3 QMK - Quantum Mechanical Keyboard Firmware

https://docs.qmk.fm/#/
https://docs.qmk.fm/#/newbs

3.1 INTRO

TODO

3.2 Setup

https://docs.qmk.fm/#/newbs_getting_started

3.2.1 Installation

```
doas pacman -S --needed --asdeps python-pip libusb-compat libffi wget zip;
doas pacman -S qmk;
```

3.2.2 Run QMK Setup

```
qmk setup
```

```
> y
```

3.2.3 Update udev rules

```
doas cp ~/qmk_firmware/util/udev/50-qmk.rules /etc/udev/rules.d/;
doas vim /etc/udev/rules.d/50-qmk.rules
```

> Comment out the unsupported line that contains `"plugdev"`

```
doas udevadm control --reload-rules;
doas udevadm trigger
```

3.2.4 Test Your Build Environment (using default keymap)

```
qmk compile -kb <keyboard> -km default
```

List of supported keyboards:

```
qmk list-keyboards
```

Example: YMDK Melody96 (Hotswap)
Path: `~/qmk_firmware/keyboards/ymdk/melody96/hotswap/`

```
qmk compile -kb ymdk/melody96/hotswap -km default
```

3.3 Building Your First Firmware

https://docs.qmk.fm/#/newbs_building_firmware

3.3.1 Set default keyboard (if you have only one active kb)

… else you have to always append `-kb <kb_name>`.

```
qmk config user.keyboard=<kb_name>;
```

3.3.2 Set default keymap name

Note: Most people use their GitHub username.

```
qmk config user.keymap=<km_name>;
```

3.3.3 Create a New Keymap (w/ default keymap of your kb)

Note: You can also import a `keymap.json` downloaded from https://config.qmk.fm using:

```
qmk import-keymap keymap.json
```

```
qmk new-keymap
```

3.3.4 Edit your keymap

Path: `~/qmk_firmware/keyboards/<kb_name>/<km_name>/keymap.c`

3.3.5 Build Your Firmware

```
qmk compile
```

3.4 Flashing Firmware

https://docs.qmk.fm/#/newbs_flashing

3.4.1 Put Your Keyboard into DFU (Bootloader) Mode

Note: In this mode you will not be able to type or otherwise use your keyboard.

Easy way: Bind `QK_BOOT` in your keymap (e.g. Fn+ESC).

Try the following, in order:

1. Hold down **both shift** keys **and** press **Pause**
2. Hold down **both shift** keys **and** press **B**
3. Unplug your keyboard, hold down the **Spacebar and B** at the same time, **plug in** your keyboard and **wait a second before releasing the keys**
4. Unplug your keyboard, hold down the **top or bottom left key** (usually Escape or Left Control) and **plug in** your keyboard
5. Press the **physical RESET button**, usually located on the underside of the PCB
6. Locate **header pins** on the PCB labeled RESET and GND, and short them together while plugging your PCB in

> Verify:

```
lsusb
> Atmel Corp. atmega32u4 DFU bootloader
> Instead of: YMDK Melody96 Hotswap
```

3.4.2 Flash your Keyboard from the Command Line

```
qmk flash
```

Errors? Try:

```
qmk doctor
```

3.5 Test

> https://config.qmk.fm/#/test/

3.6 Configuring QMK

https://docs.qmk.fm/#/config_options

There are three main types of configuration files in QMK:

- `config.h`, which contains various preprocessor directives (`#define`, `#ifdef`)
- `rules.mk`, which contains additional variables. Also for en- or disabling certain features.
- `info.json`, which is utilized for data-driven configuration

These files exist at various levels in QMK and all files of the same type are **combined** to build the final configuration. The levels, from highest **priority** to lowest priority, are:
Keymap **>** Directories (up to 5 levels deep) **>** Keyboard **>** QMK Default

=> So create your config files in your keymaps directory!

3.6.1 rules.mk (Example)

3.6.1.1 Search for your default rules.mk

1. `$ cat melody96/hotswap/rules.mk`
   `> # This file intentionally left blank`
2. `$ cat melody96/rules.mk`
   `> DEFAULT_FOLDER = ymdk/melody96/soldered`
3. `$ cat melody96/soldered/rules.mk`
   `> # Build Options: change yes to no to disable ...`
   > Verify NKRO support: `NKRO_ENABLE = yes`

3.6.1.2 Create an override file to disable build options that you don't need

… which reduces the firmware size & which *can* lower the latency (if the MCU is slow like the Atmega32u4).

```
vim melody96/hotswap/keymaps/<km_name>/rules.mk
>
# Disable Build Options
MOUSEKEY_ENABLE = no  # Override: Mouse keys
BACKLIGHT_ENABLE = no # Override: Enable keyboard backlight functionality
RGBLIGHT_ENABLE = no  # Override: Enable keyboard RGB underglow
```

3.6.2 Enable NKRO

Note: Verify in `rules.mk` that NKRO is supported.

Bind "Toggle NKRO":

```
vim keymap.c
```

> Bind `NK_TOGG` to e.g. Fn+N **&** Press `NK_TOGG`.

3.6.3 Reduce input latency – Eager debounce (switch dependent)

> https://docs.qmk.fm/#/feature_debounce_type

Note: Mechanical switches often don’t have a clean single transition between pressed and unpressed states – they *bounce* between these states. The mitigation of contact bounce is called *Debouncing*.

Bounce times of some switches:

- CHERRY MX2A Red: typ. <1ms
- Gateron Pro Yellow: 5ms

=> So if your switches don't suffer from noise (high bounce times),
Change the Debounce Method (to reduce the latency by 5ms):

```
vim rules.mk
> DEBOUNCE_TYPE = sym_eager_pk
```