Microprogrammed Control Unit

- The function of the control unit in a digital system is to initiate sequences of microoperations. It may may be hardwired or microprogrammed.
- A control unit whose control signals are generated by hardware is called hardwired control unit.
- If a control unit whose ~~control~~ binary control variables are stored in memory is called micro-programmed control unit.
- A memory that is part of a control unit is reffered to as a Control memory.
- The control memory address register specifies the address of the microinstruction, and the control data register holds the microinstruction read from memory.
- Once the microoperations are executed, the control must determine the next address.
- The next address generator is sometimes called a microprogram sequencer.

Address sequencing

Routine :- A routine is a group of microinstructions that is stored in control memory.

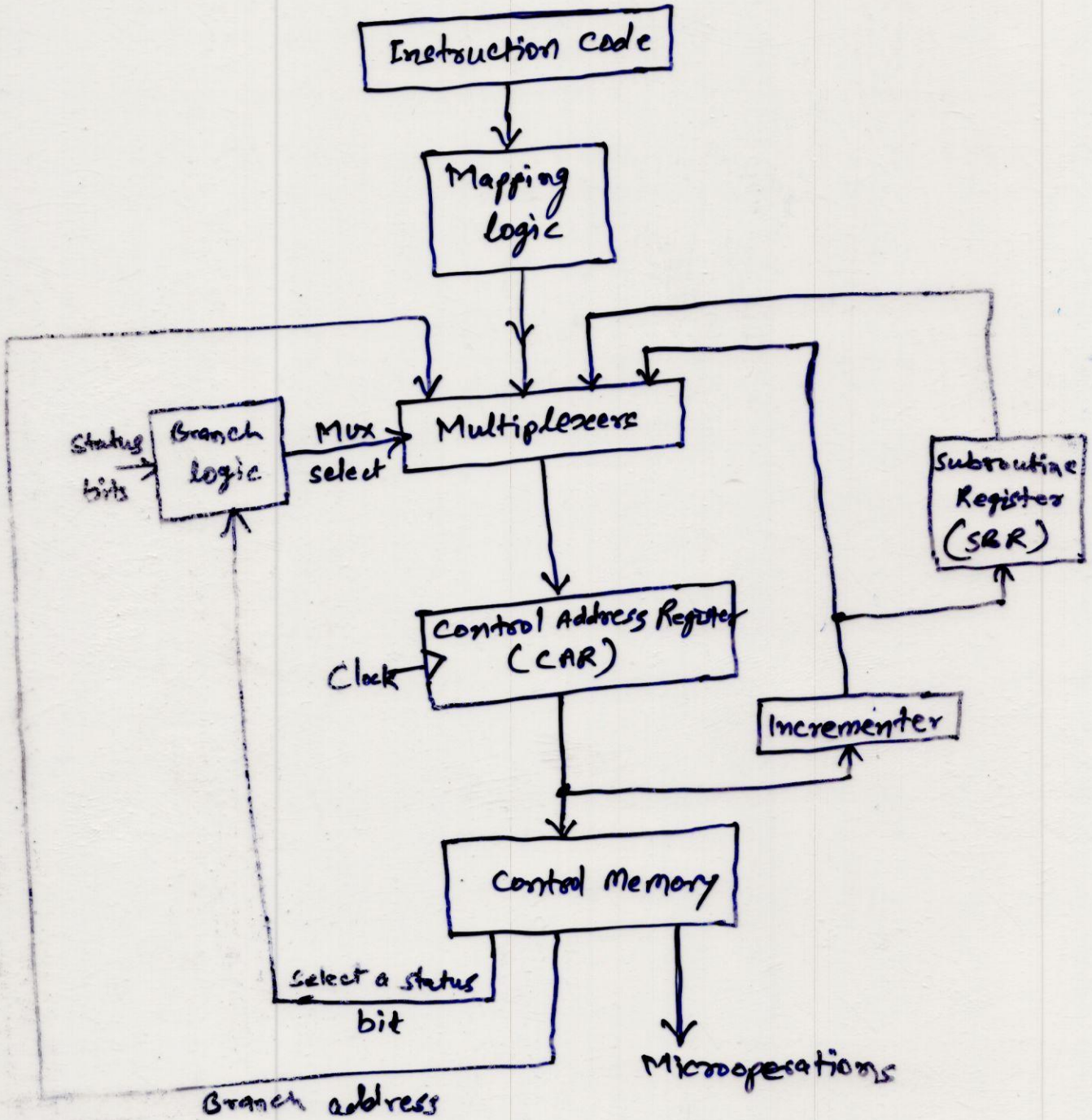
An initial address is loaded into the control address register when power is turned on in the computer. This address is usually the address of the first micro-instruction that activates the instruction fetch routine. The fetch routine may be sequenced by incrementing the control address register through the rest of its microinstructions.

Mapping :- The transformation from the instruction code bits to an address in control memory where the routine is located is ~~reffered~~ referred to as a mapping process.

The address sequencing capabilities required in a control memory are:

1. Incrementing of the control address register.
2. Unconditional or conditional branch, depending on status bit condition.
3. A mapping process from the bits of the instruction to an address for control memory.
4. A facility for subroutine call

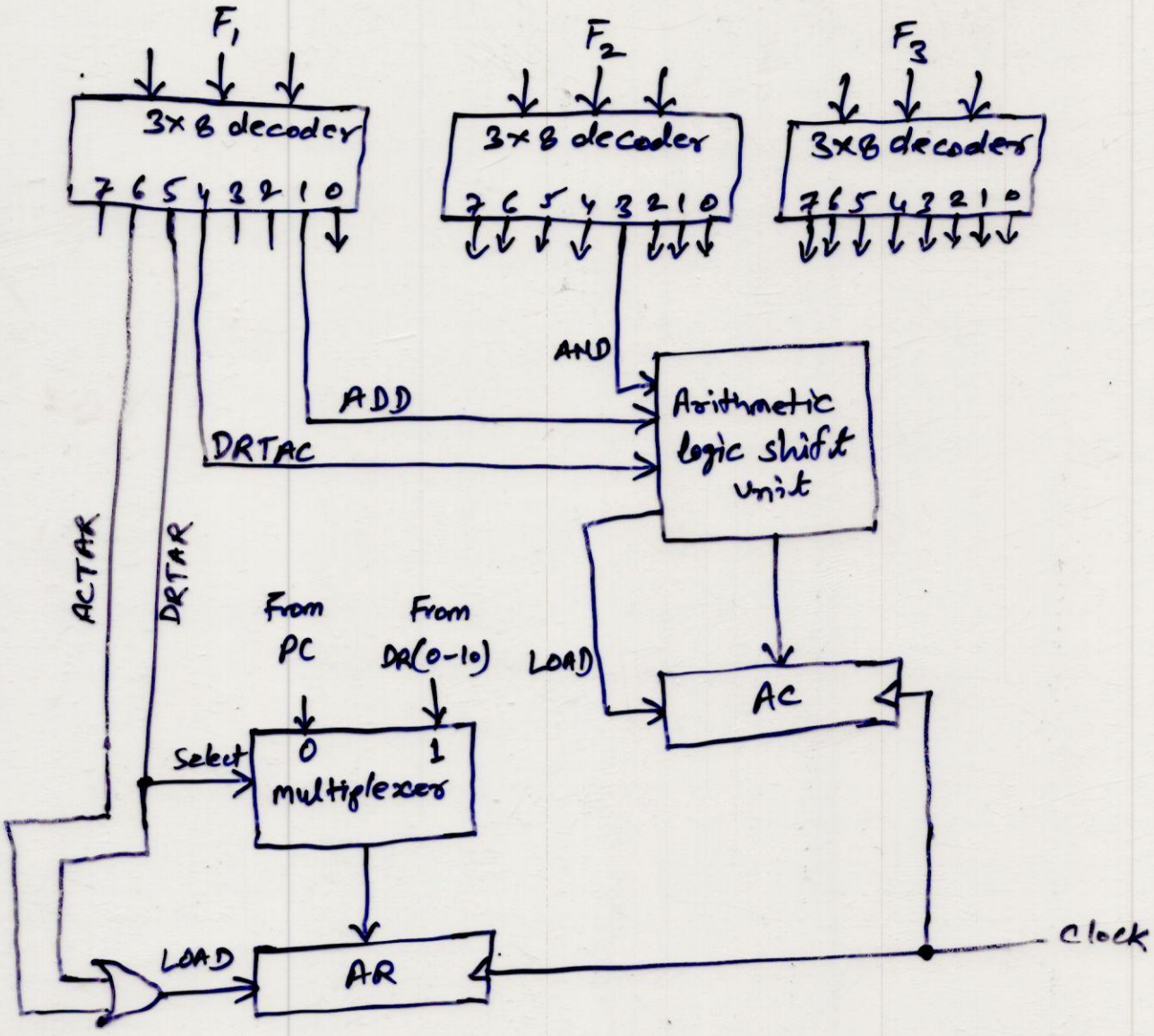
A block diagram of a control memory and the associated hardware needed for selecting the next micro-instruction address.



(selection of address for control memory)

Design of Control Unit

The bits of the microinstruction are usually divided into fields, with each field defining a distinct, separate function.



(Decoding of microoperation fields)

⇒ The nine bits of the microoperation field are divided into three subfields of three bits each.

⇒ Each subfield must be decoded to provide the distinct