Nucleon Fusion Clean Blend (standard)

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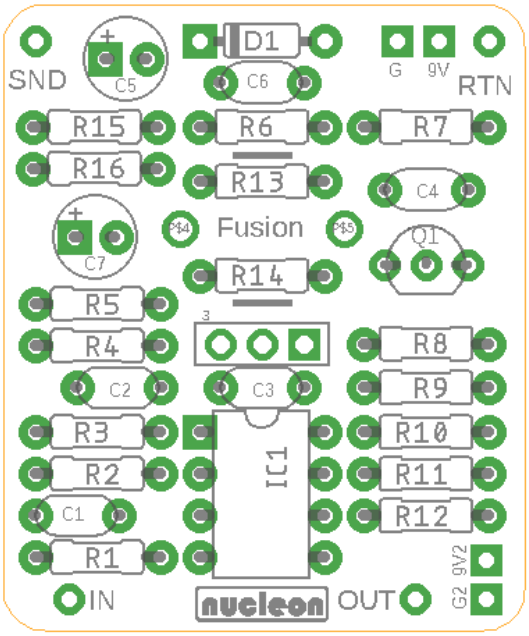
The Fusion allows you to add a clean blend feature to any pedal (or multi) you are building. Assuming you know what effect you're blending in you can tailor it to your needs: straight up blend, boost the clean signal and/or flip the phase of the effect signal Carefully observe the notes to see what part (values) you need.

There is also an 'extended' version available. This adds outboard controls for the boost and phase features. This is ideal if you want to make a stand alone clean blend pedal that can be used with any other (commercial) stompbox you have in your arsenal.



Important note: on early versions the top G and 9V pads have been mislabeled. The pad closest to D1 is the 9V pad, the one next to the RTN pad is ground.

BOM (in phase version)

Resistors	
R1	1M
R2	Omit
R3	Jump
R4	100k
R5	560R
R6	560R
R7	100k
R8	Omit
R9	Jump
R10	Jump
R11	3k3
R12	1M
R13	10k
R14	1k
R15	10k
R16	10k

Capacitors	
C1	100n
C2	100n
C3	1u MLCC
C4	100n
C5	100u
C6	100n MLCC
C7	47u

Diodes and misc	
D1	1N5817
IC1	TL072
Q1	2N5458

Controls	
BLEND	50kB

Boosted Cleans Mod

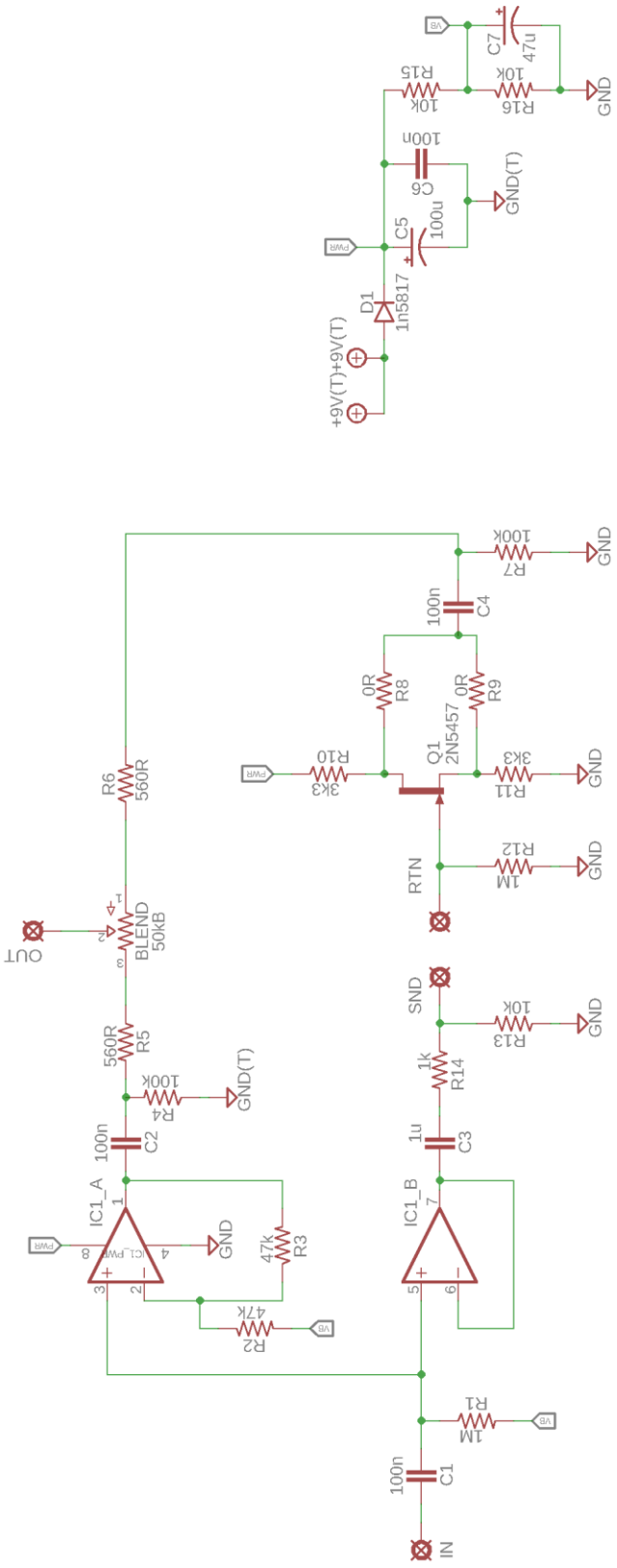
If the effect you're blending is running above unity signal levels, it can be difficult to blend in the clean signal in a desired ratio. To remedy this you can boost the cleans by adjusting R2 and R3. The gain is calculated as $Gain = 1 + \frac{R3}{R2}$. So R2 = R3 = 47kΩ gives a (voltage) gain of 2. Change R2 to 22kΩ will give gain of roughly 4.

Phase Inversion Mod

The output of some effects is phase inverted compared to the input. The ROSS compressor is one example of this. Mixing clean and effect signals will sound thin because the signals (partially) cancel each other out. To compensate, the transistor buffer can be rearranged into a (unity) gain stage that flips the phase back. The recipe is as follows:

R8	Jump
R9	Omit
R10	3k3

Schematic


VB
C7
47u
R15
10K
R16
10K
GND
100n
C6
GND(T)
C5
100u
PWR
D1
1n5817
+9V(T)+9V(T)
R7
100K
GND
100n
C4
0R
R8
0R
R9
Q1
2N5457
R10
3K3
PWR
R11
3K3
GND
RTN
R12
1M
GND
R6
560R
OUT
BLEND
50KB
SND
R13
10K
GND
560R
R5
1k
R14
100K
R4
GND(T)
1u
C3
100n
C2
IC1_A
IC1_B
GND
47k
R3
4.7K
R2
1M
R1
100n
C1
IN

NOTES

Board Mounted Pots

Use board mounted pots and tag them to the pcb by soldering only one leg at first. Fit the PCB to the enclosure and solder the remaining legs. Then reflow the first leg to relieve any tension from it. Put some thick double sided tape on the back for isolation.

Capacitor types

I roughly follow these guidelines for capacitor size when designing the:

- smaller than 1nF: Multi Layer Ceramic (MLCC) for filtering
- smaller than 1nF: WIMA box caps in audio path
- 1nF - 10nF: Whatever I have around, usually 'greenies' or MKP box caps
- 10n - 1u: Panasonic ECQ-V in audio path
- 100n - 1u: MLCC for power filtering1u - 470u: Electrolytics

This is mostly due to what's available in my personal stock. You can deviate from this. The only exception is the use of MLCC caps for filtering power lines. These do a better job than film caps.

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

SW1 - center pad to center lug
Outer pads to outer lugs

SW2 - one pad to centerlug
Other pad to outer lug
(one lug unused)

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