TRASHCOMPACTOR

FX TYPE: Compressor

Enclosure Size: 1590B

"Softie" compatibility: none

Overview

The **TrashCompactor** is designed as a "studio" quality, VCA-based compressor with a high dynamic range. Okay. "Lotta of fancy terms, there fancy pants," you are saying. And, yes - it's the same marketing drivel all pedal manufacturers say about their compressors. But, unlike them, I am a wizard. I am a wizard in the sense that I copied THAT's compressor application note for the 4305, put a sensible audio wrapper around it and it works like a charm. That's the magic: taking other people's ideas and ~~monetizing~~ expanding upon them.

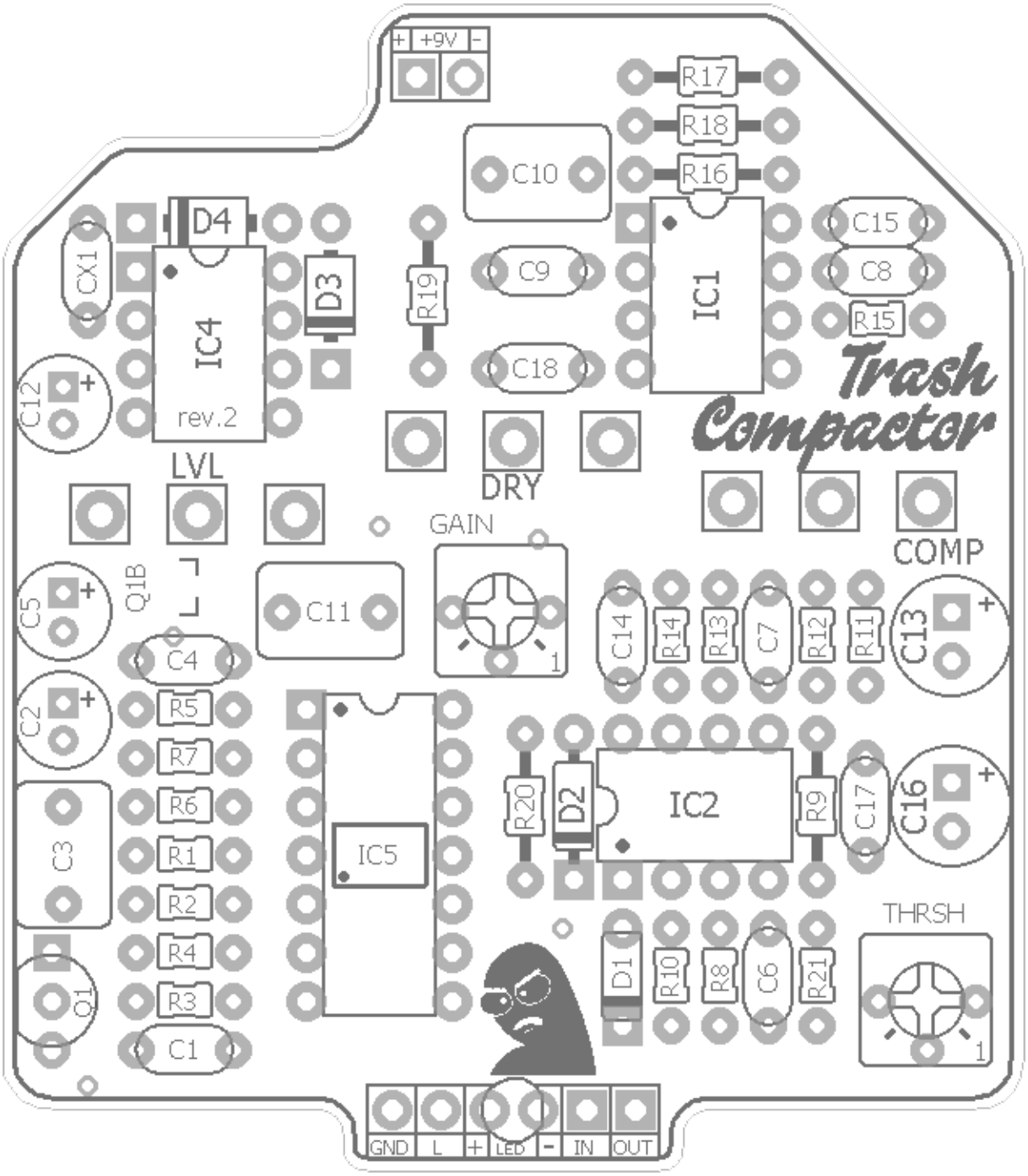
Although the TrashCompactor could have been designed as a single supply circuit, I decided to keep the bipolar supply suggested in the design note. Not many guitar compressors utilize this approach so it's worth a few extra steps for the increased dynamic range a dual supply offers. In addition, I included a JFET input buffer, volume output control and dry signal mix. That last thing turns out to be a great addition. Dialing in a little uncompressed signal in parallel with the compressor adds in some high end and sparkle to the output. Altogether, this is a great sounding compressor that offers an alternative to the optical/transistor based ones that comprise many guitar pedals.

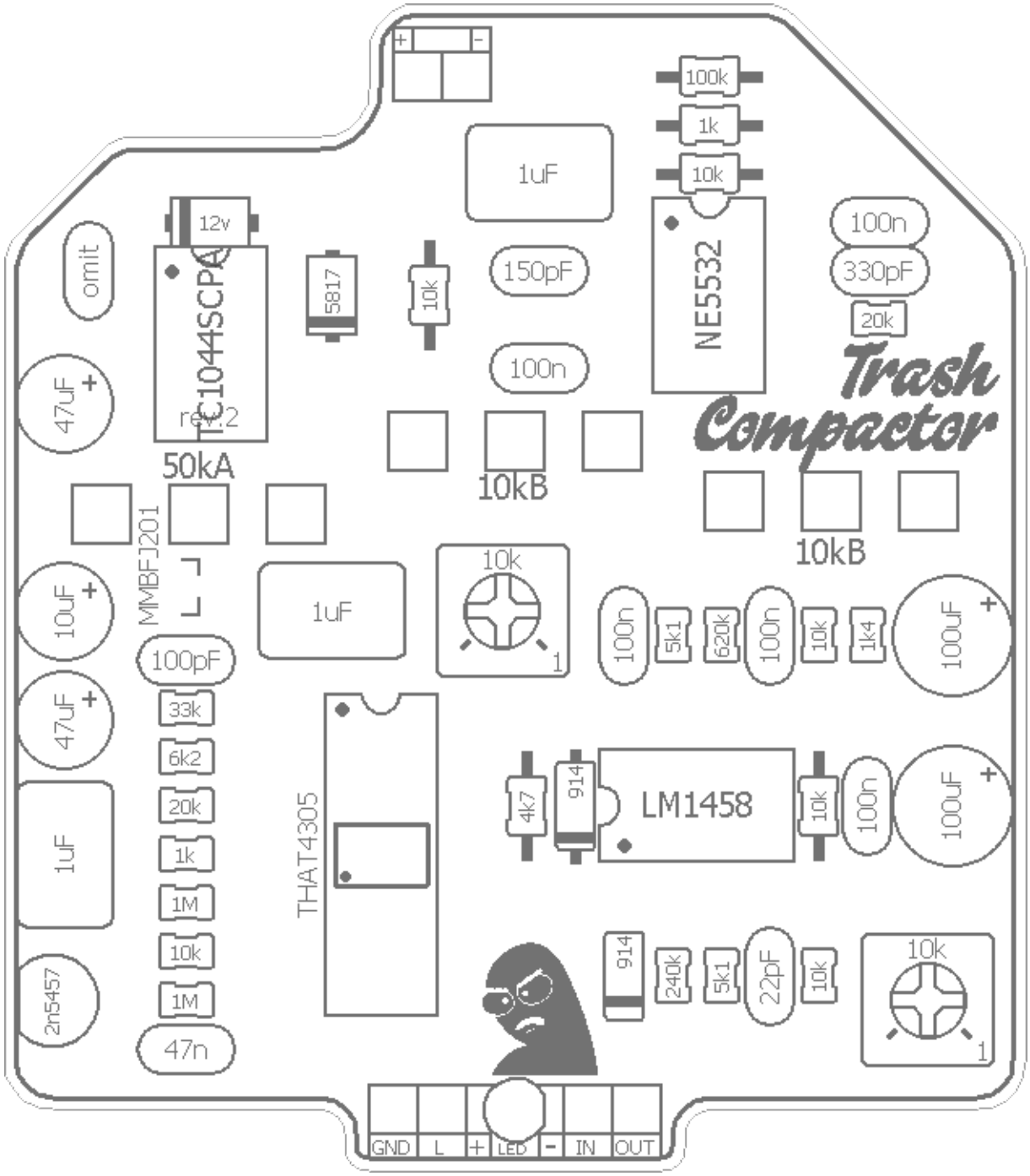
The only downside is the THAT4305 is a QSOP16 IC. That means tiny and very difficult to hand solder (unless you are experienced and prepared to rework potential soldering errors). For that reason, I am offering the TrashCompactor with the option of a pre-soldered breakout board that already contains the 4305. Ordering the project with this option means you only need to solder in pin headers and then solder the breakout board to the main PCB. That makes this project accessible to pretty much all levels of DIY builders.

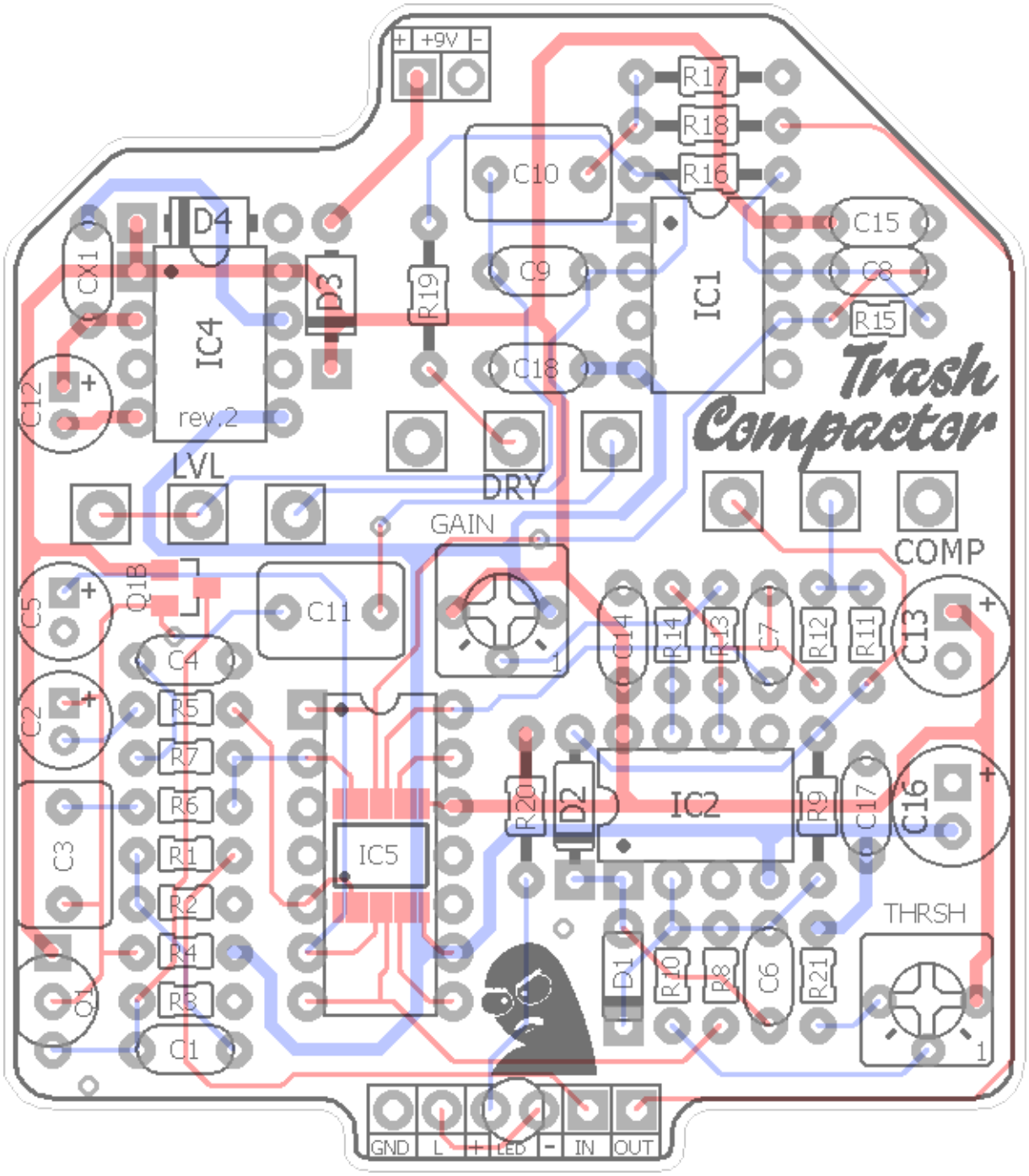
Controls

- **LVL -** Active volume control/boost.
- **COMP -** Compression amount. From minimal to rather extreme.
- **DRY -** Clean (uncompressed) signal amount. This blends in parallel with the compressed signal.
- **THRESH/GAIN -** These trimmers set the threshold detection and gain recovery amount of the 4305. See notes.

Technical assistance for your build(s) is available via the madbeanpedals forum. Please go there rather than emailing me for assistance on builds. This is because (1) I'm not always available to respond via email in a timely and continuous manner, and (2) posting technical problems and solutions in the forum creates a record from which other members may benefit.


+9V
R17
R18
R16
C10
C15
C8
C9
C18
R15
D4
D3
R19
IC1
IC4
rev.2
CX1
C12
Trash
Compactor
LVL
DRY
COMP
GAIN
Q1B
C5
C11
C14
R14
R13
C7
R12
R11
C13
C4
C2
R5
R7
R6
R1
R2
R4
R3
C1
C3
Q1
IC5
R20
D2
IC2
R9
C17
C16
THRSH
D1
R10
R8
C6
R21
GND
L
+
LED
-
IN
OUT


100k
1k
10k
1uF
150pF
100n
330pF
20k
12v
5817
10k
NE5532
TC1044SCPA
50kA
10kB
10kB
Trash
Compactor
omit
47uF
MMBFJ201
10uF
47uF
1uF
100pF
33k
6k2
20k
1k
1M
10k
1M
47n
2n5457
1uF
10k
THAT4305
100n
5k1
620k
100n
10k
1k4
100uF
4k7
914
LM1458
10k
100n
100uF
914
240k
5k1
22pF
10k
10k
GND
L
+
LED
-
IN
OUT


+9V
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Q1B
C5
C11
C4
C14
R14
R13
C7
R12
R11
C13
C2
R5
R7
R6
R1
R2
R4
R3
C1
C3
Q1
IC5
R20
D2
IC2
R9
C17
C16
THRSH
D1
R10
R8
C6
R21
GND
L
+
LED
-
IN
OUT

Resistors		Caps		Diodes	
R1	1k	C1	47n	D1	1n914
R2	1M	C2	47uF	D2	1n914
R3	1M	C3	1uF	D3	1n5817
R4	10k	C4	100pF	D4	12v Zener
R5	33k	C5	10uF	Transistors	
R6	20k	C6	22pF	Q1	2n5457
R7	6k2	C7	100n	ICs	
R8	5k1	C8	330pF	IC1	NE5532
R9	10k	C9	150pF	IC2	LM1458
R10	240k	C10	1uF	IC4	TC1044SCPA
R11	1k4	C11	1uF	IC5	THAT4305
R12	10k	C12	47uF	Trimmers	
R13	620k	C13	100uF	GAIN	10k
R14	5k1	C14	100n	THRSH	10k
R15	20k	C15	100n	Pots	
R16	10k	C16	100uF	DRY	10kB
R17	100k	C17	100n	COMP	10kB
R18	1k	C18	100n	LVL	50kA
R19	10k	CX1	omit		
R20	4k7				
R21	10k				

Value	QTY	Type	Rating
1k	2	Metal / Carbon Film	1/8W
1k4	1	Metal / Carbon Film	1/8W
4k7	1	Metal / Carbon Film	1/8W
5k1	2	Metal / Carbon Film	1/8W
6k2	1	Metal / Carbon Film	1/8W
10k	6	Metal / Carbon Film	1/8W
20k	2	Metal / Carbon Film	1/8W
33k	1	Metal / Carbon Film	1/8W
100k	1	Metal / Carbon Film	1/8W
240k	1	Metal / Carbon Film	1/8W
620k	1	Metal / Carbon Film	1/8W
1M	2	Metal / Carbon Film	1/8W
22pF	1	Ceramic / MLCC	25v min.
100pF	1	Ceramic / MLCC	25v min.
150pF	1	Ceramic / MLCC	25v min.
330pF	1	Ceramic / MLCC	25v min.
47n	1	Film	25v min.
100n	5	Film	25v min.
1uF	3	Film	25v min.
10uF	1	Electrolytic	25v min.
47uF	2	Electrolytic	25v min.
100uF	2	Electrolytic	25v min.
1n914	2		
1n5817	1		
Zener	1	12v	1W
2n5457	1	or, MMBFJ201	
NE5532	1		
LM1458	1		
TC1044SCPA	1		
THAT4305	1		
10k	2	Bourns 3362p	
10kB	2	PCB Right Angle	16mm
50kA	1	PCB Right Angle	16mm

2n5457:
1. https://smallbear-electronics.mybigcommerce.com/transistor-fet-2n5457/
2. https://stompboxparts.com/semiconductors/2n5457-jfet/

NE5532:
1. https://smallbear-electronics.mybigcommerce.com/ic-ne5532p/
2. https://stompboxparts.com/semiconductors/ne5532p-dual-op-amp-ic/

LM1458:
1. https://smallbear-electronics.mybigcommerce.com/ic-mc1458p-motorola-nos/
2. https://stompboxparts.com/semiconductors/lm1458n-dual-op-amp-ic/

TC1044SCPA:
1. https://stompboxparts.com/semiconductors/tc1044scpa-charge-pump-ic/
2. https://www.mouser.com/ProductDetail/579-TC1044SCPA
3. https://www.mouser.com/ProductDetail/595-MC1458P

THAT4305:
1. https://www.mouser.com/ProductDetail/887-4305Q16-U

Bourns 3362p trimmers:
1. https://stompboxparts.com/pots/trim-pot-3362p/
2. https://www.taydaelectronics.com/potentiometer-variable-resistors/cermet-potentiometers/3362p.html
3. https://www.mouser.com/c/passive-components/potentiometers-trimmers-rheostats/trimmer-resistors-through-hole/?q=bourns%203362p&adjustment=Top%20Cross&instock=y

16mm Right Angle Pots:
1. https://smallbear-electronics.mybigcommerce.com/alpha-single-gang-16mm-right-angle-pc-mount/
2. https://stompboxparts.com/pots/16mm-potentiometer-short-pcb-leg/

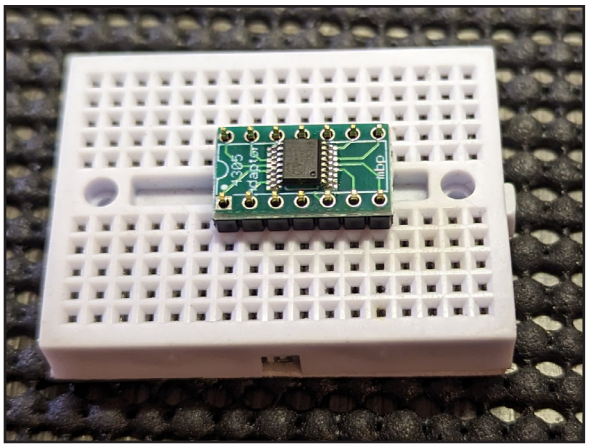
DC Jacks:
1. https://smallbear-electronics.mybigcommerce.com/2-1-mm-all-plastic-round/
2. https://stompboxparts.com/power-connections/dc-power-jack-2-1mm-low-profile/
3. https://lovemyswitches.com/thinline-lumberg-dc-power-jack-2-1mm/

1/4” jacks:
1. https://smallbear-electronics.mybigcommerce.com/1-4-in-mono-nys229/
2. https://smallbear-electronics.mybigcommerce.com/1-4-in-mono-switchcraft-11/
3. https://lovemyswitches.com/1-4-mono-jack-lumberg-klbm-3/
4. https://lovemyswitches.com/1-4-mono-jack-neutrik-rean-nys229/

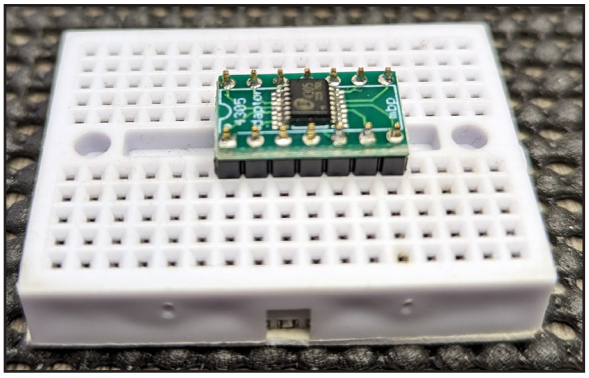
My preferred 3PDT switch:
https://lovemyswitches.com/pro-3pdt-latched-foot-switch-solder-lugs-feather-soft-click/

Unless you are pretty experienced with SMT soldering I recommend getting the pre-soldered breakout board. But, if you want to push yourself a bit you can certainly try soldering the 4305 yourself. You'll need to do it directly to the Trash Compactor PCB since the breakout board is only included with a pre-soldered chip. Just make sure you have some flux and small core solder. And, some solder wick would be a good idea!

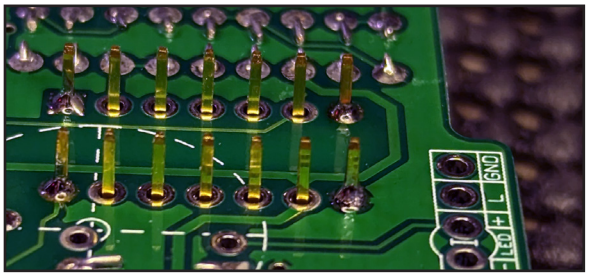
If you do purchase the breakout board, you will need to solder the pin headers.



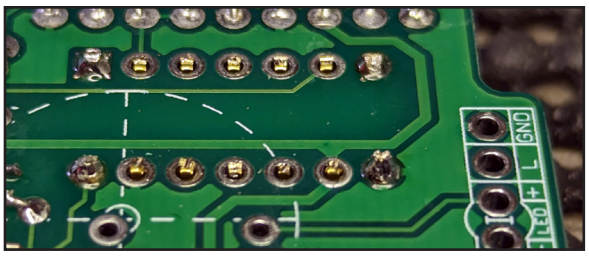
Load the two pin headers into a breadboard and place the breakout board on the pins.



Solder the pins up. Pause for a few seconds after every 3rd pin or so to keep the IC from overheating.



Load the board to the main PCB. Solder the first and last pin of each row. It helps if you use a little BluTac or some temporary fastener on the top side to keep things in place.



Gently trim the excess pins back to 1mm or so above the pads. Now solder in the remaining pins. You should reheat the first and last pins you did previously, as well.

- Calibrating the compressor is straight-forward. The THRSH trimmer sets the sensitivity of the envelope detector which controls how much the signal is compressed through the 4305. The highest compression amount is full CCW, but you don't want to use this setting. You'll want a setting that provides a very high amount of compression when the COMP control is full up, but not so much that it completely crushes the audio. I landed on about 1/3 to 1/2 up which gave a perfect range from very subtle to very, very squishy.

- The highest COMP settings will cause a big reduction in audio level so the GAIN trimmer is used to set the makeup gain. What you want here is to set the GAIN trimmer so enough volume is added back at the highest COMP setting, but not so much that the total output gets too high when the COMP is turned down. It's really just a balancing act to find the middle ground. Again, about 1/3rd up seemed right to me.

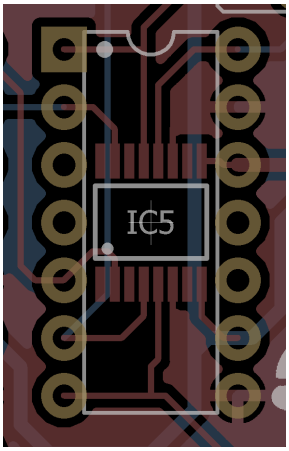
- The COMP control will reduce the output volume no matter how you have the trimmers set, so there is an active LVL boost at the end of the circuit to balance out different COMP and DRY settings. With minimal comp, it's also a decent signal booster.

- The DRY control is most useful once the COMP control is about 1/2 up. It adds back some uncompressed signal into the output which brightens it up a bit. At lower COMP settings, the DRY control should be left off.

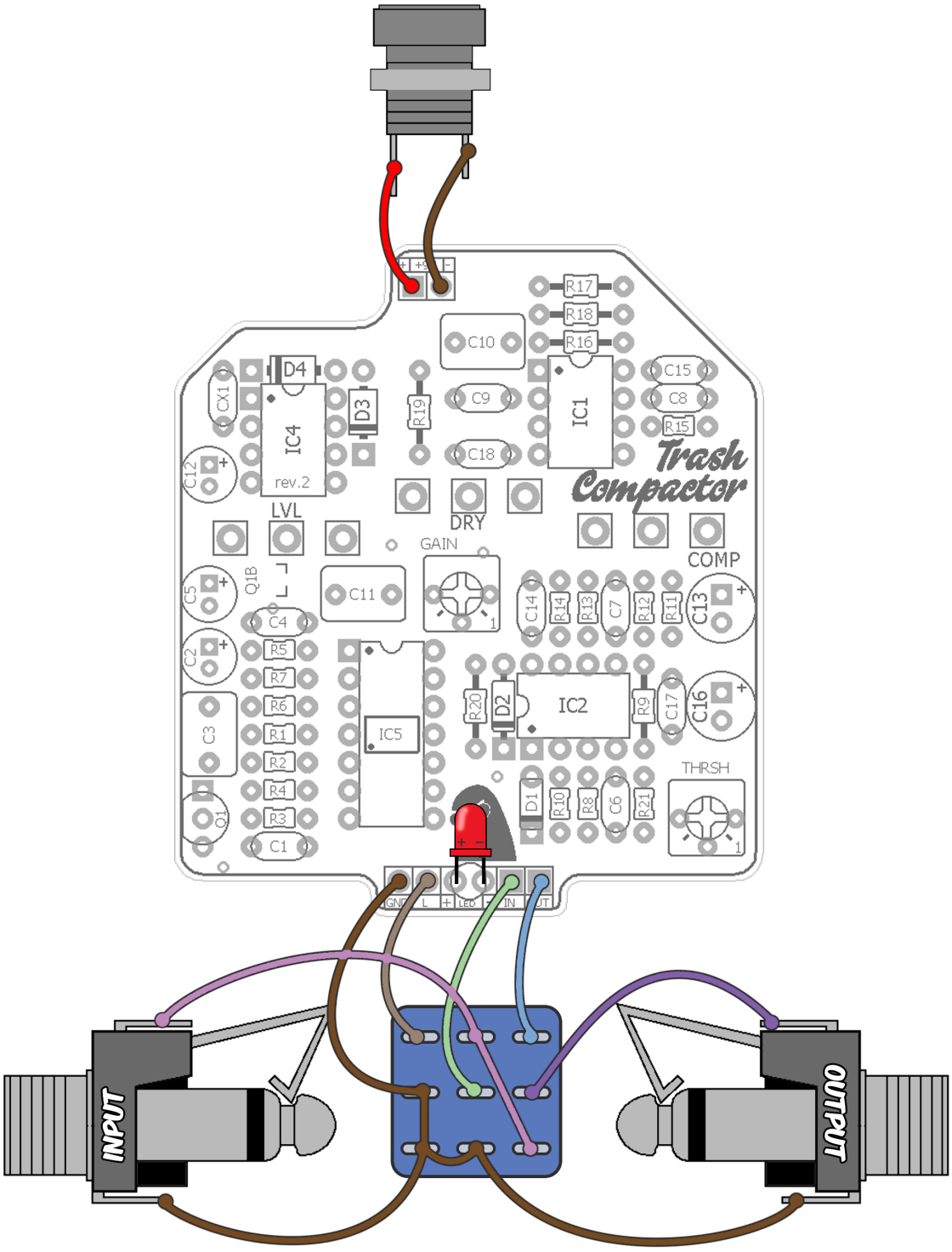
- NOTE: I don't recommend using the Softie soft-touch bypass with this project. I used that initially but found it was fairly loud when switched. A regular 3PDT bypass worked out better. Some pop is normal. If you want something dead silent, use a relay bypass that mutes the output when switched. The CODA bypass does this.

https://www.coda-effects.com/2016/04/relay-bypass-conception-and-relay.html

THAT4305 Datasheet: https://www.thatcorp.com/datashts/THAT_4305_Datasheet.pdf

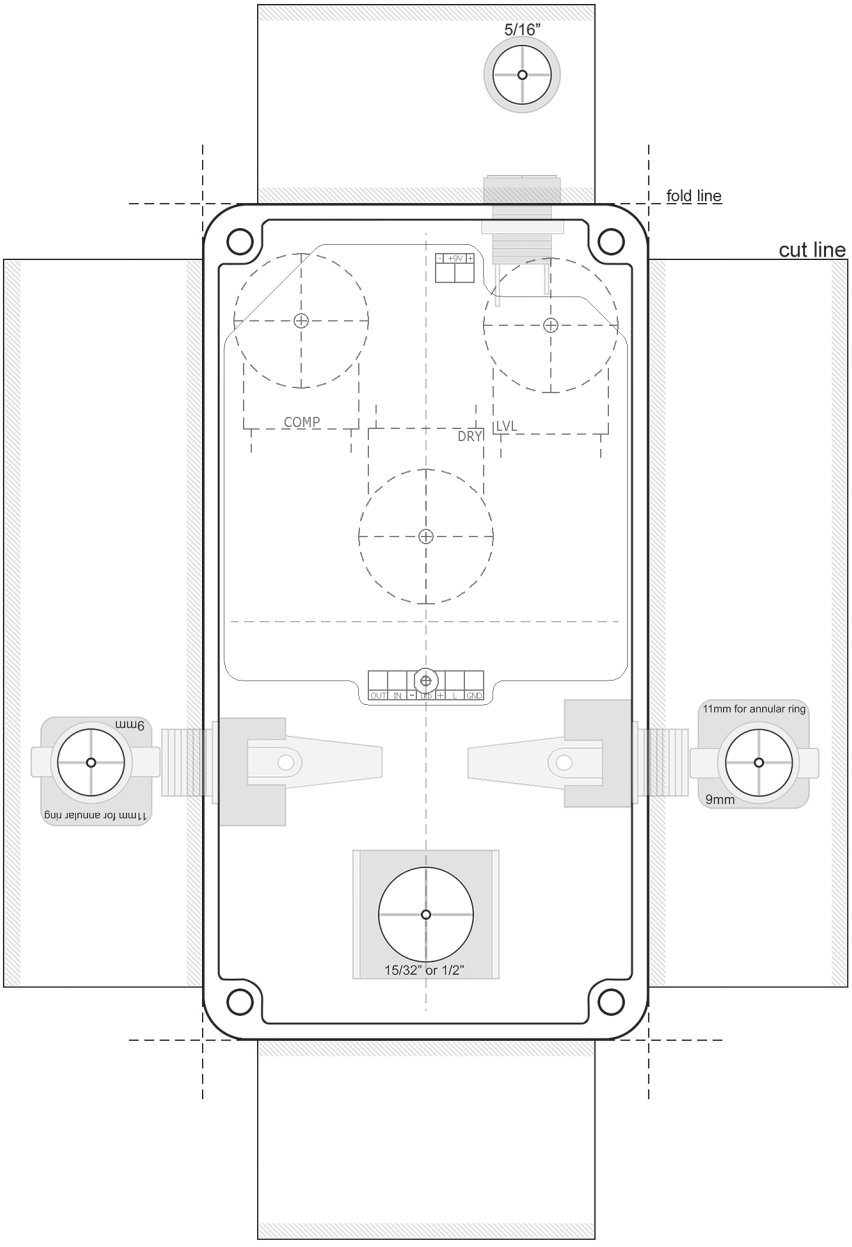


Closeup of the pin arrangement on the breakout board.



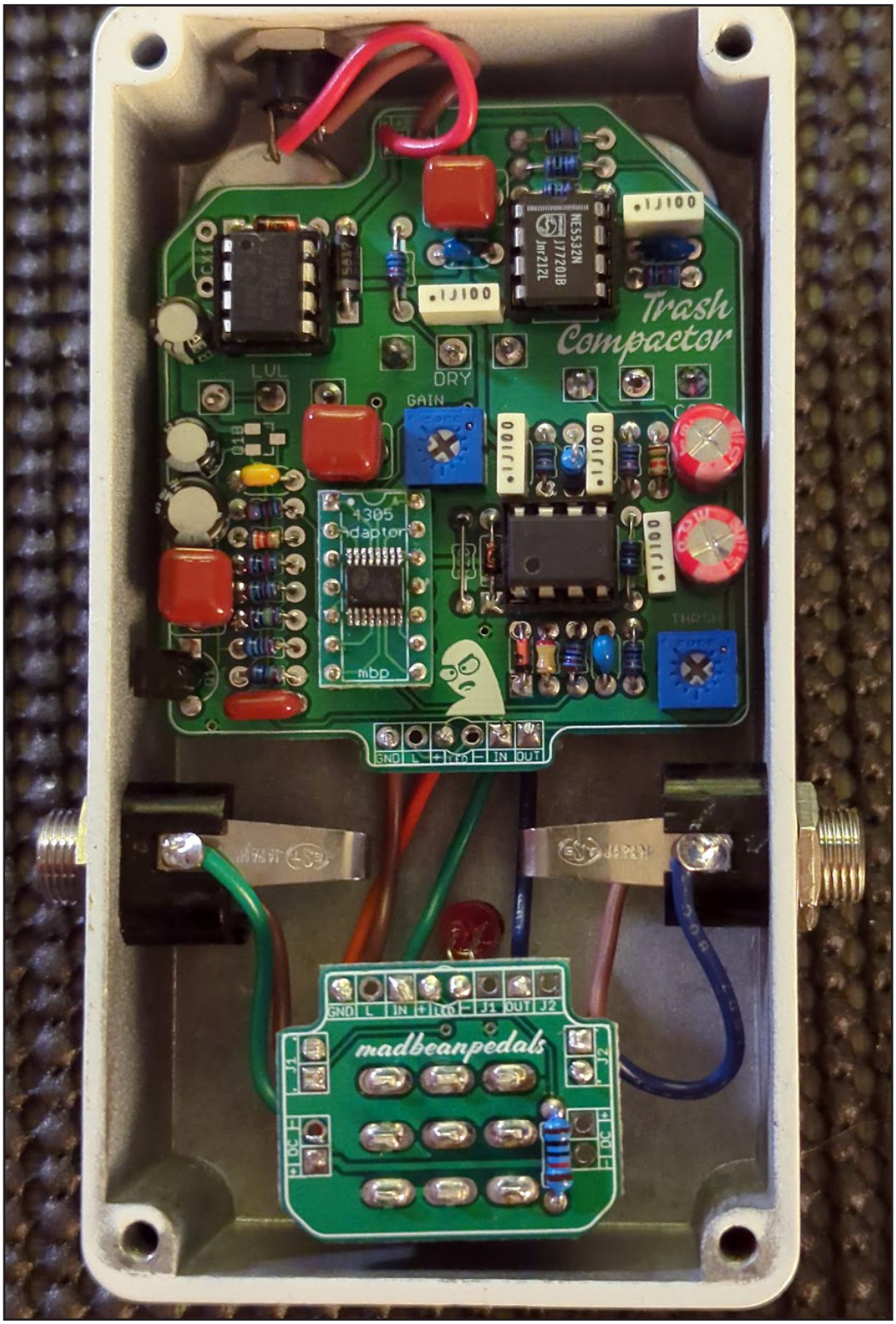
The bypass LED is soldered directly to the PCB.

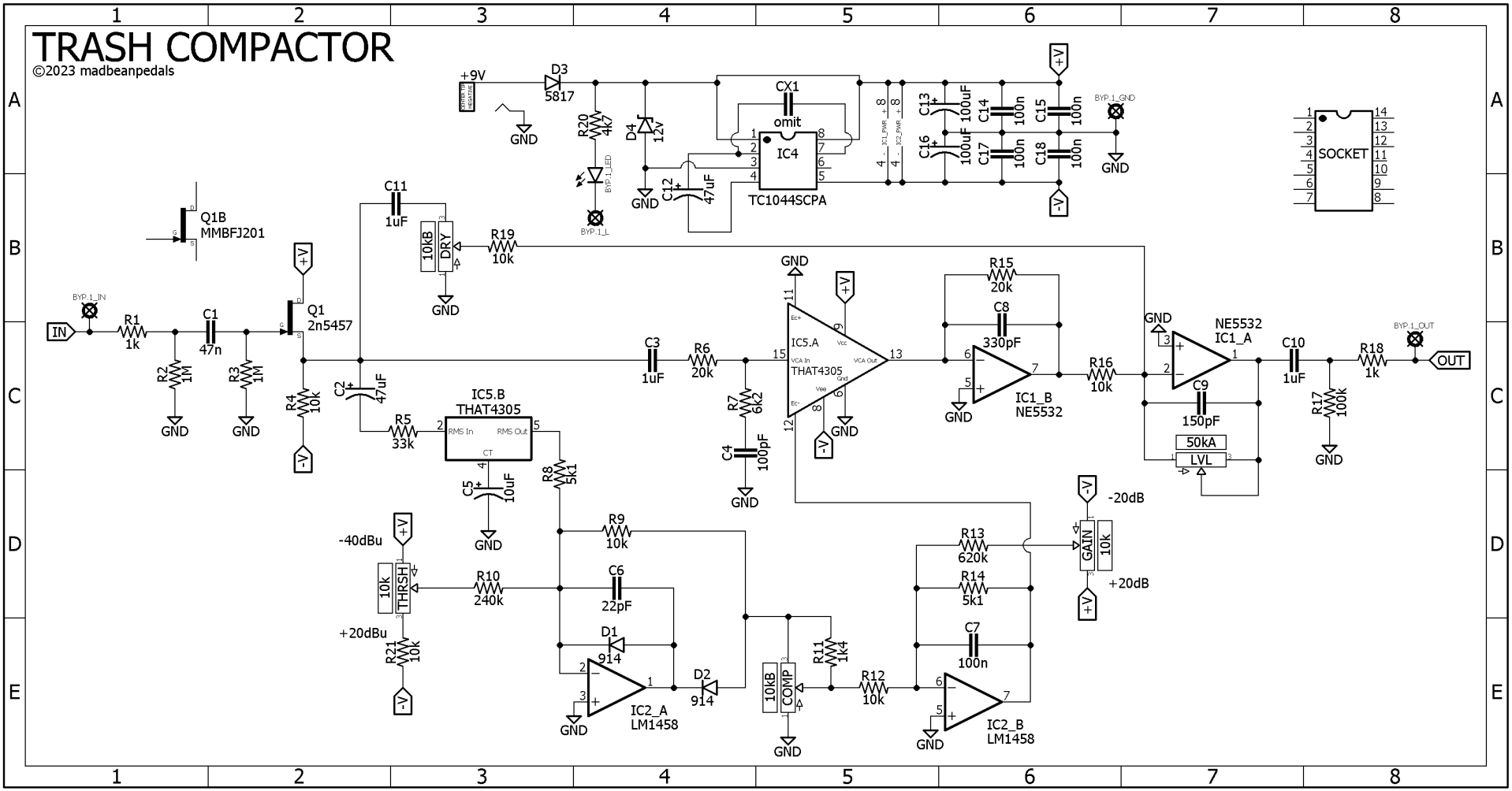
Note: *Drill Guides are approximate and may require tweaking depending on the types of jacks, switches and pots you use.*



IC1	NE5532	IC5	THAT4305
1	431mV	1	0
2	0	2	-4mV
3	0	3	~0
4	-8.72	4	-2mV
5	0	5	-3.6mV
6	-2mV	6	-265mV
7	-49mV	7	-265mV
8	9.22	8	0
IC2	LM1458	9	0
1	-4mV	10	0
2	0	11	-30mV
3	0	12	9.22
4	-8.72	13	0
5	0	14	-49mV
6	0	Q1	2n5457
7	5mV	D	9.22
8	9.22	S	346mV
IC4	TC1044SCPA	G	0
1	9.22		
2	5.3		
3	0		
4	-3.68		
5	-8.72		
6	4.26		
7	6.17		
8	9.22		

9.5v One Spot
Current Draw: ~30mA
Knobs @ noon.
Voltages for the 4305 were taken from the breakout board, not the IC directly.


Trash
Compactor
LVL
DRY
GAIN
NE5532N
GND L IN LED J1 OUT J2
madbeanpedals


TRASH COMPACTOR
©2023 madbeanpedals
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D3
5817
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R20
4k7
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C12
47uF
C13
100uF
C14
100n
C15
100n
C16
100uF
C17
100n
C18
100n
+V
-V
BYP.1_GND
SOCKET
Q1B
MMBFJ201
C11
1uF
10kB
DRY
R19
10k
BYP.1_IN
IN
R1
1k
C1
47n
R2
1M
R3
1M
Q1
2n5457
R4
10k
C2
47uF
C3
1uF
R6
20k
R7
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C4
100pF
IC5.A
THAT4305
R15
20k
C8
330pF
IC1_B
NE5532
R16
10k
NE5532
IC1_A
C10
1uF
R18
1k
BYP.1_OUT
OUT
C9
150pF
50kA
LVL
R17
100k
IC5.B
THAT4305
R5
33k
C5
10uF
R8
5k1
-40dBu
+20dBu
10k
THRSH
R10
240k
R21
10k
R9
10k
C6
22pF
D1
914
D2
914
IC2_A
LM1458
10kB
COMP
R11
1k4
R12
10k
R13
620k
R14
5k1
C7
100n
IC2_B
LM1458
-20dB
+20dB
10k
GAIN