ALIENWHOOP ZERO

PILOT'S HANDBOOK

ALIENWHOOP TEAM

SHOP: ALIENWHOOP.US | FACEBOOK: FB.ME/ALIENWHOOP

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INTRO

Welcome to AlienWhoop and congratulations on your purchase! Your AlienWhoop flight controller was built by pilots for pilots. The AlienWhoop team loves to fly and has spent many hours reviewing and refining the design of the ZER0 to provide a top performing flight controller.

The AlienWhoop team is here to support you and can be reached in the following ways

- Discord – http://alienwhoop.us/discord (best way to reach us)
- Facebook – http://fb.me/alienwhoop
- Email – support@alienwhoop.us
- Store - https://shop.alienwhoop.us/

FEATURES

AlienWhoop ZERO blends the power and performance of AlienWhoop hardware running NotFastEnuf (NFE) tuned Silverware.

- F0 Processor
  - High-performance ST Microelectronics STM32F030F4P ARM® 32-bit Cortex®-M0 CPU, frequency up to 48 MHz (can be overclocked to 64MHz)

- 8kHz Gyro
  - Invensense MPU-6881 Six-Axis (Gyro + Accelerometer) precision temperature compensating MotionTracking™ Device

- Pre-Tuned Firmware
  - Factory loaded with NFE (NotFastEnuf) Silverware tuned for ultimate whoop performance.

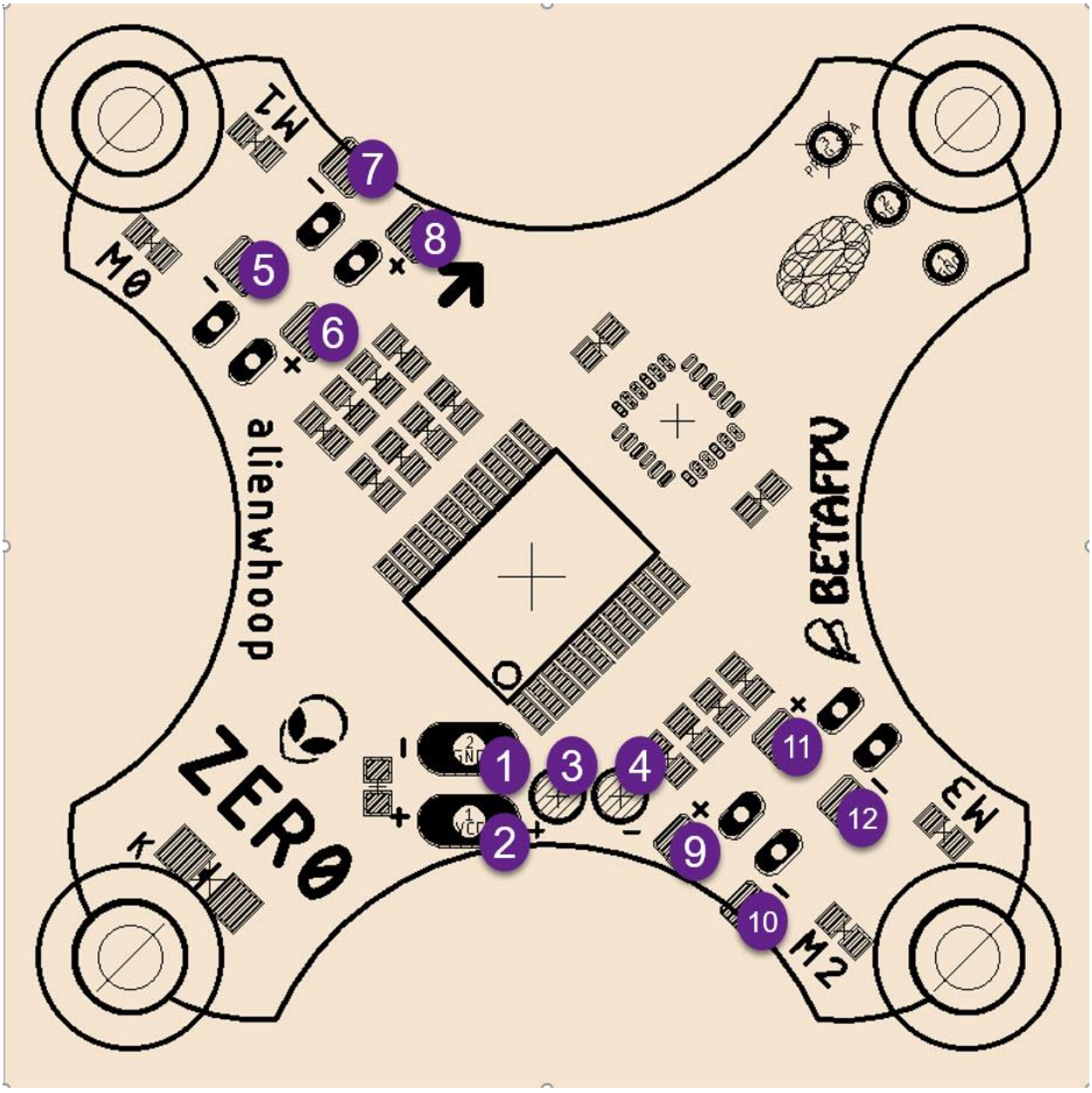
- Designed to provide maximum power for both freestyle and racing
  - High amp, Low on-resistance MOSFETs
  - Supports brushed motors 6mm up to 10mm coreless

- High Quality PCB
  - 0.8mm 2oz Copper ENIG (gold) finish purple PCBs
  - Total Weight (with pigtail) 2.66 grams
  - Supports 1S or 2S LIPO (JST 2.0 PH aka PowerWhoop connector factory installed)
  - 5V 2.25A BEC with 3.3V regulator

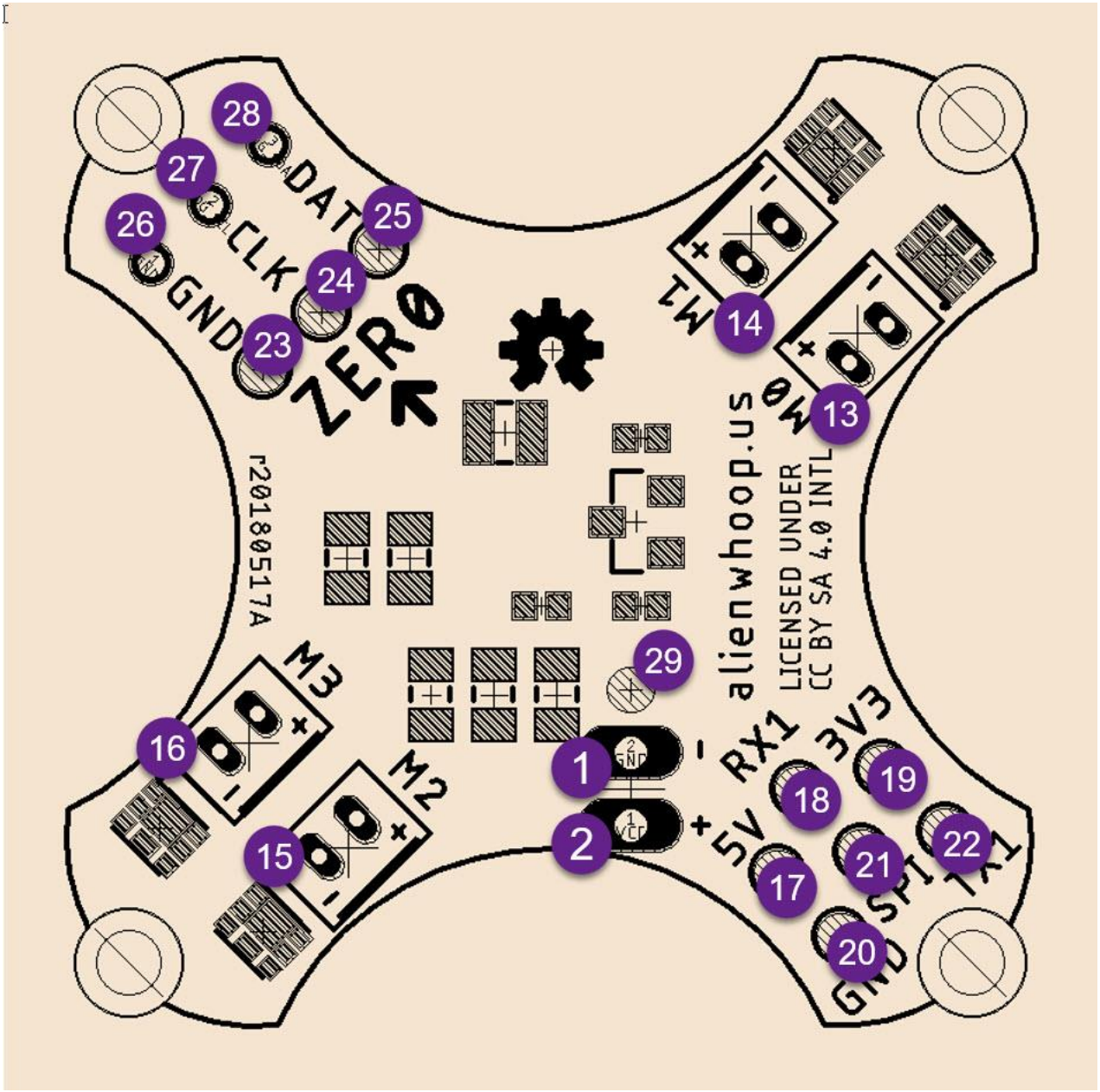
- Lightweight Modern Design
  - Designed by two of the top sixteen fastest pilots at the 2018 Tiny Whoop Invitational championship teamed up with NotFastEnuf and MontiFPV.

BOARD LAYOUT

TOP



Bottom


28
27
26
25
24
23
DAT
CLK
GND
ZER0
r20180517A
M1
14
M0
13
alienwhoop.us
LICENSED UNDER
CC BY SA 4.0 INTL
M3
16
M2
15
29
1
2
GND
VCC
-
+
RX1
3V3
19
18
5V
17
21
22
SPI
TX1
GND
20

TOP OF THE BOARD

Label #	Label Name	Description
1	-(Bat)	battery pad – negative wire
2	+(Bat)	battery pad – positive wire
3	+(Camera)	camera pad – positive wire
4	-(Camera)	camera pad – negative wire
5	M0	Motor 0 - negative wire
6	M0	Motor 0 – positive wire
7	M1	Motor 1 - negative wire
8	M1	Motor 1 – positive wire
9	M2	Motor 2 - positive wire
10	M2	Motor 2 – negative wire
11	M3	Motor 3 - positive wire
12	M3	Motor 3 – negative wire

BOTTOM OF THE BOARD

Label #	Label Name	Description
13	M0	JST1.25 plug for motor 0
14	M1	JST1.25 plug for motor 1
15	M2	JST1.25 plug for motor 2
16	M3	JST1.25 plug for motor 3
17	5V	5V 2.25A BEC power
18	RX1 (UART1)	Receive - UART1/SPI DAT
19	3.3V	3.3V power
20	GND	Ground
21	SPI	SPI CSn
22	TX1 (UART1)	Transmit - UART1/SPI CLK
23	GND	Ground
24	CLK	Prog. SCL/GPIO A14
25	DAT	Prog. DAT/GPIO A13
26	GND (Hole)	Factory Programming Header
27	CLK (Hole)	Factory Programming Header
28	DAT (Hole)	Factory Programming Header
29	BOOT	DFU Override (bridge to 3.3V)

FUNCTIONAL QUICK REFERENCE

The table below provides suggested uses for the PADs and UART on the AlienWhoop ZER0 flight controller.

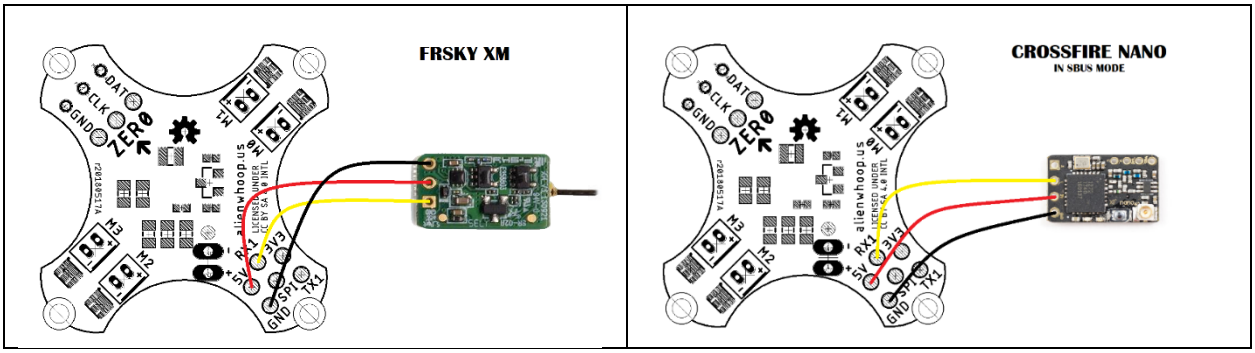
Function	UART	PAD
Battery pigtail – negative wire	-	1
Battery pigtail – positive wire	-	2
Camera – positive wire (1S LIPO only!)	-	3
Camera – negative wire (1S LIPO only!)	-	4
SBUS - serial based receiver (inverted signal only)	1	17, 18 and 20
SPI – Bayang Protocol	1	18,19, 20, 21 and 22
Crossfire (SBUS only, no CRSF)	1	17,18, and 20

Important Note: The ZER0 is flashed at the factory with SBUS configured firmware. Other supported protocols will require an update to the firmware.

Receiver Wiring

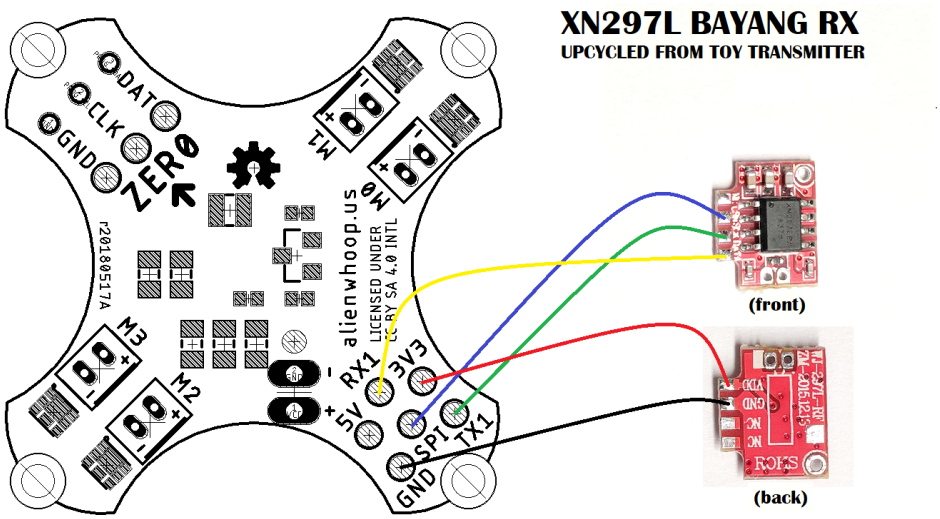
SBUS Receiver – Factory Default

FC PAD	FC Pad #	Description
5V	17	-
GND	20	-
RX1	18	UART1



Bayang XN297L SPI Receiver (Firmware Configuration Required)

FC PAD	FC Pad #	Description
3.3V	19	-
GND	20	-
TX1	22	SPI CLK
RX1	18	SPI DAT
SPI	21	SPI CSn



There are many ways to build a whoop. The ZER0 flight controller is engineered to power 6mm – 10mm brushed motors. The AlienWhoop team has put together the following build guide to help pilots build a standard 6mm whoop.

Parts Needed for a 6mm Build

- ✓ (1) Frame
  - Whoop frame for 6mm motors
- ✓ (4) Motors
  - 6mm brushed motors
- ✓ (4) Propellers
  - 31mm three or four blade props
- ✓ (1) AIO Camera (Camera and VTX Combo)
- ✓ (1) Receiver
  - Choose a supported receiver which best fits your needs
- ✓ (1) AlienWhoop ZER0 Flight Controller (includes screws and grommets)
- ✓ Optional
  - Canopy

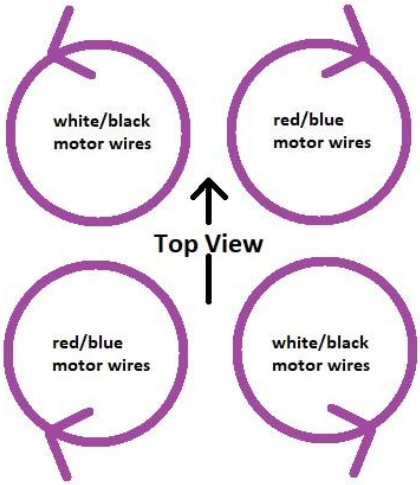
Build Video

Team Captain: Brian "VELCROFPV" Pichardo's – AlienWhoop ZER0 Build

AlienWhoop ZER0 Build

Important Items to Consider

- **Propeller Rotation**
  - ***IMPORTANT*** The default propeller rotation for the ZER0 is "props out". The AlienWhoop team has found props out rotation provides better flight characteristics.
  - When you position your motors and mount your props, make sure you place them according to the diagram below.

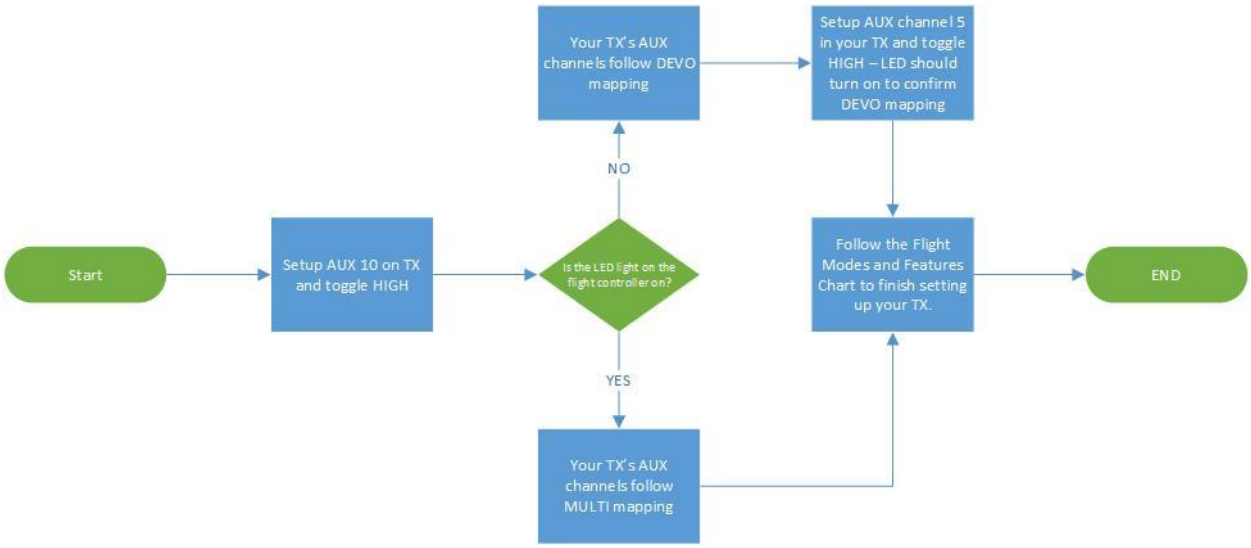


- **2S LIPO Usage or Noisy Video**
  - **2S LIPO Usage** – most micro sized AIO cameras do not support a direct connection to 2S LIPO. Do not smoke your camera!
  - **Noisy Video** - Certain AIO cameras have been known to suffer from horizontal banding when connected directly to the battery of brushed quadcopters. Most AIO cameras are properly designed to prevent this from occurring.
  - ***Connect the AIO to the 5V (pad 17) and GND (pad 20). Do not exceed 2.25A on pad 17.***

CONFIGURING YOUR TRANSMITTER

In your transmitter, RC channels 1 through 4 must be mapped in the correct order AETR. RC channels 5 through 10 provide auxiliary control of flight modes and features. The ZER0 flight controller is preprogrammed to match the standard auxiliary order of an OpenTX transmitter. The default auxiliary channel mapping may differ on other transmitters such as those running DeviationTX firmware. Follow the QuickStart flowchart to determine your transmitter mapping order.

QUICK START



Remove your props before configuring your transmitter

FLIGHT MODES AND FEATURES

MULTI - Channels	5	6	7	8	9	10
DEVO - Channels	6	10	7	8	9	5
disarm						
arm						
acromode						
levelmode						
racemode_angle						
racemode_horizon						
horizonmode						
"juicy" stick mode						
"full bronx" stick mode						
LED off						
LED on						

Key	
AUX low	
AUX high	

1) **Calibrate Accelerometer**: Place your whoop on a flat, level surface. Using your right stick, the stick gesture down, down, down will calibrate the flight controller accelerometer.
2) **Stick Travel Check:** This feature has been added to give the ability to make sure your sticks are reaching 100% throws in the software. Using your right stick, the gesture RIGHT-RIGHT-DOWN will enter a mode where the throttle is inactive, and the LED will rapid blink when you move the sticks to 100% throws. If you do not see a rapid LED blink at stick extents, scale up your throws in your transmitter until you do. The gesture LEFT-LEFT-DOWN will exit this mode.
3) **Disarm:** the motors are disabled and will not be allowed to run.
4) **Arm:** the motors and controls are enabled, and props will be spinning at an idle speed.
5) **Acromode:** a flight mode without auto-leveling, and stick deflection corresponds to a rotational rate around the input axis.
6) **Levelmode:** a flight mode in which the maximum tilt angle is limited to 65 degrees.
7) **Horizonmode:** a flight mode with leveling near center stick but the ability to roll or flip at full stick deflection.
8) **Racemode Angle:** a flight mode with levelmode behavior on roll axis and acromode behavior on pitch axis.
9) **Racemode Horizon:** a flight mode with horizonmode behavior on roll axis and acromode behavior on pitch axis.

10) **“Juicy” Stick Mode:** is a PID controller modifier which can be switched in-flight and uses a D term calculation based on “measurement”. The result is a soft or “juicy” stick feel.
11) **“Full Bronx” Mode:** is a PID controller modifier which can be switched in-flight and uses a D term calculation based on “error”. The result is an accelerated stick response which translates into a sharp and aggressive feel.
12) **Safety Features:**
    a. Powering up while armed will cause the LED to blink rapidly and the FC will enter a failsafe. To correct disarm.
    b. Arming with throttle above 10% will cause the LED to blink rapidly and the FC will enter a failsafe. To correct lower throttle.

FIRMWARE AND SETTINGS

The AlienWhoop ZER0 flight controller is flashed at the factory with NFE Silverware and has been put through the paces by our team. Your ZER0 has tuned PIDs and is ready to fly!

AlienWhoop does not officially support reflashing of Silverware to the ZER0 flight controller. However, we do understand that this is a common practice and have provided easily accessible programming pins should you choose to explore that option on your own. We have carefully preconfigured the settings, rates, and tune of the ZER0 to be race ready and freestyle ready for any whoop pilot. The ZER0 is ready to rip out of the box and does not require reprogramming. Should you choose to become involved in the development side of Silverware to manipulate the way your ZER0 operates, we encourage you to reach out to our team pilots who can guide you to Silverware social media communities. Many of our team pilots are active participants.

The original firmware is available as both source code and pre-compiled hex files on the release page of the NotFastEnuf Silverware fork on GitHub https://github.com/NotFastEnuf/NFE_Silverware/releases.

SHOUTOUTS

"Everything should be made as simple as possible, but not simpler" - Einstein

THANK YOU

- Silver13 (creator of Silverware flight controller firmware)
- Silverware Community
- BetaFPV Team
- AlienWhoop Dev Team
    - Charlie "Brucesdad" Stevenson
    - Travis "NotFastEnuf" Schrock
    - Brian "VelcroFPV" Pichardo
    - Michael "MontiFPV" Montiverdi
- Jesse Perkins (Mr. Tiny Whoop)
- Lance (old school Alienwii and Alienflight)
    - AlienWhoop ZER0 is inspired by the alienflight f3 quad brushed v1
- Joshua Bardwell (inspiration for the pilot guide)

AlienWhoop Pilot's Guide created by the AlienWhoop Dev team. Please direct questions or comments to the AlienWhoop Discord.

AlienWhoop is here to grow the whoop community for racers and freestylers alike. We want your feedback and we want to see lots of videos posted with #alienwhoop.

Have fun and let it rip!

Follow us on:

- Facebook - http://fb.me/alienwhoop
- Instagram - @alienwhoop
- Twitter - @alienwhoop