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8085 Microprocessor

Lecture 2

المدرس ضرغام الخفاف الاسدي

Third Year lecture notes

Avionics Engineering Dept.

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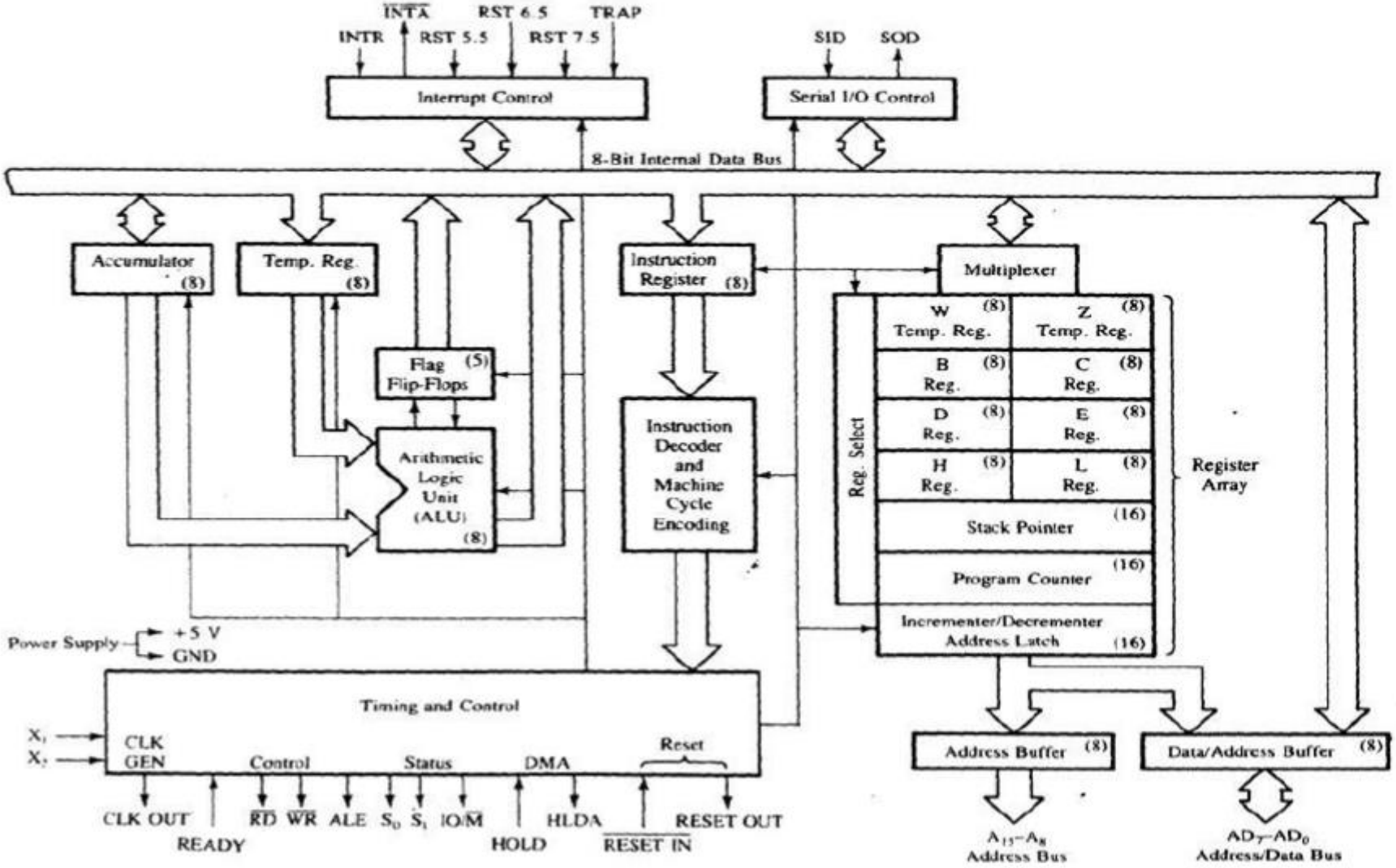
Block diagram of 8085

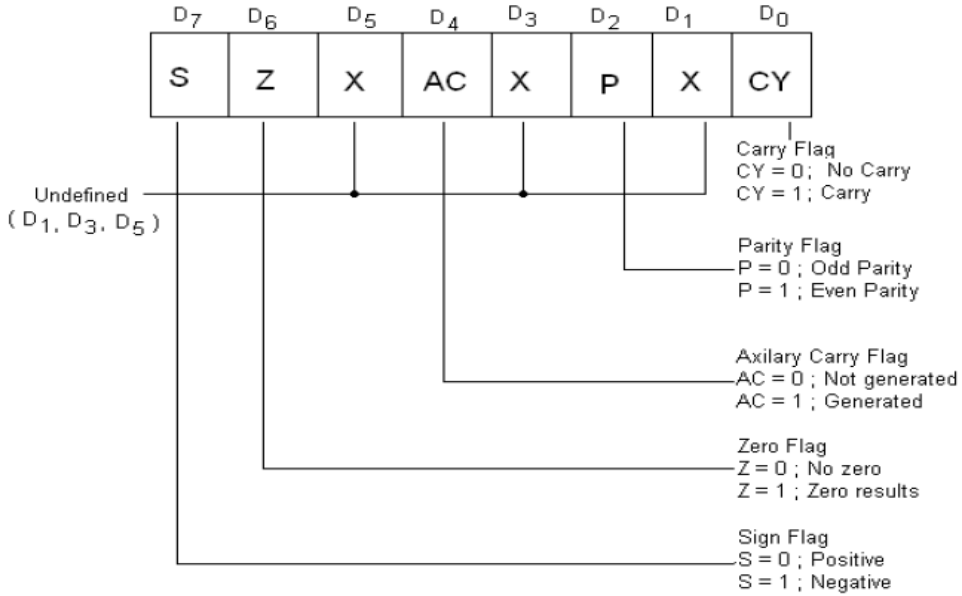


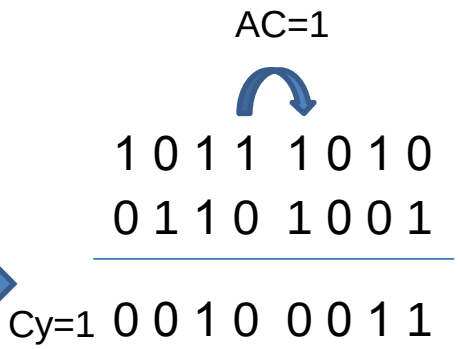
Description of block diagram

1. ALU:-The ALU performs the actual numerical and logic operation such as ‘add’, ‘subtract’, ‘AND’, ‘OR’ etc. It uses data from memory and from Accumulator to perform arithmetic operation and always stores result of operation in Accumulator. The ALU consists of accumulator, flag register and temporary register.
   - Accumulator: The accumulator is an 8-bit register that is a part of arithmetic/logic unit (ALU). This register is used to store 8-bit data and to perform arithmetic and logical operations. The result of an operation is stored in the accumulator. The accumulator is also identified as register A.

- Flag register:-8085 has 8-bit flag register. There are only 5 active flags. Flags are flip-flops which are used to indicate the status of the accumulator and other register after the completion of operations. These flip-flops are set or reset according to the data condition of the results.
- Timing and control unit:-This unit produces all the timing and control signal for all the operation. This unit synchronizes all the MP operations with the clock and generates the control signals necessary for communication between the MP and peripherals.

Flag register





(i) Sign flag (S) The sign flag is set (S = 1), if the result of the operation of the instruction is negative (MSB of the result is 1); otherwise it is reset (S = 0) for the positive result (MSB is zero).

(ii) Zero flag (Z) The zero flag is set (Z = 1) if the result of the operation of the instruction is zero otherwise this flag is reset (Z = 0). i.e. Z = 1 if the result is zero, and Z = 0 if the result is not zero.

(iii) Carry flag (CY) The carry flag is set to 1, if there exist a carry (or borrow) to the highest order bit (non-existent 9th position) as a result of the execution of addition or subtraction instructions. If there is no carry (or borrow) to the higher order bit, the carry flag is reset. i.e. CY = 1 if there is a carry to the highest order bit (or overflow), and CY = 0 if there is no carry to the highest order bit (or no overflow).

(iv) Parity flag (P) After an arithmetic and logic operation, if the result has even number of 1s, then parity bit is set. If on the other hand the result has odd number of 1s, the parity flag is reset. i.e. P = 1, if the result has even number of 1s, and P = 0, if the result has odd number of 1s.

(v) Auxiliary carry (AC) This is a new flag in 8085 microprocessor. This flag (AC) is set to 1, if there is an overflow at bit 3 of the accumulator. AC flag is used in BCD arithmetic. This is illustrated as above.

2. Instruction register and decoder:-The instruction register and decoder are part of ALU. When an instruction is fetched from memory, it is loaded in the instruction register. The decoder decodes the instruction and establishes the sequence of events to follow.

3. Register array:-The register unit of 8085 consists of Six general-purpose data registers B, C,D,E,H and L. Two 16-bit address registers PC (program counter) and SP (stack pointer). The six general-purpose registers are used to store 8-bit data. They can be combined as register pairs BC, DE, and HL to perform some 16-bit operations.

- Stack Pointer:- SP is 16-bit registers used to point the address of data stored in the stack memory. It always indicates the top of the stack.
- Program Counter:- PC is 16-bit register used to point the address of the next instruction to be fetched and executed stored in the memory.

4. System bus

1. **Data** bus:-It carries ‘data’, in binary form, between MP and other external units, such as memory. Typical size is 8-bit.
2. **Address** bus:-It carries ‘address’ in binary form. Typical size is 16-bit.
3. **Control** Bus:-Control Bus are various lines which have specific functions for coordinating and controlling MP operations. E.g.: Read/Write control line.

5. Interrupt Control:- Interrupt is a signal, which suspends the routine what the MP is doing, brings the control to perform the subroutine, completes it and returns to main routine.

- E.g. INTR, TRAP, RST 7.5, RST 6.5, RST 5.5

6. Serial I/O Control :-The MP performs serial data input or output (one bit at a time). In serial transmission, data bits are sent over a single line, one bit at a time. The 8085 has two signals to implement the serial transmission: SID (serial input data) and SOD (serial output data).

Thank you