

# 8085 MICROPROCESSOR

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# CONTENTS

1. What is Microprocessor
2. Intel 8085 Microprocessor
3. The Block Diagram of 8085 Microprocessor
4. Functional units of 8085 Microprocessor

# WHAT IS MICROPROCESSOR?

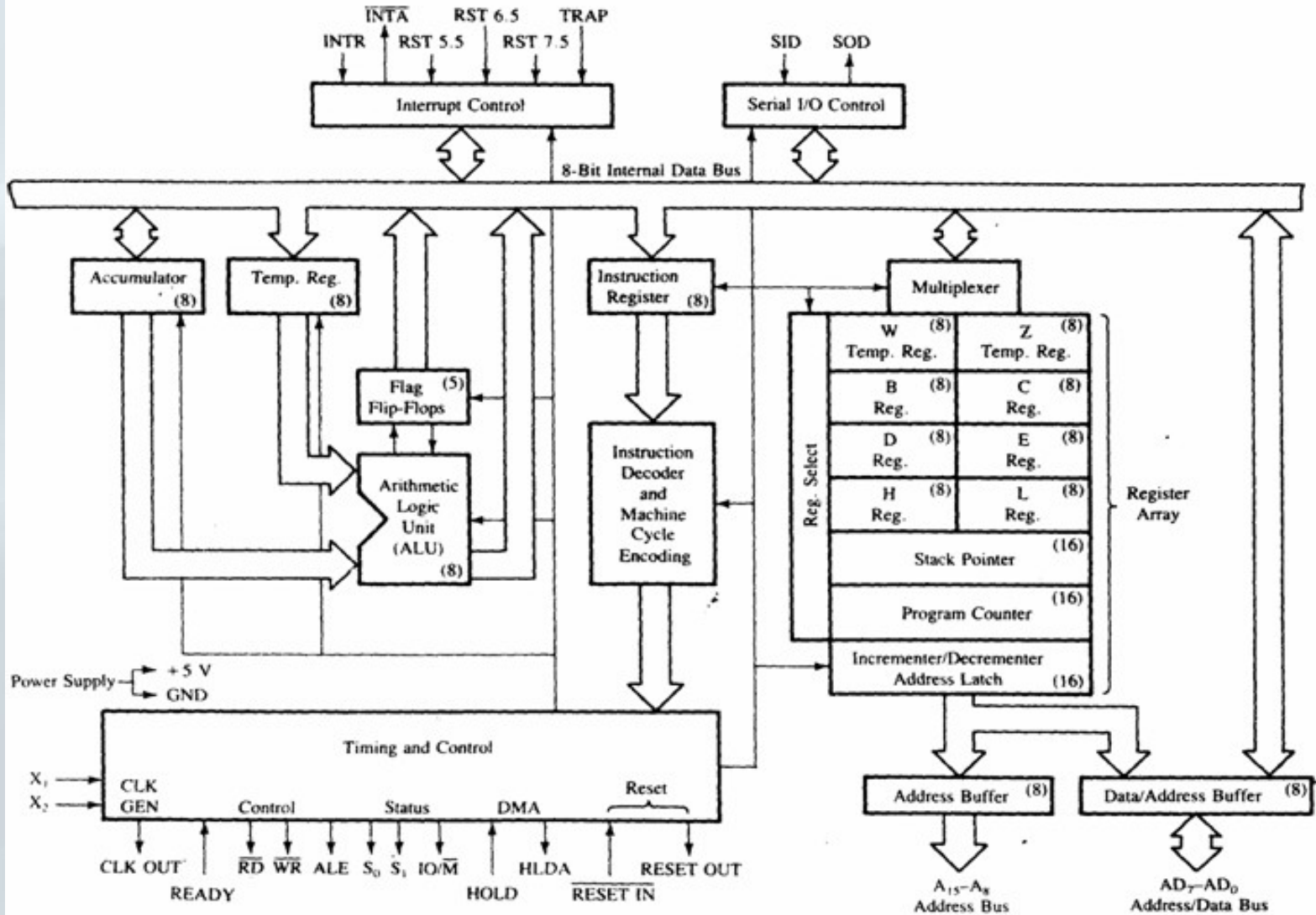
- A **microprocessor** is a computer processor which incorporates the functions of a computer's central processing unit (CPU) on a single integrated circuit (IC), or at most a few integrated circuits.



# INTEL 8085 MICROPROCESSOR

- The **Intel 8085** ("eighty-eighty five") is an 8-bit microprocessor produced by Intel and introduced in 1976.
- It is a software-binary compatible with the more-famous Intel 8080 with only two minor instructions added to support its added interrupt and serial input/output features.

# BLOCK DIAGRAM OF 8085

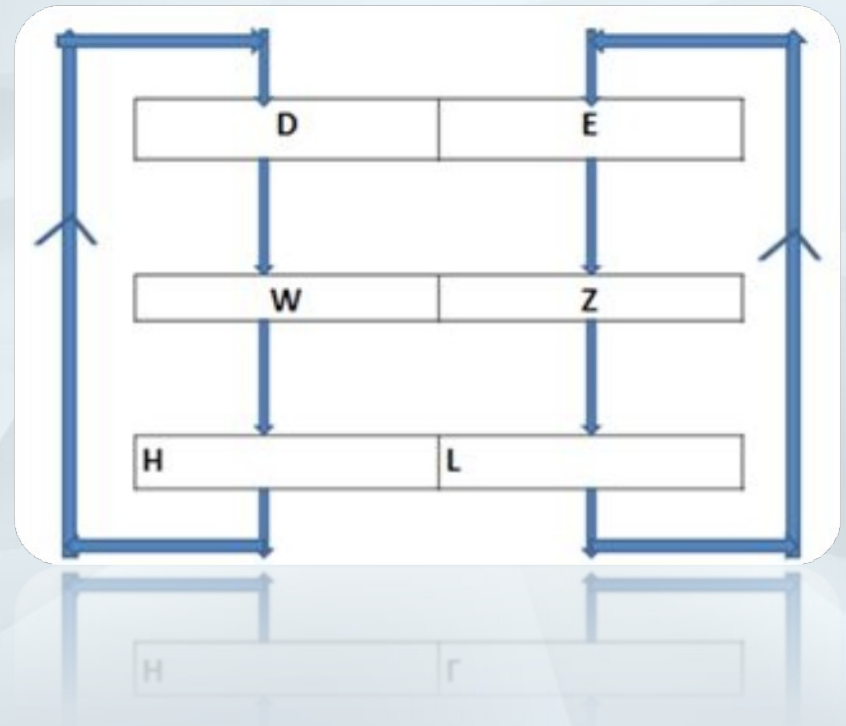


# REGISTER SECTION

1. Temporary Register
2. General purpose register
3. Special purpose register

# TEMPORARY REGISTER

- In 8085 microprocessor ,there are three temporary 8 bit register. One is used during calculation to keep data temporarily and then move it to destination ,the other two 'W' and 'Z' temporary register are used to hold data/address temporarily during execution of some instruction.





# GENERAL PURPOSE REGISTER

- B-C,D-E,H-L are the general purpose register.
- This register can also be used to work in pairs to hold 16-bit data.
- The H-L pairs works as a memory pointer.
- A memory pointer holds the address of a particular memory location.



# SPECIAL PURPOSE REGISTER

1. Accumulator
2. Instruction Register and Decoder
3. Program Counter
4. Stack Pointer
5. Flag Register

# 1. ACCUMULATOR

- It is an 8 bit Register use to perform Arithmetic Logical Input and output Operation.
- It is connected to the Internal Bus and ALU.

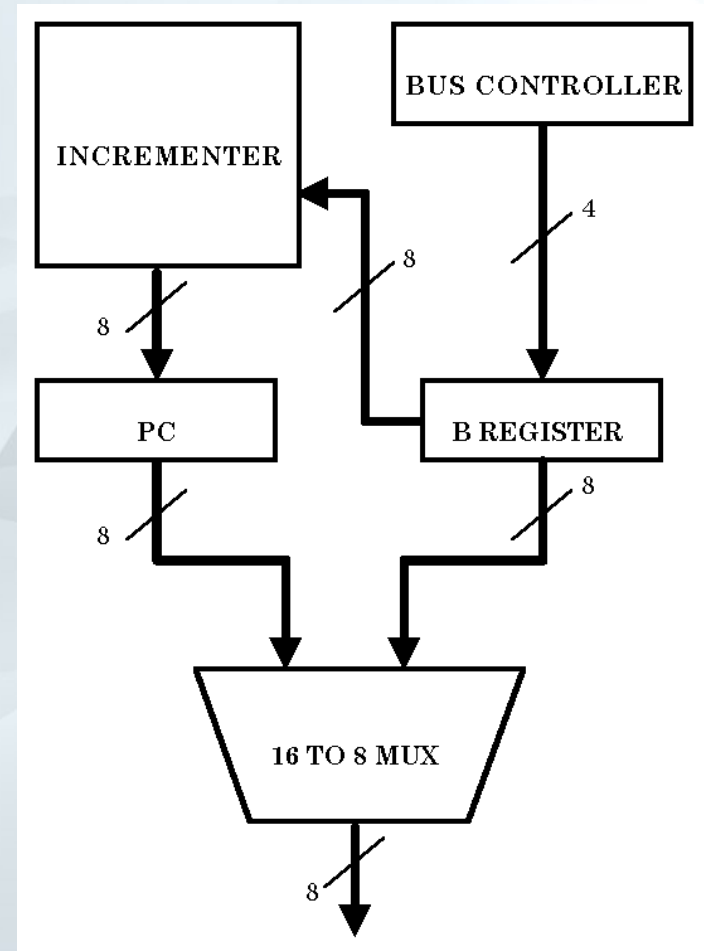
## 2. INSTRUCTION REGISTER & DECODER

✓ In computing, an **instruction register (IR)** is the part of a CPU's control unit that holds the instruction currently being executed or decoded.

✓ There is an **Instruction Decoder** which Decodes the information's present in the instruction register for further processing.

### 3. PROGRAM COUNTER

- A **program counter** is a register in a computer processor that contains the address (location) of the instruction being executed at the current time.



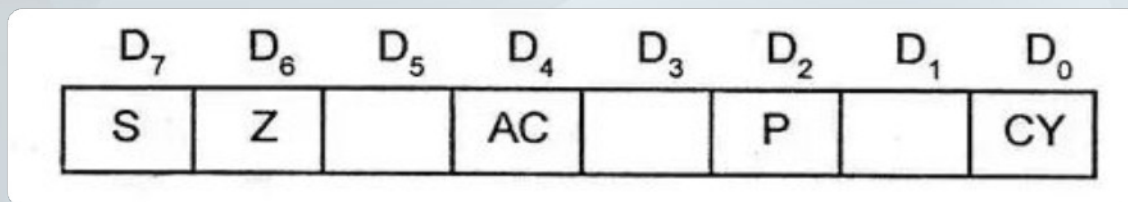
# 4. STACK POINTER

accumulator	flag
B	C
D	E
H	L
STACK POINTER	
PROGRAM COUNTER	

- A **stack pointer** is a small register that stores the address of the last program request in a stack.
- A **stack** is a specialized buffer which stores data from the top down.

# 5. FLAG REGISTER

1. **Sign Flag (S):** Sign flag occupies the 7th bit of the flag register which is also known as the Most Significant Bit (MSB).
2. **Zero Flag (Z):** Zero flag occupies the 6th bit of the flag register. It is set(1) when the operation performed in the ALU (Arithmetic and Logic unit) results in 0 and is reset(0) when the result is not zero.
3. **Auxiliary Carry Flag (AC):** If an operation performed in ALU generates the carry from D7 to next stage then CY flag is set, else its reset.
4. **Parity Flag (P):** If the result contains Even number of 1's then parity exists and flag bit is set.
5. **Carry Flag (CY):** If the arithmetic operation finally results in a carry, carry flag is set(1). Else, it is reset(0).



# ALU

The **Arithmetic Logic Unit** performs the actual numerical and logic operation such as AND, OR, NOT etc.

- ✓ It is not accessible by user.
- ✓ The word length of ALU depends upon of an internal data bus.
- ✓ It is 8 bit. It is always controlled by timing and control circuits
- ✓ It provides status or result of flag register.



# ARITHMETIC & LOGICAL SECTION

1. Instruction Decoder and Machine cycle encoder
2. Address Buffer & Data Buffer
3. Increment/Decrement Address latch
4. Interrupt control
5. Serial I/O CONTROL Group
6. Timing and Control

# 1. INSTRUCTION DECODER & MACHINE CYCLE ENCODER

- The **Instruction Decoder** of a processor is a combinatorial circuit sometimes in the form of a read-only memory, sometimes in the form of an ordinary combinatorial circuit.
- A **Machine Cycle**, also called a processor cycle or a instruction cycle, is the basic operation performed by a Central Processing Unit (CPU).

## 2. ADDRESS BUFFER & DATA BUFFER

### Address Buffer

- ✓ It is a group of lines (wires) used to refer a physical location in memory.
- ✓ It is unidirectional.
- ✓ 8085 has 16-bit address bus.

### Data Buffer

- ✓ It also called memory bus.
- ✓ Used to carry the data.
- ✓ It is bidirectional.
- ✓ the width of the data bus is determined by the size of the individual memory blocks (in 8085, it is 8-bit).

### 3. INCREMENT/DECREMENT ADDRESS LATCH

- ❑ This 16-bit register is used to increment or decrement the contents of program counter or stack pointer as a part of execution of instructions related to them.

# 4. INTERRUPT CONTROL

- The processor fetches, decodes and executes instructions in a sequence. Sometimes it is necessary to have processor the automatically execute one of a collection of special routines whenever special condition exists within a program or the microcomputer system.
- There are 6 pins available in 8085 for interrupt:
  - I. TRAP
  - II. RST 7.5
  - III. RST6.5
  - IV. RST5.5
  - V. INTR
  - VI. INTA

# 5. SERIAL I/O CONTROL GROUP

- The data transferred on to data bus is parallel data, but under some conditions it is advantages to use serial data transfer at that time this control group is brought into application.
- The input and output of serial data can be carried out using 2 instructions in 8085:
  - I. **SID** : Serial Input Data
  - II. **SOD** : Serial Output Data

# TIMING & CONTROL

*It provides timing and control signal to the microprocessor to perform operation.*

## ☐ Control Signals :

- I. READY
- II. RD'
- III. WR'
- IV. AM'

## ☐ Status Signals :

- I.  $S_0$
- II.  $S_1$
- III. IO/M'

## ☐ DMA (Direct Memory Address) :

- I. HOLD
- II. HLDA

## ☐ Reset Signals:

- I. RESET IN
- II. RESET OUT



# WHAT IS BUS?

*It is a set of pins, wires or signals having common function as bus.*

## ➤ **Address Bus :**

A15-A8, it carries the most significant 8-bits of memory/IO address.

## ➤ **Data Bus :**

AD7-AD0, it carries the least significant 8-bit address and data bus.

# CONCLUSION

The 8085 processor was used in a few early personal computers, produced from 1977 to early-to-mid 1980's. Now-a-days, in many engineering schools the 8085 processor is used in introductory microprocessor courses. However with time, better quality microprocessors have been developed with greater bit processing Capability (32 and 64 bit) along with huge no of other modifications.

# REFERENCES

- ❑ Computer Architecture Letters
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- ❑ Parallel Computing

