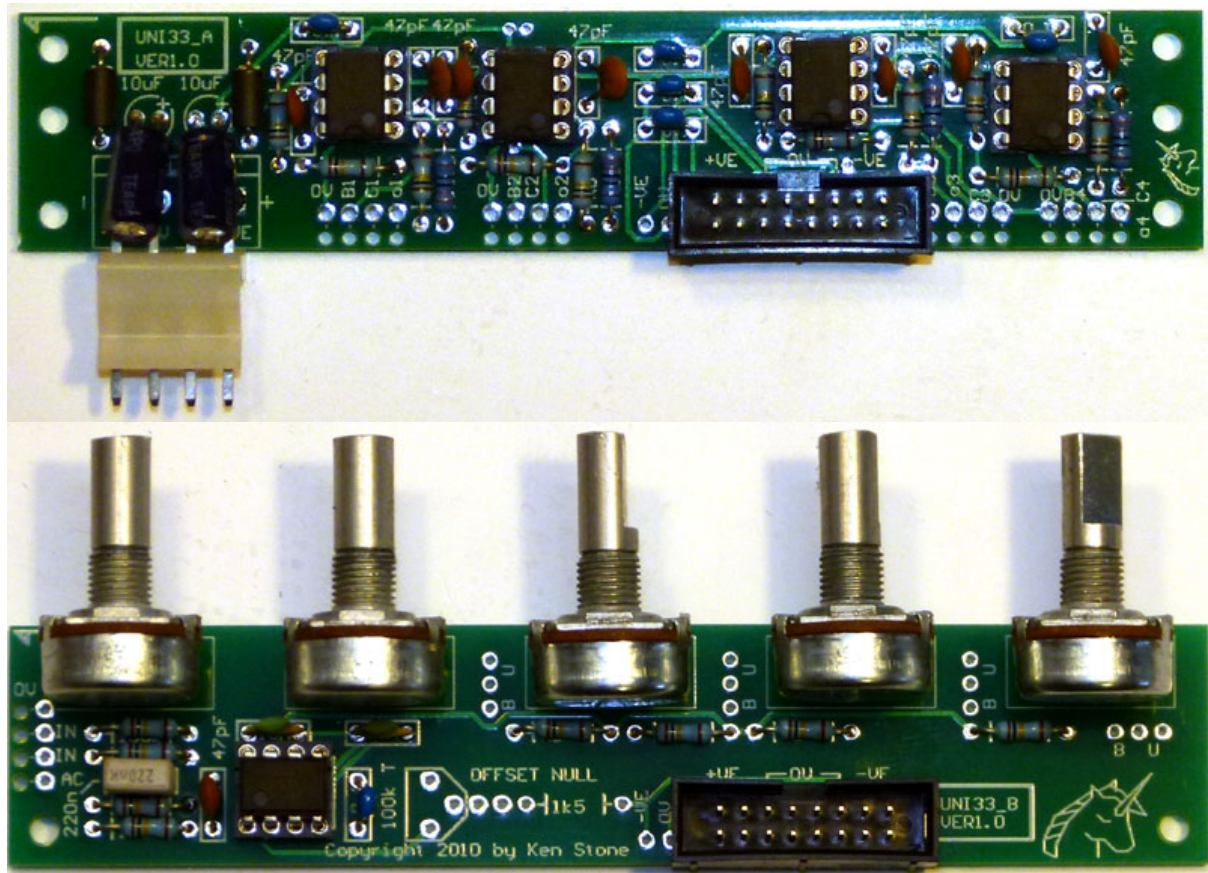


# Matrix Mixer

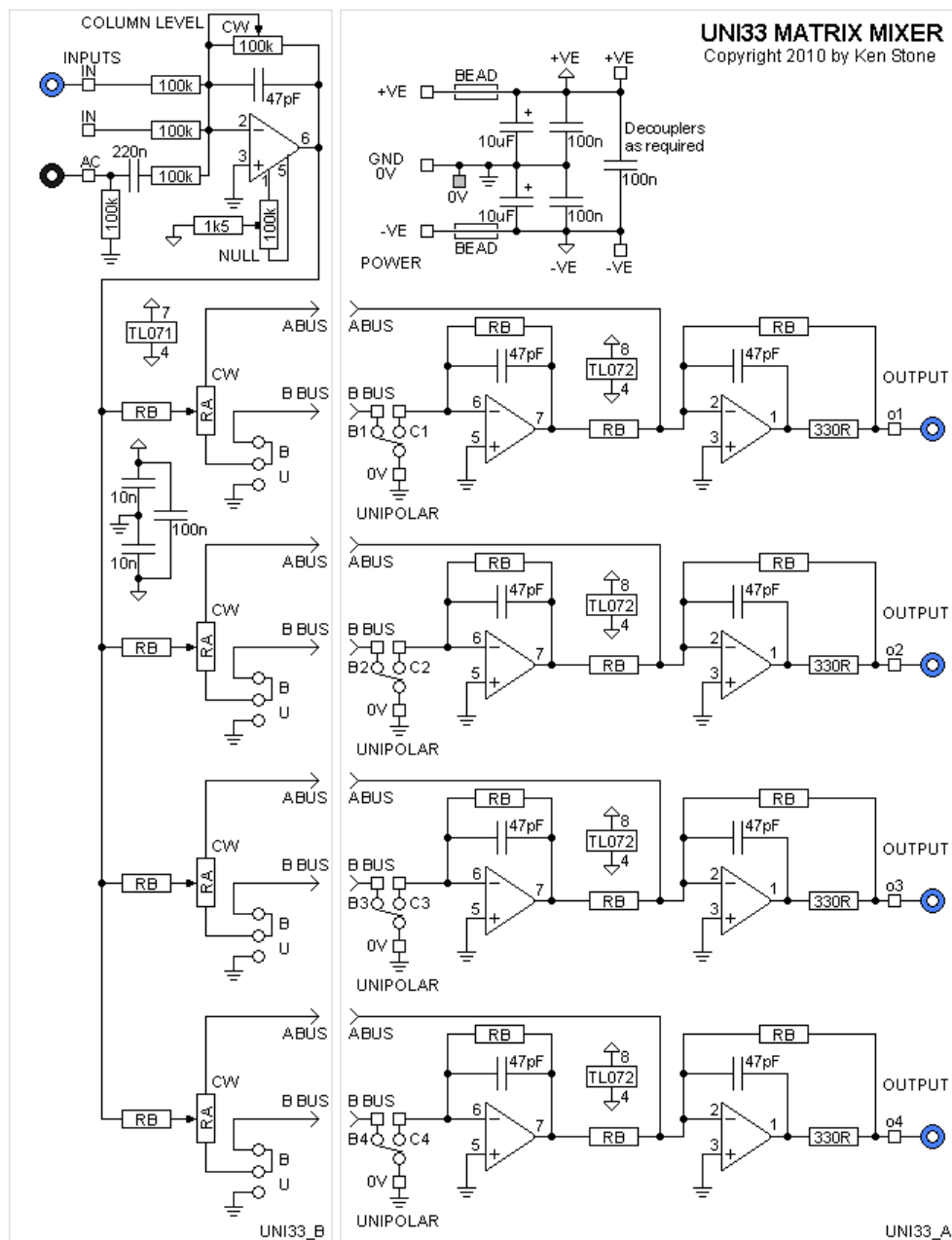
for music synthesizers.

preliminary documentation



The matrix mixer is a multiple input, four output bipolar or unipolar DC coupled mixer, for mixing control voltages or audio signals. In cases where you require several different mixes from a common set of signals, this module is ideal. Each output can be independently switched to operate in unipolar or bipolar mode. When in unipolar mode, all pots feeding that output behave in regular fashion, that is when the knob is fully counter-clockwise, no signal from the associated input passes into the mix. As the knob is advanced clockwise, a greater portion of the signal passes into the mix. In bipolar mode, each knob has a zero position mid-way through it's travel. Turning the knob anti-clockwise will add an increasing portion of a negative (inverted) version of the signal at the corresponding input, while turning the knob clockwise will add an increasing portion of the original signal to the mix. Each column has the option for three inputs, two DC coupled, and one AC coupled for audio use. The builder chooses which inputs to use. Each column also as a master level control, ranging between zero and unity gain.

**A little on how it works:**



The schematic, showing one input buffer and the master summers of for the Matrix Mixer.

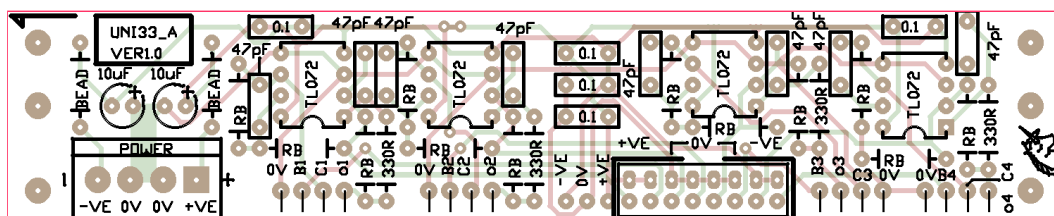
As is obvious from the circuit diagram, the matrix mixer is little more than a group of standard op-amp summing circuits.

Each column consists of an op-amp input stage and four pots. Any signal applied to an input is first buffered by an inverting summer based around a TL071 op-amp. The gain of this stage can be controlled by the pot in its feedback path. Three inputs are provided on the PCB, two DC coupled and one AC coupled via a 220nF capacitor.

The buffered signal is then fed to the wipers of four pots, which direct the signal in varying proportions to the A and B buses.

The pots steer the signal to either the first or second op-amp of the mixer in bipolar mode, or the first op-amp or ground in unipolar mode. Any signal that is sent to the first op-amp is inverted, then mixed with any signal being sent to the second op-amp. This signal is then inverted again, and sent to the output jack.

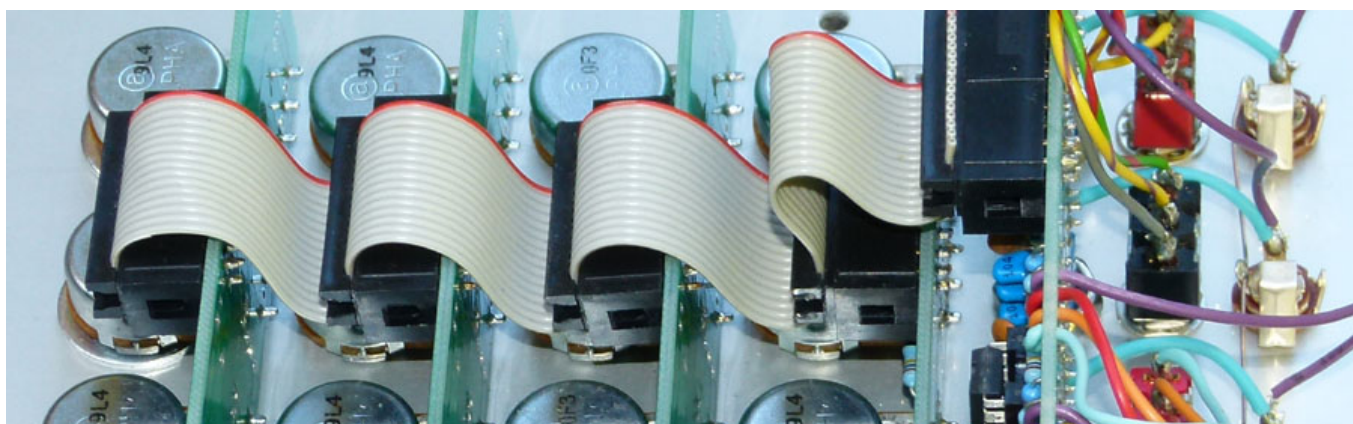
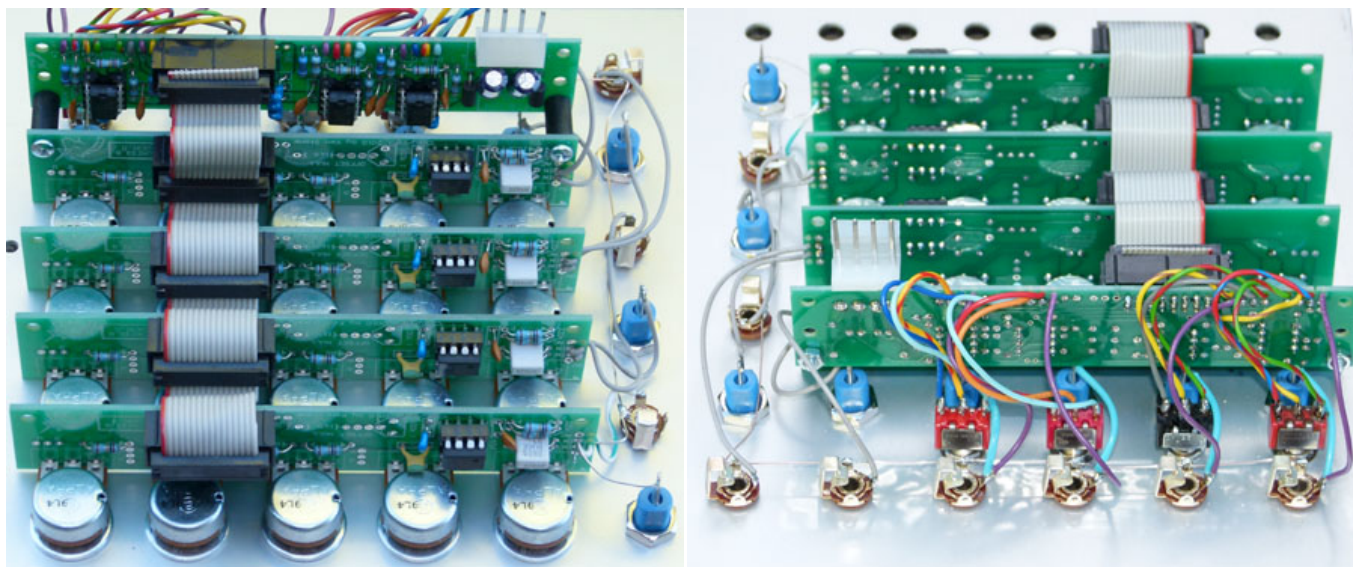
## Construction







The master PCB (UNI33A) has several mounting holes, allowing it to be bolted to one of the column boards at different heights, depending on your construction preferences. This also gives clearance for use of a standard power connector.



|        |                      |
|--------|----------------------|
| PAD ID | Function             |
| +VE    | Spare +VE connection |

|     |   |
|-----|---|
| -VE | Spare -VE connection                            |
| 0V  | CCW end of FB pot, 0V connection to 3.5mm jacks |

Pot and Resistor selection (RA and RB)

The ratio of the value of the pot (RA) to that of the fixed resistors (RB) used in the processor will affect the response of the pot. The pot itself MUST be linear. For example, with RB = 100k, a 50k pot for RA will produce a slightly anti-log response. A 100k pot would produce a linear response.

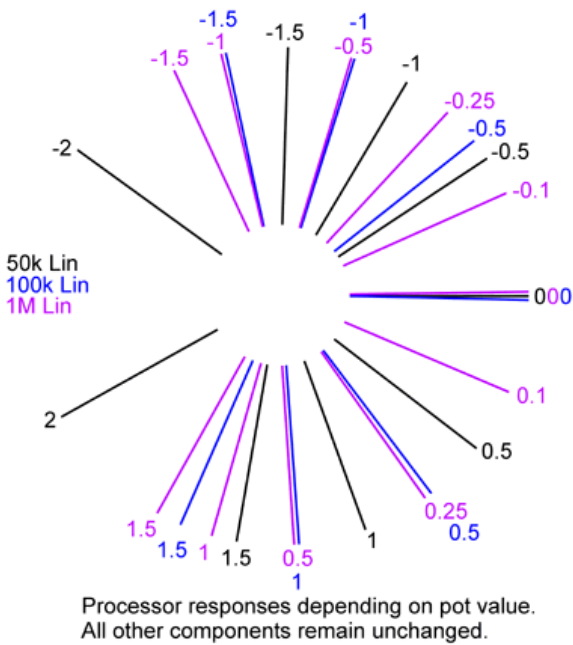
For RB = 100k:

- RA = 10k - Anti-log response - Greater sensitivity near center of rotation. Finer control towards ends of travel.
- **RA = 100k** - Linear response. Mostly for CV mixing
- RA = 1M - Log response - Finer control near center of rotation. Greater sensitivity towards ends of travel. Mostly for audio mixing

For RB = 10k:

- **RA = 10k** - Linear response. Mostly for CV mixing
- **RA = 100k** - Log response - Finer control near center of rotation. Greater sensitivity towards ends of travel. Mostly for audio mixing

Recommended choices are in bold.



Notes:

- Board dimensions: 5" x 1". Pots are spaced at 1".
- Please [e-mail me](#) if you find any errors.

Parts list

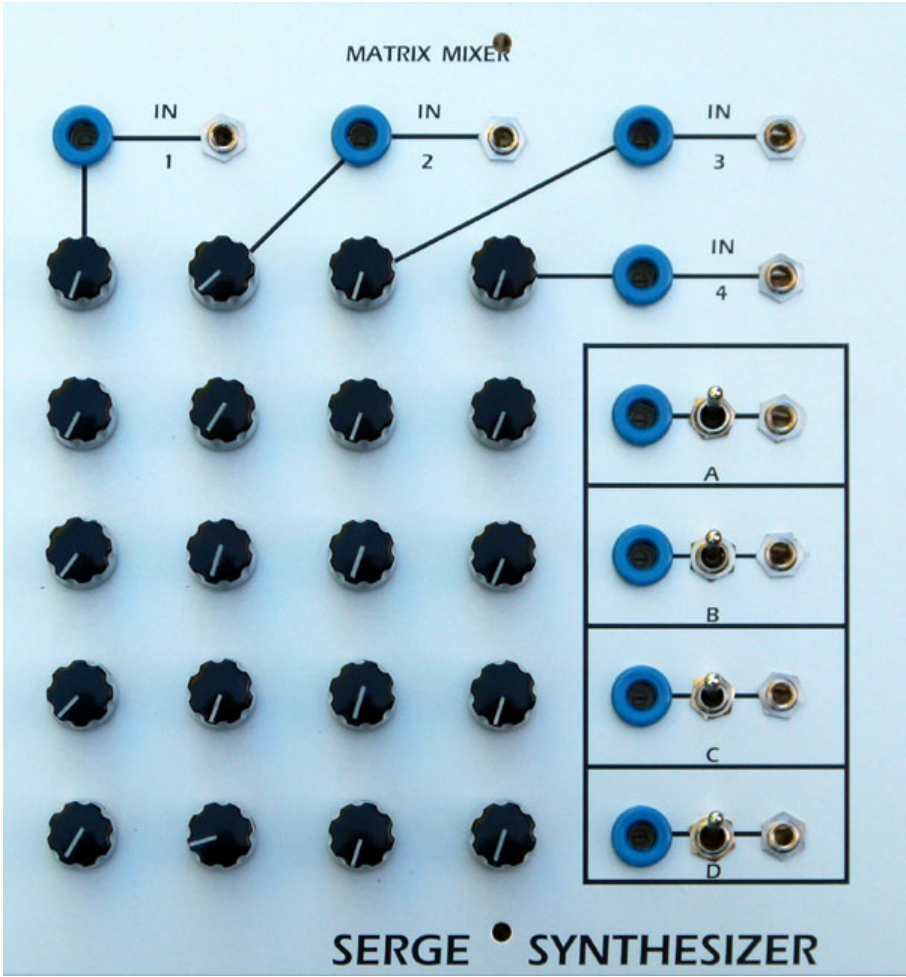
This is a guide only. Parts needed will vary with individual constructor's needs.

If anyone is interested in buying these boards, please check the [PCBs for Sale](#) page to see if I have any in stock.

Can't find the parts? See the [parts FAQ](#) to see if I've already answered the question. Also see the [CGS Synth discussion group](#).

|                                  |          |
|----------------------------------|----------|
| "A" board. Master mixer          |          |
| Part                             | Quantity |
| <b>Resistors (1% metal film)</b> |          |
| 330Ω                             | 4        |
| RB (see text)                    | 12       |
| <b>Capacitors</b>                |          |
| 47pF                             | 8        |
| 100nF (=0.1uF)                   | 5        |
| 10uF electrolytic                | 2        |
| <b>Semi's</b>                    |          |
| TL072                            | 4        |
| <b>Misc.</b>                     |          |
| ID connector 16 pin dual row     | 1        |
| box header 16 pin dual row       | 1        |
| MTA-156 connector 4 pin          | 1        |
| MTA-156 header 4 pin             | 1        |
| Ferrite Bead                     | 2        |
| 16 way ribbon cable              | 1        |
| <a href="#">UNI33_A PCB</a>      | 1        |
| "B" board. 1 per column.         |          |

| Part                                | Quantity |
|-------------------------------------|----------|
| <b>Resistors (1% metal film)</b>    |          |
| 1.5k (see text)                     | 1        |
| linearPCB mounted pot RA (see text) | 5        |
| 100k trimmer (see text)             | 1        |
| 100k                                | 4        |
| RB (see text)                       | 4        |
| <b>Capacitors</b>                   |          |
| 47pF                                | 1        |
| 10nF (=0.01uF)                      | 2        |
| 100nF (=0.1uF)                      | 1        |
| 220nF (=0.22uF)                     | 1        |
| <b>Semi's</b>                       |          |
| TL071                               | 1        |
| <b>Misc.</b>                        |          |
| ID connector 16 pin dual row        | 1        |
| box header16 pin dual row           | 1        |
| UNI33_B PCB                         | 1        |



Despite Serge Synthesizer being printed on this panel, this particular matrix mixer is not a Serge design. It can, however, use the same panel layout.

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