BERGFOTRON
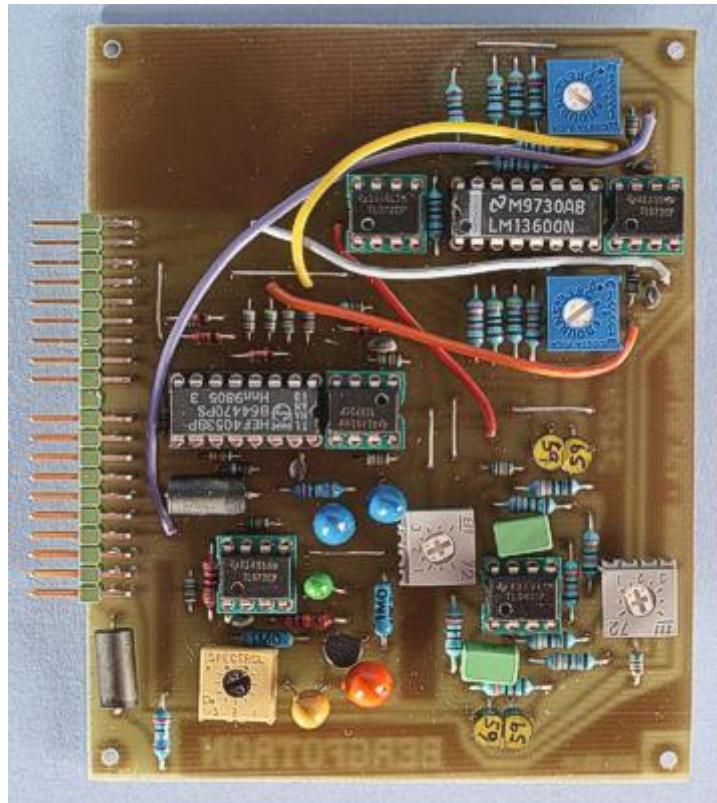
Dual voltage controlled amplifier (AMORE)

The prototype version of the board. There are a few differences compared to the final board.

This simple module consists of two logarithmic VCAs and – as an additional bonus – a noise generator. The latter is a clone of the Roland TR-808 and generates white noise. It has a separate output but can be routed through one of the VCAs if you want to voltage control the noise amplitude. If you don't require the noise generator, you can just omit the parts for it.

The VCAs are based on the LM13600 (or LM13700) and produce a clean sound, with a fairly low noise level. The VCAs are DC-coupled so you can use them to process control voltages in addition to audio signals.

The LM13600 OTA is rather difficult to find nowadays but the LM13700 seems to be still in production. I have tested the circuit with both OTA types and it seems the LM13700 has slightly lower gain but otherwise works exactly like the LM13600. So if you use the LM13700, you might want to increase the feedback resistor on the output op-amp from 47k to 56k or 62k so you get unity gain when CV is either 0 or 10V.
The noise generator uses a 2SC828 transistor as a noise source. This is the transistor originally used in the TR-808. Other noisy NPN transistors should work too. You can try different transistors and select the noisiest one. If you route the noise output to one of the VCA inputs, you should add a 100 kohm resistor inbetween.

Bill of materials

You should have access to the parts in the general bill of materials.
In addition, you need the following less common parts:

2SC828 Noisy NPN transistor

Trimming

There are two trimmers for each VCA and one for the noise generator:

VCA offset
Adjust the trimmers so there is minimal change in the DC voltage at the output when you sweep the CV with no input signal.

CV offset
Set the CV knob to max, connect a VCO to the VCA input and adjust this trimmer until the output signal stops to increase (or starts to decrease, depending on which way you turn).

Noise level
The noise generator has a trimmer fr setting noise amplitude. It's a bit difficult to set this with an oscilloscope. It's better to listen to the noise in speakers and adjust it until the noise is approximately as loud as the waveforms from a VCO.

Skill level required: LOW

This module needs no matching of components and uses no hard to find parts.

Circuit board layout

Component placement

Schematics

Connector pin	signal	on this module
1	1 oct/V	not used
2	in 1	input to VCA 1
3	CV 1	not used
4	CV 2	not used
5	CV 3	amplitude CV 1
6	-15 V	-15 V
7	out 1	output from VCA 1
8	-1 V	-1 V
9	gnd	gnd
10	key	-
11	switch 1	bypass VCA 1
12	switch 2	bypass VCA 2
13	out 2	output from VCA 2
14	+15 V	+15 V
15	+10 V	not used
16	aux output	noise output
17	in 2	input to VCA 2
18	CV 4	not used
19	CV 5	not used
20	CV 6	amplitude CV 1