8085 MPU Architecture

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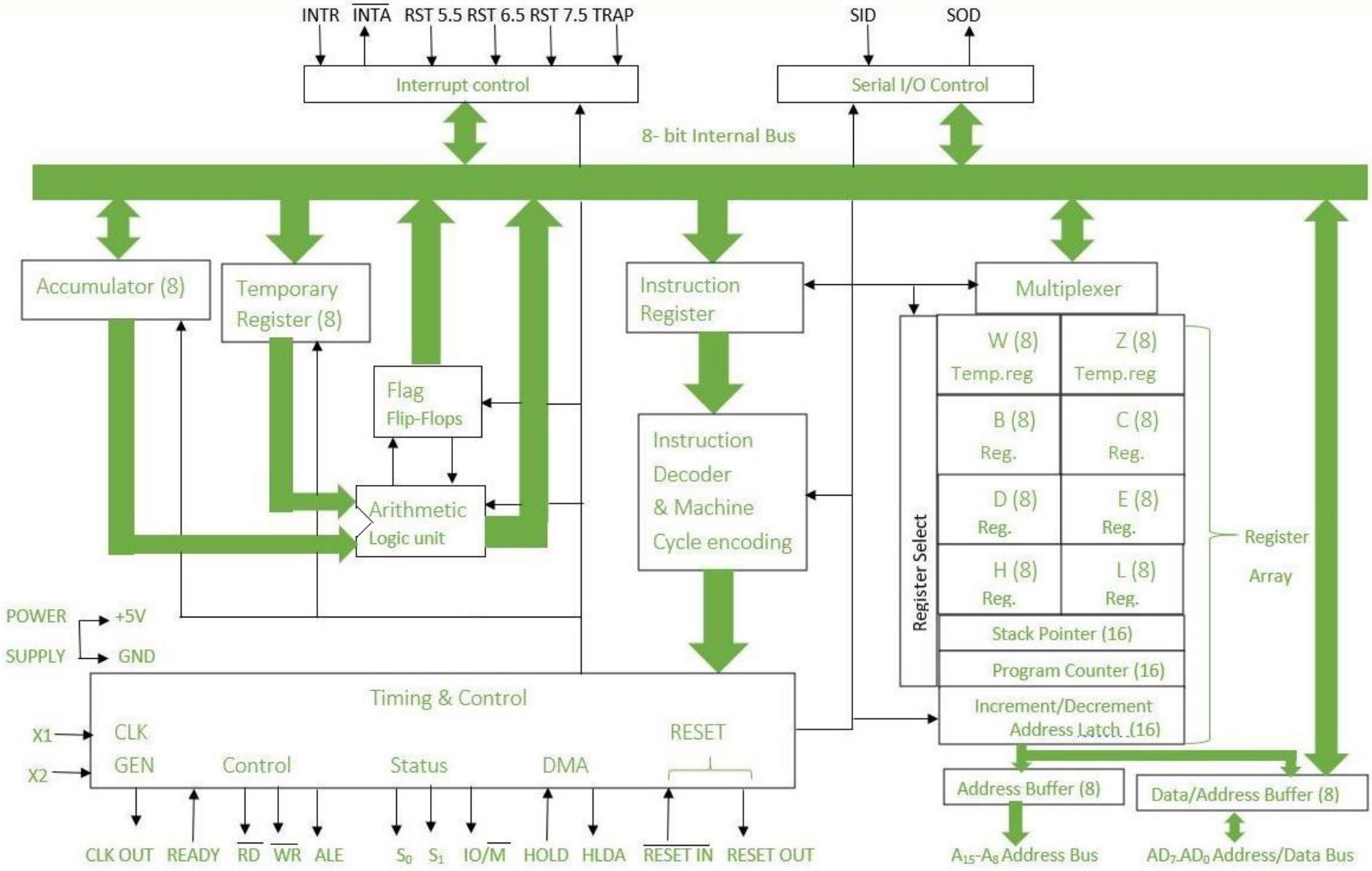

Control Unit

- Generates signals within uP to carry out the instruction, which has been decoded.

- Causes certain connections between blocks of the uP to be opened or closed, so that data goes where it is required, and so that ALU operations occur.

Arithmetic Logic Unit

- The ALU performs the actual numerical and logic operation such as ‘add’, ‘subtract’, ‘AND’, ‘OR’, etc.
- Uses data from memory and from Accumulator to perform arithmetic.
- Always stores result of operation in Accumulator.

Registers

- The 8085/8080A-programming model includes six registers, one accumulator, and one flag register, as shown in Figure.
- In addition, it has two 16-bit registers: the stack pointer and the program counter.
- The 8085/8080A has six general-purpose registers to store 8-bit data; these are identified as B,C,D,E,H, and L
- They can be combined as register pairs - BC, DE, and HL - to perform some 16-bit operations.
- The programmer can use these registers to store or copy data into the registers by using data copy instructions.

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.

Flags

- The ALU includes five flip-flops, which are set or reset after an operation according to data conditions of the result in the accumulator and other registers.
- They are called Zero(Z), Carry (CY), Sign (S), Parity (P), and Auxiliary Carry (AC) flags.
- The most commonly used flags are Zero, Carry, and Sign. The microprocessor uses these flags to test data conditions.
- These flags have critical importance in the decision-making process of the microprocessor.
- For example, the instruction JC (Jump on Carry) is implemented to change the sequence of a program when CY flag is set.

Program Counter (PC)

- This 16-bit register deals with sequencing the execution of instructions.
- This register is a memory pointer.
- Memory locations have 16-bit addresses, and that is why this is a 16-bit register.
- The microprocessor uses this register to sequence the execution of the instructions.
- The function of the program counter is to point to the memory address from which the next byte is to be fetched.
- When a byte (machine code) is being fetched, the program counter is incremented by one to point to the next memory location

Stack Pointer (SP)

- The stack pointer is also a 16-bit register used as a memory pointer.
- It points to a memory location in R/W memory, called the stack.
- The beginning of the stack is defined by loading 16-bit address in the stack pointer

Instruction Register/Decoder

- Temporary store for the current instruction of a program.
- Latest instruction sent here from memory prior to execution.
- Decoder then takes instruction and ‘decodes’ or interprets the instruction.
- Decoded instruction then passed to next stage.

Memory Address Register

- Holds address, received from PC, of next program instruction
- Feeds the address bus with addresses of location of the program under execution.

• Control Generator

- Generates signals within uP to carry out the instruction which has been decoded.
- Causes certain connections between blocks of the uP to be opened or closed, so that data goes where it is required, and so that ALU operations occur.

Register Selector

- This block controls the use of the register stack
- Just a logic circuit which switches between different registers in the set will receive instructions from Control Unit.
- **General Purpose Registers**
- uP requires extra registers for versatility.
- Can be used to store additional data during a program.
- More complex processors may have a variety of differently named registers

References

1. Gaonkar, R. S. (1990). *Microprocessor Architecture, Programming and Applications with the 8085*. Fifth Edition Prentice Hall PTR.