**CONTROL SIGNALS**

## What is control signals?

* Control signals are crucial to regulate the operation of hardware components within the processor.
* They determine which multiplexer input to select,which operation the ALU performs and more.
* Control signals are necessary to manage data flow through different stages of the datapath.
* Control signal refers to a digital signal used to control the operation of various components within a computer’s CPU,memory or I/O devices.
* It determines the sequence of operations.

Instruction Register

Control Unit

Control Bus

It have Two approaches

*1.Hardwired Control.*

*2.Microprogrammed Control.*

**Hardwired Control**

* **An** instruction is executed in a sequence of steps,where each step requires one clock cycle.Hence,a step counter may be used to keep track of the progress of execution.

**Control signals depends on:**

* Contents of the step Counter.
* Contents of the instruction register.
* The result of a computation or a comparison operation.
* External input signals,such as interrupt requests.

**Generating control signals:** counter\_enable

clock

Control signal Generator

Step counter

T1....T5

IR

External Inputs

OP\_code bits .

Instrucion Decoder

INS1

Conditional Signals

INS m

Control Signals

**Microprogrammed :**

Microprogrammed control signals is a control unit that managing the opereations of the central processing unit(CPU).

Control data register

Control address register

External Control

Control memory (ROM)

Next address generator

Input word

Next address Information

**Advantages of control signals:**

* **Instruction Execution**: Control signals manage the fetching,decoding and execution of instructions in correct order.
* **Data Path Control**: It controls the ALU and flow of data.
* **Pipeline Control:** It progress instructions smoothly through the pipeline without hazards or stalls**.**
* **Interrupt Handling:** Allowing proper handllling of interrupts without disrupting the current execution flow.

**Disadvantages of control Signals:**

* Control signals make things more complicated.
* Control signals can slow things down.
* Control signals need more space.
* Control signals use more energy.
* Fixing the problems with control signals is tough.

**Applications of control signals:**

Control signals are the output of learning and processing block,to produce desired output in the real physical world.

Eg:Motors,speakers etc..