

Andúril User Manual

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Overview

Andúril is an open-source firmware for flashlights, distributed under the terms of the GPL v3. The sources can be obtained here:

- <http://tiny.cc/TKAndúril>
- <https://bazaar.launchpad.net/~toykeeper/flashlight-firmware/trunk/files/head:/ToyKeeper/spaghetti-monster/Andúril/>

Quick Start

After putting a battery in the light and tightening the parts together, the light should quickly blink once to confirm it has power and is now operational. After that, basic usage is simple:

- Click to turn the light on or off.
- Hold the button to change brightness.
- Release and hold again to change brightness the other way.

That is all the user needs to know for basic use, but there are many more modes and features available for people who want more.

Before reading the rest of this manual, it is recommended that users look at the Andúril UI diagram, which should be provided along with the flashlight.

Ramping / Stepped Ramping Modes

Andúril's normal operation mode uses a smooth ramp or a stepped ramp, depending on which style the user prefers.

Each ramp has its own settings -- floor (lowest level), ceiling (highest level), and the stepped ramp can also have a configurable number of steps.

There are four ways to turn on the light when the light is OFF:

- Click: Turn on at the memorized brightness.
- Hold: Turn on at the floor level. The light should give a very subtle dark blink when the user can let go of the button to stay at the floor, or keep holding the button to ramp up.
- 2 clicks: Turn on at the ceiling level.
- Click, hold: Turn on at the ceiling level, then ramp down.

Ramping / Stepped Ramping Modes (cont'd)

While the light is ON, a few basic actions are available:

- Click: Turn off.
- 2 clicks: Go to or from Turbo (full power). *Light must be ON.*
- Hold: Change brightness (up). If the button was released less than a second ago, or if it's already at the ceiling, it goes down instead.
- Click, hold: Change brightness (down).
- 3 clicks: Switch to the other ramp.
- 4 clicks: Go to ramp config mode.
- 5 clicks: Activate manual memory and save the current brightness.
- 5 clicks, but hold the last click: Go back to automatic memory.

The "automatic" vs "manual" memory modes change the level the light goes to with 1 click from off. In automatic mode, it uses the last brightness the user ramped to. In manual mode, it uses the brightness the user explicitly saved with 5 clicks.

Other Modes

Andúril has several other modes too. To access these, press the button more than 2 times when the light is off:

- 3 clicks: Access the blinky / utility modes.
- Click, click, hold: Access the strobe modes.
- 4 clicks: Lockout mode.
- 5 clicks: Momentary mode.
- 6 clicks: Muggle mode.

Blinky / Utility Modes

Click 3 times from Off to access Andúril's blinky / utility modes. This always starts at battery check and the user can proceed to other blinky modes from there. The sequence is:

- 1. Battery check.**
- 2. Sunset mode.**
- 3. Beacon mode.**
- 4. Temperature check.**

In all of these modes, some basic actions are available:

- Click: Turn off.
- 2 clicks: Next blinky mode.

Additionally, in beacon and temperature check modes:

- 4 clicks: Go to the beacon config mode or thermal config mode.

Blinky / Utility Modes (cont'd)

In more detail, this is what each blinky / utility mode does:

1. Battery check.

Blinks out the battery voltage per cell. Full is 4.2V, empty is about 3.0V. The light blinks the whole-number digit first, pauses, then blinks out the "tenths" digit. Then a longer pause, and it repeats. So for 4.2V, it would be "blink-blink-blink-blink .. blink-blink".

A "zero" digit is represented by a very quick blink.

2. Sunset mode.

This starts at a low level, then dims gradually for an hour, and then shuts off. It is intended for use when going to bed.

3. Beacon mode.

Blinks at a slow speed. The light stays on for half a second, and then stays off until the next blink. The brightness and the number of seconds between pulses are configurable:

- Brightness is the user's last-ramped level, so set this in ramping mode before starting beacon mode.
- Speed is configured in beacon config mode. Click 4 times to enter beacon config mode, wait for the light to stutter, then click to enter the number of seconds per blink. For example, to do a 10-second alpine beacon, click 10 times.

4. Temperature check.

Blinks out the current temperature in degrees C. This number should be pretty close to what a real thermometer says. If not, it would be a good idea to click 4 times to enter thermal config mode, and calibrate the sensor.

Thermal config mode has two settings:

Current temperature: Click once per degree C to calibrate the sensor. For example, if the ambient temperature is 21 C, then click 21 times.

Temperature limit: This sets the maximum temperature the light can reach before it will start doing thermal regulation to keep itself from overheating. Click once per degree C above 30. For example, to set the limit to 50 C, click 20 times. The default is 45 C.

Strobe / Mood Modes

Andúril includes a few extra modes for a variety of purposes:

- Candle mode
- Bike flasher
- Party strobe
- Tactical strobe
- Lightning storm mode

Click 3 times from Off to access these, but hold the third click for a moment. Click, click, hold. The last-used strobe mode is remembered, so it will return to whichever one you used last.

In all of these modes, a few actions are available:

- Click: Turn off.
- 2 Clicks: Next strobe / mood mode.
- Hold: Increase brightness, or strobe faster. (except lightning)
- Click, hold: Decrease brightness, or strobe slower. (except lightning)

Additionally, candle mode has one more action:

- 3 clicks: Enables the timer for 30 minutes. If timer is already on, adds 30 minutes to the timer.

In more detail, here is what each mode does:

Candle mode

Brightness changes randomly in a pattern resembling a candle flame. If a timer is set, it will run until the timer expires, then get dimmer for one minute, then sputter and turn itself off. Without a timer, candle mode runs until the user turns it off. Brightness is configurable.

Bike flasher

Runs at a medium level, but stutters to a brighter level once per second. Designed to be more visible than a normal ramping mode, but otherwise works mostly the same. Brightness is configurable.

Party strobe

Motion-freezing strobe light. Can be used to freeze spinning fans and falling water. Speed is configurable.

Tactical strobe

Disorienting strobe light. Can be used to irritate people. Speed is configurable, and the duty cycle is always 33%.

Lightning storm mode

Flashes at random brightness and random speed to simulate lightning strikes during a busy lightning storm. Do not look directly at the flashlight when this mode is running, because it may suddenly go to full power without warning.

Lockout Mode

Click 4 times from Off to enter Lockout mode. This makes the light safe to carry in a pocket or a bag or anywhere else the button might be pressed by accident.

To exit lockout mode, click 4 times. The light should blink briefly and then return to the regular "off" mode.

Lockout mode also doubles as a momentary moon mode, so the user can do quick tasks without having to unlock the light. The brightness in lockout mode has two levels:

- Hold: light up at the floor level of the current ramp.
- Click, Hold: light up at the floor level of the other ramp.

Momentary Mode

Click 5 times from Off to enter Momentary mode. This locks the flashlight into a single-mode interface where the LEDs are only on when the button is held down. It is intended for Morse code, light painting, and other tasks where the light should be on only for a short time and probably in a pattern.

Momentary mode does either a steady brightness level or a strobe. To select which one, go to the mode you want to use, adjust the brightness and speed and other settings, then turn the light off. Then click 5 times to enter momentary mode.

Supported momentary modes are steady (normal ramping mode) and strobes (everything in the "strobe" mode group).

In steady mode, brightness is the last-ramped level, so adjust that before entering momentary mode.

In momentary strobe mode, the settings are copied from the last-used strobe mode, such as party strobe, tactical strobe, or lightning.

To exit this mode, physically disconnect power by unscrewing the tailcap or battery tube.

Muggle Mode

Click 6 times from Off to enter Muggle mode. This is a simpler and less-bright interface which makes the light relatively safe to lend to children or other people who could use the light unsafely.

In Muggle mode, there are only a few available actions:

- Click: Turn the light on or off.
- Hold: Change brightness.
- 6 clicks: Exit Muggle mode.

The brightness in this mode usually goes from about 10 lm to 300 lm.

Muggle mode is remembered even after changing the battery. This helps prevent children from exiting the mode by unscrewing the tailcap.

However, be sure to supervise children whenever they are using any powerful tools, including a bright flashlight.

Note: If the light steps down in muggle mode, it probably needs to have the temperature sensor calibrated. Use thermal config mode to do this.

Configuration Modes

Every config mode has the same interface. The menu has one or more options the user can configure, and it will go through them in order. For each menu item, the light will follow the same pattern:

- Blink one or more times, corresponding to the item number.
- Stutter or "buzz" quickly between two brightness levels for a few seconds. This indicates that the user can click one or more times to enter a number. It will keep buzzing until the user stops clicking, so there is no need to hurry.
- Pause, and then go to the next option.

After the light has gone through all of the menu options, it should return to whatever mode the light was in before entering the config mode.

If the user doesn't press a button during a menu item's "buzz" phase, that item remains unchanged from its previous value.

Ramp Config Mode

While the light is on in a ramping mode, click 4 times to enter the config mode for the current ramp.

For smooth ramping mode, there are two menu options:

1. Floor. (default = 1/150)
2. Ceiling. (default = 120/150)

For the stepped ramping mode, there are three menu options:

1. Floor. (default = 20/150)
2. Ceiling. (default = 120/150)
3. Number of steps. (default = 7)

To configure the floor level, click the button equal to the number of ramp levels (out of 150) at which the floor should be. To set the lowest possible level, click once. No clicks will leave the existing value.

To configure the ceiling level, each click goes one level lower. So 1 click sets the highest possible level (150), 2 clicks is the 2nd-highest (149), 3 clicks is the 3rd-highest level (148), etc. To set the default of 120, click 31 times to click down from 150 to 120. No clicks will leave the existing value.

When configuring the number of steps, the value can be anything from 2 to 150.

Protection Features

Andúril includes low voltage protection (LVP) and thermal regulation.

LVP makes the light step down to a lower level when the battery is low, and if the light is already at the lowest level, it shuts itself off. This activates at 2.8V. LVP adjustments happen suddenly, in large steps.

Thermal regulation attempts to keep the light from overheating, and otherwise adjusts output to stay as close as possible to the user-configured temperature limit. Thermal adjustments happen gradually, in steps so small they are difficult for humans to perceive.

Aux LEDs / Button LEDs

Some lights have aux LEDs or button LEDs. These can be configured to do different things while the main emitters are off. There is one aux LED mode for the regular "off" mode, and another aux LED mode for "lockout" mode. This allows the user to see at a glance whether the light is locked.

Aux LED modes typically include:

- Off
- Low
- High
- Blinking

To configure the aux LEDs, go to the mode you want to configure and then click the button a few times:

- Off mode: 7 clicks.
- Lockout mode: 3 clicks.

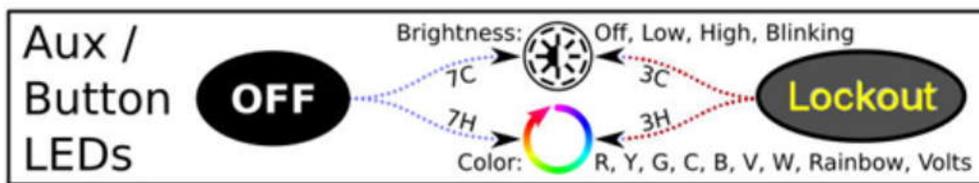
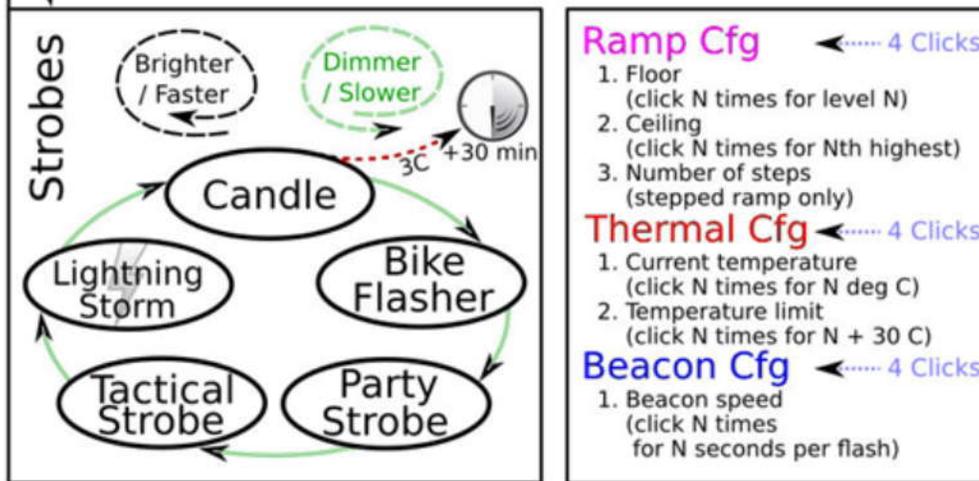
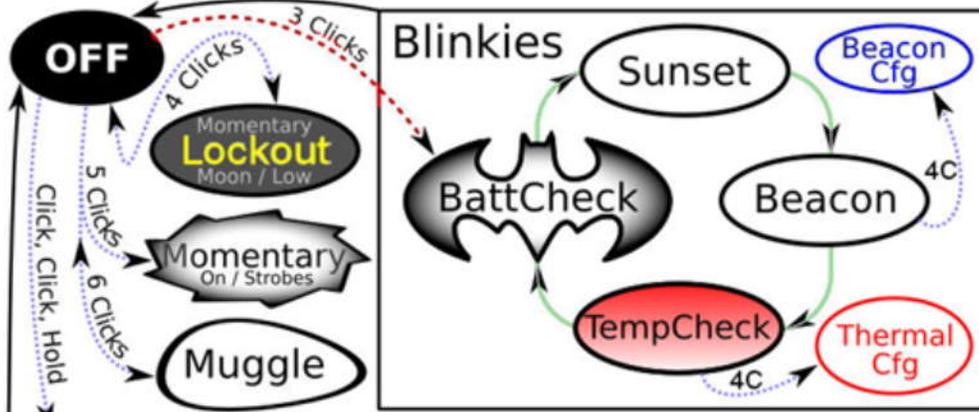
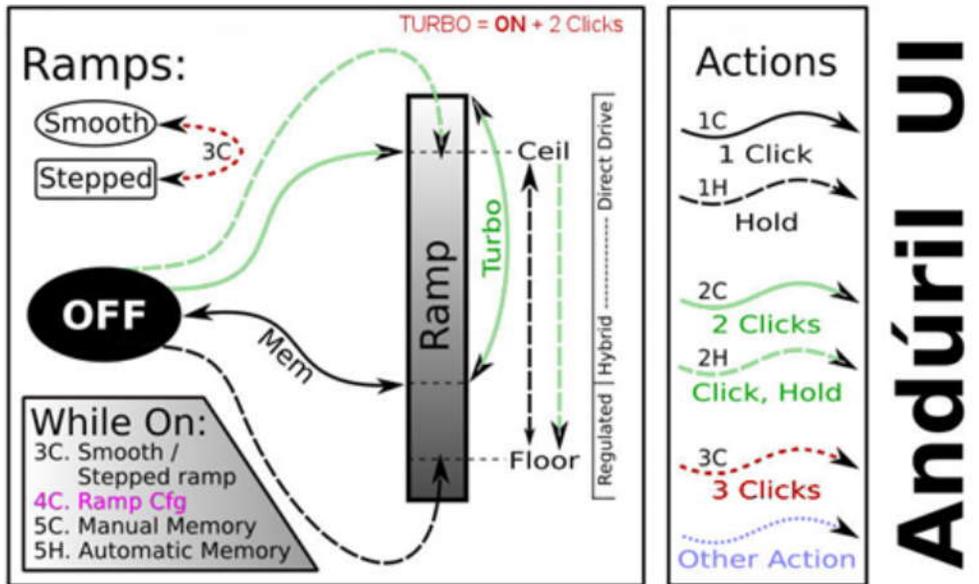
This should change the aux LEDs to the next mode supported on this light.

If the aux LEDs can change color, there are additional actions to change the color. It is the same as above, but hold the button on the last click and then let go when the desired color is reached.

- Off mode: 7 clicks, but hold the last click.
- Lockout mode: 3 clicks, but hold the last click.

For lights with a button LED, the button LED typically stays on while the main emitters are on. Its brightness level is set in a way which mirrors the main LED -- off, low, or high.

For lights with front-facing aux LEDs, the aux LEDs typically stay off when the main emitters are on, and when the light is otherwise awake. The aux LEDs on most lights only turn on when the light is asleep.



Factory Reset: Loosen tailcap, Hold button, Tighten tailcap, Hold 3s (or 13H from Off)