should be set to 10100 to divide the clock by 20 to yield the proper 100 KHz operating frequency

③ Clear Display

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
1	1	0	C_D	C_D	C_D	C_F	C_A

D_4 D_3 D_2

→ C_D C_D C_D → The lower two C_D bits specify the blanking code to be sent to the segments to turn them off while the display is switching from one digit to the next. D4 → if D_4 is 1, enables clear display The rows of display RAM are cleared by the code set by lower two CD bits. If CD=0 contents of RAM will be displayed.

→ D_4 bit is to enable clear display [1]

→ CF - If CF = 1, FIFO status is cleared
- interrupt and o/p flags are reset
- Sensor RAM pointer is set to ROW 0

→ CA - Clear all bit has the combined effect of C_D and C_F.
- It causes the C_D clearing code on the display and clears the FIFO status.

- It also synchronizes the internal timing chain.

Write Display RAM

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
1	0	0	AI	A	A	A	A

* To display data, it must be entered into the display RAM.
* After this word is written, all subsequent writes will be to the display RAM.
* Commands are written using an address which ensures that pin $A_0 = 1$. Data is written with $A_0 = 0$
* AI - Auto Increment. If AI = 1, the row address selected in the display RAM will be incremented after each write.
* AAAA - selects one of the 16 rows in the display RAM - thus it varies from 0000 to 1111.