

Laboratory Application Assignment

In this lab application assignment you will learn how mechanical switches can be used to control or change the voltage and current in a circuit. This lab application assignment is different from the others in that you will not be given any schematic diagrams. It is up to you to draw the circuit diagram with the proper circuit connections based on the criteria specified.

Equipment: Obtain the following components from your instructor.

- Dual-output variable DC power supply
- Two 12-V incandescent lamps
- SPST, SPDT and DPDT switches
- DMM
- 24-V_{DC} motor

Switching Circuits

1. In the space provided below, or on a separate sheet of paper, draw a schematic diagram showing how to use an SPDT switch to connect a 12-V incandescent lamp to either a 6-V or 12-V power supply. The brilliance of the bulb will be either dim or bright depending on the position of the switch. Build the circuit you have drawn, and verify that it functions properly. Have an instructor check your circuit.
2. In the space provided below, or on a separate sheet of paper, draw a schematic diagram showing how to use a DPDT switch to connect two 12-V incandescent lamps either in series or in parallel with a 12-V_{DC} power supply. The series or parallel connections must be controlled by the position of the switch. For one position, the 12-V incandescent lamps must be in series with the DC power supply. In this position, the lamps will be dim because each bulb will receive only 6 V. In the other position, the lamps must be in parallel with the DC power supply. In this position the bulbs will be much brighter because the full 12 V is across each bulb. Build the

circuit you have drawn, and verify that it functions properly. Have an instructor check your circuit.

3. With the switches and DC voltage sources shown in Fig. 11-24, draw a schematic diagram that will control both the speed and direction of a 24-V_{DC} motor. Use the SPST switch to control whether the motor is on or off. The speed of the motor should be controlled using the SPDT switch and have two settings, **low** and **high**. (The speed is determined by which voltage source is applied to the motor.) The direction of rotation is determined by the polarity of the voltage across the motor and should be controlled using the DPDT switch. When you have completed drawing the schematic diagram, construct the circuit and demonstrate its operation to an instructor.

Figure 11-24

