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RLC Resonant Amplifier Circuit (Receiving)

Project Started: July 5th, 2022
Project Ended: July 14th, 2022

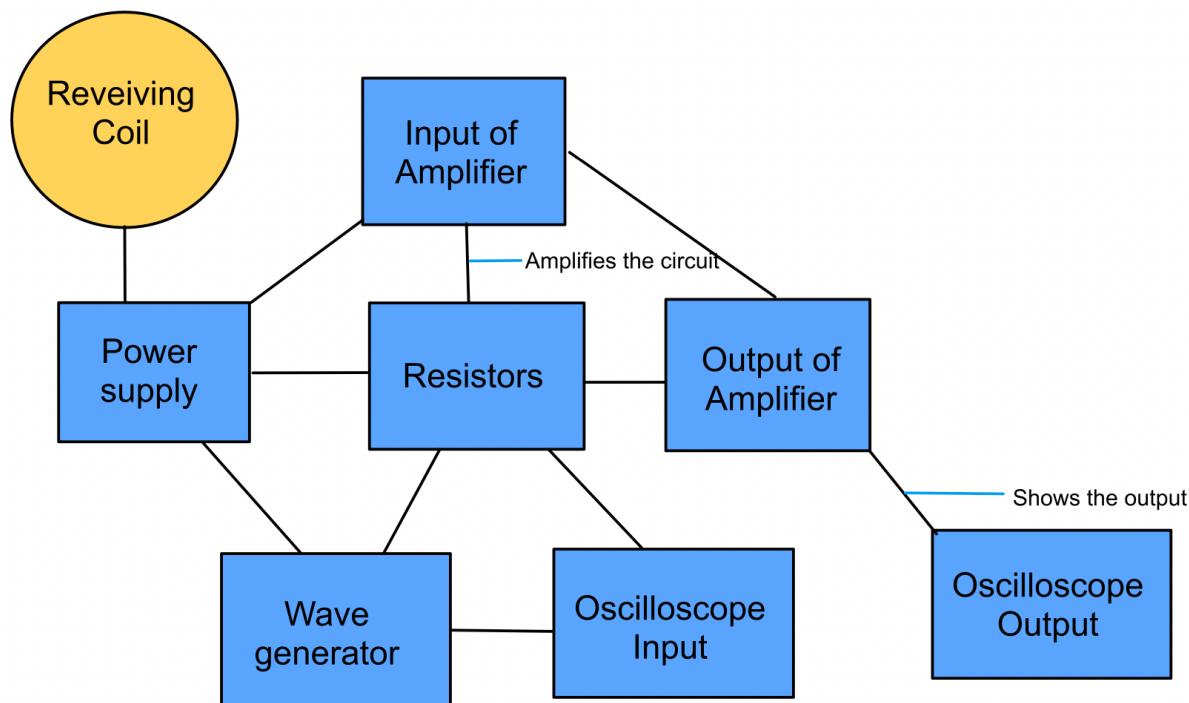
Objective

The receiving team must work with the transmitting team to build a RLC circuit that would amplify the circuit 20 times. The transmitting team generates a sequence of 1s and 0s as well as a frequency of 500Hz to the transmitting coil, while the receiving coil receives the transmitted signal and amplifies the circuit 20 times which will be displayed in the oscilloscope. This will focus more on the receiving side of the whole circuit, which is amplifying the circuit 20 times.

Documents

- <https://www.tinkercad.com/things/anOmhRD8391?sharecode=pH8NDSX9Gney6UwuOGtFD51aFW9rfeFkK9dKGPC9r0>
- <https://www.ti.com/lit/ds/symlink/lm741.pdf>

System Overview



Materials and Equipment

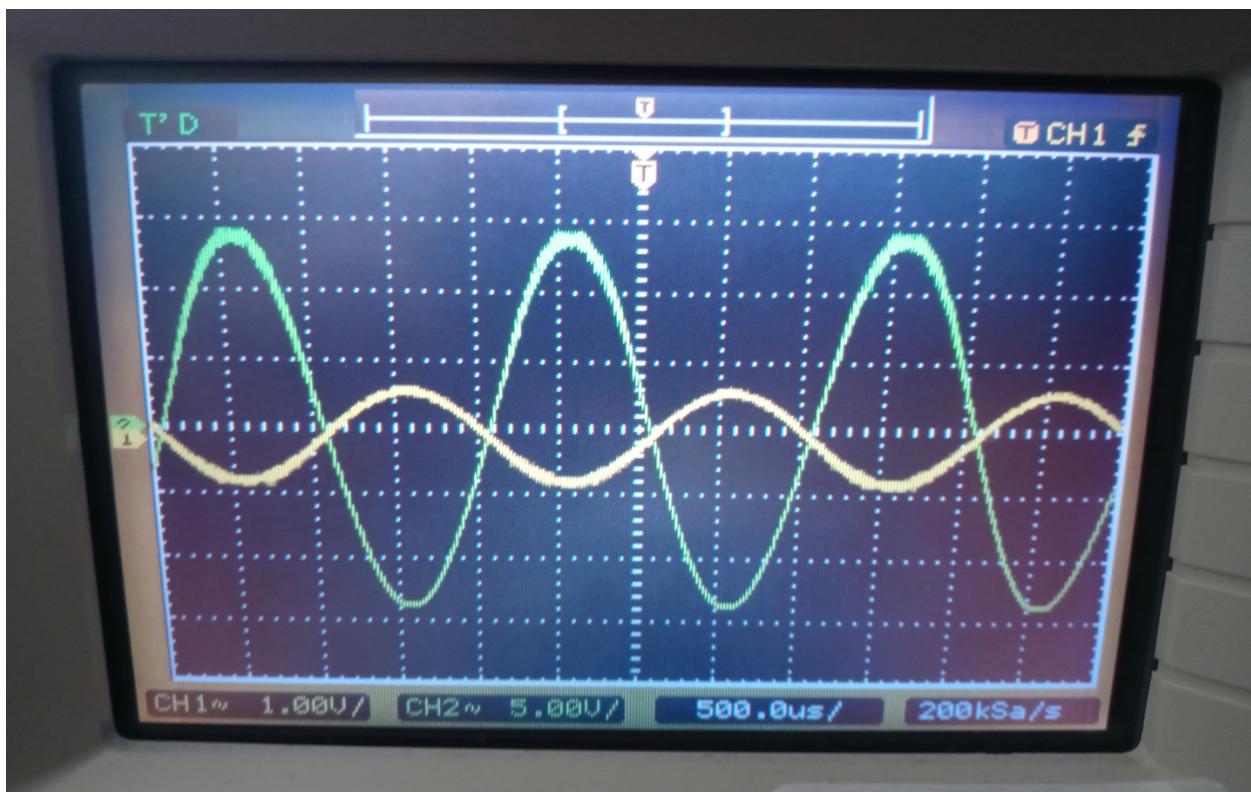
- Breadboard
- 2 power supplies with alligator clips
- Waveform generator with alligator clips
- Oscilloscope with 2 channels with alligator clips
- LM741 Operational Amplifier
- Lots of wires
- 3 resistors
 - 100Ω
 - 10Ω
 - $2.2k\Omega$

Setup Procedures

1. Use the two alligator clips to hook up the two power supplies. Each power supply is wired up to the power rails on the breadboard.
2. Place the LM741 amplifier in the middle of the breadboard.
3. Take a wire and hook that wire onto the power rail that is giving off the power supply to the column where it has pin number 7 on the amplifier.
4. Hook the bottom power rail ground onto the pin number 3 of the amplifier and the negative power supply onto pin number 4.
5. Place the 100-ohm resistor where one end is in the same column as pin number 2 on the Amplifier and the other end of the resistor in an empty column where it will not affect the amplifier. Connect the 10-ohm resistor making it a series circuit.
6. Along the same column where the other end of the 10-ohm resistor is, take one wire for the waveform generator and place that wire in the same column as the 10-ohm resistor. Take another wire for the first channel of the oscilloscope, and place that wire in the same column as well.
7. Place the second channel of the oscilloscope in the same column as pin number 6 on the amplifier. Take a short wire and make a connection from the output to one of the empty columns away from the amplifier.
8. Take the 2.2k- ohm resistor and connect one end of the resistor to the short wire in the empty column and the other end to the other side of the breadboard. Take another short wire and place one end to the same column as the 2.2k resistor, and the other end to pin number 2 of the amplifier, making the circuit being amplified 20 times.
9. With the receiving coil place one end of the coil to the same column as the first channel of the oscilloscope, and the other end to the ground on the power rail.

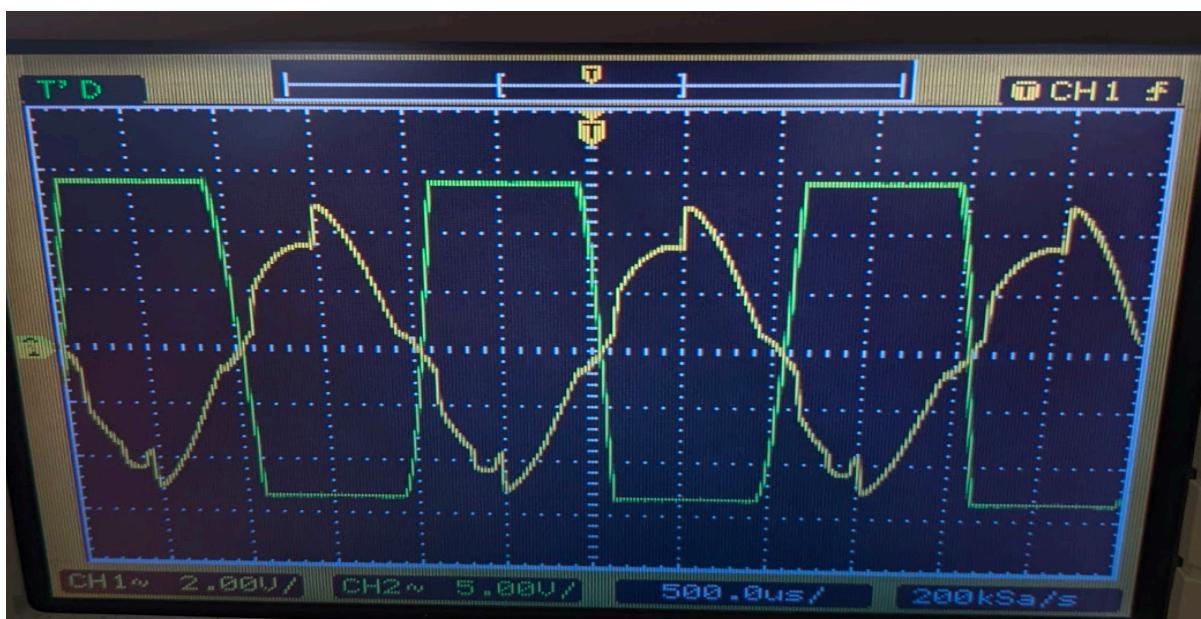
Results

Testing this without the coil, the amplifier works perfectly fine. It amplified the circuit 20 times just like it needed to. Below are the results from the oscilloscope: yellow being the input, and green as the output.

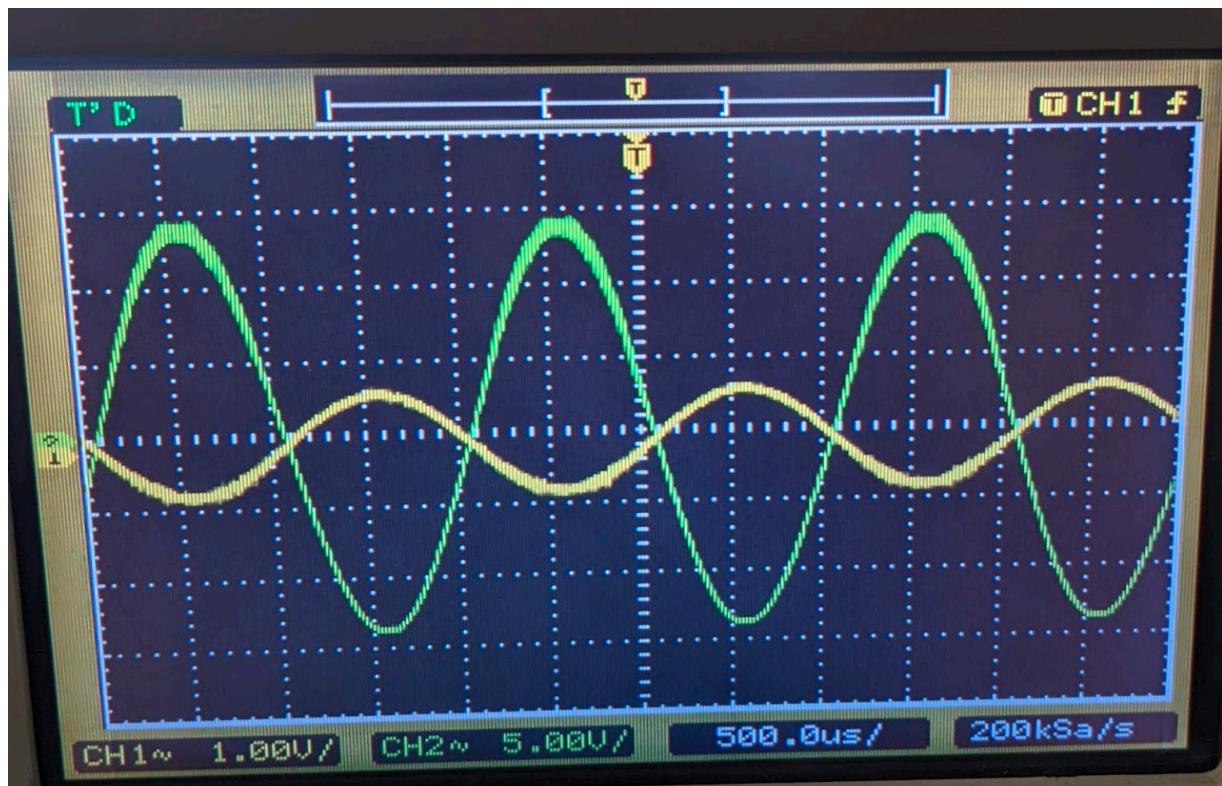


When doing it with the receiving coil and the actual circuit without the wave generator and instead, the transmitting team transmit a wave generator onto the transmitting coil, we got very different results. We have done the results by placing the 2 coils together, when the 2 coils separated by blocks and the last one separated by a metal pipe. The blocks seem to be the most efficient because we can get an accurate read.

Non-Separated



Blocks Separated



Metal pipe Separated

