



# CSE360 – COMPUTER INTERFACING

## Assignment - 02

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Section: 04

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1. Assume you have connected a mouse to Port B and a Graphics Tablet to port A of the 82C55 PPI.

a. In which mode Port A and B are working? Also write the control word in which the 82C55 should be programmed. (Marks 2)

b. Draw a diagram showing the configuration of the 82C55 IC (Hint: specify the configuration of Port A, Port B and Port C pins). (Marks 2)

### Answer to the Question Number – 01

(a)

Since,

Port A (Input/Output device) → Graphics Tablet → Mode 2

Port B (Input Device) → Mouse → Mode 1

Control word: 11XXX11X

(b)

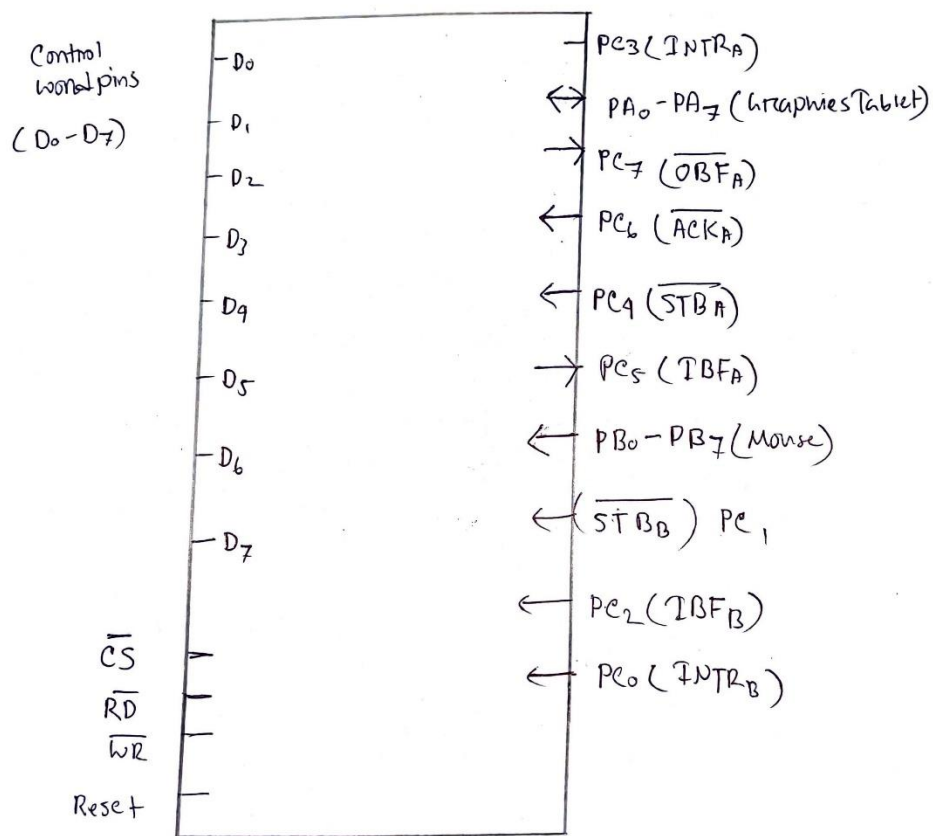


Figure: Configuration of 82C55

Now suppose you have tapped a picture on your screen and after a while the picture pops out and opens.

a. Describe the sequences and process that takes place between the 82C55 and the Graphics Tablet. You should mention the sequence in which the signals are generated and the pins that are involved in the process. (Marks 4)

b. Draw a timing diagram to support your explanation. (Marks 2)

(a)

Sequences and process between 82C55 & Graphics Tablet,

**Seq – 1:** The touch signal from graphics tablet will be sent to 82C55 IC through PA0 – PA7 pins. The IC will be notified through (STB<sub>A</sub>)' pin where (STB<sub>A</sub>)' pin becomes active with a value of 0. Also, IBF<sub>A</sub> becomes active.

**Seq – 2:** The IC will send interrupt signal to check whether the microprocessor is ready to receive data and if the microprocessor is ready, it will activate the RD' signal and give it a value of 0, then select the port using A0 and A1 pin. Additionally, it will read data through the D0 – D7 pins and IBF<sub>A</sub> signal becomes low. From this the device understands that it can send more data.

**Seq – 3:** As a response of the touch signal or data, the microprocessor will now send the data through the D0 – D7 pin after getting and acknowledging an interrupt signal from the IC, activating the WR' pin, selecting the port through A0 and A1 pin and OBF<sub>A</sub>' will be active.

**Seq – 4:** When the OBF<sub>A</sub> is active, the device will send ACK<sub>A</sub>' signal as an acknowledgement and finally the picture data will be delivered to the device through PA0 – PA7 port.

(b)

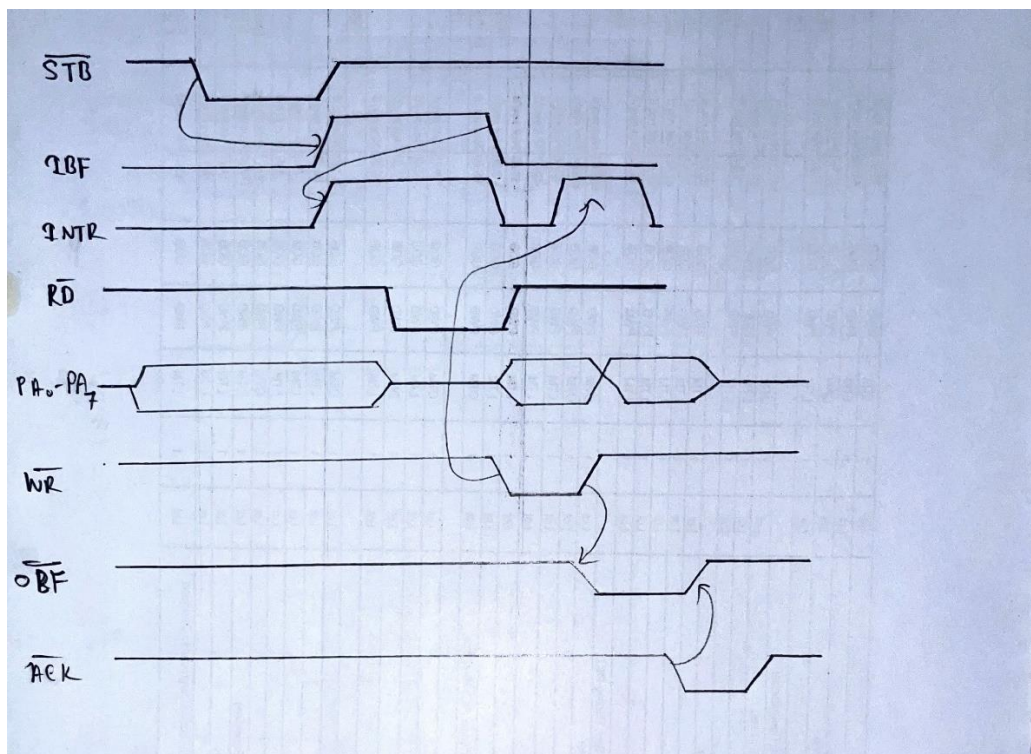


Figure: Timing Diagram

2. Suppose, a peripheral device Keyboard is connected to Port A and a monitor is connected to Port B of the 82C55 PPI.

- Write the Control Bits to configure the 82C55 IC. (Marks 1)
- Draw a diagram showing the configuration of the 82C55 IC (Hint: specify the configuration of Port A, Port B and Port C pins) (Marks 2)
- Suppose you pressed the 'B' key on the keyboard. Write down the steps that will take place in the 82C55 IC. Draw a timing diagram accordingly. (Marks 3.5)
- Now, you want to see the 'B' in the monitor, Write down the steps that will take place in the 82C55 IC. Draw a timing diagram accordingly. (Marks 3.5)

### Answer to the Question Number – 02

(a)

Since,

Port A (Input device) → Keyboard → Mode 1

Port B (Output device) → Monitor → Mode 1

Control bits to configure 82C55 IC: 1011X10X

(b)

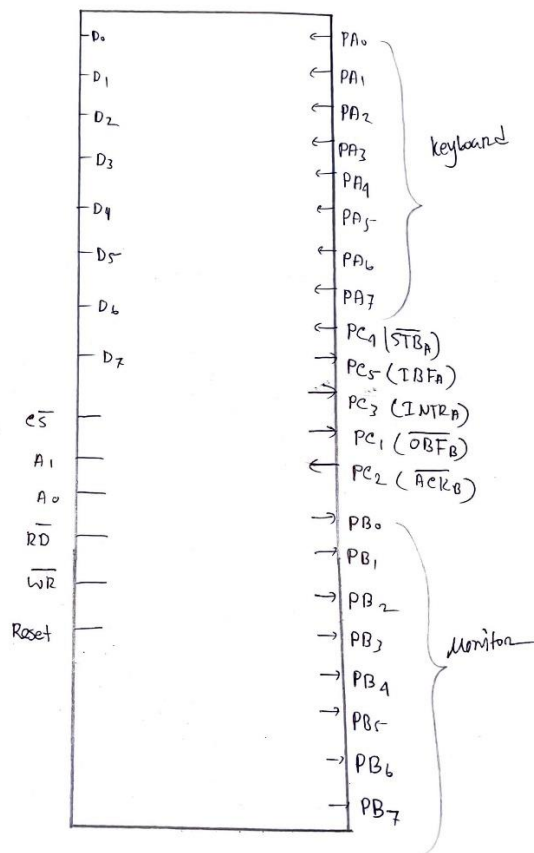


Figure: Configuration of 82C55

(c)

Steps taking place upon pressing B in keyboard,

1. PA0 - PA7 will receive the ASCII value B from the keyboard. The keyboard will send a strobe signal through (STB<sub>A</sub>)' pin activating it with a value of 0.
2. After receiving the strobe signal, IBF<sub>A</sub> will be sent to the keyboard as the input buffer is full now and not to send further data.
3. IC will send interrupt signal to the microprocessor through INTR<sub>A</sub> pin to check if the microprocessor is ready to receive the data or not.
4. After the microprocessor activates RD' pin, it means that it is ready to read the data now, then the data is being transferred to the microprocessor using the D0 - D7 pins.
5. After microprocessor receives the data IBF<sub>A</sub> becomes 0 or active and the keyboard can now send the next data.

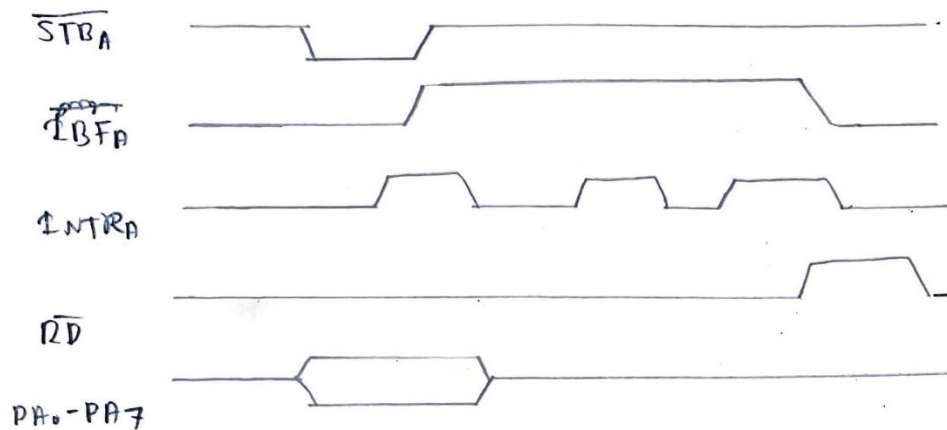


Figure: Timing Diagram

(d)

Steps taking place to see B in the monitor,

1. First 82C55 IC will send interrupt signals to the microprocessor through  $\text{INTR}_B$  to check if it wants to output any data.
2. Microprocessor will acknowledge interrupt activating  $(\text{WR})'$  pin with a value of 0 and select the Port B using  $A1 = 0, A0 = 1$ . Then it will send the data through data bus D7-D0.
3. The  $(\text{OBF}_B)'$  pin will send a signal to monitor to check if it is ready to show the output.
4. When monitor is ready it will send an acknowledge pin through  $(\text{ACK}_B)'$ .
5. After IC receives the acknowledge from the monitor, it sends out the 8-bit data through  $\text{PB}_0 - \text{PB}_7$  and  $\text{OBF}_B$  is disabled as output buffer will be empty after delivering the data to the monitor.

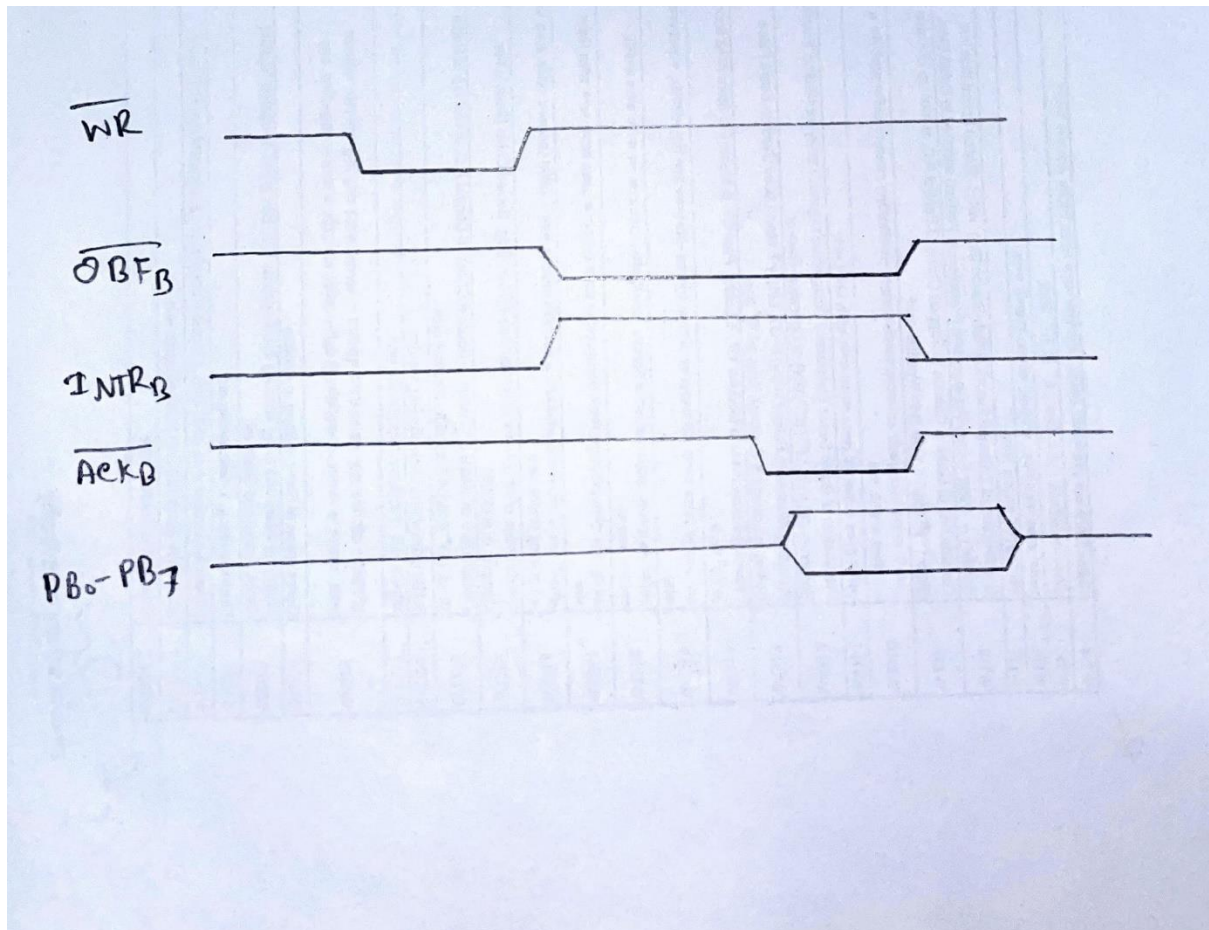


Figure: Timing Diagram