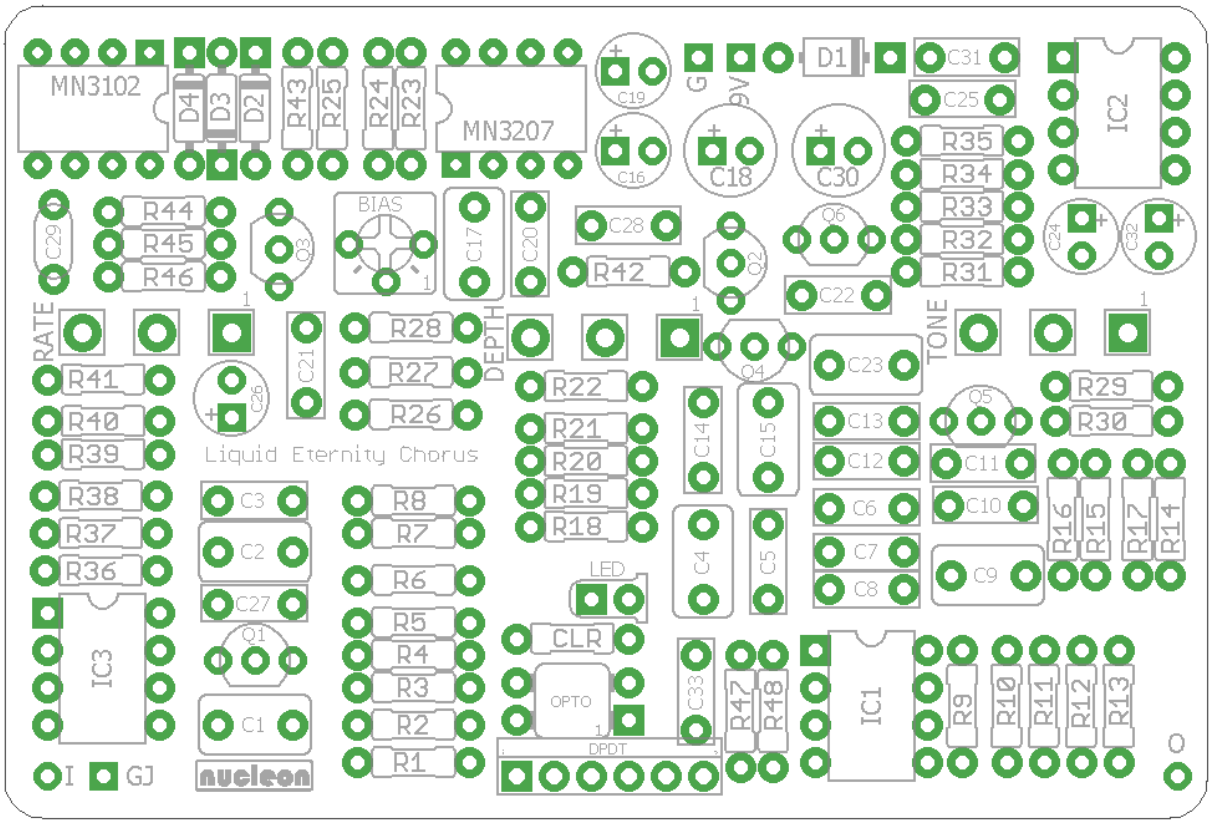
Liquid Eternity Chorus

Date modified: June 24 2018

The Liquid Eternity Chorus is based on the Arion SCH-1 from the 80s. It uses the same delay chip as other fabled chorus pedals like the BOSS CE-2, yet has its own distinctive sound. Originally a cheap unit in a plastic casing, it gained quite a loyal following. Artists such as Eric Clapton and Michael Landau have used the unit. A later revision was called the SCH-Z and there's various mod services to be found online that charge top dollar for converting Zs to 1s. Now you can just build your own.



BOM

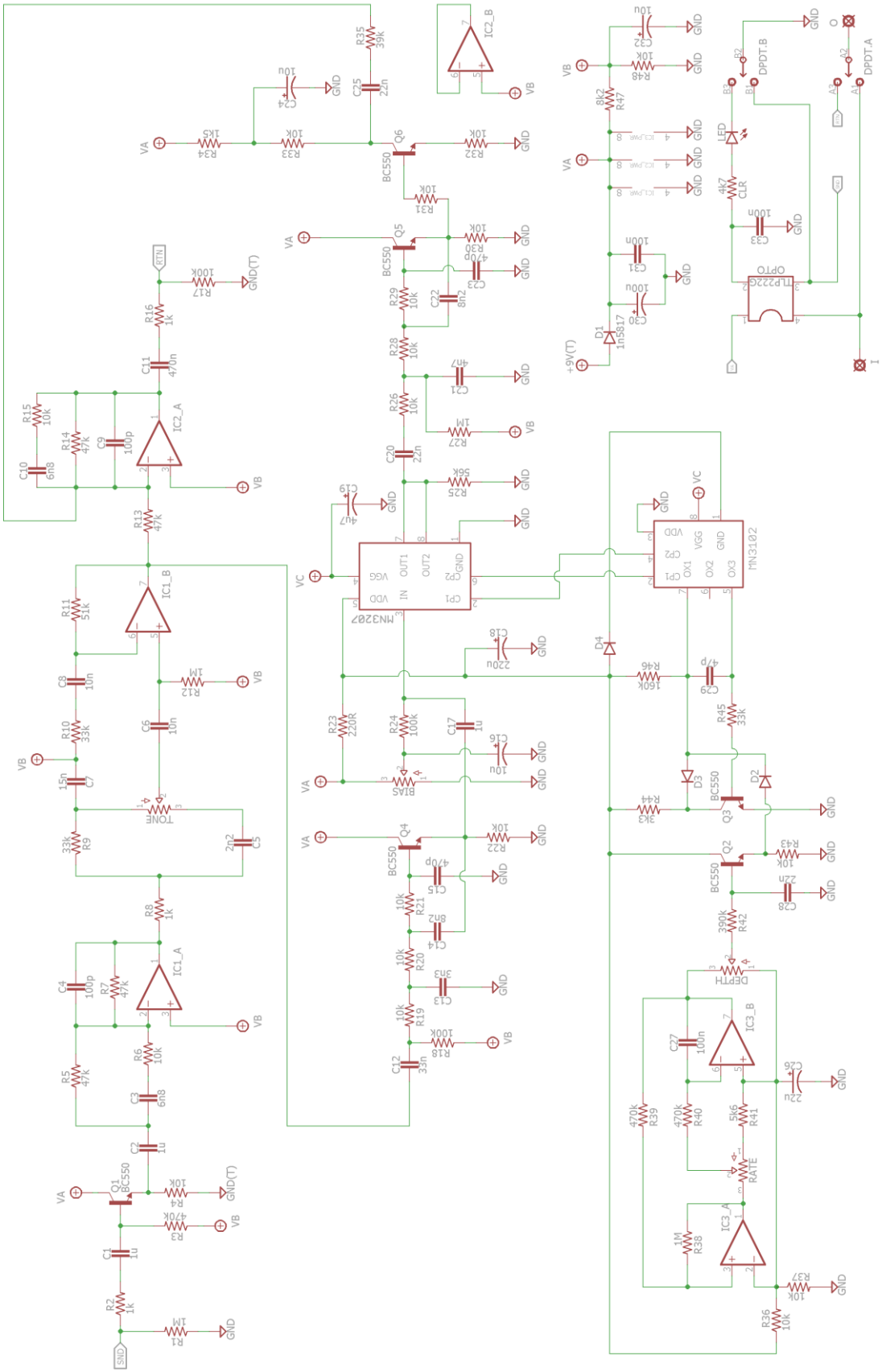
Resistors			
R1	1M	R25	56k
R2	1k	R26	10k
R3	470k	R27	1M
R4	10k	R28	10k
R5	47k	R29	10k
R6	10k	R30	10k
R7	47k	R31	10k
R8	1k	R32	10k
R9	33k	R33	10k
R10	33k	R34	1k5
R11	51k	R35	39k
R12	1M	R36	10k
R13	47k	R37	10k
R14	47k	R38	1M
R15	10k	R39	470k
R16	1k	R40	470k
R17	100k	R41	5k6
R18	100k	R42	390k
R19	10k	R43	10k
R20	10k	R44	3k3
R21	10k	R45	33k
R22	10k	R46	160k
R23	220R	R47	8k2
R24	100k	R48	10k
CLR	4k7		

Capacitors			
C1	1u	C18	220u
C2	1u	C19	4u7
C3	6n8	C20	22n
C4	100p	C21	4n7
C5	2n2	C22	8n2
C6	10n	C23	470p
C7	15n	C24	10u
C8	10n	C25	22n
C9	100p	C26	22u
C10	6n8	C27	100n
C11	470n	C28	22n
C12	33n	C29	47p
C13	3n3	C30	100u
C14	8n2	C31	100n
C15	470p	C32	10u
C16	10u	C33	100n
C17	1u		

Diodes and misc	
D1	1n5817
D2, D3, D4	1n914
Opto	TLP222G
Q1 - Q6	BC550
IC1	TL072
IC2	TL072
IC3	TL072
BBD	MN3207
Clock	MN3102

Controls	
DEPTH	100kB
RATE	100kB
TONE	100kB
BIAS	100k TRIM
Bypass	DPDT Stomp

Schematic



NOTES

In general, this is a tight layout. Some resistors are very close together. I advise you to work on a small group at a time and visually check for accidental solder bridges. That will save a lot of debugging later on.

Setting the Bias

When firing up the circuit for the first time the thing to listen for is if it is passing signal, chorused or clean. If it is, the build was probably successful even if you don't hear a chorus type sound. The next thing to do is adjust the bias trimpot. There will be a narrow range within which a chorus effect is produced. Turn the trimpot left and right to find the outer limits of this range. Mark these with a fine tip sharpie on the put and then adjust the pot to the middle of this range. That should ensure a good chorus sound without the need for an oscilloscope.

Mods

I strongly suggest building the chorus as per the supplied BOM. You could play around with R5 and C9 to change the tone control a bit, but the stock values work just fine. Below are two potential mods that have been tested but are not accommodated on the PCB so they require a little 'rogue' wiring.

Rate LED

Tie a resistor followed by a LED to ground from pin 7 of IC3B to have a LED flash at the rate of the chorus. This should work with a resistor of about 4k7 Ω and a normal diffused LED. Be careful of other combinations. I've found that a bright LED or lower values for the resistor can start messing with the LFO. Your chorus will sound like a very very drunk sailor, warbling all over the place. So best to test this before before drilling your enclosure.

Vibe Mod

A popular mod is to cut the dry signal from one channel and just have the chorused sound for a swirley vibe. You can do this by switching R13 out of the circuit. Instead of putting R13 on the PCB, run a wire from an R13 pad on the PCB to the center lug of an SDST (or SPDT) switch. Solder one side of R13 to an outer lug on the switch and solder a wire to the other end. Run this wire back to the second R13 pad on the PCB. You can also use a footswitch of course. Better yet: a momentary ‘normally closed’ switch. You get the vibe when you step on it and normal operation as soon as you release. This mod was suggested by user MJG on the madbeanpedals.com forum.

Board Mounted Pots

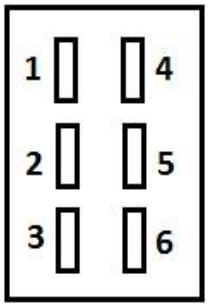
I tried to keep the PCB weight balanced on the pots as best as possible. Try to solder it to the pots as straight and level as possible relative to the enclosure. To make sure there's no excess stress on the pot joints you may cushion the lower side of the PCB a bit by attaching some foam to the lid of the enclosure to support it.

Wiring

JI - tip of input jack
JO - tip of output jack
G - sleeve of output jack

9V - sleeve of power jack
G2 - center of power jack

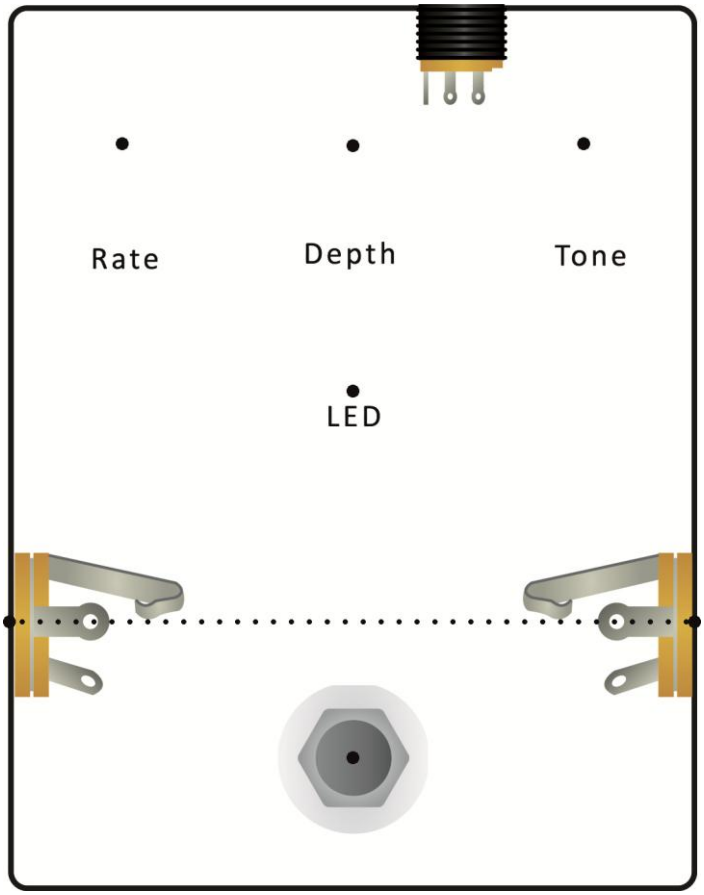
Bypass DPDT
Two sets of three (1 + 2 + 3 and 4 + 5 + 6) corresponding to columns on a DPDT switch.
1 and 4: top lug
2 and 5: center lug
3 and 6: bottom lug



For quick and easy wiring consider using the Nucleon Bypass board.

Drill template

Cover a 1590A in painters tape. Print this page at 100% scale and stick the template on top of the tape with some glue or tape. Double check alignment with the PCB before drilling. Drill the pot holes with a diameter 8 mm (one size larger than required) so you have some wiggle room.



Drill Sizes

Pots: 7 mm minimum (use 8mm if you need some wiggle room)
Toggle switch: 6mm (7mm for extra wiggle room)
Jacks: 9 or 10 mm
Stomp: 12 or 13 mm (5 inches usually)
DC Jack: 7 mm (small barrel, no switch) to 13 mm (round 'Boss style' switched jacks)