98 Number Page-এ [illegible] Figure-এ Address Map

Page → 100

A_{15}	A_{14}	A_{13}	A_{12}	A_{11}	A_{10}	A_9	A_8	A_7	A_6	A_5	A_4	A_3	A_2	A_1	A_0		RAM CHIPS
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1st	RAM CHIP 0
0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	Last	
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1st	RAM CHIP 1
0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	Last	
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1st	RAM CHIP 2
0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	Last	
0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1st	RAM CHIP 3
0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	Last	

Draw the diagram of 8-bit microprocessor with 16 bit address bus interfaced with 7KB RAM using the full decoding technique. Each RAM chip has 10 bit address bus and 8 bit data bus. Also provide the corresponding address map for each RAM chip.

Ans:

Given,
RAM Chip
Address Bus = 10 bit
Data Bus = 8 bit

Memory size of a single RAM Chip $= 2^{10} \times 8$
$= 8192$ bits
$= \frac{8192}{8}$ bytes
$= 1024$ bytes
$= \frac{1024}{1024}$ KB
$= 1$ KB

Target = 8 KB

Which mean we will need 8 RAM Chips.

Memory size / Capacity of the Processor $= 2^{16} \times 8$ bits
$= 524288$ bits
$= \frac{524288}{8}$ bytes
$= 65536$ bytes
$= \frac{65536}{1024}$ KB
$= 64$ KB.

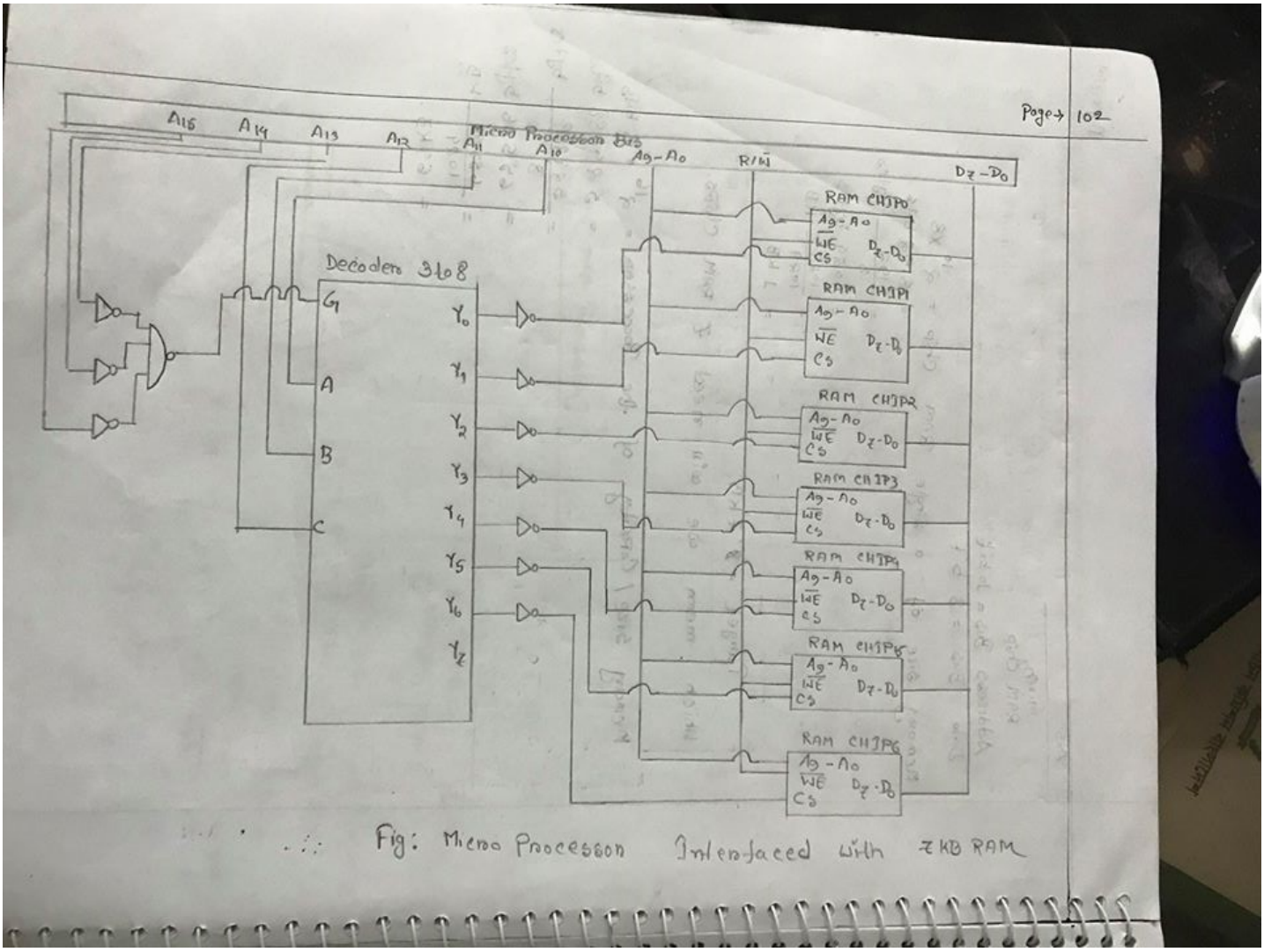


Fig: Micro Processor Interfaced with 7KB RAM

Address MAP

A_{15}	A_{14}	A_{13}	A_{12}	A_{11}	A_{10}	A_9	A_8	A_7	A_6	A_5	A_4	A_3	A_2	A_1	A_0		RAM CHIPS
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1st	RAM CHIP 0
0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	last	
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1st	RAM CHIP 1
0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	last	
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1st	RAM CHIP 2
0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	last	
0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1st	RAM CHIP 3
0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	last	
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1st	RAM CHIP 4
0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	last	
0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1st	RAM CHIP 5
0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	last	
0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1st	RAM CHIP 6
0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	last	

* Decoder লাগানোর পর যেই চিপগুলো বাকি থাকে সেগুলো 0 করে রাখা হয়। ঐ chips গুলো Active হয়ে গেলে MicroProcessor hang করে।

Slide → 8255 PPI

Q. Draw 8255 MP diagram.

Ans.

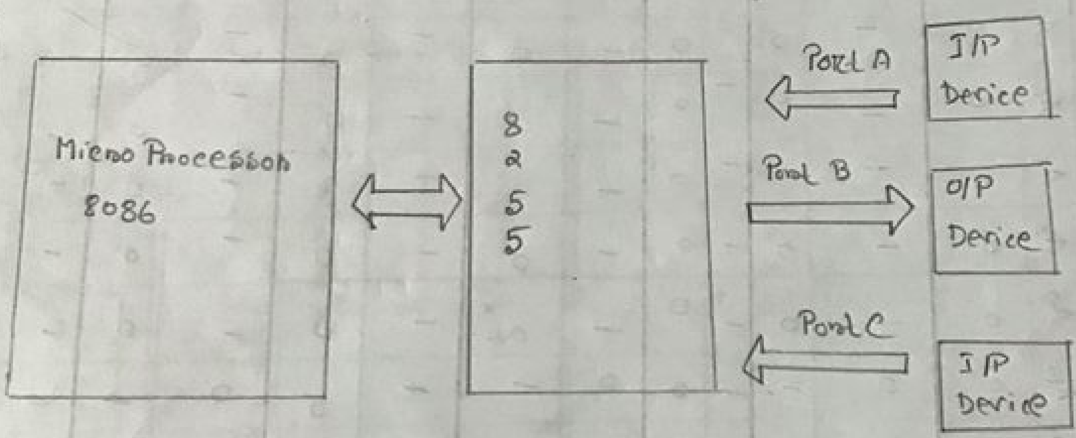


Fig: 8086 MP diagram

* PPI তে ২৪ টা I/O Pins আছে, যেগুলোর ~~...~~ ১২টা Programmable group Pin.
* PPI ৩ টা different mode এ কাজ করে।

Mode 0	Basic I/O
Mode 1	Strobe I/O
Mode 2	Bi-din bus

Mode 0:

Port A, B & C can work either as input function or as output function.

Mode 1:

In this either Port A or B can work & Port C bits are used to Provide handshaking.

Mode 2:

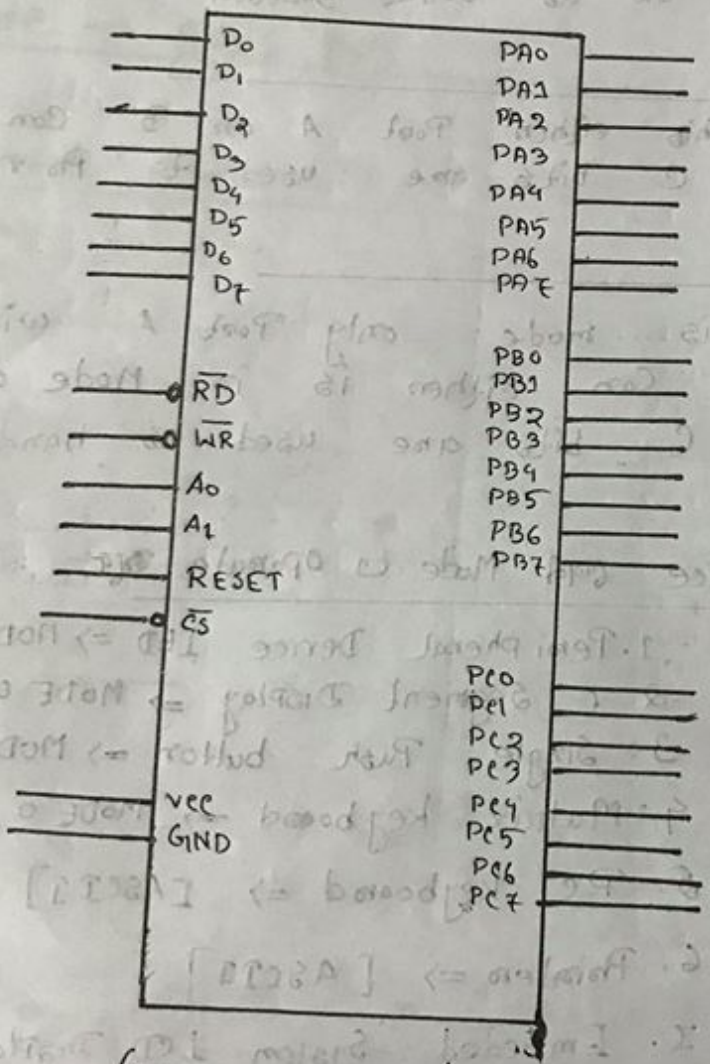
In this mode only Port A will work, Port B can either is in Mode 0 or 1 & Port C bits are used as handshake signal.

কোন Device কোন Mode এ Operate করে:

1. Peripheral Device LED => MODE 0
2. 7 Segment Display => MODE 0
3. Single Push button => MODE 0
4. Matrix keyboard => MODE 0
5. Pc keyboard => [ASCII]
6. Printer => [ASCII]
7. Embeded System LCD Display => MODE 0
8. Pc LCD => MODE 1.

* PC keyboard => ASCII key value send করে,
* Single Push button => High / Low voltage send করে,
* MODE 1 => Acknowledgement এর সুবিধা আছে, Hand shaking এর মাধ্যমে হয়ে থাকে,

82C55 Pin Layout



Group A => (PA7 - PA0) & (PC7 - PC4)
Group B => (PB7 - PB0) & (PC3 - PC0)

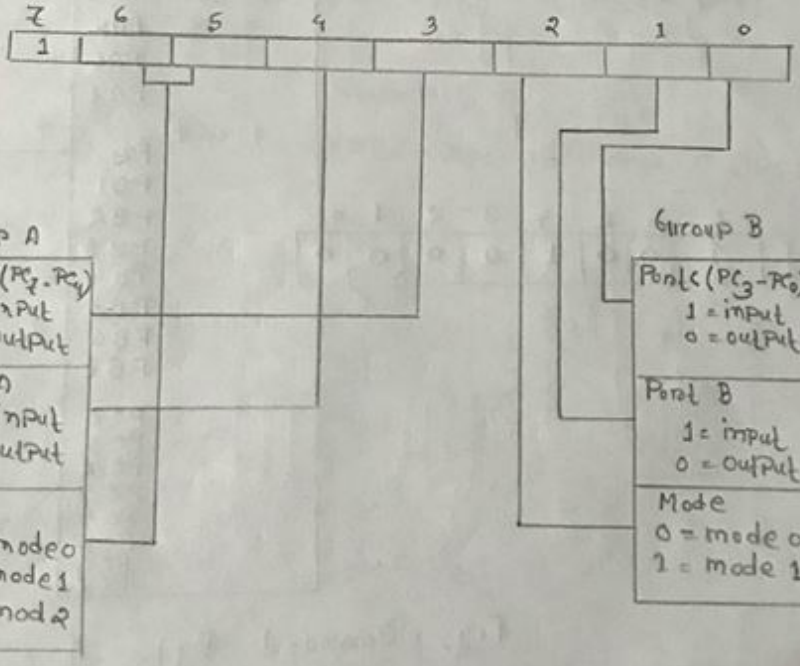
* A_0 & A_1 Pin দিয়ে কোন Port Active করা হবে তা Select করা হয়

A_1	A_0	Function
0	0	Port A
0	1	Port B
1	0	Port C
1	1	Command Register

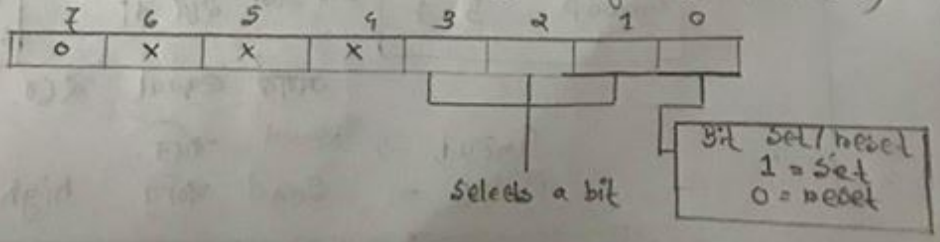
* Command Byte MODE 1 নাকি MODE2 তে যাবে,

Programming 8255

Command Byte A (Program Ports A,B,C)



Command Byte B (Sets or Resets any bits in Port C)



Q Suppose you want to interface Push button with Peripheral interface 82C55 PortA & LED with Peripheral interface 82C55 PortB. Write down the appropriate Command byte for A for 82C55 Command Register.

Ans:

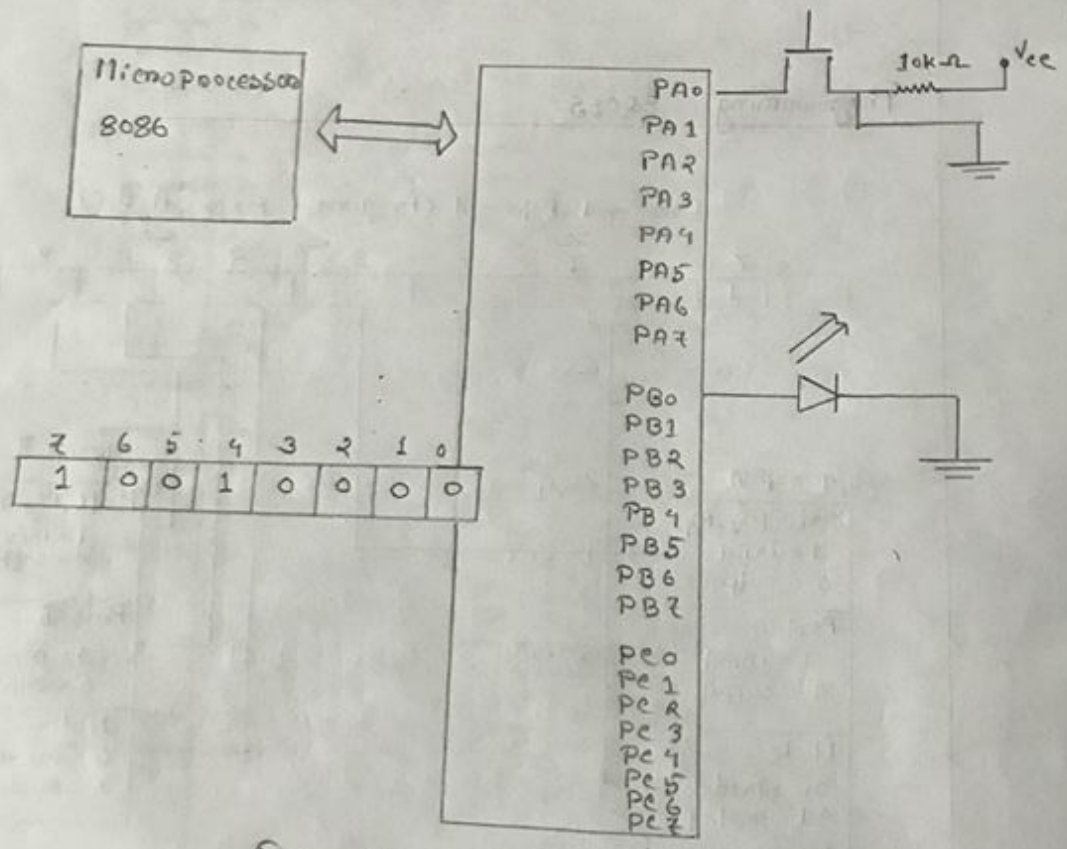


Fig: Command Byte A = 0b 100 10000

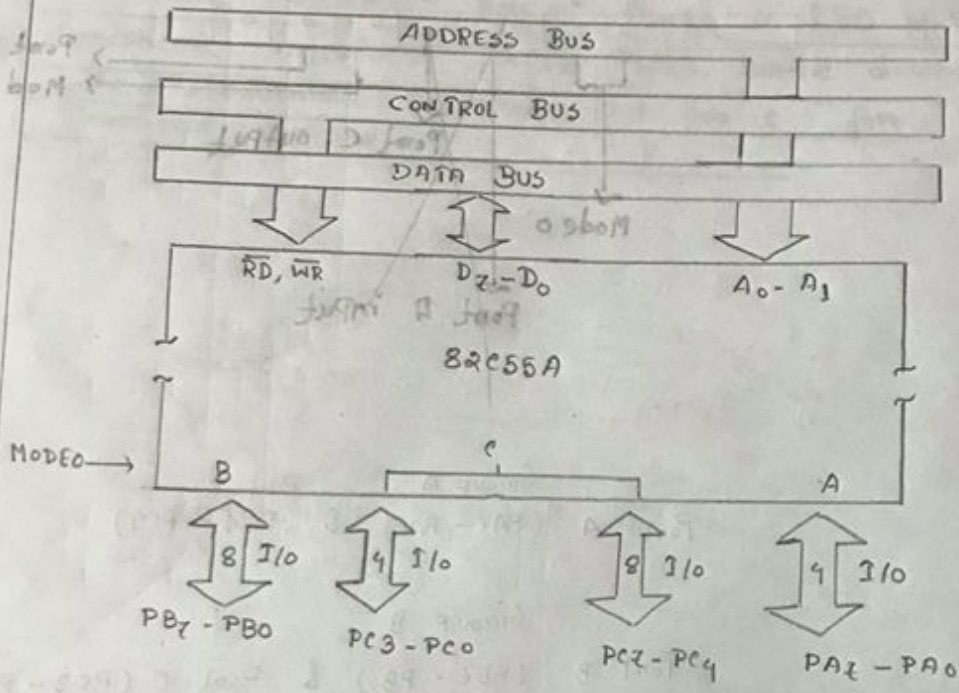
Group A = 0
Group B = 1 → এটা হবে না

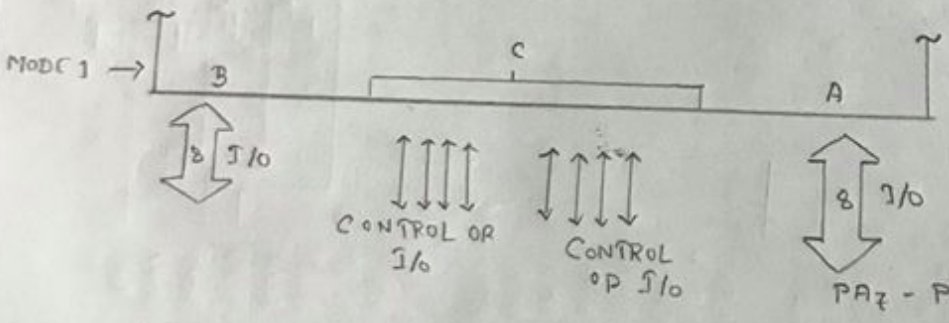
Group A = 1
Group B = 0 → এটা হবে।

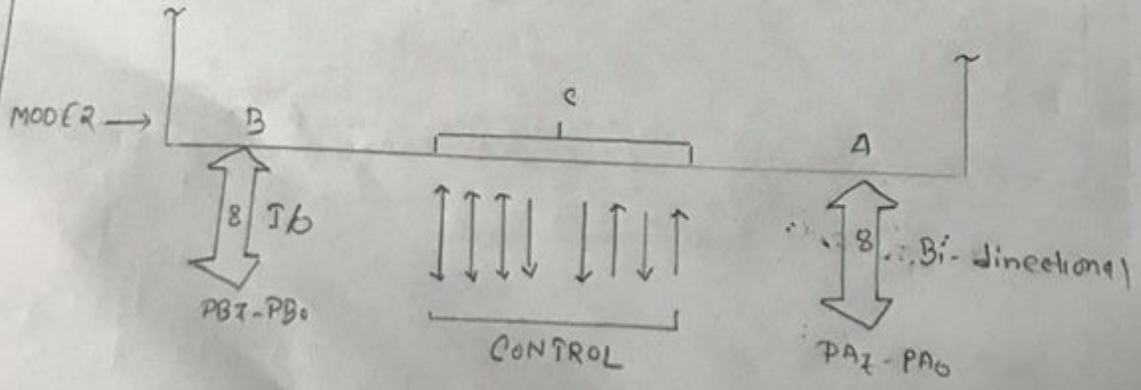
সবার equal হবে,

Input → Read করবি.
Output → Send করবি high/low voltage.

Basic Mode Definitions & Bus Interface





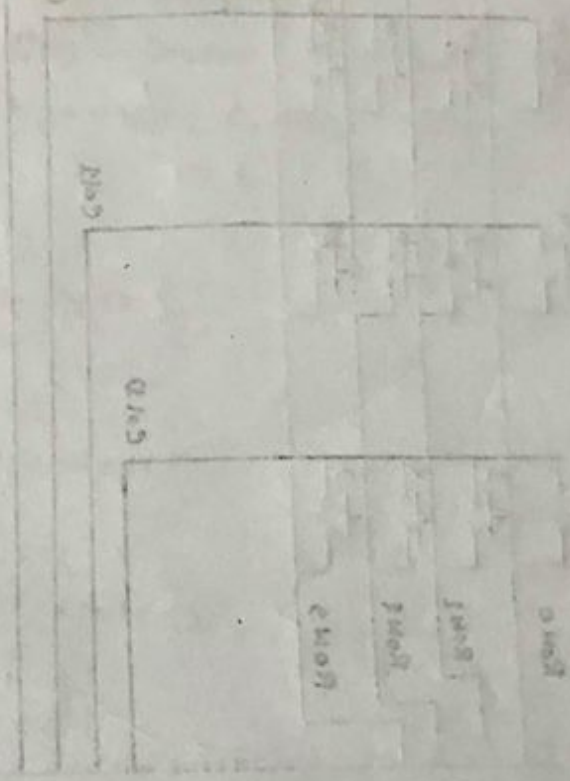


Write notes on Basic Input/Output [Mode 0]

Ans:

a. This functional configuration provides simple input & output operations for each of the three ports.

b. No handshaking is required, data is simply written to or read from a specified port



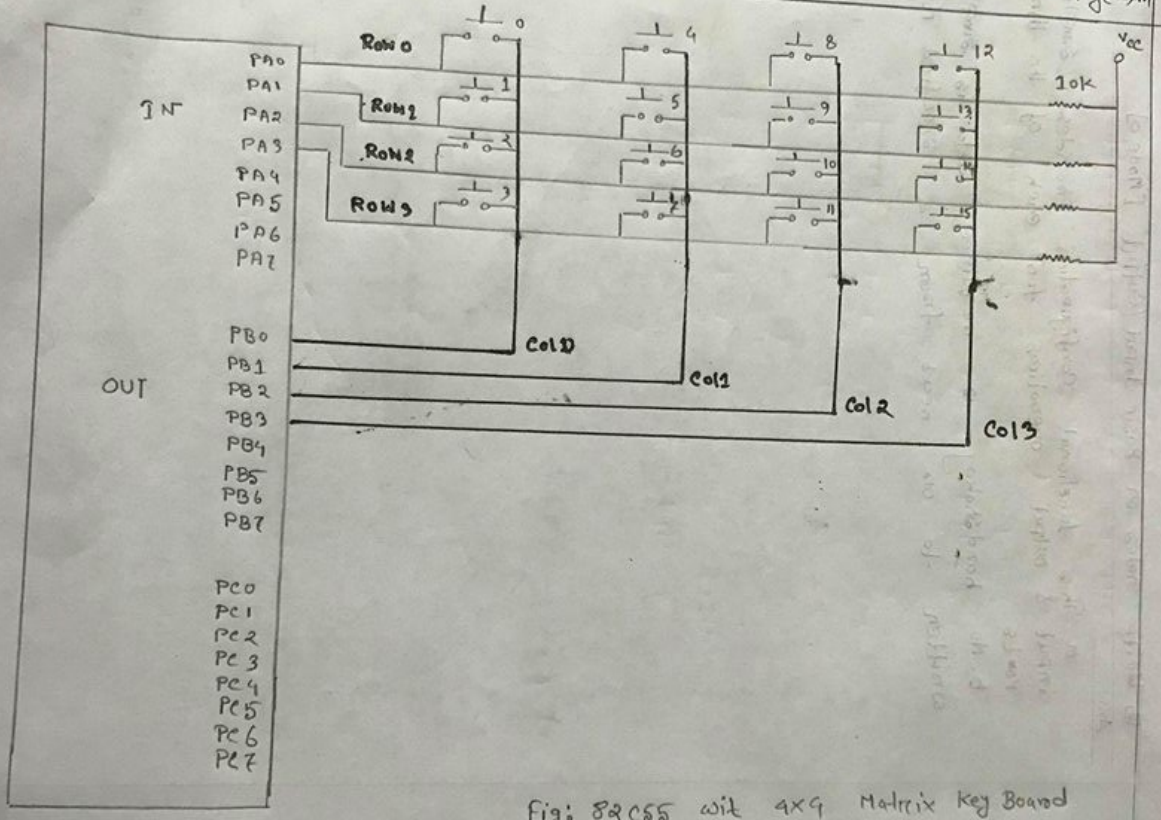


Fig: 8255 with 4x4 Matrix Key Board

16 switch বিশিষ্ট (4x4) matrix keyboard 8255 এর Port A এবং Port B এর সাথে interface করা হয়েছে।

* প্রতিটা row 0.5 V এর Vcc এর সাথে Connected. এই Connection এর সাথে রয়েছে 10K Ω Pull UP resistor. Resistor লাগানো হয়, যেন row গুলো Pull high থাকে।
* Port B এর 0 Volt.
* Button Press করলে low voltage.
* 8255 Column বরাবর thread এ প্রবাহমান হয়।
* Voltage যখন high হয়ে Current flow করে না

Looping

```
if(PA0 == 0){
        execute();
}
if (PA1 == 0){
        execute();
}
if (PA2 == 0){
        execute();
}
if (PA3 == 0){
        execute();
}
```

```
if (PB1 == LOW && PA0 == LOW){
    Print " Button 4";
    }
if (PB1 == LOW && PA1 == LOW){
    Print " Button 5";
    }
if (PB1 == LOW && PA2 == LOW){
    Print " Button 6";
    }
if (PB1 == LOW && PA3 == LOW){
    Print " Button 7";
    }
```

Write algorithm (flowchart for 4x4 Matrix keyboard)

Ans