

Links and resources for builders

Hi! Thanks for attending our workshop! We hope you had fun and would like to continue on the path of the builder. If that is the case, here you will find possible next steps, info on where to find parts and schematics for your next builds and more.

We do our best to run prototyping and soldering workshops every month at Pedal Markt. If you are interested in building more or learning the basics of electronics, ***please subscribe to our newsletter:*** <https://pedalmarkt.com/pages/newsletter>

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Next steps

Building a pedal/synth from a kit by yourself

The benefit of ordering a kit is you wouldn't need to source parts, schematics and the PCB, it will all be included in the kit. You would still need to get the [Essential tools](#), we have a list of those below.

Pay attention to the complexity of the kit, some may be very challenging. Fuzz pedals, overdrives, and distortions are usually easier.

Where to get a pedal kit:

- <https://musikding.de> is probably the best place to buy a kit in Germany, but pay attention to the quality of the kit: documentation and wiring. If the build needs lots of wiring, especially for pots, or the documentation is poor, I'd recommend against it.
- <http://www.banzaimusic.com> is another one, although they focus more on parts

Where to get a synth kit:

- <http://thonk.co.uk>
- <https://www.exploding-shed.com>
- <https://www.3u-shop.de>
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Building a pedal/synth from a PCB

Next in terms of complexity would be ordering a ready-made PCB and sourcing components for the pedal by yourself. The building process would be similar to building from a kit, but

1. You'd spend time with all the different places that sell components and
2. You'd learn to read values of different components, they wouldn't be pre-marked.

Which is pretty valuable.

Another benefit is you can order a PCB from anywhere in the world. Shipping costs would be slim and you won't have to pay customs since the price of the pcb would be small.

For ordering Pedal PCBs check out these websites:

- <https://musikding.de>
- <http://www.banzaimusic.com>
- [Build Your Own Clone](#)
- [General Guitar Gadgets](#)

- [madbeanpedals](#)
- [GuitarPCB](#)
- [MusicPCB](#)
- [3PDT](#)
- [Aion Electronics](#)
- [MOD Kits](#)
- [Rullywow](#)
- [FuzzDog](#)

For ordering Synth PCBS check out:

- <http://thonk.co.uk>
- <https://pushermanproductions.com>
- <https://www.amazingsynth.com>
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For ordering parts and components please see [this section below](#).

Building a pedal/synth from a perf-/strip- board layout

The next step in terms of complexity would be to build a pedal without a PCB, using a perf- or a strip- board. Prototyping boards are useful when you want to quickly piece together a mod for your existing gear or even a simple pedal. No need to wait for a PCB, easy to experiment and slightly change the schematics of whatever you are building.

You can find layouts and instructions on how to use them on these websites. We'd recommend starting with a stripboard (easier, no need to make tracks that connect components) rather than perfboard (harder but more flexible).

Pedal layouts:

- <https://tagboardeffects.blogspot.com> (stripboard layouts)
- <https://effectslayouts.blogspot.com> (perfboard layouts)
- <http://guitar-fx-layouts.42897.x6.nabble.com/> (all kinds of layouts and schematics)

Synth layouts:

- <http://musicfromouterspace.com>
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For ordering parts and components please see [this section below](#).

Building a pedal/synth on a breadboard

Breadboards are easy to use and flexible. They are perfect for prototyping new effects and experimenting with an existing circuit. They are not portable though and can get quite tangled and complicated after a while.

A good place to start is to breadboard an existing circuit and start experimenting with it, changing components values adding extra options and switches.

Here is where you can get a pedal circuit to experiment with:

- <https://www.electrosmash.com> – great blog that goes into the details of many popular circuits like Tube Screamer or RAT
- <https://www.diystompboxes.com/pedals/schematics.html>
- <http://experimentalistsanonymous.com/diy/index.php?dir=Schematics>
- <http://guitar-fx-layouts.42897.x6.nabble.com/> (all kinds of layouts and schematics)

Some synth circuits:

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For ordering parts and components please see [this section below](#).

Making a PCB/Perf-/Strip- board layout by yourself

Let's say you've breadboarded an effect you like and you'd like to turn it into a pedal. If the circuit is simple you can just place components on a perf- or strip- board, solder them and some wires together and you are good to go.

If the circuit is not simple though, you might want to come up with the layout first. For perf- or strip- boards you can do it on paper or use a community-beloved free tool called [DIY Layout Creator \(DIYLC\)](#).

For PCBs it is easier if you use dedicated software. [KiCAD](#) is the most popular free open source tool out there, but there are many many more others too e.g. [Eagle](#).

Once your PCB is ready, you can order a small batch (3-5 boards) from a manufacturer, for example:

- <https://aisler.net>
- <https://jlcpcb.com>
- <https://oshpark.com>
- <https://www.pcbway.com>
- <https://allpcb.com>

Resources

Books

- [“The Art Of Electronics” by Paul Horowitz and Winfield Hill.](#) Excellent book that covers the basics of electronics, not only for audio.
- [“Make: Analog Synthesizers” by Ray Wilson.](#) Good introduction into audio circuits.
- [“Electronotes” by various authors.](#) An excellent collection of audio circuits.

Beginner resources

Pedal building

- [A list of beginner guides from GuitarPCB.com](#)
- [A list of beginner info from generalguitargadgets](#)
- [Introduction to electronic parts](#)
- https://www.reddit.com/r/diypedals/comments/327vbs/so_youre_starting_out_a_guide_to_what_youll_need/
- https://www.reddit.com/r/diypedals/comments/8xbrcj/guide_how_to_get_started_building_effects_pedals/

Synth building

- Dimensions of a eurorack module https://doepfer.de/a100_man/a100m_e.htm
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Forums

Pedal building

- <http://freestompboxes.org>
- <https://www.reddit.com/r/diypedals/>
- [Diystompboxes.com](http://diystompboxes.com)
- <http://ilovefuzz.com>
- <https://guitarpcb.com/community/>
- <https://forum.pedalpcb.com>
- <http://experimentalistsanonymous.com/board/>

Synth building

- <https://muffwiggler.com>
- Synth DIY reddit
- <https://synth-diy.org> mailing list (with an immense archive)
- <http://analogue-heaven.1065350.n5.nabble.com/>

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YouTube Channels

PCB Design

- [Phil's Lab](#)
- [Robert Feranec](#)

Pedal building

- [Effects Layouts](#)
- [DIY Guitar Pedals](#)

Synth building

- [Moritz Klein](#)
- <https://www.youtube.com/user/abovenyquist>
- <https://www.youtube.com/user/sourceryone>
- <https://www.youtube.com/channel/UC-optxul3FrunxcuQIMYbrq> Casper Electronics

Blogs

Pedal building

- www.electrosmash.com
- <http://www.muzique.com/news/>
- <http://bevisaudio.com>
- <http://geofex.com>
- <http://www.generalguitargadgets.com>
- <https://www.madbeanpedals.com/>

Synth building

- <http://schmitzbits.de>
- <http://www.timstinchcombe.co.uk/index.php?pge=synth>
- <https://northcoastsynthesis.com/news/>
- <https://electricdruid.net/articles/>
- <http://musicfromouterspace.com/>
- Ken Stone CGS <http://synthpanel.com/>
- Electronotes – an excellent source of synth circuits:
<http://electronotes.netfirms.com/free.htm>

<https://archive.org/details/electronotes-meh-ebgpcc-torrent/Electronotes%20-%20Builder's%20Guide%20%26%20Preferred%20Circuits%20Collection/mode/2up> (a large archive of Electronotes)

- <http://www.birhofasynth.com/> (Scott Stites, Thomas Henry)
- <https://knopsmodular.design.blog/>
- <https://www.chaotic-circuits.com/>
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Schematics and layouts

Pedals

- <https://www.diystompboxes.com/pedals/schematics.html>
- <https://tagboardeffects.blogspot.com>
- <http://guitar-fx-layouts.42897.x6.nabble.com/>
- <https://effectslayouts.blogspot.com>
- <http://experimentalistsanonymous.com/diy/>
- <http://tonepad.com/>
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Synths

- Excellent collection of basic synth schematic building blocks
https://github.com/PierrelCoding/sdiy/tree/main/Building_Blocks
- <https://www.schmitzbits.de/index.html>
- <http://electronotes.netfirms.com>
- <https://github.com/stripboard-layouts/lament-for-mills>
- Building blocks http://looklook.tv/sdiy/get_started/about/
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Sourcing parts

<https://eu.mouser.com>

Pricey, good choice of parts, shipping is consistently 1 week if parts are in stock. Shipping is free for orders over 50€.

<http://musikding.de>

Pricey, but parts are tailored for pedal building, usually shipping is fast but due to corona expect delays up to a week.

<http://banzaimusic.com>

Pricey, but parts are tailored for pedal/amp building, usually shipping is fast but due to corona

expect delays. They are located in Berlin, so you can also pick up your parts at their warehouse, even on the same day.

[Sly.de](#) [segor.de](#) [conrad.de](#)

Berlin-based shops. They don't always have what you need and components are more expensive than ordering online, but you can get them on the same day instead of waiting for a week or more.

www.taydaelectronics.com

Cheaper than the resources above, large choice, good for ordering in batches because of high shipping costs. With DHL Express the package is in Berlin within a week, but you would have to pay customs. With regular post the package is in Berlin within 3 weeks and usually you don't pay customs.

<https://ebay.com>

Good for ordering specific/rare parts. Especially if you need just a few components and don't mind paying more for getting them faster.

<https://www.aliexpress.com>

Probably the cheapest of the listed resources, but requires more effort when sourcing. It is organized similarly to ebay, where every seller has their own "shop" on the site. You save more by ordering from the same seller. It's better to first find the seller that has most of the stuff you want, otherwise you'd pay shipping costs for every seller you order from.

Here are a couple sellers we ordered from in the past:

- <https://www.aliexpress.com/store/2178016>
- <https://www.aliexpress.com/store/1596219>

[Here's a good reference doc with people validating parts and sellers on AliExpress.](#)

Shipping takes 2-3 weeks with AliExpress standard shipping.

<http://www.uk-electronic.de>

<https://www.reichelt.com/>

www.profusionplc.com

<https://tme.eu> (e.g. great for [knobs](#))

Tools

Essential tools to build pedals/synths (e.g. from kits)

- Soldering iron or soldering station
- Desoldering pump
- 1mm Solder
- Multimeter
- Wire (0.25mm² or 24 AWG)
- Wire with alligator clips
- Wirecutters & wirestrippers
- Assortment of wrenches for jacks, potentiometers, and switches
- Pliers
- Third hand or Blu Tack or PCB holder
- Assortment of screwdrivers for enclosure bolts and knobs
- Alligator clips

Nice-to-have tools

- Tweezers
- Desoldering braid
- Mask and goggles
- Solder fume extractor
- Drill or Drill Press
- Unibit for drilling enclosures
- Hole punch
- Calipers

Tools for Prototyping

- Stripboard
- Perfboard
- Breadboard + jumper wires