20 simple steps to get your flying wing "flying good" with iNAV / aka "Flying wing iNAV setup for dummies":

(based on Pawel Spychalski youtube tutorials)

Introduction

Assuming you have everything built, ready and connected correctly to corresponding ports, you can follow the below steps to have your wing flying amazing! While following this guide, never forget to save/save and reboot whenever you are about to switch out of a tab and go to another, or else your changes WILL NOT be saved!

1.Perform calibration. You can do it before or after installing the flight controller in aircraft (for "fine tuning, lay the craft flat on a table and change the board roll, pitch, yaw under configuration tab). Click save

2. In mixer tab, use a mixer and appropriate platform (ie airplane, flying wing mixer) if you have iNav 2.0 or later. Servo 3 has two inputs, one for stab pitch on for stab roll. Same for servo 4, one for stab pitch on for stab roll. Leave weight as 50 on all and saturated speed at 0, it is enough. In earlier versions, you just select flying wing from configuration tab. Click save

3. Select a preset if you want (i have found z84 preset to be ok for starting out if you dont see your model in the presets) or continue on to a manual process in step 9. Click save

4. Set up in ports tab the receiver, under the corresponding uart you have plugged it into. Click save

5. Go into configuration tab and change receiver mode into what your receiver's protocol is using (ppm, sbus, ibus etc). click save. After it restarts, go into the receiver tab and verify all controls are working correctly!

6. In configuration tab:
- change board and sensor alignment depending on how you have set it up. You want the model to be moving correctly when in setup tab, according to how you move it on the bench.
- under esc/motor features enable the motor and servo output and select corresponding esc protocol (standard etc...) and refresh rate.
- under esc/motor features the servo refresh rate should be left at 50hz (99% of people use standard 50hz servos).
- under esc/motor features enable dont spin motors when armed (you want to be able to glide with no power). Also, select 0 seconds until disarm due to low throttle
- leave min and max throttle as is if you want.
- under system configuration, select gyroscope lpf frequency 256khz its the best possible option for a flying wing. asynchronous mode should be also disabled. Select flight controller loop time at 1khz (doesnt really matter, but 1khz is a good value).
- under current sensor and voltage sensor battery capacity, use if you want or if your board supports it.
- under other features permanently enable airmode. click save to save this step and all above of config tab.
- Dont forget to click save and restart!!!!

7. in servo tab, change servo direction (either -100% for old versions, or just select reverse for iNav 2.0 and later). If you want help, use the "high five method" to see if control surfaces are correct. click save

8. Go to failsafe tab. if not using gps, just leave failsafe at "land". Make sure guard time for activation after signal loss is 0!!! If using gps select rth if you want it to come home. Click save. After restart, come back and check (props off!!!!) if you turn off the radio, the red parachute should turn on at the top to indicate failsafe is activated!!!! If it doesn't you need to read your receiver/radio manual on how to set failsafe, and then go and set it up manually so it will trigger correctly, or if not able to do so, set it to trigger the "failsafe" mode under the modes tab. Very important, dont skip this step, MAKE SURE you get the red parachute when turning off your transmitter or else whatever action you selected for failsafe (ie, RTH) WILL NOT WORK!!!

9. Go into pid tuning tab. You don't need to do this if you have select a preset, but would be a good idea to go over the settings of your preset just to learn some things.
   - Leave all pids as is for the maiden, maybe slightly increase pitch I to 12 and roll I to 9.
   - Roll rate for flying wings up to one meter span should be around 300 and 400.
   - Pitch rate for same wingspan should be around 120-200 (select 120).
   - Select the roll and pitch angle, should be around 40 for roll and 30 for pitch.
   - Gyro LPF cutoff frequency should be around 30-40, that makes it more smooth when it gets hit by winds/gusts and tries to self right itself or fly in automated modes such as poshold and rth.
   - Leave all rest (notch dterm etc and miscellaneous) as is.
   - However, TPA should be around 0 for maiden, you can tune after the maiden.
   - Don't forget to save!

10. In advanced tuning tab, if you don't use gps and automated functions, leave everything AS IS. Click save.

11. Go to modes tab and setup arm, angle and manual mode for the utmost basic setup (if you don't use gps and dont need navigation modes). You can also set up autotrim and autotune (look on youtube for more info how to use these functions properly). Set up launch mode it will help a lot in the maiden, also look on youtube about how to use it properly. Click save.

12. Go to OSD tab and set it up as you like (if you have OSD).

13. If you are using a led strip, you need to enable that function from configuration tab and the save, then go to the led tab and set up your programmable led strip according to your liking. Click save

14. Go into cli tab and type "get iterm" and press enter. Change to 300 by typing "set fw_iterm_throw_limit=300" and press enter, then type "get fw_iterm_throw_limit" and press enter to check and see if it correctly changed to 300. Finally, type "save" and press enter. The new 300 iterm throw limit will help if you have really bad cg and servo throw problems. After performing an auto trim and autotune correctly as suggested above in step 11, come back here and set it back to 165 as stock.

Keep reading below this point if you want to use gps, automated flight modes, etc:

15. for automated modes, if you have a barometer on your flight controller, leave it enabled (blue icon should be lit up on top) and USE IT since gps height information accuracy is not very good.

16. On fixed wing airplanes (and also flying wings) keep the magnetometer OFF!!!!! only use it in multicopters!!! Go into configuration tab and select none for magnetometer, then click save and reboot.

17. For gps, go into the ports tab and enable it on the corresponding uart and also select the correct baudrate. Click save and reboot. Now, go into configuration tab, select enable gps for navigation and telemetry and select the correct protocol for the gps you are using. select ground assistance autodetect or depending on where you live select the appropriate setting. The declination is not needed to be set up since you are not going to be using the magnetometer on the flying wing or any fixed wing inav airplane for that matter. Again, click save and reboot. To see if it is working properly check for the blue icon on top, go into the gps tab and check to see that there are no errors and time outs and that communication is normal by looking at the message count rising.

18. Go into the CLI tab and type "get gali" and press enter to see if it is off or on. If you live in Europe, type "set gps_ublox_use_galileo=ON" press enter, and then type "get gps_ublox_use_galileo" and press enter to see if it saved to "ON". Now type save and press enter. If you are not in Europe ignore this step.

19. Go into the advanced tuning tab:
- leave Position Estimator as is
- ignore Multirotor Navigation Settings
- under Fixed Wing Navigation Settings:
  o cruise throttle min and max throttle depend on your aircraft, you should know how much you need to cruise and not stall, etc.
  o Max bank angle (used in all automated flight modes) is set to 20. That will make for very wide turns. You should increase to 30-40.
  o Dive angle leave as is
  o climb angle leave as is or change only if you know your craft is not underpowered and can climb on a steeper angle.
  o Pitch to throttle ratio is how iNav uses the throttle when in automated modes, lower it if you see the craft is applying too much throttle when climbing, Increase if it doesn't apply enough throttle while climbing, causing a stall. Take into account tailwinds and headwinds for this setting. Usually leaving as is, is ok for most planes that aren't severely underpowered.
  o Loiter radius is preset to 50m radius circles. You can change if you want tighter radius but remember your wing might or might not be able to make a tight radius. Change the bank angle to be able to achieve a tighter radius.
- Under RTH and Landing Settings:
  o Select "at least" for RTH altitude mode
  o Change the RTH Altitude as you like: Default is 10m (1000cm), its recommended to increase it since you are flying a fixed wing. 30-40m is good (3000-4000cm).
  o Climb before RTH should be off for fixed wings, because if you leave it on, it will first climb and only after it reaches your RTH altitude it will turn around to go home! If you leave off as recommended it will turn around right away when RTH is called (we want that) and then start gaining altitude as it flies home.
  o Climb regardless of position sensor should be disabled
  o tail first should be disabled
  o Land after RTH depends on what you want:
    ▪ "always": it will go down slowly in circles with intent to land, every time you switch to RTH. Make sure where you are flying there is enough space to do so.
    ▪ "only on failsafe" will do the above, only when there is a failsafe state. For example, if you go out of range or you transmitter runs out of battery or you have a radio problem.

- Never, will never try to land the craft after it comes home. It will fly in circles above.
- Only on failsafe is recommended and has saved many planes when people had radio problems.
  - If you decide to use "only on failsafe":
    - leave vertical landing speed at 200
    - change min vertical landing speed at altitude to 1500cm or 1000cm (15m or 10m). this is the height at which the plane will cut the motor and try to land softly.
  - leave all other numbers below as is.
- Now you are done with the advanced tuning tab. click save and reboot.

20. Go to modes tab and set up the modes you want. Most important automated flight modes are "nav althold", "nav poshold" and "nav RTH". It is also recommended to use "nav launch" as mentioned before, to assist with launching! After you are done to forget to click save. For more info on all the modes, go to the iNav website https://github.com/iNavFlight/inav/wiki/Flight-modes

Have fun and HAPPY FLYING
best regards,
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