Construct a Time-Delay Motor Control for Multiple Motors

Program: Electrician Technician

Course: EL170 – Motor and Industrial Motor Controls

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

- Select and install solid-state relays for specific applications in motor control circuits.
- Select and install electromechanical and solid-state timing relays for specific applications in motor control circuits.
- Demonstrate and/or describe the special precautions used when handling and working with solid-state motor controls.
- Identify and connect various control devices.

Lab Equipment:

- 1 – Momentary-contact Stop-Start Station
- 1 – 8-pin time-delay relay (0-1 min or less) with 24V coil
- 1 – 8-pin relay base
- 2 – Size 0 or 00 (or whatever size available) magnetic starters with 24V coils
- 1 – 120V/24V isolation control transformer (minimal VA rating) with 120V pigtail to energize transformer

Required Tools:

- 1 – Screwdriver set
- 1 – Pair of Wire cutters
- 1 – Pair of Wire strippers
- 1 – Pair of Lineman pliers
- 1 – Digital multimeter

Materials:

- 5 - 14 AWG THHN red
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- 6 - Sheet metal or wood screws f

Safety (PPE):

- **Safety Glasses**

Resources: N/A

Instructor Notes:

- You may alter this project as needed based on component availability but stay as close to the original project as possible.
- You may use a 24-volt power supply in lieu of the transformer.
- Connections to 120-volt supply must be performed in the presence of your instructor.
- All circuit connections (except for the power supply pigtail) must be made on the low voltage (24V) secondary side of the transformer.

- Refer to the modules listed in the reference materials to familiarize yourself with the terminals on a magnetic starter and Stop-Start Station.
- No wiring connections are made to L1, L2, and L3, or T1, T2, or T3 on either starter. You are only wiring the controls circuit, not the power or motor leads.
- Do not energize the circuit until all wiring has been completed by you and approved by your instructor.

Time Required: 180 Minutes

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 student's responsibility.

Procedures: (Eye protection must always be worn)

This performance project requires the trainee to install and wire all the components needed to create three-wire multiple motor controls, incorporating a time-delay relay to energize the second magnetic starter.

1. Refer to Figure 1 to identify and mount components to the project board. Mount the components.
2. Refer to Figure 2 wiring schematic for wiring the project.
3. Use the white wire for all X2 connections.
4. Have your instructor check your wiring before energizing the circuit.
5. Set your timing relay for a delay of approximately 20 seconds.
6. Put on your safety glasses.
7. Energize your circuit and check for the presence of 24VAC. Treat all energized circuit testing as if dangerous voltage levels are present.
8. Press the Start button. Magnetic Starter "A" should immediately pull in and 20 seconds later Magnetic Starter "B" should pull in.
9. Press the Stop button and both starters should drop out.
10. If the circuit does not function properly, you may troubleshoot the circuit in the energized state, as long as all testing is performed on the 24-volt side of the transformer or power supply and your safety glasses are worn.

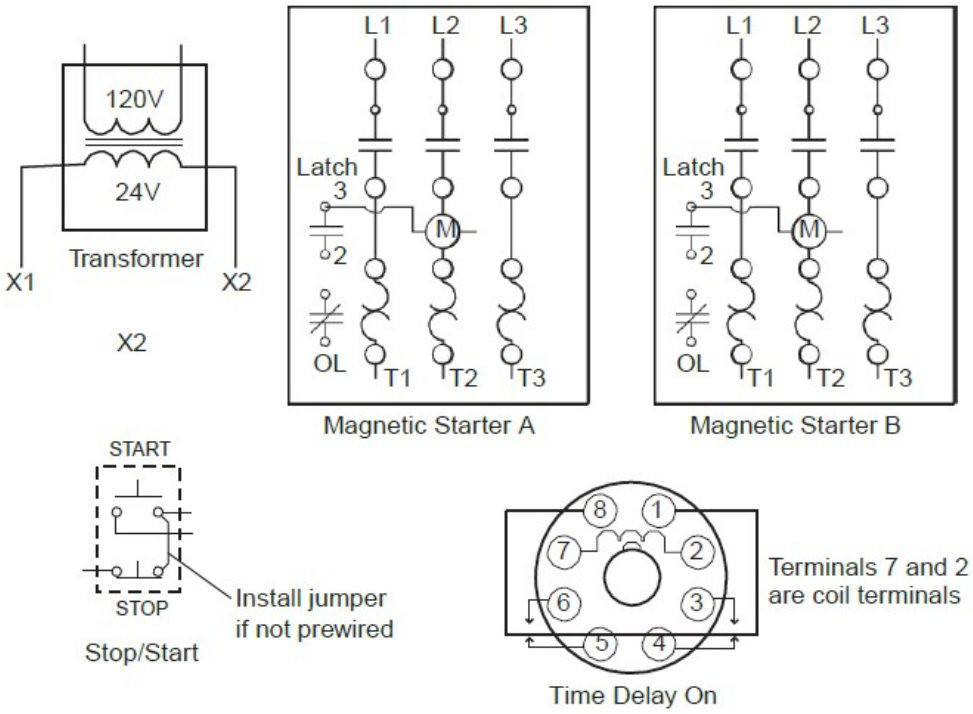

Figure 1 ■ Component Identification and Layout

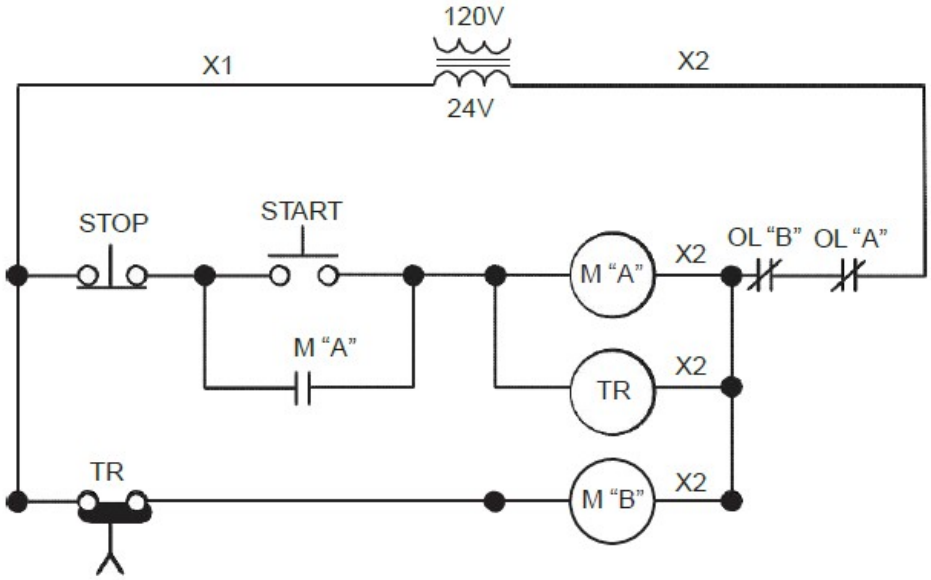

Figure 2 ■ Wiring Schematic