



## Beneath the Bush of Ghosts Build Doc

Warning! This is a much more difficult build than the usual pre-soldered SMD release from DE. To make it work you need to remove 4 0603 resistors from the board as well as solder a lot of through-hole components and headers. You have been warned, proceed with caution. Warning! This has been resolved in later version and can be ignored completely. The new version is labeled "BENEATH THE BUSH OF GHOSTS V1.1 DEC 2022" on the component board.

Beneath the Bush of Ghosts is a 26hp Quad Lo-fi sampler based on the ISD1820 IC which is an old answering machine chip. It is inspired by several other projects based on the ISD1820 chip (Lonershy and BASTL builds comes to mind but also others). Each channel is identical

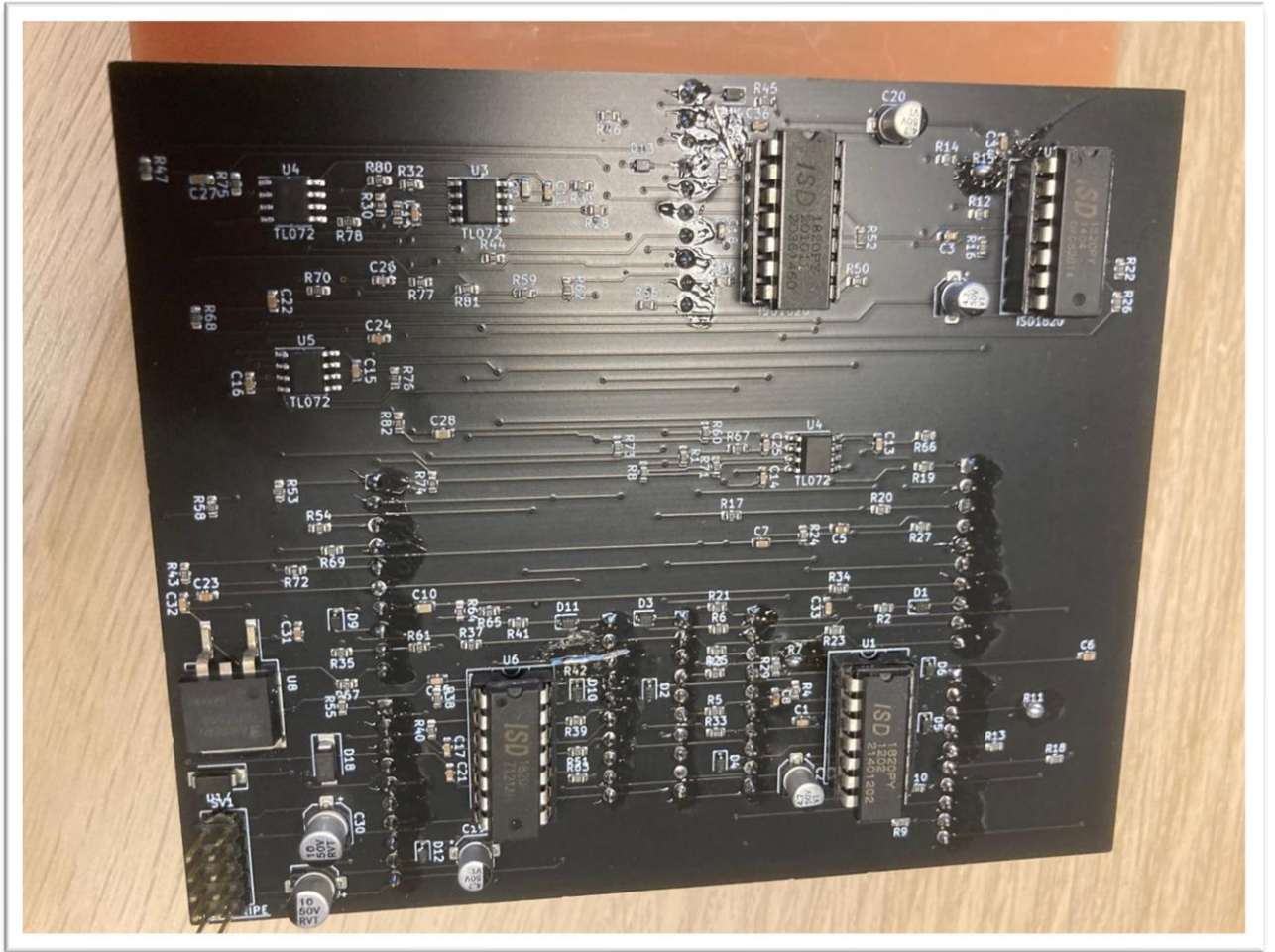
to each other with some sneaky normalization going on between channels. There is a mixer combining all dry inputs with the sampler outputs. The individual outs only contain the sampler out. Each output of each channel is cross modulation the channel next to it in pairs, so 1-2 modulate each other and 3-4 the same way. Each output is normalled to the following input, 1-2-3-4 and 4 goes back to input 1. This means you can do generation loss (i.e. disintegrating loops) with some clever patching.

Each channel has an input and an output. A pitch knob with a dedicated attenuated cv attached to it. A filter with lowpass to the left and high pass to the right. It also has a dedicated trig in jack with tactile switch for these functions: record in, momentary play and full play of the sample. The trig inputs need a +5v gate to be able to operate. There is also a Loop switch which makes it play the sample over and over. For more info on functions check out my [YouTube video](#).

In order to record you need to turn loop, switch off, set the pitch to around the 10 to 2 o'clock (you can experiment with this), CV knob usually influence sample speed so make sure it is full CCV. Insert an input signal (or use the looping sampler next to it) hit record, the LED will turn off, when its start lighting again the memory of the chip should be full. It's a simple as that!

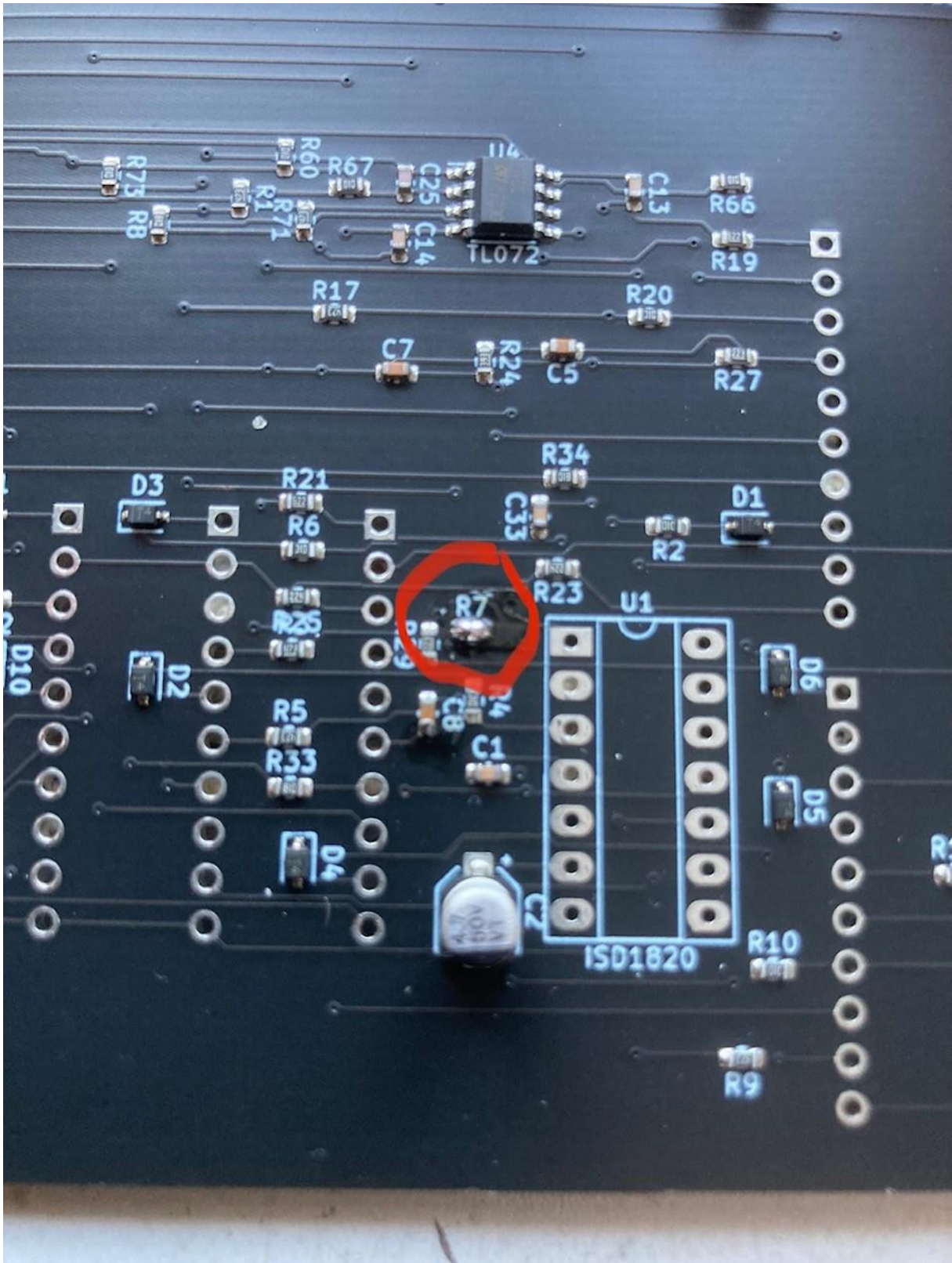
## Build guide:

~~In order to get the record button to work as should you need to remove the following 0603 resistor: R7, R15, R42 and R49. This is quite easy: smudge the resistor with some solder. Heat up the smudge and remove the resistor. Make sure to not dwell to long with the iron, the pads might get to warm and be damaged or even fall off. It should come off right away if done right. Now you have to bridge the pads underneath, either with a solder blob or a tiny bit of a resistor leg (see pictures). I prefer the latter. After you are done, check continuity with a meter and make sure you have a sturdy connection between the pads. If not, the record button won't work (but the trig in for record will).~~



The populated board with resistors removed and IC holders and IC's in place.





In the picture above, R7 has been replaced with a solder "blob".

I usually continue with headers on this one since there are plenty of those and should be the most difficult part. I usually solder in female headers on the SMD board and male on the component/jack board. Follow the silkscreen to get the headers on the right side of the pcb.

When doing so I only solder one pin on each header before putting them together like a sandwich. This will make it way easier to fit the two boards when constructing the sandwich. If one is tilted in the wrong way, simply warm up the one solder point and align. Move on until both fits and inspect around the boards that all headers have contact with each other and that no pins are sticking out. One pitfall with this operation is if you are forced to take the two boards apart, then usually the one in you soldered will stay, breaking the surrounding plastic and thus destroying the header. So be very careful if you need to restart and take the boards apart before soldering all pins. If needed reheat that one point and separate the boards with the point, Go over all pins and carefully solder them in. Inspect and reinspect.) 90% of the errors I've done with my builds are header solder points touching each other or missing completely. Don't rush this.

I do the IC holders for the ISD1820 next. I place the ICs into the holders after soldering the holders.

Then I move on to the component board, usually solder one point on the components from the top side, the ground pin on all jacks (the one sticking out from the jack that has a square pad), one point on the pots and no soldering on the switches and LEDs. LEDs goes with the short leg (GND) through the square pad. Then attach the panel with a few nuts. Double check from the other side that panel looks good, that the LED are peeping out correctly and don't look weird. Then systematically go through the whole board and solder everything in. There are quite a lot of components on this one so makes sure all solder points are soldered at least twice.

Then solder the power connector on the SMD board.

Time to start up and test. Enjoy.

## BOM

Part	Designator	QTY	INFO	Product link
3mm clear White LED (Ultrabright)	D7, D8, D15, D16	4	Short leg goes to square	<a href="https://www.taydaelectronics.com/led-3mm-white-water-clear-ultra-bright.html">https://www.taydaelectronics.com/led-3mm-white-water-clear-ultra-bright.html</a>
Thonkiconns	J1- J10, J15- J16, J25- J37	25		thonk, tayda, aliexpress: <a href="https://www.thonk.co.uk/shop/thonkiconn/">https://www.thonk.co.uk/shop/thonkiconn/</a>
Header 1x10 Female	J23, J12, J14, J21, J41, J22,	8		<a href="https://www.taydaelectronics.com/10-pin-2-54-mm-single-row-female-pin-header.html">https://www.taydaelectronics.com/10-pin-2-54-mm-single-row-female-pin-header.html</a>

	J39, J24			
Header 1x10 Male	J11, J13, J17, J18, J19, J20, J38, J40	3		<a href="https://www.taydaelectronics.com/40-pin-2-54-mm-single-row-pin-header-strip.html">https://www.taydaelectronics.com/40-pin-2-54-mm-single-row-pin-header-strip.html</a>
Alpha 9mm potentiometer T18 100K Lin	RV1- RV12	12		<a href="https://www.taydaelectronics.com/tayda-100k-ohm-linear-taper-potentiometer-spline-shaft-pcb-mount-9mm.html">https://www.taydaelectronics.com/tayda-100k-ohm-linear-taper-potentiometer-spline-shaft-pcb-mount-9mm.html</a>
Eurack power pins 2x5	SV1	1		<a href="https://www.taydaelectronics.com/2x40-pin-2-54-mm-double-row-pin-header-strip.html">https://www.taydaelectronics.com/2x40-pin-2-54-mm-double-row-pin-header-strip.html</a>
ISD1820	U2, U7, U1, U6	4	Through hole part	ebay or aliexpress
Micro knobs T18	For RV1- RV12	12	Must be Black	<a href="https://www.thonk.co.uk/shop/micro-knobs/">https://www.thonk.co.uk/shop/micro-knobs/</a>
SPDT ON-ON	SW 7- 8, SW 15-16	4		<a href="https://www.taydaelectronics.com/mini-toggle-switch-spdt-on-on.html">https://www.taydaelectronics.com/mini-toggle-switch-spdt-on-on.html</a>
Tactile Switch Mouser# 612-TL1105SPF100Q	SW 1- 6, SW 9-14	12		<a href="https://www.mouser.se/ProductDetail/612-TL1105SPF100Q">https://www.mouser.se/ProductDetail/612-TL1105SPF100Q</a>
Switch caps for tactile Switches Mouser# 612-1R-BK		12	Must be black	<a href="https://www.mouser.se/ProductDetail/612-1R-BK">https://www.mouser.se/ProductDetail/612-1R-BK</a>
IC Sockets for ISD1820 IC's 14pin		4		<a href="https://www.taydaelectronics.com/14-pin-machine-tooled-ic-socket.html">https://www.taydaelectronics.com/14-pin-machine-tooled-ic-socket.html</a>

