How to Program BL Heli 32 Drone Esc's for F5J Use

Ok, an early heads up. If you do not have good soldering skills/equipment then doing this is probably not for you! Drone ESC's range in size from small to very small. Unlike fixed wing ESC's most drone ESC's come with no wires soldered onto the boards, meaning you have to solder all the wires onto the board with a good degree of accuracy and joint quality. The only ESC I have found to date which has all the wires soldered onto the board, other than the 3 large motor wires, is the DYS Aria 70A. Being a 70Amp ESC it should cover just about every motor/battery combination currently used in F5J. I purchased my DYS Aria 70A (£18) from Flyingtech.co.uk who offered next day delivery with prices that were competitive compared to the usual large Chinese web suppliers (see link below)

https://www.flyingtech.co.uk/electronics/dys-aria-70a-3-6s-blheli-32bit-dshot1200-opto-esc-led

Flyingtech also sell another very high quality 65A ESC (Holybro Tekko32 F3 Metal 65A ESC BLheli_32 Dshot 1200) which is slightly more expensive at around £24 but requires, as most do, for you to solder all the wires onto it.

https://www.flyingtech.co.uk/products?search_api_views_fulltext=tekko32+f3

The trend, apparently, in drone ESC's is for them to be supplied from the factory without any wires soldered on. So going forward it's likely to become more and more difficult to find any drone ESC with wires pre soldered onto the board.

The ESC's that I and the others who helped with the testing found worked well are the DYS Aria 70A and the Tekko 32 F3 mentioned above. For the budget conscious I also tested the HGLRC T-Rex 60AMP 60A BLHeli_32 3-6S ESC Dshot1200 (Around £10 Bangood) which to date has performed very well but is not, visually at least, manufactured to the same build quality as the more expensive drone ESC's.

Another thing to be aware of is that whilst the BL-Heli 32 software supports LVC (Low Voltage Cut-off) that we are all familiar with, this also needs to be natively supported by the ESC itself. Finding out which ones actually support LVC in advance of purchasing is nigh on impossible however. I have come to the conclusion that for F5J use where we do a maximum motor run of 30 seconds that LVC is probably not a major concern particularly if you recharge after each launch as most pilots do or use an independent battery back-up switch. On my test units the DYS did not support LVC but the HGLRC TRex and the Tekko one's did.

HOW TO CONNECT & PROGRAM DRONE ESC's

1 The first thing to do is to look at this video. It covers most of what you will need to know in order to connect and program BL Heli 32 drone ESC's:

https://www.youtube.com/watch?v=eFDN0MGWz10

2 Order the Arduino Nano board (£4-5) which is the interface for connecting the ESC to your PC, Linux, Mac or Android based phone/tablet. When you receive the Arduino Nano Board make up the required 2 wire lead and solder it to the board as detailed in the video. These boards are available from literally hundreds of suppliers on the web. I got mine from here:

https://www.ebay.co.uk/itm/Arduino-Nano-V3-0-Compatible-Board-Atmega328P-16Mhz-Mini-USB-Multipack/332833858510?ssPageName=STRK%3AMEBIDX%3AIT&var=541956407243&_trksid=p2057872.m2749.l264

3 Download and install the BL Heli 32 Software Suite from either of the links below and also the manual as well. Be sure you choose the **BL Heli 32** Software and not the BL Heli software! When you first see the number of fields that can be programmed using the software suite it can be somewhat daunting as there are a lot of fields included that fixed wing pilots are probably not familiar with. Don't be concerned by this. For the inquisitive who want to know more as to what these fields actually do, take the time to read the manual where you will find in depth explanations. BL Heli 32 Software is available for PC, Mac, Linux and there is also an Android based App available from the Google Store which apparently is very good and ideal for making changes in the field.

https://github.com/bitdump/BLHeli/tree/master/BLHeli_32%20ARM

or

https://www.mediafire.com/folder/dx6kfaasyo24l/BLHeliSuite

4 The first time I plugged the Arduino into my Laptop (Windows 10) it found the required driver for the Arduino and installed it automatically. If your PC/Laptop doesn't find a suitable Arduino driver you will need to source one on the web and manually install it.

Once the Arduino driver is installed on your laptop follow the instructions in the video to flash the Arduino with the Multi Rotor Software. I used the 4 way version he shows in the video which works fine for connecting a single ESC. If the connection to the ESC using the BL Heli 32 software fails, try changing the BAUD rate in the field towards the bottom of the window. Make sure it connects/reads OK but DON'T PROGRAM ANYTHING YET !.

5 Now disconnect the ESC from everything and do the following

5.1. Connect the ESC to any motor (No prop!) The motor is only required to hear the beeps.

5.2. Then connect the esc to your rx motor channel, connect rx power and turn on.

5.3. Put Tx motor control to maximum power and then Turn tx on.

5.4. Now connect the motor lipo. You will hear a number of beeps. When first long group of beeps have finished put motor control to minimum power. You will hear another set of long beeps followed by two end beeps. Once you hear the final two beeps disconnect the lipo battery and the power from the rx. This procedure manually calibrates the ESC to the range

of the motor control and I've found it is is absolutely necessary before attempting any programming. See the beep table in the manual for more info on the beep patterns. On Futaba I set my Tx Motor end points to 115/115.

6 You are now ready to start programming the ESC using the BL Heli 32 Software but before doing so be sure that **the device you are using i.e. PC, Mac etc is connected to the internet.** (Note: The ESC must be connected to the motor Lipo in order to program it). My understanding about the need for an Internet connection is that when first programming the ESC the software calls home to ensure that the manufacturer has paid a royalty/licence fee for the right to use the firmware. This only takes a couple of seconds. All the the ESC's I have tested connected and were certified as being legit via a on screen message which then allowed programming to be done.

7 Connect it all up to your PC or whatever you are using to interface with the ESC and make sure the connection check is ok and that when you click the Read button the software populates the existing ESC values into the various window fields. There are several fields within the software that for F5J you don't have to be concerned with. It's pretty obvious which fields you will need to use/change as they will be familiar to you from using fixed wing ESC's. If you are unfamiliar with any fields just leave them at the default they read in with. It took me a bit of time to work out which fields to change and their values to get the ESC to work with all types of motors, ie High and Low Kv, in runner/out runner etc. One key field is the Brake. I recommend that you set this somewhere between 50-70% especially when using larger folding props for various reasons, not least that using 100% brake with large folding propellers can damage the gear box.

The following field values might be a good start point to change in addition to the normal one's seen in fixed wing ESC's:

Ramp Up Power: 90%
Demag Compensation OFF
Low RPM Power Protect: OFF
Brake: 50-70%
Motor Timing: AUTO

After you have changed the required fields to your chosen values just click on the "Write Set-Up" button to save the settings to the ESC. You should receive an on screen message telling you that the ESC was successfully updated.

8. As most drone ESC's have no built in BEC you will of course need to use one to power the servo's Rx etc. The two I have used are the Castle Creations 10A one and the Reisenauer Sunrise Model UBEC 6A one. Both have proven themselves to be reliable.

With any luck you should now have a small/thin/lightweight fully working Drone ESC that is extremely smooth and runs cool. If you don't, you will need to experiment with the various software settings.

Always fully test your drone esc set-up on the ground before flying.

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