Control Systems Lab

Program: Electrician Technician

Course: EL150 Commercial Applications

Objectives: Under the supervision of your instructor, you should be able to do the following:

- Install a time delay relay working multiple lights (or motors).
- Interpret the ladder logic diagram.
- Wire the ladder logic diagram to produce the desired results.
- Energize and De-energize the ladder diagram.
- Adjust the timer Relay for the desired number of seconds ON delay.
- Adjust the timer Relay for the desired number of seconds OFF delay.

Lab Equipment:

- 2 X 16” Plywood Lab Board

Required Tools:

- 1 – Pair of strippers
- 1 – Phillips screwdriver
- 1 - Flat head screwdriver

Materials:

- 1 – 8 Pin time delay socket
- 1 – 8 Pin time delay relay
- 1 – Terminal strip
- 1 – 6’ Power cord
- 3 – 4S Boxes (no brackets)
- 2 – 3/0 Round ring covers
- 5 – 1/2” Single gang ring covers
- 1 – 3 Phase motor
- 1 – Toggle switch
- 2 – Keyless fixtures
- 2 – Light bulbs
- 2 – 1/2” Plastic bushings

Safety (PPE):

- Safety glasses/goggles

Resources: N/A

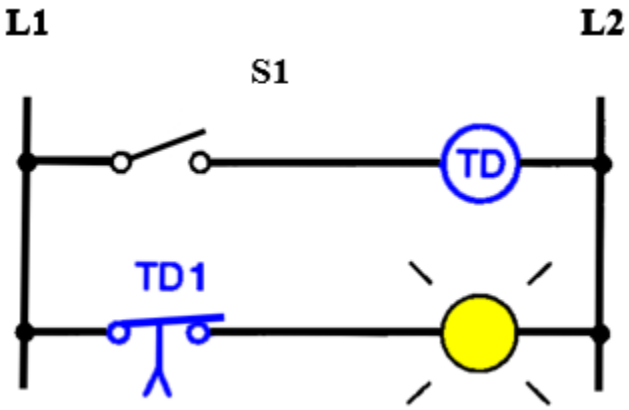
Required Time: One Day

Shop Maintenance:

- All work will cease 20 minutes prior to the end of class.
- All work areas must be cleaned.
- Tools and equipment must be cleaned and returned to the designated areas (cage, tool room, cabinets etc.)
- Any broken or missing tools must be reported immediately.
- Tools and equipment are students' responsibility

Procedures: *(Eye protection must always be worn)*

Step1: Write a documented program using at least two rungs that will simulate the on-delay relay timer using schematic diagram provided.

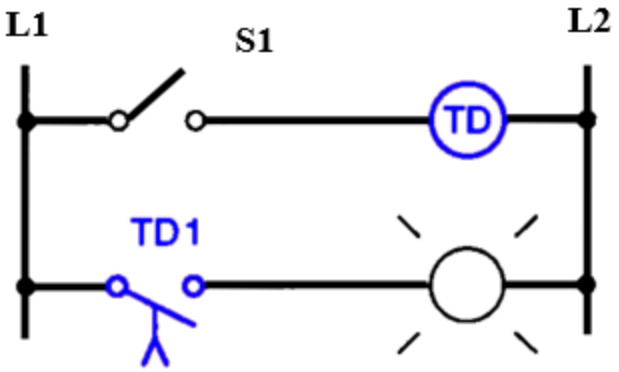


- S1 open, TD de-energizes, TD1 closed, L1 on.
- S1 closes, TD energizes timing period starts, TD1 is still closed, L1 is still on.
- After 10 s, TD1 opens, L1 is switched off.
- S1 is opened. TD de-energizes, timing period starts, TD1 closes instantly, L1 is switched on.

Step2: Write a documented program that will simulate the off-delay relay timer using the schematic provided. Use TD1 as normally open switch for timer off- delay.

Sequence of operation

- S1 open, TD de-energized, TD1 open, L1 off,
- S1 closes, TD energizes, and TD1 closes instantly, L1 is switched on.
- S1 is opened, TD de-energizes, and timing period starts, TD1 is still closed, L1 is still on.
- After 10s, TD1 opens, L1 is switched off.



Step3:

1. Provide power in the 4S box with the switch (box #1).
2. Install one bushing connector, on the side of box #1, closest to the terminal strip.
3. Install one bushing connector in each of the remaining two boxes, (box #2 & #3) on the side closest to the terminal strip.
4. Run a black (hot) and a neutral (white) wire from the switch to the terminal strip, follow the diagram.
5. Install the switch, using the 1 gang mud ring, in box #1.
6. Tie off the neutrals, ground the box with the pigtail ground, and install the two blacks on the switch.
7. Run one black and one white, each from box #2 and box #3, the blacks to the timer (terminal #3 & #4) and the whites to the terminal strip, follow the diagram.
8. Install a keyless fixture on each of the remaining boxes, using the 3/0 mud rings, and install light bulbs.
9. Terminate both white wires from the lights on the terminal strip.
10. Terminate the white wire from the switch to the opposite side of the white wires from the lights.
11. Run a white wire from the same screw as the white wire from the switch on the terminal strip, to terminal #7 of the timer.
12. Terminate the black wire from the switch on one screw of the terminal strip.
13. Run two separate black wires from terminal #1 and terminal #2 of the timer to the terminal opposite of the screw from the black wire coming from the switch.
14. Terminate the black wire from box #2 to terminal #3 of the timer. (Use the schematic attached)
15. Terminate the black wire from box #3 to terminal #4 of the timer.
16. Apply power and test.