Ahsanullah University of Science and Technology (AUST)

Department of Computer Science and Engineering

Course No: CSE 3110

Course Title: Digital System Design

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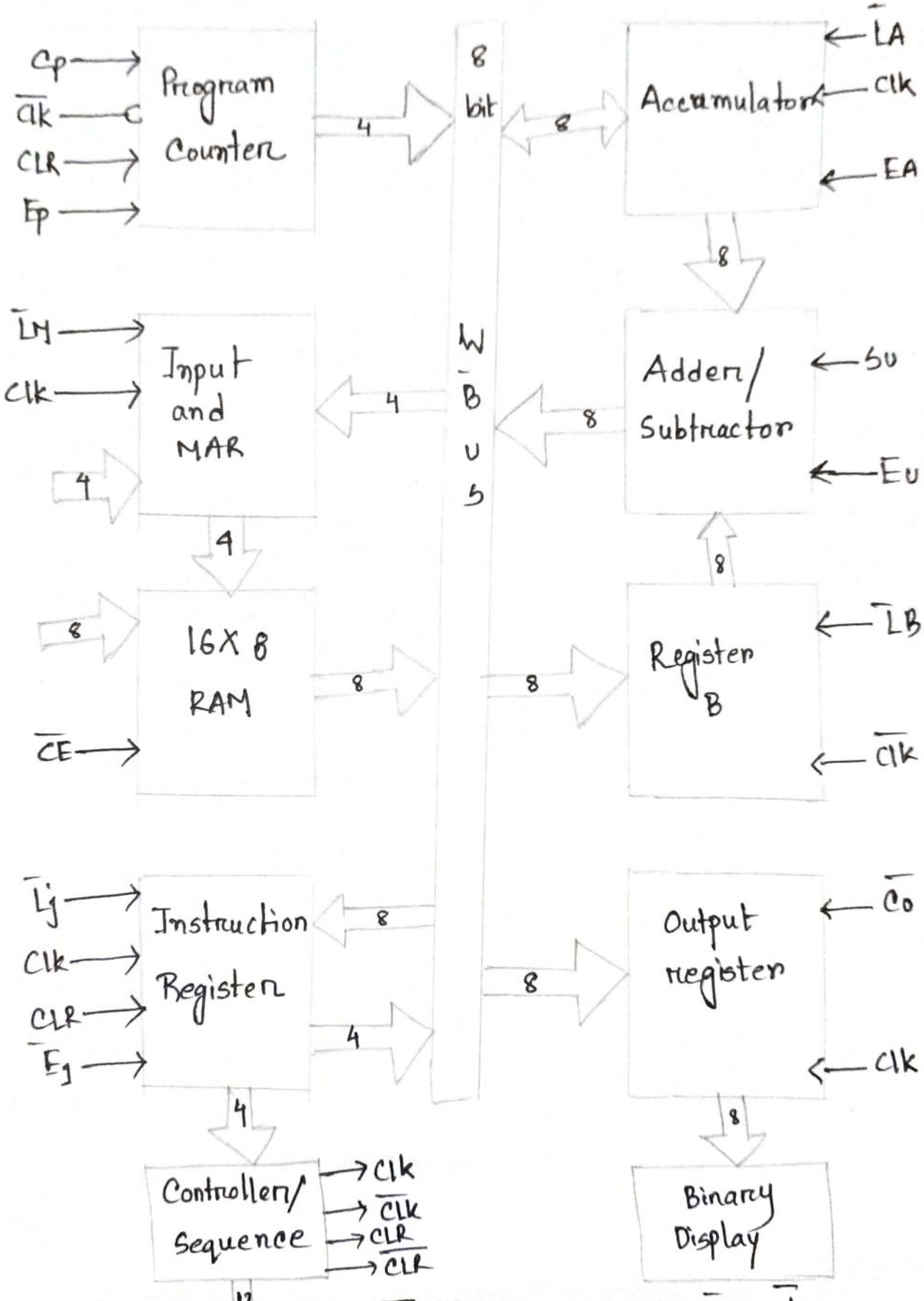
Name of the Experiment : Implementation of SAP-1.

Introduction : SAP-1 is the first stage in the evolution towards modern computers. The main purpose of SAP is to introduce all the crucial ideas behind computer operations. Being a simple computer, SAP 1 also covers many advanced concepts. SAP 1 is a bus organized computer. All registers are connected to W bus with the help of tri-state buffers. The abbreviation of SAP is 'simple as possible!

Block Diagram :



Cp, Ep, $\bar{L}_M$, $\bar{CE}$, $\bar{L}_I$, $\bar{E}_j$, $\bar{L}_A$, E_A, Su, E_U, $\bar{L}_B$, $\bar{L}_O$

Fig- Sap-1

Program Counter:

Memory Address Register (MAR):-

$\overline{LM}$	Function
0	Load
1	hold

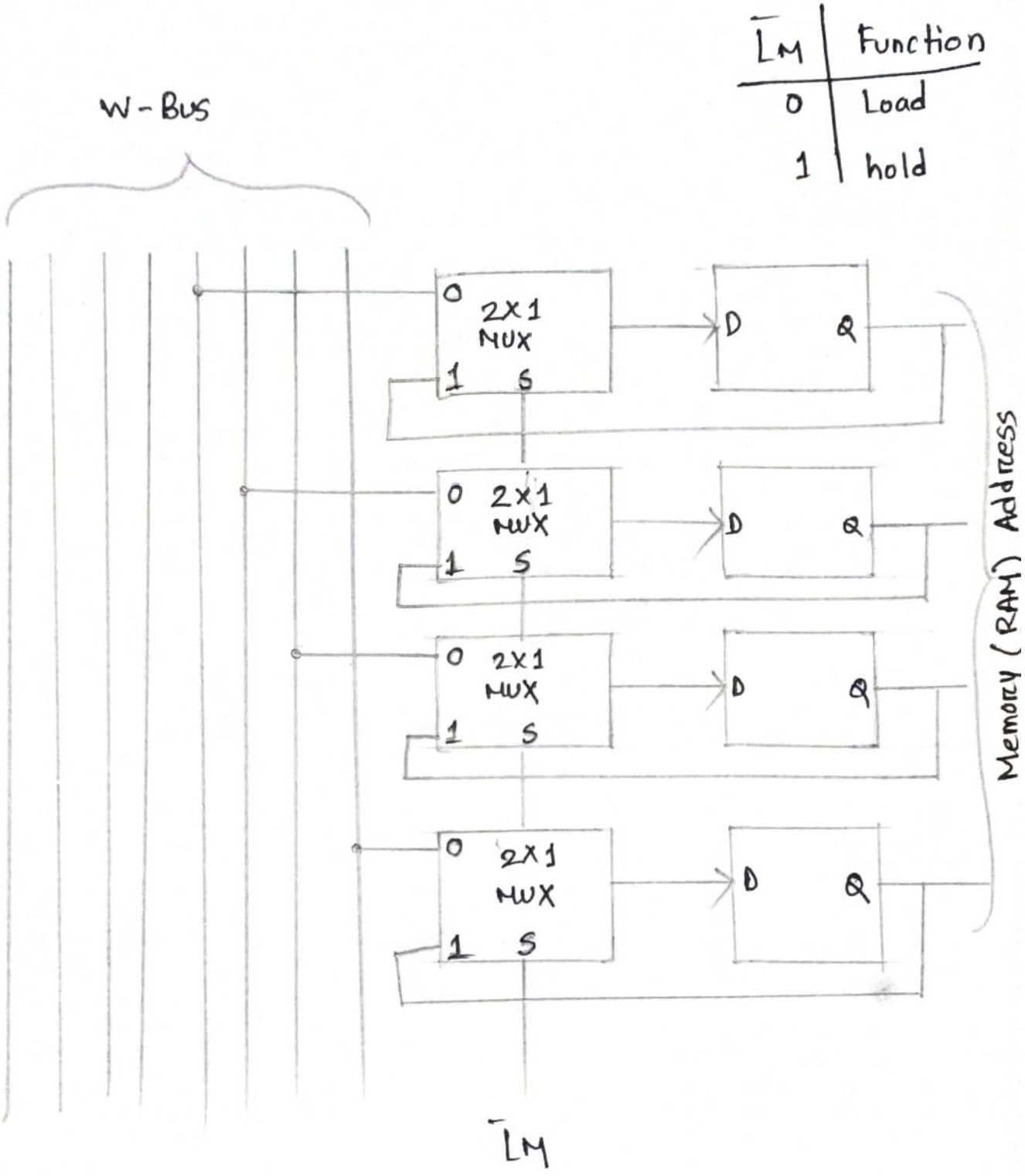
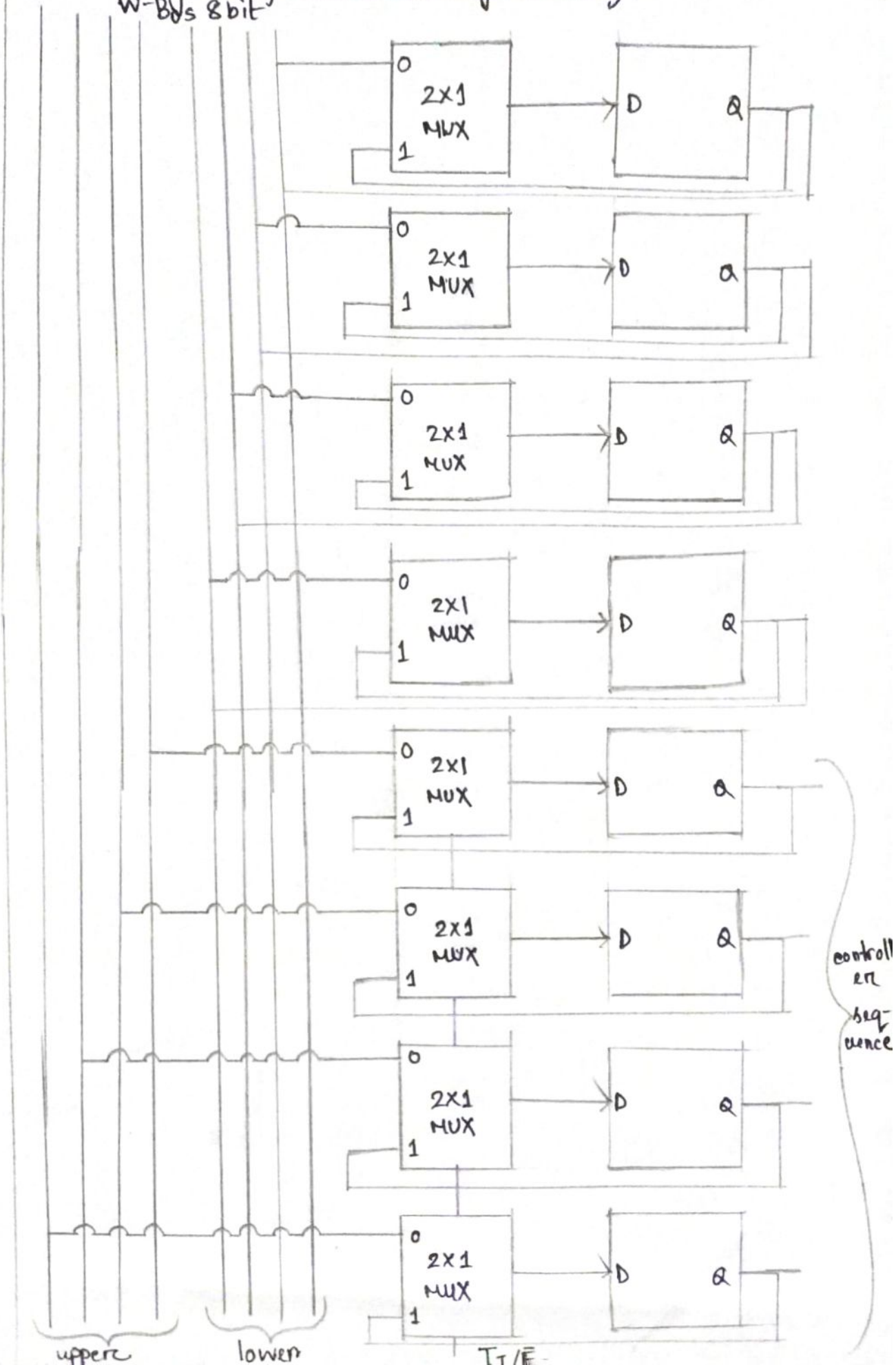
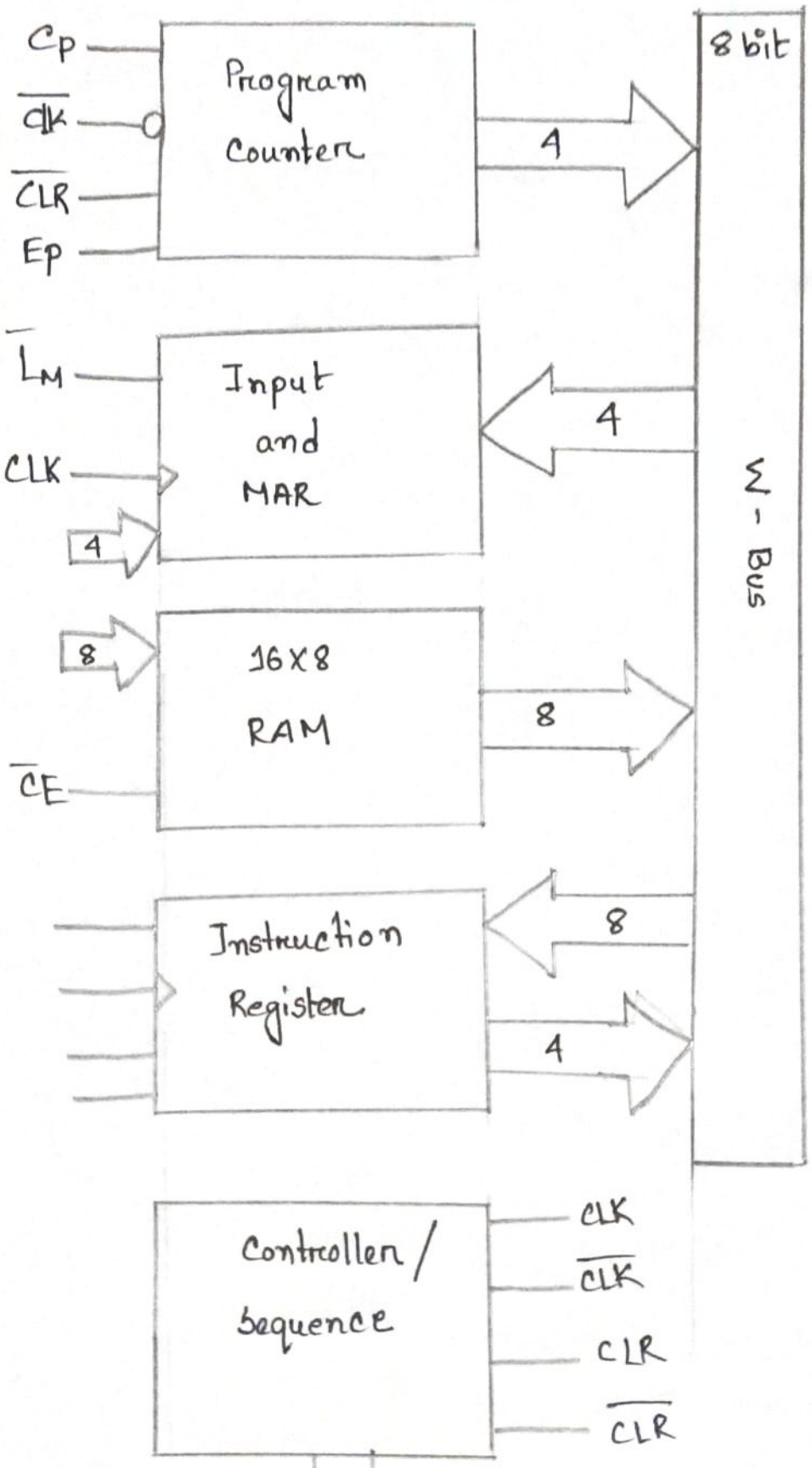


Fig: MAR

Circuit Diagram of Instruction Register (IR):-





$C_P . E_P . \bar{L}_M . \bar{C}E . \bar{L}_i . \bar{E}_i . \bar{L}_A . E_A . S_U . E_U . \bar{L}_B . \bar{L}_O$

Control Unit :

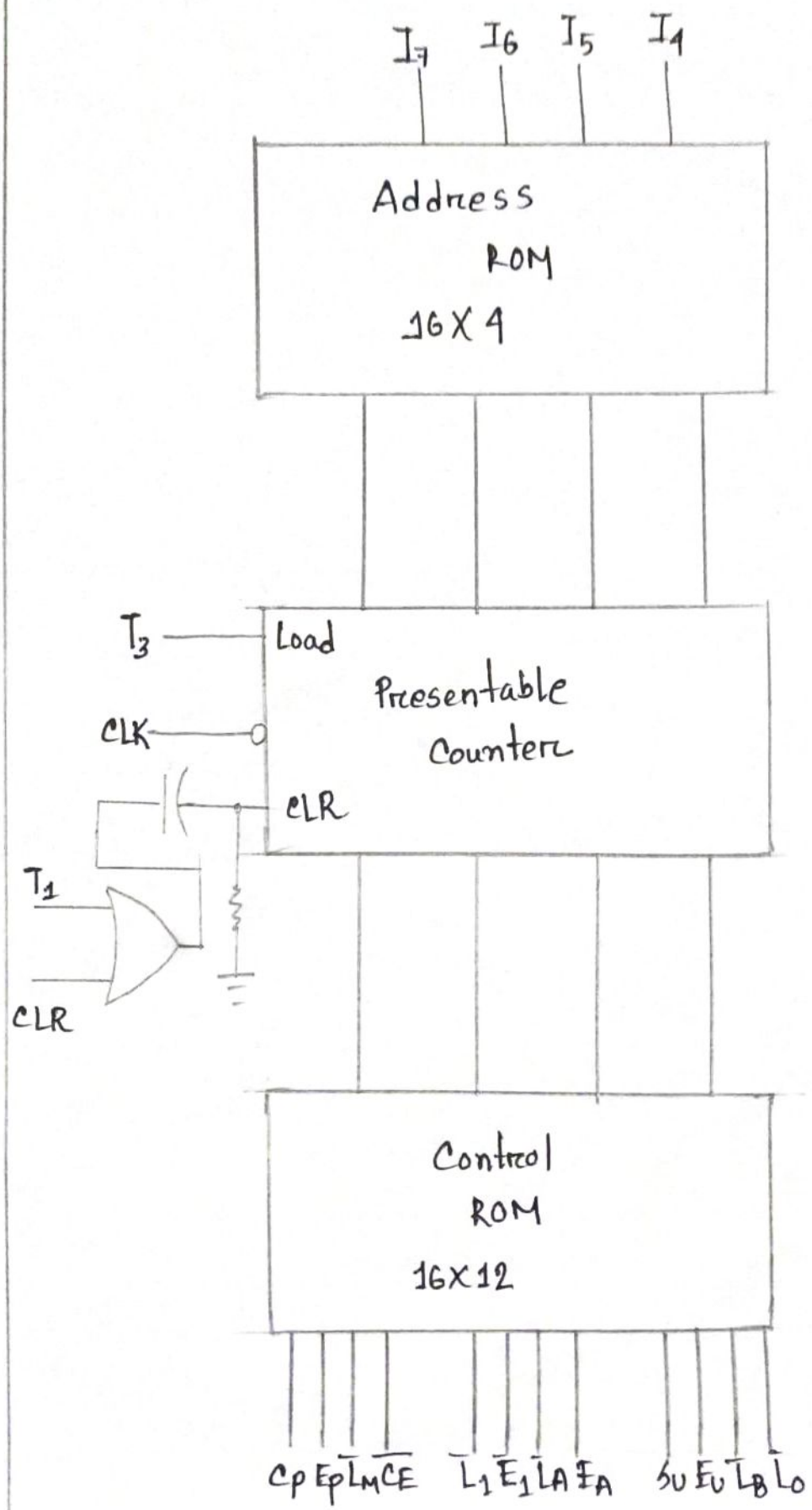
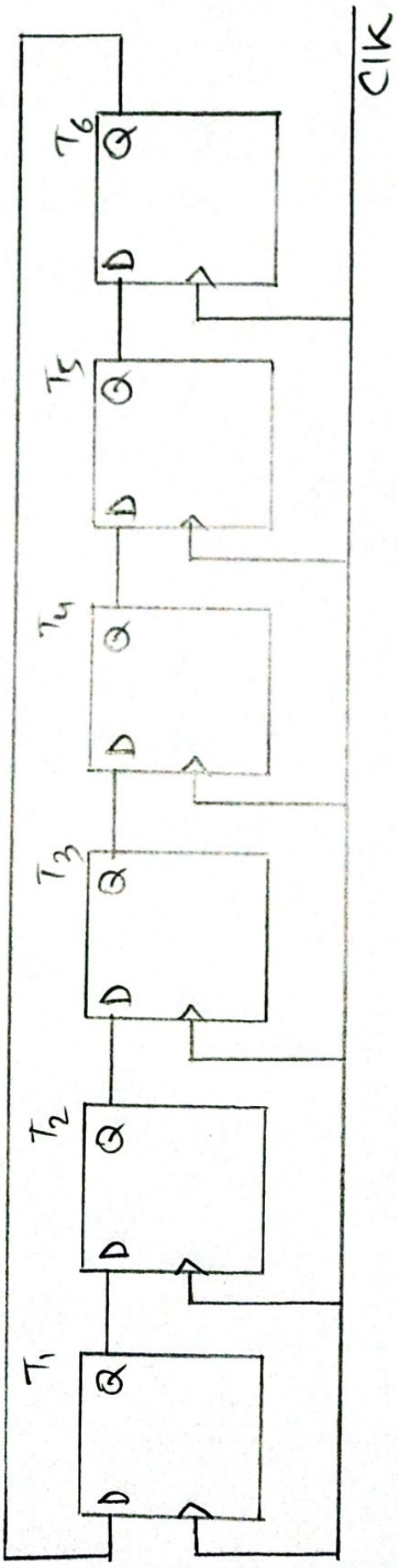
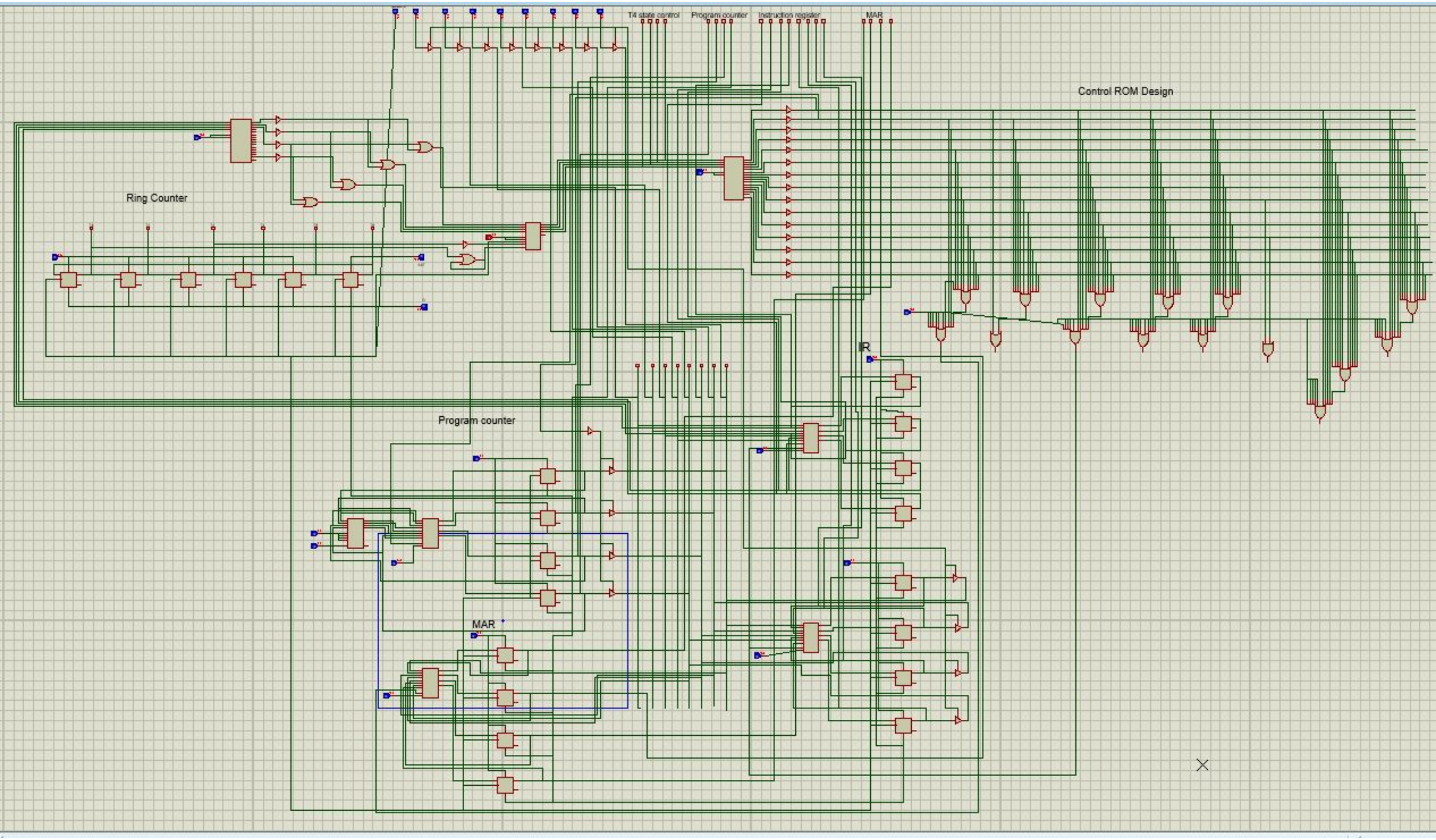
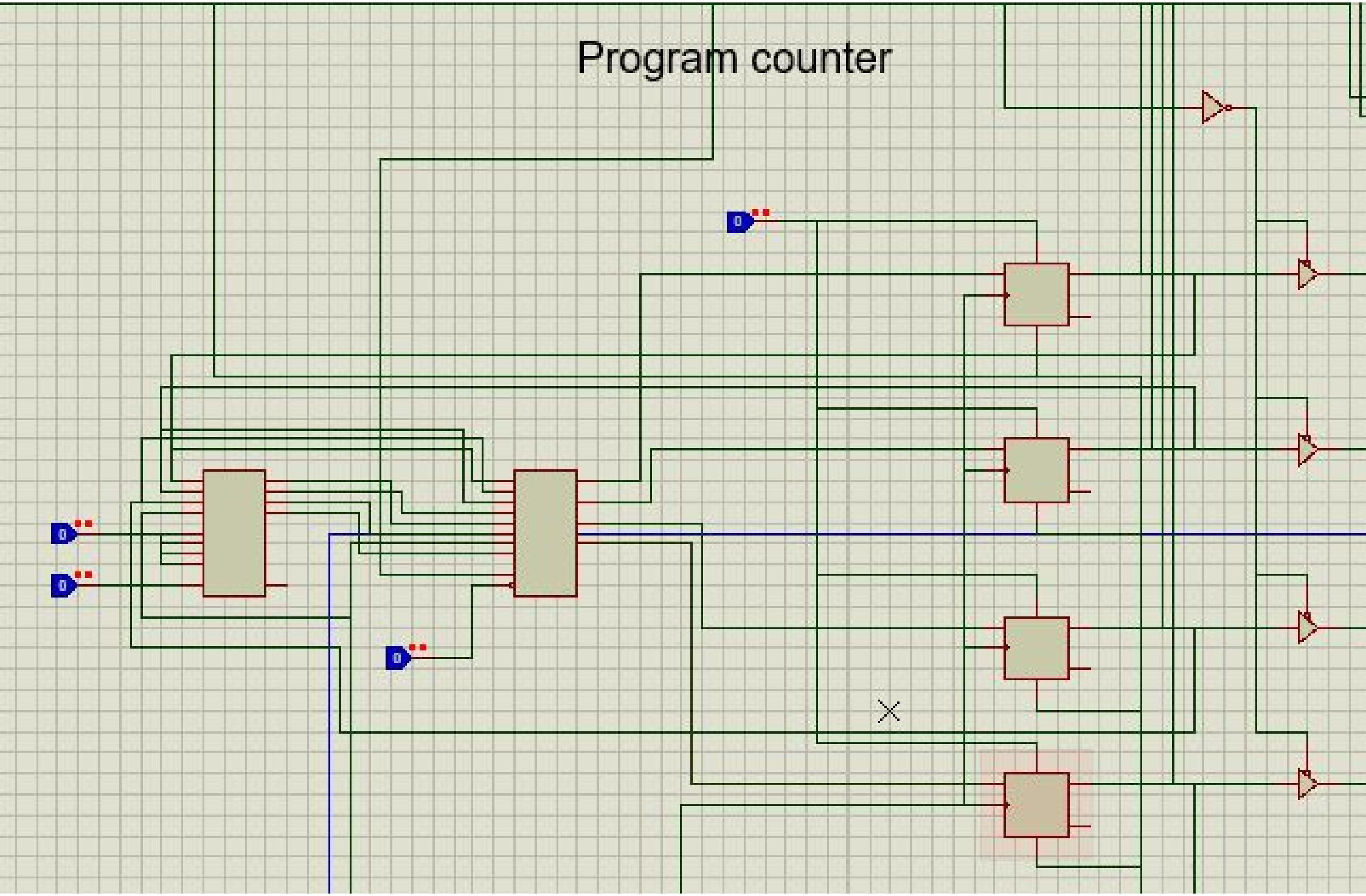


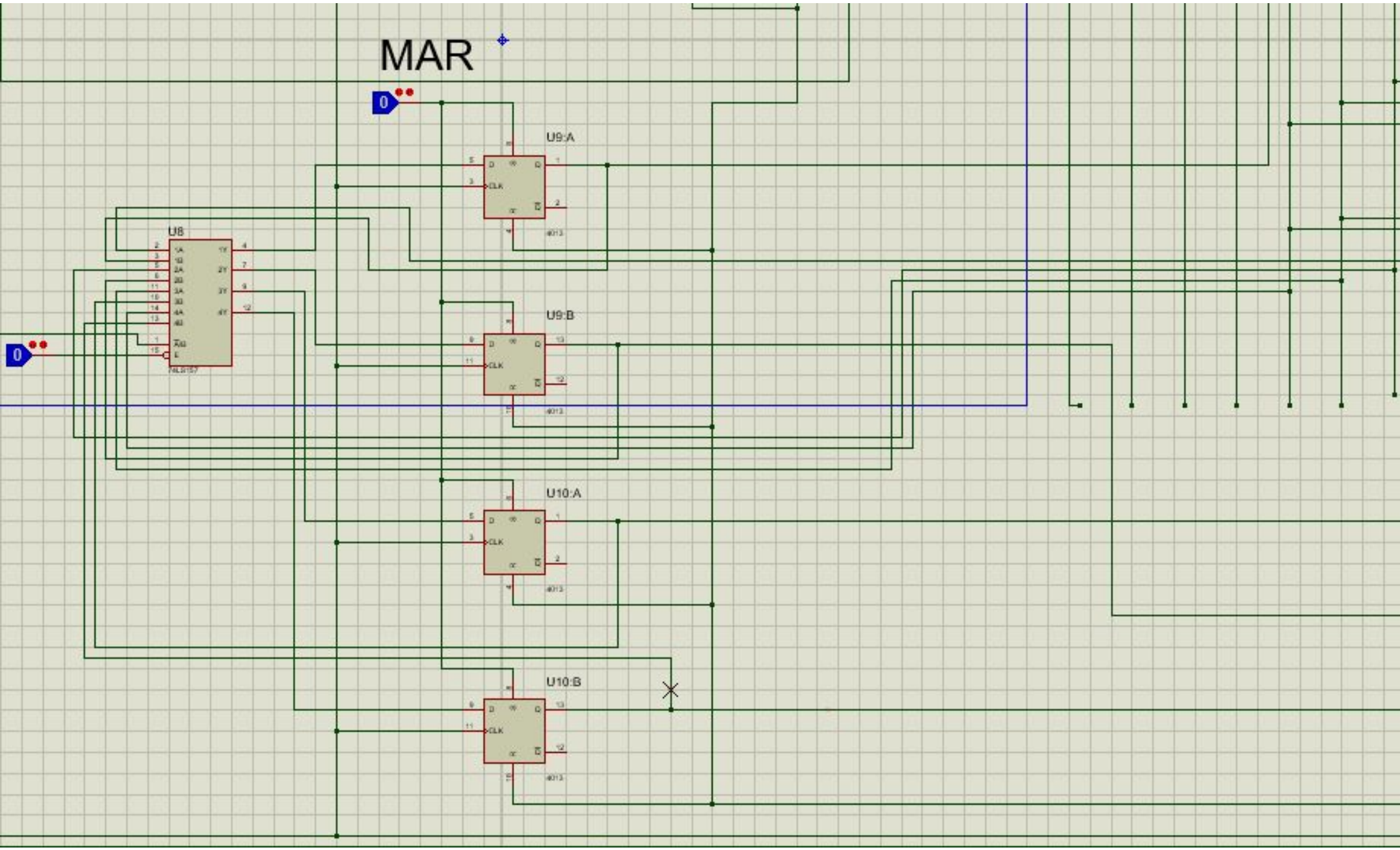
Figure : Microprogrammed control of SAP-1.

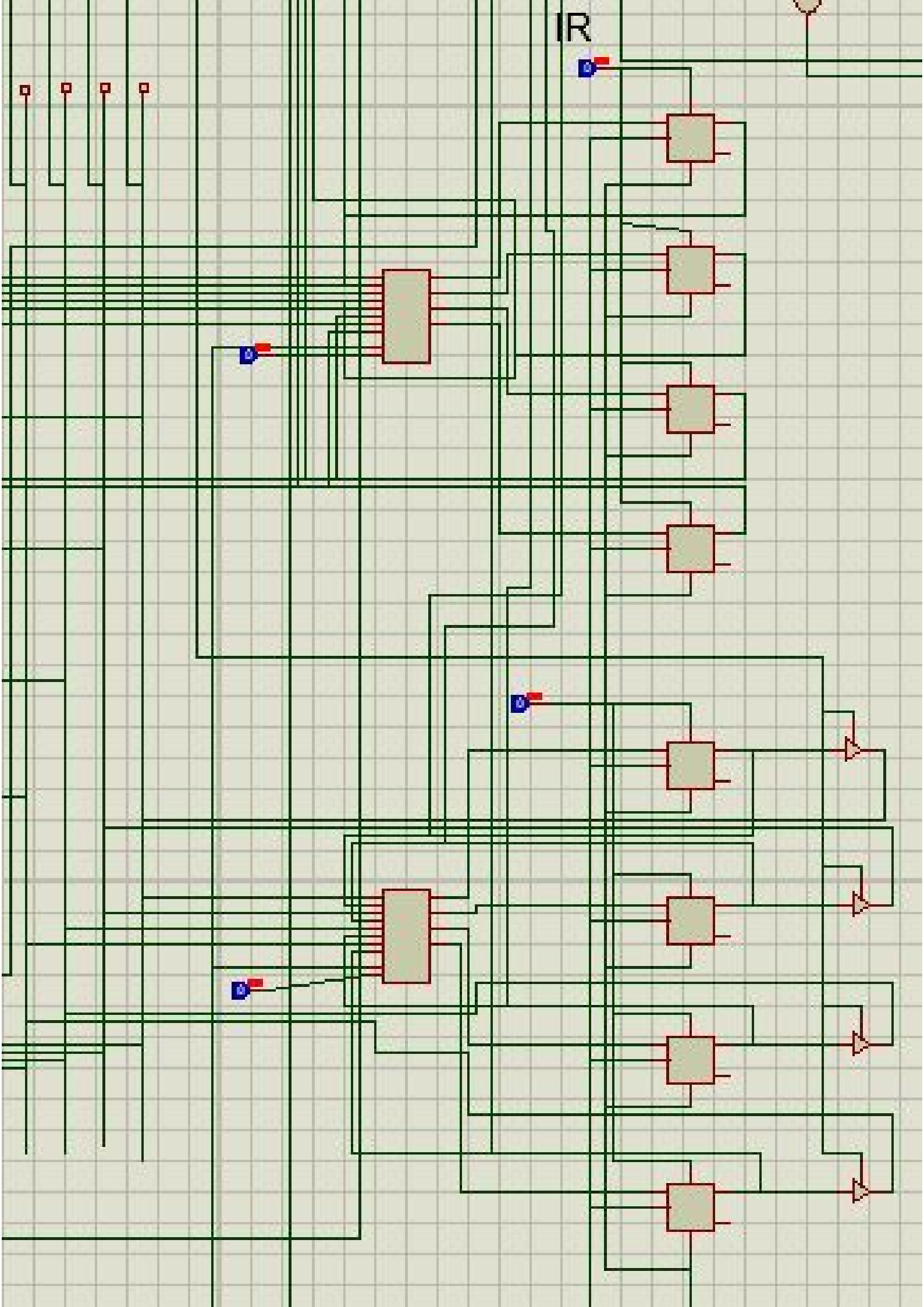
Circuit Diagram for ring counter

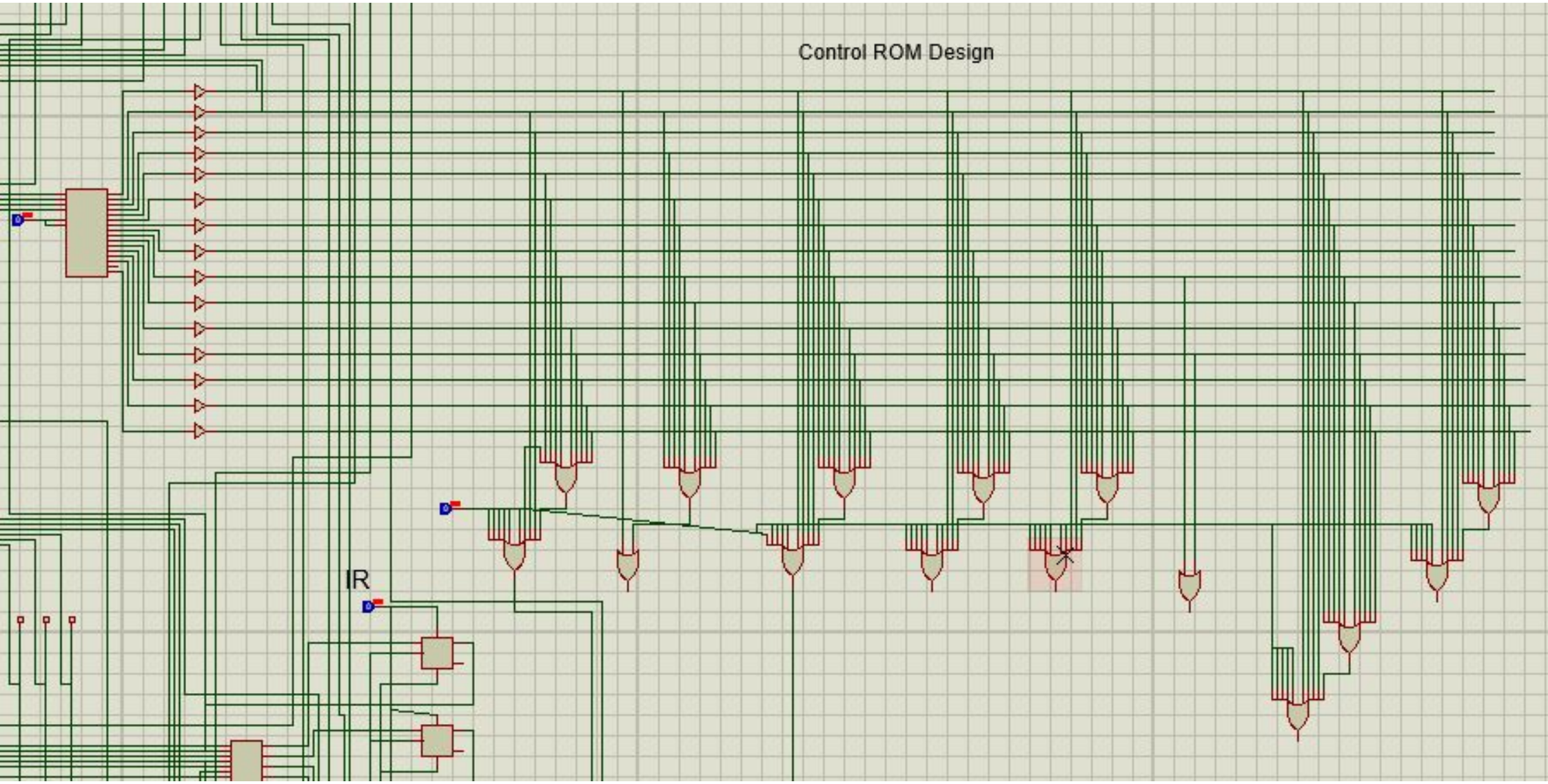


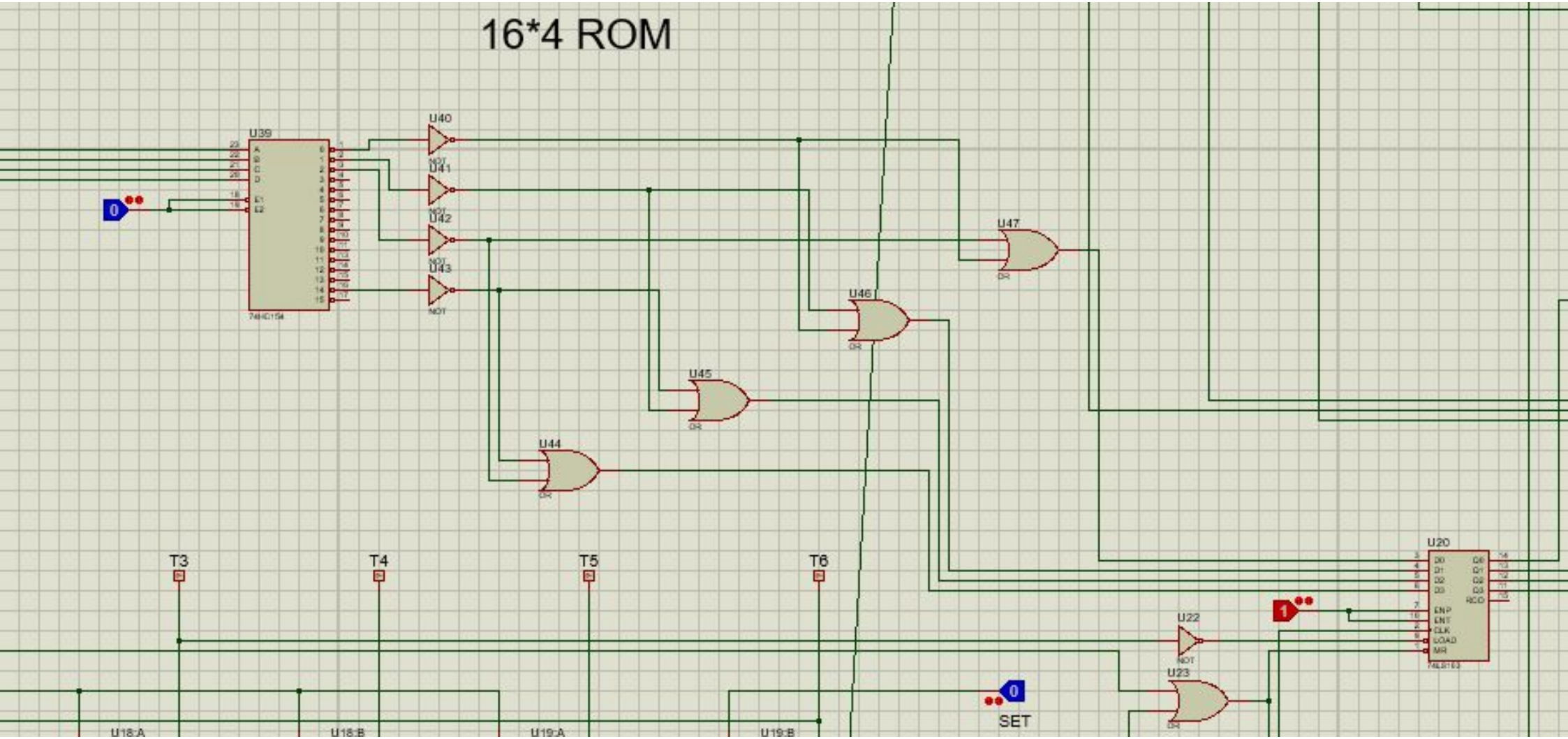

T4 state control
Program counter
Instruction register
MAR
Control ROM Design
Ring Counter
IR
Program counter
MAR

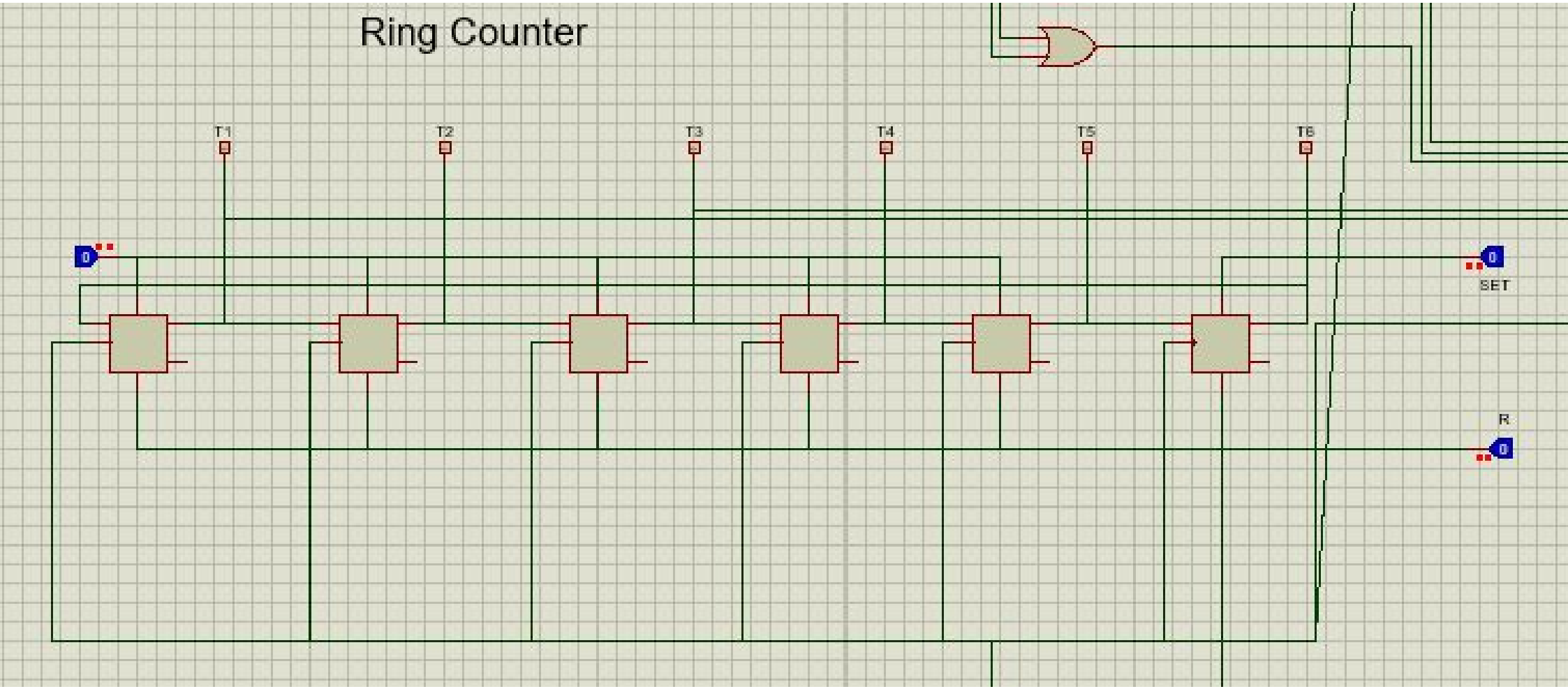

Program counter

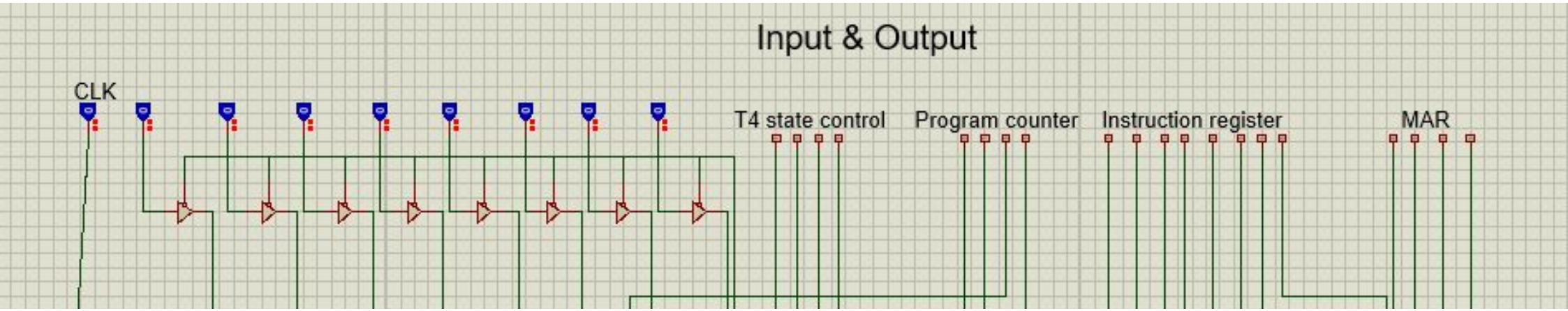

MAR
0
U9:A
U8
0
U9:B
U10:A
U10:B

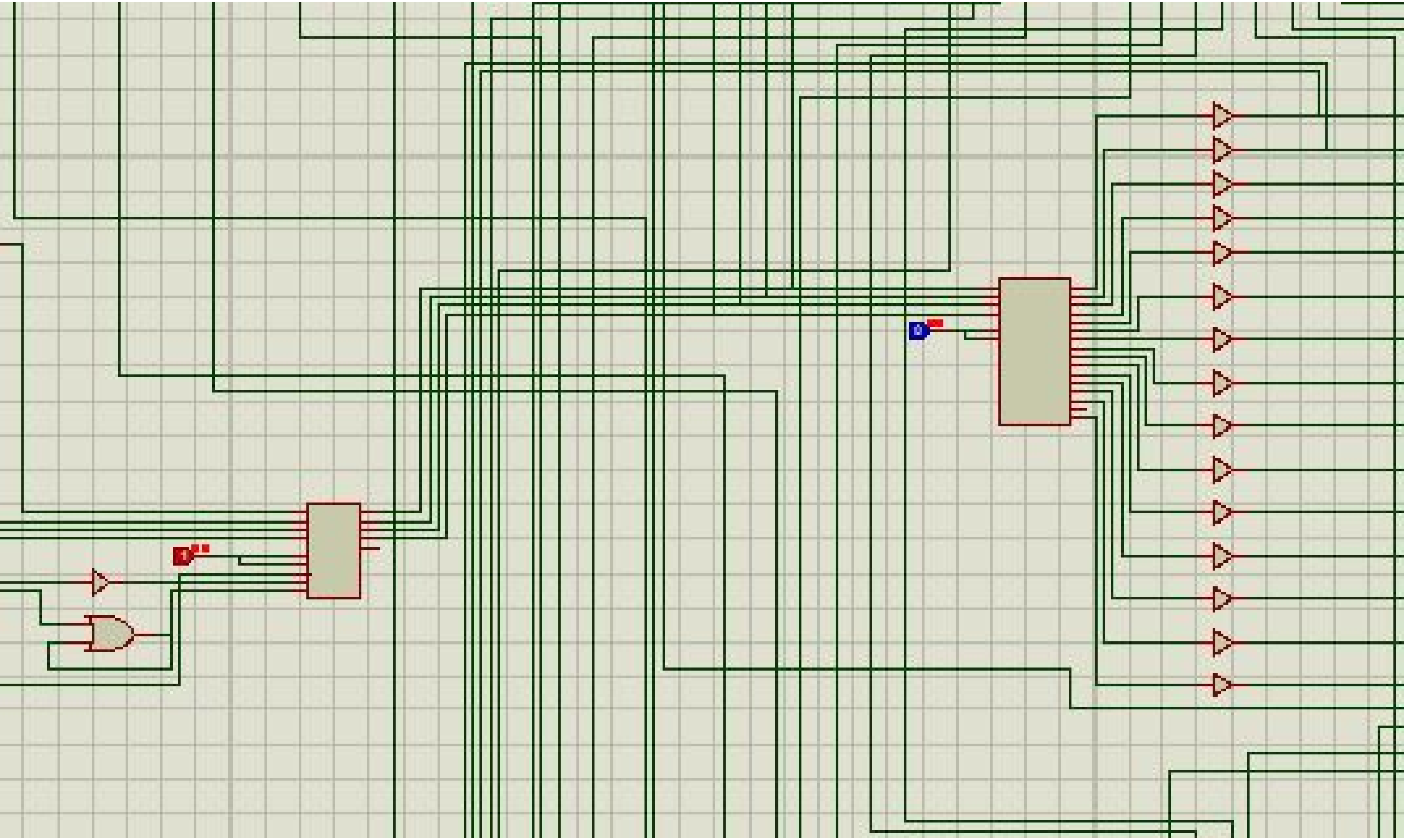

IR


Control ROM Design
IR


16*4 ROM
U39
U40
U41
U42
U43
U44
U45
U46
U47
U20
U22
U23
T3
T4
T5
T6
SET
U18:A
U18:B
U19:A
U19:B


Ring Counter
T1
T2
T3
T4
T5
T6
D
0
SET
R
0


Input & Output
CLK
T4 state control
Program counter
Instruction register
MAR



Conclusion: There are some advantages of SAP 1 like flexibility. The architecture of SAP 1 is 8 bits of data bus and comprised of 16X8 memory. Therefore 16 memory location having 8 bits in each location. It needs 4 address lines which either comes from PC during computer run phase or may come from the 4 addresses switches during the program phase. These features of SAP-1 allows to make complex operations done.