12/10/12

8085 Microprocessor

CLASSMATE Date Page

* The 8085 MPU
  i) 8-bit general purpose microprocessor
  ii) 40-pin IC package
  iii) 8085 → This 5 indicates +5 V power supply.
  iv) 8-bit data bus $2^8 = 256$ bits
  v) 16-bit address bus $2^{16} = 65536$ bits = 64KB
  vi) max frequency = 3 MHz.

1] Arithematic & logic unit (ALU)
  i) It performs the arithematic & logic operations such as addition, subtraction, AND, OR etc.
  ii) It uses data from memory & from accumulator to perform operations.
  iii) The result of operations are stored in the accumulator

2] Accumulator
  i) 8-bit register
  ii) 'A' → Accumulator
  iii) store the result of operations

3] Registers:
  i) 6 registers, one accumulator, one flag
  ii) B, C, D, E, H, L → 8 bit registers.

B	C
D	E
H	L

  iii) 3 register pairs :- B-C, D-E, H-L to handle 16-bit data.

iv) The programmer uses these registers to store or copy data into register by using data copy instructions.

4] Flag registers :- (8 bit register)
i) 5 flip/flops
ii) Flags are set or reset after an operation according to data condition of the result in the accumulator and other registers.

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
S	Z		AC		P		CY

① Sign flag (S)
② Zero flag (Z)
③ Auxiliary Carry (AC)
④ Parity (P)
⑤ Cy (carry)

① S = 1 (set) → negative
=0 (reset) → positive
② P = 1 (set) → even no. of 1's
=0 (reset) → odd no. of 1's
③ Z = 1 (set) → result = 0
=0 (reset) → result ≠ 0
④ AC = 1 (set) → D_3 generates a carry
it is used internally for BCD operations.
⑤ CY = 1 (set) → an arithematic op. generates a carry.

- Two 16-bit registers: Stack pointer (SP), Program counter (PC)

5] Program counter :-
i) deals with sequencing in the execution of instructions.
ii) memory register.
iii) MP uses this register to hold the address of the next instruction.
iv) PC points to the memory location from which the next byte is to be fetched.
v) When a byte is fetched, the program counter is automatically incremented by one to point to the next memory location.

6] Stack pointer :-
i) 16 bit memory register
ii) It points to a memory location in RIW memory called stack.
iii) The beginning - [↳ an array of memory locations] of the stack is defined by loading 16-bit address in the stack pointer

7] Instruction Register/Decoder :-
i) 8-bit register that temporarily stores the current instruction of a program
ii) Decoder decodes or interprets the instruction
iii) Decoded instruction is then passed to the next stage.

8] Control unit :-
i) Generates signals on data bus, address bus, and control bus within microprocessor to carry out the instruction which has been decoded.

8.1) Data bus :- Carries data in binary form between microprocessor & other external units.
It is used to transmit data, result of arithematic and logic operations.
8-bit data bus
Bidirectional
$D_0 - D_7$

8.2) Address bus :- It carries addresses of the memory locations or other devices.
16-bit $A_0 - A_{15}$
unidirectional

$A_0 - A_7$ → Lower order address bus
+
multiplexed with data bus ($D_0 - D_7$)
↓
$AD_0 - AD_7$

$A_8 - A_{15}$ → Higher order Address bus

8.3) Control bus :- i) It provides lines which have specific functions for coordinating and controlling microprocessor operations.
ii) Carries control signals partly unidirectional & partly bidirectional.

9) Control and status signal
① ALE (output) Address Latch enabled
It is a pulse provided when an address appears on $AD_0 - AD_7$ lines.
ALE = 1 → Address
ALE = 0 → data

② $\overline{RD}$ (active low)

↳ $\overline{RD}$ signal = 0 → active → performs read operation

↳ —11— 1 → inactive.

↳ The read signal indicates that data are being read from the selected I/O or memory device & that they are available on the data bus.

③ $\overline{WR}$ (active low signal) :- The write signal indicates that data on the data bus are to be written into a selected memory or I/O location.

④ IO/$\overline{M}$:- Input-Output | Memory signal.

IO (Active High) → 1

$\overline{M}$ (Active Low) → 0

when IO/$\overline{M}$ = 0 → memory operation

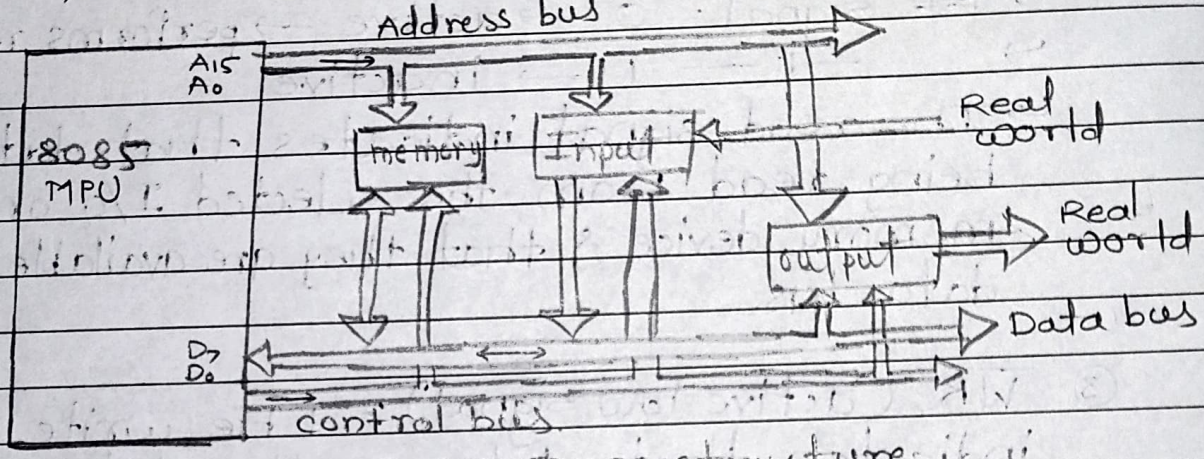
—— 11 —— 1 → Input-Output —11—

⑤ Status signal :- S_1 & S_0

S_1	S_0	States of MP
0	0	Halt
0	1	Write
1	0	Read
1	1	Fetch

MP performs 4 operations

* Memory read → data/instruction from memory.
* Memory write → write into memory.
* I/O read → data/instru. from I/O device.
* I/O write → write into output devices.



8085 Bus structure.

* Pin diagram of 8085