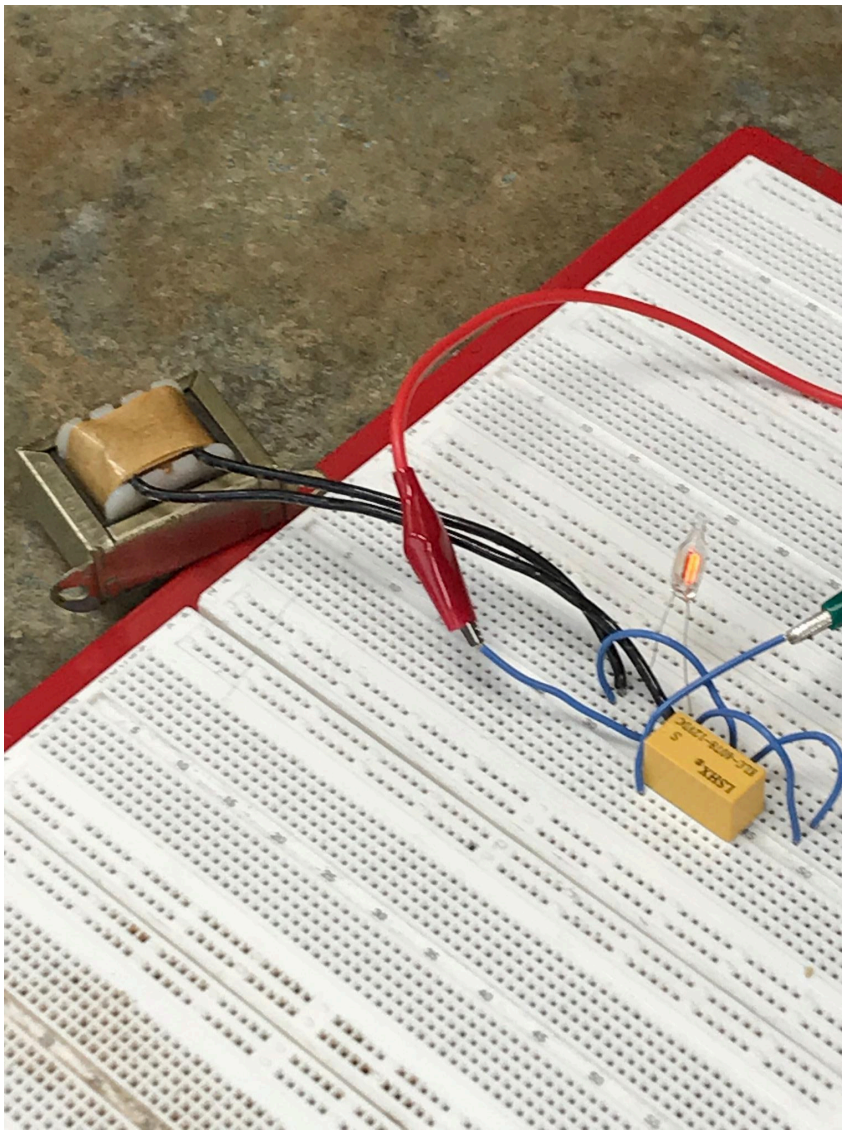
Experiment #36
Inductance:Level 1



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Objectives:

1. Observe the collapsing magnetic field surrounding an inductor.
2. Observe Faraday's Law.
3. Observe the operation of a neon gas tube.

Procedure:

We collected the materials needed as described by the book.

a. 0-20 Volt DC power supply
b. 4 to 7 Henry inductor
c. SPST switch
d. NE2 - Neon gas tube
e. 12 V DPDT relay
f. Various test leads

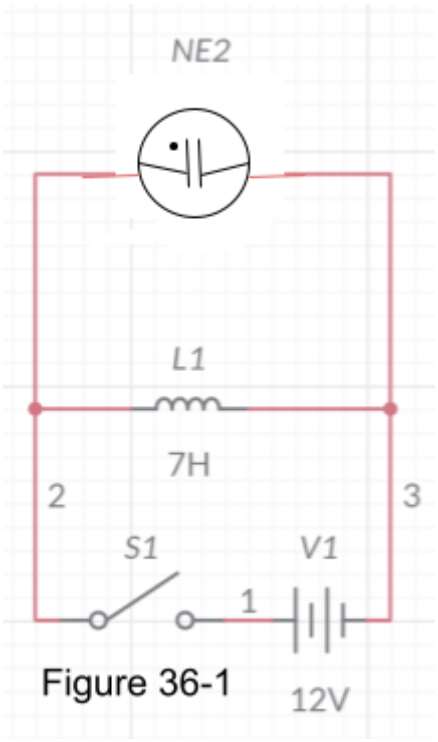

Figure 36-1

1. We constructed the circuit shown in figure 36-1 on our protoboard and in multisim to observe what happens in each.
2. We then closed the switch on S1 for 10 seconds and then opened it again. Knowing that the neon tube needs 70-75 v to even light up, we observed that after the 10 seconds with the switch closed the neon lamp would glow briefly after the sitch was opened. We hypothesize that the 70 volts needed to power the lamp was created when the switch was closed and the voltage climbed from 0v to 12v causing a magnetic field in the inductor. When the switch was opened, the inductor's field collapsed producing the 70 v to turn on the lamp. This means that we have observed Faraday's law, because Faraday's law talks about how voltage creates a magnetic field in inductors and how a collapsing magnetic field can create voltage.

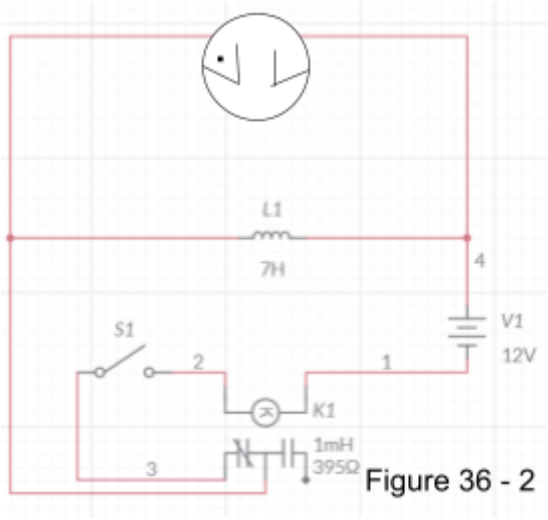

Figure 36 - 2

3. We then constructed the circuit in figure 36 - 2 on our proto board.
4. We closed the switch and observed that the neon lamp appeared to be permanently on. We hypothesized that what was happening is that the relay was switching on and off really fast. When the relay was closed, the inductor was absorbing the voltage from the battery and creating a magnetic field , but when the relay opened, the inductor's magnetic field would collapse causing a voltage to be produced and the neon light to be turned on.

Since the relay is opening and closing really fast, the inductor's magnetic field is collapsing and rebuilding really fast, making the neon lamp look as if it's on all the time.

Discussion:

Problem: In Multisim when constructing the circuits in figure 36-1 and 36-2 we could not find the neon lamp in multisim and nothing came up on google about where to find the neon lamp.
Troubleshooting: We asked Mr. B to look into finding out how to make a neon lamp in multisim.
Solution: The multisim data of our lab was no longer required, since making a neon lamp in multisim would be more work than it would be worth.

Conclusion:

1. We observed the collapsing magnetic field around an inductor in step 2 when we put 12 volts through a 6 Henry inductor in parallel with a neon lamp for 10 seconds. After the 10 seconds we cut the 12 volts to the circuit and observed the inductor's field collapse, and created enough voltage to power the neon lamp that needed at least 70 volts to turn on.
2. We observed how faraday's law works in step 2, where we observed how a collapsing magnetic field from a 6 H inductor could produce the 70 - 75v needed to light up a neon lamp because Faraday's law states that a collapsing magnetic field can create an induced voltage.
3. We observed the operation of a neon gas tube in step 4 when the neon lamp was turned on indicating at least 70 volts was going through the neon lamp. Because that is the point where the Neon gas tube activates