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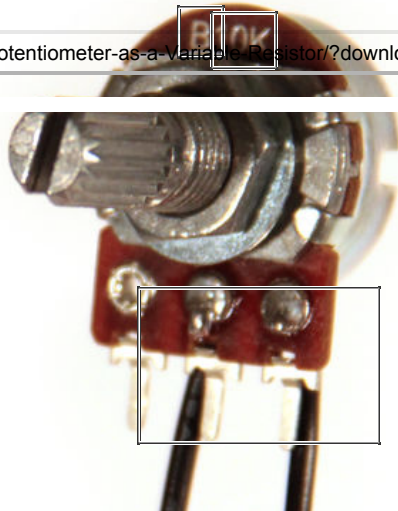
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## Wire a Potentiometer as a Variable Resistor by amandaghassaei

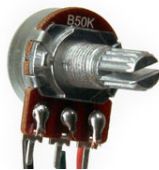
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(<http://cdn.instructables.com/FEK/NHEQ/H5JCLQFC/FEKNHEQH5JCLQFC.LARGE.jpg>)

At some resistor.

Variable

adjustable

(<http://en.instructables.com/FLQ/UXCV/H5EDUDQR/FLQUXCVH5EDUDQR.LARGE.gif>)

adjustable cutoff frequency of an RC filter

([http://en.wikipedia.org/wiki/RC\\_circuit](http://en.wikipedia.org/wiki/RC_circuit))

change the brightness of an LED

making measurements with a wheatstone bridge

([http://en.wikipedia.org/wiki/Wheatstone\\_bridge](http://en.wikipedia.org/wiki/Wheatstone_bridge))

adjusting the sensitivity of sensors wired in series/parallel to the variable resistor

testing- find the best resistance for your circuit before soldering a non-variable resistor in permanently

Normally, potentiometers are wired as variable voltage dividers

([http://en.wikipedia.org/wiki/Voltage\\_divider](http://en.wikipedia.org/wiki/Voltage_divider)): connect +V to one side, connect



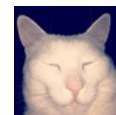
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**Bio:** I'm a developer here at Instructables, I work on the website and iOS app.

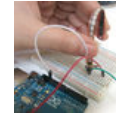
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### Tags:

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variable resistor (/tag/type-id/category-technology/keyword-variable resistor/)

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pot (/tag/type-id/category-technology/keyword-pot/)

the other side to ground, and the middle pin will output a voltage between 0 and +V (fig 2).

However, by only connecting two pins (one outside pin and one center pin) of a potentiometer to your circuit, you can turn a pot into a variable resistor. Think about it this way: the potentiometer is filled with resistive material and turning the knob changes the amount of this material that the electrons must travel through before leaving the pot. This means that the maximum resistance of this variable resistor is the total resistance of the pot. In figure 1 the pot has a total resistance of 10kOhms, so if the pot is turned all the way to the left the resistance between the two black wires is 10kOhms. If the pot is turned all the way to the right the amount of resistive material between the two black leads drops to zero and the resistance goes to zero as well. Any position in the middle will give a resistance between 0 and 10kOhms. If I'd soldered a wire to the left lead instead of the right all of this will flip: turning all the way to the left is 0Ohms and all the way to the right is 10kOhms.

One thing you might want to keep in mind when using this technique is the taper of your pot. This pot has a B label on it, which means it is a linear taper pot. This means the resistance of the material inside the pot is uniform for all positions of the knob. If the knob of the pot is positioned exactly halfway between the two extremes, the resistance between the black wires equals  $10k\Omega/2 = 5k\Omega$ . Position the knob halfway between this mid point and the right extreme and the resistance between the two wires equals  $10k\Omega/4 = 2.5k\Omega$ . If the wiring is reversed (wires connected to the left and middle pin instead of right and middle) the pot is still linear but the knob positions of 0Ohm and 10kOhms have reversed.

If you have a pot with an A label on it it has a logarithmic taper: the resistive material inside the pot is not uniform. When you move the knob from the right extreme the resistance changes dramatically then becomes almost constant as you approach the left extreme position. So if you wire up the right and middle leads (as shown in fig 1) the dramatic change will happen as you approach 0Ohms resistance, but with the left and middle leads connected the dramatic change happens as you approach 10kOhms resistance. See fig 3 for more detail (from <http://www.beavisaudio.com/techpages/Pots/>). Depending on what you are doing you may find one preferable over the other

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**nuggu.subramanyam (/member/nuggu.subramanyam/)**

11 days ago

[Reply \(CAHC0R211YU4YW9\)](#)

may i know why we use variable resistors instead of resistors.for example for one project we need variable resistor and we set at 22k ,and why should we not use resistor of 22k,please give me answer soon



**Goturtlepoop (/member/Goturtlepoop/)**

1 year ago

[Reply \(CK8TFE9HNICS9RJ\)](#)

(/member/Goturtlepoop/)

my pot is wired using the 3 posts....but my unit gets really hot.....can't figure this out



1 year ago

[Reply \(CRTK2UAHAQ38477\)](#)

it won't slow down an AC motor but a simple 6V DC motor it sure will... great

info

(/member/ddpowell12/)



**tutdude98** (/member/tutdude98/)

2 years ago

[Reply \(C390BB6H5R9EL2E\)](#)

I get some pots from old electronics and i didnt know what pins i need to solder to leds and this really helped me  
Thanks

(/member/tutdude98/)



**amandaghassaei** (/member/amandaghassaei/) (author) tutdude98

2 years ago

[Reply \(C6VEZELH5EDUVXT\)](#)

great! let me know if you have

(/member/amandaghassaei/) any questions!



**scryptopower** (/member/scryptopower/)

2 years ago

[Reply \(CEYVFL0H5R9ECUO\)](#)

I didn't think there was a "normal" use for pot. They get used in all kinds of different ways.

(/member/scryptopower/)



**avionicskypilot777** (/member/avionicskypilot777/)

2 years ago

[Reply \(CZ4ZX7RH5JVOQB0\)](#)

Thanks for the lesson. I had always wondered of the difference between an audio and linear potentiometer. I knew they could be used as variable resistors I just didn't know the difference between the two.

(/member/avionicskypilot777/)



**verence** (/member/verence/)

2 years ago

[Reply \(CSJ3QC4H5JVXLB9\)](#)

Good info.

(/member/verence/)

You might add a word about the amount of load a potentiometer can handle (i.e. next to nothing).

So a warning that potentiometer is NOT the way to slow down a motor would be nice.

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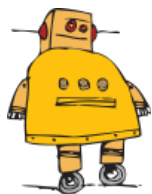
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