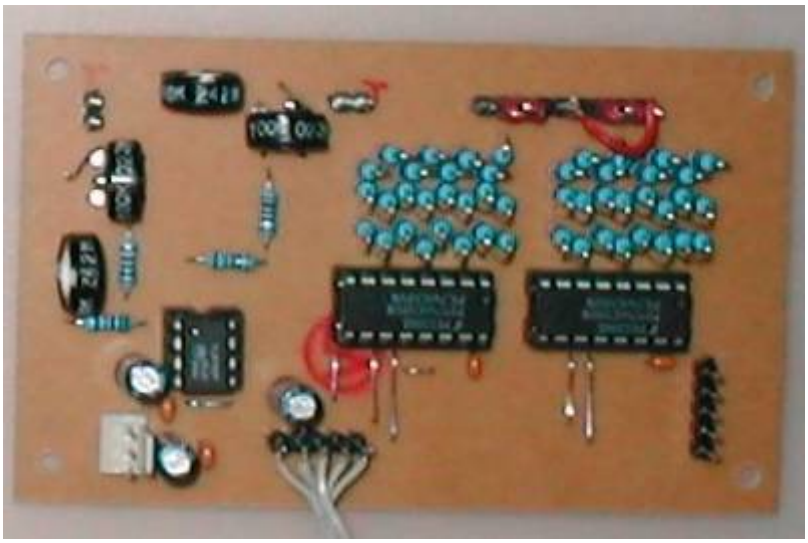
AOUT_LC Module



Introduction

The idea behind the AOUT_LC module was to realize control outputs with parts that are easy to get in most countries. After a discussion with Karl Dalen about the difficulity to find DIY friendly DACs with a serial interface. He proposed these circuits, and the discrete solution was selected because of the simplicity.

In difference to the AOUT or AOUT_NG, this project doesn't require a special (expensive and hard to get) DAC IC, instead resistors are formed to a discrete R-2R ladder network. Building such a circuit means a lot of soldering effort, but as the MBHP is indented as a Do-It-Yourself platform, and not as a commercial product, this argument is very weak. However, the resistor ladder could be replaced by a DAC with parallel interface (see Karl's schematics), this would still have the advantage, that the DACs are accessible via a serial chain (→ low number of uC pins are allocated), and that the software driver doesn't need to be adapted for a proprietary interface.

Regarding the quality of the “discrete DAC” outputs it should be mentioned, that it directly depends on the chosen resistors. The tolerance should be 1% or lower (Metalfilm) and stable over the typical temperature range. The results can be dramatically improved by selecting the best matching resistors: just buy a set of 100 pieces , measure the resistance and take the ones with the best matching values for the ladder circuit.

Another typical problem of cheap DACs (not only of this circuit, but also for cheap integrated DACs) is, that there is some “zipper noise” each time a new voltage is selected. The intensity of this noise depends on the bits which are toggled when a new voltage is selected - the leftmost bits (most signifigant bits) will produce the highest zipper noise. Even I can see this noise on my scope, I haven't noticed an audible effect with a discrete Moog- and CEM3378 filter, yet. Also CV controlled Korg MS-20 oscillators are working well with it. However, this is an explicit warning for those who expect perfect results!

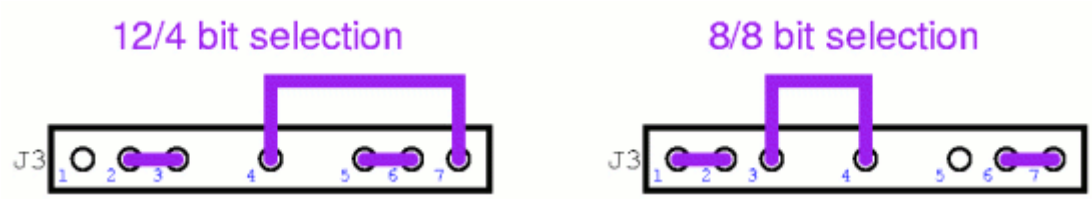
Parts List / Schematic

see AOUT_LC Parts List

- Schematic[UCapps]

Resolution Adjustment

In order to increase the flexibility, the MBHP_AOUT_LC PCB provides two different resolution options. The first channel can either be controlled with 12bit or 8bit resolution, the second channel with 4bit or 8bit resolution:



The 12/4 bit option is used by MIDIbox SID (the filter is controlled with 12bit, the resonance with 4bit only). In the MIDIbox CV firmware the resolution option is selectable. 8/8bit is enough if the module should control V/Oct CV inputs via Note or CC events. 12/4bit should be selected if channel #1 is connected to a Hz/V input, or if high-resolution events (NRPNs, PitchWheel) are desired.

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