

SludgeHammer24

F X Type: **BASS DI**

Build Level: Intermediate

Based On: SansAmp® Bass Driver DI™

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The 2024 version of the **SludgeHammer** has no significant circuit changes and minor layout tweaks. It now includes a bypass board for the 3PDT switch.

Overview

When I was a regular gigging bass player (and I swear I was for a couple of years) I was vaguely aware of the SansAmp stuff. But, I never had a need for it and definitely did not have \$\$ for pedals (my bass pedal assortment consisted of a Tube Screamer and Digitech PDS1002 from my high-school days and a borrowed v1 Whammy pedal, and also a borrowed Eden head and cab). Many years later, I play much less bass but I for sure have a need for a good DI for home studio stuff.

The Bass Driver DI™ is a straight-forward and effective bass pre-amp. It's not as fancy as some of the more modern ones, certainly, but what it does it does well. For the **SludgeHammer** project, I've included what I thought were the most essential features. It can be used as a pre-amp in a pedal rig, and also a DI for home recording or live playing. It doesn't have everything (I chose to exclude the phantom power) but more than enough to do the job. The SludgeHammer is based on the earlier version which I believe arrived in the early or mid-90's.

I've included the option for a balanced output like the original, but I recommend using a TRS jack instead of an XLR. The XLR requires a massive hole to be drilled in the enclosure. I happened to have a large enough stepped bit to do the job. Even with the bit, a drill press and a vice it was difficult to drill. Enough so that I never want to do it again. For my second build, I used a TRS jack instead and that's what I recommend you do as well. KIM, the balanced output is also optional: if you don't need or want it, you can omit it and just use the SludgeHammer as a pre-amp or plugged directly into your computer audio interface through the main output.

Controls

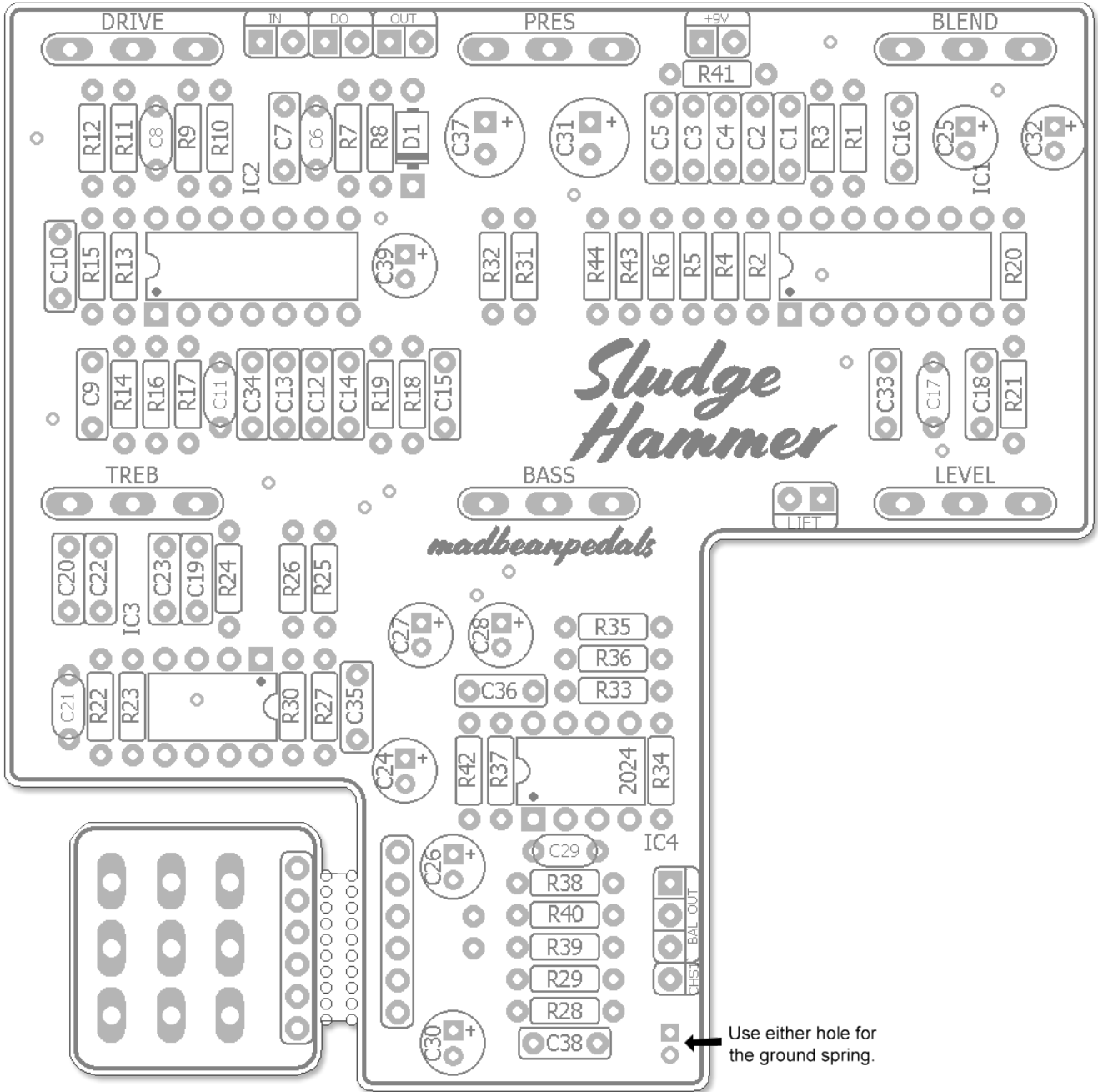
- **LEVEL:** Effect output.
- **BASS, TREB:** Active cut and boost tone controls for bass and treble frequencies. These controls are available no matter where the BLEND control is set.
- **BLEND:** This control blends between the clean input and PRES and DRIVE section. The entire drive section of the SludgeHammer is somewhat scooped and can provide thick and aggressive tones.
- **PRES:** This control adds additional presence (high end) in the drive path.
- **DRIV:** Thick, articulate and pretty hairy overdrive.
- **BAL:** The Balanced output is explained in the introduction. The super low impedance and phase separation of the balanced output can drive very long cable lines with minimal tone degradation. This can be essential when you are plugging directly into a PA in a live situation, or perhaps creating a mix of direct, amplified or re-amplified audio tracks in the studio. It is optional for the build.
- **Direct Out:** This output can be fed separately to a mixing console or even be used as a tuner out. One helpful situation is using the Direct out record your un-effected dry signal which can be re-amped later on (IOW, for studio tracking).
- **LIFT:** This switch is used in conjunction with the BAL output. It separates DC and chassis ground in case of a ground loop. If you choose not to use the BAL output, this switch can be omitted (see Notes).

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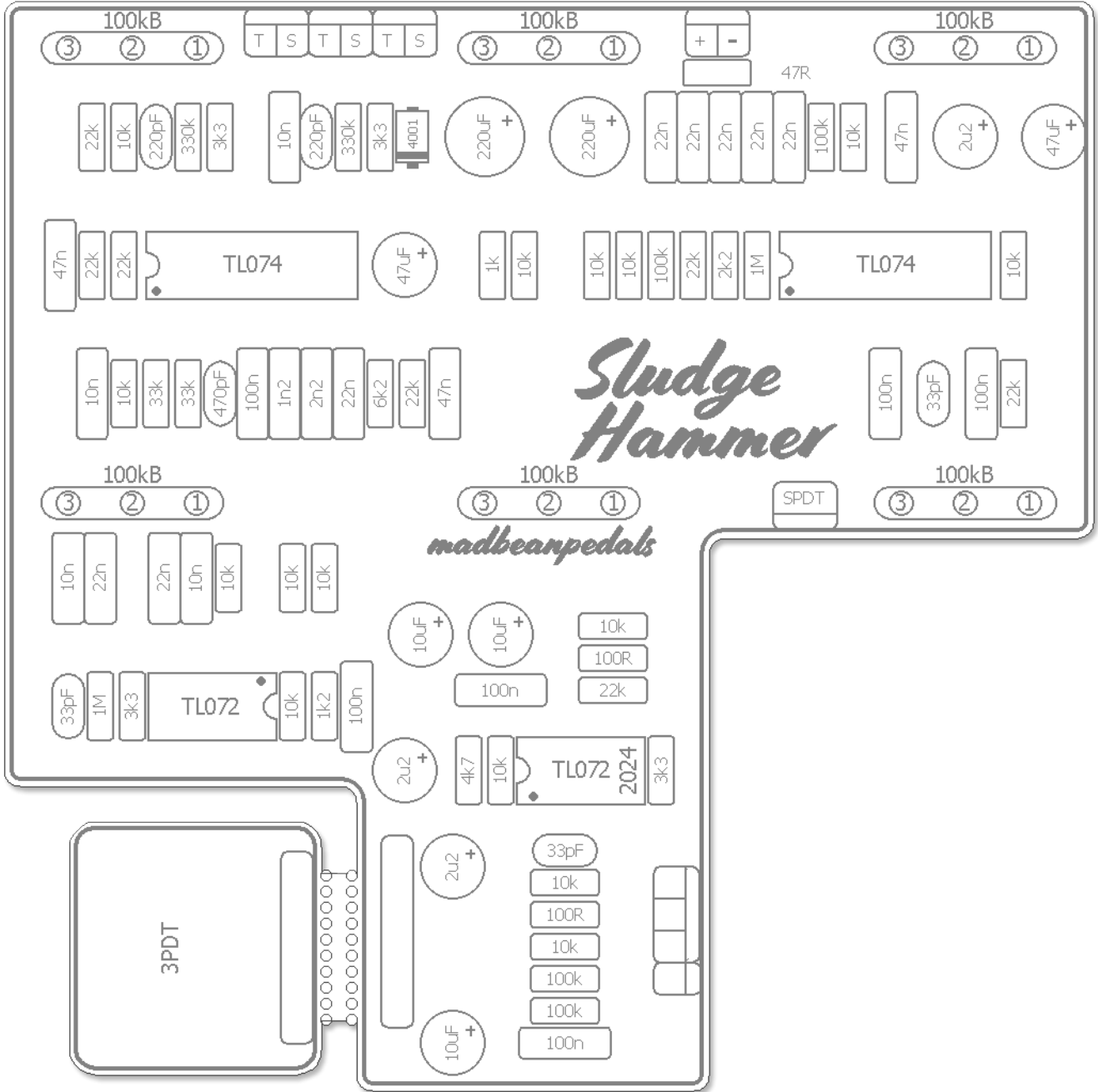
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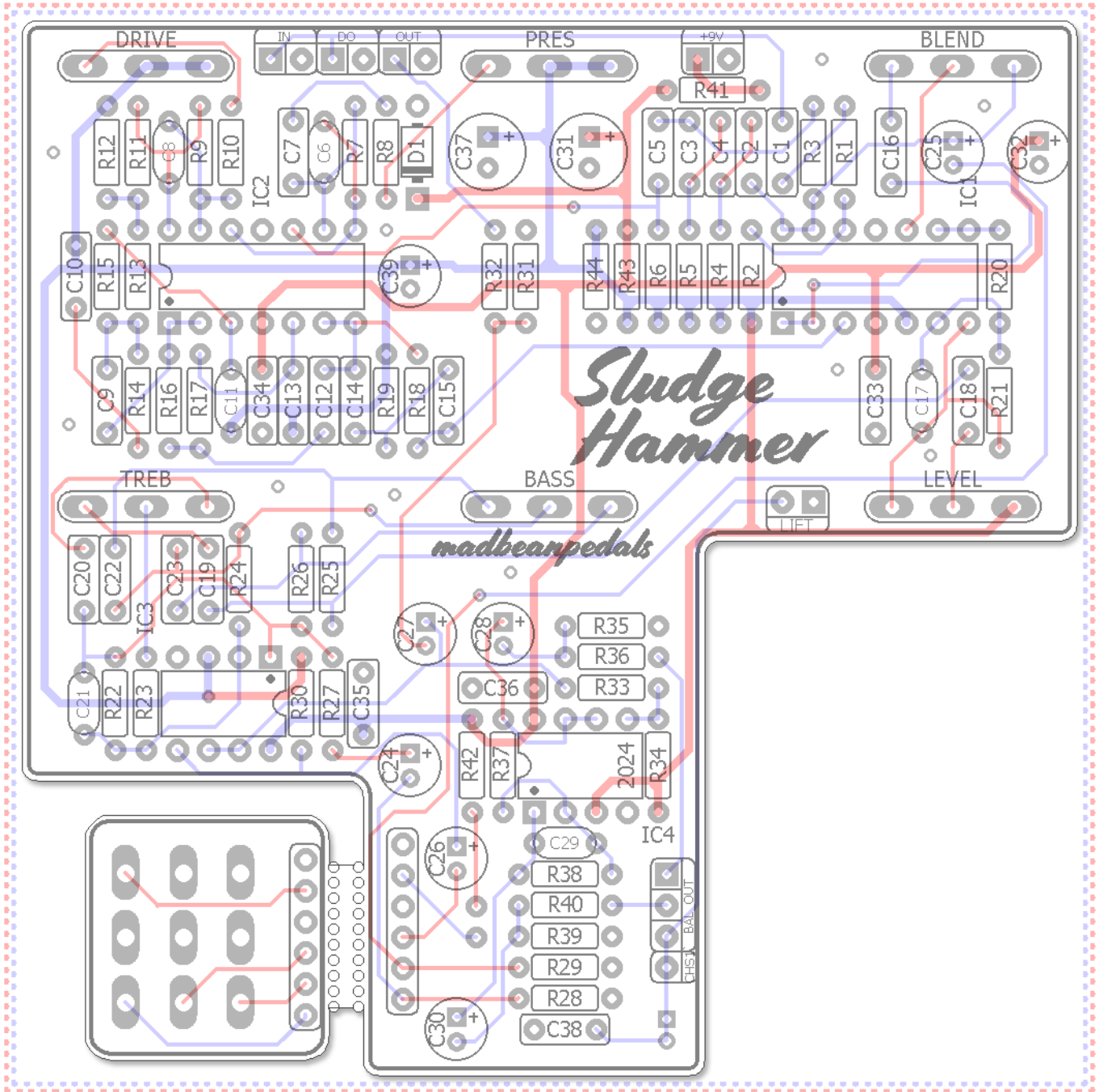
Parts Layout



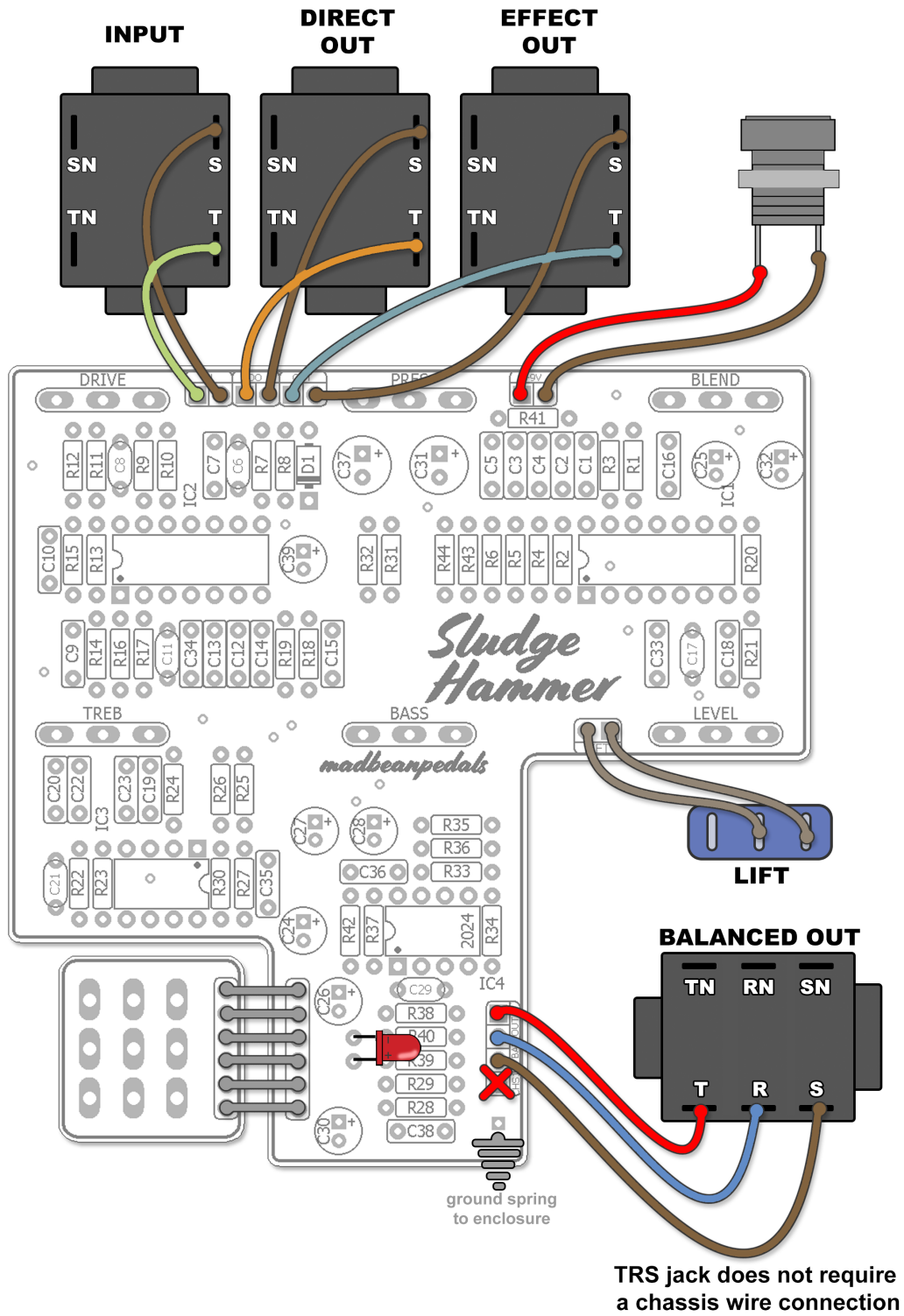
Component Values



Trace Layout

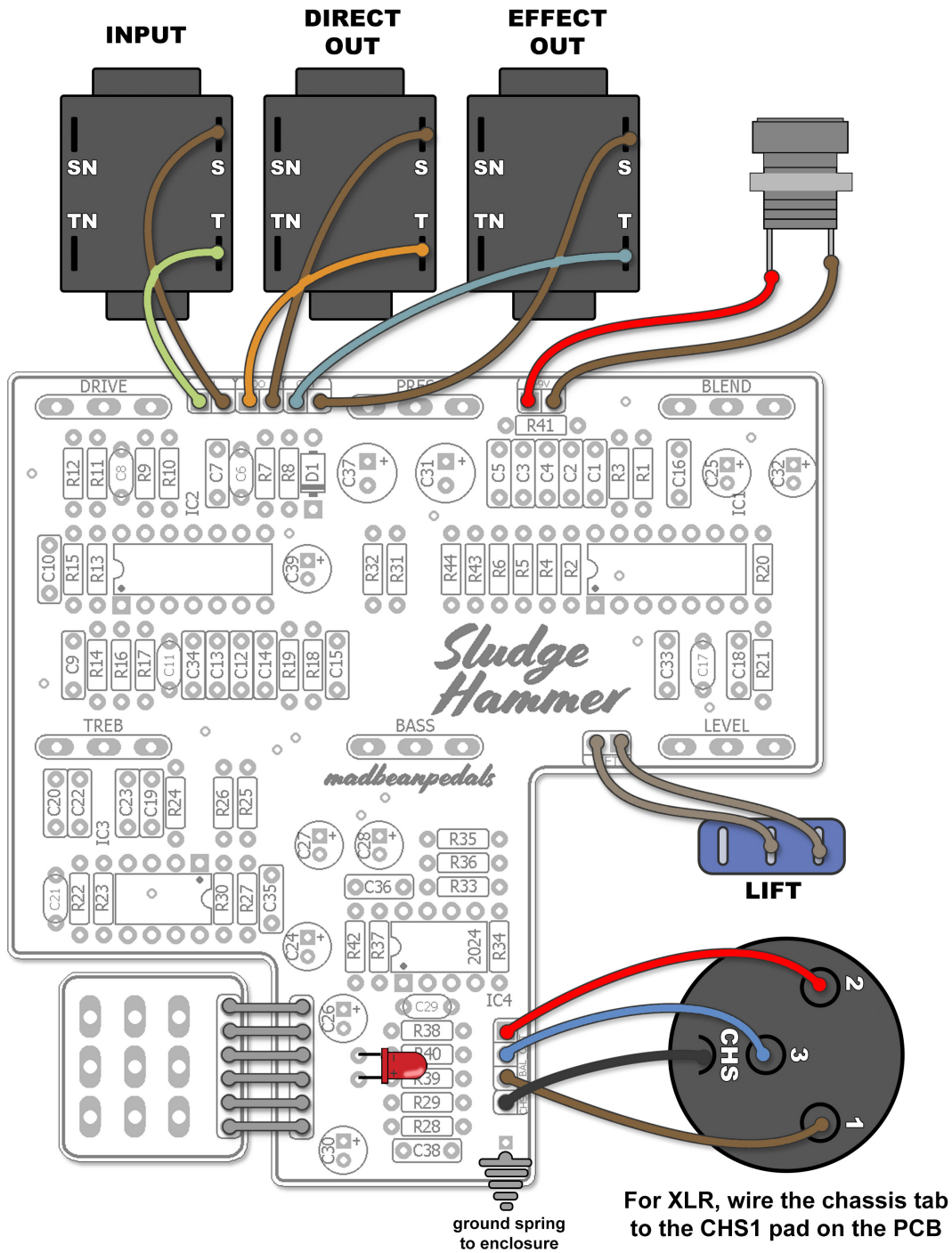


Wiring



Wiring for TRS balanced output

Wiring



Wiring for XLR balanced output

B.O.M.

Resistors		Resistors		Caps		Caps		Diodes	
R1	10k	R23	3k3	C1	22n	C23	22n	D1	1n4001
R2	1M	R24	10k	C2	22n	C24	2u2	ICs	
R3	100k	R25	10k	C3	22n	C25	2u2	IC1	TL074
R4	2k2	R26	10k	C4	22n	C26	2u2	IC2	TL074
R5	22k	R27	1k2	C5	22n	C27	10uF	IC3	TL072
R6	100k	R28	100k	C6	220pF	C28	10uF	IC4	TL072
R7	330k	R29	100k	C7	10n	C29	33pF	Switches	
R8	3k3	R30	10k	C8	220pF	C30	10uF	LIFT	SPDT
R9	330k	R31	10k	C9	10n	C31	220uF	Jacks	
R10	3k3	R32	1k	C10	47n	C32	47uF	IN	TS
R11	10k	R33	22k	C11	470pF	C33	100n	OUT	TS
R12	22k	R34	3k3	C12	2n2	C34	100n	DO	TS
R13	22k	R35	10k	C13	1n2	C35	100n	BAL OUT	TRS
R14	10k	R36	100R	C14	22n	C36	100n	Pots	
R15	22k	R37	10k	C15	47n	C37	220uF	BASS	100kB
R16	33k	R38	10k	C16	47n	C38	100n	BLEND	100kB
R17	33k	R39	10k	C17	33pF	C39	47uF	DRIVE	100kB
R18	22k	R40	100R	C18	100n			LEVEL	100kB
R19	6k2	R41	47R	C19	10n			PRES	100kB
R20	10k	R42	4k7	C20	10n			TREB	100kB
R21	22k	R43	10k	C21	33pF				
R22	1M	R44	10k	C22	22n				

Shopping List

Value	QTY	Type	Rating
47R	1	Metal or Carbon Film	1/4W
100R	2	Metal or Carbon Film	1/4W
1k	1	Metal or Carbon Film	1/4W
1k2	1	Metal or Carbon Film	1/4W
2k2	1	Metal or Carbon Film	1/4W
3k3	4	Metal or Carbon Film	1/4W
4k7	1	Metal or Carbon Film	1/4W
6k2	1	Metal or Carbon Film	1/4W
10k	15	Metal or Carbon Film	1/4W
22k	7	Metal or Carbon Film	1/4W
33k	2	Metal or Carbon Film	1/4W
100k	4	Metal or Carbon Film	1/4W
330k	2	Metal or Carbon Film	1/4W
1M	2	Metal or Carbon Film	1/4W
33pF	3	Ceramic or MLCC	25v min.
220pF	2	Ceramic or MLCC	25v min.
470pF	1	Ceramic or MLCC	25v min.
1n2	1	Film	25v min.
10n	4	Film	25v min.
22n	8	Film	25v min.
47n	3	Film	25v min.
100n	6	Film	25v min.
2u2	4	Electrolytic	25v
10uF	3	Electrolytic	25v
47uF	2	Electrolytic	25v
220uF	2	Electrolytic	25v
1n4001	1		
TL074	2		
TL072	2		
SPDT	1	On/On, any type	
TS	3	Isolated (Marshall Style)	
TRS	1	Isolated (Marshall Style) or XLR	
Spring	1	*included with PCB	
100kB	6	PCB Right Angle	16mm

Additional Hardware

- (1) 1590BB enclosure
- (1) Slim 2.1mm DC jack
- (1) Standard 3PDT footswitch
- (1) 5mm LED

Build Notes

Without Balanced Output

Omit the following parts:

TRS/XLR jack, Lift switch, R33-R40, C28-C30, C38, IC4, and ground spring.

You do not need to use the ground isolated style jacks in this case. I suggest either the Lumberg or open-frame jacks like Neutrik, Switchcraft, etc. You can omit the Direct Out jack if you don't want/need it.

With Balanced Output

You'll need all the parts listed in the BOM/Shopping List.

When using a TRS jack for the Balanced output, you do not need to wire anything to the CHS1 pad (since there is no chassis ground tab on a TRS jack). But, you do need to solder in the ground spring in the CHS2 pad on the PCB. It should contact the enclosure wall when the PCB is installed.

If you choose to use an XLR jack instead of TRS, you will need to drill a 22-24mm sized hole. This means you will need a step bit capable of drilling that size. It's not easy to do. Even with a drill press and vice to hold the enclosure I found it pretty difficult and slow going. Mount the XLR jack before putting the PCB in your enclosure. You'll need to solder the XLR jack wires after PCB installation. TIP: my XLR jack did not come with screws or nuts. I used a #4/40 screw/thread I bought at Home Depot and it worked perfectly. YMMV.

The default position for the Lift switch is to *the right*. IOW, when DC and Chassis ground are connected. In the left position, the sleeve of the Balanced output is chassis ground only. This may reduce noise or buzzing in case of a ground loop.

General Notes

When the Blend control is full CCW (IOW, bypassing the Presence and Gain) output will be reduced to around or slightly above unity with the Level control dimed. As you turn the blend up, you will increase the overall output and have plenty of boost on tap..

This is one effect where the character really comes out when using all the controls in some way. Turns out, half-way up on everything is a great starting point to sculpt the sound you are after.

There are minor issues with noise and feedback in this build. These are common complaints from other DIY builders of the Bass Driver and they seem inherent to the design itself. One is feedback/oscillation when the Treble, Presence, Drive and Level pots are simultaneously dimed when the unit is plugged through an amp. This is most likely due to the cascaded gain stages of the Presence and Drive and the frequencies being pushed in that setting. But, this is not really a setting you would use anyway. I had no oscillation or feedback plugged into my audio interface, however, only with an amp at that particular setting.

The second issue is some noise with the Presence control. I was able to reduce the noise by changing IC2 from a TL074 to a TLE2074 so I do recommend it if you have a noise issue. However, I also noticed that this noise was reduced by changing the design from 1/8W to 1/4W resistors. So, you may not experience it at all.

The Drive control will bunch up at the very last part of its rotation. This turns out to be a good thing because I find the highest gain setting not too desirable. It's op-amp clipping which can sound a little ratty. But, the rest of the control is very useful in beefing up the bass. Note: when running the SludgeHammer at 18v, I found the Drive control to be smoother and more pleasant at the highest setting. You can run yours at 18v so long as you use 25v rated caps or higher.

I've included the R41 resistor with the PCB. Originally, this was a 47R 1/4W resistor but I found that it ended up reducing the operating voltage more than I liked. So, I changed it to 10R 1/2W. The space on the PCB is undersized for this resistor so you'll need to bend the leads inwards slightly to make it fit.

Build Notes

If you are *including* the Balanced out option, you'll need an SPDT switch and ground isolated jacks (three TR and one TRS)

SPDT:

<https://lovemyswitches.com/spdt-on-on-switch-solder-lug-short-shaft/>

TR Ground isolated jacks:

*preferred <https://lovemyswitches.com/1-4-mono-switched-enclosed-jack-solder-lugs-threaded-bushing/>

<https://lovemyswitches.com/1-4-mono-switched-enclosed-jack-solder-lugs/>

TRS Ground isolated jacks:

*preferred <https://lovemyswitches.com/1-4-stereo-switched-enclosed-jack-solder-lugs-threaded-bushing/>

<https://lovemyswitches.com/1-4-stereo-switched-enclosed-jack-solder-lugs/>

I recommend the TRS jack instead of XLR, but if do want to use XLR here are some links.

XLR Jacks

Lots of these available, the one I used is similar to this:

https://www.amazon.com/Tegg-Chassis-Microphone-Socket-Connector/dp/B07VTP4MM5/ref=sr_1_5?keywords=XLR+3-Pin+Male+Jack&qid=1642120046&sr=8-5

XLR Jack screws:

I used #4 screws with a 40 thread count for my jack. You can find them at most hardware stores. Similar to these:

<https://www.homedepot.com/p/4-40-x-3-8-in-Combo-Pan-Head-Zinc-Plated-Machine-Screw-8-Pack-819441/204282758>

If you are *not using* the Balanced output option, you do not need the SPDT switch. You can also use any style 1/4" jack. You'll need up to three (Input, Direct Out, Output). Note, DirectOut is also optional and does not have to be used.

Circuit Voltages

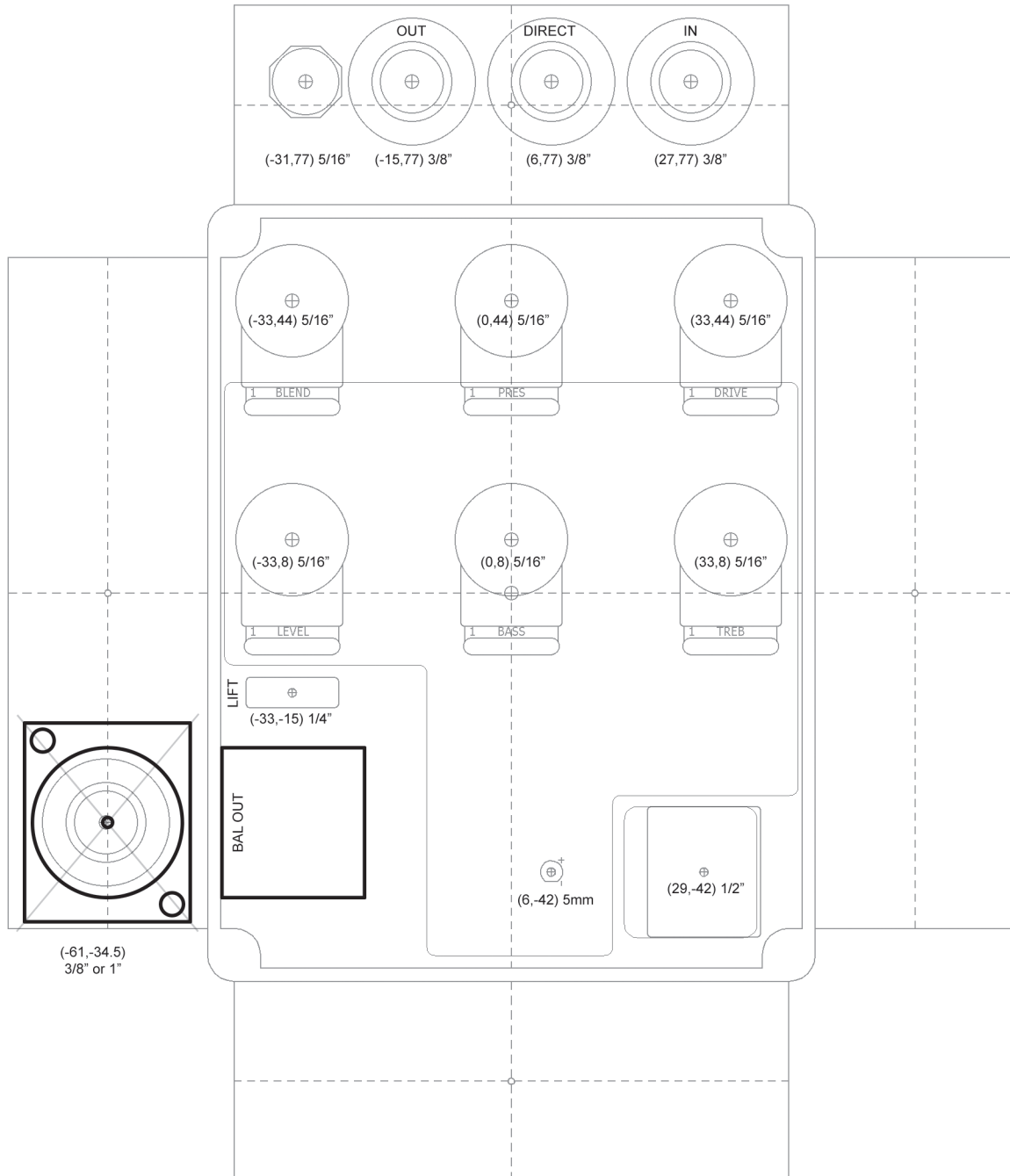
IC1	TL074	IC2	TL074	IC3	TL072	IC4	TL072
1	4.8	1	4.75	1	4.71	1	4.68
2	4.8	2	4.75	2	4.71	2	4.68
3	4.79	3	4.73	3	4.71	3	4.68
4	9.32	4	9.32	4	0	4	0
5	4.7	5	4.76	5	4.69	5	4.68
6	4	6	4.79	6	4.7	6	4.68
7	5.57	7	4.79	7	4.7	7	4.68
8	4.31	8	4.71	8	9.32	8	9.32
9	4.31	9	4.91				
10	4.29	10	4.61				
11	0	11	0				
12	4.04	12	4.71				
13	4.32	13	4.73				
14	4.32	14	4.76				

- 9.42vDC One Spot
- Current Draw ~ 23mA

Drill Template

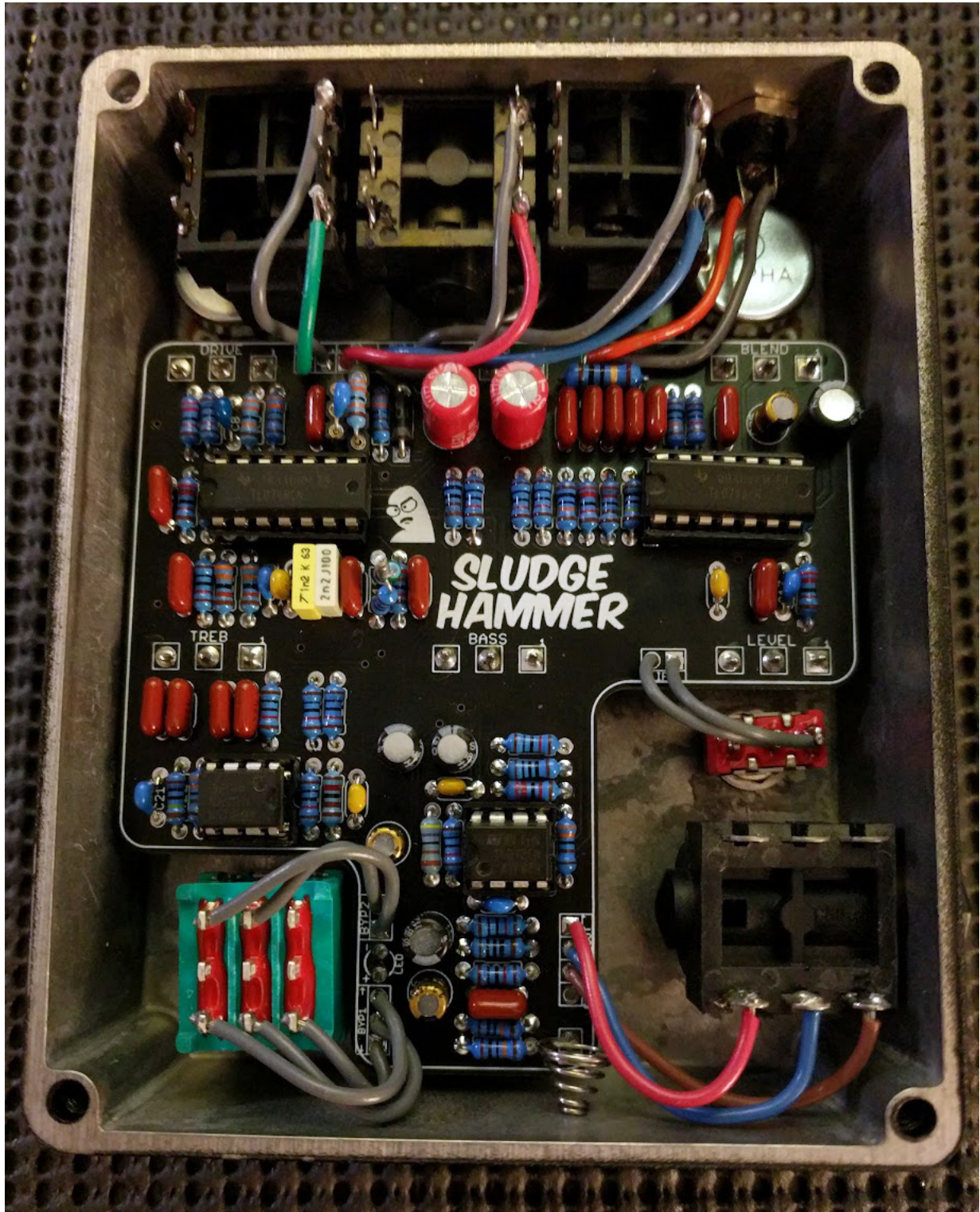
Coordinates are denoted in **(X,Y)**, **drill size** format starting from the center (0,0) location of the enclosure.

Tayda drill template: https://drill.taydakits.com/box-designs/new?public_key=cGltbIRzcDVadU9jdEdGZjcrT3IUZz09Cg==



If you choose an XLR for the Bal Out, you'll need a step bit capable of up to 1" holes in order to drill a large enough hole. For the Tayda drilling service, I've made the Bal Out drill spot 9.5mm by default. For XLR, change that to 22mm.

Build Pic



Previous version build.

Schematic

