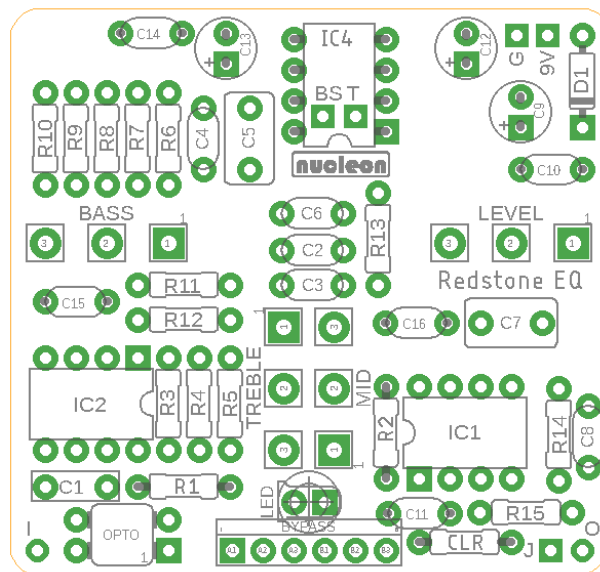


Nucleon Redstone EQ

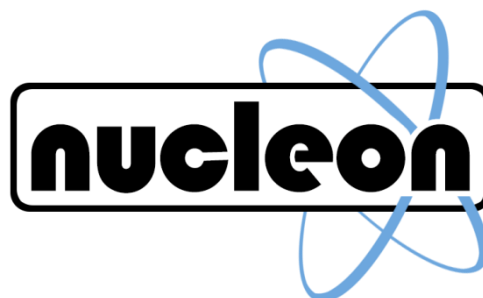
Date modified: June 24 2018

The Redstone is a very effective three band EQ. It has shelving bass and treble controls to add thumb and sparkle. Then there's an independent mid boost/cut that can be easily adjusted to taste by choosing different resistors. The fourth control is the opamp booster stage from the Paperclip boost. You can use this to level match guitars or EQ'd signals. Add sparkle to your clean tones, scoop out the mids for metal riffs or smash into the front of your tube amp with a very hot, mid boosted signal to get it cooking. You can also use the Redstone as a clean preamp into a power amp. There's a charge pump on the board for increased headroom.

An EQ pedal can completely revoice an overdrive, distortion or ramp channel. Place the Redstone after the pedal or in the FX loop for maximum effect. One of my favorite uses is to setup set up a slightly scooped high gain sound for rhythm playing and boost the signal and mids for solos with the Redstone. Works really really well.



This project is for personal (DIY) use only. Commercial (re)selling or distribution of the PCB, it's design layout, this build document is prohibited. These materials are not to be sold as part of a kit. PCBs may only be used as part of a commercial pedal after express permission from NucleonFX. NucleonFX can not be held accountable for any damage to yourself or equipment from the project here described.



BOM

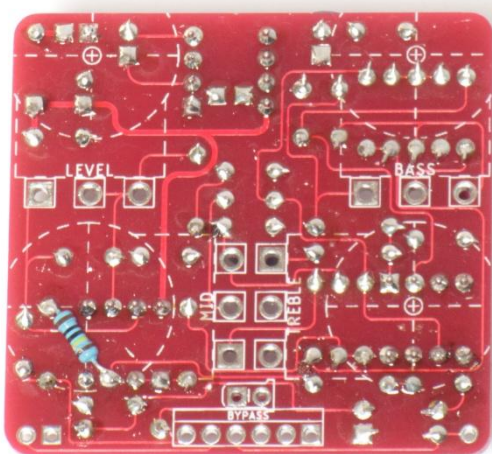
Resistors	
R1	1k
R2	Jumper
R3	100k
R4	4k7
R5	4k7
R6	100k
R7	Jumper
R8	18k
R9	10k
R10	22k
R11	18k
R12	10k
R13	10k
R14	100k
R15	1M
CLR	3k3

Capacitors	
C1	22n
C2	5n6
C3	18n
C4	22n
C5	2n2
C6	1u
C7	47p
C8	1u
C9	100u
C10	1u – 10u MLCC
C11	1u
C12	10u
C13	100u
C14	1u – 10u MLCC
C15	1u – 10u MLCC
C16	1u – 10u MLCC

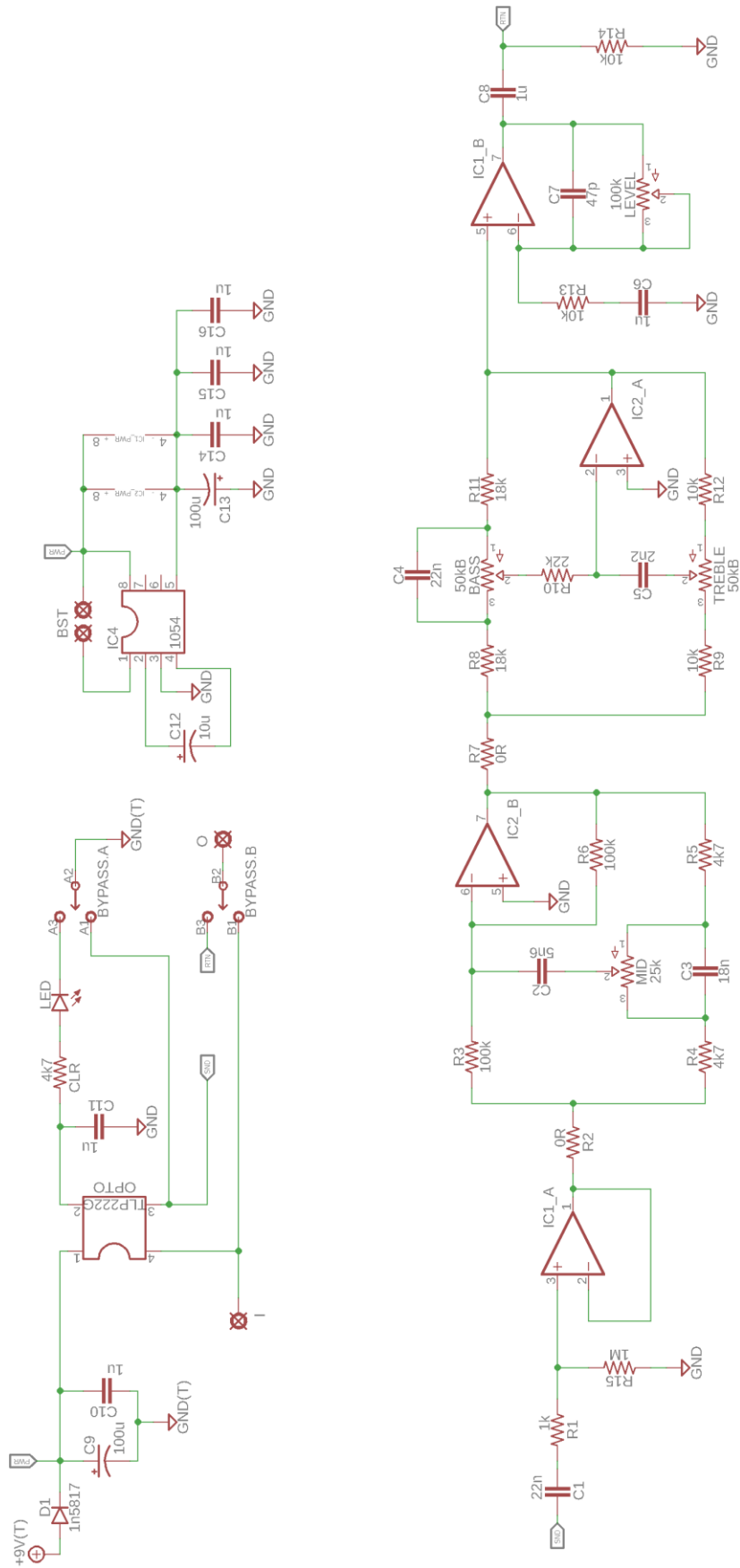
Diodes and misc	
D1	1N5817
IC1, IC2	TL072 etc
IC4	See notes
Opto	TLP222G

Controls	
LEVEL	50kB
BASS	50kB
MID	25kB
TREBLE	50kB
Bypass	DPDT Stomp

An early version of the PCB is missing R15 (doh). Add it underneath the board by connecting (for instance) pin 3 of IC1 and the top of R14. See the picture below. Check the schematic to make sure you understand what's happening.



Schematic

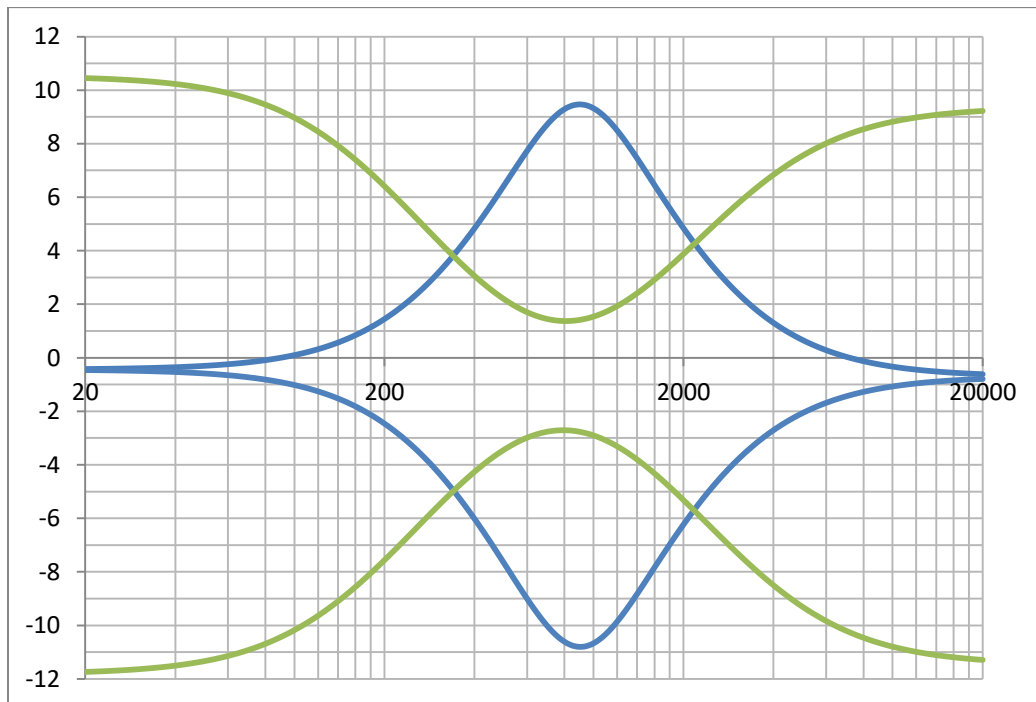


NOTES

Frequency Response

With Bass, Mid, Treble half way and Level fully CCW the EQ should be flat and your bypass and effect signals should be very close. Sculpt your tone from there.

Below is a simulated frequency response for the EQ section (excluding the buffer and booster). Bass and Treble are seen in green either fully CCW and CW and the Mid control is in blue.



Mid Frequencies

The center frequencies for the mid control are determined by R4 (boost) and R5 (cut). They also determine the maximum amount of boost and cut. With the stock 4k7 suggestion the Redstone is set smack bang on that tubescreamer frequency of about 750 Hz. A value of 3k3 could also be a popular one (1000 Hz) but the mid band will then be less isolated from the treble control. Some other suggestions:

Resistor Value (Ω)	Max Boost/Cut (dB)	Frequency (Hz)
2k7	12	1100
3k9	10	900
5k6	8	750

If you build the Redstone into a 1590BB enclosure, you can use the extra space for one or two Mod Boards to always have the possibility to select your ideal mid frequency. Another interesting idea is choosing R4 and R5 for an asymmetrical response. See next section.

Presence Switch

If you use the Redstone as a preamp I suggest $R4 = 3k3$ and $R5 = 4k7$ or $5k6$. This asymmetrical mid control has the side effect of an added 4dB treble/presence boost in all positions. It compensates for the guitar's natural mid heavy sound.

You can easily make this selectable with a switch. Run a wire from one side of $R4$ to a 10k resistor. Solder the other end of the 10k resistor to the outer lug of an SPST (or SPDT) switch and from the middle lug run a wire back to $R4$. Now you can switch between 4k7 to 3k3. You won't notice much in the response of the mids, but there's an added presence. You could also substitute a 20k pot for the parallel resistor if you want to be able to dial it in.

Power filtering

There's was room on the PCB for some extra filtering on the -9V power line so I added C14, C15 and C16. They may not be needed. If your build is producing a faint whining noise with the charge pump your using, adding these capacitors most likely will solve the problem. Use Multi Layer Ceramic Capacitors (MLCC) [here](#).

IC1 and IC2

These can be most any dual opamp that follows the same pinout as a TL072. Since this is an EQ type pedal, it can really benefit from finding the right opamp for you. Maybe go Burr Brown audiophile for C2 if you want to minimize noise. In any case, use a socket. Start out with a cheap opamp and when the build is up and running try some others.

IC4 - Charge pump

This IC generates a -9V supply for the split rail design. I suggest using a socket here also. Pick one of the ICs below. I've not found a bullet proof recipe. I've had seemingly identical builds where one worked well with the 7660S while the other one needed the 1054. In other words: YMMV.

Chip	BST pads	Comments
ICL7660S	Jumper	Cheap and confirmed to be silent in this circuit
TC1044	Jumper	Use as improvement over 7660S if that generates audible whine
LT1054	Leave open	Best performance, highest current consumption and expensive

Wiring

I - tip of input jack	9V - sleeve of power jack
O - tip of output jack	G - center of power jack
J - sleeve of output jack	

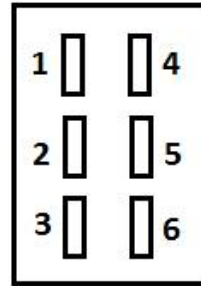
Bypass DPDT

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

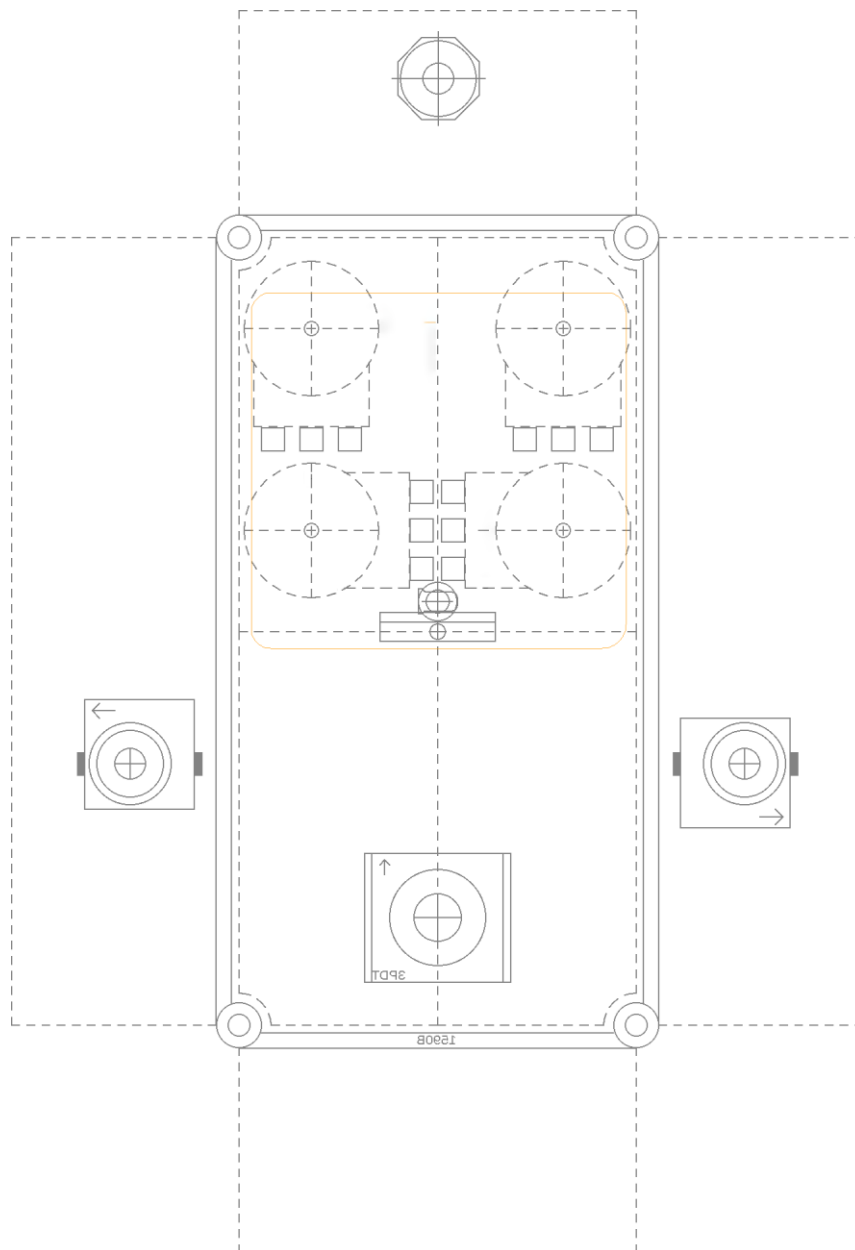
3 and 6: bottom lug



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

Drilling template

If you plan on using an LED holder drill the hole for the LED a bit lower. Otherwise it will be in the way of the legs of the Treble and Mid pots.



Drill Sizes

Below is a list of common drill hole sizes (in mm). Double check with the parts you use.

Pots: 7 mm minimum (use 8mm if you need some wiggle room)

Toggle switch: 6mm

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)