

Simple line mixer

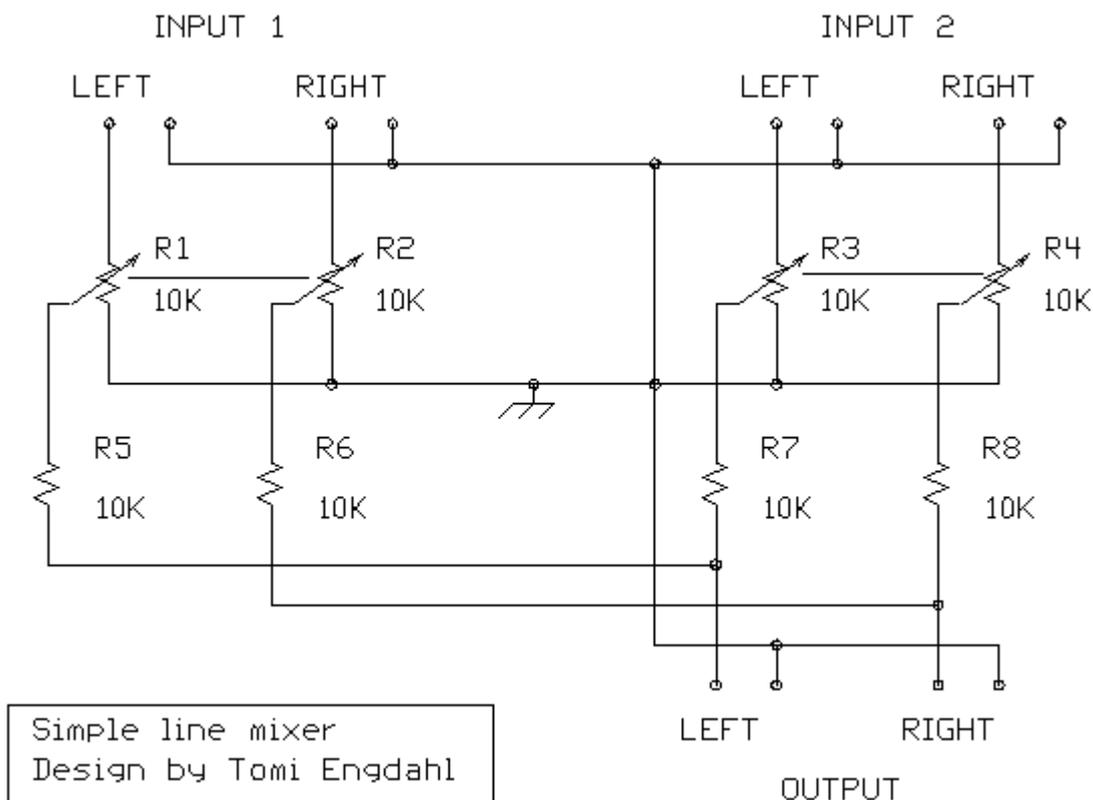
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I designed this circuit for one friend of mine to be used as a small portable DJ mixer. The circuit is an audio mixer circuit so simple as it can be. There are two dual logarithmic potentiometers in the circuit to adjust the input signal levels and some resistors to do the actual mixing. The circuit is totally passive, so no power supply is needed.

The circuit is suitable to be used as a mixer between two line level sources and one HIFI amplifier input. This circuit has been successfully used for mixing signals from two CD players or computer soundcard and CD players. There are many situations where a simple mixer would be useful and commercially available mixer desks are too expensive and big.

This simple line mixer has two drawbacks: it attenuates the signal all the time (even sliders set to maximum) and the output impedance is quite high. The first problem can be solved by just turning a little more volume in the amplifier. High output impedance is no problem when connected to a high impedance amplifier input with short wires (few meters).

In the picture below you see the schematic of the whole mixer circuit. The potentiometer slides which are actually inside one dual potentiometer are connected together using one line. Every input and output pin has a corresponding ground signal on the right side of the signal line.



You can build this circuit easily in a small plastic box using two rotary dual logarithmic potentiometers, six RCA connectors and four resistors. You don't need any special circuit board because there are so few components that you can just solder them going from place to place. If you want a mixer which is easier to use, replace the rotary potentiometers with slider potentiometers. And if you want better shielding use a metal enclosure.

Frequently asked questions

What does the line drawn between left channel and right channel potentiometers mean ?

That line means that those potentiometers are mechanically connected together so that they move together (that line does not mean any electrical connection because it is not connected to those potentiometers). This kind of mechanical connection is done in dual potentiometers. If you use two separate linear potentiometers then you can connect the sliders of them together using some suitable method. If you prefer totally separate left and right channel volume controls then you don't need to do this mechanical connection between the potentiometers.

Could I use 1/4" phone jacks as opposed to RCA jacks?

Yes. No problems. You can use any line level signal connectors in the place of those RCA connectors when you wire them correctly to the circuit.

On each input, there are obviously two connections. To which part of the jack does each connect?

For RCA connectors:

Outer part in RCA connector goes to the common ground (right tap in schematic connections). The center of the RCA connector is connected to the resistor (left tap in schematic).

For PHONE jacks:

The body of the PHONE jack goes to common ground wire (right tap in schematic). PHONE connector tip then goes to the left tap in the schematic.

That "ground" symbol in the middle is bugging me. Do I actually have to ground that part ?

The ground here just tries to tell where to ground you can do it here. If you want to ground the case you can connect it here. Grounding of this circuit is not necessary.

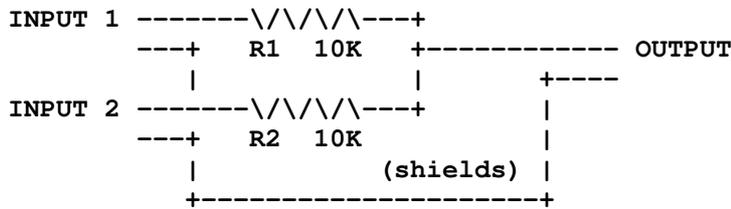
I wouldn't have to change any resistor values if I wanted to add more inputs ?

With the same resistor values you can add more inputs if you wish. Adding more inputs has some negative effects to the circuit performance, because more input you have then more attenuation this mixer circuit causes. You can use this circuit for few inputs, but if you put more than few inputs the signal level you get out of the mixer is quite fast so low that it is not usable. If you need more than few inputs (more than three or four) then it is a better idea to use some more advanced active mixer circuit or at least add an amplifier to the signal output.

Can I make this circuit even simpler ?

If this circuit seems to be to complicated, then you can build this even simpler circuit, which mixes two signals but does not have any option for adjusting their levels.

To build this circuit you need three RCA connectors and two 10 kohm resistors (R1 and R2). The resistors connect the audio signals (center connector) from inputs together to from one output signal. You can see the wiring details in the figure below:



When you have connected the audio lines together using the resistors, then connect the connector grounds directly together using short piece of wire.

Can I add easily standard DJ mixer features to this circuit like crossfader, equalizer and kill switches ?

The answer is no. This design is so simple because this does not include this kind of functions. Each of those functions are by themselves as complicated or much more complicated than the entire mixer design shown above. If you need a mixer with those functions built-in, you should go to some entirely different mixer design.

If you want fiddle with the circuit, a cross-fader might be a doable addition to the circuit with some modifications and addition of one potentiometer. I have few ideas how to do that, but I have not drawn them down and tested them, so I don't publish the ideas yet. Might take although quite a bit time until I add them here because I don't have any immediate personal need to further develop this circuit for my own needs. I don't provide any further information related to those modification ideas through e-mail, because that with same effort I could publish them here... maybe someday I will do so. Until then you can only wait and hope to get them someday here or pay so much money that I feel it important enough to test and publish the details immediatly.

Can I use this design with two phono players ?

This circuit is is deigned for line levle signal and line level interconnections. It is not designed to work with phono level signals and phono connections. If you try ot use this circuit in such application the circuit is expected to perform poorly.

Now you have made a nice once one channel mixer circuit. For mixing stereo signals build another identical circuit for the other audio channel.