Overview

- Instruction Codes
- Computer Registers
- Computer Instructions
- **Timing and Control**
- Instruction Cycle
- Memory Reference Instructions
- Input-Output and Interrupt
- Complete Computer Description

Control Unit

- **Control unit (CU) of a processor translates from machine instructions to the control signals for the microoperations that implement them**

- **Control units are implemented in one of two ways**

  Hardwired Control

  CU is made up of sequential and combinational circuits to generate the control signals

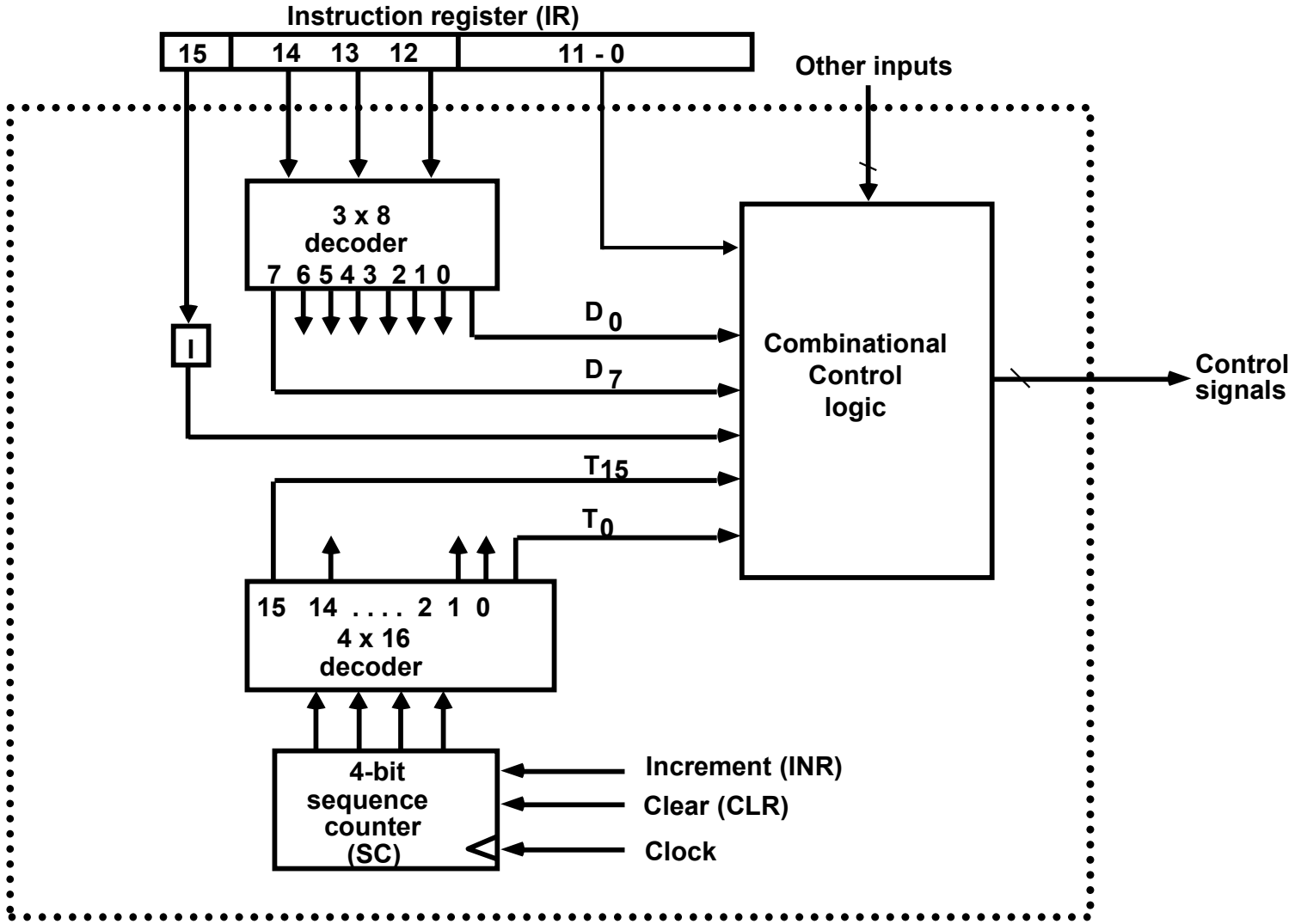
  Microprogrammed Control

  A control memory on the processor contains microprograms that activate the necessary control signals

- **We will consider a hardwired implementation of the control unit for the Basic Computer**

Timing and Control

Control unit of Basic Computer



Timing Signals

- Generated by 4-bit sequence counter and 4×16 decoder
- The SC can be incremented or cleared.

- Example: $T_0, T_1, T_2, T_3, T_4, T_0, T_1, \ldots$
  Assume: At time T_4, SC is cleared to 0 if decoder output D3 is active.

D_3T_4: SC ← 0