ADDRESS SEQUENCING :

Micro instructions are stored in control memory in groups, with each group specifying a routine. Each computer instruction has its own micro program routine in control memory to generate the micro operations that execute the instruction. The hardware that controls the address sequencing of control memory must be capable of sequencing the micro instructions within a routine and able to branch from one routine to another.

To appreciate the address sequencing in a micro-programmed control unit, we enumerate the steps that the control must ~~be~~ undergo during the execution of a single computer instruction.

An initial address is loaded into the control address register when power is turned on in the computer. This address is the address of first micro-instruction that activates the instruction fetch routine.

The fetch routine is sequenced by incrementing the control address register through its rest of micro instruction.

At the end of fetch routine, the instruction in the instruction register of the computer.

M-02/06

Microprogram sequencer :

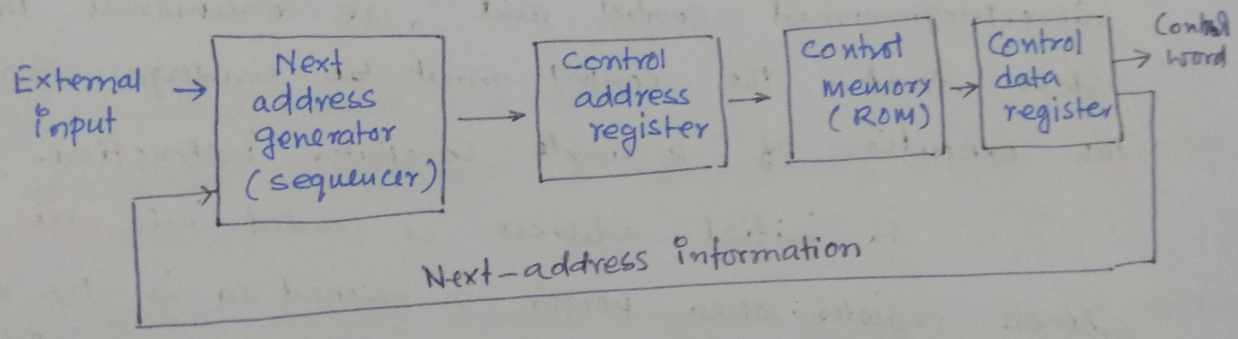
↳ Next address generator,

↳ it determines the address sequence that is read from control memory.

Functions :- → incrementing the control address register by one.

→ Load an address from control memory into control address register.

→ transfer an external address or load an initial address to start control operation.



→ Control words → At any given time control variable can be represented by a string of 1's and 0's called Control word.
↳ Can be programmed to perform various operations on the components of system.

Defn :- A control unit (CU) whose binary control variables are stored in memory is called a Microprogrammed control unit.

Defn of Control Memory :

A memory that is a part of control unit is referred to as a control memory.

→ control memory is a ROM
→ Control information is permanently stored in Control Memory
→ Control memory address register → specifies the address of microinstruction.
→ Control Data Register
↳ Holds the micro inst^n read from Memo
→ Micro-inst^n contains a control word that specifies one or more micro-operations for data processor.

2. Micro-Programmed control :

→ Principle of microprogramming is an elegant and systematic method for controlling the micro operation sequence in a digital computer.

Eg. → Intel 8080
→ Motorola 68000
→ Any CISC (Complex Instruction Set Computer) CPU:

Control function → binary variable → Specifies micro-operation
(control variable)

→ When it is in one binary state, the corresponding micro-operation is executed.

→ The active state of control variable may be either the 1 state or the 0 state. depending on the application.

The control unit initiates a series of sequential steps of micro-operations. During any given time certain micro-operations are to be initialed while others remain idle.

→ Control variables can be represented by ~~set of~~ string of 1's or 0's. → called Control word

1. Hardwired Control :

→ involves the use of fixed instruction,
→ fixed logic blocks of arrays.
→ encoders and decoders.

Key characteristics of H/W control logic :

→ High-speed operation
→ expensive
→ relatively complex
→ no flexibility of adding new instn.

Eg. → Intel 8085
→ Motorola 6802
→ Any RISC (Reduced Instruction Set Computer) CPU

:. When the control signals are generated by ~~hardware~~ hardware ~~using~~ using conventional logic design technique, the control unit is said to be Hardwired control.

Ref :- Moris Mano

Module : 02

Micro-Programmed control :-

Control Memory :-

Functional part of digital computer
- (1) CPU
- (2) Memory
- (3) Input-output

Functional unit of CPU
- (1) control unit
- (2) ALU
- (3) Registers.

Function of Control unit (CU) → to initiate sequence of micro-instonctions.

→ no. of micro-operation for a system is finite

Methods of implementing CU :

(1) Hardwired Control ~~unit~~

(2) Microprogrammed Control. ~~unit~~

Next, the control memory must go through the routine that determines the Effective Address of the operand.

When the effective address computation routine is completed, the address of the operand is available in the Memory Address Register (MAR).

The next step is to generate the microoperations that execute the instruction fetched from memory.