

# GREEN BEAN

2014 edition

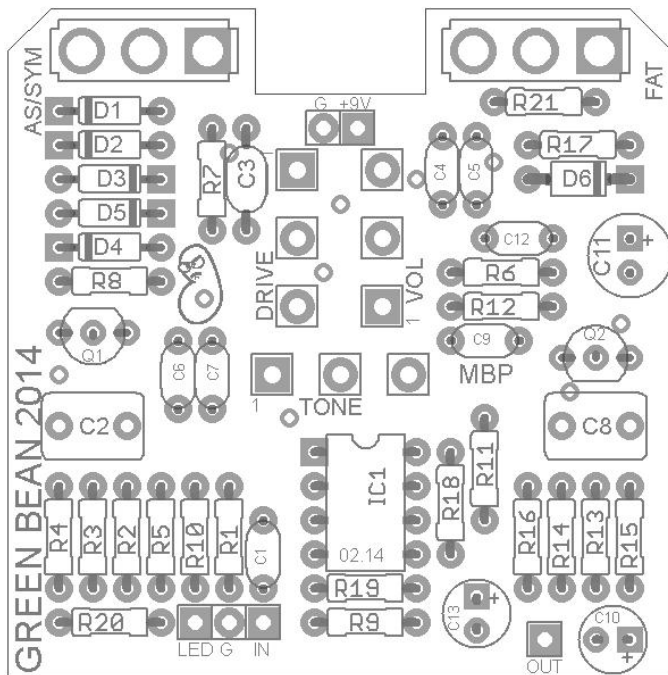
## FX Type: Overdrive

Based on the Ibanez® Tube Screamer™

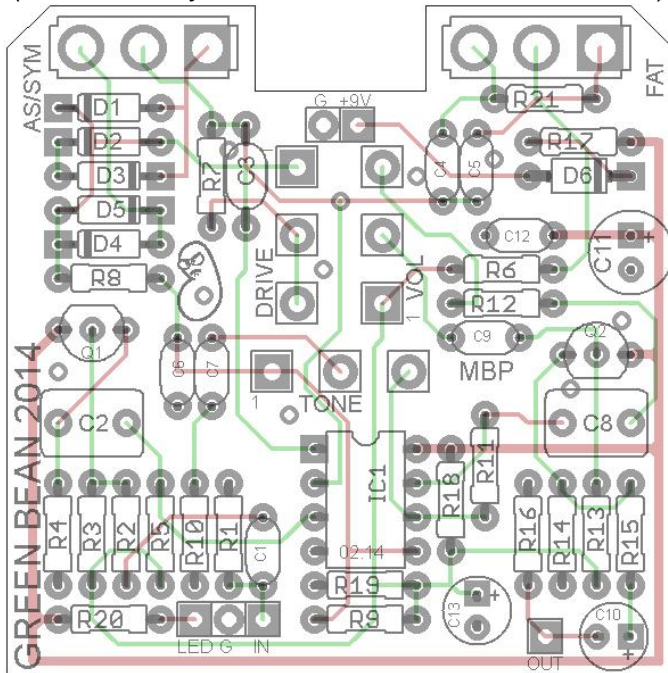
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Previous version: <http://www.madbeanpedals.com/projects/GreenBean/docs/GreenBean.zip>

**1.95" W x 1.96" H**



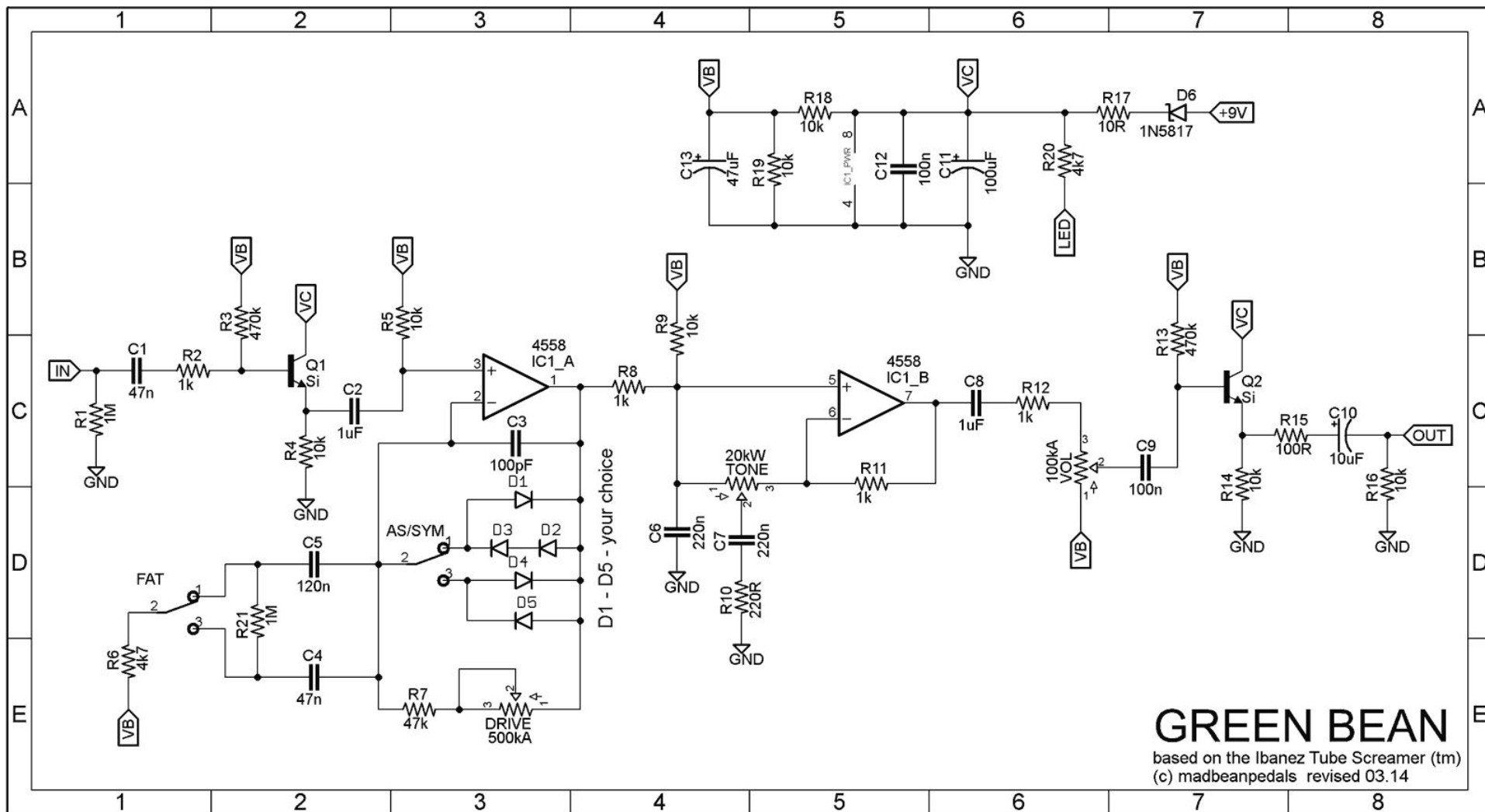
(those extra tiny holes are vias---don't mess with those)



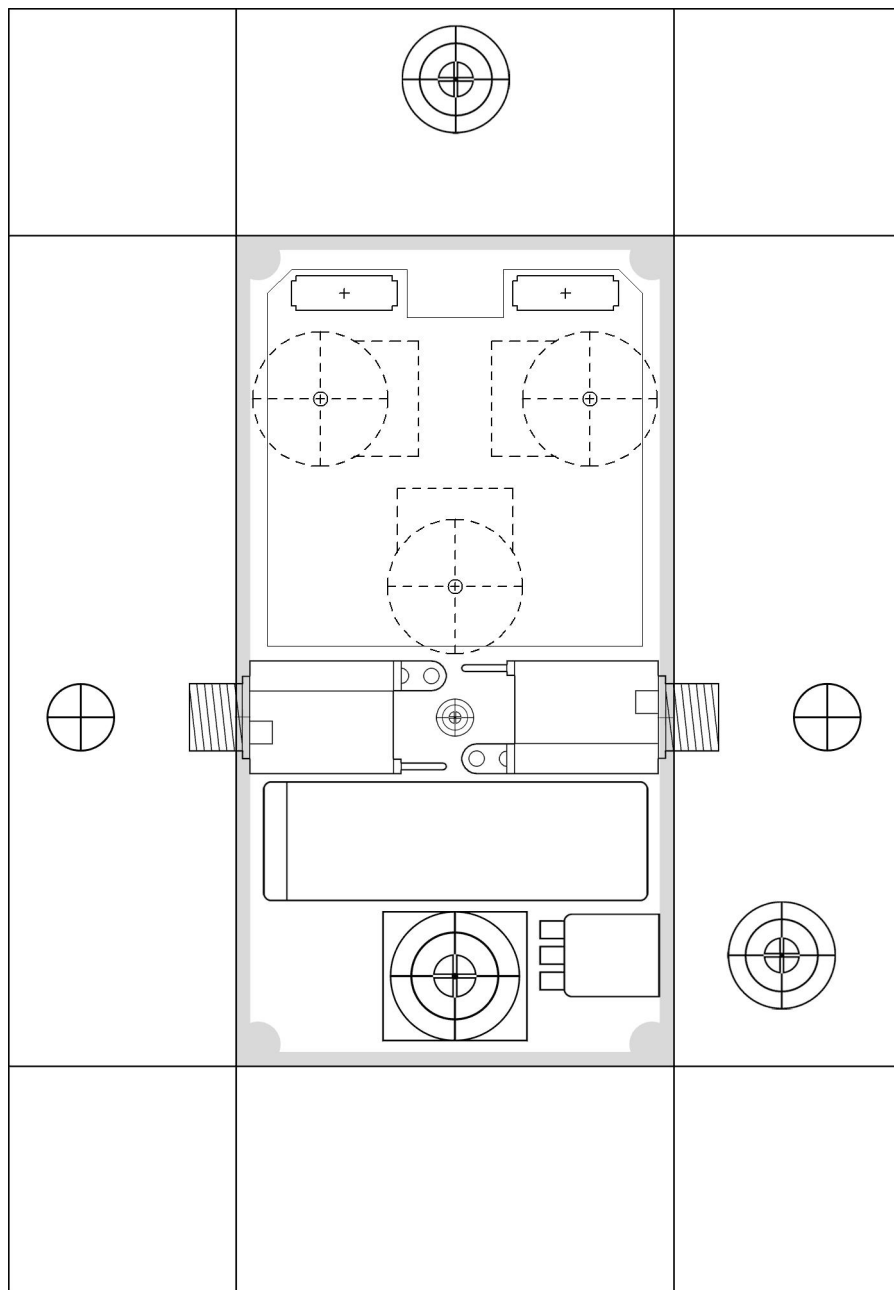
**Terms of Use:** *You are free to use purchased Green Bean circuit boards for both DIY and small commercial operations. You may not offer Green Bean boards for resale or as part of a “kit” in a commercial fashion. Peer to peer re-sale is, of course, okay.*

BOM					
Resistors		Caps		Diodes	
R1	1M	C1	47n	D1-D5	your choice
R2	1k	C2	1uF	D6	1N5817
R3	470k	C3	100pF	Transistors	
R4	10k	C4	47n	Q1, Q2	Si
R5	10k	C5	120n	IC	
R6	4k7	C6	220n	IC1	4558
R7	47k	C7	220n	Switches	
R8	1k	C8	1uF	FAT	On/On
R9	10k	C9	100n	AS/SYM	On/On
R10	220R	C10	10uF	Pots	
R11	1k	C11	100uF	DRIVE	500kA
R12	1k	C12	100n	TONE	20kW
R13	470k	C13	47uF	VOL	100kA
R14	10k				
R15	100R				
R16	10k				
R17	10R				
R18	10k				
R19	10k				
R20	4k7				
R21	1M				

Shopping List		
Value	QTY	Type
10R	1	1/4W
100R	1	1/4W
220R	1	1/4W
1k	4	1/4W
4k7	2	1/4W
10k	7	1/4W
47k	1	1/4W
470k	2	1/4W
1M	2	1/4W
100pF	1	Ceramic/Mica
47n	2	Film
100n	2	Film
120n	1	Film
220n	2	Film
1uF	2	Film
10uF	1	Tantalum / Electrolytic
47uF	1	Electrolytic
100uF	1	Electrolytic
Diodes	5	1n914, 1n4001, LED, etc.
1N5817	1	
Si	2	2n5089, BC550, etc.
On/On	2	SPDT solder lug
500kA	1	16mm PCB Pot
20kW	1	16mm PCB Pot
100kA	1	16mm PCB Pot



4.64" W x 6.69" H



If you are using a battery, drill for the side DC jack next to the 3PDT switch. If not using a battery, use one of the smaller DC jacks (or the one with an external nut) and mount at the top of the enclosure (this is where the 9v hookup is located).

Small DC Jack:

<http://www.bitcheslovemyswitches.com/#/~product/category=5027592&id=18921807>

<http://www.smallbearelec.com/servlet/Detail?no=1362>

External DC Jack:

<http://www.bitcheslovemyswitches.com/#/~product/category=5027592&id=26629535>

<http://www.smallbearelec.com/servlet/Detail?no=666>

Download the Photoshop template used to create this drilling guide:

[http://www.madbeanpedals.com/projects/GreenBean/docs/GB\\_1590B\\_Drill.zip](http://www.madbeanpedals.com/projects/GreenBean/docs/GB_1590B_Drill.zip)

## Overview:

The Ibanez® Tube Screamer™ really does not require an introduction. It is probably the most well known and widely used overdrive in the history of guitar effects pedals. Vintage TS units are known to fetch in the several hundred dollar range 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.

*List of changes between the Tube Screamer™ and Green Bean.*

Part	TS	Green Bean
R1	not used	1M
C1	20n	47n
C3	51pF	100pF
R3	510k	470k
R7	51k	47k
R13	510k	470k
R17	not used	10R
C6, C7	Tantalum	Film
C2, C8	Non-Polar	Film
Vol	100kB	100kA

In addition to the value changes listed above, two other mods were implemented: the **Fat** switch and the **As/Sym** clipping switch.

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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. The Fat switch is great for lower gain settings. Higher gain settings tend to show less difference between the positions. And, of course, you can use other values here such as 82n, 100n, or even 150n. I would not go higher than 220n unless you like a lot of mud in your tone.

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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™.

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Lastly, the two transistors here are not indicated. This is because a variety of NPN Silicon transistors will work. These are only used as buffers and the particular transistor chosen should have little or no impact on the tone of the circuit. From experience, I can tell you that I have used 2n5089 in a lot of these builds but recently I used BC550 instead. The only difference I could tell is that there seemed to be a bit less noise with the BC550 (or my previous builds were noisy for some other reason). In any case, the pinout for the transistors on the Green Bean is the same as the 2n5089/88. If you use BC550, be sure to flip the transistor around since it has the opposite pinout.

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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.

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

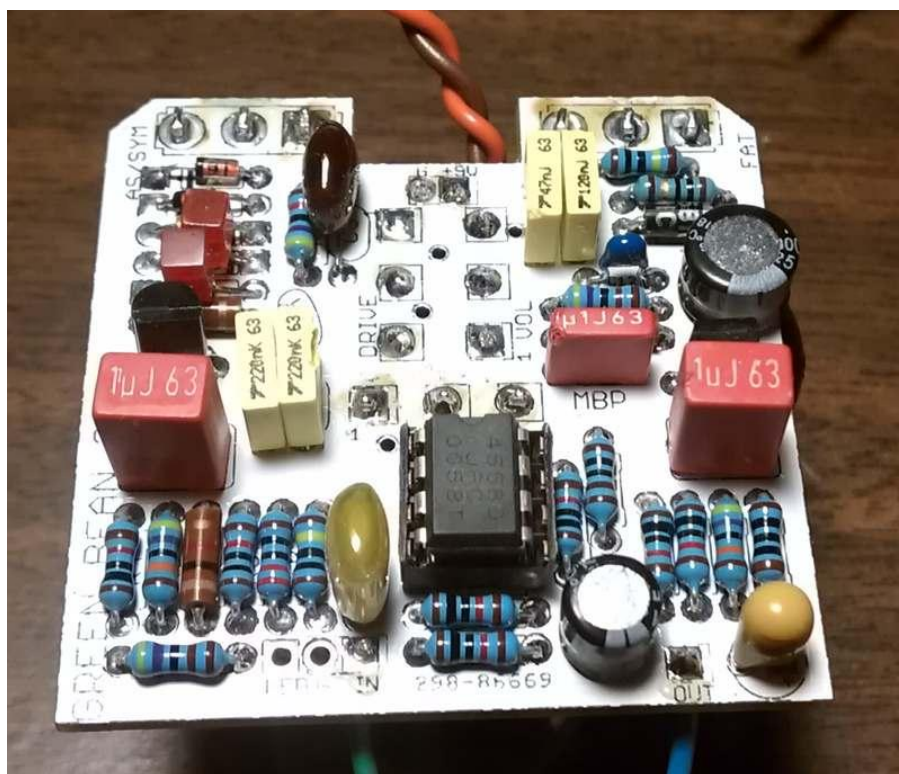
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For a thorough analysis of the Tube Screamer™ circuit design, please read R.G. Keen's article on the subject:

[http://www.geofex.com/Article\\_Folders/TStech/tsxtech.htm](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.

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*Please excuse the flux and burn marks shown in this build. Some things...happened.  
Despite its poor appearance it sounds great!*