

# Basic Mechatronics Workshop

## Module 3: Introduction to PLC

LAB-7

Use Logic circuit

YES and NOT, AND, OR, use sensor of lamp control  
(Practice)

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# LAB-7

## Use Logic circuit

**YES and NOT, AND, OR, use sensor of lamp control  
(Practice)**

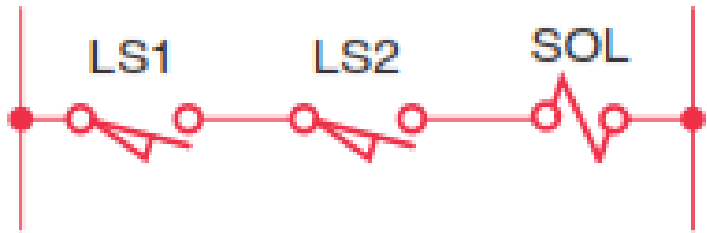
### Objectives

Upon completion of this chapter, Student should be able to

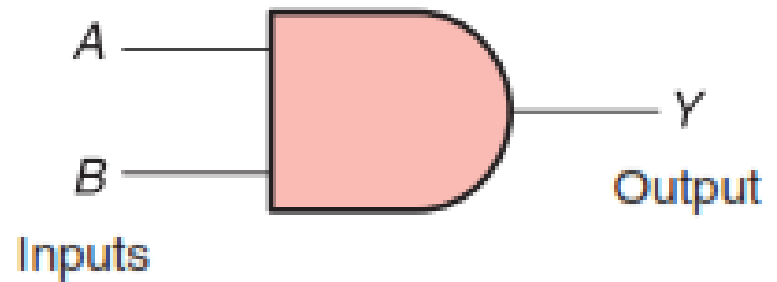
- ✓ Design the control circuits with the hardwired logic and logic gates.
- ✓ illustrates the relationship between the relay ladder schematic, the ladder logic gates, and the equivalent logic gate circuit through control a solenoid valve.

**Example 1** Two limit switches connected in series and used to control a solenoid valve.

**Relay schematic**



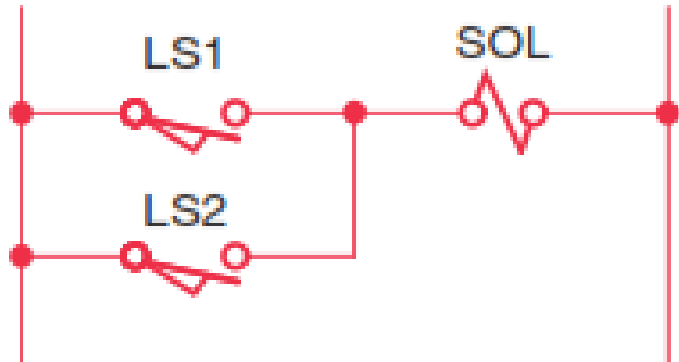
**Gate logic**



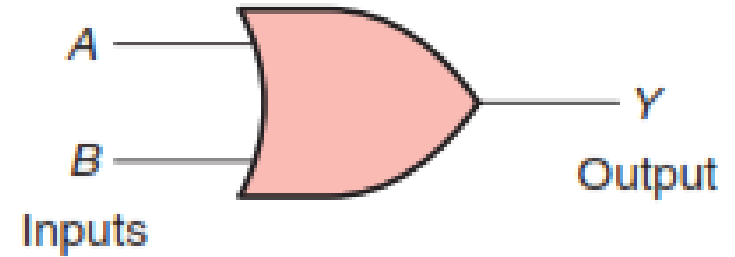
Boolean equation:  $AB = Y$

**Example 2** Two limit switches connected in parallel and used to control a solenoid valve.

**Relay schematic**



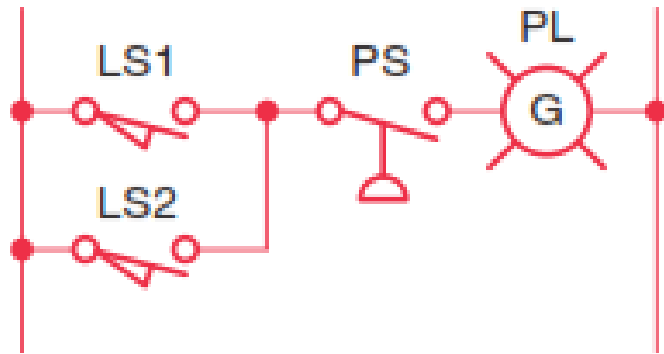
**Gate logic**



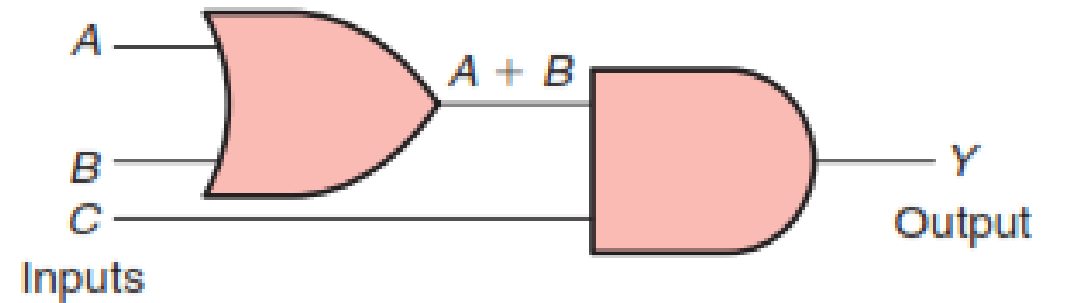
Boolean equation:  $A + B = Y$

**Example 3** Two limit switches connected in parallel with each other and in series with a pressure switch.

Relay schematic

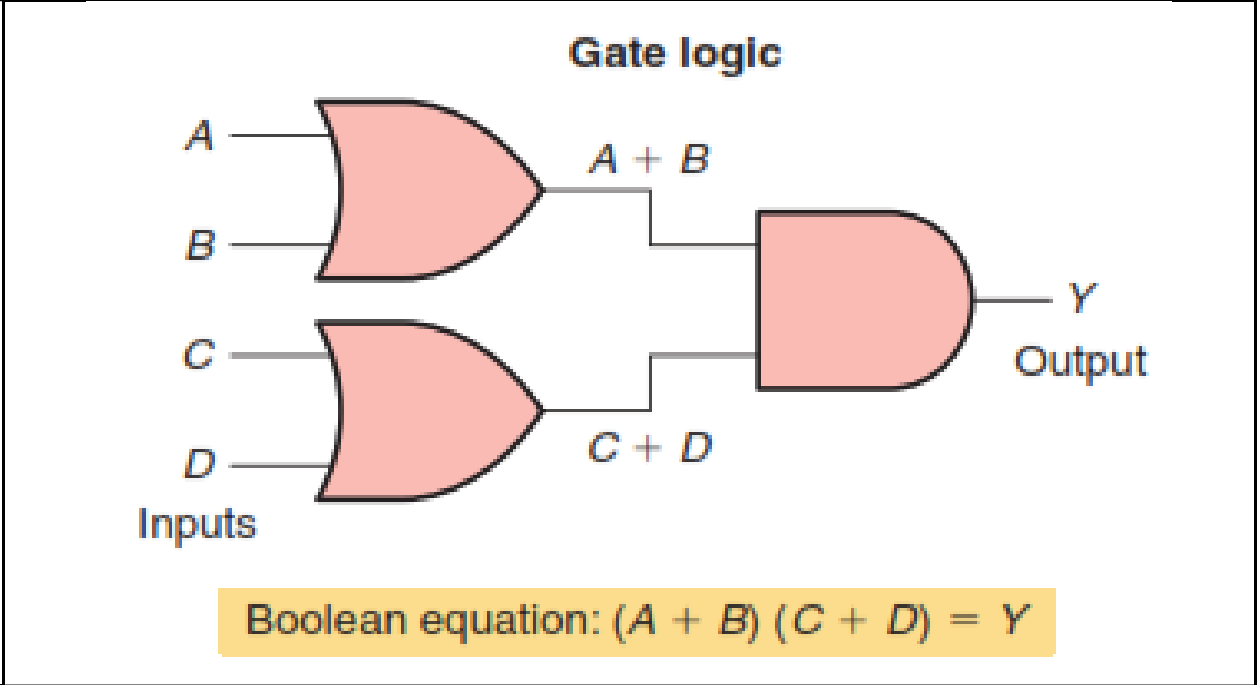
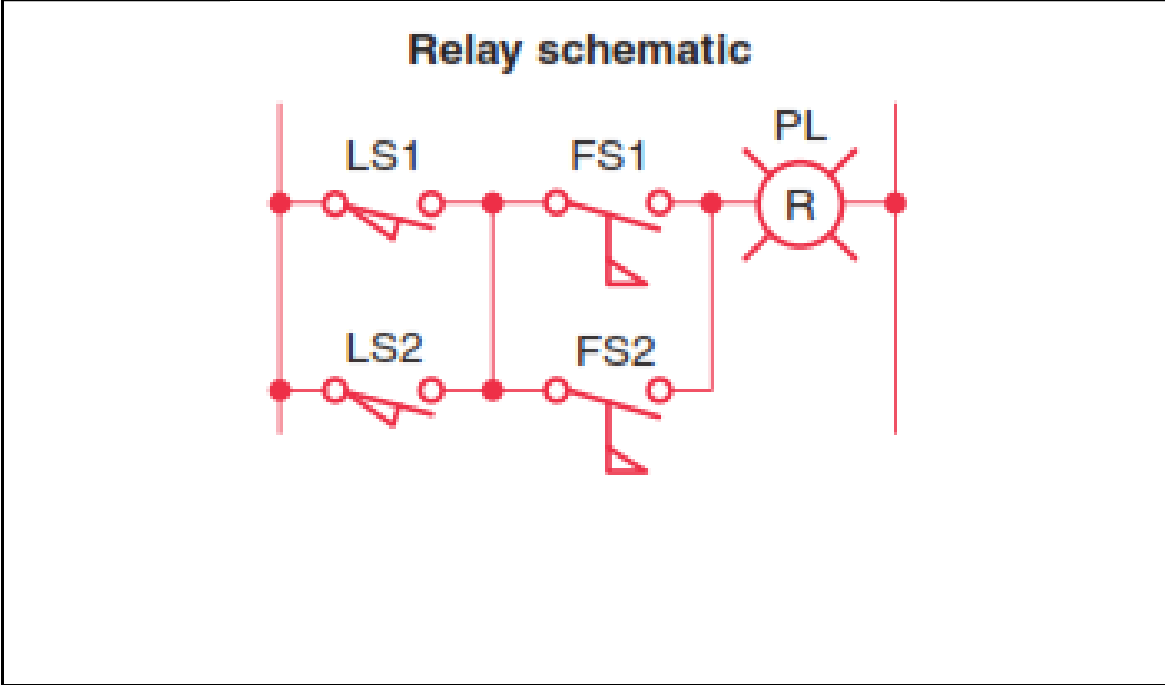


Gate logic



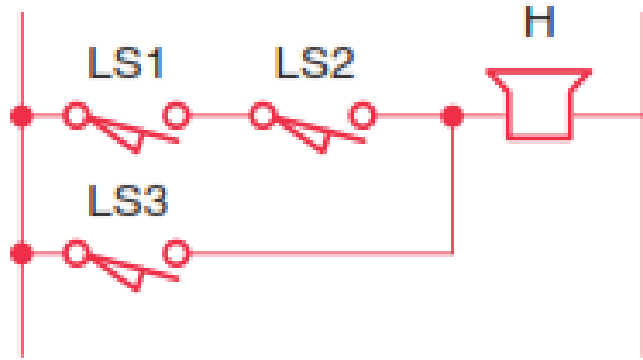
Boolean equation:  $(A + B)C = Y$

**Example 4** Two limit switches connected in parallel with each other and in series with two sets of flow switches (that are connected in parallel with each other), and used to control a pilot light.

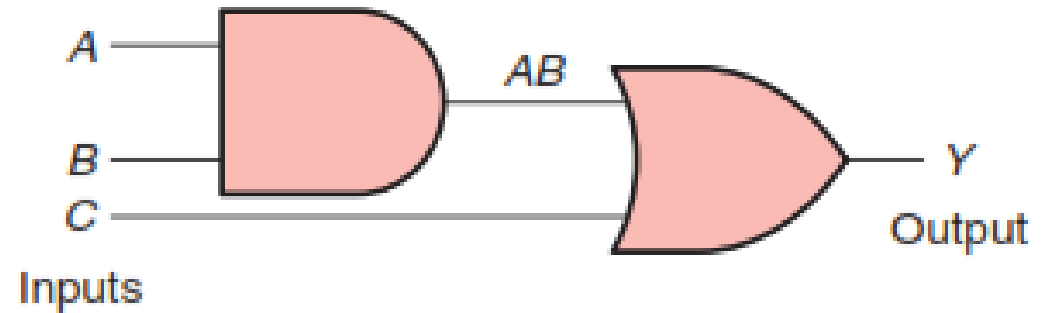


**Example 5** Two limit switches connected in series with each other and in parallel with a third limit switch, and used to control a warning horn.

Relay schematic



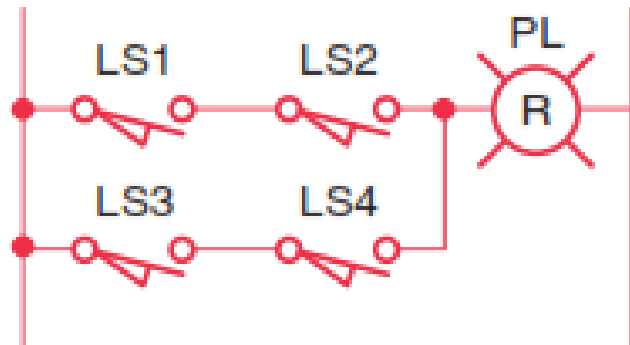
Gate logic



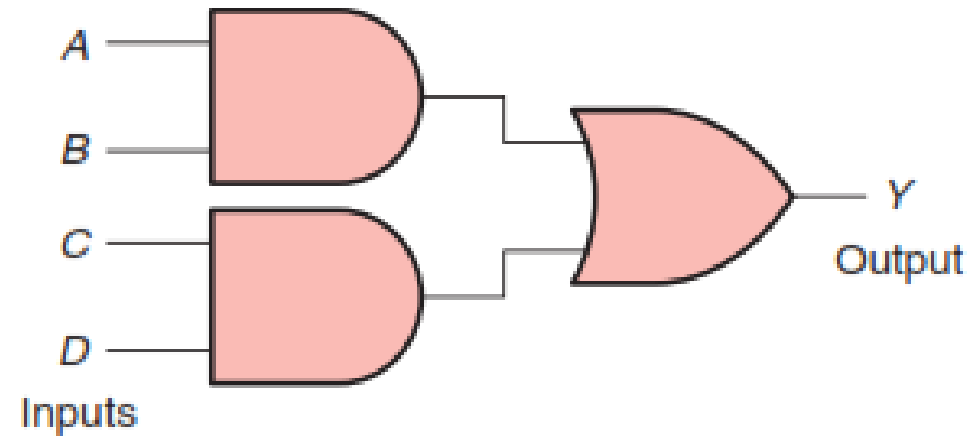
Boolean equation:  $(AB) + C = Y$

**Example 6** Two limit switches connected in series with each other and in parallel with two other limit switches (that are connected in series with each other), and used to control a pilot light.

Relay schematic



Gate logic

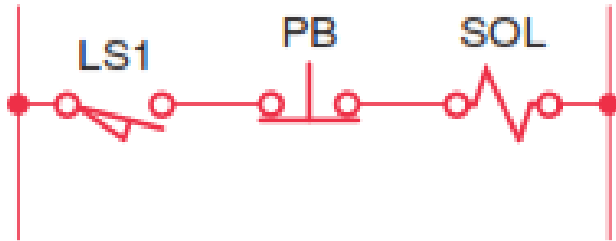


Boolean equation:  $(AB) + (CD) = Y$

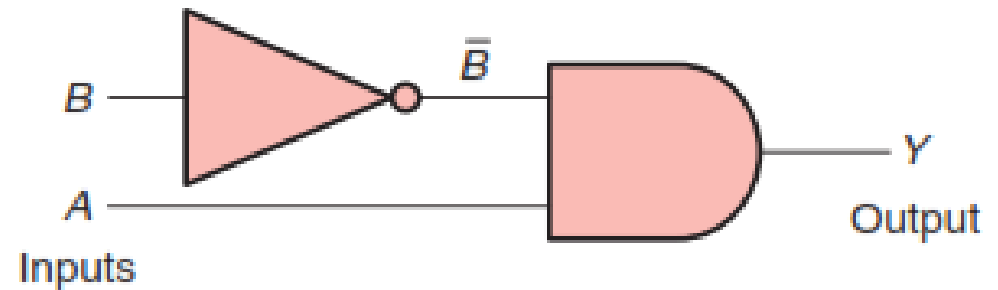


**Example 7** One limit switch connected in series with a normally closed pushbutton and used to control a solenoid valve. This circuit is programmed so that the output solenoid will be turned on when the limit switch is closed and the pushbutton is not pushed.

Relay schematic

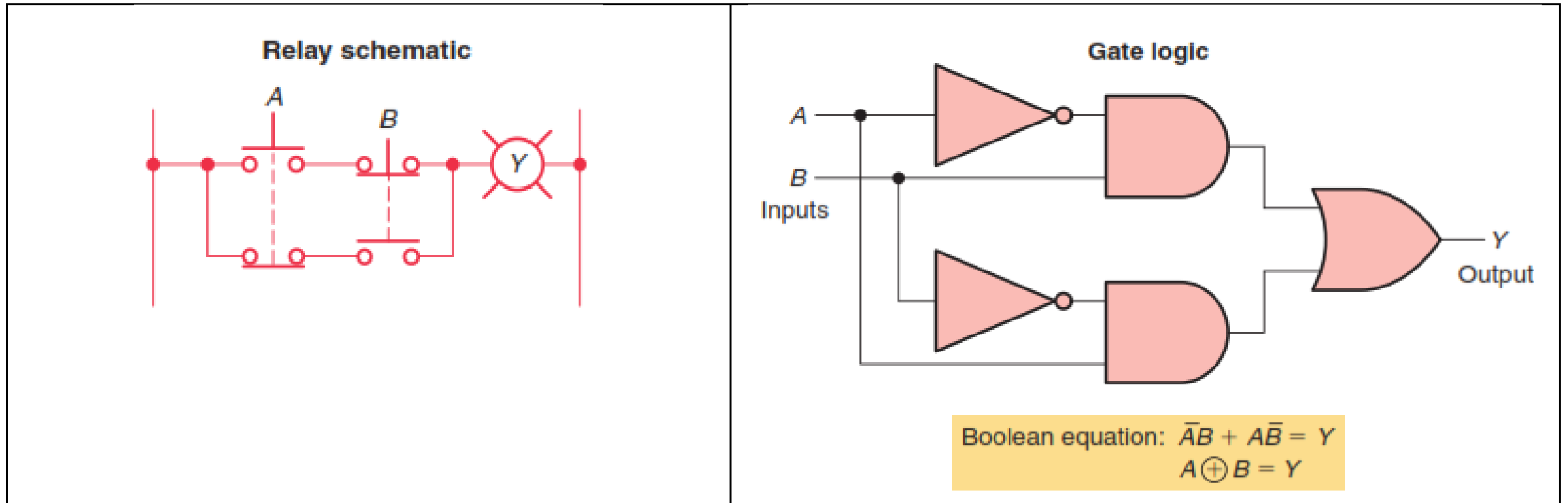


Gate logic



Boolean equation:  $A\bar{B} = Y$

**Example 8** Exclusive-OR circuit. The output lamp of this circuit is ON only when pushbutton A or B is pressed, but not both. This circuit has been programmed using only the normally open A and B pushbutton contacts as the inputs to the program.



**Example 9** A motor control circuit with two start/stop buttons. When either start button is depressed, the motor runs. By use of a seal-in contact, it continues to run when the start button is released. Either stop button stops the motor when it is depressed.

