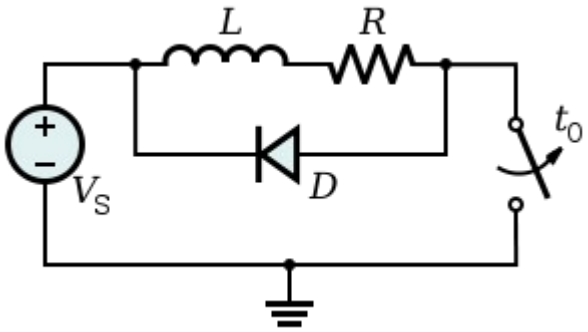
Flyback Diode

I ran into the need for a flyback diode when I connected a 12v solenoid to this controller for the first time, so I thought I would take a minute to explain the problem I encountered and what I did to correct it.

Problem: When running a sequence with nothing connected, the relays clicked away no problems. When I connected a 12v air solenoid to the number 1 relay (shared 12v with the microcontroller) I noticed that when the solenoid engaged for the first time everything worked- but when it went through the first on-to-off cycle, the microcontroller would reset.

What was happening: Since the solenoid is an inductive load (essentially a big coil), the on-to-off power cycle causes the electrical field to collapse over the coil, which in turn creates an induced power spike.

Solution: I added a 1n4007 diode at the relay contacts, similar to "D" in this diagram:



Were it a more permanent wiring job, I would place the diode as close as possible to the solenoid. After adding the 2 cent 1n4007, things worked great and the reset problem was completely solved. Also, from what I read, using a diode across inductive loads in this fashion will prolong the life span of your relay contacts. I certainly looks like 2 cents well spent.

The things to remember when using a diode like the one in the picture above:

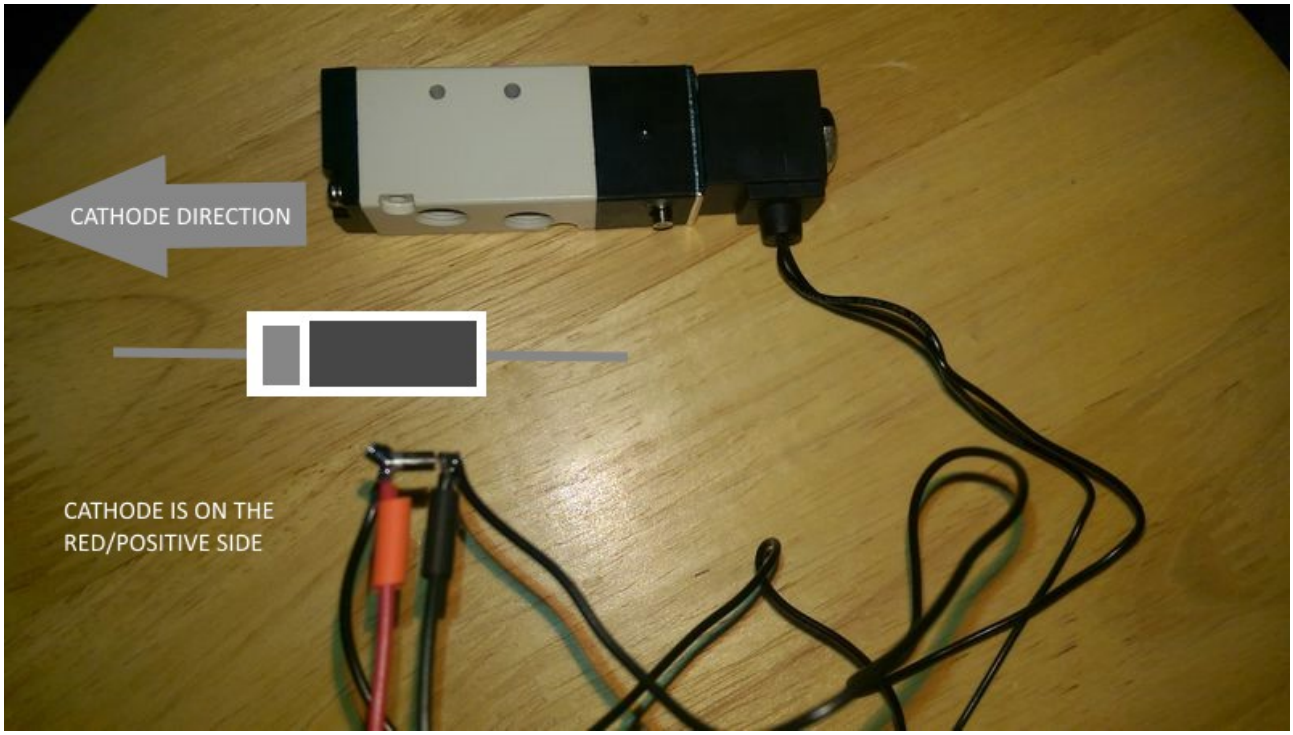
1) Orient the diode correctly!
2) Remember that you should have the +positive lead to the solenoid always connected, and switch the negative side with the relay

One last note, if I had used a separate adapter for the solenoid, added more power filtration between the adapter and the microcontroller, or used an A/C solenoid, I would likely have not had this issue. I just like the convenience of being able to run 12v solenoids and the microcontroller from a single adapter to keep the parts count down.

I just thought I would throw this out as a consideration if anyone ever encounters these symptoms.

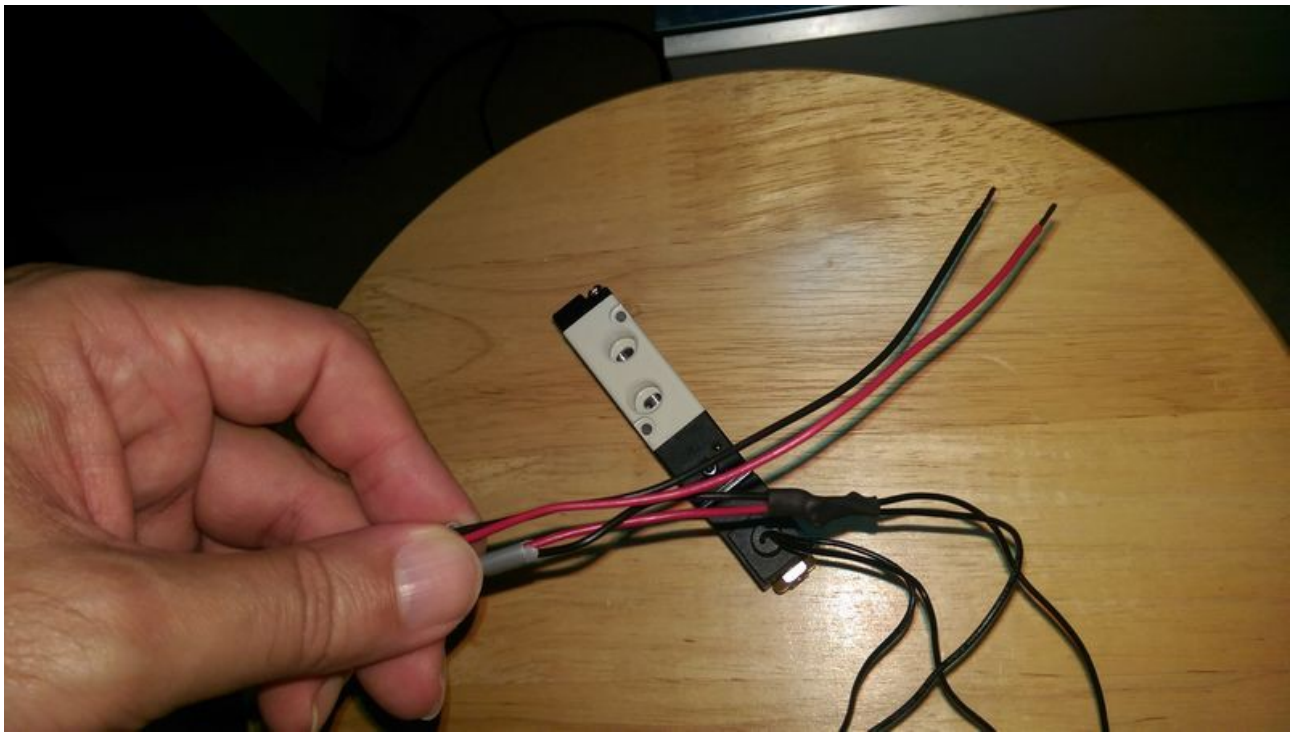
Adding a Flyback Diode to a 12vdc Solenoid

The 12v solenoid shown in the picture below will create a TON of noise/interference if a flyback diode is not installed. Here is an example of how I like to wire them:



The wires coming out of the solenoid are both black and may be hooked up either way.

After installing the diode, the polarity must match the red (positive) and black (negative) polarity.



I like to have the red wire connected to +12v continuously (always hot), then switch the black GND with the normally-open and common relay terminals.