Microprogrammed Control Unit

Control Memory:- The one of functional unit of CPU is control unit, whose function is to initiate sequences of microoperations. There are two methods of implementing control unit :-

(1) Hardwired control.

(2) Microprogrammed control

1). **Hardwired control:-** When the control signal are determined by hardware using conventional logic design techniques, then the control unit is said to be hardwired.

features :-

(a) fixed instructions

(b) fixed logic blocks of and/or arrays, encoder, decoder etc.

(c) Expensive relative complex high speed operation.

(d) No flexibility of adding new instructions.

e.g Intel 8085, motorola 6802, Zilog 80, RISC CPUs.

(2) **Microprogrammed control:-** It is a control unit whose binary control variable are stored in the memory is called a microprogrammed control.

e.g:- Intel 8080, motorola 68000, CISC CPU's

* The control function specifies a microoperation.
* The control variables used in a control function are binary and at any given time can be represented by a string of 0's and 1's called control word.
* Each control word in the control memory contains within it a microinstruction.
* A microinstruction specifies one or more microoperations.
* A sequence of microinstructions is called a micro-program.
* The content of the word in ROM at any given point specifies the microinstruction.
* The control memory is read only & cannot be altered by programming because the ROM words are made permanent during the hardwired production of the unit.

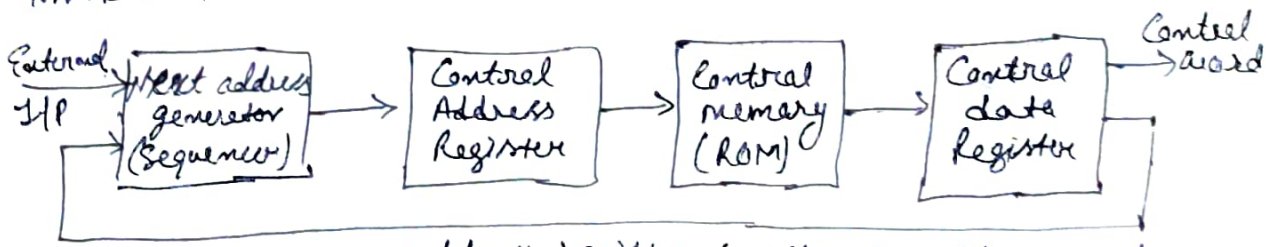
Control Memory :- A memory i.e a Part of the Control unit is referred to as control memory.

*. The Computer that employs micro-Programmed Control unit will have two separate units i.e a main memory & Control memory.

*. The main memory is used for storing the Programs for user.

*. The Content of main memory can be manipulated everytime the Program is changed i.e it Consists of machine instructions & Data.
But in Contrast, the Control memory hold a fixed micro-Programs which Cannot be altered by the users. This micro-programs Consists of micro-instructions that specify various internal Control Signal for execution of register micro-operation.

Note :- Each Machine instruction initiates the Series of micro-instructions in the Control memory. These micro-instructions generate the microoperations to fetch the instruction from the main memory. Evaluate the effective address to execute the operation specified by the instructions & to return Control to fetch Phase in order to repeat the cycle for the next instruction.



*. The Control memory address register specifies the address of micro-instruction.

*. The Control data register holds the micro-instructions read from the memory.

*. The micro-Program sequencer or Next address generator determines the address sequence that is read from Control memory.

*. The micro-instruction Contains a Control word that specifies one or more micro-operations for the data Processor. Once these operations are executed, the Control must determine the next address.

*. The micro-instructions Contains bits for initialising micro-operations in the data Processor Part & bit to determine the address sequence for Control memory.

*. The Control data register holds the Present micro-instructions while the next address is Computed & read from the memory. So, Data register is called Pipeline register.