

2.1 - Diode Rectifiers

About Diode Rectifiers

Although a single diode can be used as a rectifier, a more common design uses four diodes to make a full-wave bridge rectifier. Full-wave bridge rectifiers have the advantage of passing current on both the positive and negative half-cycles of the AC wave, making them more efficient than half-wave rectifiers made from a single diode.

Diode rectifier activity

1. What is the function of a diode rectifier?

2. Solder one pin of CON1, the 2.1mm co-axial power jack, into your CHRP circuit board. After soldering the first pin, check to make sure the power jack is properly seated on circuit board (and fix it if it isn't) before soldering the remaining pins.

Teacher Check

3. Install bridge rectifier, D1, into your circuit board ensuring it is oriented with the correct polarity. After making sure D1 is properly seated on the circuit board, solder it into place.
4. Draw a schematic diagram of a bridge rectifier circuit showing the two AC input pins as well as the positive and negative DC output pins. Label each of the 4 rectifier pins sequentially (1-4).

5. The four labelled pins in the schematic above correspond to the four contacts on the bottom of the bridge rectifier. Set a multimeter to the diode test setting, and measure the forward and reverse potential drop across each diode as you move the meter probes around the rectifier.

$$V_{FWD1-2} =$$

$$V_{REV1-2} =$$

$$V_{FWD2-3} =$$

$$V_{REV2-3} =$$

$$V_{FWD3-4} =$$

$$V_{REV3-4} =$$

$$V_{FWD4-1} =$$

$$V_{REV4-1} =$$

- When testing the **forward** voltage drop of the two diodes attached to the positive (+) terminal of the rectifier, record which meter lead connects to the positive pin.

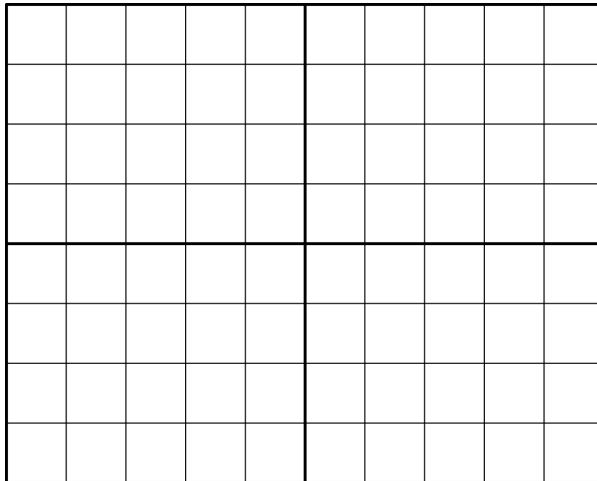
Teacher Check

- Obtain an AC output wall adapter. Record the rated output voltage of the adapter, and then measure the output voltage using a multimeter.

$V_{\text{RATED}} =$

$V_{\text{AC}} =$

- Using an oscilloscope, measure and record the output voltage waveform of the AC adapter. Record the oscilloscope settings as well.

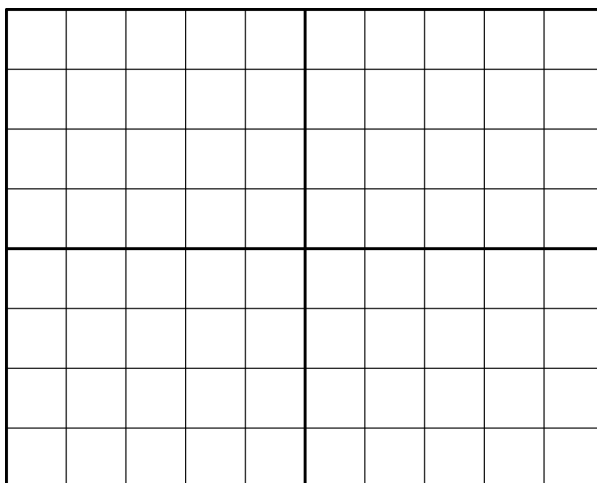


Time/Div

Channel 1
Volts/Div

Channel 2
Volts/Div

- Next, plug the AC adapter into the CHRP and measure the pulsing DC output of the rectifier.



Time/Div

Channel 1
Volts/Div

Channel 2
Volts/Div

- Compare the potential measurements in steps 7, 8 and 9. What was each potential? How was each potential measured? Are all three measurements the same? Why or why not?