

RUSTBUCKET

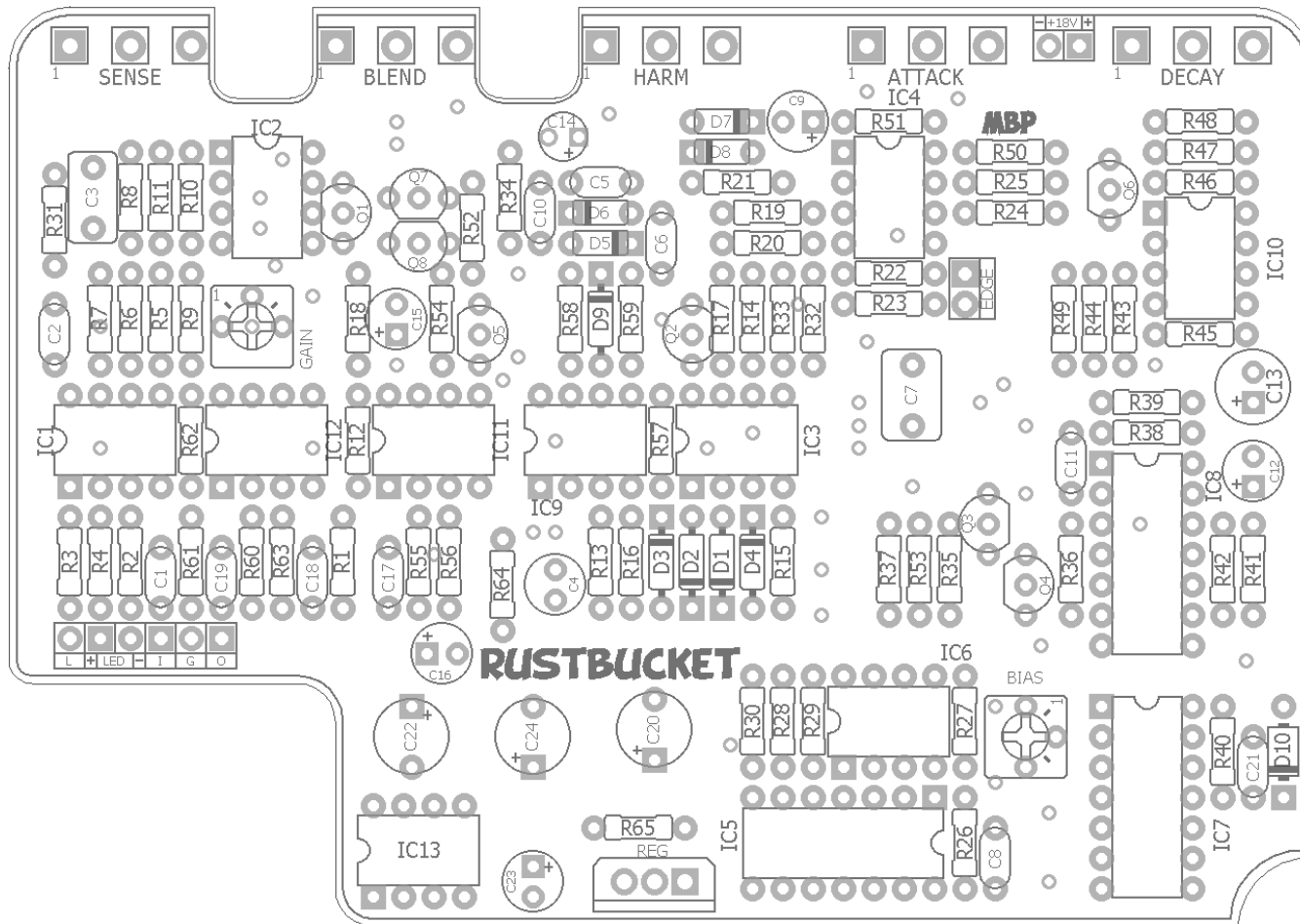
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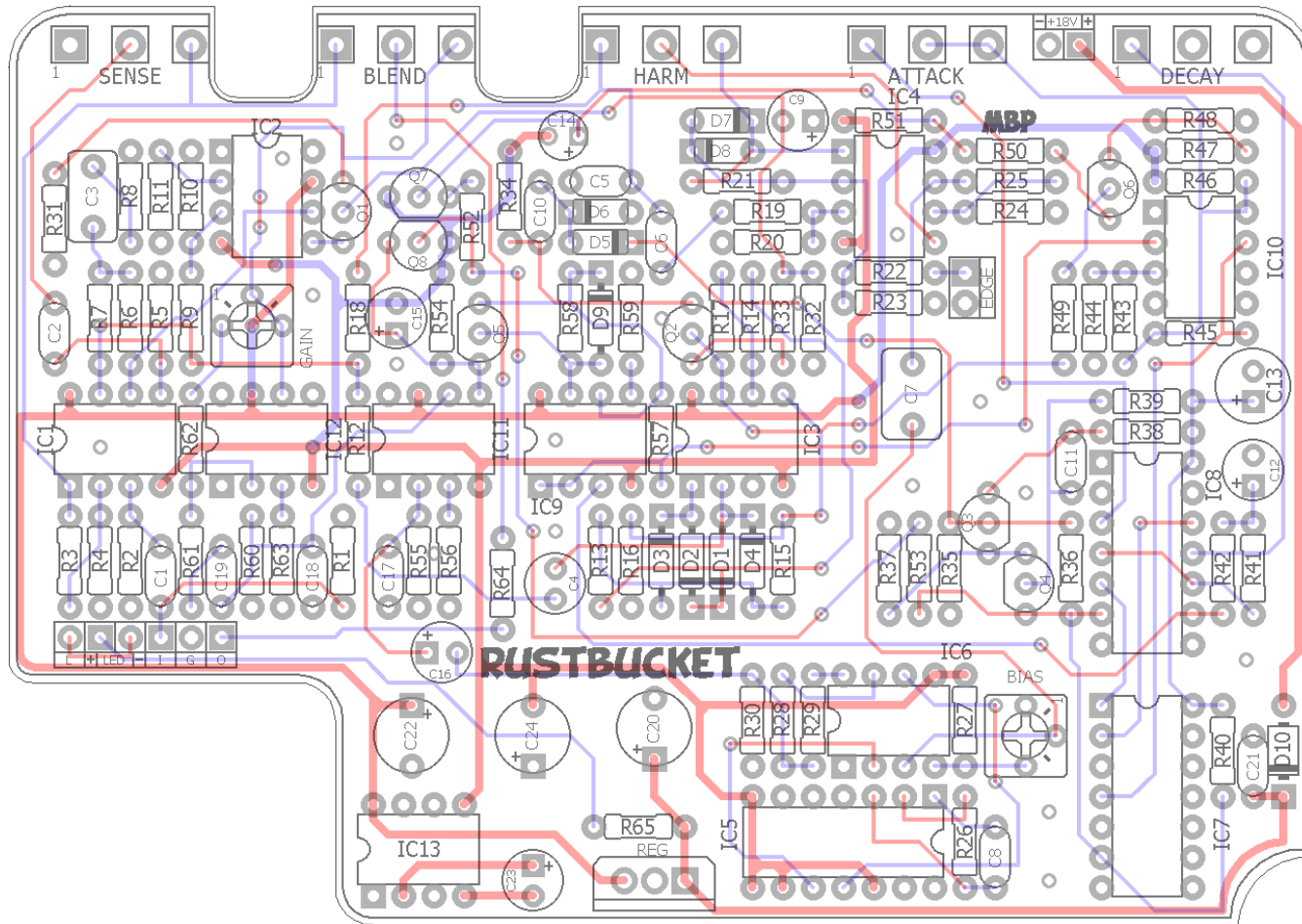
Based on the EHX® Attack Decay™

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This project requires a 18v 100mA (or more) power supply. If you do not have an 18v tap on your pedal power supply, I suggest using the Dunlop 18v wall-wart, which was used in the development of this project.

4.3" W x 3.025" H





Licensing: You are free to use Rustbucket PCBs for DIY and small commercial building. You may not sell Rustbucket PCBs on your own (selling to fellow DIY'ers through the forums is fine, of course) or re-package them as part of a "kit". These guidelines are simple. Failure to follow them make baby pandas become homeless.

B.O.M.

Resistors		Resistors		Caps		Transistors	
R1	1M	R34	12k	C1	68n	Q1	2N5087
R2	100k	R35	470k	C2	220n	Q2	2N5087
R3	150k	R36	1M	C3	330n	Q3	2N5088
R4	150k	R37	1k	C4	2u2	Q4	2N5088
R5	39k	R38	27k	C5	6n8	Q5	2N5087
R6	470k	R39	1M	C6	18n	Q6	2N5087
R7	470k	R40	27k	C7	1uF	Q7	2N5088
R8	680R	R41	470R	C8	220pF	Q8	2N5088
R9	100k	R42	220R	C9	1uF	IC	
R10	1k	R43	24k	C10	10n	IC1	4558
R11	1k	R44	100k	C11	47n	IC2	CA3080
R12	10k	R45	15k	C12	4u7	IC3	LM1458
R13	10k	R46	22R	C13	100uF	IC4	4558
R14	100k	R47	15k	C14	33uF	IC5	CD4047
R15	100k	R48	510R	C15	2u2	IC6	MN3007
R16	100k	R49	10k	C16	4u7	IC7	CD4013
R17	100k	R50	12k	C17	27n	IC8	CD4066
R18	27k	R51	10k	C18	220pF	IC9	LM1458
R19	150k	R52	2k4	C19	220n	IC10	LM311
R20	51k	R53	120k	C20	470uF	IC11	CA3080
R21	470k	R54	47k	C21	100n	IC12	LM741
R22	5k6	R55	1k	C22	220uF	IC13	LT1054
R23	56k	R56	1k	C23	47uF	Trimmers	
R24	47k	R57	15k	C24	220uF	BIAS	100k
R25	68k	R58	560k	Regulator		GAIN	10k
R26	27k	R59	15k	REG	LM7815	Pots	
R27	6k8	R60	18k	Diodes		DECAY	500kA
R28	91k	R61	18k	D1 – D9	1n914	ATTACK	500kA
R29	91k	R62	1k5	D10	1N5817	BLEND	10kB
R30	5k6	R63	4k7	Switch		SENSE	10kA
R31	10k	R64	150R	EDGE	SPST	HARM	1MB
R32	270k	R65	10k				
R33	1k						

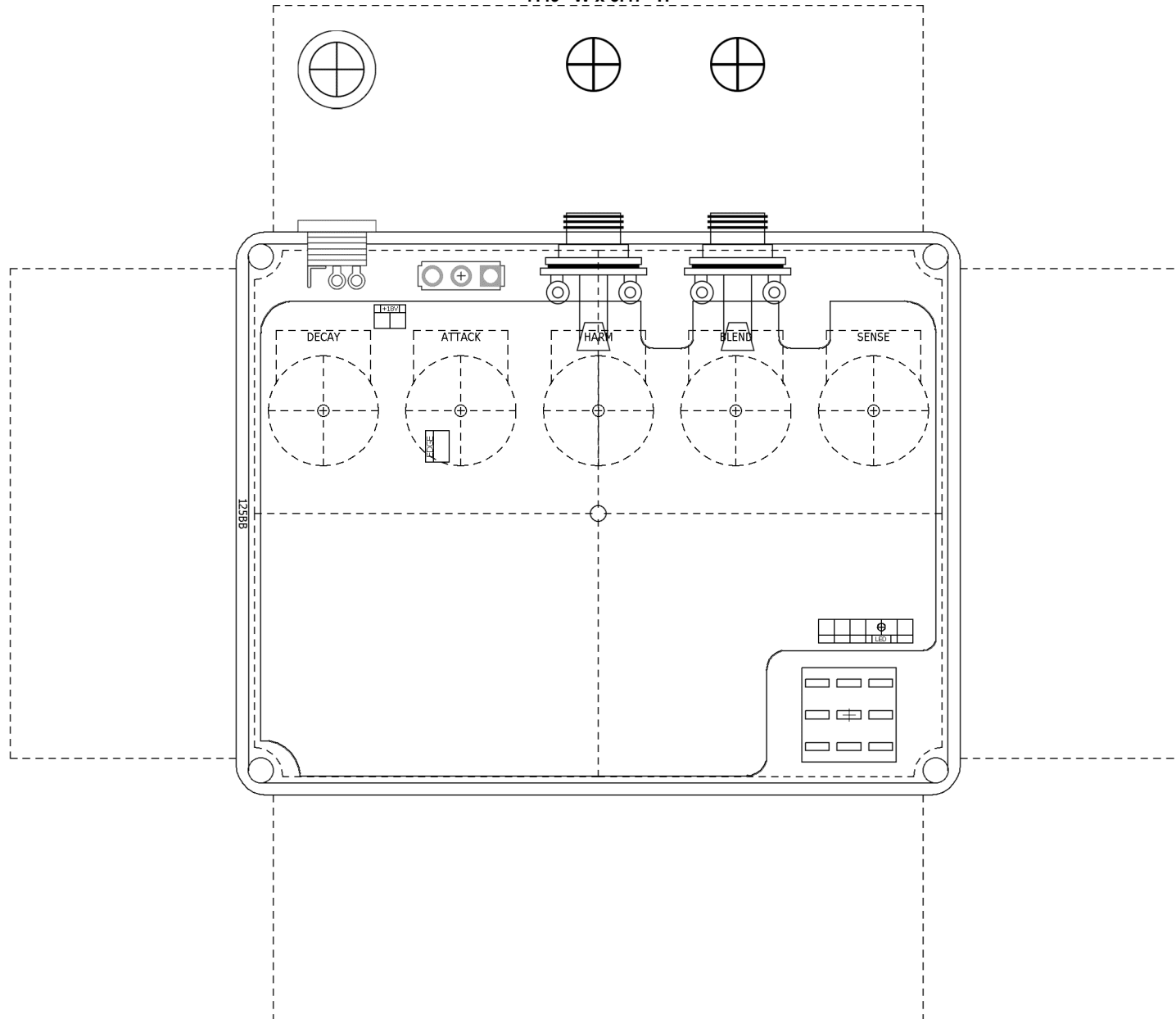
Shopping List

Value	QTY	Type	Rating	Value	QTY	Type	Rating	Value	QTY
22R	1	Metal / Carbon Film	1/4W	220pF	2	Ceramic / Film	25v min.	4558	2
150R	1	Metal / Carbon Film	1/4W	6n8	1	Film	25v min.	CA3080	2
220R	1	Metal / Carbon Film	1/4W	10n	1	Film	25v min.	CD4013	1
470R	1	Metal / Carbon Film	1/4W	18n	1	Film	25v min.	CD4047	1
510R	1	Metal / Carbon Film	1/4W	27n	1	Film	25v min.	CD4066	1
680R	1	Metal / Carbon Film	1/4W	47n	1	Film	25v min.	LM1458	2
1k	6	Metal / Carbon Film	1/4W	68n	1	Film	25v min.	LM311	1
1k5	1	Metal / Carbon Film	1/4W	100n	1	Film	25v min.	LM741	1
2k4	1	Metal / Carbon Film	1/4W	220n	2	Film	25v min.	LT1054	1
4k7	1	Metal / Carbon Film	1/4W	330n	1	Film	25v min.	MN3007	1
5k6	2	Metal / Carbon Film	1/4W	1uF	1	Film	25v min.	2N5087	4
6k8	1	Metal / Carbon Film	1/4W	1uF	1	Electrolytic	25v min.	2N5088	4
10k	6	Metal / Carbon Film	1/4W	2u2	1	Non-Polar	25v min.		
12k	2	Metal / Carbon Film	1/4W	2u2	1	Electrolytic	25v min.		
15k	4	Metal / Carbon Film	1/4W	4u7	2	Electrolytic	25v min.		
18k	2	Metal / Carbon Film	1/4W	33uF	1	Electrolytic	25v min.		
24k	1	Metal / Carbon Film	1/4W	47uF	1	Electrolytic	25v min.		
27k	4	Metal / Carbon Film	1/4W	100uF	1	Electrolytic	25v min.		
39k	1	Metal / Carbon Film	1/4W	220uF	2	Electrolytic	25v min.		
47k	2	Metal / Carbon Film	1/4W	470uF	1	Electrolytic	25v min.		
51k	1	Metal / Carbon Film	1/4W	LM7815	1				
56k	1	Metal / Carbon Film	1/4W	1n914	9				
68k	1	Metal / Carbon Film	1/4W	1N5817	1				
91k	2	Metal / Carbon Film	1/4W	SPST	1	or, SPDT			
100k	7	Metal / Carbon Film	1/4W	100k	1	Bourns 3362P			
120k	1	Metal / Carbon Film	1/4W	10k	1	Bourns 3362P			
150k	3	Metal / Carbon Film	1/4W	500kA	2	PCB Right Angle	16mm		
270k	1	Metal / Carbon Film	1/4W	10kB	1	PCB Right Angle	16mm		
470k	4	Metal / Carbon Film	1/4W	10kA	1	PCB Right Angle	16mm		
560k	1	Metal / Carbon Film	1/4W	1MB	1	PCB Right Angle	16mm		
1M	3	Metal / Carbon Film	1/4W						

Stock unit used BC239 and BC309 for the 2N5088 and 2N5087, resp. These are not as widely available, but if you want to use them mind the different pinouts (they are the opposite of the 2N ones).

125BB Enclosure

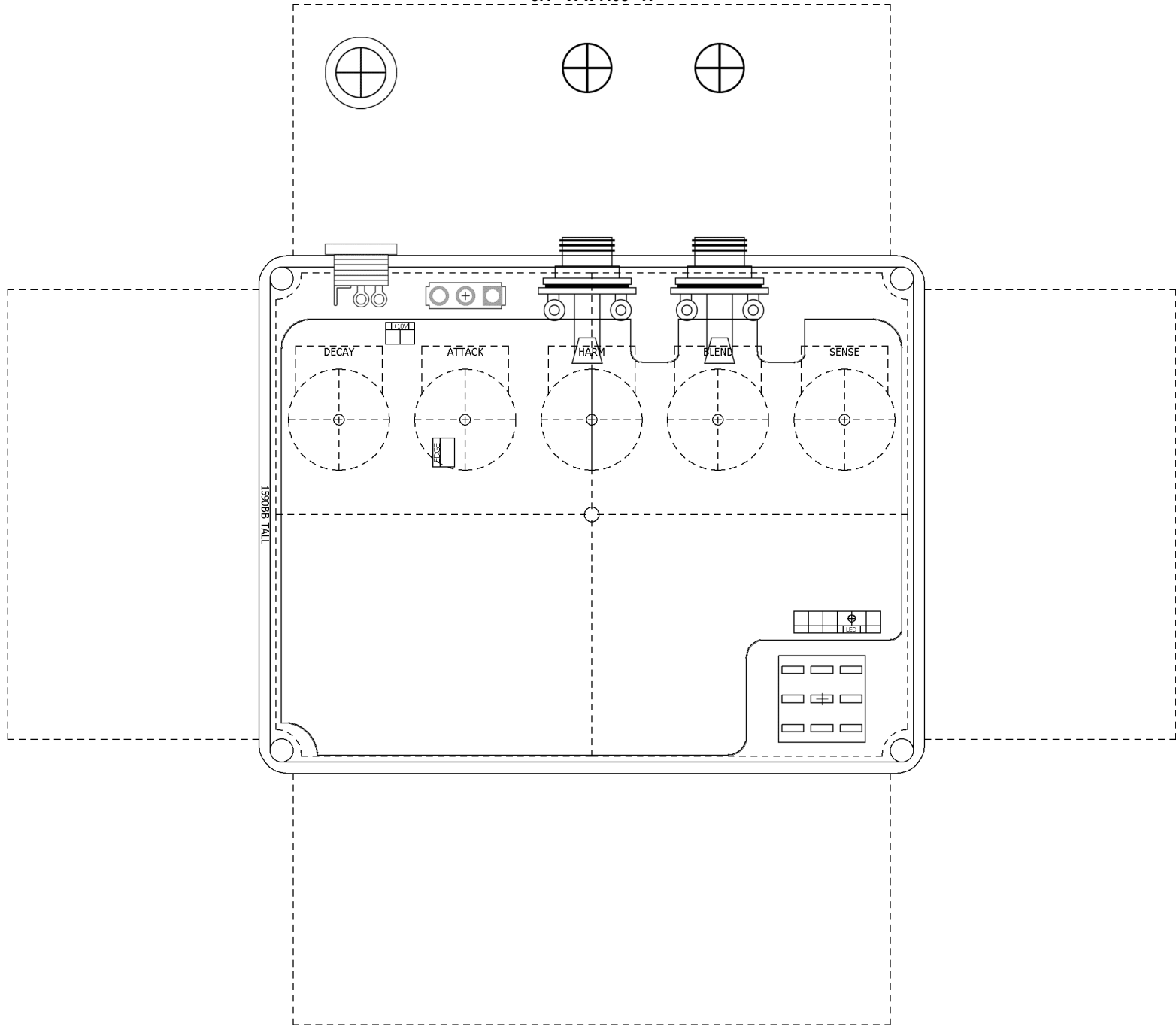
7.49" W x 6.47" H



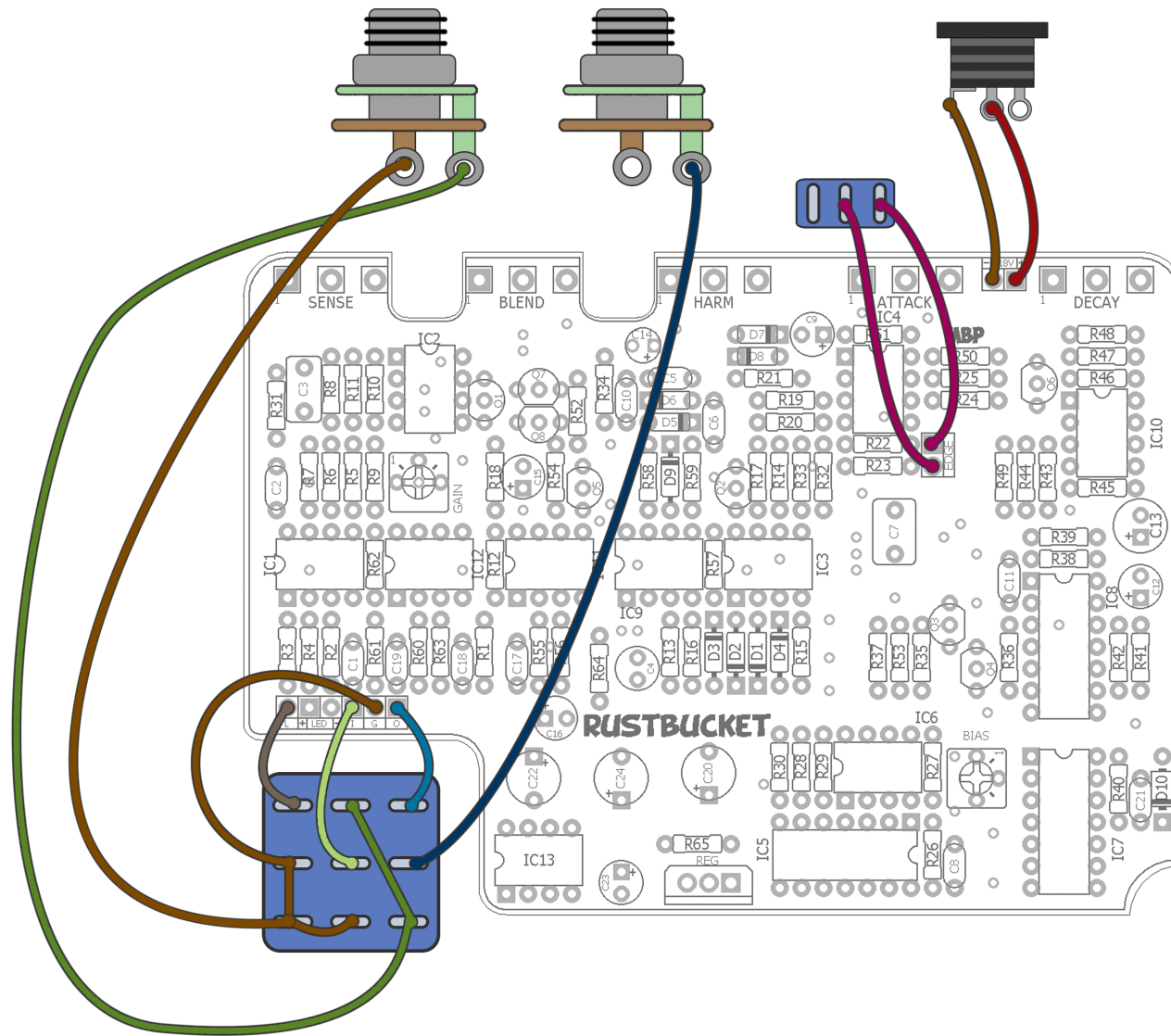
Using the 125BB enclosure **will require** Lumberg style mono jacks: <http://smallbear-electronics.mybigcommerce.com/lumberg-1-4-compact-shrouded-mono-jack/>
You can also use a 1590BB Tall enclosure which has 1.95" tall sides instead of 1.4". You *may* be able to use Neutrik style metal jacks with the 1590BB Tall but this has not been confirmed. Download the Photoshop templates for the two drill guides here: http://www.madbeanpedals.com/projects/Rustbucket/Rustbucket_DRILL.zip

1590BB Tall Enclosure

8.1" W x 7.08" H



Wiring



Indicator LED can be soldered directly to the PCB, if you like.

Tip: Solder the wires for the Edge switch onto the PCB before soldering in your pots!

Do you like violence? Sorry...I meant, do you like violins? You probably have heard some examples of guitars made to sound like bowed instruments; EVH and his rapid fire volume knob twisting, Eric Johnson and his insane control of pick attack, or Jimmy Page and his bowed Les Paul. The **Rustbucket** is a circuit that will get you that sound without having to use any of the aforementioned techniques. You turn it on, play some notes, and the effect more-or-less does the heavy lifting for you allowing you to bypass any constraints on your playing technique.

Well, not exactly, but we'll get back to that later. It's also important to mention that this is basically a monophonic effect. Most chords will not work very well with it as they cause multiple or inconsistent triggering (thanks to Scruffie for pointing this out to me). The Rustbucket shines with single note playing...even fast leads!

The EHX® Attack Decay™ is described as a “tape reverse simulator”. It sort of is, and kinda is not. Tape reverse can be described as an inversion of dynamics and with a guitar it is characterized by reversing both the volume and attack envelope of a plucked note. The Rustbucket does not do this. Rather, it creates an enveloped gate which opens and closes around a plucked note. The difference is while the volume envelope on the Rustbucket will swell and decay similar to a tape reverse, the attack envelope is removed (almost) completely rather than being moved to the end of the note. So, the effect is very similar but not exactly the same thing.

This effect does require some mechanical adjustment in your playing to get the most out of it. The controls are very both very sensitive and interdependent and will react according to how you are playing. This means that you really need to spend some time dialing it in for both your guitar and your playing technique. Not every knob setting is a winner, but once you dial it in it works very well. I will do my best to describe how below.

Controls

Sense: This control sets the sensitivity of the note envelope. Low settings have low sensitivity and vice-versa. This is also the most important knob adjustment to make to get the effect working well. You need to set it within the range that it responds to your guitar and your playing dynamics. Too low and it will not trigger the envelope. Too high and it will become so sensitive that minor pick or string scratches will trigger it into a sonic mess.

Harm: This sets the harmonics of the plucked note. Low settings are fairly clean. As it is turned up the note distorts. The Harm control will allow you to “smooth out” the subsequent envelope according to your playing dynamics.

Edge: This switch simply increases the distortion generated by the Harm setting into more fuzzy territory.

Attack: This control determines whether the initial note envelope has a fast (full down) or slow (full up) attack. Think of it in terms of a bowed instrument where the speed of the bow across the strings determines how quickly the note volume swells to its maximum.

Decay: Similar to the Attack control but in reverse. The Decay knob determines how quickly the note dies out. Fast decay is full down and slow decay is full up.

Blend: This control allows you to blend the dry vs. effected signal. Full down is dry only, full up is wet only.

There are two trimmers that need to be set, as well. The **BIAS** trimmer is for the MN3007 which controls the delay of the note. It does not set the delay amount, but rather biases the chip for the best output. To set this, **use an audio probe** on either of the output pins (7 or 8) of IC6. Play a note or use an audio source to feed the input of the circuit. Adjust the BIAS trimmer for the cleanest output you can get on the output pin you are probing. There will be a small range where this setting is optimal and your ear is fine for making the adjustment. Set the control knobs wherever you feel you can get the best result while adjusting the trim. I suggest leaving them all about halfway up with the Edge switch off.

The second trimmer sets the output **GAIN** of the effected signal. There is no optimal setting here other than the one that gets you a nice strong output signal that blends about 50/50 with your dry signal when the Blend knob is halfway up.

Voltages

IC1	
1	5mV
2	4mV
3	3mV
4	-14v
5	2mV
6	3mV
7	-8mV
8	14.4v

IC2	
1	-
2	2mV
3	2mV
4	-14v
5	-13.6v
6	4mV
7	14.4v
8	-

IC3	
1	82mV
2	2mV
3	2mV
4	-14v
5	7mV
6	7mV
7	-4mV
8	14.4v

IC4	
1	5mV
2	3mV
3	3mV
4	-14v
5	-1.3mV
6	-1.2mV
7	-6.8mV
8	14.4v

IC5	
1	-7.1v
2	-6.9v
3	-6.7v
4	1.9mV
5	1.8mV
6	1.3mV
7	-14v
8	-14v
9	-14v
10	-7v
11	-7v
12	-14v
13	-7.1v
14	2mV

IC6	
1	2.2mV
2	-7v
3	-7.1v
4	-13.1v
5	-14v
6	-7v
7	-6.7v
8	-6.8v

IC7	
1	2.1mV
2	14.3v
3	2.3mV
4	65mV
5	2.1mV
6	.46v
7	2.1mV
8	2.2mV
9	2mV
10	2mV
11	2mV
12	2mV
13	14.3v
14	14.3v

IC8	
1	varies
2	varies
3	13.8v
4	2.8mV
5	2mV
6	.46v
7	2.1mV
8	2.2mV
9	2.8mV
10	2.8mV
11	2.8mV
12	14.3v
13	2.2mV
14	14.3v

IC9	
1	.4v
2	3mV
3	3mV
4	-14v
5	3mV
6	3mV
7	-53mV
8	14.4v

IC10	
1	2.2mV
2	3.5mV
3	11.5v
4	2.2mV
5	14.2v
6	14.2v
7	65mV
8	14.3v

IC11	
1	-
2	2mV
3	2mV
4	-14v
5	-14v
6	1.5mV
7	14.4v
8	-

IC12	
1	-14v
2	1.5mV
3	1.4mV
4	-14v
5	-14v
6	1.6mV
7	14.4v
8	9mV

IC13	
1	1.9v
2	7.8v
3	5mV
4	-6.3v
5	-14v
6	2.56v
7	1.45v
8	14.4v

Q1	
C	-13.6v
B	2mV
E	2mV

Q2	
C	-13.9v
B	-5mV
E	-13.9v

Q3	
C	14.2v
B	152mV
E	.41v

Q4	
C	.46v
B	1v
E	.41v

Q5	
C	-14v
B	-53mV
E	3mV

Q6	
C	-13.9v
B	-4mV
E	.47v

Q7	
C	-13.3v
B	-13.9v
E	-13.9v

Q8	
C	-14v
B	-13.4v
E	-14v

