Dactyl Orca Design Notes

Finalized DM Base Model Choice

After several test prints, the best DM base model from the Dactyl Generator site, for both typing and gaming, is the following:

(FINAL) **DM9: Y0.5, X3.13 w/ Pinky & Thumb Adjustment: link**

- Key Hole: Box and MX
- Inner Index Finger's Column: Use inner column
- Tenting Angle: 10
- USB Hole: None
- Web Thickness: 3.5
- Wall Thickness: 4
- Horizontal (X) Spacing: 3.13
- Vertical (Y) Spacing: 0.5
- Custom Thumb Cluster: *Checked*
- Right Side: *Unchecked*
- Stagger
  - Middle, Z: -4.75
  - Pinky, Y: -10
  - Pinky, Z: 4.5
  - Thumb, X: 6.63
  - Thumb, Z: 6.37
- Top Right
  - Offset, X: -14.8
  - Tenting, Z: 8
- Bottom Left
  - Offset, Z: -21.5
- Bottom Right
  - Offset, Z: -22

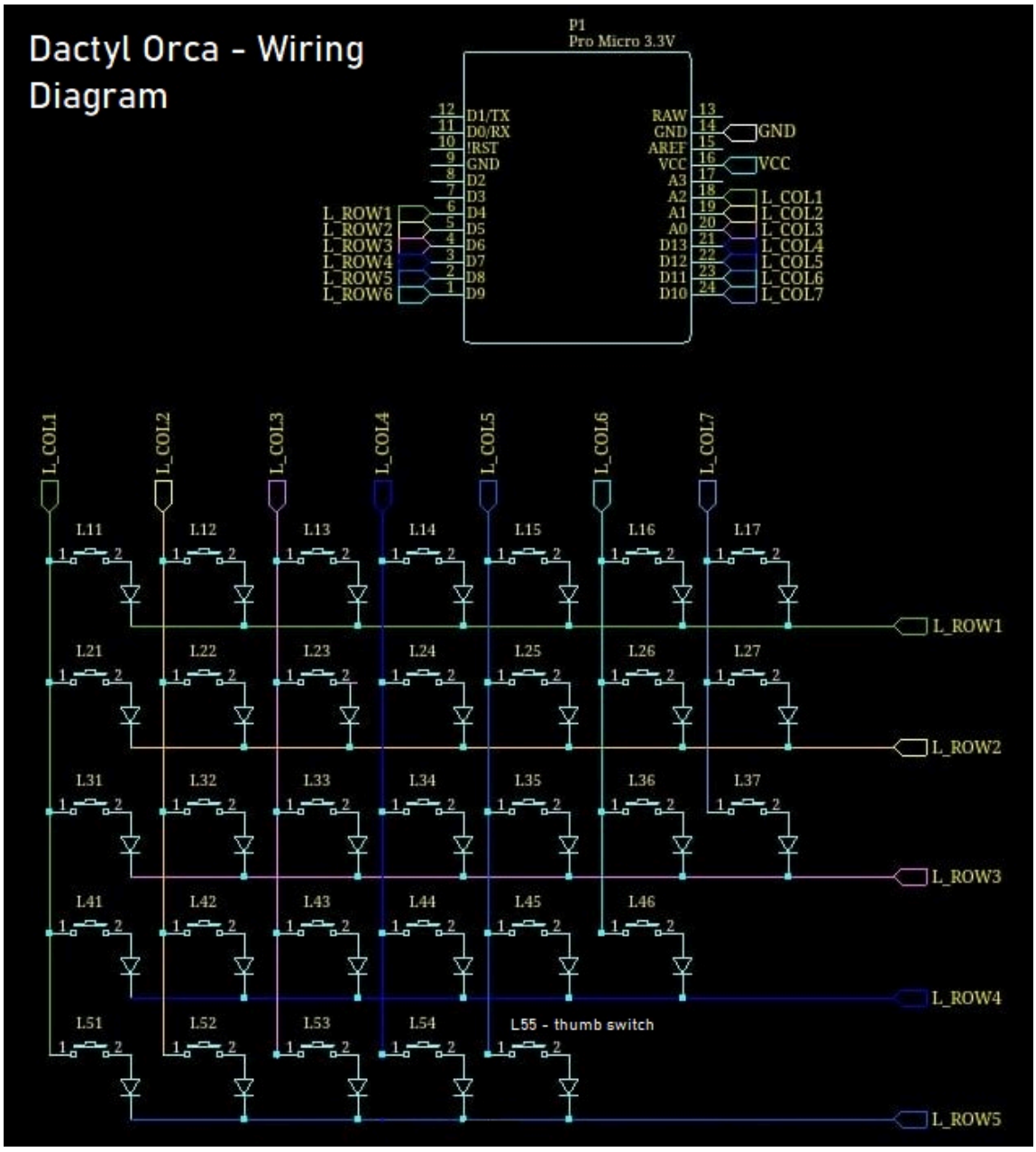
Dactyl Orca - Electronics and ZMK programming

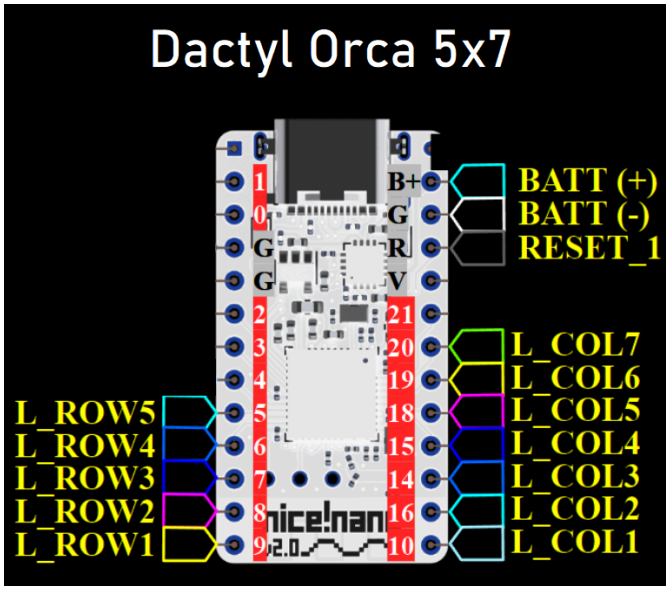
The focus is now shifted towards the electrical and programming side of the Dactyl Orca.

Dactyl Orca - ZMK Firmware Completed

- Github repository: link
- Version 1 firmware download: link

Dactyl Orca - Circuit/Wiring Diagram & NiceNano v2 pins





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Dactyl Orca Keymap

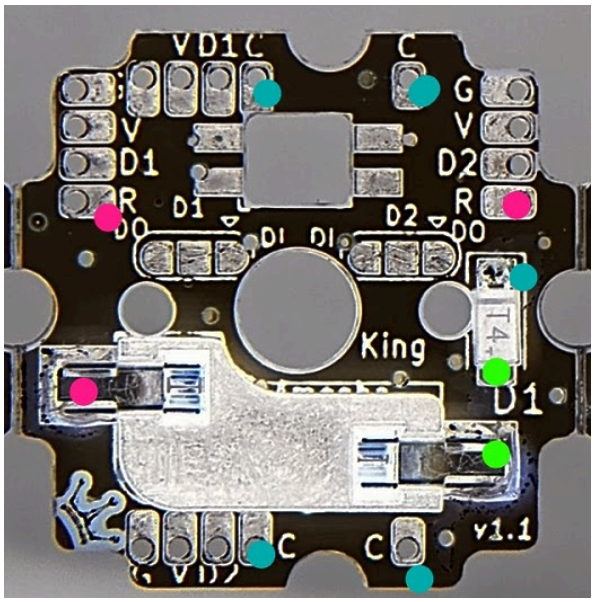
```
&kp ESC    &kp N1   &kp N2   &kp N3    &kp N4    &kp N5   &kp N6
&kp TAB    &kp Q    &kp W    &kp E     &kp R     &kp T    &kp LBKT
&kp CAPS   &kp A    &kp S    &kp D     &kp F     &kp G    &kp GRAVE
&kp LSHIFT &kp Z    &kp X    &kp C     &kp V     &kp B
&kp LCTRL  &kp HOME &kp LALT &kp SQT   &mkp LCLK  &none
```

Mouse Emulation Behaviors

- ZMK Documentation on mouse use: Link
- **IMPORTANT:** REFRESHING THE HID DESCRIPTOR
    - Enabling or disabling the mouse emulation feature modifies the HID report descriptor and requires it to be refreshed. **The mouse functionality will not work over BLE (Bluetooth Low Energy) until that is done.**
- Currently, the thumb button is assigned the Left Shift key. If you want to natively change it to the Left Mouse Button, you need to modify the repository files as follows:
    - In `dactyl_orca_5x7.conf`, add line:
        - `CONFIG_ZMK_MOUSE=y`
    - In both `dactyl_orca_5x7.keymap` files, add header line:
        - `#include <dt-bindings/zmk/mouse.h>`
    - Replace `&kp LSHIFT` with
        - `&mkp LCLK`

Amoeba King PCB Continuity Nodes

The color
dots are labeled by the respective electrical continuity node.



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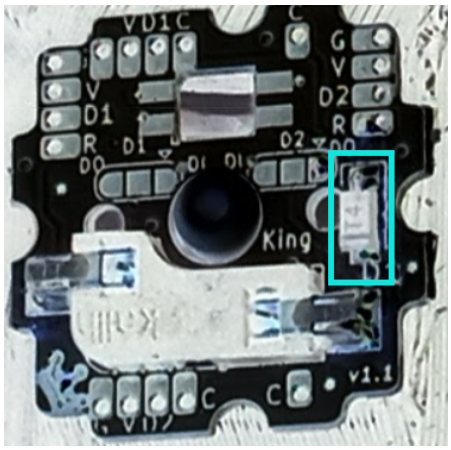
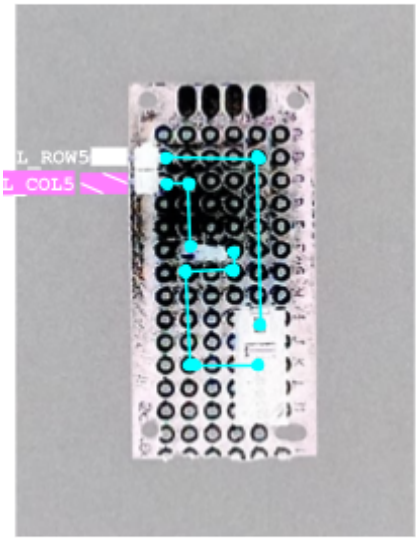
THE DIODE SHOWN ABOVE IS REVERSED FROM THE FINAL PRODUCT

Amoeba King PCB diode direction

Even though the wiring guide states that you should solder the diode as shown in the picture above, the way you ZMK firmware is implemented is such that the signal will flow from column to row pins ("`col2row`" in the file `dactyl_orca_5x7.overlay` in your Dactyl Orca github repository). Due to the Amoeba King's circuity, you will need to solder the diode in the opposite direction, with the band facing downward, as shown in the pic:



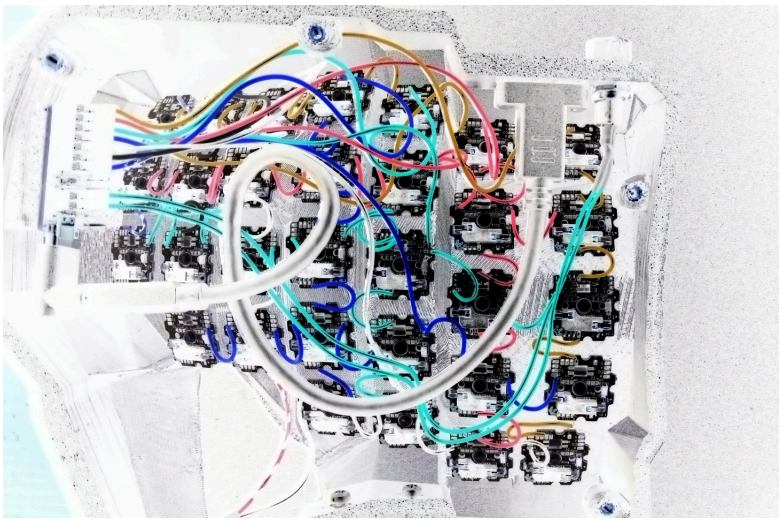
Dactyl Orca - daughterboard design



Dactyl Orca - Summary

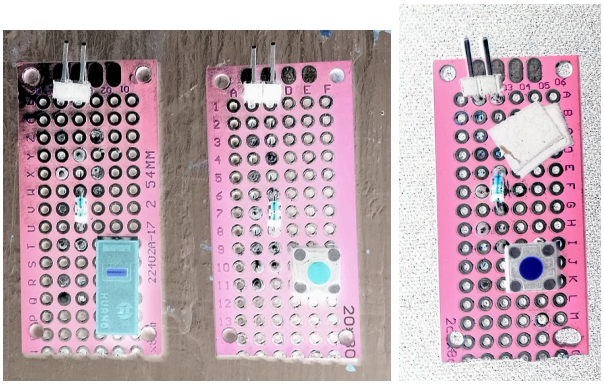
- The Dactyl Orca operates without a battery and must be connected with USB-C. In the future you may want to add a battery, but it may need to be a small one.
- A MX stem extender is implemented for changing the height of the R key, for FPS games or otherwise. You'll need to remove an adjacent keycap to get enough room to use the tweezers to hold down the switch while the keycap is pulled out.
- The wiring is shown below. A right-angle USB-C adapter was needed to connect the NiceNano to the cable. The microcontroller was mounted using velcro, so it's easily removable if the Dactyl Orca needs servicing.

- The thumb button actuator was taken from a Kensington Expert Mouse, with the lower tabs cut off so the button pressing motion wouldn't be obstructed by the shell's side walls.



Daughterboard for multiple microswitches

- Multiple daughterboards were made with different switch types and easy plug-and-play installation. So far I've made four boards, shown below:

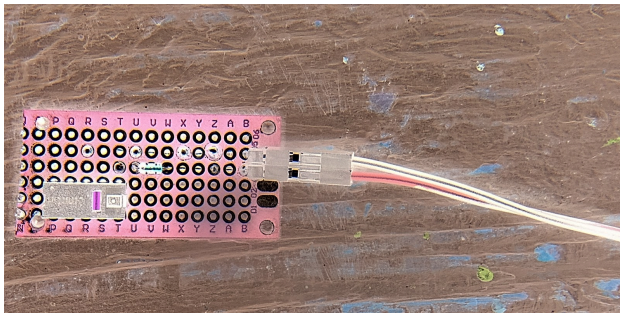


- From left to right:
  - Huano yellow mouse microswitch
    - "Linear" microswitch, no click, Amazon link
  - Kailh silent switch
    - Tactile
  - Salvaged silent switches - yellow button
    - Salvaged from: Quiet JNL-101K Black Silent: Amazon link
    - Less tactile than Kailh switches

- They are a little shorter than typical mouse microswitches. Can be compensated by adding two layers of [1mm rubber gasket] on the actuator, as shown in the picture below.

Daughterboard dupont plug-ins

- All the daughterboards are plugged in to the dupont connectors in the following color-coded manner, shown in the picture:



- The colors of the wires are **black** and **green/black striped**.

Remapping/Reflashing

- Quickly double tap the Reset button (black recessed button next to the USB-C port) to have the NiceNano go into “Bootloader Mode”. You’ll know it’s in Bootloader mode if the NiceNano appears as a drive in FIle Explorer.
- Drag the uf2 file into the NiceNano drive.
- **Done!**

Parts List

Dactyl Orca (left-half side of a keyboard)

MX Keys: 31

- **Amoeba King w/ SMD diodes and Kailh hotswap sockets x 2 - link**
- **Kalih Sockets**
- **12Pcs 2 Pins SPST Momentary Mini Push Button Switch Normal Open -** link
- Krytox GPL-205 Grade 0 (205g0) Keyboard Grease - **link**
- **Mistel Doubleshot PBT Keycaps for MechKB w/ Cherry MX Switches - link**
- **Gateron Switches Mx Keyboard Switch 3-pin SMD LED - link**
- **Row 3, Size 1x1.50 Cherry MX Keycap (R3 1x1.50) x 4 - link**
- Kensington Expert Mouse's right mouse button - **link**
- **Nice!nano v2 - link**
- **22 AWG Wire Solid Core wire - link**
- **Dupont Connector Crimping Tool Kit - link**
- Wrist rests - link
- **Phillips Pan Head Machine Screws Kit - link**
- (Optional) USB-C Male to Female Adapter, Right Angle - **link**