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1. Objective

This lab comprises of several exercises of both pure pneumatics and electro-pneumatics system. The Instructor will brief the students about the fluid power circuits and demonstrates the circuit assembly. Then students are to practice them on the bench. This will enable students to understand about the function of the fluid power components. Finally relate to the circuit drawings with the practical components assembly.

2. Exercises

Exercise 1.

Draw the symbols and describe the functions of these components. You also need to label the signal ports of the components.

Num.	Component
1	Single Acting Cylinder
2	Double Acting Cylinder
3	5/2 Way Valve double pilot
4	5/2 Way Valve single pilot
5	3/2 way valve normally open
6	3/2 way valve normally close
7	Shuttle valve
8	Two pressure valve
9	Time delay valve
10	Pressure Sequence Valve
11	Filter-Regulator-Lubricator
12	5/2 Way Valve With Double Solenoid
13	5/2 Way Valve With Single Solenoid
14	Relay Timer
15	Pressure Switch
16	Limit Switch
17	Limit Valve

Exercise 2

Assemble the pure pneumatics circuit listed below.

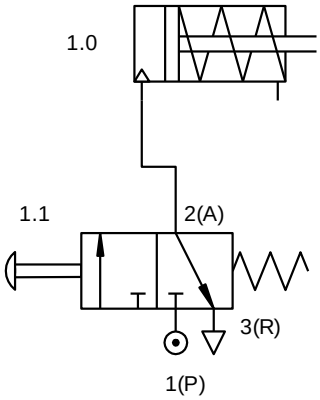

Figure 1

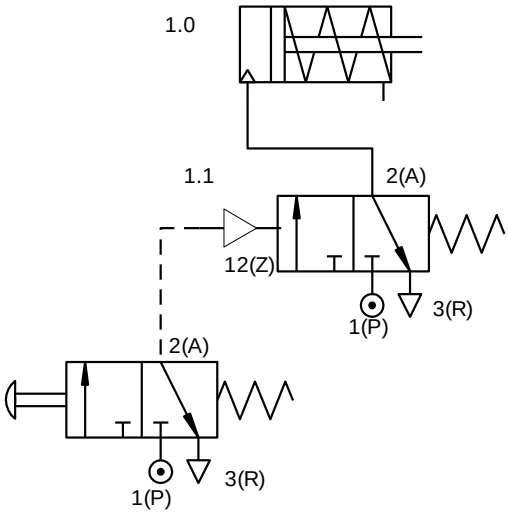

Figure 2

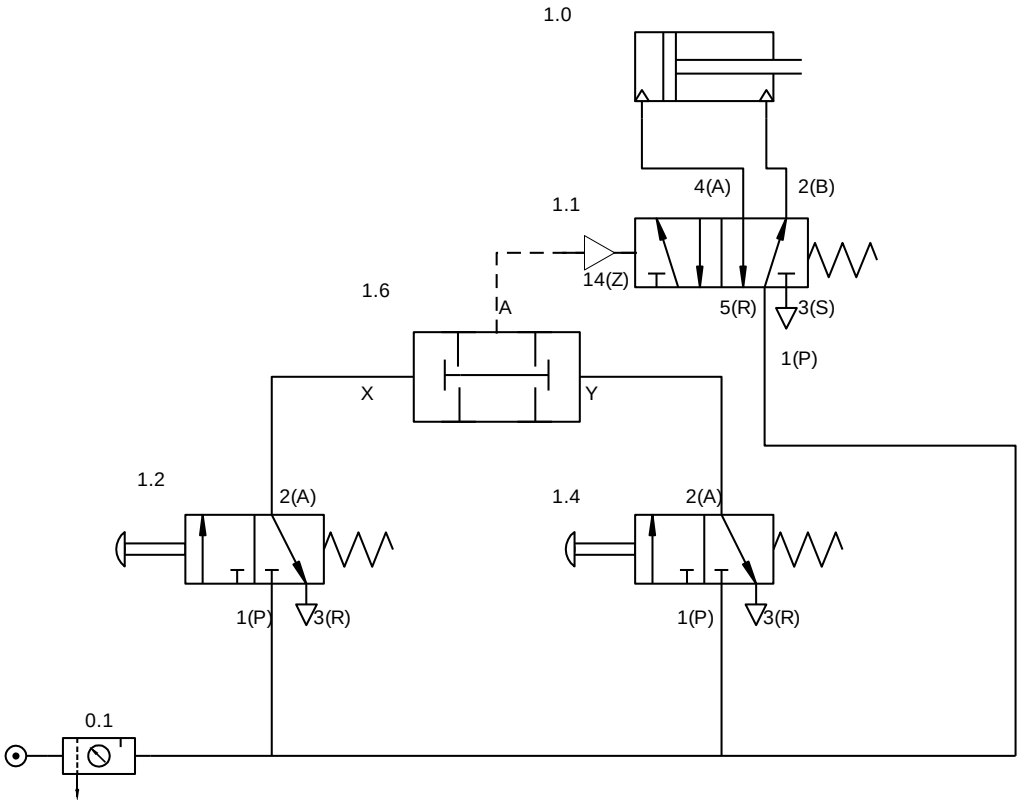

Figure 3

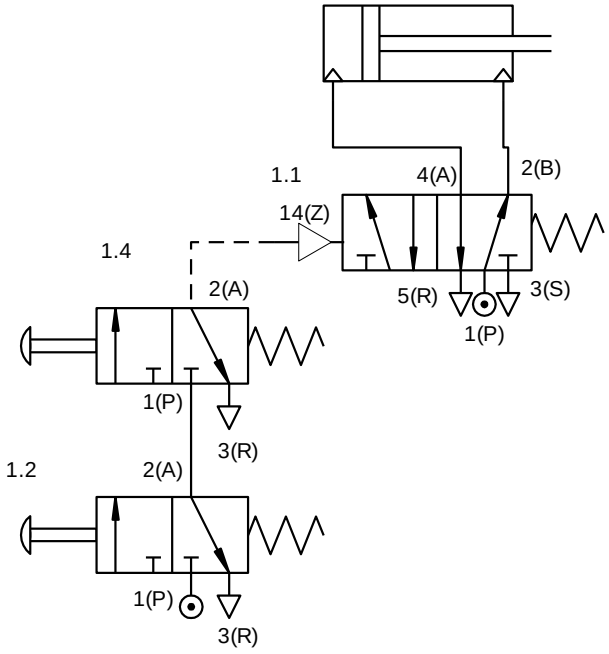

Figure 4

Note that Figure 4 shows an alternative if the two pressures valve is un-available.

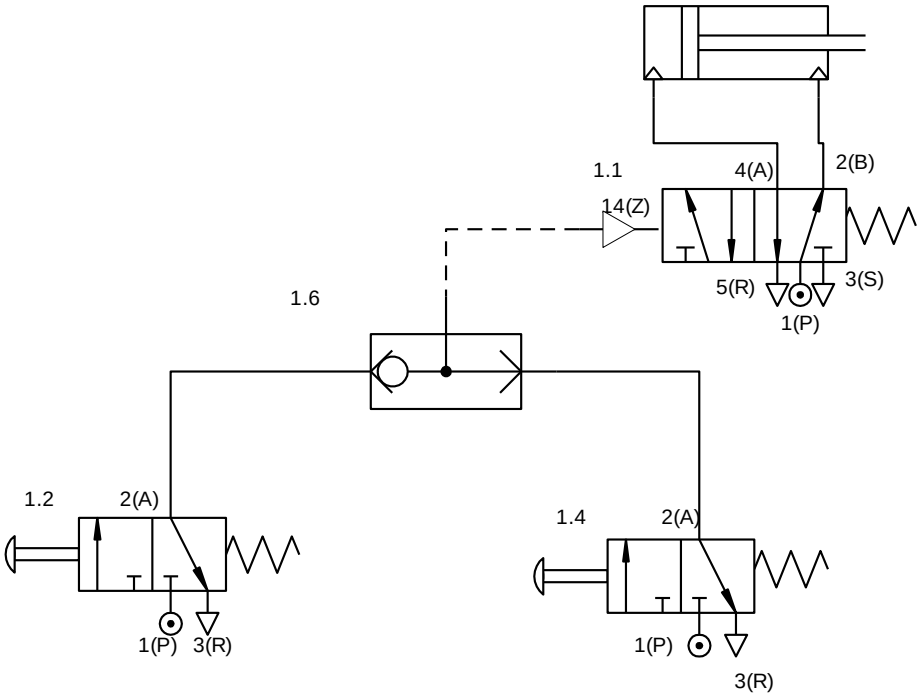

Figure 5

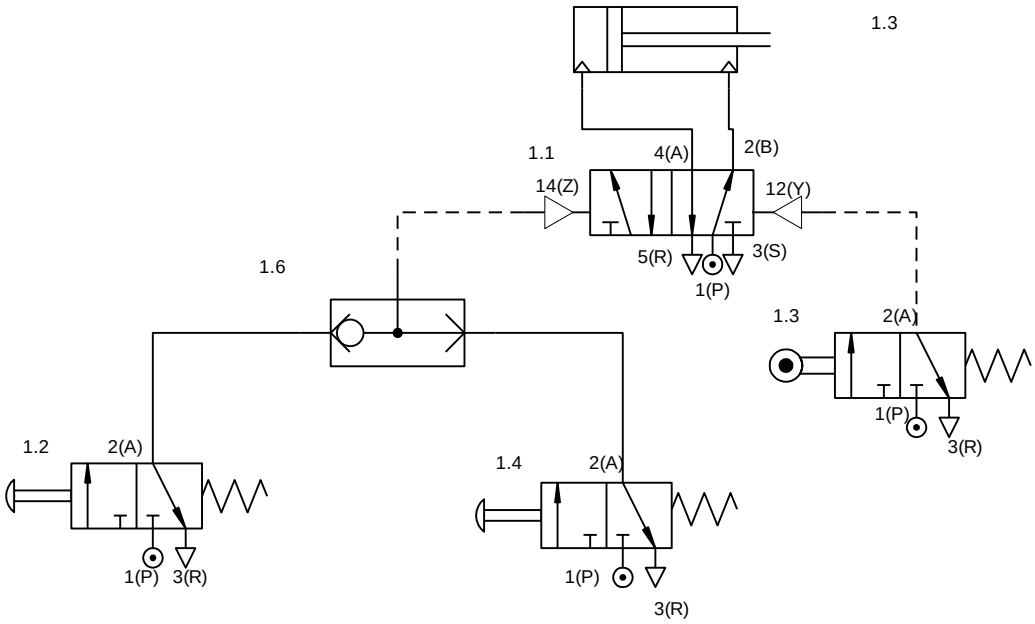

Figure 6

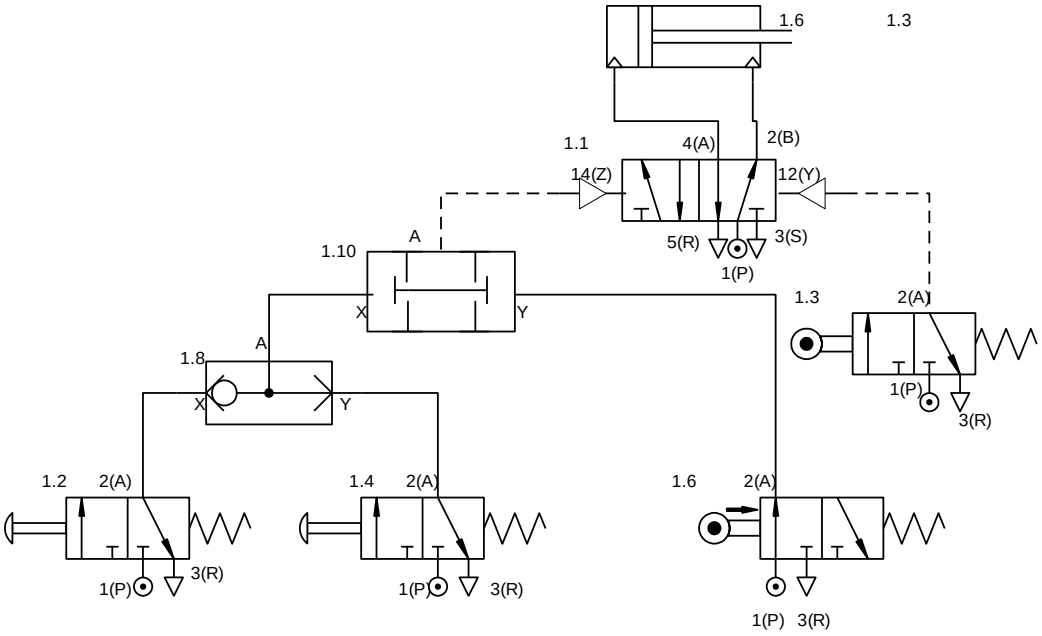

Figure 7

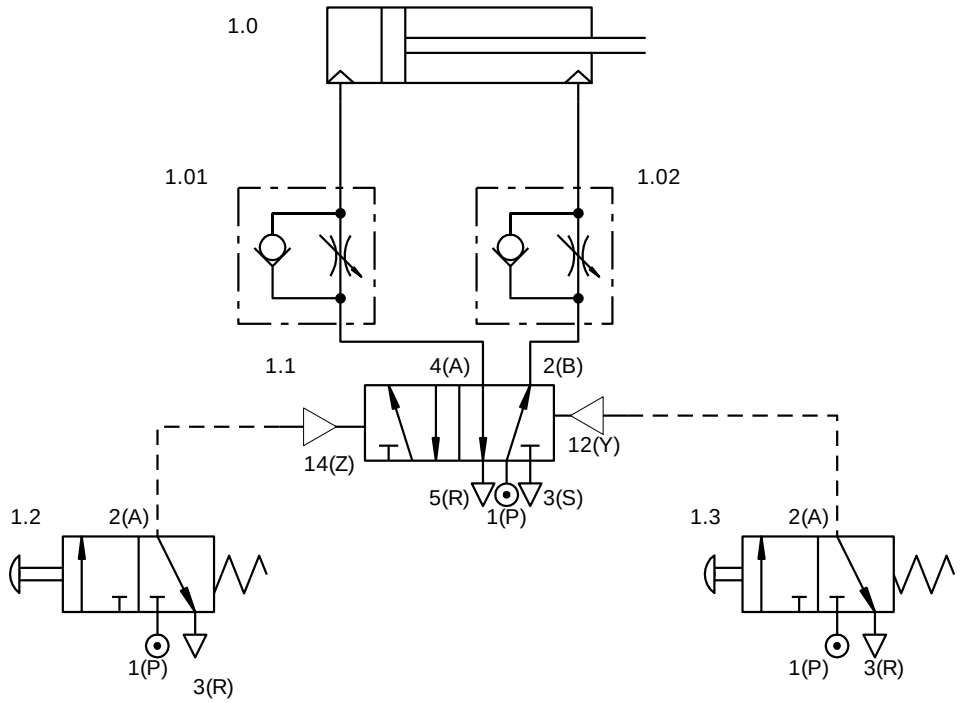

Figure 8

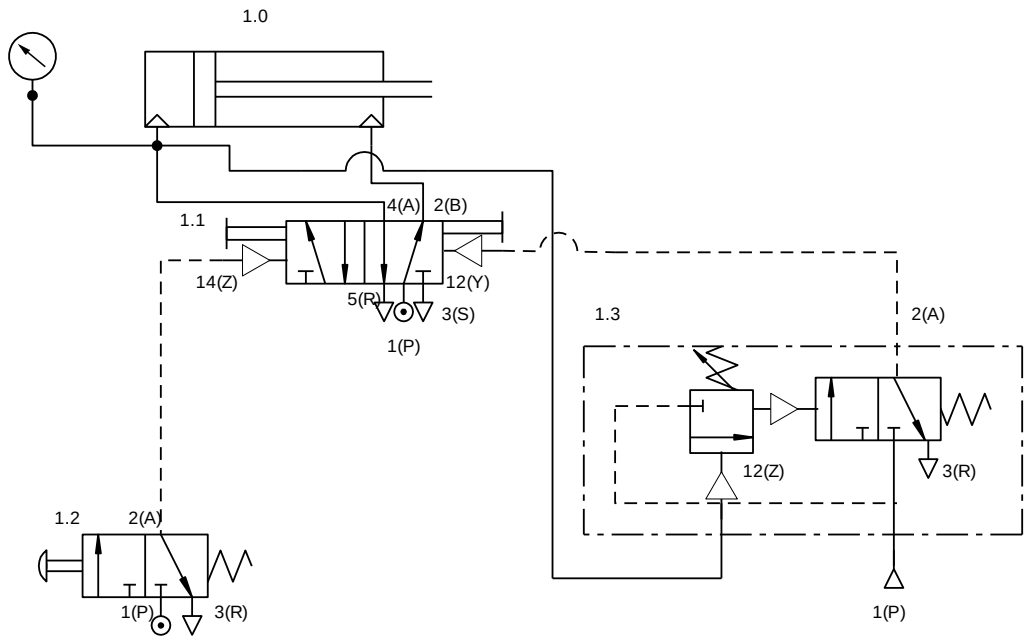

Figure 9

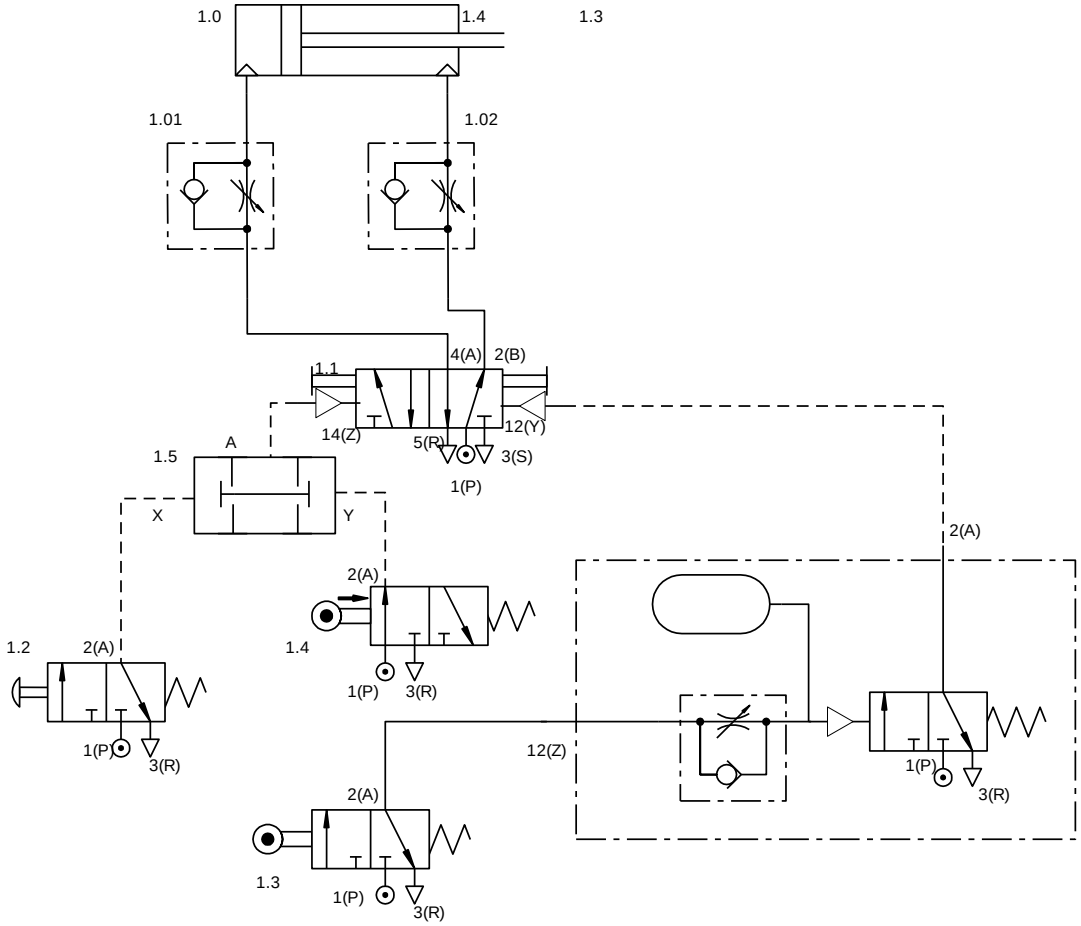

Figure10

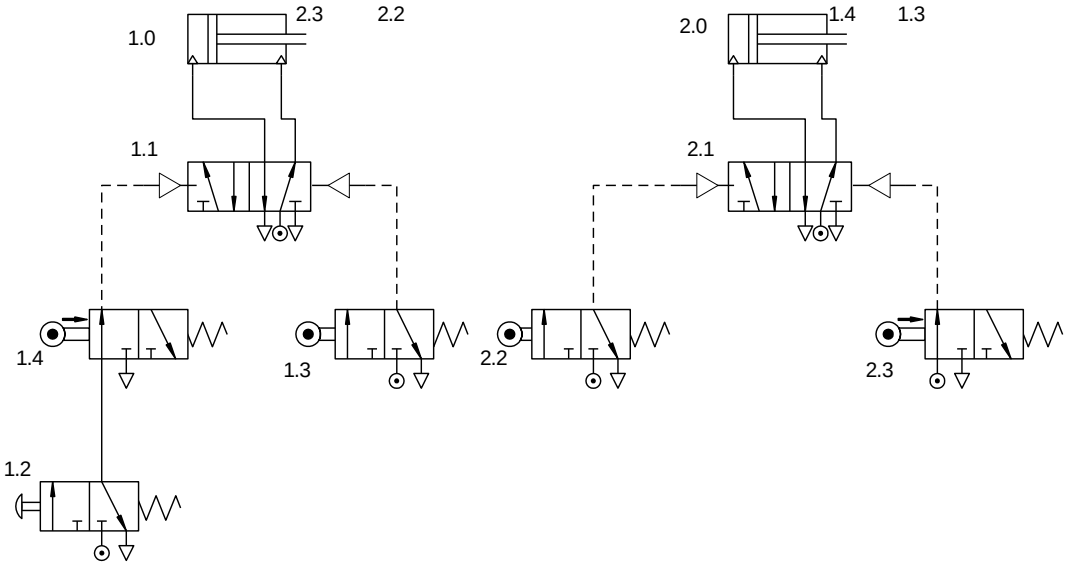

Figure 11

Exercise 3.

Assemble the electrical circuit as shown in Figure 12 (a) and (b) and explain how solenoid 1Y1 is energised?

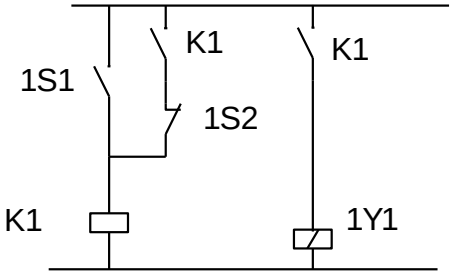

Figure 12 (a)

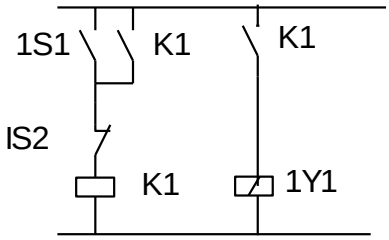

Figure 12 (b)

Further, assemble the electrical circuit to perform the AND and OR logics for energising the solenoid 1Y1 as shown in Figure 13 (a) and (b). Explain how does it work.

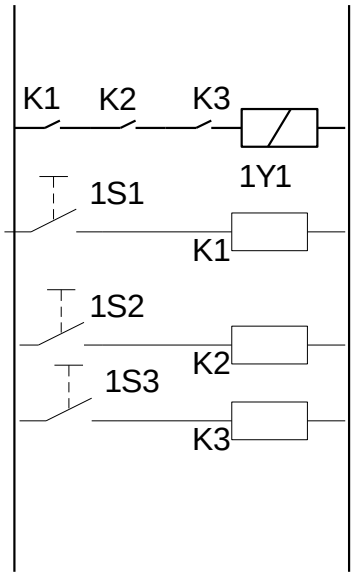

Figure 13 (a)

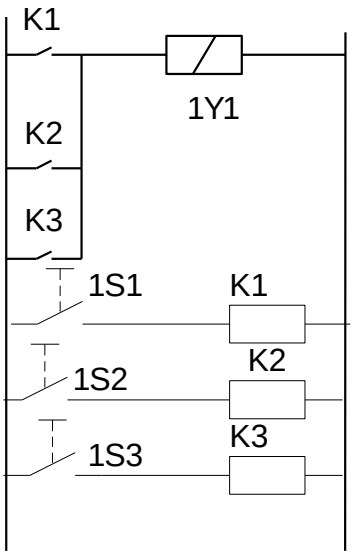

Figure 13 (b)

Figure 14 (a) and (b) shows a pneumatics circuit that are controlled by the single and double solenoid DCV respectively.

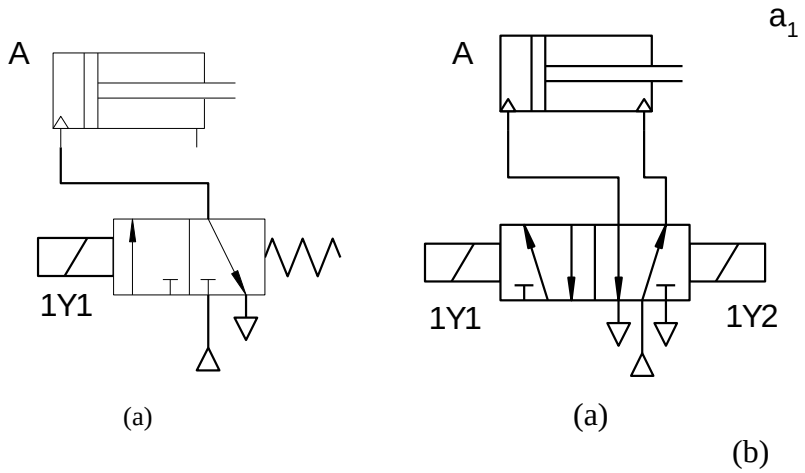

Figure 14

According to Figure 14 (a), assemble the electrical wiring to function the cylinder based on the ladder diagram shown below.

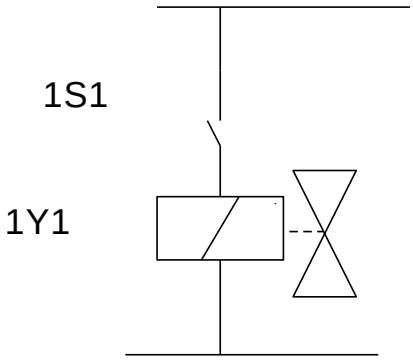

Figure 15

Further, assemble the electrical wiring to function the cylinder shown in Figure 14 (b) based on the ladder diagram shown below.

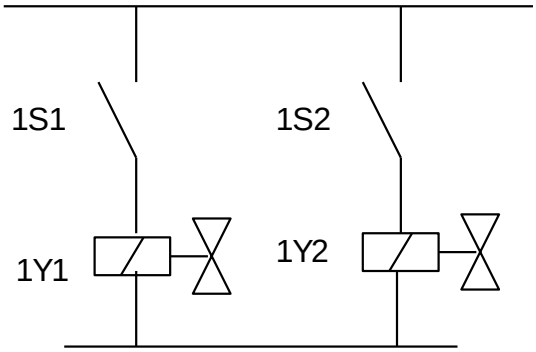

Figure 16

Then replace switch 1S2 with the limit switch a_1 as shown in Figure 17 below.

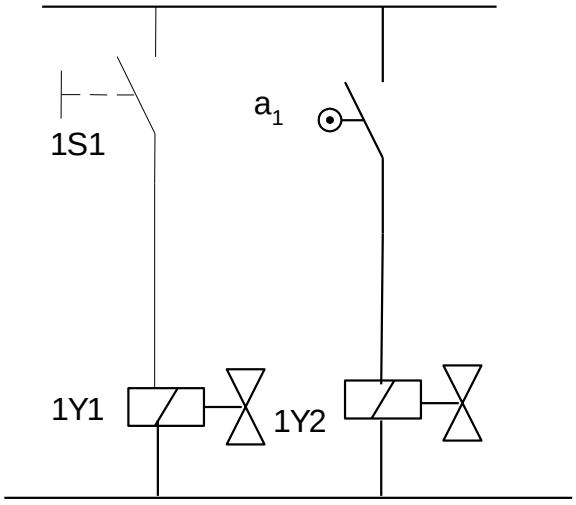

Figure 17

Introduce the Relay timer, K1 in the ladder diagram shown in Figure 17. This is as shown in Figure 18.

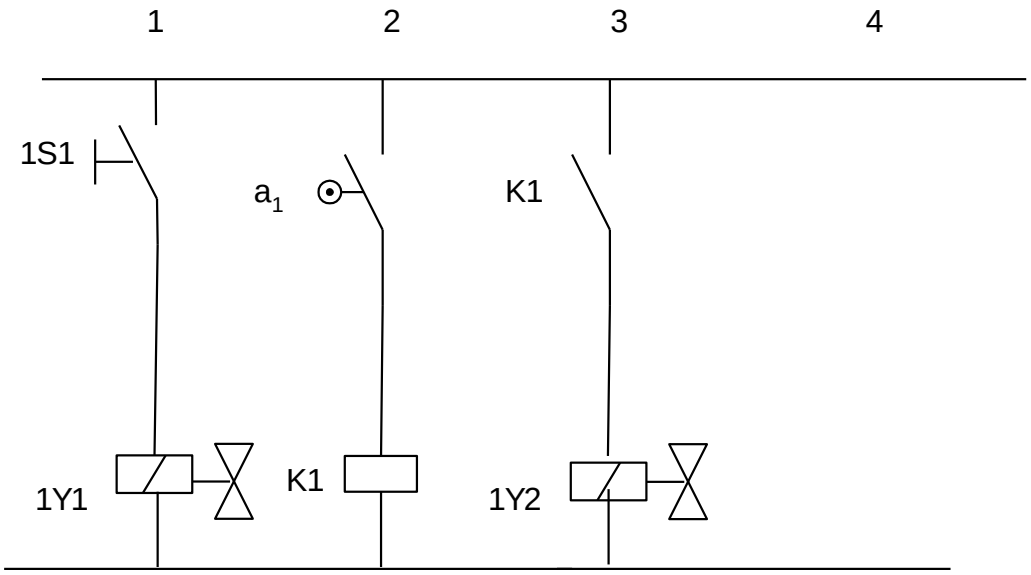

Figure 18

You can adjust the time delay by turning the knob. The time adjustment is in seconds.

Moreover, replace the relay timer, K1 with the pressure switch as shown in Figure 19. Note that, the cylinder is stall at the fully extend if the air supply pressure is less than the switch pressure.

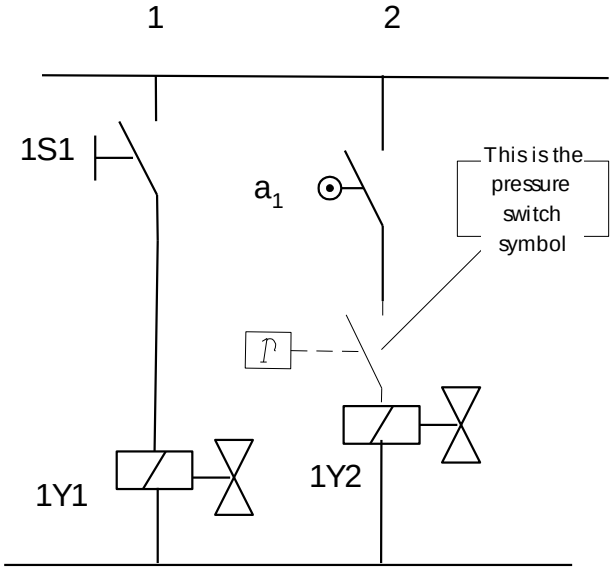

Figure 19

Finally, assemble the wiring for a ladder diagram shown in Figure 20. Relays K1 and K2 are used in this case.

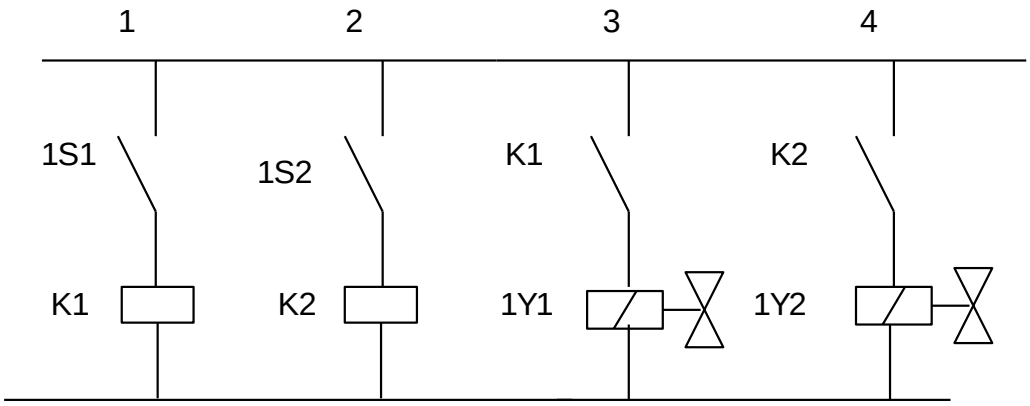

Figure 20

Exercise 4.

1. 1. Construct a pure pneumatics and electro-pneumatics circuit for actuating a double acting cylinder in the automatic mode. You are suggested to demonstrate them on bench.
2. 2. Explain briefly, where should we use the components listed below in Industry.
    a. a. Shuttle valve and two pressures valve.
    b. b. Time delay valve/relay.
    c. c. Pressure sequence valve/pressure switch.
3. 3. What are the significance of the relay interlocking circuit in the electro-pneumatics and electro-hydraulics circuit?

Lab Report.

Write the answer for exercise 1, 2,3 and 4 in your lab report.