

VOLTAGE QUADRUPLER

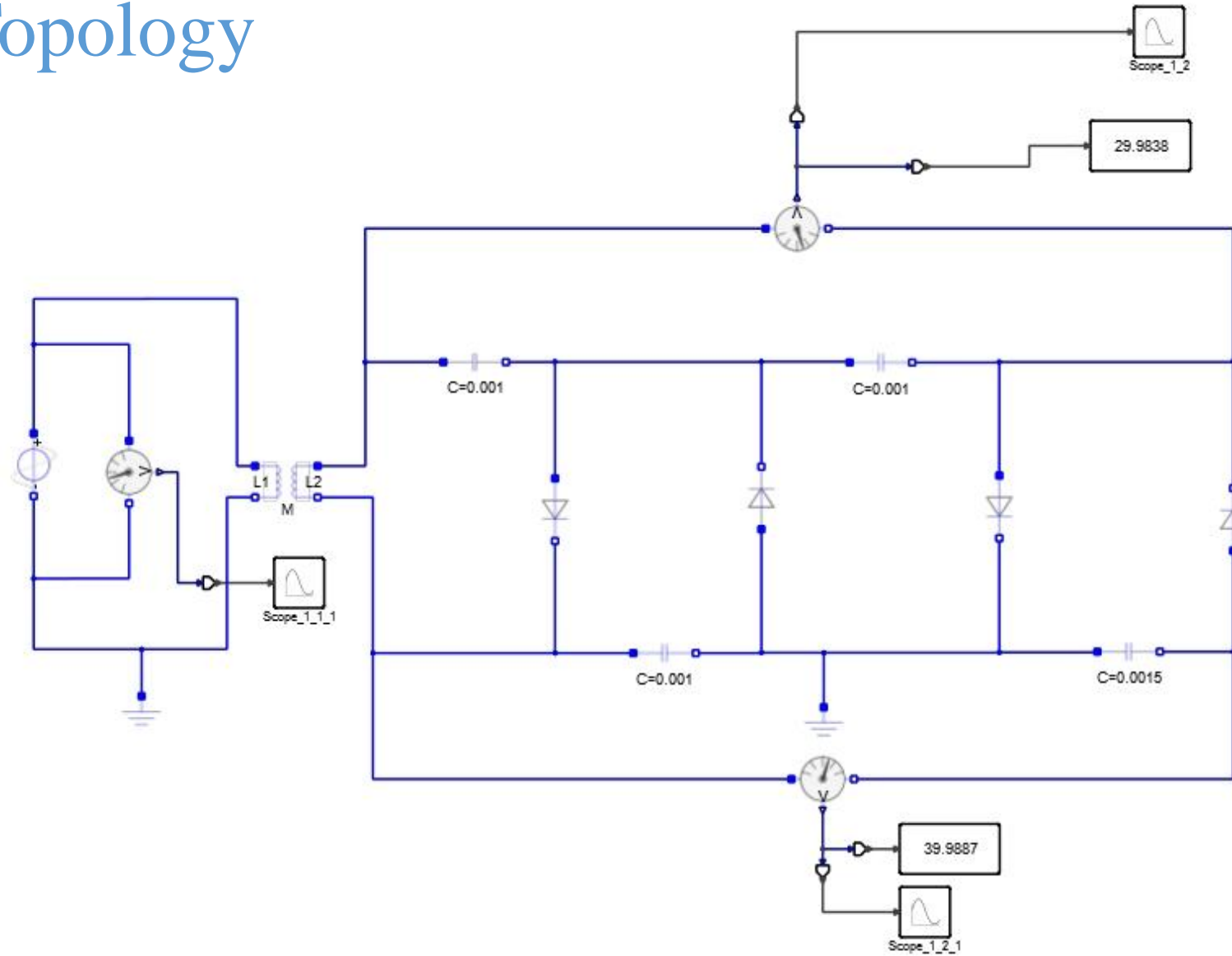


Voltage Quadrupler

- A voltage quadrupler circuit is a circuit in which the output voltage is quadruple, or 4 times, the amplitude of the input voltage.
- This voltage quadrupling effect is achieved through the use of capacitors. We use individual capacitors to charge up to the input voltage. The first capacitor charges up to the input voltage of the circuit. The second capacitor has a successive effect. It charges up to the value of the input voltage but always sees the voltage from the first capacitor, having an additive effect. The result is double the input voltage. The third capacitor, again, charges up to the input voltage but sees the voltage from the other 2 capacitors, so the output is triple the input voltage. The fourth capacitor charges up to the input voltage, while seeing the voltage from the other 3 capacitors, so the output is now quadruple the input voltage. We use diodes to block capacitors from discharging once they are charged. So it's a series of capacitors and diodes that allows this multiplying effect.

- The circuit intakes an input voltage and multiplies it by 4 to give an output voltage that is 4 times larger than the input voltage. Thus, this circuit is a type of voltage multiplier circuit.
- The circuit intakes an AC voltage signal and outputs a larger DC voltage signal. Thus, the circuit is a type of AC-to-DC converter, an AC-to-DC boost converter.

Circuit Topology



- The diodes are used simply for the purpose of blocking the capacitors from discharging once they charged. This is so that the diodes hold their charge, so that the voltage at the output can be triple the voltage at the input. Since the diodes are one-way devices, current can only flow in one direction and are blocked from flowing in the other direction. Using diodes, we can allow capacitors to charge up but not discharge.
- The other specification we must take into account with capacitors is the voltage rating. Depending on the input voltage you are using, you must choose the voltage ratings of the capacitors in accordance.

Conclusion

- The output voltage is directly determined by the number of capacitors. So we want quadruple the input voltage, so we use 4 capacitors in which the output voltage is quadruple, or 4 times the input voltage, we use 4 capacitors.
- The diodes in the circuit are used just so that we can determine how we want current to be routed in the circuit and to block the discharge of capacitors when they are charged. Since diodes are one-way electronic devices, they allow current only in one direction and prohibits current from flowing across it when reverse biased.
- Thus the voltage Quadrupler circuit is implemented using the Activate tool.