

Re: voltage to resistance convertor?

Source: <http://sci.tech--archive.net/Archive/sci.electronics.basics/2005-04/msg00853.html>

- *From:* "Larry Brasfield" <donotspam_larry_brasfield@xxxxxxxxxxxxx>
 - *Date:* Fri, 15 Apr 2005 11:00:48 -0700
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"Andrew Howard" <ask.me@xxxxxxxxxxxxx> wrote in message [news:heH7e.11799\\$5F3.5931@xx](mailto:news:heH7e.11799$5F3.5931@xx) [Brasfield wrote:]

>> Right now, your requirement appears to be:

>> 1. Accept an input voltage, 'Vx', ranging between 0 V and 9 V, on one port, consisting of pins VxIn and VxRef.

>> 2. Provide a "resistance", 'Ro', on another port, consisting of pins RoA and RoB.

>> 3. If current is passed thru Ro, the voltage across it should be $V_x * 2500/9$, within some unknown tolerance. There is no presently known limit on what that current might be.

>> 4. If a voltage is applied across Ro, the current passing thru it should be $9/(2500 * V_x)$, within some unknown tolerance.

>> There is no presently known limit on what that voltage might be.

>> 5. The accuracy implied by items 3 and 4 applies only over the frequency range 0.2 Hz to 20 Hz. Outside that range, any voltage or current result is acceptable.

>> 6. The connection, if any, between the Vx port and Ro port, is unspecified. They might be required to be isolated from each other for an unbounded voltage difference. Or it may be fine for either RoA or RoB to be connected to VxRef.

>>

>> I state the above to clarify what is missing. For any of the unknown bounds and limits, smaller will be easier and if it can be unipolar rather than having to be bipolar, the design may be simplified. Not having to isolate the ports will greatly simplify the problem.

>>

>>> In case you are wondering, it is for a Guitar FX pedal I am semi-designing.

>>

>> What sort of circuit is going to use the synthesized resistance? Can it accept a voltage or current instead? There may be an easier way to solve the real problem than synthesizing a resistance.

>

>

> This is the circuit that needs the variable resistance. It is the basis for a simple phaser. Apparently it works by using the fact

> that the emitter is 180 degrees out of phase with the collector (or something). The varying resistance has

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been labelled R1.

```
> VCC
> + (9V)
> |
> |-----'
> .-. .-.
> 47K| || |2K2
> |||
> '-'- ' 1uF
> || +[/
> 1uF | '-----[|-----'
> \ | / [ \ |
> IN o-----]----o----| BC548 || 1uF
> /]+ | |> .-. | \]
> | .-----' | |<-----]-----o OUT
> o ||| |2K5 /]+
> | .-. .-. | '-R1
> === 22K| ||| | o
> GND ||| |2K2'----' |
> '-'- ' ===
> |-----' GND
> |
> ===
> GND
>
>
> (created by AACircuit v1.28.5 beta 02/06/05 www.tech-chat.de)
```

I concur with Roger on the misconnection between the top end of the pot and its wiper.

> I have decided that I would prefer a sine wave, if that makes any difference to anything.

Sorry, but I cannot understand what you mean by that. Are you saying you want the resistance versus control voltage function to be a sinusoid? Or that you intend to use sinusoids as the control voltage?

> Both the phaser circuit and the sine wave generator will be using the same power supply.

That pretty much resolves the isolation issue. The control voltage can be assumed to share the same ground with your "phaser".

> I am fairly new to this, so I am unsure about what you mean by having an isolate resistance, or the difference between unipolar

> and bi polar. I am guessing that unipolar means that it doesn't go below 0V (changing DC?) and that bipolar means otherwise (AC?).

> If so, wouldn't it be possible to bias an AC waveform into DC, or am I getting confused.

You've roughly got the bipolar/unipolar distinction, except

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bipolar means can have either of two signs and unipolar means can have only one sign or be zero. A bipolar signal could have DC content or not, and it is meaningful to speak of the AC content of a unipolar signal. The AC/DC concept and the unipolar/bipolar concept are not the same.

> I have not yet figured out what I would be using to generate the sine wave, so if anyone has any suggestions, that would be great.

There are many ways to do that. Digitally synthesized sine generators are pretty cheap these days.

> Also, I am not sure how to figure out the current needed, and I have never dealt with this type of circuit before, so I can't

> really guess. It would probably be in the low mA range though.

Yes. But I am not inclined to help go down the synthesized resistance route. (I concur with Roger on that as well.)

It would be easier to build a voltage controlled "phaser" than to synthesize a voltage controlled resistance to put into that circuit you drew.

For example, by differencing the output of two multipliers, one fed with ($V_{max} - V_{control}$) and the other fed with ($V_{control}$), (where V_{max} is the fullscale multiplier input), you would get the effect you are after. You can get a good multiplier in an 8 pin package.

> Thanks for the help

—

—Larry Brasfield

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Above views may belong only to me.

• *Follow-Ups:*

◆ *Re: voltage to resistance convertor?*

◇ *From:* Larry Brasfield

• *References:*

◆ *voltage to resistance convertor?*

◇ *From:* Andrew Howard

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