

# EXPERIMENT No. : 1

## Aim :

Draw the ladder rung to represent.

- i) Execution of energized motor or bulb using switches in series.
- ii) Execution of energized motor or bulb using switches in parallel.

## Apparatus :

Ladder software, Two normally open switches, PLC board, Motors.

## Description :

When input switches 0001, 0002 are turned ON output is ON.

## Connections :

Make the connection between external connection on PLC board to experimental model.

To see output on module change switches to EXTN. on PLC board.

Connect the power supply (24 V) to PLC board.

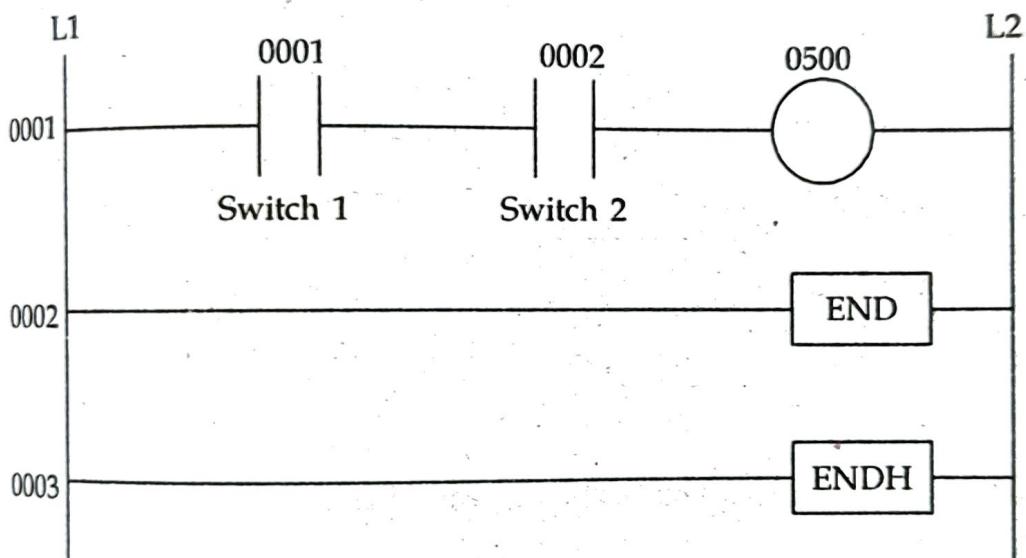
## Procedure :

1. The ladder software is opened the KV-16 is selected.

2. Create the ladder diagram as shown in figure.
3. Compile the ladder diagram.
4. Simulate the ladder diagram.
5. Finally check the output.

### Ladder Diagram :

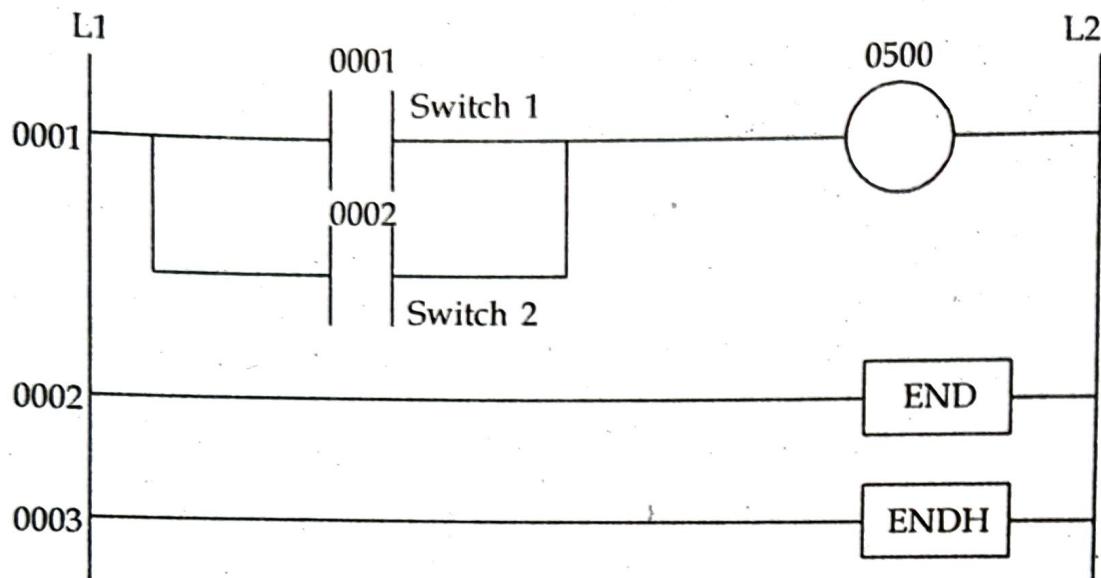
- i) Execution of energized motor or bulb using switches in series.



### Coding :

Sl.No.	Instruction	Operands
1	LD	0001
2	LD	0002
3	OUT	0500
4	END	--
5	ENDH	--

- ii) Execution of energized motor or bulb using switches in parallel.



These are 3 mixing devices on a processing line A, B, C. After the process begins mixer A - is to start after 7 seconds elapse, next mixer - B is to start 3.6 second mixer. A mixer - C is to start 5 seconds after B. All of them remain on until a master enable switch is turned off. Develop PLC ladder diagram, timing diagram and simulate the same.

Aim:- To develop the ladder diagram as per the above mentioned mixer system.

Components:- Ladder software, 2 normally open switches, 3 timer switches, PLC board, motor.

#### Procedure:-

- 1 The ladder software is opened with KV-700 is selected.
- 2 Create the ladder diagram as shown in figure.
- 3 Compile the ladder diagram.
- 4 Simulate the ladder diagram.
- 5 Run the ladder diagram by clicking the continuous execution and check the results.

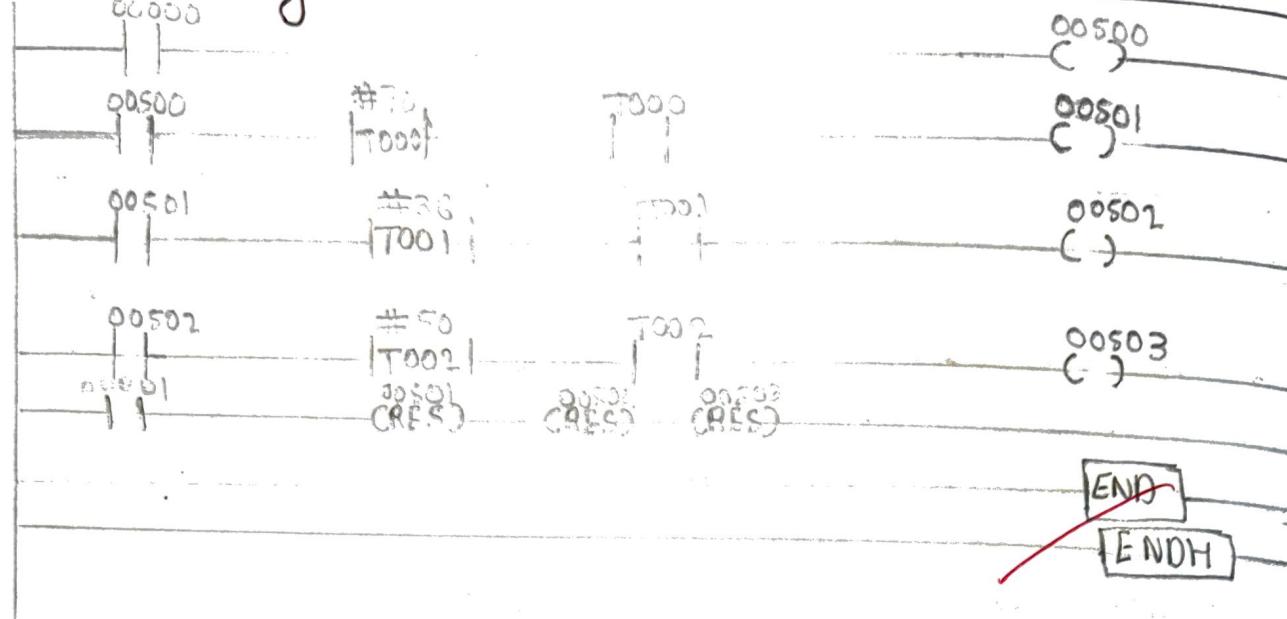
#### ~~Results:-~~

Ladder diagram is constructed for the given logic and results are verified.

See



# Ladder Diagram:-



## Coding:-

S.L NO	Instruction	Operands
1	NO switch 1 Input	00000
2	Output CP80C	00001
3	Output CP80ces (start)	00500
4	Output Cmixes A starts)	00501
5	Output Cmixes B starts)	00502
6	Output Cmixes C starts)	00503
7	Times for mixe&A	T000
8	Times for mixe&B	T001
9	Times for mixe&C	T002
10	RESET	RES
11	END	---
12	ENDH	---

### **7.3 Develop the Ladder Diagram for Relay based Motor Control Automation such that the Motor Reversed its Direction when the Limit Switches are Activated :**

#### **Aim :**

To develop the ladder diagram for relay based to have forward motion and reverse motion, when the limit switches are activated.

#### **Apparatus :**

1. Ladder builder KV-16
2. Normally open switches (LD)
3. Normally closed switches (LDB)
4. Motor.

#### **Procedure :**

1. Open the ladder builder software and click KV-16.
2. Prepare the ladder diagram as shown in fig.
3. Then compile the drawn ladder diagram.
4. Simulate the ladder diagram.
5. Run the ladder diagram by clicking the continuous execution and check the results.

Fig. 7.6 : Ladder diagram with limit switches

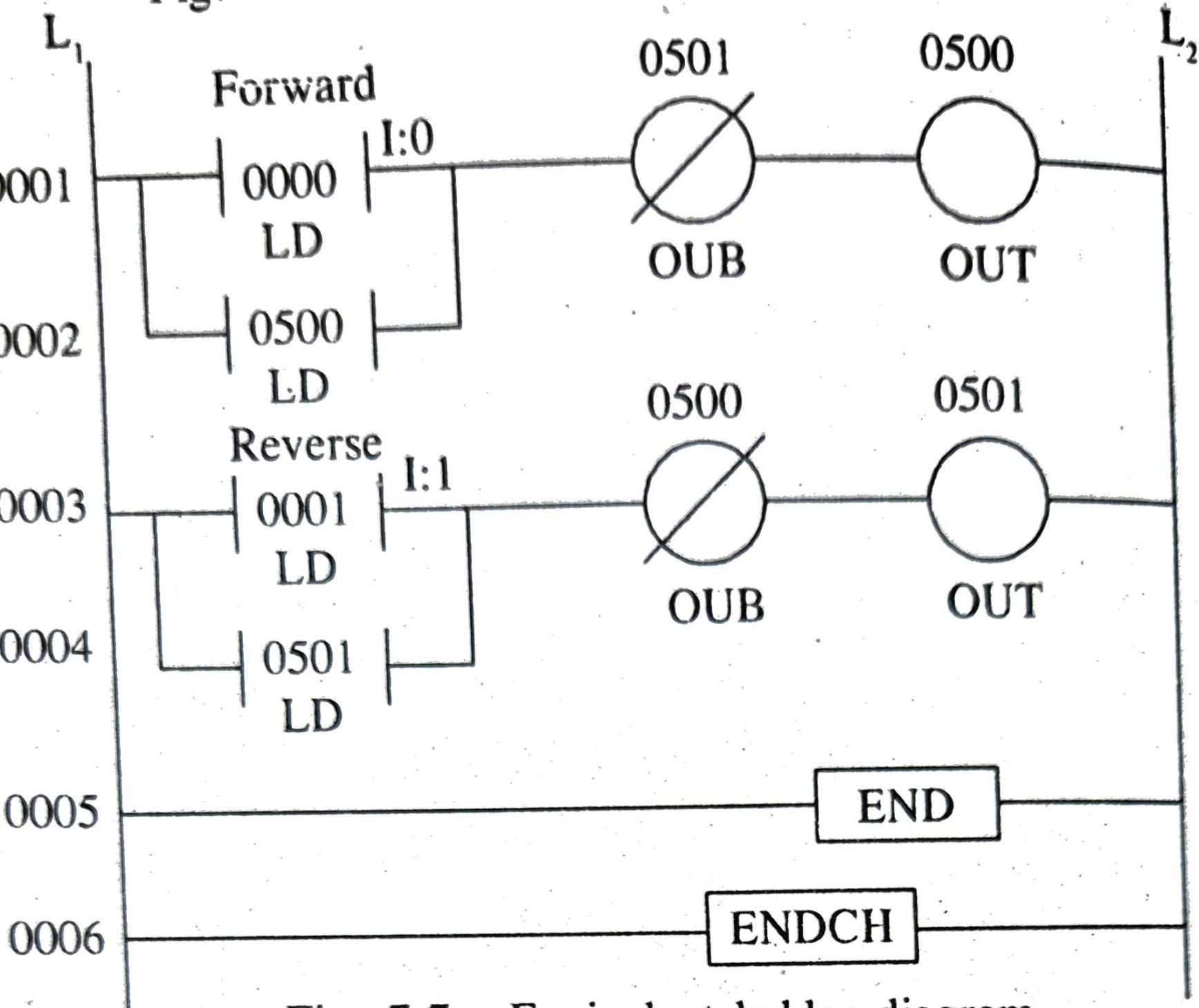


Fig. 7.7 : Equivalent ladder diagram

$I:0 \rightarrow$  Limit switch for forward motion

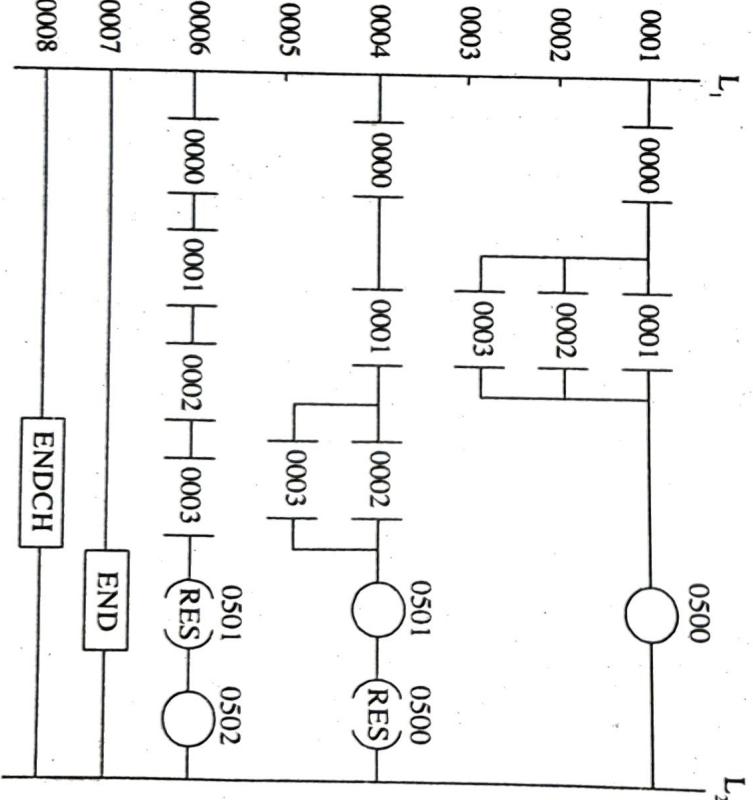
$I:1 \rightarrow$  Limit switch for reverse motion.

- When a limit switch I:0 (0000) is pressed, the motor (0500) starts i.e., forward motion of the motor.
- When you press the limit switch I:1 (0001) momentarily the forward motion of the motor (0500) stops and motor (0501) starts i.e., reverse motion of the motor and vice-versa.

**Program : Develop a PLC Ladder Diagram to Construct an Alarm System which operates as follows :**

- If one input is ON nothing happens
- If any one inputs are ON, a red light goes ON
- If any three inputs are ON, an alarm sirens sound
- If all are ON, the fire department is notified.

#### Ladder Diagram :



Simulate the PLC ladder diagram developed for an alarm system.

#### Apparatus :

- Ladder software
- PLC board (ABB)
- Normally open and closed switches
- Outputs.

#### Procedure :

- Open the ladder builder software and click KV-16.
- Prepare the ladder diagram as shown in fig. 7.8.
- Then compile the drawn ladder diagram.
- Simulate the ladder diagram.
- Run the ladder diagram by clicking the continuous execution and check the results.

Fig. 7.8 : Ladder diagram

## Coding :

Sl.No.	Instruction	Operands
1	LD	0000
2	LD	0001
3	LD	0002
4	OUT	0500
5	LD	0003
6	OUT	0501
7	RES	0500
8	RES	0501
9	OUT	0502
10	END	--
11	ENDCH	--

## Steps of Operation :

1. Start with pressing LD (0000) i.e., one input is ON, nothing happens.
2. Now press either LD (0001) or LD (0002) or LD (0003) i.e., any two inputs are ON, a red light goes ON i.e., OUT (0500) gets ON.
3. Now press input (0000) and input (0001) of limb 0004. Then press any one input (0002) or (0003) i.e., any three inputs are ON, an alarm sirens sound i.e., OUT (501) gets ON at the same time OUT (0500) gets off.
4. Now press all inputs of limb 0006 i.e., LD (0000), LD (0001), LD (0002), LD (0003) it means all are ON, the fire department is notified i.e., OUT (502) gets ON and at the same time OUT (0501) gets OFF.

## **8.1 Develop a PLC Program for the Traffic Light:**

### **Aim :**

To develop the traffic light system consists of Red, Green and Yellow signals.

### **Apparatus :**

1. Ladder builder KV-16
2. Normally open switches (LD)
3. Normally closed switches (LDB)
4. Motor.

### **Procedure :**

1. Open the ladder builder software and click KV-16.
2. Prepare the ladder diagram as shown in fig.
3. Then compile the drawn ladder diagram.
4. Simulate the ladder diagram.
5. Run the ladder diagram by clicking the continuous execution and check the results.

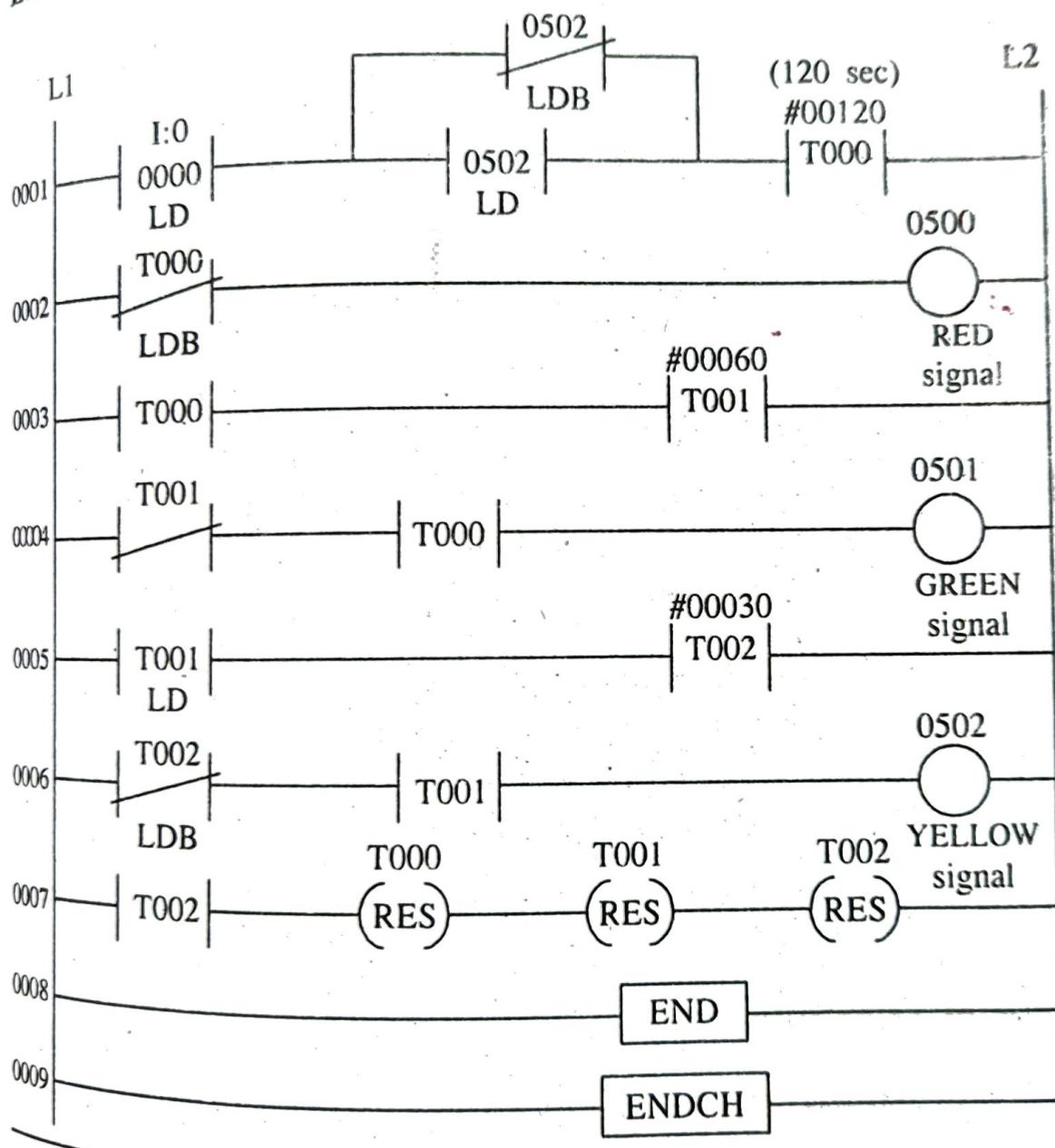
### **Steps for Operation :**

1. When LD (0000) I/P is pressed, the timer T000 (120 sec) starts at the same time the RED light (0500) goes ON for 120 sec.
2. After 120 sec., the RED light gets OFF and the timer T001 gets ON for 60 sec., at the same time the GREEN signal (0501) goes ON for 60 sec.

3. After 60 sec., the GREEN light gets OFF and the timer T002 gets ON for 30 sec., at the same time the YELLOW signal (0502) goes ON for 30 sec.
4. After 30 sec. YELLOW signal OFF, once again RED signal starts for 120 sec., and this process repeats as long as the stop switch (0000) LD is pressed.

*Note :* I/P LD (0000) acts as a start and stop switch.

### Ladder Diagram :



Input :

I:0 → Start/stop switch - LD (0000)

T000 → Timer (120 sec)

T001 → Timer (60 sec)

T002 → Timer (30 sec)

Output :

0500 → RED Signal

0501 → GREEN Signal

0502 → YELLOW Signal

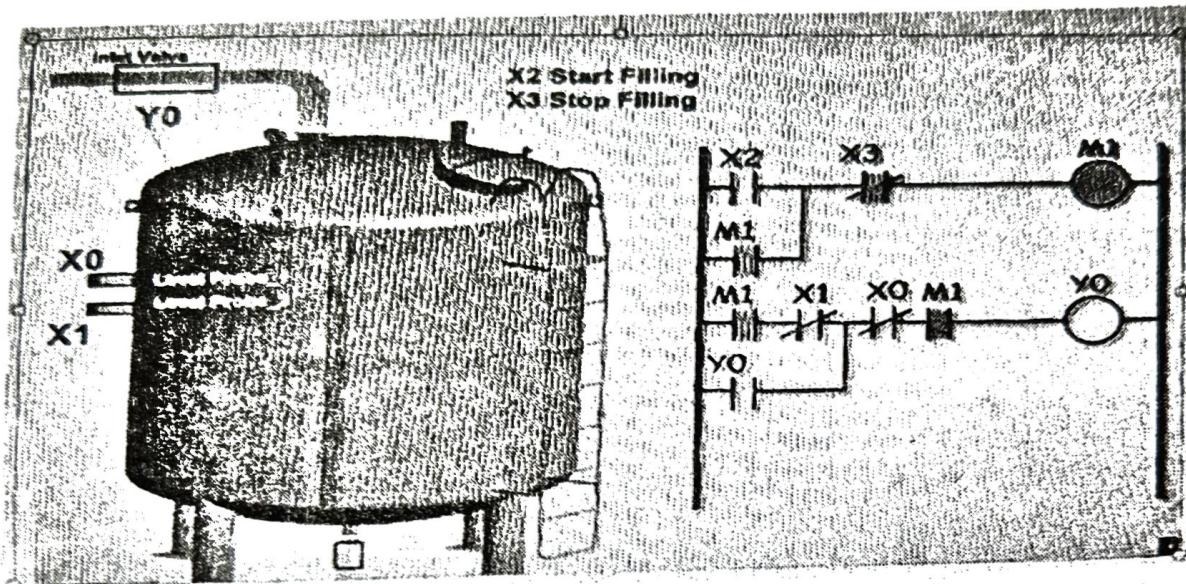
## 8.2 Develop the Ladder Program for Water Level Indicator :

**Aim :**

To develop the ladder diagram for water level indicator.

0002 - Intermittent level of water in a tank

0003 - Final top level (tank full) of water in tank.



**Apparatus :**

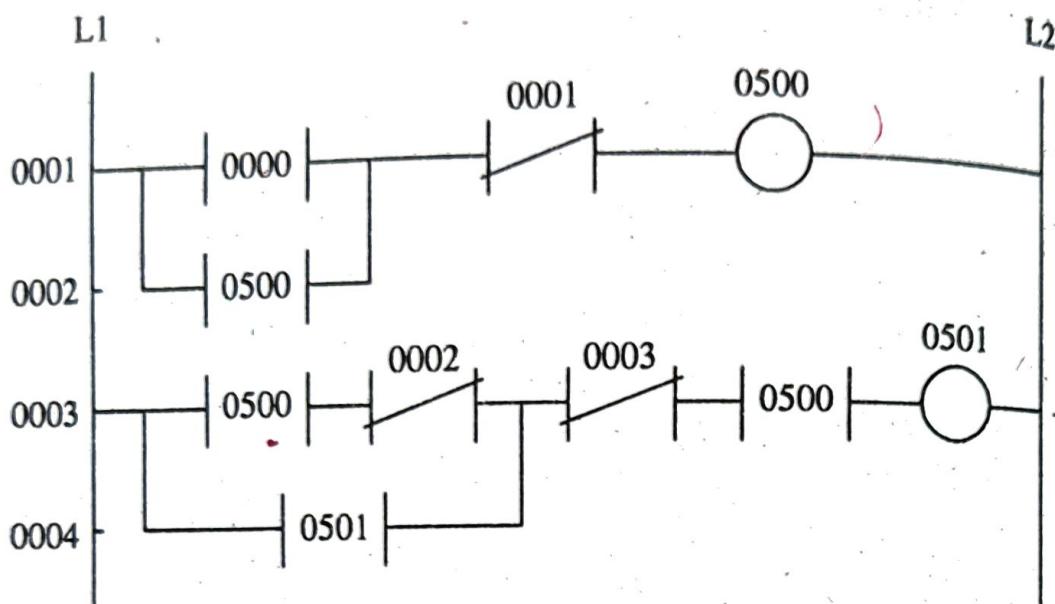
1. Ladder builder KV-16
2. Normally open switches (LD)
3. Normally closed switches (LDB)
4. Motor.

**Procedure :**

1. Open the ladder builder software and click KV-16.

- Week 8
2. Prepare the ladder diagram as shown in fig.
  3. Then compile the drawn ladder diagram.
  4. Simulate the ladder diagram.
  5. Run the ladder diagram by clicking the continuous execution and check the results.

### Ladder Diagram :



Input - LD (0000) - motor start switch

Output - 0500 - motor

0501 - inlet valve of the tank

$X_1$  - 0002 - intermittent level of water in a tank

$X_0$  - 0003 - final (tank full) level of water in a tank.

### Steps of Operation :

1. When water level in a water tank is low, press I/P

*Week 8*  
(0000) switch, the motor (0500) starts, water starts filling in a tank by opening the inlet valve (0501) of the tank.

2. When water reaches the intermittent level  $X_1$  (0002) of the tank, the motor (0500) still ON and inlet valve (0501) is also open.
3. When water level reaches the  $X_0$  (0003), the motor (0500) goes OFF and inlet valve (0501) will also closes and water stops falling in a tank.



## **10.1 Design Ladder Diagram for Car Parking :**

(Hint : Car is to be detected and enter the parking space to a particular location if space is available. If there is no space, lamp should indicate that the parking is full)

### **Aim :**

To design the ladder diagram for car parking.

### **Apparatus :**

- i) Ladder software.
- ii) PLC board.
- iii) Normally open and closed switches.
- iv) Outputs

### **Procedure :**

1. Open the ladder builder software and click KV-16.
2. Prepare the ladder diagram as shown in figure.
3. Then compile the drawn ladder diagram.
4. Simulate the ladder diagram.
5. Run the ladder diagram by clicking the continuous execution and check the results.

# Model of car parking system

## Inputs :

- 0000 - Process start
- 0001 - Process stop
- 0002 - Car space 1
- 0003 - Car space 2
- 0004 - Car space 3
- 0005 - Car space 4
- 0006 - Car entry sensor
- 0007 - Car entry over sensor
- 0008 - Car exit sensor
- 0009 - Car exit over sensor

## Outputs :

- 0500 - Process start indicator
- 0501 - Car space full indicator
- 0502 - Car space available indicator

- 0503 - Input gate opening  
 0504 - Exit gate opening

### Steps of Operation :

1. (When the car comes nearer to the parking area entry gate) press the process start switch (0000), the process start indicator (0500) goes ON.
2. At the same time, if the parking space is full [space 1 (0002), space 2 (0003), space 3 (0004), space 4 (0005) are full], the car space full indicator (0501) goes ON. It means no space is available for car parking. If any one or more space are empty, then car space available indicator (0502) goes ON.
3. (4th rung) if space is available and car is entering the parking area gate the sensor (0006) sensis the car at the gate, therefore, press the car entry sensor (0006) switch, the input gate (0503) opens. After gate opens, the car enters and passes through the car entry over sensor (0007) and goes to the parking area, meanwhile the sensor (0007) makes the input gate (0503) closes. Therefore press the switch (0007) to close input gate (0503).
4. (In 5th rung) if any parked car going out, the car comes nearer to the car exit gate sensor (0008), therefore, press the switch (0008) then the exit gate (0504) opens, as soon as the car passes through the exit gate over sensor (0009), the exit gate (0504) closes, therefore, press the switch (0009) to close the exit gate (0504) i.e., to make it OFF.

Ladder Diagrams

