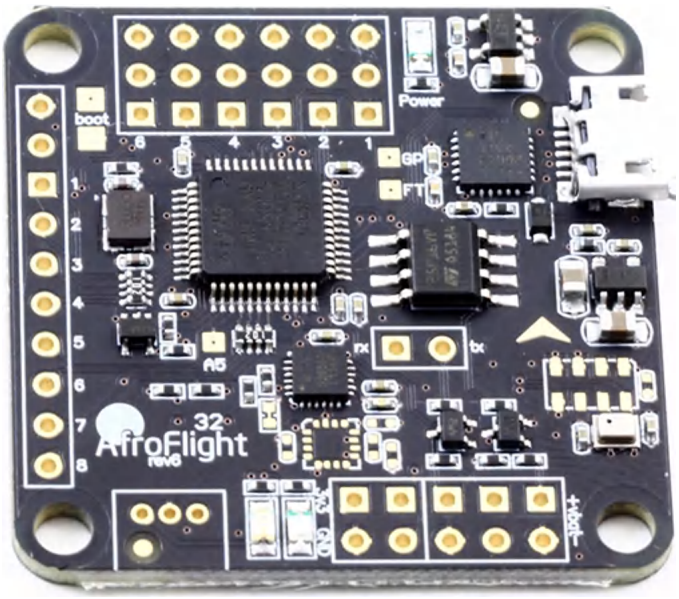
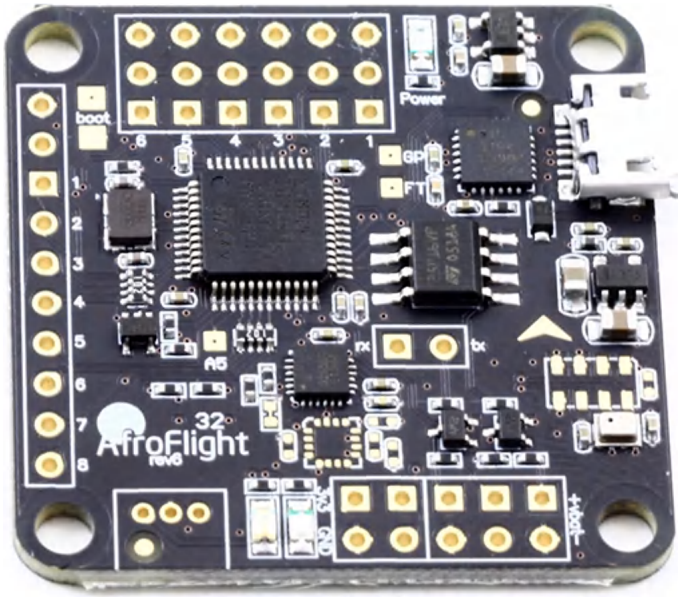
Naze32 Acro rev6



WARNINGS & NGTGS



WARNING Do not use this hardware for serious business, commercial aerial photography, or anything else where its usage could endanger the end user, spectators, inanimate objects, aircraft flying overhead, etc.

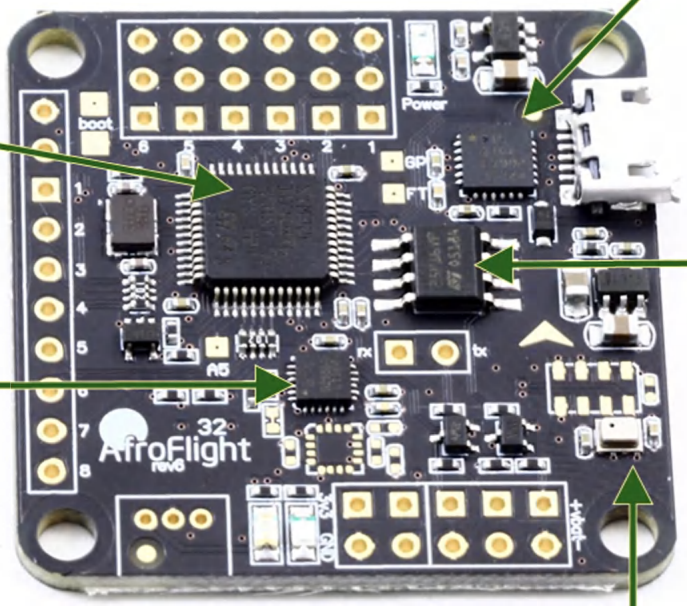
NOTE While the flight controller firmware and configuration software is based on the Multiwii system, the processor is not Atmel AVR, and this hardware cannot be programmed through the Arduino development environment or any AVR development tools. For more information on STM32 development, see the following link: http://code.google.com/p7afrodevices/wiki/STM32Development

NOTE This hardware is provided as-is and end-user is expected to have reasonable technical knowledge to complete set-up and reasonable R/C experience to operate multi-rotor aircraft.

Board layouts acro vs. full

*board colors vary

Acro Board



CP210x USB to serial

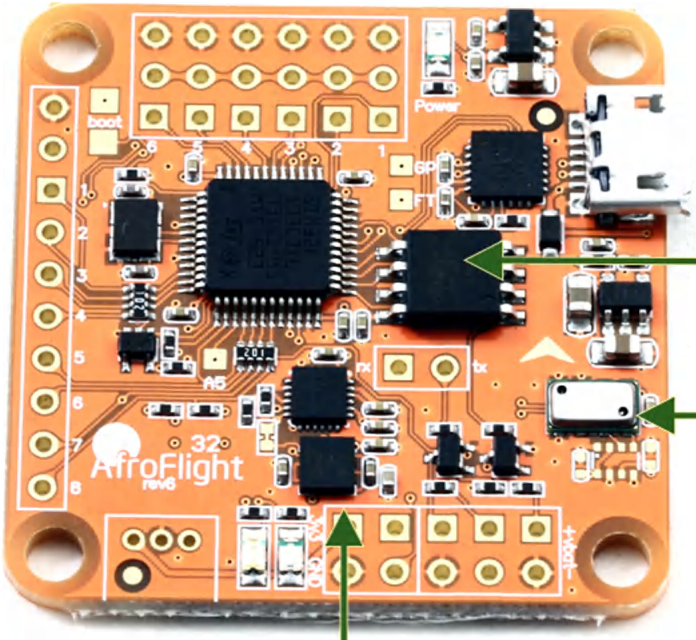
STM32 F1
32bit
processor

16mbit
onboard
memory

Mems
MPu6500
invensense
gyro/acc

BMP 280
Barometer

Full Board



128mbit
on board memory

ms5611 Barometer

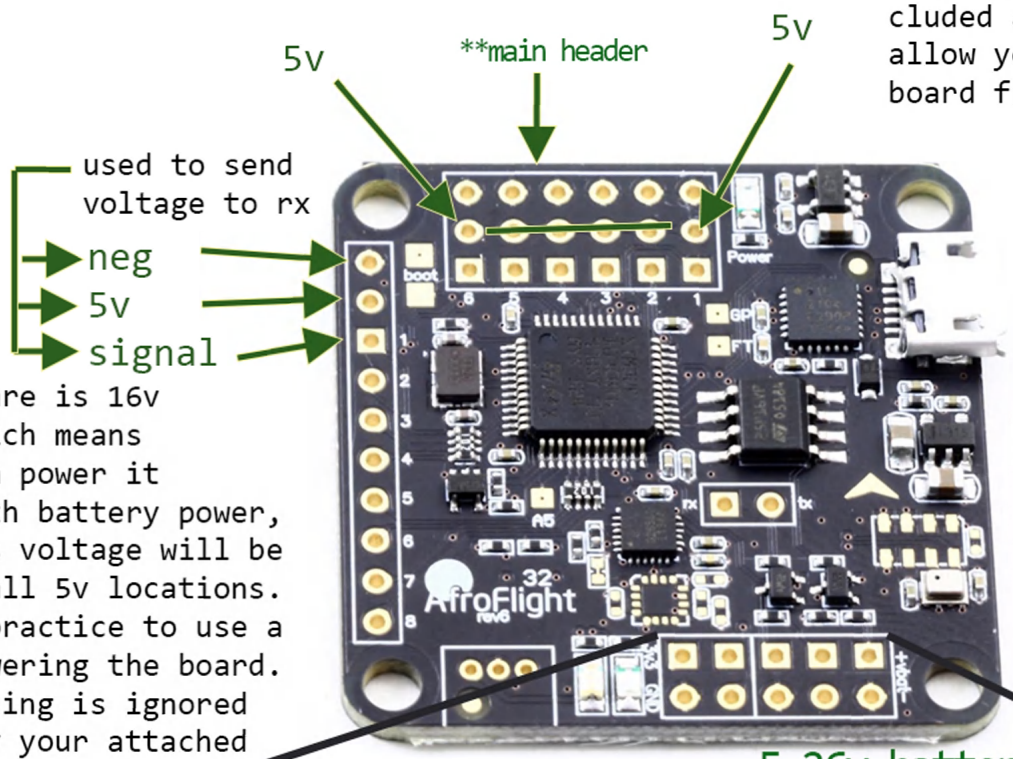
Magnetometer
+ upgraded
Barometer & Memory

quadquestions.com

Naze32 rev6 manual v1.2

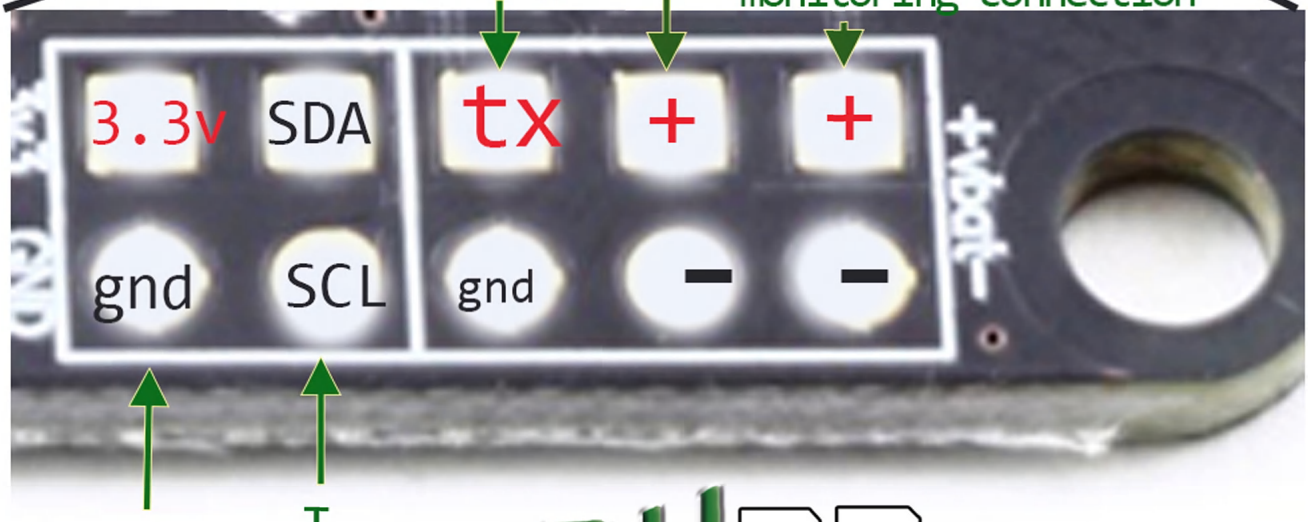
POWER SCHEME

Provide 5v power to board either via BEC or step down voltage regulator. Many escs have becs included and therefore allow you to power the board from your esc.



* The hardware is 16v tolerent which means that you can power it directly with battery power, however this voltage will be present at all 5v locations. It is best practice to use a BEC when powering the board. If this warning is ignored you will fry your attached 5v hardware such as receivers sensors, etc.

**The Battery monitoring connection does not power the board. To power the board 5v must be connected to a 5V connection such as via a servo lead to the main header.



The I2C bus can be used for additional sensors or debugging. I2C bus runs at 3.3V only, do not connect 5V sensors here (such as I2C sonar, etc).

3v3 power

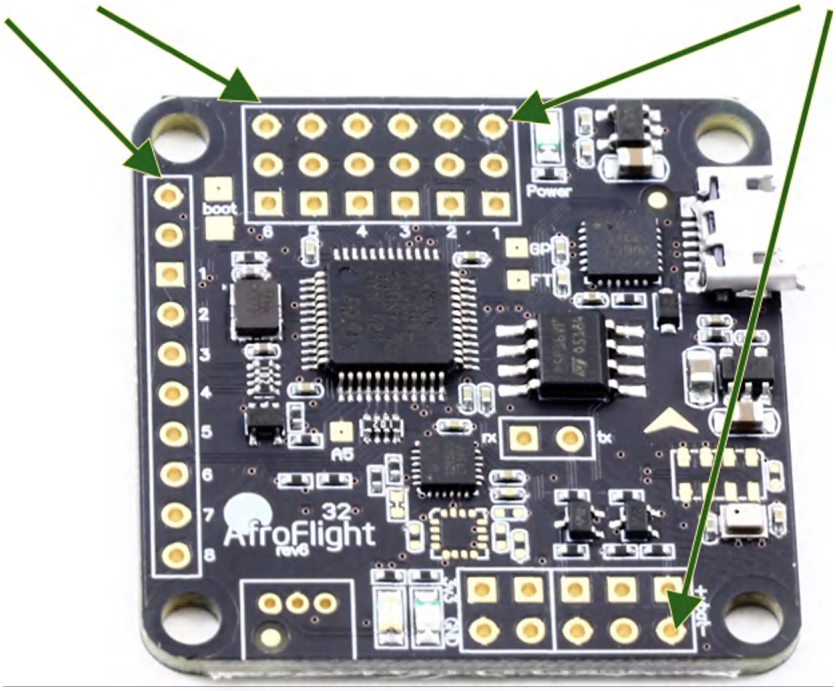
I2C port

QUADQUESTIONS.COM

Naze32 rev6 manual v1.2

GROUNDING

The NEG pads are on outer edge of board

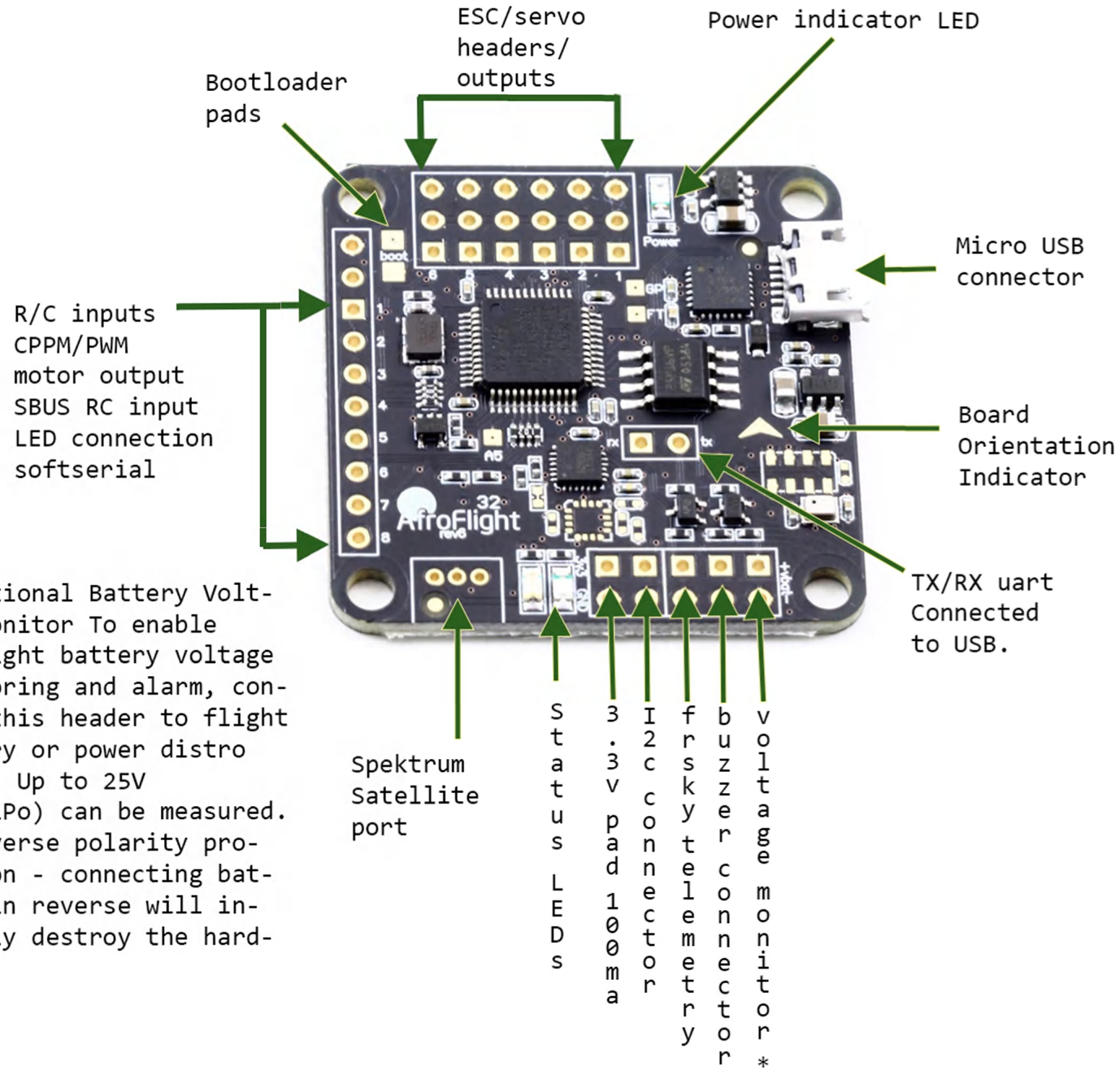


Warning: there is no reverse voltage polarity protection built into this board, so if you connect your power backwards you will instantly destroy the hardware.

QUADQUESTIONS.COM

Naze32 rev6 manual v1.2

General Inputs



The naze32 is a static sensitive device. Use caution when handling and make sure that you follow proper anti static handling procedures.

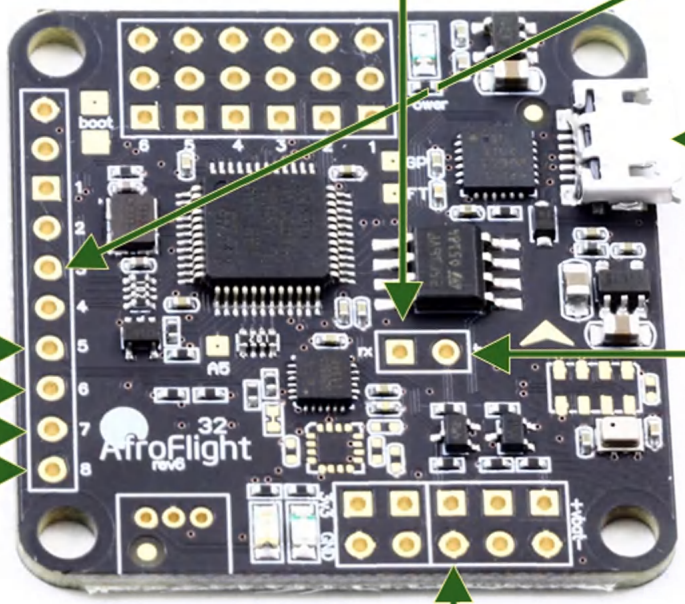
Naze32 rev6 manual v1.2

PORTS
UART AND SOFTSERIAL

The Naze32 features 2 dedicated hardware UART serial ports. One on tx&rx and one at pins 3&4

When “feature softserial” is enabled in the soft-ware, it will create software emulated serial ports on pins 5&6, & 7&8.

5=rx 1
6=tx 1
7=rx 2
8=tx 2



USB Port

tx&rx

telemetry pins

The USB Serial port shares the same UART as tx&rx.

If a serial device is connected to tx/rx it wont work when the usb is connected and vice versa, if there is a device connected to tx & rx there will be problems with the usb connection, so disconnct devices attached here when connecting the Naze32 to USB.

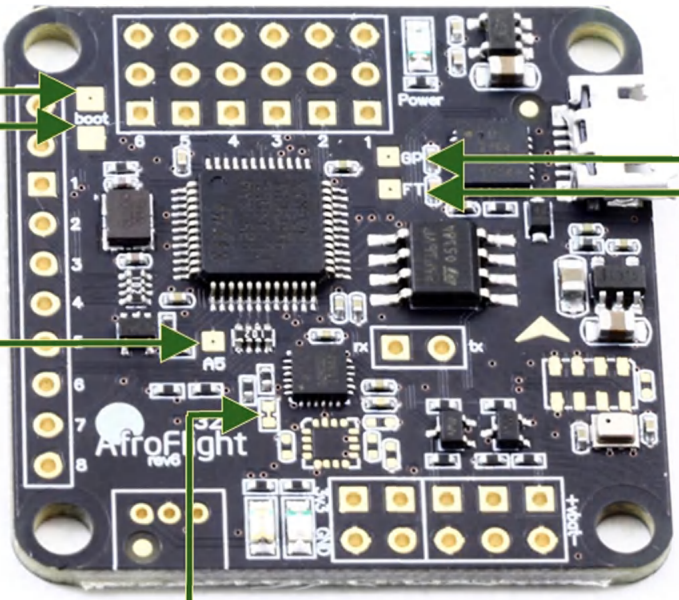
Also, Frsky telemetry is connected to this same UART1, if you want to use the tx & rx pins, you will have to move your telmetry to a soft serial port or UART2. If there is no connection to tx&rx, the teleme-try will not work when usb is connected.

The hardware will not output to the telemtry pins when connected via usb, so if you are using the telem-etry pins, you will not see teleme-try values until the board has been armed.

ADDITIONAL FEATURES

3.3V-tolerant GPIO connected to PB5 on STM32. Cannot be connected to 5V levels as this will instantly destory the hardware.

*Bootloader pads can be shorted out in the event that the board cannot be flashed with the bootloader flasher. Make sure "no reboot sequence" is checked in the firmware flasher if these pads are shorted.

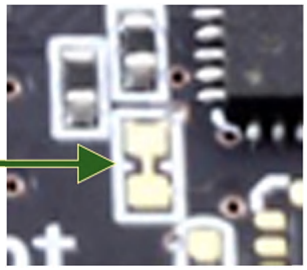


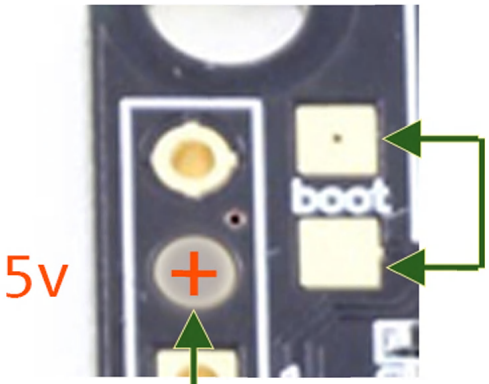
GPIO 3v3
GPIO 5v tolerant

5V-tolerant GPIO connected to PA15 on STM32. Can be used for sonar trigger or any other 5V I/O.

3.3V ADC input connected to ADC12_IN5 on STM32. Not 5V tolerant.

You can cut this trace to disable the onboard magnetometer on the full version.



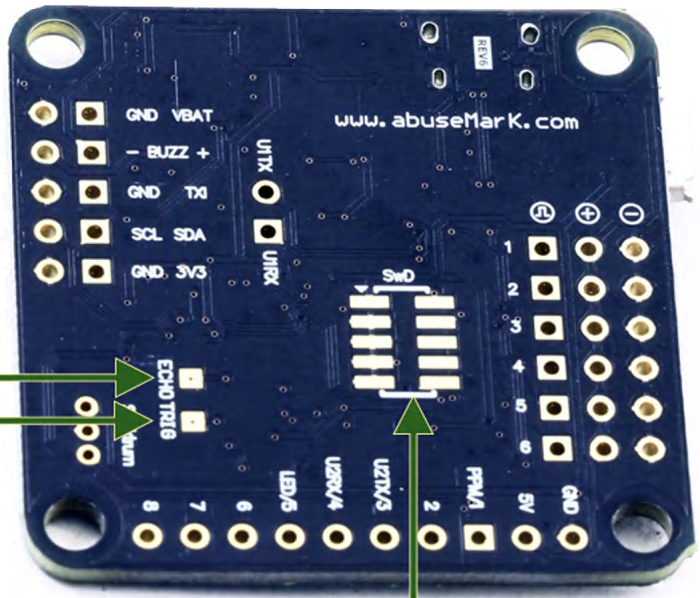


*warning- if shorting bootloader pads, be sure to only short the 2 pads together, be mindful not to short the pads to the 5v pin or hardware failure will result.

QUADQUESTIONS.COM

Naze32 rev6 manual v1.2

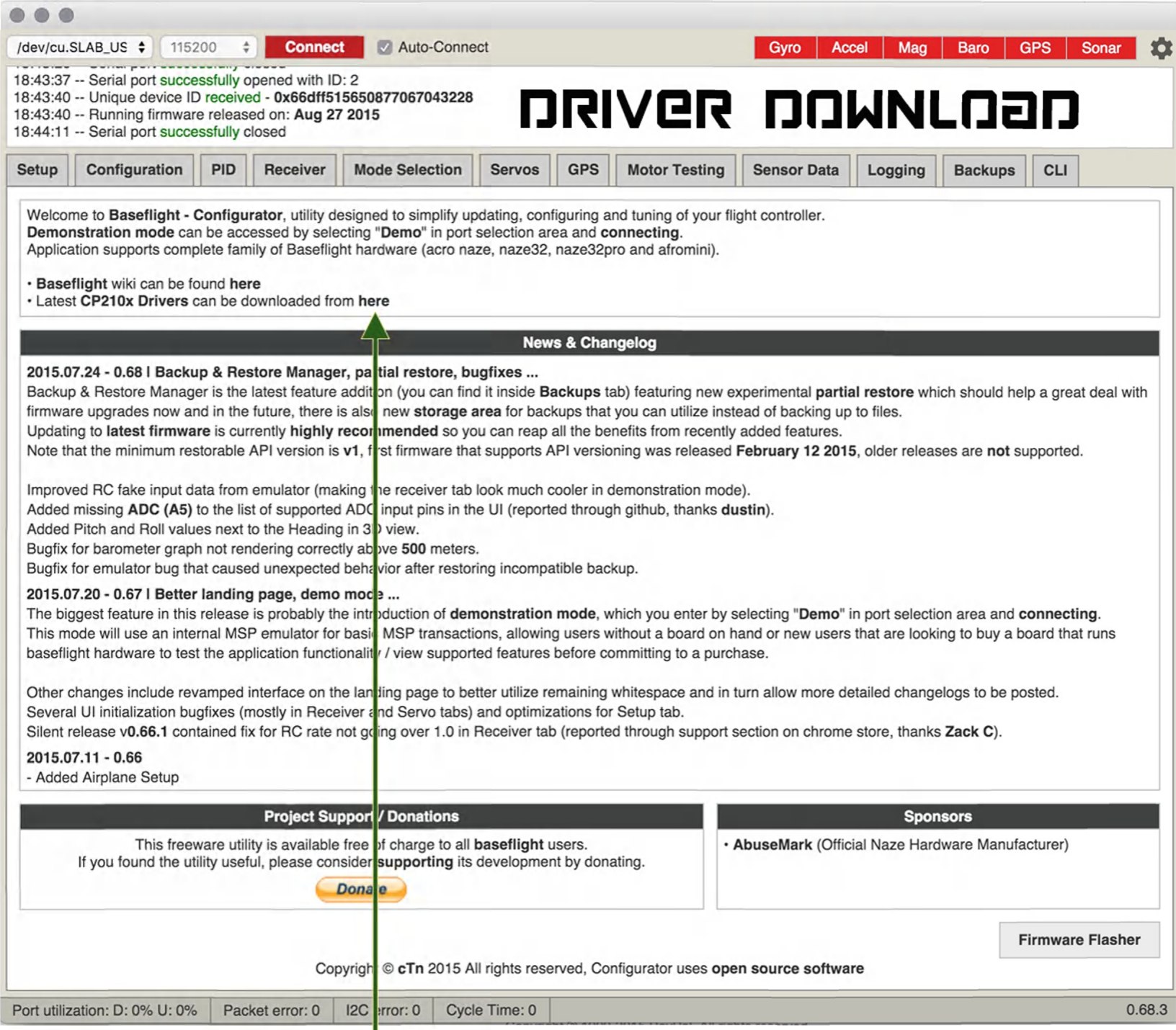
THE BACKSIDE



Echo and trigger Sonar pads w/resistors added for direct connection to 5V sonar.

Cortex Debug Connector 10 pin 0.05” debug connector connected to ‘SWD’ port of STM32.

Naze32 rev6 manual v1.2

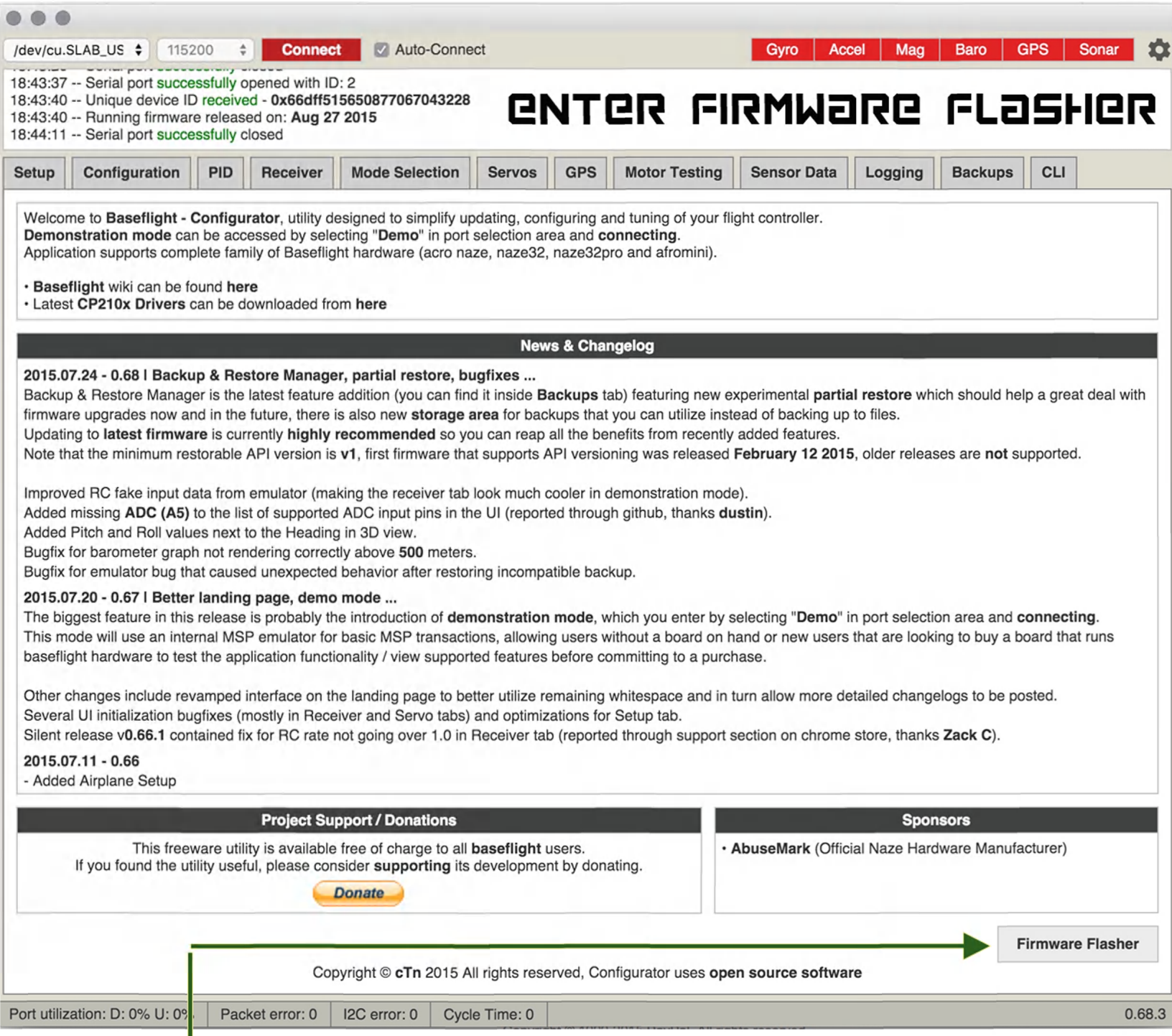


Download the CP210x drivers by clicking here

When connecting to Baseflight the first thing that you need to make sure to do is download the drivers so that your computer can communicate with the board. We also recommend testing the board before soldering so that a return can be made if needed. All Naze32s are tested from the factory before shipping.

QUADQUESTIONS.COM

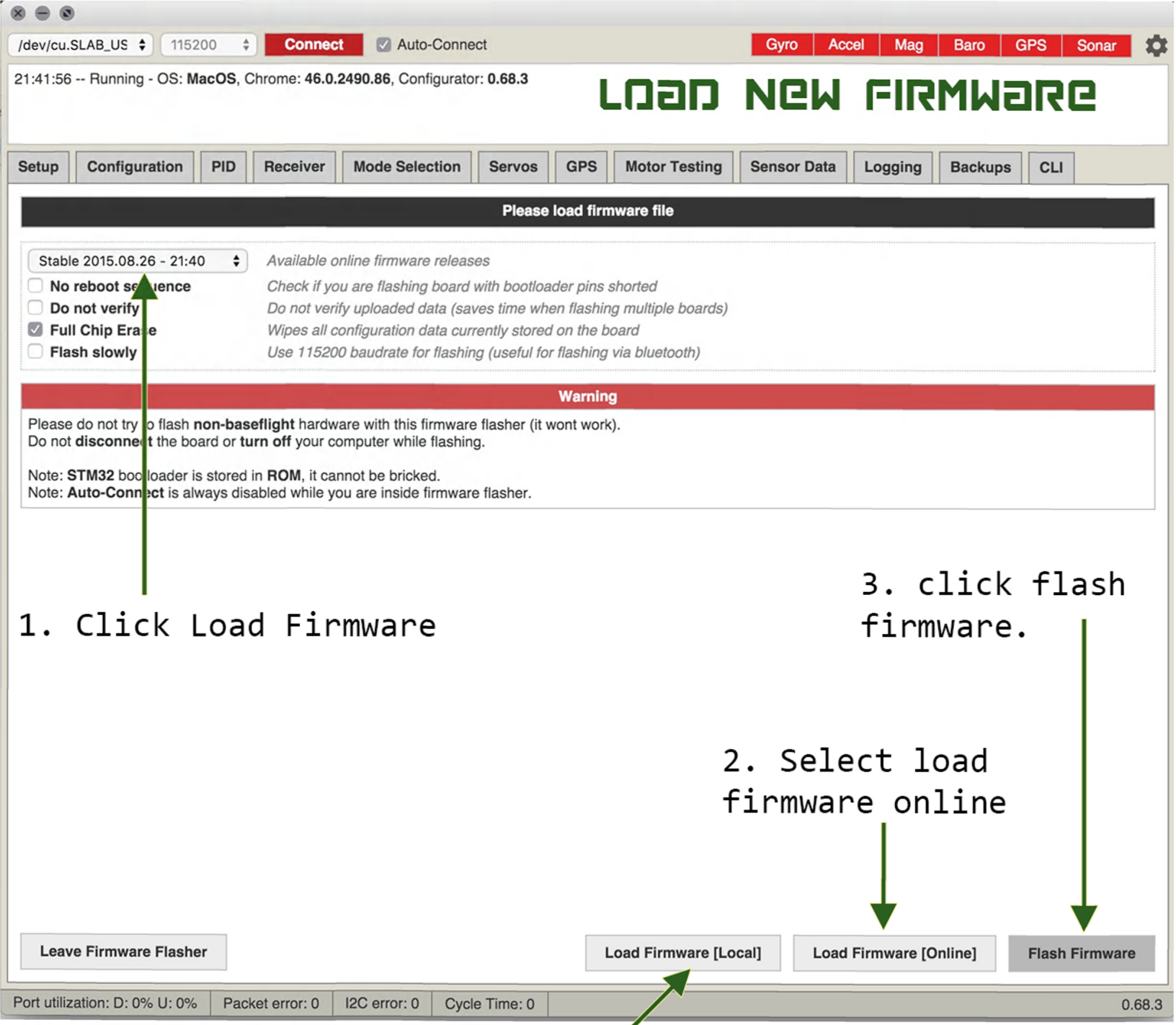
Naze32 rev6 manual v1.2



Click here to open the firmware flasher.

QUADQUESTIONS.COM

Naze32 rev6 manual v1.2



1. Click Load Firmware

2. Select load firmware online

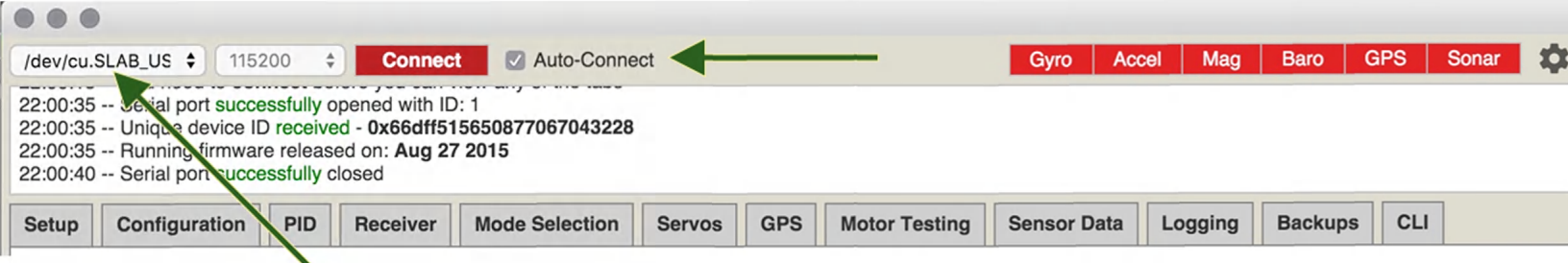
3. click flash firmware.

You can load custom firmware by clicking “load firmware (local)”

This will allow you to run custom varients of baseflight (for advanced users)

QUADQUESTIONS.COM

Naze32 rev6 manual v1.2



To connect for the first time, plug in your Naze32 to the computer, once this is done, the port should be listed in the dropdown. Look for SiLab port, select it and then click “connect”.

If the dropdown shows “no ports” then you havent installed the driver properly or need to check your USB cable. You should see a blue light on the board when there is power applied.

Clicking autoconnect is the easiest way to find the right port. If you click auto-connect and then plug in your Naze32, it should automatically connect to the board.

The tabs at the top of the screen will not be clickable until you connect to the board. You can also connect to demo under the port dropdown to play around with settings.

QUADQUESTIONS.COM

Naze32 rev6 manual v1.2

/dev/cu.SLAB_US | 115200 | Disconnect | Auto-Connect | Gyro | Accel | Mag | Baro | GPS | Sonar

22:00:40 -- Serial port successfully closed
22:09:56 -- Serial port successfully opened with ID: 2
22:09:56 -- Unique device ID received - **0x66dff515650877067043228**
22:09:56 -- Running firmware released on: **Aug 27 2015**

The indicator lights turn green to show that your sensors are working properly. GPS and sonar are red in this instance because they are not enabled.

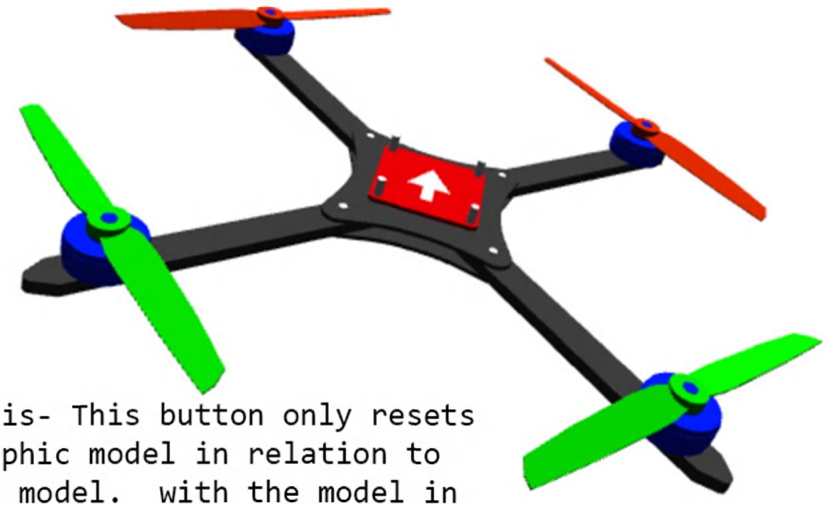
Setup | Configuration | PID | Receiver | Mode Selection | Servos | GPS | Motor Testing | Sensor Data | Logging | Backups | CLI

Calibrate Accelerometer	Place board or frame on **leveled** surface, proceed with calibration, ensure platform is not moving during calibration period
Calibrate Magnetometer	Move multirotor at least **360** degrees on all axis of rotation, you have 30 seconds to perform this task
Reset Settings	Reset / Restore settings to **default**

Author: creyc

Heading: -35 deg
Pitch: -30 deg
Roll: 19 deg

Calibrate Acc. Click this only when the quad is level
Calibrate Mag. Do this in open air away from metallic objects
Reset Settings- use this to reset all setings to default.



Reset z axis- This button only resets the 3d graphic model in relation to the actual model. with the model in front of you facing away from you, click reset z axis to make the 3d rendering match what the model is doing.

Reset Z axis, offset: 43 deg

Info

Battery voltage:	0 V
Capacity drawn:	0 mAh
Current draw:	0.00 A
RSSI:	0 %

GPS

3D Fix:	False
Sats:	0
Latitude:	0.0000 deg
Longitude:	0.0000 deg

The info and GPS boxes give information from the sensors on the board. Batt voltage is measured from the VBat pins and current draw and rssi

Port utilization: D: 4% U: 2% | Packet error: 0 | I2C error: 0 | Cycle Time: 3503 | 0.68.3

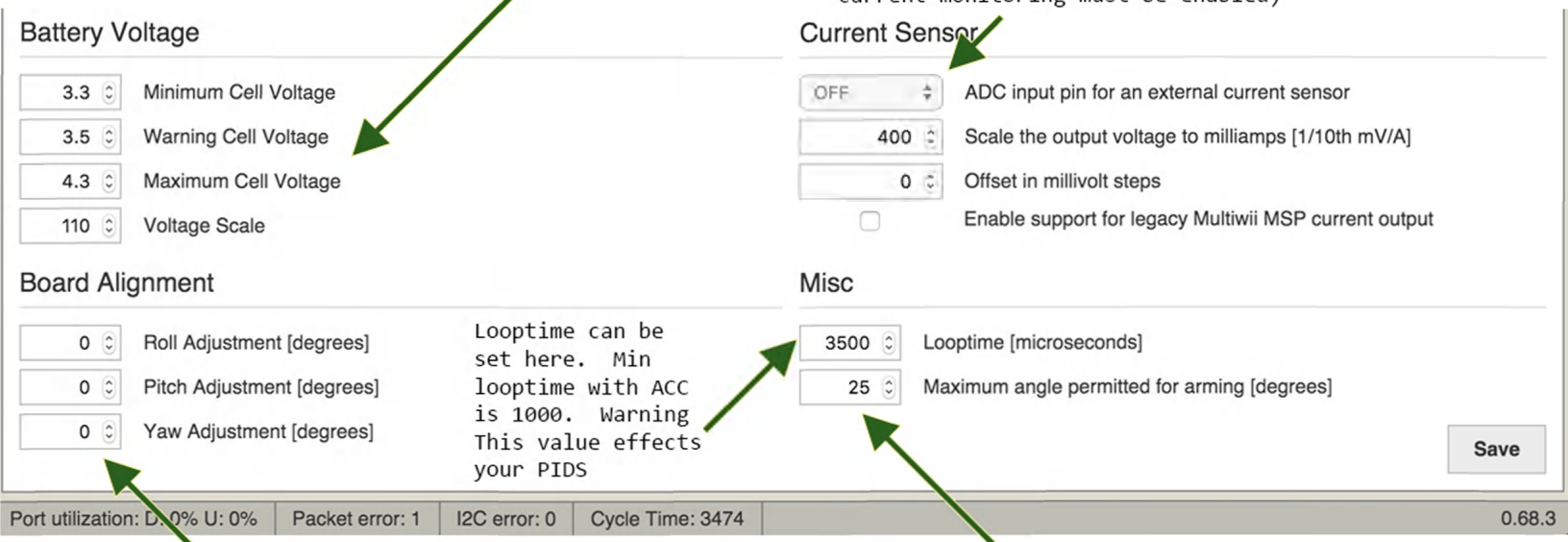
If you get several errors, check your USB cable- these values are mostly used for bluetooth debugging.

Naze32 rev6 manual v1.2

CONFIGURATION TAB PG 3.

Set these to match your battery chemistry (initial values are setup for Lipo batteries)

Use these values to setup your current sensor. (battery current monitoring must be enabled)



To change the board orientation, adjust these settings. fpr example, to rotate the board counter clockwise 90 degrees in the Yaw axis, you could use either a value of -90 or 270.

It is extremely important to set this up properly. You can verify that it is setup by making sure that the model moves according to the actual movements of the quad.

This is the maximum angle allowed for arming, If you have troubles arming your quad in rough terrain, adjust this setting.

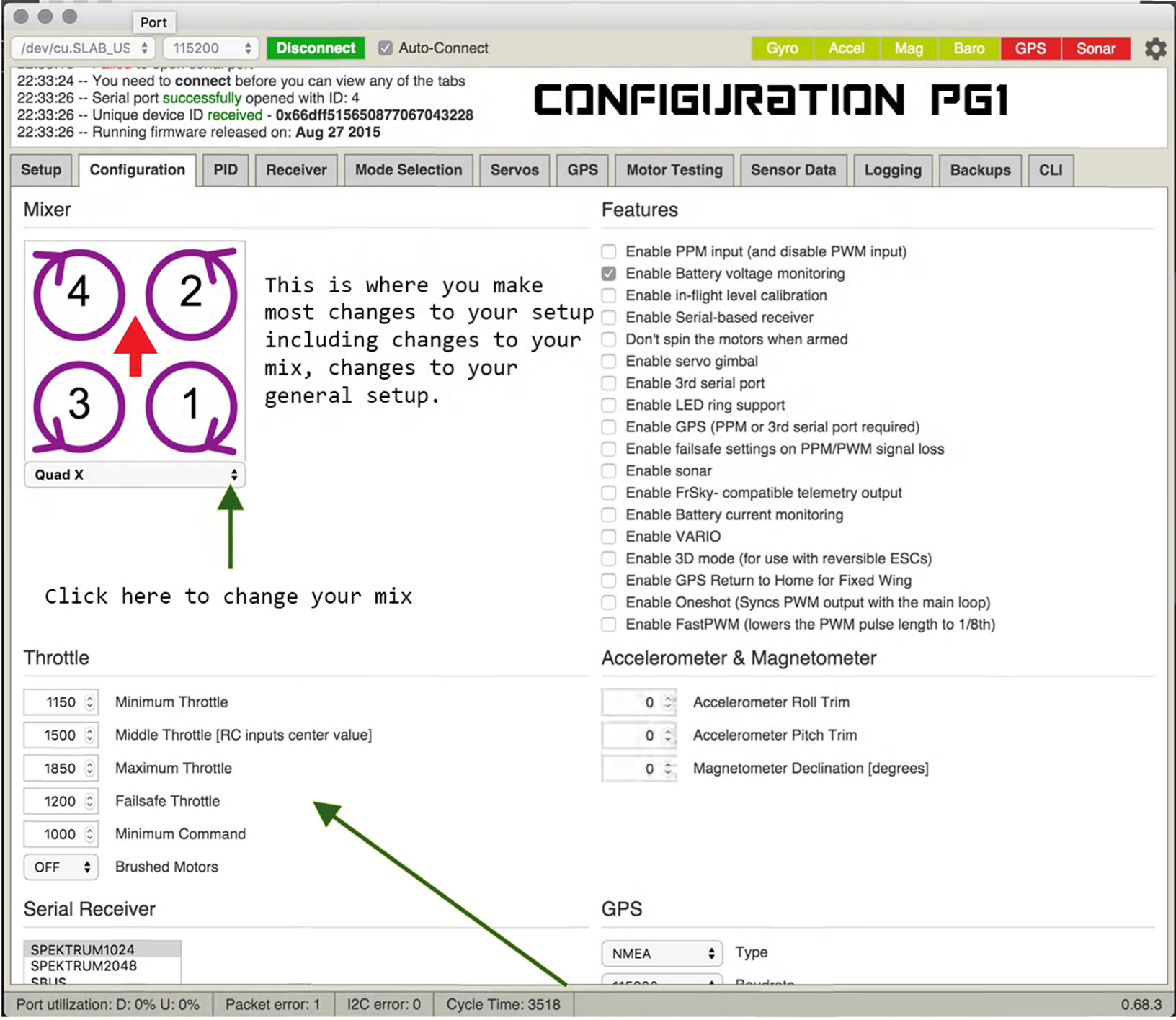
***Make sure to set the board alignment before you try to fly for the first time.**

***also, calibrate your acc if the board is realigned.**

***If you have problems arming on a level surface, ACC calibration Is a good place to start.**

QUAD QUESTIONS .COM

Naze32 rev6 manual v1.2



Min throttle- this value should be set for your escs. BLheli and Kiss escs work well with a the stock minimum throttle of 1150, simonK firmware should be set at 1064, other escs vary- its best to start low and turn this value up until your motors start reliably.

middle throttle- The center value for your RC input

max throttle-max value for the escs at full power

failsafe throttle-the throttle value set when failsafe is initiated.

MINCOMMAND is the signal the sent to the ESC when unarmed.

Brushed Motors-setting to 8000 will use brushed mode at 8kHz switching frequency. Up to 32kHz is supported. Note, that in brushed mode, minthrottle is offset to zero. -must use external fets

QUADQUESTIONS.COM

Naze32 rev6 manual v1.2

CONFIGURATION TAB PG2

Features

- [ ] Enable PPM input (and disable PWM input) — Enable this for use with ppm receivers.
- [x] Enable Battery voltage monitoring — Enable this to allow batt monitoring on vbat pins
- [ ] Enable in-flight level calibration — Enable Level calibration during flight.
- [ ] Enable Serial-based receiver — Enable for use with sbus receiver- utilizes UART2
- [ ] Don't spin the motors when armed — Stops motors when armed at minthrottle- useful for beginners.
- [ ] Enable servo gimbal — Use this to enable gimbal output-uses servo 1& 2 for gimbal**
- [ ] Enable 3rd serial port — Use this to enable soft serial on pins 5,6 and 7,8
- [ ] Enable LED ring support — Enables LED ring support-output on pin 5.
- [ ] Enable GPS (PPM or 3rd serial port required) — Enables GPS on Pins 3 & 4
- [ ] Enable failsafe settings on PPM/PWM signal loss — Enables failsave throttle setting on PPM/PWM loss from receiver
- [ ] Enable sonar — Enables Sonar
- [ ] Enable FrSky- compatible telemetry output — Enables Frsky Telemetry output. (inverted on telemetry pins)***
- [ ] Enable Battery current monitoring — Enables Current monitoring****
- [ ] Enable VARIO — Enables vario over telemetry-for audible beeps when altitude changes
- [ ] Enable 3D mode (for use with reversible ESCs) — Enables 3d mode, sets throttle midpoint at 0- use for acrobatic tricks
- [ ] Enable GPS Return to Home for Fixed Wing — self explanitory
- [ ] Enable Oneshot (Syncs PWM output with the main loop) — set this to enable Oneshot
- [ ] Enable FastPWM (lowers the PWM pulse length to 1/8th) — set this if enabling oneshot

Accelerometer & Magnetometer

- 0 Accelerometer Roll Trim — set your acc roll trim (acc stick commands change these values)
- 0 Accelerometer Pitch Trim — Set your acc pitch trim (acc stick commands change these values)
- 0 Magnetometer Declination [degrees] — set this for your locale (important for accurate GPS Measurements)

*Inflight level calibration procedure
1. You arm the function with a stick combo and take off as usual
2. you either trim the hover mode using the trims on the rx until it is perfectly level and not drifting or you use the acromode until it is leveled
3. you now hit the "arm" switch (usually aux1/aux2) and turn off the engine. Don't worry the code does not turn off the engines - there is a failsafe feature.
4. The copter now takes 50 measurements of the current angle and stores them in ram.
5. After landing you have to transfer the new values into the eeprom with a stick combo.
** When gimbal is enabled, motor outputs shift by 2, so motor 1 is on servo3, motor2 is on servo 4 and so on.
*** Telemetry can be output to a soft serial (must be inverted and programmed via CLI)
****RC inputs (assuming you are using PPM) or you can use the ADC on the bottom of the board, this way baseflight will keep track of the current and send the data via MSP to the OSD.

Serial Receiver

SPEKTRUM1024
SPEKTRUM2048
SBUS
SUMD

Select your serial receiver type here.
Not used if “enable serial based receiver” is unchecked.

GPS

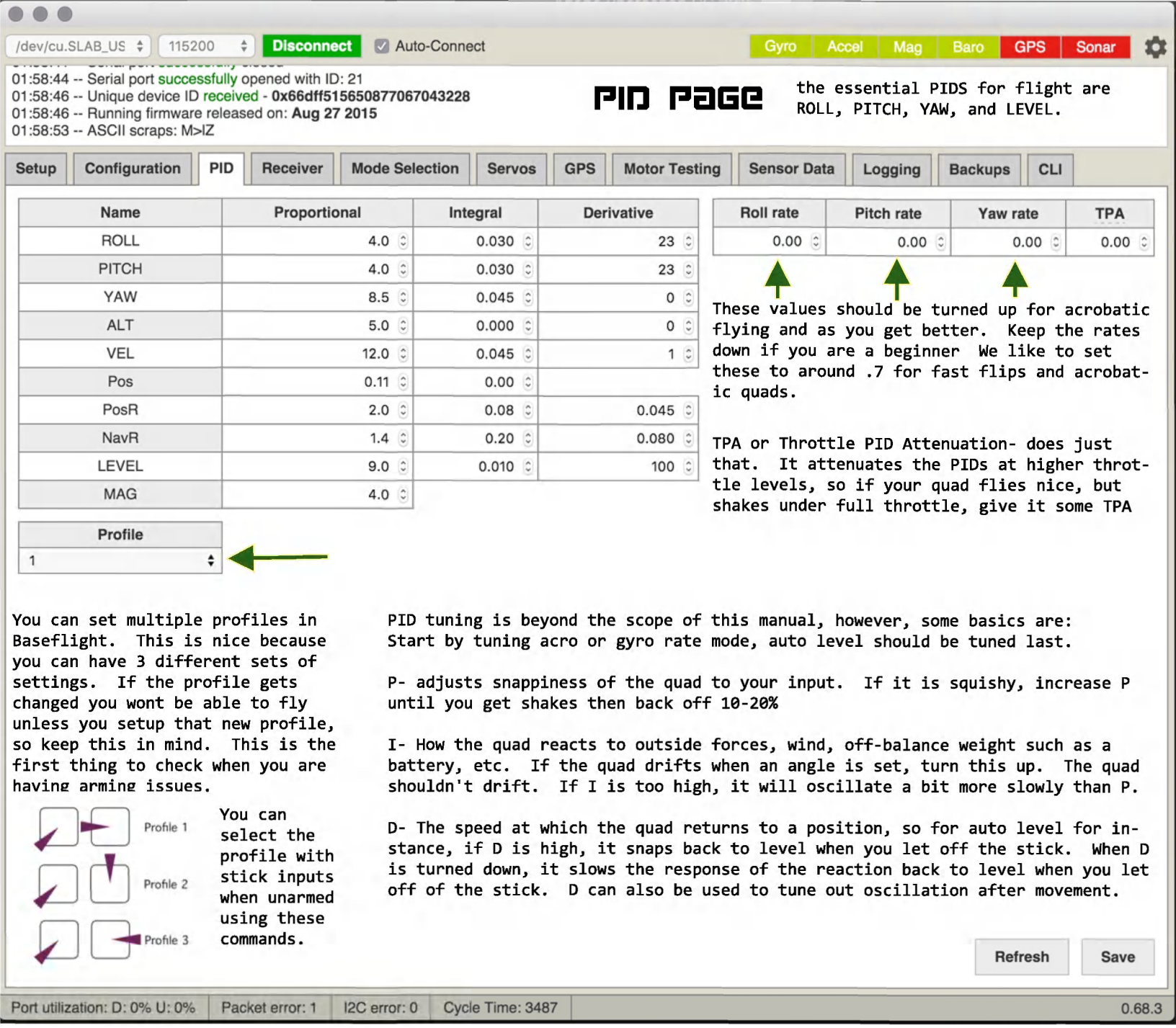
NMEA — Type — Select the GPS Type here
115200 — Baudrate — Select GPS baudrate (configured in GPS modules settings)
Auto-detect — Ground Assistance Type

Select Ground assistance type.
(auto is fine for most circumstances

****** YOU MUST CLICK THE SAVE BUTTON AT THE BOTTOM OF THE PAGE TO SAVE YOUR SETTINGS BEFORE MOVING ON TO ANOTHER TAB**

QUADQUESTIONS.COM

Naze32 rev6 manual v1.2

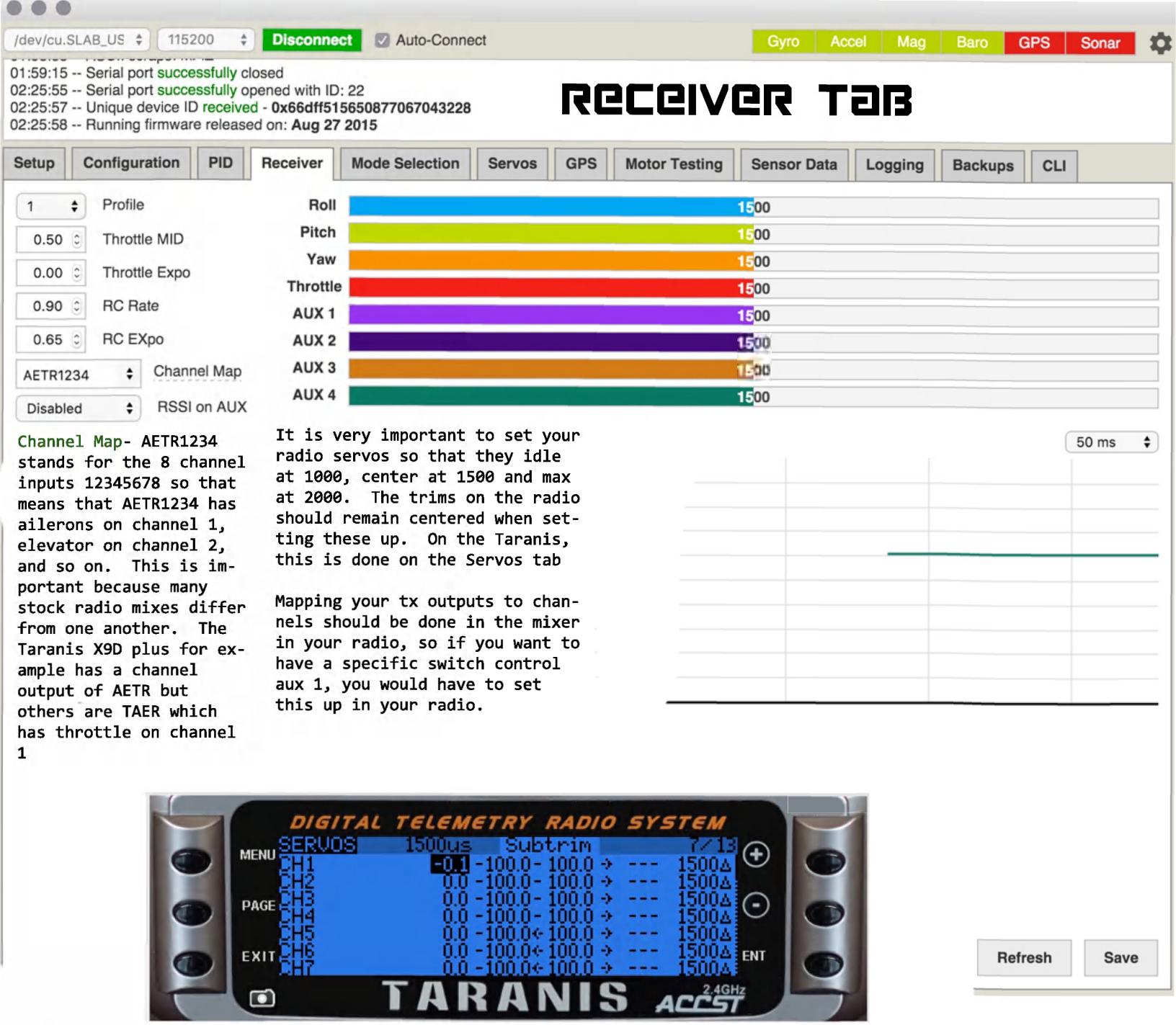


Typically, if the stock values don't work or allow you to fly, then you have got some other issues going on that you should look into adjusting. The Naze32 works by looking at many factors, sensor inputs, user inputs, and all of these factors are calculated and a motor output is "written" This happens over and over again at a high rate of speed. (loop-time) The PID gains adjust this calculation and tuning the PIDS is essential to really dialing in your quad. Every quad is different, and all require slightly different settings, Also, every pilot's opinion of how a quad should fly is also different. Be sure to consider this when tuning, it is subjective and there are many different ways to do it.

PID tuning videos on you tube, and Google searches should help you get your quad dialed in. Please discuss at quadquestions.com

QUAD QUESTIONS .COM

Naze32 rev6 manual v1.2



Channel Map- AETR1234 stands for the 8 channel inputs 12345678 so that means that AETR1234 has ailerons on channel 1, elevator on channel 2, and so on. This is important because many stock radio mixes differ from one another. The Taranis X9D plus for example has a channel output of AETR but others are TAER which has throttle on channel 1

It is very important to set your radio servos so that they idle at 1000, center at 1500 and max at 2000. The trims on the radio should remain centered when setting these up. On the Taranis, this is done on the Servos tab

Mapping your tx outputs to channels should be done in the mixer in your radio, so if you want to have a specific switch control aux 1, you would have to set this up in your radio.

You should set your radio up with no expo and then let the flight controller software setup your expo and rates for you. This is handy because it allows you to have different expos and rates setup on different profiles, so you could for instance have one profile setup for filming, which has smooth expo, rates, pids, etc, and then have an acrobatic profile that is aggressive, and then have a racing profile with another set of settings.

Set RSSI on Aux if you port the RSSI in via a servo channel.

Be sure to check this page and that your radio is functioning properly before your first flight.
Check that all channels are properly mapped and that none are reversed. Check QuadQuestions.com for videos on how to do this.

To make sure your servos aren't reversed, you should see these values when moving your sticks:
pitch up (right stick up)=2000
Roll Right(right stick right)=2000
throttle full=2000
yaw right=2000

QUAD QUESTIONS .COM

Naze32 rev6 manual v1.2

Setup | Configuration | PID | Receiver | **Mode Selection** | Servos | GPS | Motor Testing | Sensor Data | Logging | Backups | CLI

Profile: 1	AUX 1			AUX 2			AUX 3			AUX 4		
Name	LOW	MED	HIGH	LOW	MED	HIGH	LOW	MED	HIGH	LOW	MED	HIGH
ARM	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
ANGLE	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
HORIZON	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
BARO	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
VARIO	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
MAG	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
HEADFREE	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
HEADADJ	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
CAMSTAB	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
GPS HOME	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
GPS HOLD	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
BEEPER	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
CALIB	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐
OSD SW	☐	■	☐	☐	■	☐	☐	■	☐	☐	■	☐

Arm- if not set to a switch, arming will happen with the left stick down and to the right. If the arm switch is set, arming via stick command is disabled.

Flight modes:
Angle=autolevel- the quad levels when stick is neutral
.
Horizon=autolevel plus Acro mode at edges of stick movements, so hard right would cause flips, centering stick causes autolevel.

no angle or horizon selected=gyro rate.

*Many people have problems when first starting out because they don't select level mode.

Baro=alt hold

vario=vario sent via telemetry

Mag=heading hold
Headfree (Full board only)- orients the quad to the user so no matter which direction the quad is facing, pitch forward is always away from you and pitch back is always towards you This works in conjunction with HEADADJ which allows you to set the new yaw origin.

Camstab=Camera Stabilization (works if gimbal is enabled)

GPS HOME= GPS return to home (use at your own risk)

GPS HOLD= GPS hold

Beeper= Sounds buzzer when activated

Calib- Write in flight level calib to eeprom

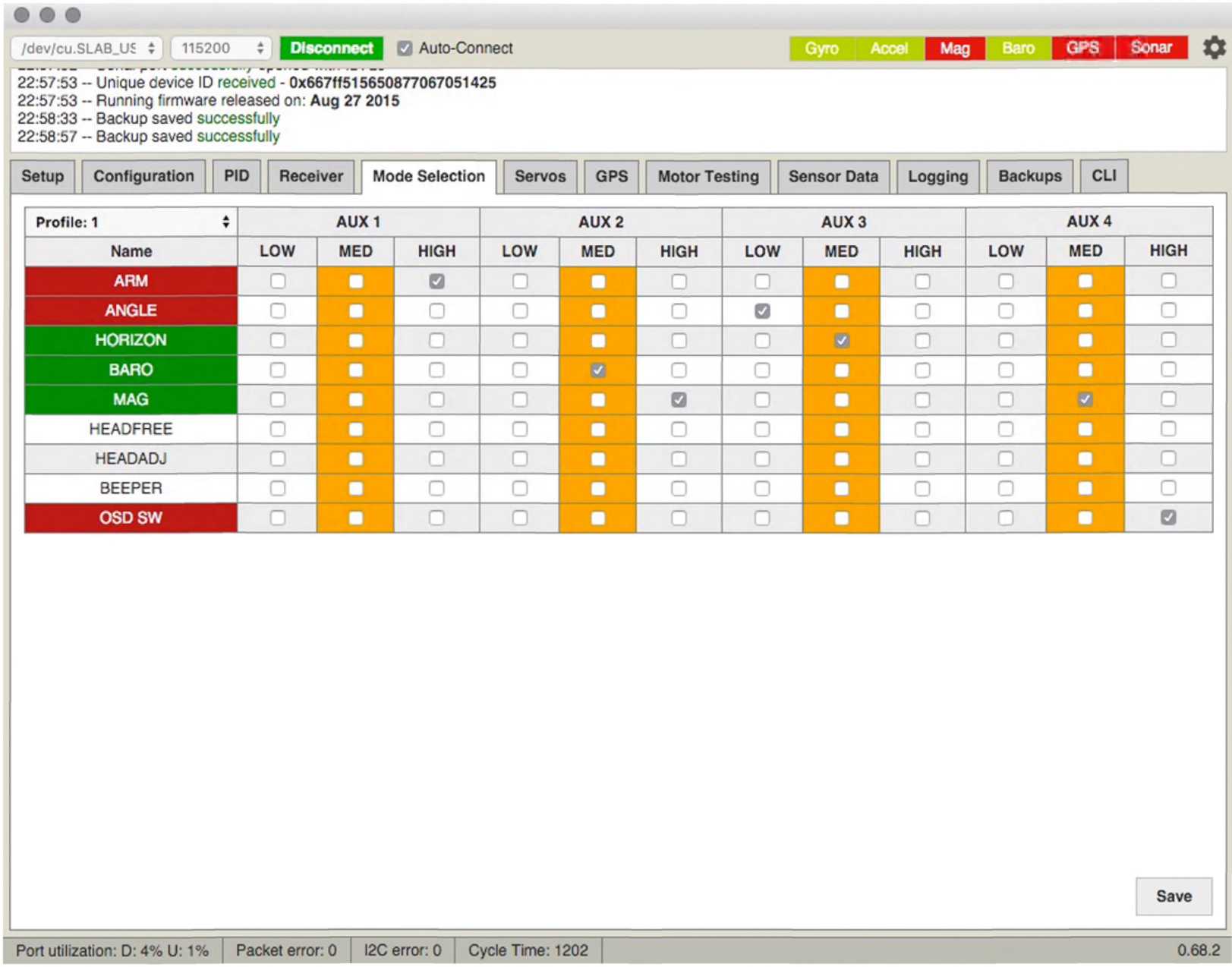
OSDSW- Turn off OSD (if using minimosd)

When setting the modes, a check box sets the mode to a switch. SO, a typical flight mode selection switch, with low being angle mode, mid being horizon and high being rate mode would look something like this:

Profile: 1	AUX 1		
Name	LOW	MED	HIGH
ARM	☐	☐	☐
ANGLE	☑	☐	☐
HORIZON	☐	☑	☐
BARO	☐	☐	☐
VARIO	☐	☐	☐
MAG	☐	☐	☐
HEADFREE	☐	☐	☐
[illegible]	☐	☐	☐
[illegible]	☐	☐	☐
[illegible]	☐	☐	☐
[illegible]	☐	☐	☐
[illegible]	☐	☐	☐
OSD SW	☐	☐	☐

QUADQUESTIONS.COM

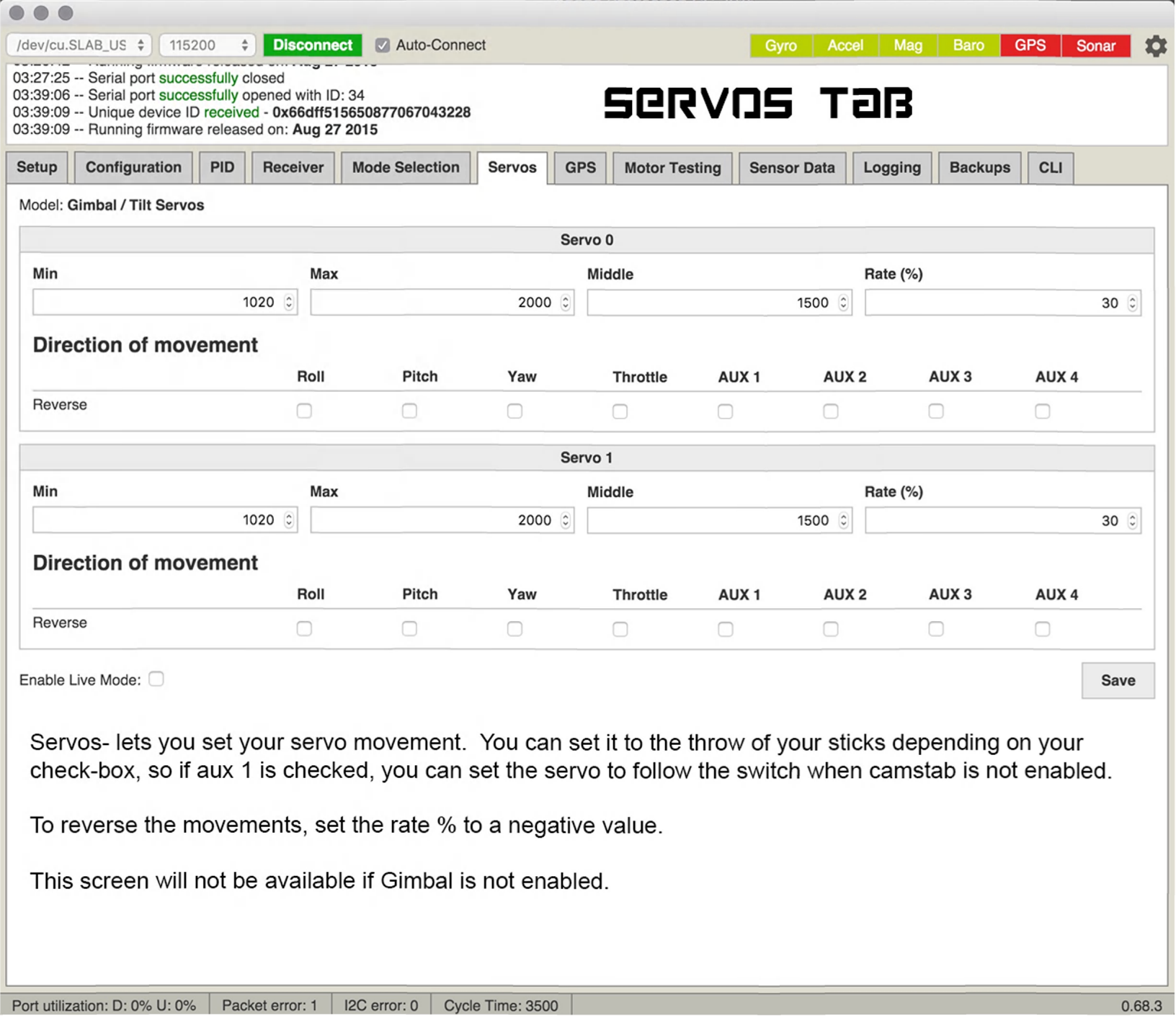
Naze32 rev6 manual v1.2



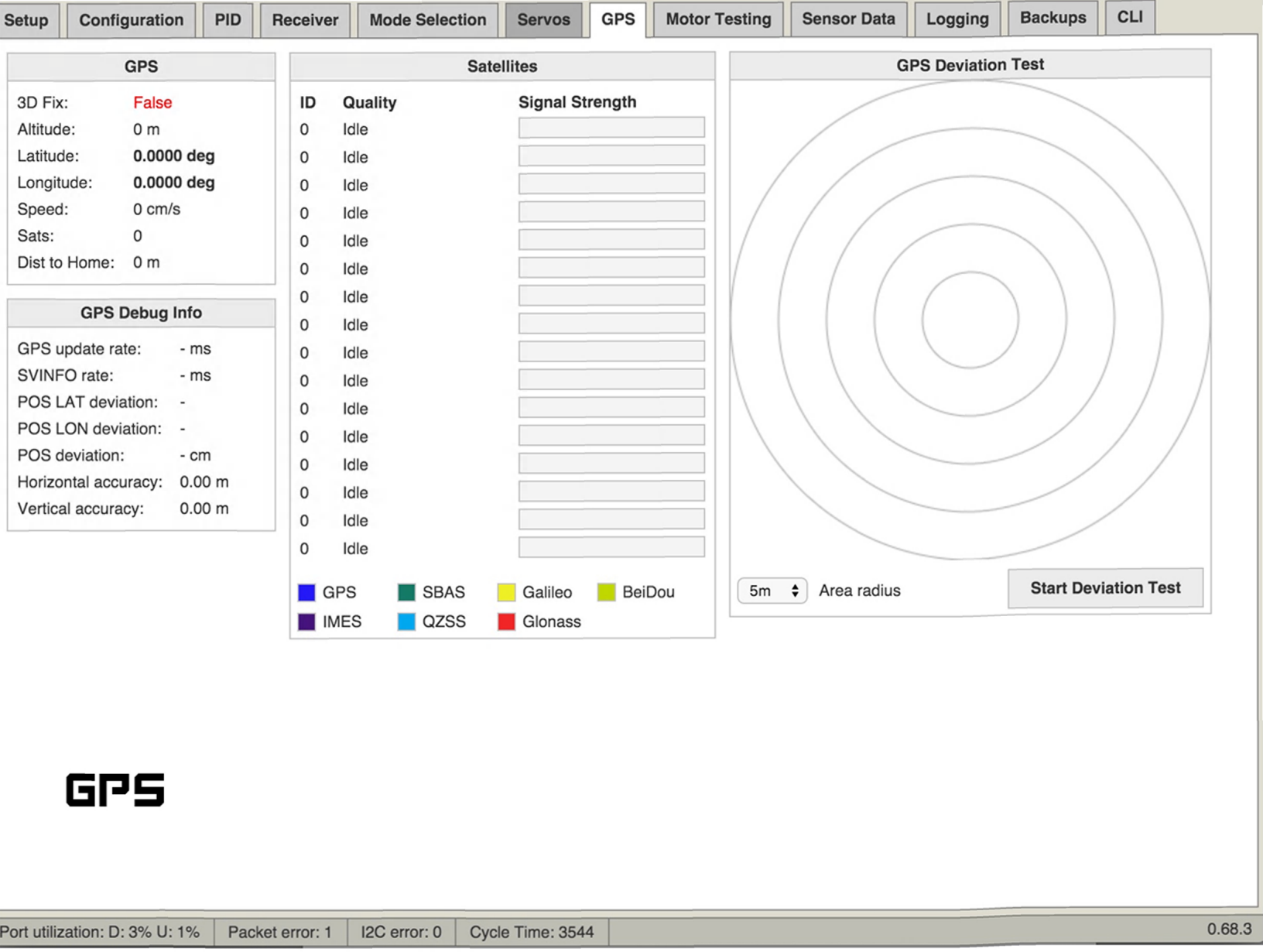
A typical switch setup, arm on switch 1, alt hold and heading hold on switch 2, flight modes on 3, and heading hold again /OSDsw on switch 4.

You can see that all switches are in the mid position, so this quad is flying horizon with altitude hold and heading hold active.

Naze32 rev6 manual v1.2

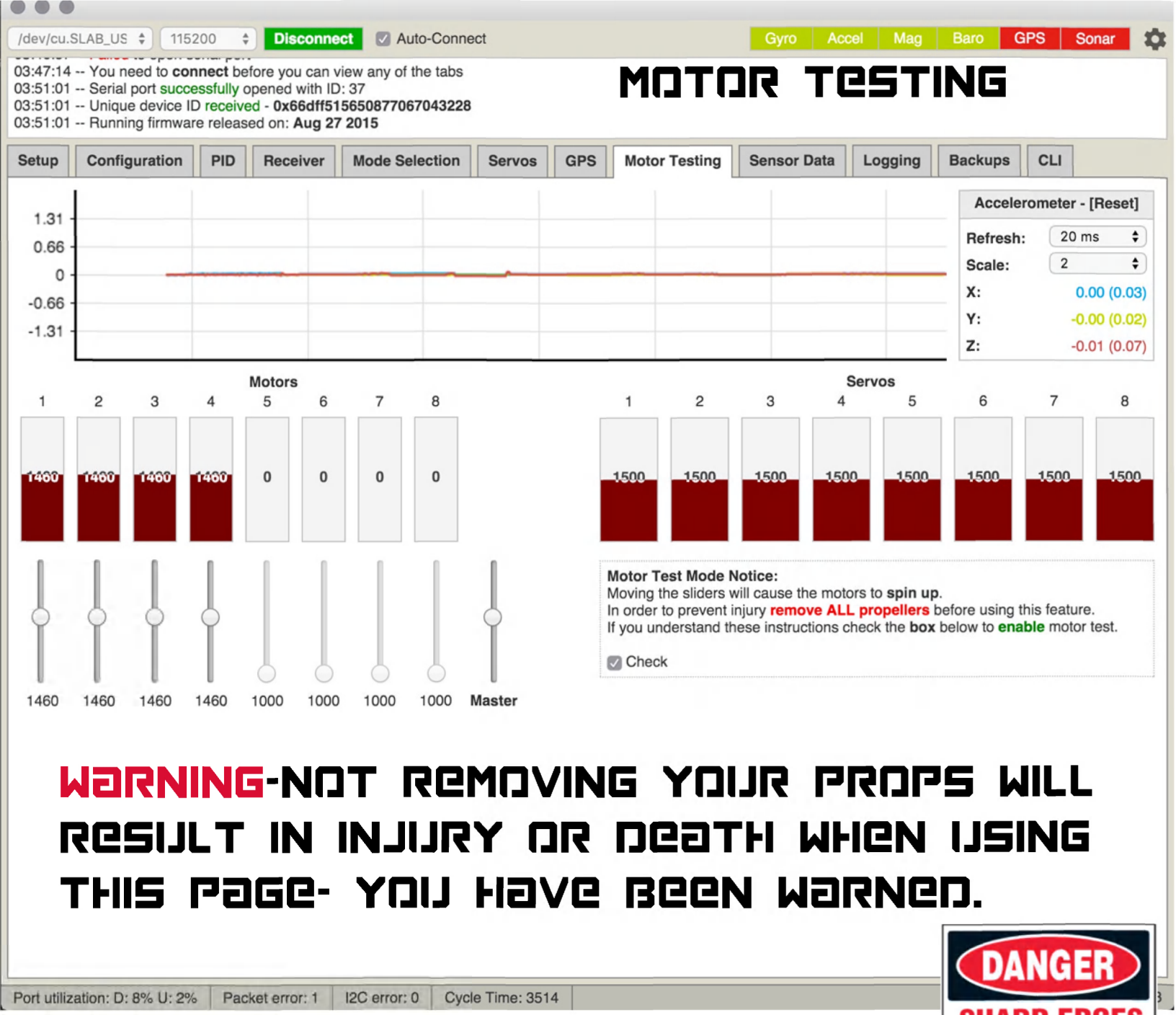


Naze32 rev6 manual v1.2



GPS

This page can help you to view and troubleshoot your gps if installed. If the GPS is hooked up but the GPS box on the top right of Baseflight is red, try swapping your TX and Rx lines.



Use This page to test your motors. Make sure to remove your props. This is the first place you should go to test your motor rotation. This is also a good place to visually inspect what your motors and servos are outputting. The motor value will take into account your mixing, so if the quad is not level, and in angle mode, these values might not all be the same. You can use the sliders to spin motors individually, or you can use the master slider to spin all of the motors at once.

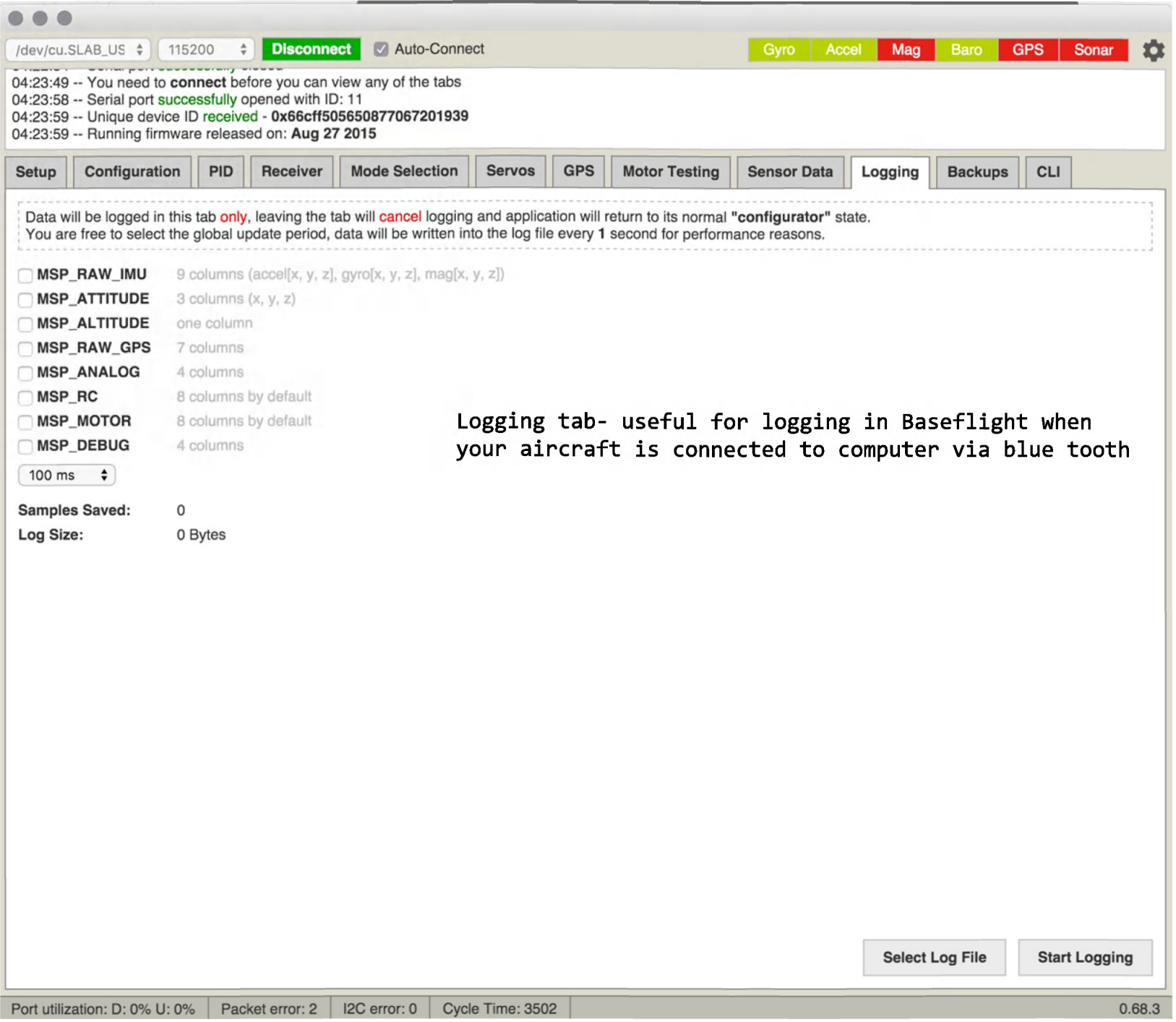
QUAD QUESTIONS .COM

Naze32 rev6 manual v1.2

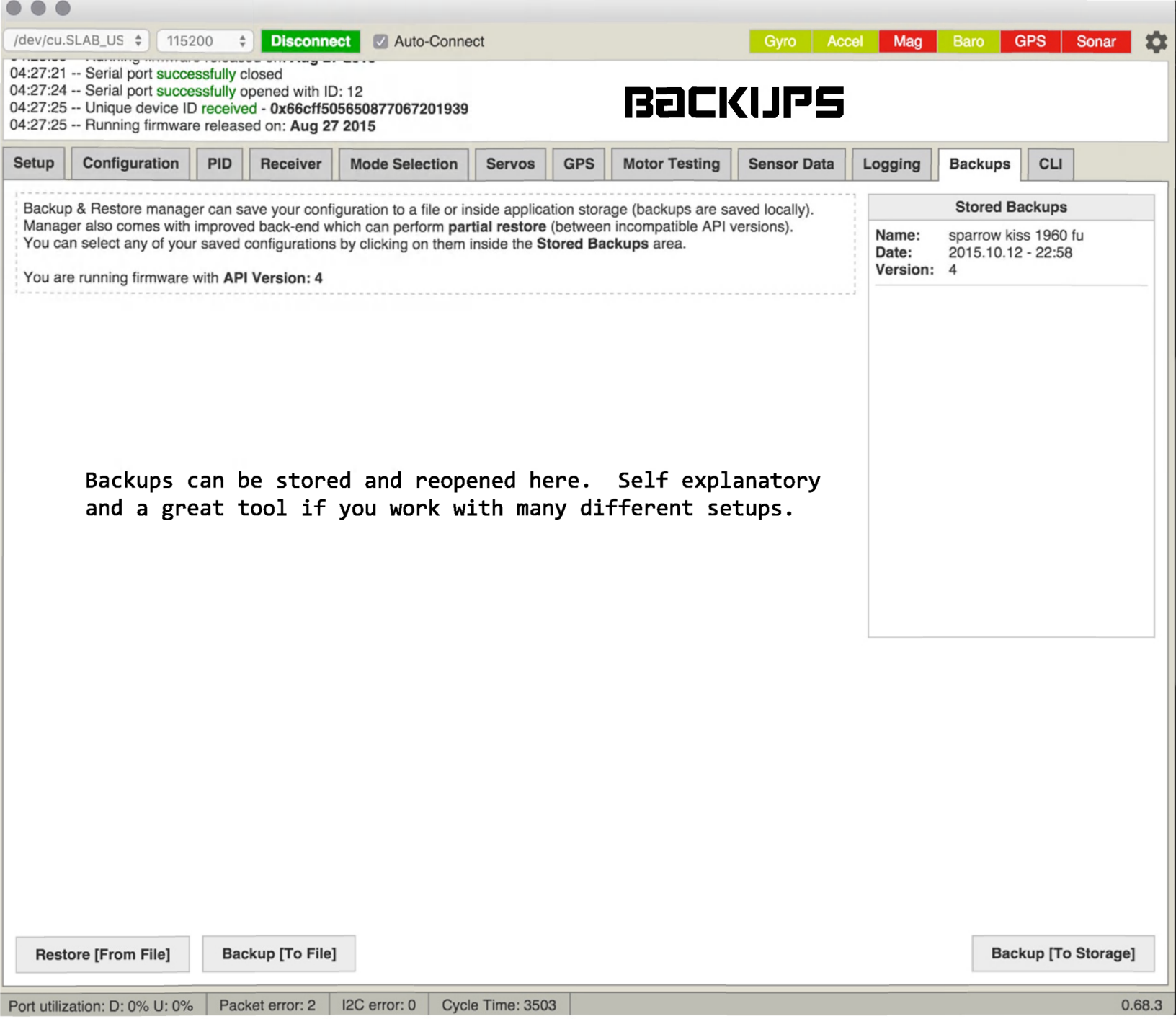
Raw Sensor Data

You should use the raw sensor data page to check your sensors. When moving the board, you should see movement on the accelerometer, gyro, magnetometer, barometer, etc.

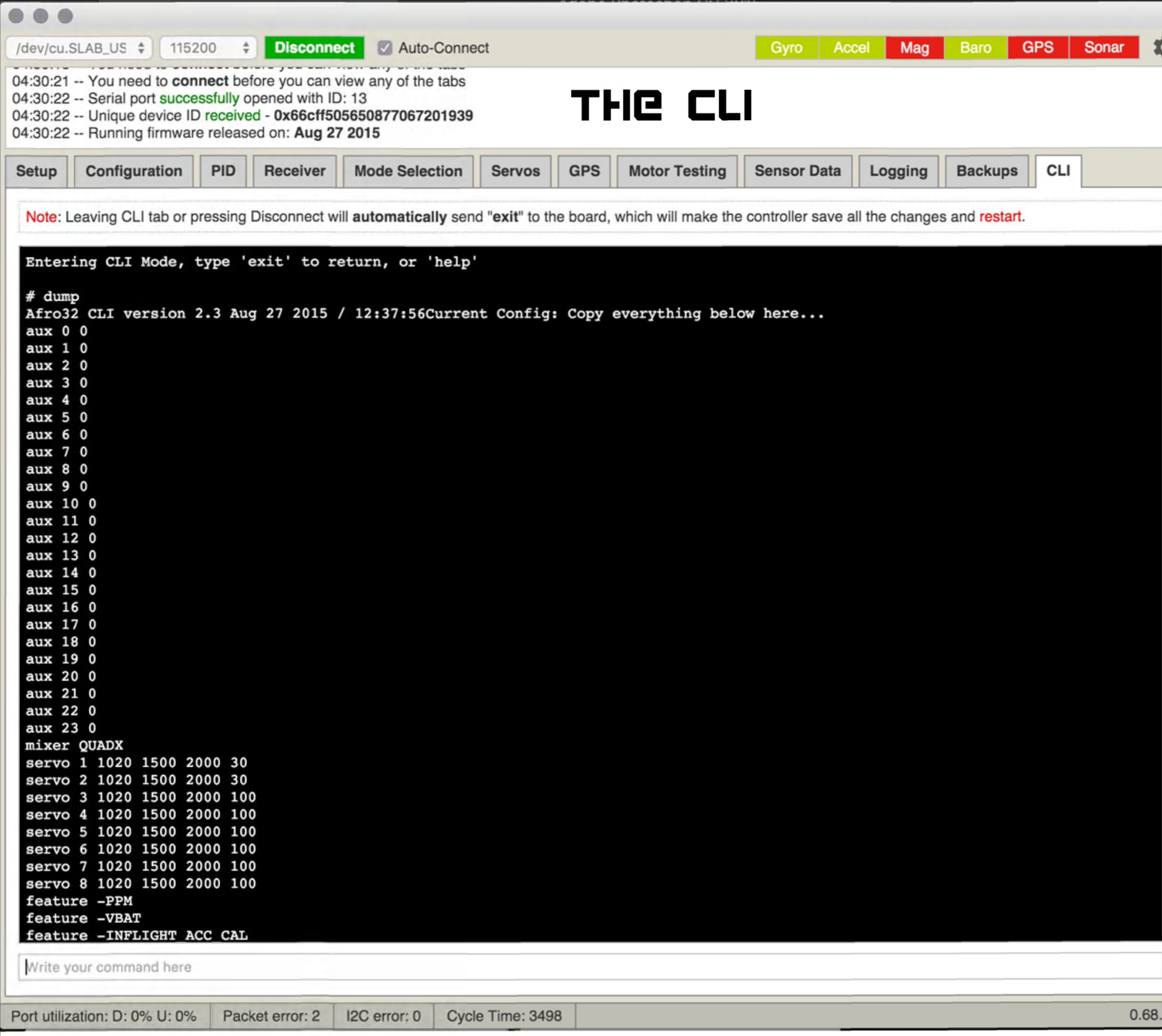
If you have an item that is flat-lined at 0, even with lots of movement of the board, then that is indicative of an issue with the sensor. You can see in the above example that there was rapid movement of the board showing that the sensors were working, followed by the board sitting still which is shown by the flat lines.



Naze32 rev6 manual v1.2



Naze32 rev6 manual v1.2



The CLI is an excellent tool for power users, you can quickly load settings, and configure the quad for your needs. When working with support, you can go to the CLI, type “dump” and the copy and paste all of your settings into an email- this is also a handy way to take notes of your setup. We recommend that you get familiar with the CLI and do some searches for Multiwii CLI commands to find out all of the neat things that you can do.

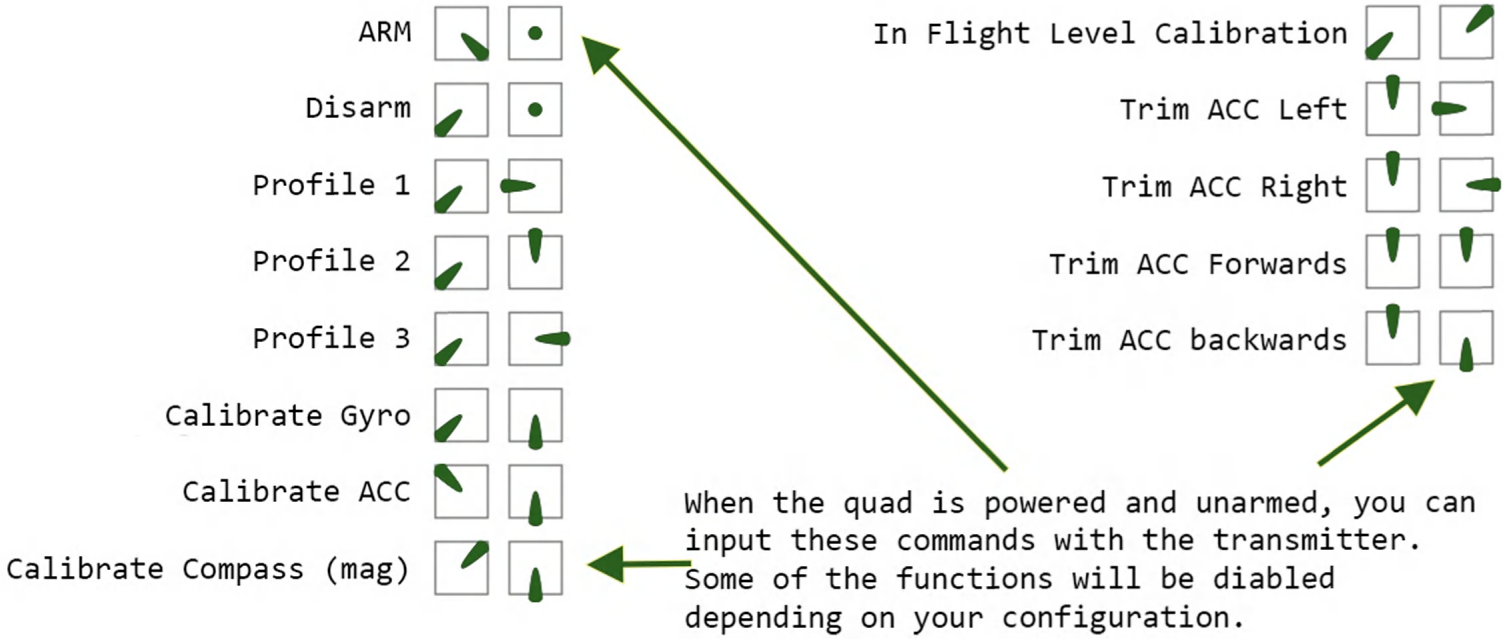
QUADQUESTIONS.COM

Naze32 rev6 manual v1.2

Naze32 Stick Commands

Stick commands can be used to initiate actions without the need of a computer, these actions include things like Calibrate Accelerometer, Change profiles, Calibrate mag and more. In order to use stick commands, the quad must be powered and un-armed.

Mode 2 Stick Functions



The autolevel mode requires a well calibrated Acc. If it is not calibrated, the quad will drift when it is hovering. You should trim the ACC to make up for the drift and leave your transmitter trims center. To trim the quad, hover 2-3 feet off of the ground and then center your sticks (use throttle to maintain altitude) if the quad is drifting right, land, then disarm, then use this stick command.

You will need to hold the stick command and watch the lights on the Naze32. You will have to watch the lights flash several times before there is any noticeable change in the ACC trim. We usually go about 5 flashes, then arm and test again. Repeat as needed.

Do not move the Naze32 when first plugging it in and during the first few seconds of power up. The GYRO must be idle or the initial calibration will be off. You can watch the lights on the board during power up, they will flash when the initial measurements are taken and then they will turn solid when the board is ready to arm.

Quad Questions .com

Naze32 rev6 manual v1.2

CLI COMMANDS:

CLI commands can be found here:
https://github.com/multiwii/baseflight/wiki/CLI-Variables

ESC CALIBRATION

The Rev6 hardware is sharing the 5v power from the USB connection and allowing the ESCs to power up as soon as USB is connected. Please be very careful as this can lead to a motor spinning at full speed when the flight battery is connected if you use the old method of calibration. The following workaround will allow you to calibrate ESCs properly and safely. Please note that the flight battery is never connected during this procedure.

1 disconnect all ESCs from the flight control board
2 props off, flight control board plugged into computer, configurator open, flight battery not connected
3 on the configuration tab, set minimum command to 1050 and save
4 go to motors tab, check motor test mode box at bottom, raise master slider to full
5 plug just one ESC into any of the motor outputs 1-4, wait a few seconds for ESC beeps to finish
6 un-check motor test mode box - values should drop back down to 1050
7 wait a few seconds for beeps to finish, unplug ESC from control board
8 repeat steps 4-7 for the remaining ESCs
9 on the configuration tab, set minimum command back to 1000 and save.

FINAL CAVEATS

This hobby is in its infancy and it is supported and developed by a community of open source contributors and innovators that are designing the hardware that goes along with it. PLEASE PURCHASE OFFICIAL HARDWARE--- There is rampant copying going on right now and the innovation that has made our great hobby what it is will be lost if the pioneers cannot innovate anymore, so boycott copied hardware, and please contribute to these projects to help the technology continue to develop. If you have any questions, please go to Quadquestions.com and post a question. We are happy to answer, and will be quick to respond.

Have fun flying!

Anthony & team
QuadQuestions.com
412-229-QUAD

QUAD QUESTIONS .COM

Naze32 rev6 manual v1.2