Microprocessors
Interfacing 1

Lecture-6:-
Intel 8085 Microprocessor

The 8085A is an 8- bit microprocessor suitable for a wide range of applications. It is a 40-pin DIP (Dual in package) pice. The pin configuration is shown in fig.1
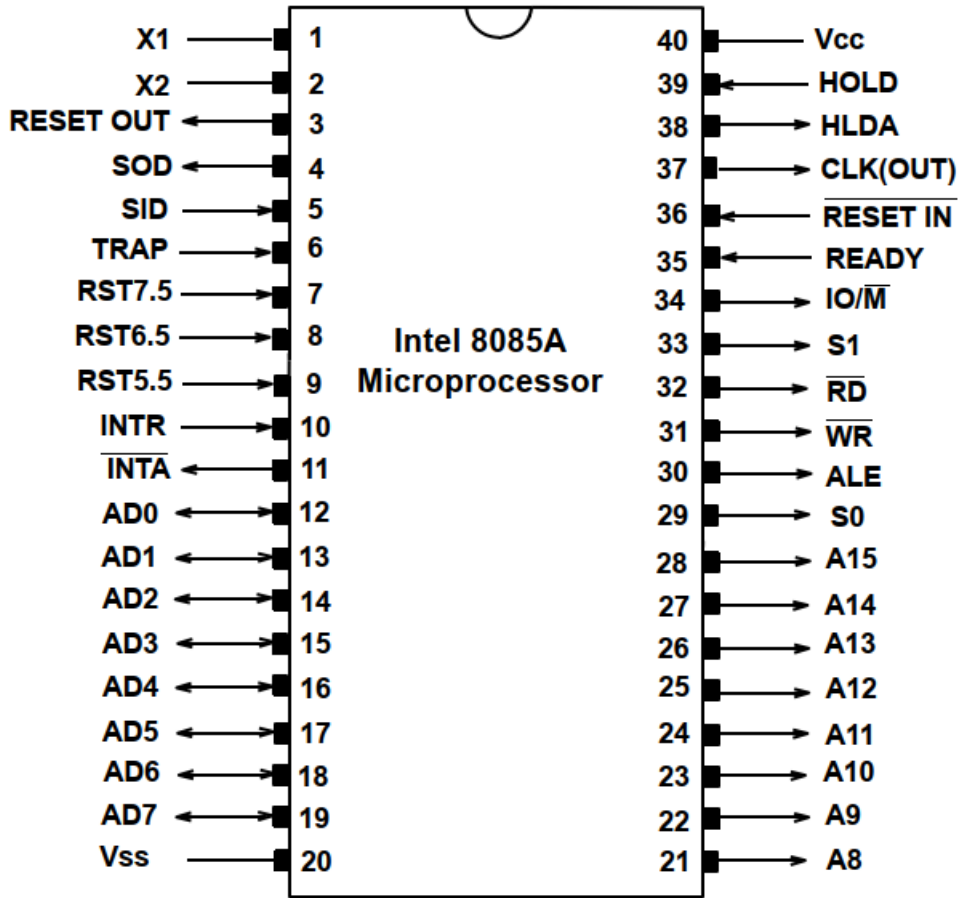
	Intel 8085A Microprocessor	
X1 — 1		40 — Vcc
X2 — 2		39 ← HOLD
RESET OUT ← 3		38 → HLDA
SOD ← 4		37 → CLK(OUT)
SID → 5		36 ← $\overline{\text{RESET IN}}$
TRAP → 6		35 ← READY
RST7.5 → 7		34 → IO/$\overline{\text{M}}$
RST6.5 → 8		33 → S1
RST5.5 → 9		32 → $\overline{\text{RD}}$
INTR → 10		31 → $\overline{\text{WR}}$
$\overline{\text{INTA}}$ ← 11		30 → ALE
AD0 ← 12		29 → S0
AD1 ← 13		28 → A15
AD2 ← 14		27 → A14
AD3 ← 15		26 → A13
AD4 ← 16		25 → A12
AD5 ← 17		24 → A11
AD6 ← 18		23 → A10
AD7 ← 19		22 → A9
Vss — 20		21 → A8

Fig.1 Pin Configuration of Intel 8085A Microprocessor

The pins of a 8085 microprocessor can be classified into seven groups.

1.Address bus

A15 – A8 at pin no. 28 to pin no. 21, it carries the most significant 8-bits of memory and I/O address. The microprocessor can address directly 65536 memory locations or 64k memory locations using 16-address lines (A15-A0). Pin no. 28 to pin no. 21 give us the higher order 8-bits of the address (A15-A8).

AD7–AD0 at pin no. 19 to pin no. 12 are used for dual purpose. It is time multiplexed lower 8-bit address bus (A7-A0) and 8-bit data bus (D7-D0).

2.Control and status signals

These signals are used to identify the nature of operation. There are 3 control signal and 3 status signals.

Three control signals are RD, WR & ALE.

- **RD(**Read control signal) − This signal indicates that the selected I/O or memory device is to be read and is ready for accepting data available on the data bus.
- **WR(**Write control signal) − This signal indicates that the data on the data bus is to be written into a selected memory or I/O location.
- **ALE(**Address latch Enable) − It is a positive going pulse generated when a new operation is started by the microprocessor. When the pulse goes high, it indicates address, that is means ALE=1. When the pulse goes down it indicates data, that is means ALE=0.

3.Three status signals are IO/M, S0 & S1.

- **IO/M**

This signal is used to differentiate between I/O and Memory operations, i.e. when it is high indicates I/O operation and when it is low then it indicates memory operation.

- **S1 & S0**

These signals are used to identify the type of current operation. These two status signals along with IO/M signal output identify the type of the machine cycle being executed by the 8085A.(Fetch, Read or Write Machine Cycle)

4.Power supply

There are two power supply signals − VCC & VSS. It requires a single +5V supply between Vcc at pin no. 40 and Vss at pin no. 20.

5.Clock signals

There are three clock signals, i.e. X1, X2, CLK OUT.

- X1, X2 − A crystal is connected at these two pins and is used to set frequency of the internal clock generator. This frequency is internally divided by 2.
- CLK OUT − This signal is used as the system clock for devices connected with the microprocessor.

6.Interrupts & externally initiated signals

Interrupts are the signals generated by external devices to request the microprocessor to perform a task. There are 5 interrupt signals, i.e. TRAP, RST 7.5, RST 6.5, RST 5.5, and INTR.

- **INTA** − It is an interrupt acknowledgment signal.
- **RESET IN** − This signal is used to reset the microprocessor by setting the program counter to zero.
- **RESET OUT** − This signal is used to reset all the connected devices when the microprocessor is reset.
- **READY** − This signal indicates that the device is ready to send or receive data. If READY is low, then the CPU has to wait for READY to go high.
- **HOLD** − This signal indicates that another master is requesting the use of the address and data buses.
- **HLDA** (HOLD Acknowledge) − It indicates that the CPU has received the HOLD request and it will relinquish the bus in the next clock cycle.

7.Serial I/O signals

There are two serial signals, i.e. SID and SOD and these signals are used for serial communication.

SID (Serial Input Data) line

- There is an One bit Input line inside the 8085 CPU (Pin number 5)

- 1 bit data can be externally read and stored using this SID line

- The data that is read is stored in the A7th bit of the Accumulator

- RIM instruction is used to read the SID line as shown in figure.2
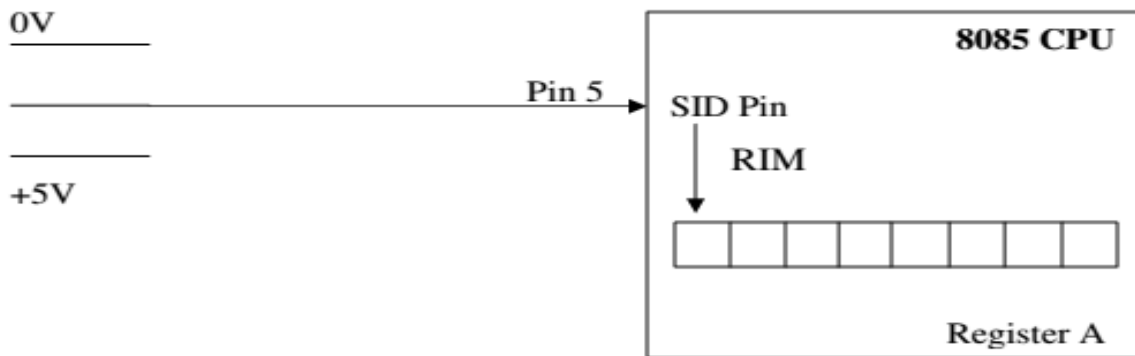
Fig.2 SID (Serial Input Data) line

SOD (Serial Output Data) Line

- There is a One bit Output port inside the 8085 CPU (Pin number 4
- 1 bit data can be externally written in this port.
- To write data into this port, SIM instruction is used.
- The data that is to be written in this port must be stored in the A7th bit of the Accumulator.
- Bit A6 of the Accumulator is known as SOE (Serial output Enable).
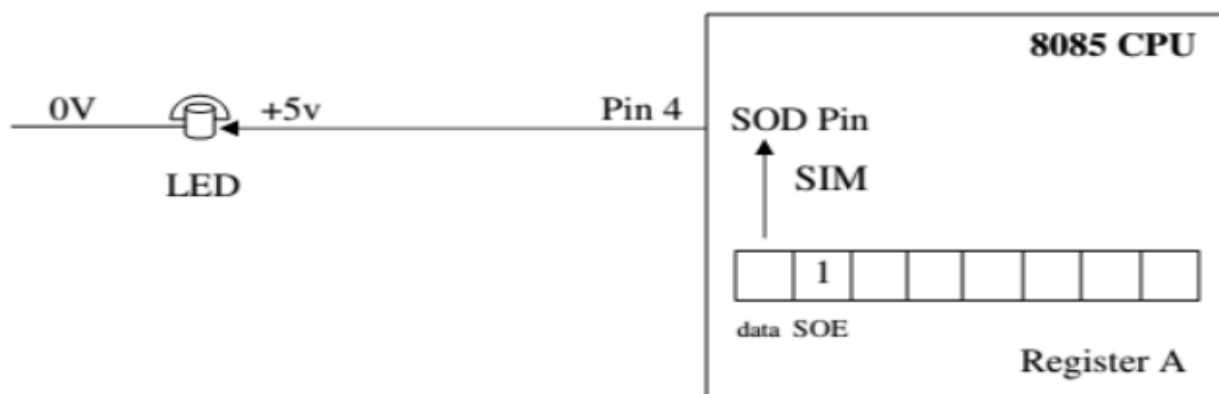
This bit Must be set to 1 to enable Serial data output as shown in figure.2

Fig.3 SOD (Serial Output Data) Line