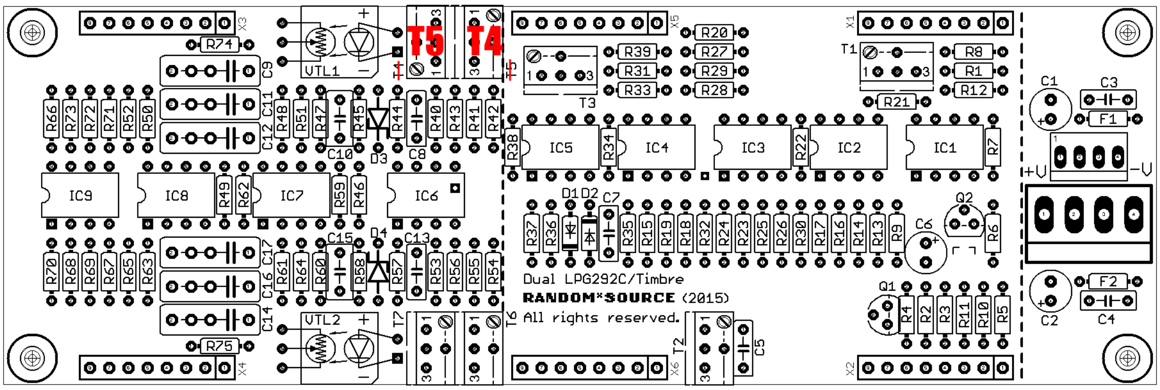
Dual LPG + Timbre

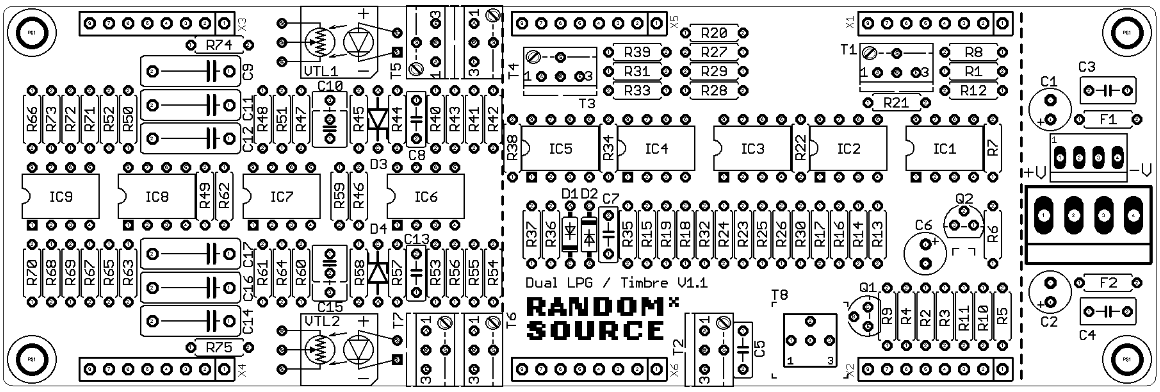
The **Dual LPG + Timbre section** is part of the “Donks“ module and comprises a dual low pass gate based on the famous 292C as well as the equally famous Timbre circuit adjusted to +12V and 5V CV.

The Random*Source kit comprises a main pcb with the **Dual LPG + Timbre circuitry** and a panel pcb where the pots are mounted.

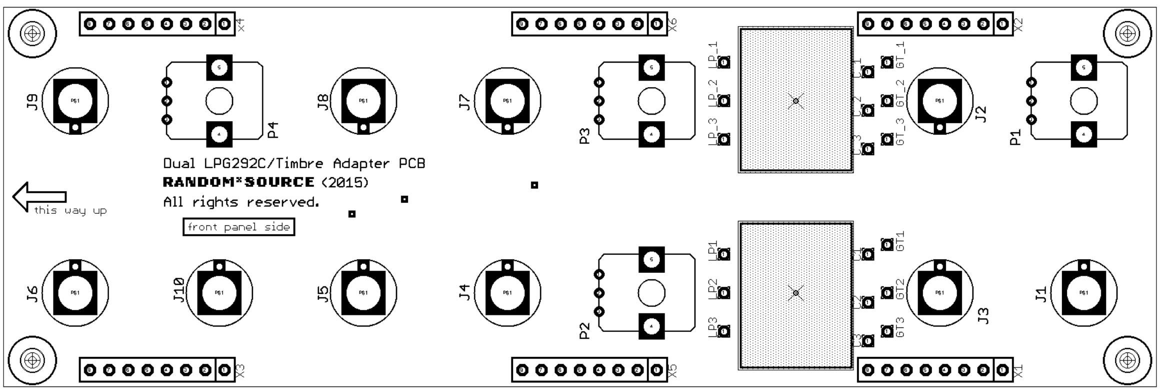
Main pcb V1:



Main pcb V1.1:



Panel pcb:



Please note:

- **Error in V1: the labels of T4 and T5 are mixed up on the pcb! T5 is the upper one (same height as T7). In other words use a 100k to 1M trimpot for the ring/bleed control (labels T4 and T7 on the pcb) and 20k for the CV width (T5 and T6 on the pcb)!**
- LPG: if the capacitors C10 and C15 are too big/wide, they can be soldered onto the other side of the pcb, but may have to be slanted a bit to stay clear of the banana jacks - best to solder them in when the pcb is attached to the component pcb.
- **Version 1.1** adds a **Trimmer (T8)** in series to R9 for easy adjustment of the Timbre folding behavior (depending on input level). It is recommended to use **6k8 for R9** plus **500k** (or 250k) for **T8**.
- Orientation of the main pcb: **power header is at the bottom** (when looking at the module upright, e.g. in a rack)

Bill of Materials (Dual LPG + Timbre)

Resistors

2	10R	F1, F2	alt: 22R, FERRIT BEAD
5	1k	R4, R39, R52, R65, R73	
1	2.2k	R32	
1	3.3k	R12	
1	4.7k	R31	
1	(4.7k)*	R10	* sets Timbre pot behavior (CCW) - we recommend R10 = 8-10% of pot value, i.e. 4.7k for a B50K pot
		R11	sets Timbre pot behavior (CW) - leave empty
1	10k	R6, R13, R36, R38, R43, R50, R56, R63, R74, R75	
10	15k	R48, R51, R61, R64, R66, R67, R68, R69, R71, R72	
1	18k	R22	
1	30k	R23	
5	33k	R8, R29, R37, R44, R57	
1	44.2k	R2	
4	49.9k	R16, R19, R33, R34	
1	51k	R70	
2	68k	R1, R27	
1	75k	R26	
1	91k	R20	
1	100k*	R9	* see above / Calibration info
11	100k	R15, R42, R45, R46, R47, R55, R58, R59, R60	
1	105k	R3	

1	130k	R5	
8	150k	R14, R17, R21, R24, R28, R35, R40, R53	
1	240k	R30	
1	390k	R18	
2	470k	R41, R54	
1	680k	R7	
1	1.5M	R25	
2	4.7M	R49, R62	

Variable Resistors (Trimmers)

2	20k	T4 - labelled T5 on the pcb!!, T6	LPG CV width
1	50k	T3 (Timbre output level)	Timbre output level (single-turn)
2	100k	T1, T2	S64YW - Timbre (single-turn)
2	100K or 1M	T5 - labelled T4 on the pcb!!, T7	LPG ring / bleed balance
1	250k (500k)	T8 - pcb version 1.1 only!	Timbre folding calibration

Capacitors

1	47p	C7	Silver Mica
2	220pF	C11, C16	Styrene (Styroflex)
2	2n	C8, C13	TDK COG or Styrene (Styroflex)
2	1n	C12, C17	Styrene (Styroflex)
2	4.7n	C9, C14	Styrene (Styroflex)
1	10n	C5	TDK COG
2	100n	C3, C4	Decoupling Caps
2	1uF	C10, C15	Film
2	10uF	C1, C2	Electrolytic
1	15uF	C6	Tantalum

ICs

2	1N4148	D1, D2	
1	2N3906	Q1	
1	J201	Q2	JFET
1	SST201	Q2-A (SMT Alternative to Q1)	Install INSTEAD of J201!
9	OPA2134	IC1, IC2, IC3, IC4, IC5, IC6, IC7, IC8, IC9	Burr-Brown Op-Amp
2	ZENER 3.9V	D3, D4	Z-Diode
2	VTL5C3/2	VTL1, VTL2	PerkinElmer Vactrols

Misc

6	SIL header 8pol	X1, X2, X3, X4, X5, X6	8-pin connector, links main pcb to component pcb
1	MTA-100	MTA-100	optional
1	MTA156	MTA-156	MTA-156 power connector
1	B50K	P1 (Timbre)	50k linear pot Alpha 9mm vertical, pcb mount Alt: B100k - adjust R10 accordingly to 8.2k
1	B10K	P4 (Mix)	10k linear(!) pot Alpha 9mm vertical, pcb mount
2	B100K	P2, P3 (LPG Offset)	100k linear pot Alpha 9mm vertical, pcb mount
2	3PDT	Switches (LPG Mode)	NKK M2033SS1W01-RO
7	Banana Jacks	(bipolar) for AUDIO inputs / outputs	Emerson-Johnson Mouser: 530-108-0903-1 (black)
3	Banana Jacks	(unipolar) for PAN / GAIN CV inputs	Emerson-Johnson Mouser: 530-108-0910-1 (blue)

General Building Recommendations

This is simply a suggestion - you might find a different workflow more practical:

1. Mount the Banana jacks and the switches onto the front panel.

2. Mount the pots onto the component pcb. Pots should sit on the printed side - this side faces the front panel. Don‘t solder them in yet.

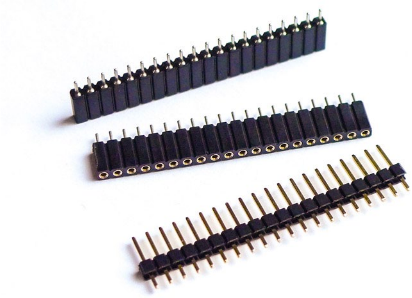
3. Carefully mount component pcb (with the pots inserted) onto the front panel - you may have to wiggle a bit to get the pots through. Make sure the threads of the pots go through.

4. Once everything is nicely in place, solder the pots onto the component pcb (while the front panel is attached). DO NOT SOLDER THE BANANA JACKS YET!

5. Remove the component pcb again. Solder short pieces of (stiff) wire - about 10mm long, 1mm thick works nicely - into the pads for the switches. These should stick up in the air on the printed side (same direction as the pots) and should only go through the pcb as much as required to solder them in (i.e. should not stick out much on the other side). As the switches are quite high, try to connect the wires to the solder terminals of the switches from the side, so the they don‘t increase the height. Don‘t solder the switches in yet. Depending on the SIL headers you use to connect component pcb and main pcb, there may be no room above the switch: **use some (strong) insulation to avoid the solder side of the main pcb the touching the switch contacts**. Beware, the solder points can be quite sharp and will easily get through normal tape.

6. Stuff the main board **after reading the Build Notes below**. Begin with the resistors, then caps etc.

7. Main pcb and component pcb are to be connected through precision DIP socket and pins:



It is recommended to use the pins on the main pcb (facing down, soldered from above) and the pin sockets on the component pcb (standing up, soldered from the front panel side). Break or cut off the pieces you need and stick them together so that main pcb and component pcb form a nice sandwich (don't solder yet). Check that you didn't leave out any pins / holes and that the sockets are all on the same side (component pcb). Solder all the pins in while keeping the sandwich together - this avoids any misalignments.

8. Carefully separate the sandwich - if you used precision sockets, this may not to too easy - they stick together nicely (giving a good connection).
9. Mount the component pcb onto the front panel again and screw on the pots from the front side.
10. Make sure everything is in place.
11. Solder the switches in by soldering the air-wires onto the correcponding contacts.
12. Solder the banana jacks in.
13. Attach any screws / spacers if desired and mount the main pcb onto the component pcb.
14. Connect a power cord supplying +12V, GND, GND, -12V to the MTA-header on the main board and you should be ready to go :-)

General Recommendations

The 3PDT switches underneath the main pcb are quite high. Try to solder any wires from the side to not increase the height any more. Depending on the SIL headers you use to connect component pcb and main pcb, the may be no room above the switch - **use some (strong) insulation to avoid the solder side of the main pcb the touching the switch contacts**.

Timbre Build Notes

1. Use either a J201 or SST201 - not both!!
2. Make sure you observe the polarity of the tantalum cap.
3. Use single-turn trimmers - makes calibration easier.

Timbre Calibration

Calibrating the Timbre is not hard, but it can be a bit confusing as T1, T2 (and the value of R9 - plus T8 in v1,1) interact - T1 does not only set the input level, but by doing so also influences the amount of wave folding. A scope is needed to see the output wave, so a software scope should suffice.

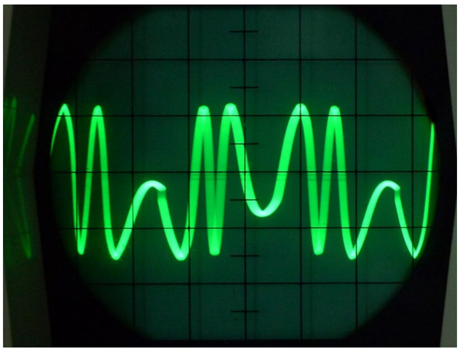
1. Send a sine wave to the Timbre input. Turn the Timbre pot all the way to the left (CCW) and make sure no CV is applied. Version 1.1 only: Set T8 to about 100k-200k (e.g. 30% on 500k trimmer).

2. Use trimpot T1 to get the signal roughly to unity gain or about 4V peak-to-peak (i.e. -2V to +2V) - this can be measured on R1 (using the leg pointing towards T1). Of course a different input level of your signal will result in a different level here, so it's a good idea to check the input level and make sure it represents the typical level you'd feed into the module. For the maximum folding range, try to keep T1 as open as possible without introducing any folding when the pot is at minimum.

3. Adjust T2 so that the wave at the Timbre output jack does not fold, i.e. try to open up T2 as far as possible.

4. Check the Wave when the pot is at maximum (CW). The more folding, the better. You may want to carefully revisit T1 and T2 to find a setting where the pot covers zero folding to as-good-as-it-gets folding.

5. V1.1: Adjust T8 according to taste, starting from around 100k or so.



6. Adjust T3 for the desired output level (R37 and T3 set the output level).

For those about to experiment: R9 is kind of the counterpart to T2 - for a J201 as Q2, any value in the range of 6.8k up to 100k (and probably even above) should to work, but will require different settings of T2. A value of 100k seems to increase the maximum folding range that can be obtained by calibration compared to a 6.8k value, however this may also be due to part tolerances. If you intend to explore alternatives to the J201, you may want to adjust R9 accordingly.

LPG calibration

- T5, T7 set the balance between “ringing” and “bleeding” for the lowpass gates. If you’re a fan of ringing, you may want to turn the trimpots all the way down - in this case, you may as well use 100k trimpot.
- Adjust T4, T6 according to taste.

(Latest change: 11. August 2016, 7:01 PM)