

GREEN BEAN

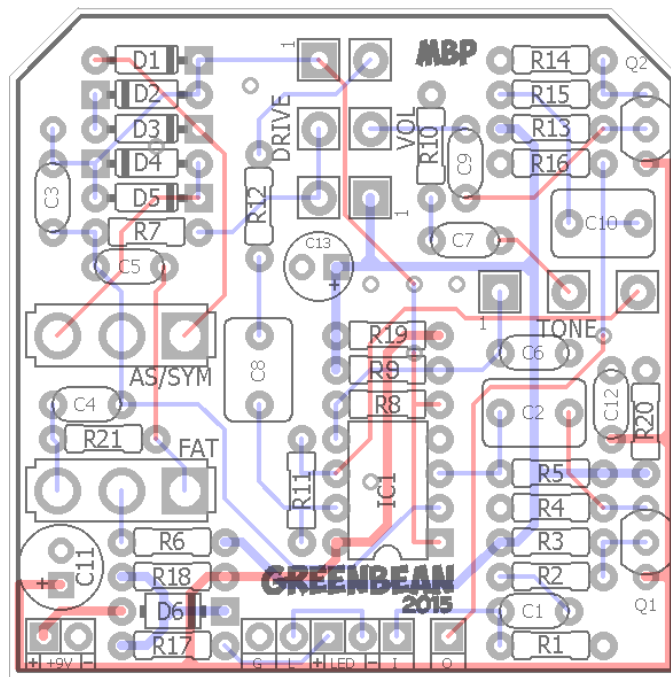
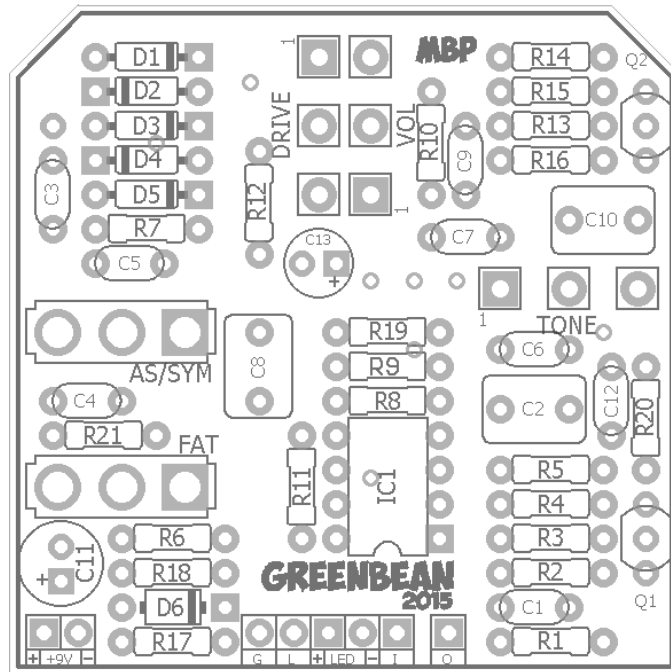
FX Type: Overdrive

Based on the Ibanez® Tube Screamer™

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2015 version

1.95" W x 1.95" H



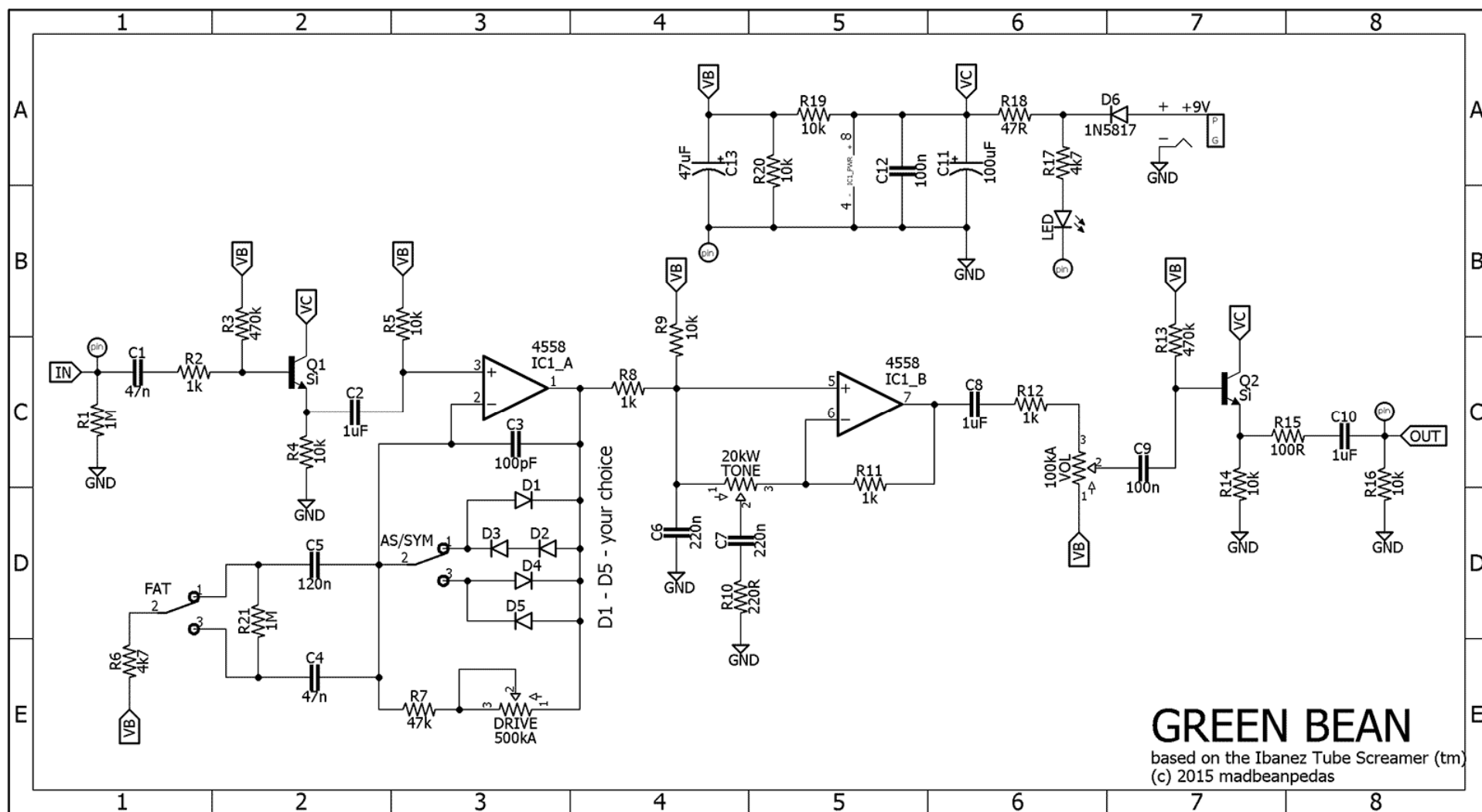
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"madbean" version					
Resistors		Caps		Diodes	
R1	1M	C1	47n	D1 - D3	1n914
R2	1k	C2	1uF	D4, D5	your choice
R3	470k	C3	100pF	D6	1N5817
R4	10k	C4	47n	IC	
R5	10k	C5	120n	IC1	JRC4558
R6	4k7	C6	220n	Transistors	
R7	47k	C7	220n	Q1, Q2	Si
R8	1k	C8	1uF	Switches	
R9	10k	C9	100n	FAT	On/On
R10	220R	C10	1uF	AS/SYM	On/On
R11	1k	C11	100uF	Pots	
R12	1k	C12	100n	TONE	20kW
R13	470k	C13	47uF	DRIVE	500kA
R14	10k			VOL	100kA
R15	100R				
R16	10k				
R17	4k7				
R18	47R				
R19	10k				
R20	10k				
R21	1M				

Stock Version					
Resistors		Caps		Diodes	
R1	omit	C1	20n	D1 - D3	your choice
R2	1k	C2	1uF	D4, D5	1n914
R3	510k	C3	51pF	D6	1N5817
R4	10k	C4	47n	IC	
R5	10k	C5	120n	IC1	JRC4558
R6	4k7	C6	220n	Transistors	
R7	51k	C7	220n	Q1, Q2	2SC1815
R8	1k	C8	1uF	Switches	
R9	10k	C9	100n	FAT	On/On
R10	220R	C10	1uF	AS/SYM	On/On
R11	1k	C11	100uF	Pots	
R12	1k	C12	100n	TONE	20kW
R13	510k	C13	47uF	DRIVE	500kA
R14	10k			VOL	100kB
R15	100R				
R16	10k				
R17	4k7				
R18	47R				
R19	10k				
R20	10k				
R21	1M				

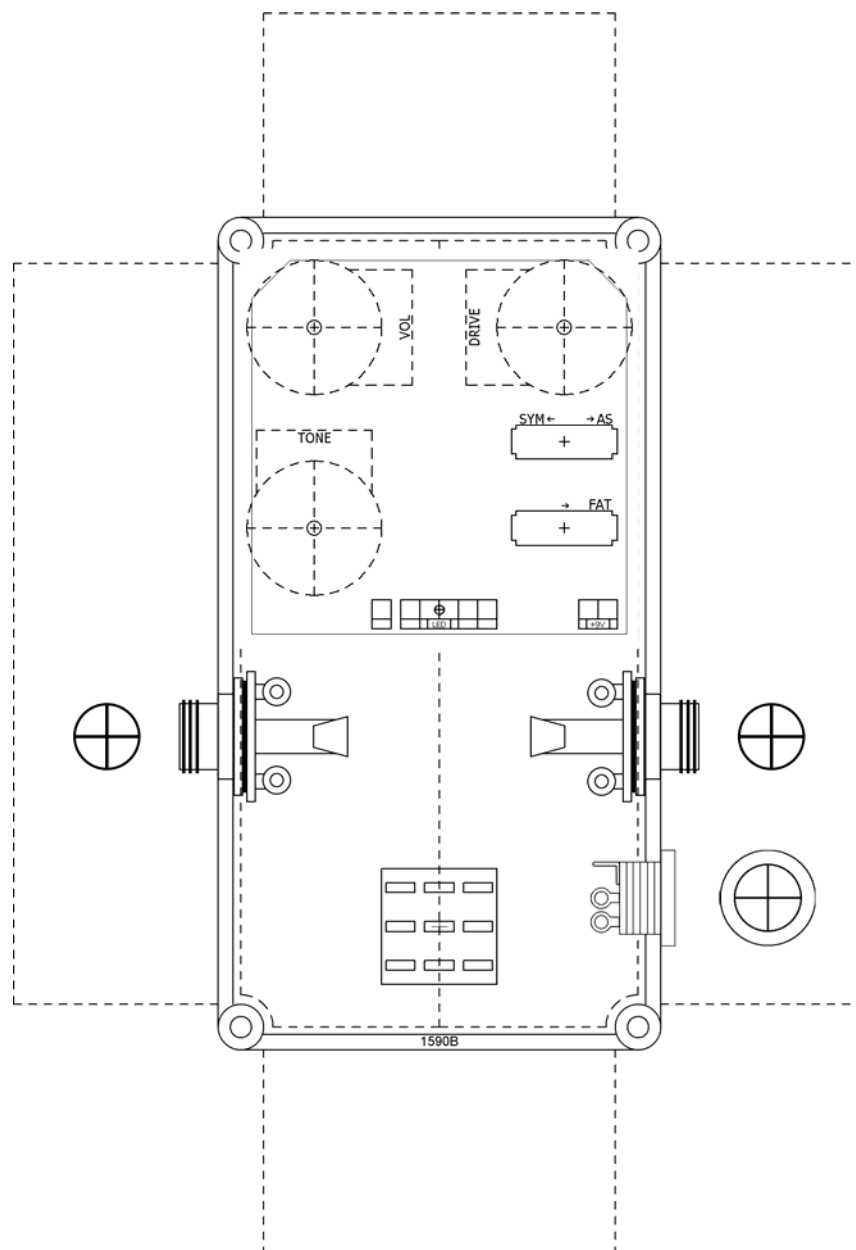
Highlighted components indicate different values in the two version.

Shopping List (madbean version)			
Value	QTY	Type	Rating
47R	1	Metal / Carbon Film	1/4W
100R	1	Metal / Carbon Film	1/4W
220R	1	Metal / Carbon Film	1/4W
1k	4	Metal / Carbon Film	1/4W
4k7	2	Metal / Carbon Film	1/4W
10k	7	Metal / Carbon Film	1/4W
47k	1	Metal / Carbon Film	1/4W
470k	2	Metal / Carbon Film	1/4W
1M	2	Metal / Carbon Film	1/4W
100pF	1	Ceramic / Film / Mica	25v min
47n	2	Film	25v min
100n	2	Film	25v min
120n	1	Film	25v min
220n	2	Film	25v min
1uF	3	Film	25v min
47uF	1	Electrolytic	25v min
100uF	1	Electrolytic	25v min
1n914	3		
D4, D5	2	LED, Germanium, Silicon	
1N5817	1		
JRC4558	1	or, other	
Si	2	2N5088/89 or BC550	
On/On	2	SPDT / solder lugs	
20kW	1	PCB Right Angle	16mm
500kA	1	PCB Right Angle	16mm
100kA	1	PCB Right Angle	16mm

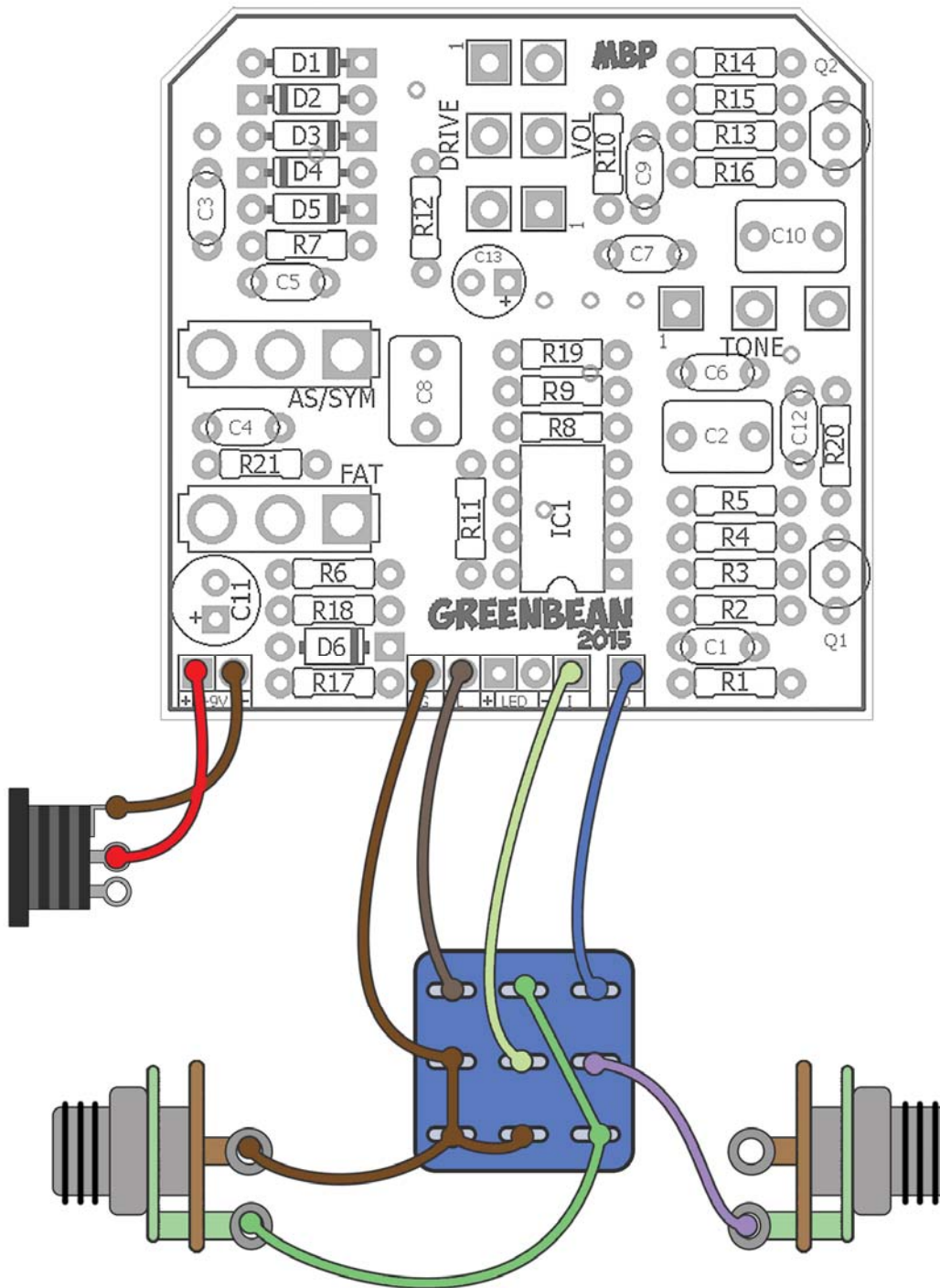


1590B Drill Guide

4.44" W x 6.46" H



Wiring Guide



Pots, switches and indicator LED are soldered directly to the PCB.

The Ibanez® Tube Screamer™ is probably the most well known and widely used overdrive in the history of guitar effects pedals. Vintage TS units can fetch several hundred dollars on the used market while new units remain cheap and plentiful. The Green Bean is based on the vintage unit, known as the 808, however it incorporates several mods to increase its flexibility and tonal range.

The 2015 version in a new layout. The two toggle switches have moved to a more convenient location and the Tone knob has moved to one side.

There are two versions listed from you to choose from . The Stock values give the original TS in all its glory. The "madbean" version is the one I always build. Here is an explanation of why I choose the different values.

R1 - This pulldown resistor is not needed on the Tube Screamer since it is a buffered bypass (not present in the Green Bean). In the absence of the buffer bypass, a pulldown decreases the chance for any popping when the foot-switch is engaged.

R3, R13 - These resistors do two things: set the input impedance on the input and output buffer transistors and provide current to the transistor bases. The value here is not terribly critical so I use 470k because it's more common. You could even go up to 1M if you wanted but I probably would not go higher than that (if the resistance is too high the resistors may not provide adequate current to the transistor base for proper operation). Conversely, you would not want to use too low of a value for these....there is no reason to go below 470k.

R7 - The value of this resistor sets the minimum gain when the Gain knob is all the way down. I use 47k because it is a more common value. It will lower the minimum gain slightly but almost imperceptibly.

C1 - Who has a 20n film cap? Not me. 47n also lets a little more bass into in the circuit. 27n is another popular alternative.

C3 - I use 100pF instead of 51pF because it smoothes out the high frequency range a bit more when the Gain pot is all the way up. This helps balance out the Tone pot, IMO (the Tone pot at full up can get a little "ice-pickey" with some guitars).

D1 - D6 - The vintage TS used two back to back silicon diodes for symmetrical clipping. This is fine. It is also boring. The madbean version instead uses the silicon diodes asymmetrically and gives the option for a different pair of diodes for symmetrical clipping. I generally use LEDs for the symmetrical clipping, but you can use anything you like here; silicon, LED, germanium, etc.

Q1, Q2 - Since these two transistors are used as buffers the actual transistor we use is not critical (IOW one particular type does not impart any magic tone more than another). The only thing that matters here is that they are reasonably low noise and reliable. So, I pick the more common C-B-E pinout type rather than the 2SC1815 which is E-C-B (note if you use 2SC1815 on the GreenBean you are going to have to twist the transistor leads around). I generally use either 2N5088/89 or BC550 (these have the opposite pinout from the 2N5088). The BC550 does seem to be slightly lower noise but that is purely anecdotal.

VOL - Just a personal preference. I like audio taper for the volume control more than the linear type. YMMV.

Other Mods

The **Fat** switch changes between the stock clipping frequency cap (47n at C4) and a larger value cap (120n at C5). This increases the bass response of the overdrive by moving the mids emphasis of the Tube Screamer™ clipping from around 720Hz down to approximately 282Hz. This is what could be considered the lower

threshold of the “warmth” frequency range, which tops off at around 400Hz. If you do not have a 120n cap, use a 100n. You could go higher up to 150n but it will start to get a bit muddy at that point.

The **AS/Sym** switch lets you choose between asymmetrical clipping and symmetrical clipping. The vintage TS unit used two small signal diodes back to back for symmetrical clipping. A common mod for TS builders is to change one of those diodes to two diodes in series to create asymmetrical clipping. Some purport this makes it behave more like a tube amp, but nah, it doesn't. It just makes it sound a little different. Trust me on this. Why would I lie to you? There is no switch that suddenly makes guitar pedals sounds like amps. That's just marketing.

Anyway, it is a good mod so you have both options. The BOM does not list any particular diodes to encourage experimentation but I will tell my personal choice: in my builds D1-D3 are 1n914 and D4, D5 are 3mm red diffused LEDs. The LEDs are louder and crunchy, where the 1n914 are smooth and quieter. But, feel free to try as many varieties as you can stand. For this reason, it is a good idea to socket those diodes until you are sure you have the combination you want.

BTW: If you use an On/Off/On SPDT for the As/Sym mod, the center position will be no clipping diodes. This is the same as the “Comp Cut” mode on the Fulldrive 2™.

The two toggle switches, while better located now, as still fairly close to the Gain knob. For this reason, I **suggest not using HUGE knobs** for this build. 1/2" - 3/4" diameter should be fine.

Lastly, you can go up to 1MA on the Gain pot for more overdrive. This tends to make less difference on the 1n914 diodes since they are fairly saturated at 547k (gain pot + stopper resistor) but if you do use LED's the extra resistance will help drive them a bit harder for more saturation.

You can run the Green Bean at 15 or 18v provided you use caps and an IC rated accordingly. Rail to Rail op-amps typically have a lower max voltage threshold. IOW: look at the datasheet and use the appropriate voltage.

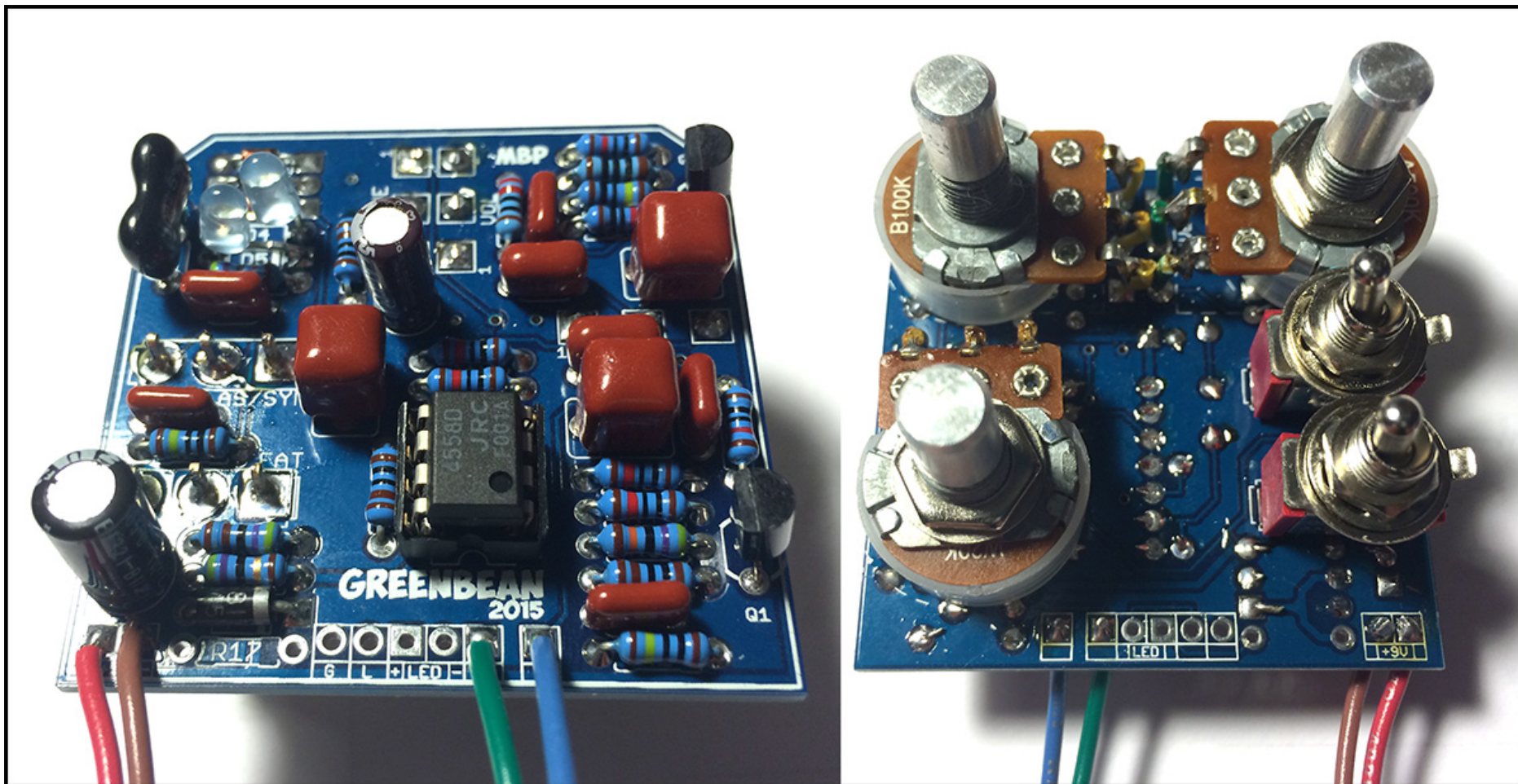
There are many op-amps to try in the Grean Bean besides the 4558. Here are a few: JRC4580D or DD, TL072, LF353, LM1458, TLC2272, OPA2134, LF442, OPA2604, NE5532, JRC3404 and on and on.

For a thorough analysis of the Tube Screamer™ circuit design, please read R.G. Keen's article on the subject:

http://www.geofex.com/Article_Folders/TStech/tsxtech.htm

You should read his “Technology of...” articles about once a year. You will learn something new each time.

Voltages - 9.42v supply			
VC: 9.0		VB: 4.49	
IC1	DC	Q1	DC
1	4.48	C	9
2	4.56	B	3.92
3	4.48	E	3.58
4	0	Q2	
5	4.48	C	9
6	4.48	B	3.58
7	4.48	E	3.27
8	9		



Hey you liar! You said you use 100k Ω for VOL! True, but I was also out of them when I did this verification build. The blue LED's I picked kinda suck so I will be changing those, too. It was worth a try.