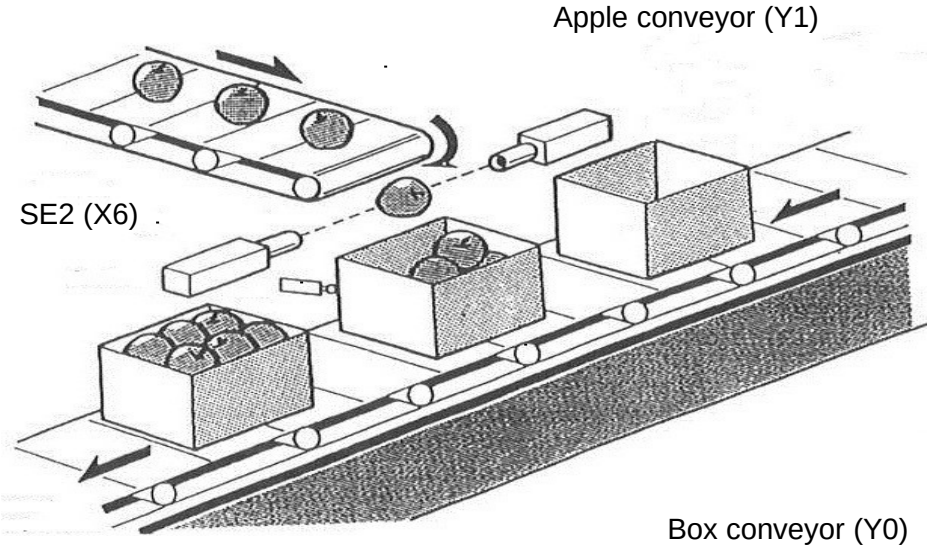
EXERCISE 9 and 10 are based on the figure below.



EXERCISE 9

After activating Start Push Button X3 ***twice*** (CNT 101), the box conveyor moves. Upon detecting of box present, the box conveyor stops and the apples conveyor starts to run. Part sensor will ***count*** for 20 apples (CNT 102). Apple conveyor stops and box conveyor starts again. Counter will be reset and operation repeats until 10 boxes of apples (CNT 103) have been completely packed.

Construct a ladder logic diagram for this operation and convert this diagram to its equivalent mnemonic codes using the format below.

Address	Instruction	Data

EXERCISE 10

After activating Start Push Button X3 and X4, the box conveyor moves. Upon detecting of box present, the box conveyor stops and the apples conveyor starts to run. Part proximity sensor will ***count*** for 40 apples (CNT 101). For safety purpose, the Apple counter can only be activated when box conveyor exactly stops and the apples conveyor exactly run. The Apple conveyor stops and the system ***delay*** for 3 seconds (TIM 1) before the box conveyor starts again. Counter will be reset and operation repeats until X0 and X1 are activated by operator.

Construct a ladder logic diagram for this operation and convert this diagram to its equivalent mnemonic codes using the format below.

Address	Instruction	Data

EXERCISE 11

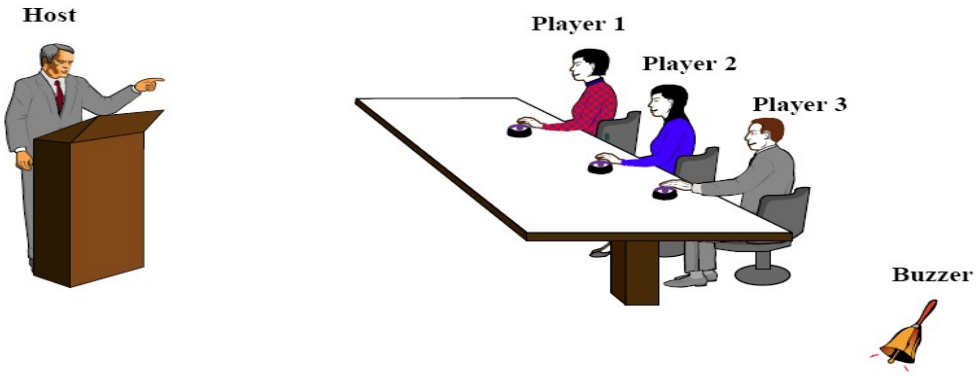
In the coating process of product Z, the operator needs to start a coating machine by activating the Push Buttons A and B. The white color will be sprayed on the product for 10 seconds and continued by drying process for 15 seconds. These spraying and drying processes should be done for 10 times, repeatedly.

Input	Devices		Output	Devices
X3	Start Push Button A		Y0	Spraying Unit
X4	Start Push Button B		Y1	Heater Unit
TIM 1	Spraying Timer			
TIM 2	Drying Timer			
CNT 101	Product Counter			

Construct a ladder logic diagram for this operation and convert this diagram to its equivalent mnemonic codes using the format below.

Address	Instruction	Data

EXERCISE 12



The game buzzer control requirement:

1. After the Host has finished with question.
2. The 3 players will press the switch in front of them to fight to be the first to answer the question.
3. The buzzer will sound for 10 seconds after any one of the players has touched the switch.
4. The light indicator in front of each player will light-up and only reset by the Host switch.

Input	Devices		Output	Devices
X3	Start Push Button 1		Y0	Buzzer
X4	Start Push Button 2		Y1	Player 1 Light
X5	Start Push Button 3		Y2	Player 2 Light
X0	Reset Switch		Y3	Player 3 Light
TIM 1	Timer 1			

EXERCISE 13

A television program consists of a Host and three players. The Host is supplied Start and Stop Push Buttons and one lamp. Each player is supplied with one push button and use one lamp individually. After the Host has completely finished with question, he will press the Start Push Button switch to activate the buzzer and light-up the lamp in front of him. The buzzer will sound for 2 seconds. Once the buzzer stops, the players will be allowed to answer the question. The three players will press the Push Button switch in front of them simultaneously. The lamp in front of the fastest player is light-up and only he will then be allowed to answer the question. The answer time is set to a maximum of 10 seconds. The buzzer will ring again for 2 seconds indicating the answer time has ended. The system can also be turned off by the Host by activating Stop Push Button switch if the answer given is correct without waiting until the end of maximum answer time. The Timing Diagram for this application is shown in **Figure EXERCISE 13**.

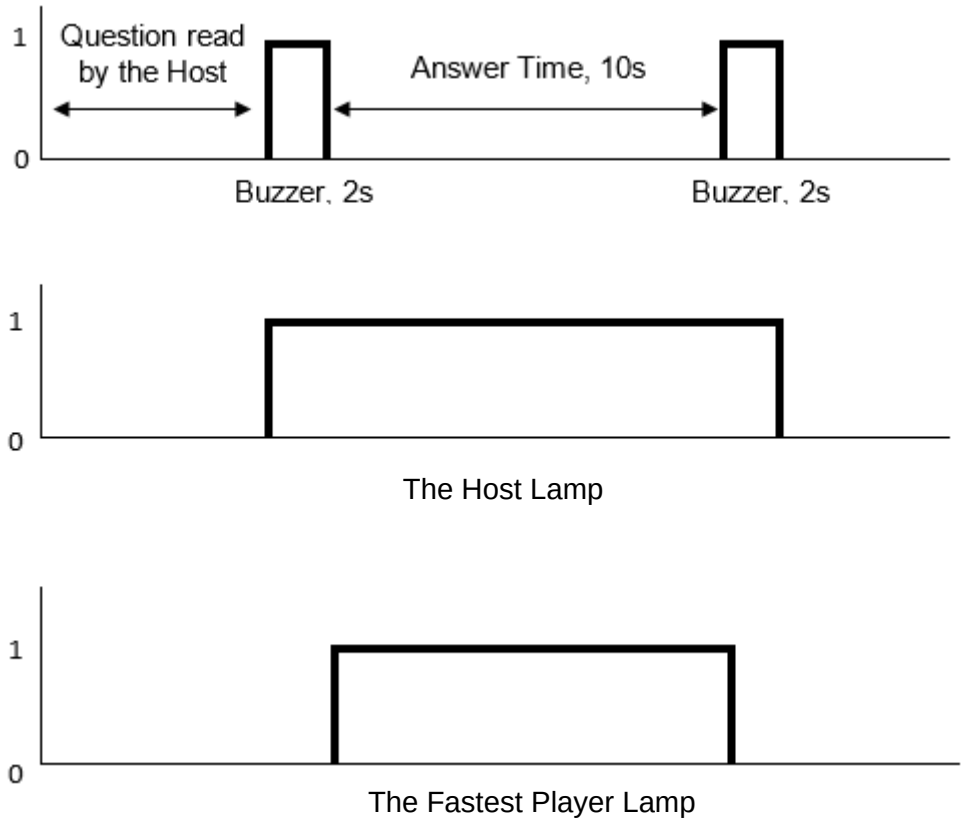


Figure EXERCISE 13