# Microprocessor & Interfacing
# Lecture 5
# 8085 Pin Diagram

**PARUL BANSAL**
**ASST PROFESSOR**
**ECS DEPARTMENT**
**DRONACHARYA COLLEGE OF ENGINEERING**

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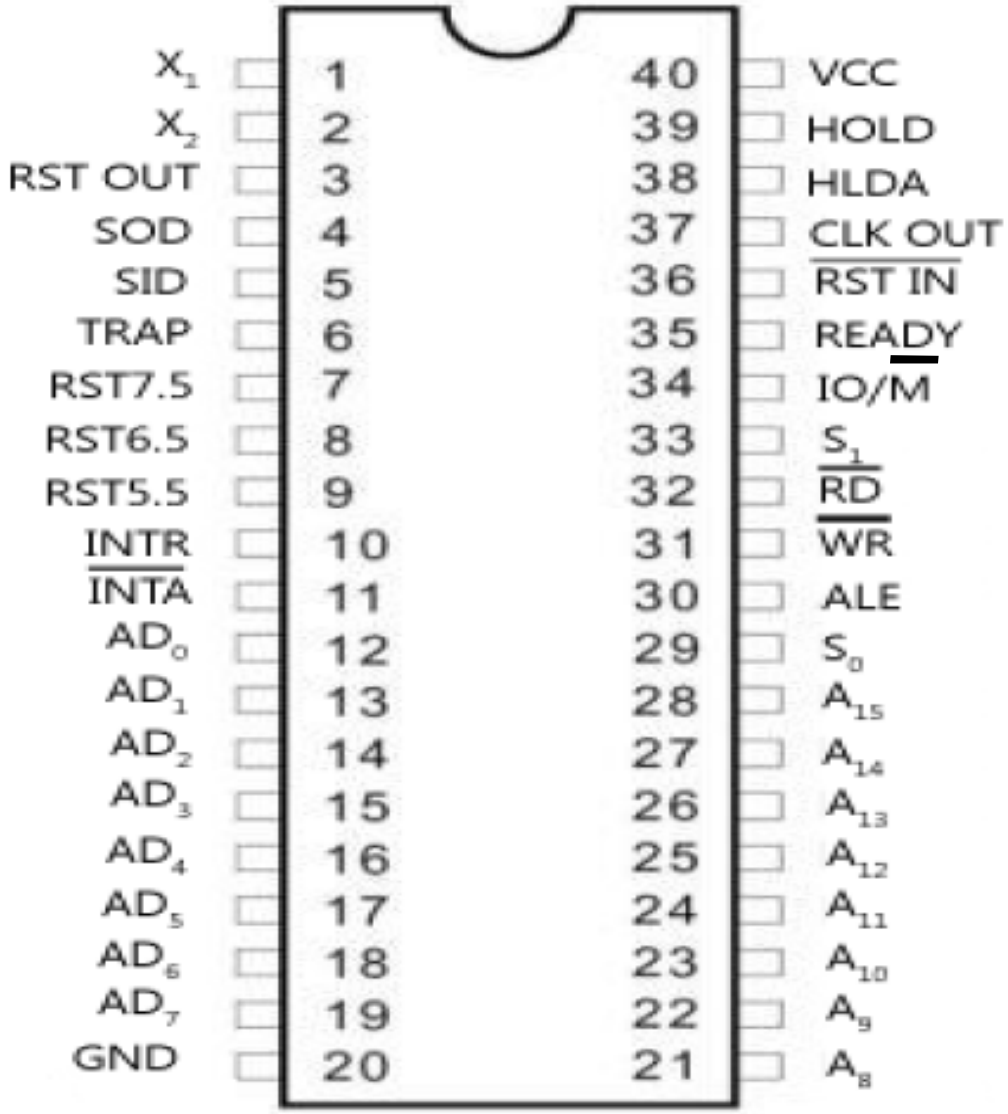
# Introduction

- Pin diagram shows the physical architecture of the microprocessor which defines all the pin and there sequences. 8085 microprocessor is a 40 pin IC which operate on 5volt power supply.

# Pin Diagram


X1 1
X2 2
RST OUT 3
SOD 4
SID 5
TRAP 6
RST7.5 7
RST6.5 8
RST5.5 9
INTR 10
INTA 11
AD0 12
AD1 13
AD2 14
AD3 15
AD4 16
AD5 17
AD6 18
AD7 19
GND 20
40 VCC
39 HOLD
38 HLDA
37 CLK OUT
36 RST IN
35 READY
34 IO/M
33 S1
32 RD
31 WR
30 ALE
29 S0
28 A15
27 A14
26 A13
25 A12
24 A11
23 A10
22 A9
21 A8

# Description

**Address Bus:**

- The pins A8-A15 denote the address bus. They are used for the most significant bit of memory address.

**Address/Data Bus:**

- AD0-AD7 constitutes the Address/Data bus. They are time multiplexed. These pins are used for least significant bits of address bus in the first machine clock cycle and used as data bus for second and third clock cycle.

# Clock Cycle

- What is a clock cycle? What is first clock cycle and second, third so on...
  - A clock cycle is the time taken between two adjacent pulses of the oscillator. In simple words clock cycle refers to the transition between o volts to 5 volts and back to 0 volts. So the first clock cycle means the first transition of pulse from 0volts to 5 volts and then back to 0 volts.

# ALE

**ALE: Address Latch Enable:**

- In the previous article we saw how ALE helps in demultiplexing the lower order address and data bus.
- This signal goes high during the first clock cycle and enables the lower order address bits.
- The lower order address bus is added to memory or any external latch.

# IO/M’

- Consider we have an address to be processed. But how do the processors know whether the address is for memory or I/O functions?
- For this purpose a status signal called IO/M’ is used. This distinguishes whether the address is for memory or IO.
- When this pin goes high, the address is for an I/O device. While the pin goes low, the address is assigned for the memory.

# S0-S1

- S0 and S1 are status signals which provides different status and functions depending on their status.

| S0 | S1 | Operation |
|---|---|---|
| 0 | 0 | Halt |
| 0 | 1 | Write |
| 1 | 0 | Read |
| 1 | 1 | fetch |

# Read & Write

**RD':**

- This is an active low signal. That is, an operation is performed when the signal goes low. This signal is used to control READ operation of the microprocessor. When this pin goes low the microprocessor reads the data from memory or I/O device.

**WR':**

- WR' is also an active low signal which controls the write operations of the microprocessor. When this pin goes low, the data is written to the memory or I/O device.

# READY

- READY is used by the microprocessor to check whether a peripheral is ready to accept or transfer data.
- A peripheral may be a LCD display or analog to digital converter or any other. These peripherals are connected to microprocessor using the READY pin.
- If READY is high then the periphery is ready for data transfer. If not the microprocessor waits until READY goes high.

# HOLD

- This indicates if any other device is requesting the use of address and data bus. Consider two peripheral devices. One is the LCD and the other Analog to Digital converter.
- Suppose if analog to digital converter is using the address and data bus and if LCD requests the use of address and data bus by giving HOLD signal, then the microprocessor transfers the control to the LCD as soon as the current cycle is over.
- After the LCD process is over, the control is transferred back to analog and digital converter.

# HLDA

- The acknowledgment signal for HOLD. It indicates whether the HOLD signal is received or not. After the execution of HOLD request, HLDA goes low.

# INTA & INTR'

**INTR:**

- INTR is an interrupt request signal. It has the lowest priority among the interrupts. INTR can be enabled or disabled by using software. Whenever INTR goes high the microprocessor completes the current instruction which is being executed and then acknowledges the INTR signal and processes it.

**INTA':**

- Whenever the microprocessor receives interrupt signal. It has to be acknowledged. This acknowledgement is done by INTA'. So whenever the interrupt is received INTA' goes high.

# RST **5.5, 6.5, 7.5**

- These are nothing but the restart interrupts. They insert an internal restart function automatically.
- All the above mentioned interrupts are maskable interrupts. That is, they can be enabled or disabled using programs.

# TRAP

- Among the interrupts of 8085 microprocessor, TRAP is the only non-maskable interrupt. It cannot be enabled or disabled using a program. It has the highest priority among the interrupts.
- PRIORITY ORDER (From highest to lowest)
  - TRAP
  - RST 7.5
  - RST 6.5
  - RST 5.5
  - INTR

# RESET IN' ,RESET OUT

**RESET IN':**

- This pin resets the program counter to 0 and resets interrupt enable and HLDA flip-flops. The CPU is held in reset condition until this pin is high. However the flags and registers won't get affected except for instruction register.

**RESET OUT:**

- This pin indicates that the CPU has been reset by RESET IN'.

# X1, X2

**X1 X2:**

- These are the terminals which are connected to external oscillator to produce the necessary and suitable clock operation.

**CLK:**

- Sometimes it is necessary for generating clock outputs from microprocessors so that they can be used for other peripherals or other digital IC's. This is provided by CLK pin. Its frequency is always same as the frequency at which the microprocessor operates.

# SID, SOD

**SID:**

- This pin provides serial input data. The serial data on this pin is loaded into the seventh bit of the accumulator when RIM instruction is executed.
- RIM stands for READ INTERRUPT MASK, which checks whether the interrupt is masked or not.

**SOD:**

- This pin provides the serial output data. The serial data on this pin delivers its output to the seventh bit of the accumulator when SIM instruction is executed.

# Vcc and Vss

- Vcc is +5v pin and Vss is ground pin.

# Scope of Research

- Scope of research can be in the following fields such as

(A) decrease the size of microprocessor.

(B) decrease the power requirement.

(C) increase the feature of microprocessor.

(D) change the manufacturing technology.