MANUAL

`$ aaru -help`

2020.11
EDITION 20

en

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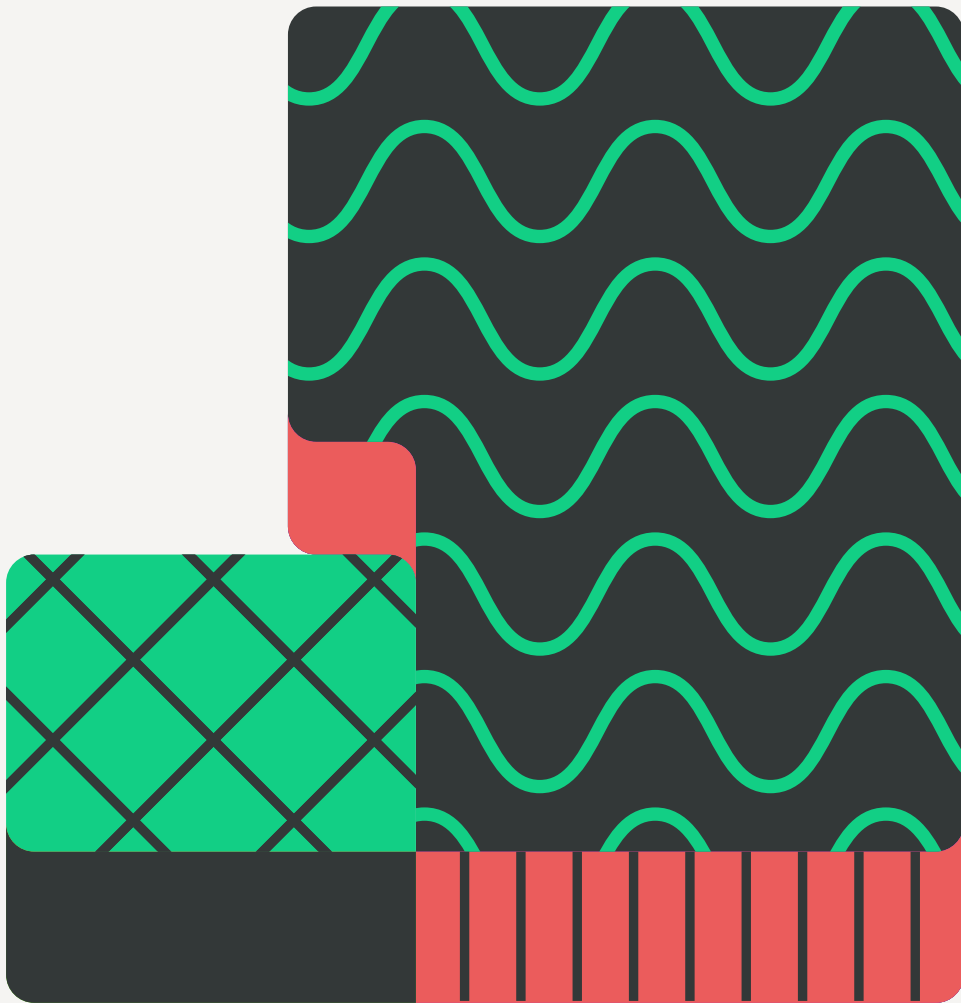
AARU™ offers two types of PCBs to fulfill the need for 2 switch installing methods. For the type that switches needs to be soldered, we call it "**Solder PCB**". For the type that switches can be just plugged in order to use, we call it "**Hotswap PCB**."

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The solder PCB supports ANSI and ISO standard 87-key keyboard layout, in addition to WKL, step caps lock, split shifts and 7U length spaces. Hotswap PCB supports ANSI standard 87-key keyboard layout.

The charts below show all the layouts supported by AARU™, while each key is labeled with the default key position used by AARU™. If the factory key position of a key is not what you want, you can read the section "Custom keymap".
The keys in green color show the difference from ANSI layout.
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ANSI 87% default layout

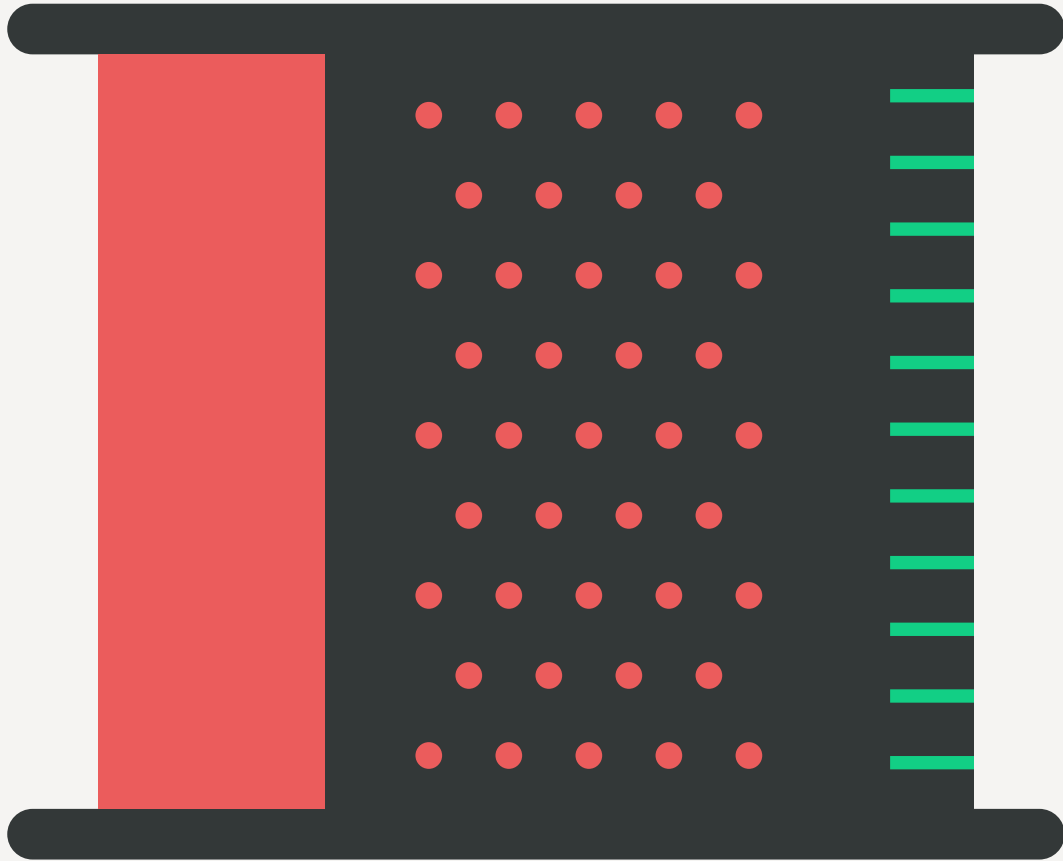

ISO 87% default layout

7U spacebar option default layout

esc

f1 f2 f3 f4 f5 f6 f7 f8 f9 f10 f11 f12 prtsc | scroll lock | pause

~ 1 2 3 4 5 6 7 8 9 0 - = ← insert home pgup

→ Q W E R T Y U I O P [ ] \ del end pgdn

caps lock A S D F G H J K L ; ' ↵

left shift Z X C V B N M , . / right shift △

ctrl win cmd alt win cmd layer switch ctrl ◁ ▽ ▷

WKL option default layout

esc

f1 f2 f3 f4 f5 f6 f7 f8 f9 f10 f11 f12 prtsc | scroll lock | pause

~ 1 2 3 4 5 6 7 8 9 0 - = ← insert home pgup

→ Q W E R T Y U I O P [ ] \ del end pgdn

caps lock A S D F G H J K L ; ' ↵

left shift Z X C V B N M , . / right shift △

ctrl alt win cmd ctrl ◁ ▽ ▷

Step caps lock and split right shift option default layout

esc

f1 f2 f3 f4 f5 f6 f7 f8 f9 f10 f11 f12 prtsc | scroll lock | pause

~ 1 2 3 4 5 6 7 8 9 0 - = ← insert home pgup

→ Q W E R T Y U I O P [ ] \ del end pgdn

caps lock A S D F G H J K L ; ' ↵

left shift Z X C V B N M , . / right shift menu △

ctrl win cmd alt alt win cmd layer switch ctrl ◁ ▽ ▷

For soldering PCBs, you need to solder the switches yourself, which requires the preparation of solder wire and tools, and this chapter will describe how to se-lect and use them.

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Pre-test the PCB to ensure that all keys are triggered as expected before offi-cially start soldering.

○Soldering Material
Solder wire and soldering flux

The solder wire you can buy from the market can be roughly divided into leaded and lead-free solder wire according to the alloy composition, we always recommend leaded solder wire to newcomers, although it contains harmful substances lead, but has various advantages:

· Low melting temperature requirement,easy to use with any soldering iron
· Good fluidity, filling the entire pin hole quickly
· High quality leaded solder wire makes the solder joint bright as a mirror

The only downside is that these leaded products will make your AARU™ no longer RoHS compliant.You should clean your hands after soldering to reduce the absorption of harmful substances into your body.

You can choose to use lead-free solder wire so that you don't have to worry about harmful substances, but they almost never have the advantages of leaded wire. The higher melting temperature creates many problems. When using lead-free solder wire for soldering, consider the following points.

· Best used with a thermostatic soldering iron
· Make sure that the soldering iron tip always has tin on it, otherwise, the tip will quickly blacken in the air at high temperatures
· If the soldered shaft needs to be disasembled, lead-free tin will make disasembly more difficult.

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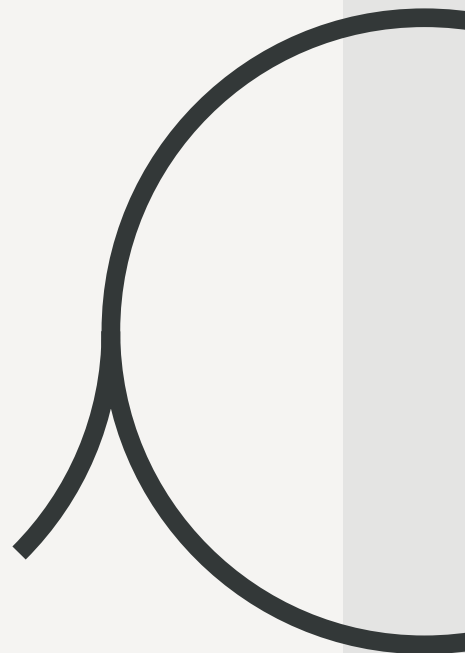
Soldering flux is used to improve soldering performance, and either paste flux or solid rosin serves the same purpose. Your solder wire usually has a small amount of flux in it, which emits a pungent fume as it melts and leaves a transparet residue on the PCB after soldering.

If you find that these problems occur when soldering, they can be improved with additiona flux:

· Solder "stretches" between the pad and the tip of the soldering iron after it has been applied
· Solder pads not being tinned
· Solder joints not rounded in shape

○ Tools
Soldering iron, high-temperature sponge, washboard water

There are no restrictions on the choice of soldering iron, but as mentioned above, you need a better iron when you are doing lead-free soldering.
Do not solder while the PCB is being powered.
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High temperature resistant sponges help remove residual tin from the tip of the soldering iron and remove the blackened oxide from the tip. Before using a high-temperature sponge, wet the sponge well with water and squeeze out all the water. If you use a dry sponge, it will be less effective and may scorch it.
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After soldering, there are usually some stains left on the PCB, including flux residue, solder beads, fingerprints, etc. Although they are very unlikely to affect the PCB, you can still apply flux cleaner to wipe away these traces and make your PCB look shiny and new.
Use a brush to apply some of the flux cleaner to the area to be cleaned, then dry with a dust-free cloth or paper towel
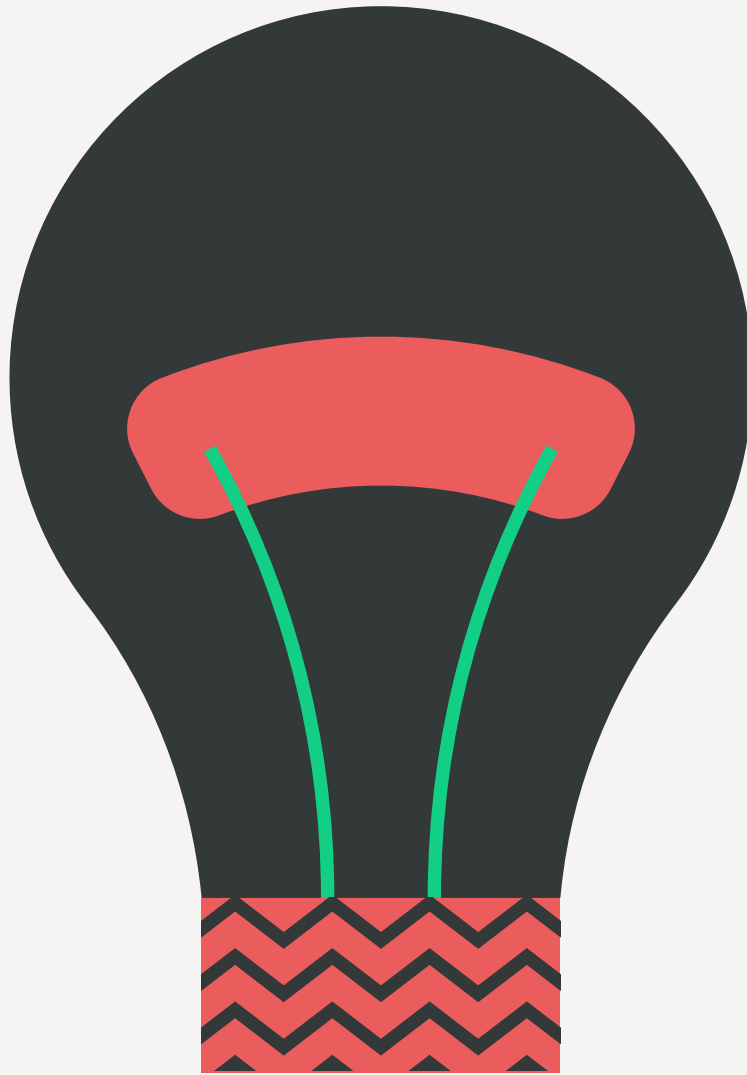
The solder PCB is shipped with a back bar RGB ambient light, two SMD LED status indicators, and optional single color per-key LEDs that can be soldered by yourself.
Hotswap PCB is shipped with back bar RGB ambient light, and SMD per-key RGB LEDs.

○Solder PCB lighting control keys

All lighting control keys are located in the second layer of keymap, when press and hold the Fn (layer switch) key, the keyboard will activate the second layer

Soldering PCB back bar RGB ambient light default controlling keys
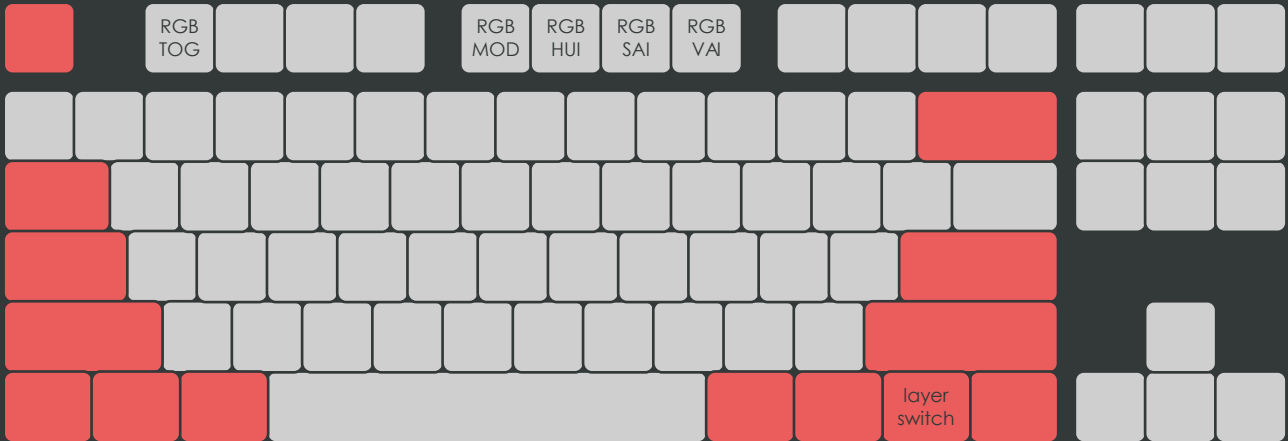
RGB TOG: Toggle back bar RGB LED On/Off
RGB MOD: Switch to the next lighting effect, switch to the previous lighting effect while holding shift
RGB HUI: Hue
RGB SAI: Increases color saturation, decreases color saturation when shift is held down
RGB VAI: Increase light brightness, decrease light brightness when shift is held down

Solder PCB single color per-key LEDs control default controlling keys
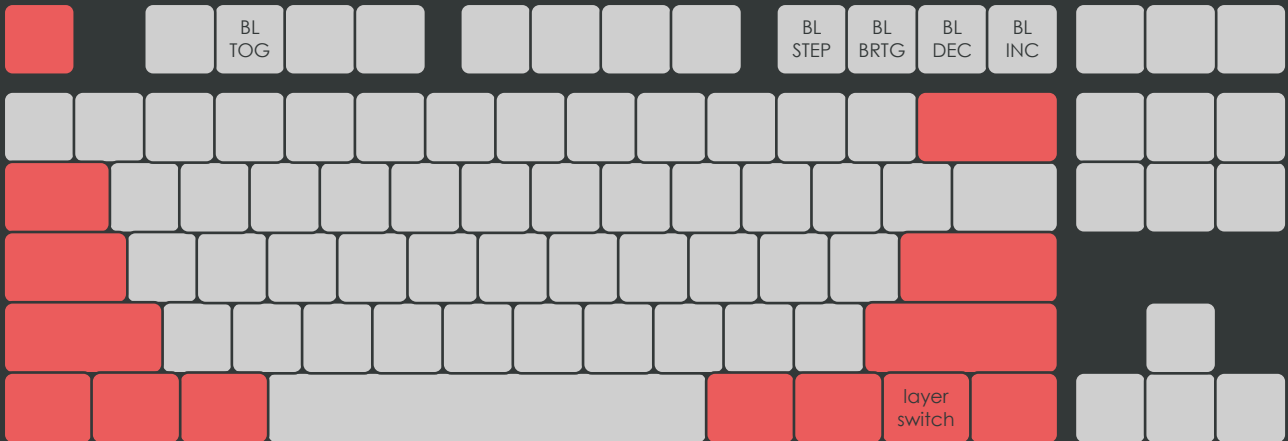
BL TOG: Toggle per-key LED On/Off
BL STEP: Enhance the brightness of the light, if the brightness has reached the highest, press this key will reduce the brightness to the lowest
BL BRTG: Toggle light breathing effect
BL DEC: Decrease the light brightness
BL INC: Increase the light brightness

○Soldering PCB single color LEDs
Soldering PCB's per-key LED is optional and you can decide whether to solder them or not based on your needs.
Before soldering, you should make sure that the selected LED is compatiable with the soldering pads on the PCB, as well as your key switch.
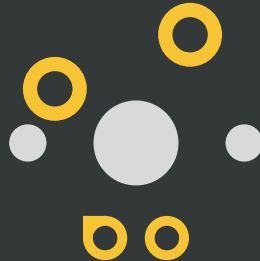
is the pad for soldering LEDs
represents the anode pin of the LED
represents the cathode pin of the LED

Single color LEDs usually have a longer pin for the anode pin, and a shorter pin for the cathode pin
Notes when using:

· The anode pin of the LED corresponds to the anode pad of PCB, the cathode pin of the LED corresponds to the cathode pad of the PCB
· Soldering time should not be too long, soldering temperature should not be too high
· Can use different colors of LEDs in different locations
· If the high brightness exceeds the maximum power supply ca pacity of your USB power supply, please reduce the brightness
· LED products produce different voltage drops depending on the color, when mixing different colors or manufacturers of LEDs, it's normal to find that they produce different brightness

If LEDs are not working, follow these steps:
· Refer to the previous page "Solder PCB lighting control keys" to turn on the light
· Refer to the previous page "Solder PCB lighting control keys" to increase the light brightness
· Whether the anode and cathode pin of the LED correspond to the anode and cathode pads of the PCB
· Refer to the "MISCELLANEOUS" chapter to restore the keyboard settings

○Solder PCB status Indicator LED
The solder PCB provides two SMD status indicator LEDs, one located at the caps lock key and the other at the scroll lock key.
The indicator will light up after you trigger the function of the key, but first you need to set its color by connecting the jumper pads, otherwise it will not light up.
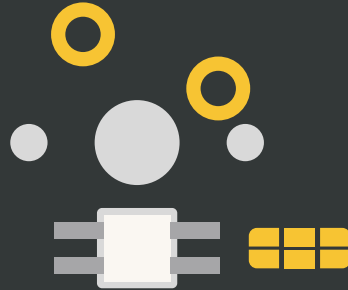
Below the two SMD LED indicators you can find shaped pads
These pads are used to set the indicator color
If you do not set the color, the indicator will not light up
If you don't want the indicator to light up, don't set the color
Two indicator lights can be set to different colors

Just use solder wire and a soldering iron to connect the pads and melt the solder on the pads you want to connect.

Connect the pads on the right to set the indicator to red

Connect the middle pad to set the indicator to green

Connect the pads on the left to set the indicator to blue.

If you wish to reselect the color, use a soldering iron to remove the solder from the pads and then reconnect the pads.

○Hotswap PCB lighting control keys
All lighting control keys are located in the second layer of keymap, when press
and hold the Fn (layer switch) key, the keyboard will activate the second layer

Hotswap PCB Back bar RGB ambient light default controlling keys
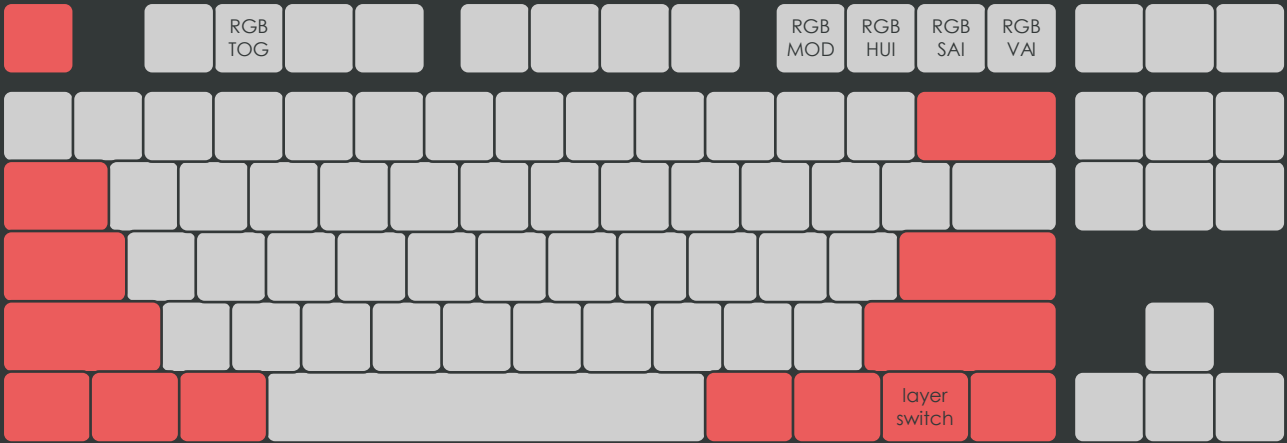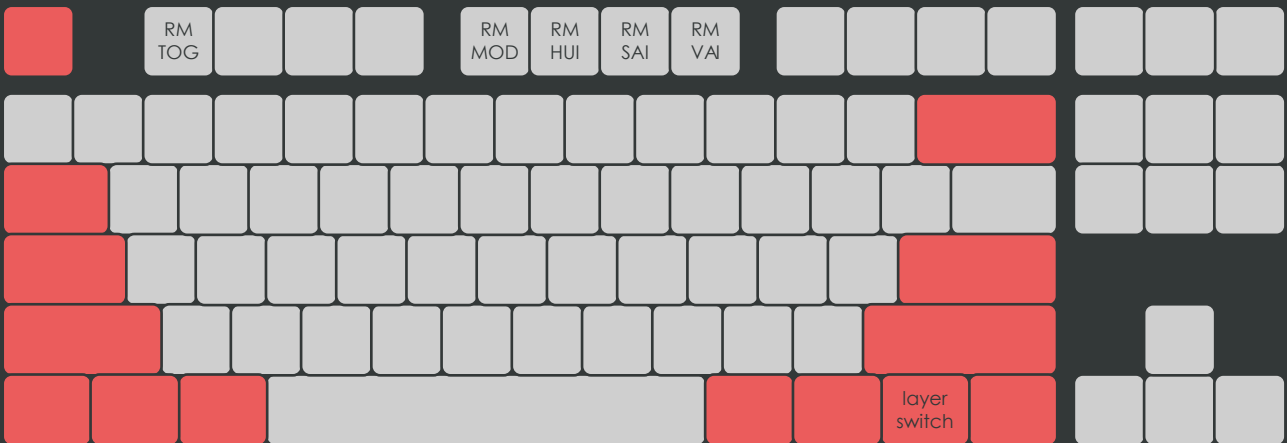

RGB TOG: Toggle back bar RGB LED On/Off
RGB MOD: Switch to the next lighting effect, switch to the previous lighting effect while holding shift
RGB HUI: Hue
RGB SAI: Increases color saturation, decreases color saturation while holding shift
RGB VAI: Increases light brightness, decreases light brightness while holding shift
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Hotswap PCB SMD per-key RGB LEDs default controlling keys

RM TOG: Toggle per-key RGB LED On/Off
RM MOD: Switch to the next lighting effect, switch to the previous lighting effect while holding shift
RM HUI: Hue
RM SAI: Increases color saturation, decreases color saturation while holding shift
RM VAI: Increases light brightness, decreases light brightness while holding shift

○Hotswap PCB SMD per-key RGB lighting effect chart

· Static two-color key combination area highlighted, default
· Static monochrome light
· No light effect, only the indicator function is retained
· Interactive light effect, single color ripple
· Interactive light effect, color ripple
· Interactive light effect, small lightning bolt
· Interactive light effect, huge lightning bolt
· Interactive light effect, block trigger
· Interactive lighting effect, monochrome background, trigger
· Interactive lighting effect, colorless background, trigger
· Interactive lighting effect, color block trigger
· Color double wheel, reverse
· Color double wheel, same direction
· Color single wheel
· Color turbo
· Colorful Windmil
· Colorful double concentric circles
· Colorful single concentric circles
· Colorful flag, left and right
· Colorful flags, up and down
· Colorful circle
· Monochrome turbo
· Monochrome windmill
· Scanning, colorless background, up and down
· Scan, colorless background, left and right
· Scan, Monochrome Background, Left and Right
· Hue Change Breathing
· Brightness Change Breathing
· Static color banner
· Static Gradient

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When you turn off the per-key RGB LEDs by pressing RM_TOG, it will also turn off the caps lock indicator function.
If you do not want to see the per-key lights, but still want to have caps lock indicator function, please press RM TOG to turn on the light and switch to " No lighting effect, only the indicator function is retained " effect.
As you press shift+RM_SAI to reduce the color saturation, the light will become whiter, and the current draw of the LEDs incease, because each RGB pixel consists of red, green and blue channel, with which lights on simultaneously to display white color. Therefore, in order not to exceed the power supply capacity of your USB port, you can hit shift+RM_VAI to reduce the brightness.

○Hotswap PCB RGB indicator
The hotswap PCB supports RGB indicators, you can set different caps lock indicator colors, the colors are cycled through the IND_HUI key, which is located at the second layer, press and hold the Fn (layer switch) key and then press the IND_HUI key.

Hotswap PCB RGB indicator default keys
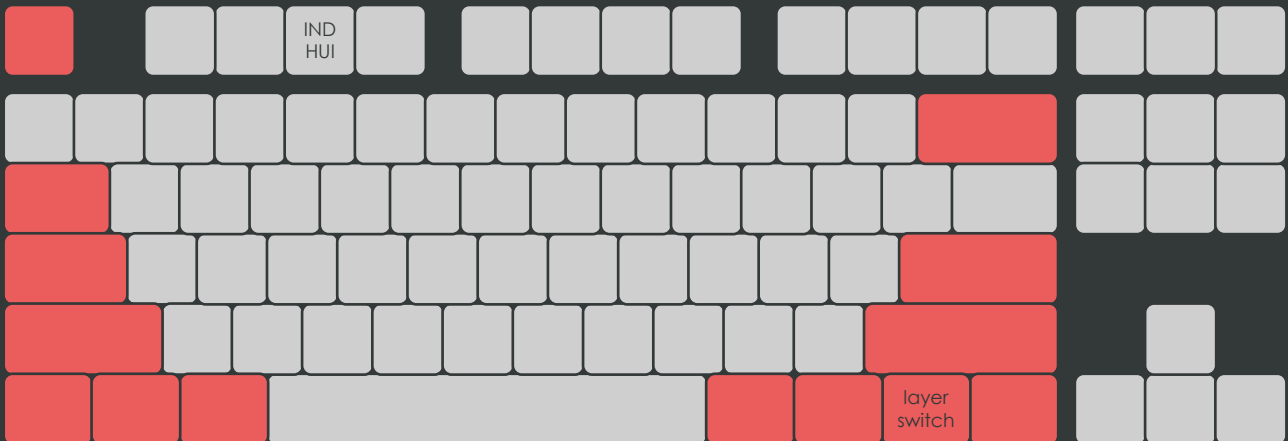
When setting the caps lock indicator color, you can trigger the caps lock indicator for easy viewing of the color effect.
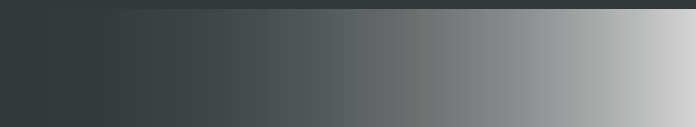
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○Other
When adjusting RGB lighting, it helps to understand some color theory, and you can refer to the following chart to quickly have an idea.
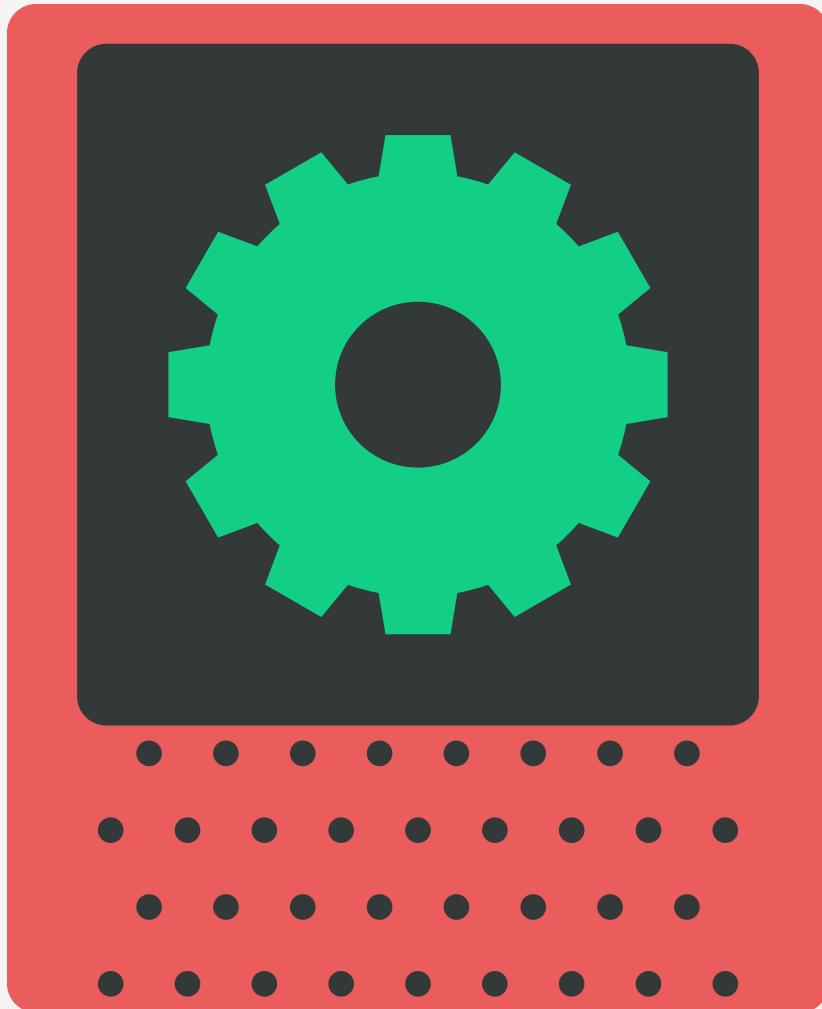

Hue: refers to different colors, such as blue, green, red, purple

Saturation: the lower the saturation, the closer to white

Brightness: the lower the brightness, the darker the light

AARU™ supports kepmap modification with the VIA. Before you start, you need to install the VIA stored in the microSD or download the latest version from Github.

○Modifying solder PCB keymap
Open the installed VIA, plug in the USB cable to connect AARU™ to the computer, when Searching for devices appears in the VIA interface, select Import Keymap from the top menu to import the "aaru_SolderPCB.json" file stored in the microSD. After the import is completed, VIA will automatically recognize the PCB and the interface will change to configure below:
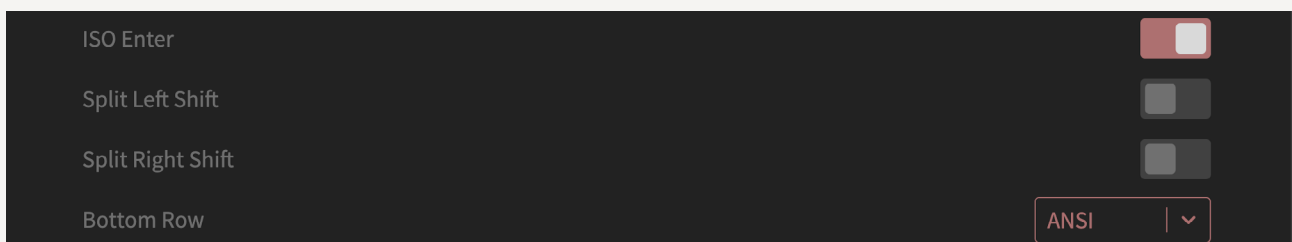

0 1 2 3 located at the top of the upper chart marks the layer, click on "1" to modify the keymap of second layer.
Click on any key you wish to modify, then select the key value you wish to modify from the section below.
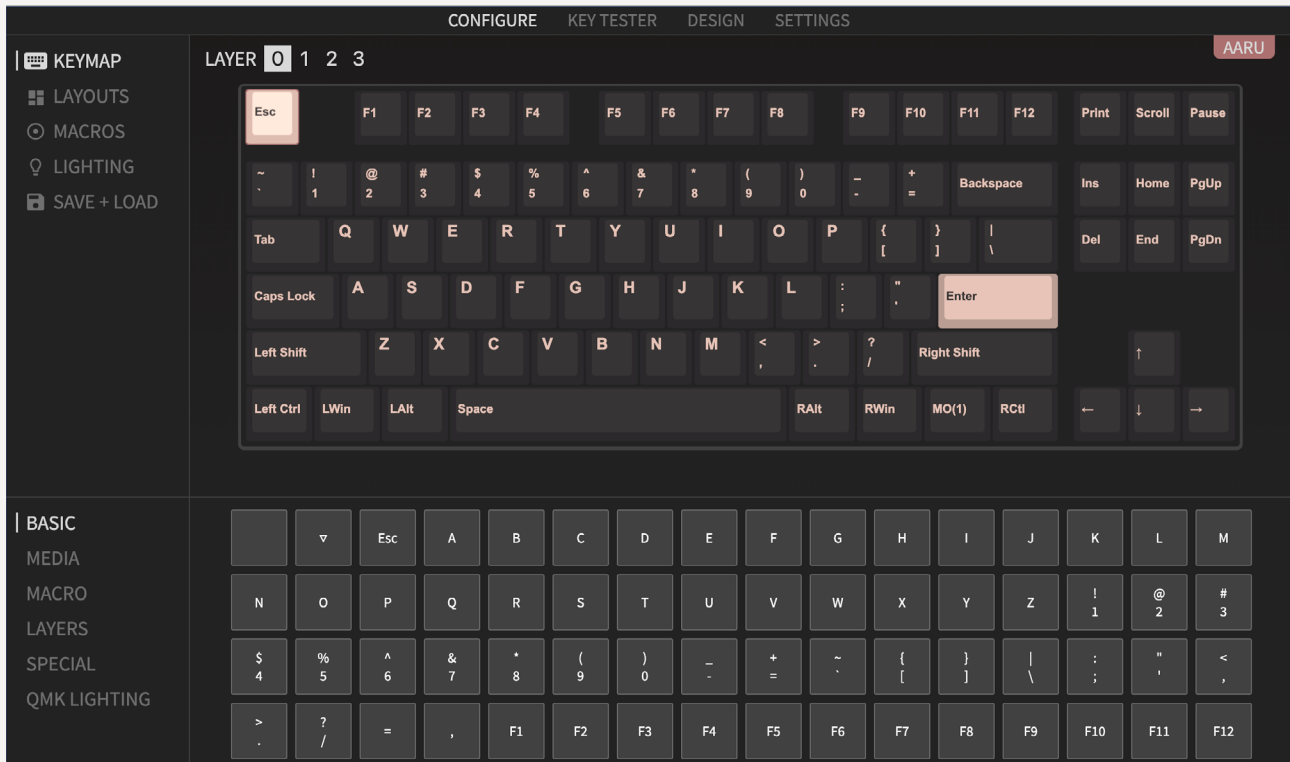The key categories are selected by the area on the lower left:
· BASIC
· MEDIA
· MACRO
· LAYERS
· SPECIAL
By default, VIA will display ANSI layouts, you may choose to use other layouts such as ISO, to do so, click on LAYOUTS in the left menu and open the slider for the corresponding layout, as shown below.

○Modifying hotswap PCB keymap
Open the installed VIA, plug in the USB cable to connect AARU™ to the computer, when Searching for devices appears in the VIA interface, select Import Keymap from the top menu to import the "aaru_HotswapPCB.json" file stored in the microSD. After the import is complete, VIA will automatically recognize the PCB and the interface will change to configure below:

0 1 2 3 located at the top of the upper chart marks the layer, click on "1" to modify the second level key value.
Click on any key you wish to modify, then select the key value you wish to modify from the section below.
The key categories are selected by the area on the lower left:

- · BASIC
- · MEDIA
- · MACRO
- · LAYERS
- · SPECIAL

○N-key rollover
In certain usage cases N-key rollover may result in inability to input. You may want to switch between six-key rollover and N-key rollover modes. Press and hold the Fn (layer switch) key to enter the second layer of the keyboard, then press N to switch between the two.
NKRO keys can be modified via VIA, refer to the "Keys value" section.
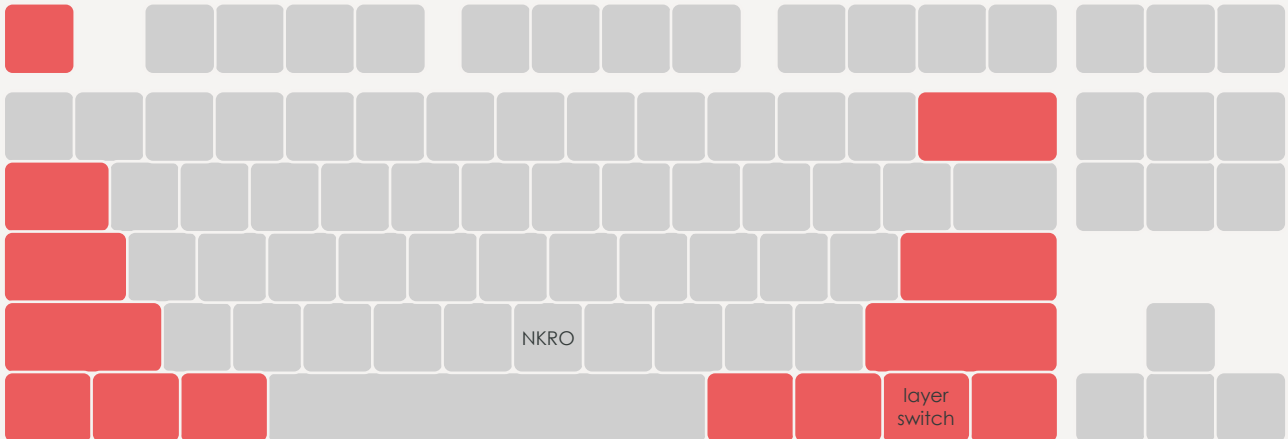
○Restore all settings
If the keyboard is experiencing problems or you wish to restore all settings, please follow these steps:

    1. Disconnect the USB cable from the keyboard.
    2. Press and hold the ESC key at the top left corner of the keyboard.
    3. Hold down the ESC key and do not release it, then reconnect the key board to the computer via the USB cable.
    4. Release the ESC key, the keyboard is in DFU mode, the keyboard will not work, and the data saved on the keyboard will be deleted
    5. Disconnect the USB cable, and then reconnect the cable.

This step will restore all settings, including all lighting effects will be restored to the factory state, and the key values modified by using VIA will also be lost.

○Installing QMK Toolbox

You will need the QMK Toolbox to flash the firmware for the AARU™. The QMK Toolbox installation file is available from microSD, or you can download the latest version from [Github](#).

 If you are a Windows user, you need to refer to [this](#) article to install the driver via Zadig.

○Preparing the firmware

The solder PCB and the hot-swap PCB each runs different firmware, and you cannot flash the solder PCB's firmware to the hot-swap PCB and vice versa.
The factory firmware can be obtained from microSD. The firmware for solder PCB is AARU_soldering_1.0.0.hex, and the firmware for hot-swap PCB is AARU_Howswap_1.0.0.
Subsequent firmware updates can be obtained by contacting us.

○Entering DFU mode

Only when your keyboard enters DFU mode, you will be able to flash the firmware into the keyboard.
After entering DFU mode, the keyboard functions will become unavailable until you unplug the USB cable to exit DFU mode.

Method 1 for entering DFU mode:

      1. Disconnect the USB cable from the keyboard.
      2. Press and hold the ESC key on the top left corner of the keyboard.
      3. Hold down the ESC key and do not release it, then reconnect the keyboard to the computer via the USB cable
      4. Release the ESC key, then the keyboard will be in DFU mode.
This method is convenient and reliable, the downside is that it resets all settings on the keyboard.
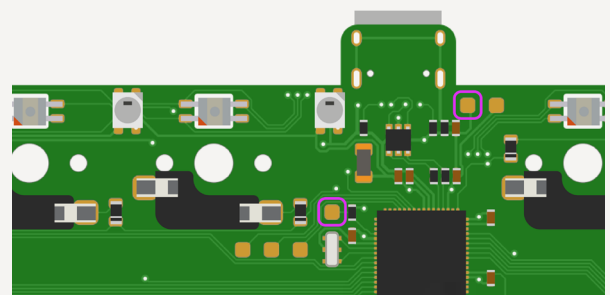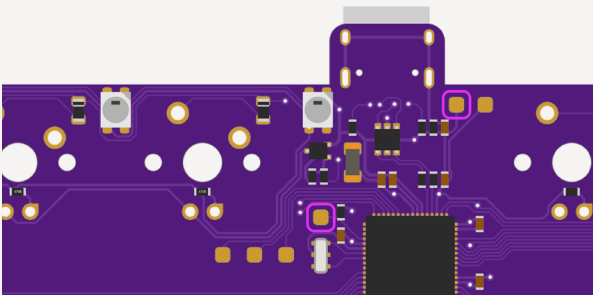
Method 2 for entering DFU mode:
 1. Find the rounded rectangular pads ☐ circled in the figure above on the back of your PCB.
 2. Find a metal object near you, such as a wire, tweezers, round gauge, etc.And connect the two rounded rectangular pads briefly.
 3. At this point the keyboard will be in DFU mode.

If your PCB is already assembled into the case, then you will need to disassemble it to perform these operations. However, unlike method 1, entering the DFU in this way will not clear any settings on the keyboard.

○Flashing firmware
Open QMK Toolbox, load the firmware to be flashed to the keyboard in the Local file checkbox, and select at90usb646 in the MCU (AVR Only) drop-down menu on the right.
After the keyboard enters DFU mode, the QMK Toolbox will display the word "Atmel DFU device connected" in yellow color, which means your keyboard is ready to be flashed with the firmware, then click on the Flash button in the QMK Toolbox to flash the firmware to the keyboard.
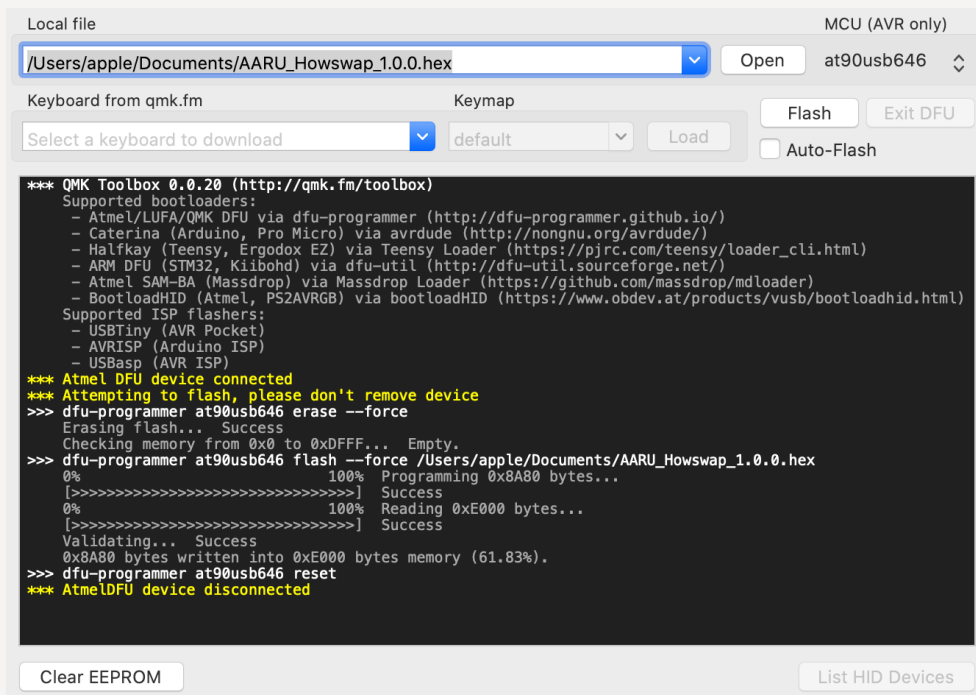
If the firmware is flashed as shown above, then the firmware has been successfully flashed. If other information is displayed, then please double check these steps again.