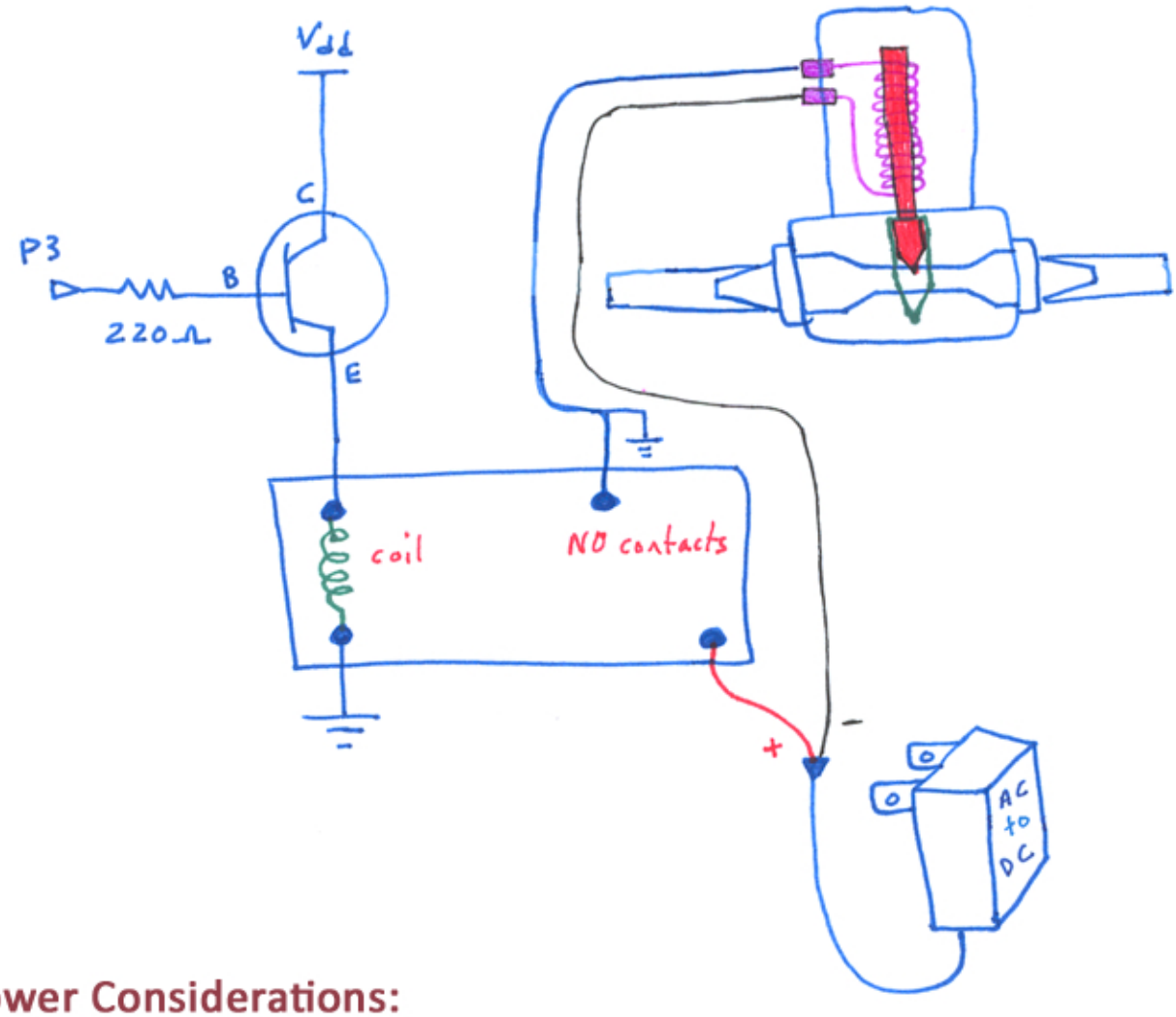
Cascaded Switching of a Solenoid Valve

A solenoid valve is a valve that can be opened and closed using electricity. The valve has a built-in electromagnet that causes a plunger to slide, causing the valve to either open (when the electromagnet is energized) or close (when the electromagnet is not energized).

We will use a transistor to switch a relay which will energize the solenoid valve - see the diagram below.



Power Considerations:

① Power to switch TRANSISTOR

Source : pin 3

Max power that can be sourced through a single boe-bot pin : 20 mA

② Power to switch RELAY

Source: V_{dd} which is provided by the voltage regulator on the board of education.

Max output of the voltage regulator: 1A

Power required to switch relay: 40mA

the voltage regulator can put out plenty

③ power to activate SOLENOID VALVE

Source: 12 VDC wall power supply

Max output of power supply: 1A

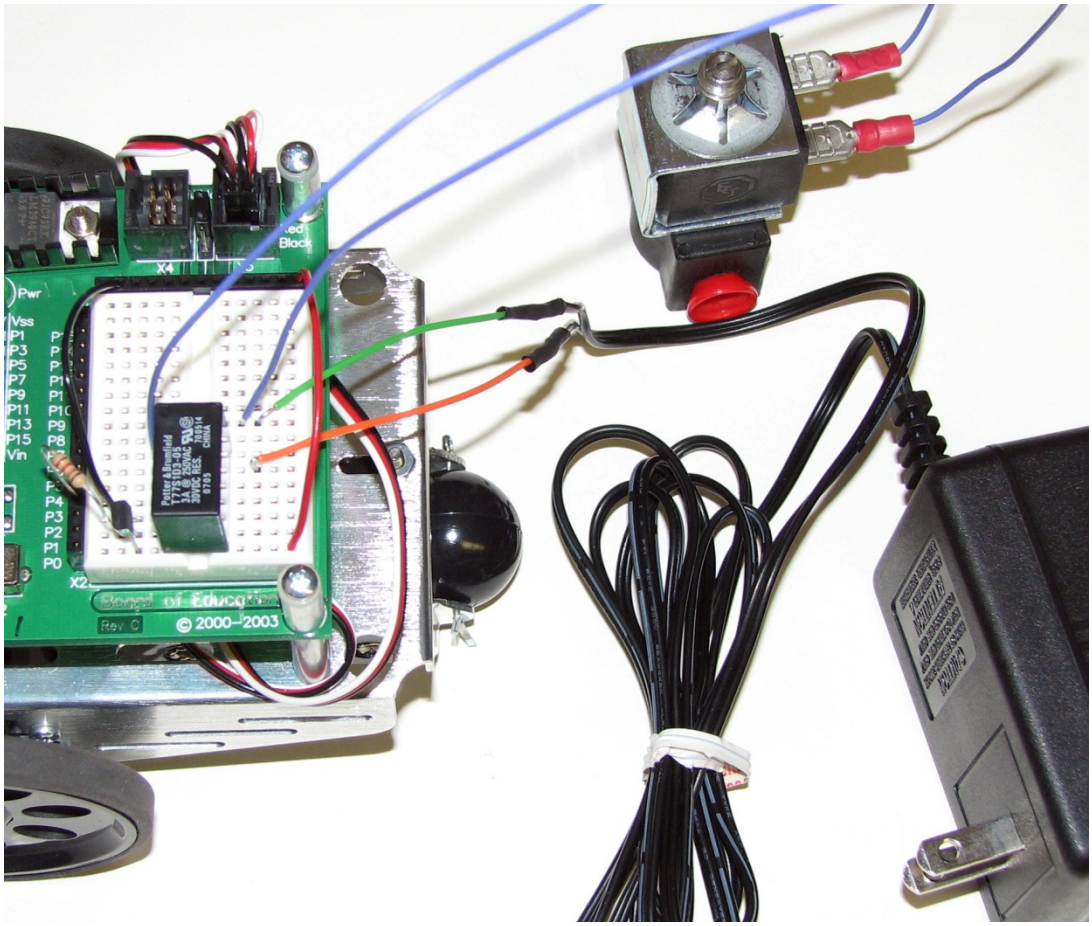
requirements of solenoid valve: 0.5A

wall power supply can cover the requirements

Implementation of a Cascaded Switching

TEAMS OF 2: Implement the cascaded switching circuit to control the solenoid valve. Start by having the transistor power the coil of the relay, and then add the AC to DC power supply to activate the valve. Have the solenoid valve (and relay) come on for 0.5 seconds and stay off for 1.5 seconds repeatedly. Show your instructor when you are finished.

The picture below is provided for reference only. Look at the *WIRING DIAGRAM* shown earlier to complete the circuit.



Example PBASIC program for switching the transistor, relay and solenoid valve.

```
' {$STAMP BS2}
' {$PBASIC 2.5}
DO
   HIGH 3
   PAUSE 500
   LOW 3
   PAUSE 1500
LOOP
```