9-20-2016-1b Motor Analysis

Tuesday, September 20, 2016
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Motor Analysis 9-20-2016 Phase 1b - Repair

Because of the data collected, discovered, and evaluated, I decided to replace the Left Back Motor. With my data analysis completed, I had to repair this beloved object of my affection, my hobby. Expensive, challenging, and tons of fun. So I had to plan that out too.

Items needed:

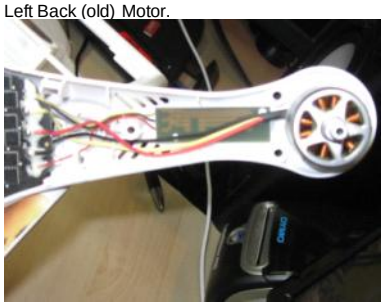
1. Tools to open AC, got it.
2. Soldering iron, solder (have to buy it).
3. Watch YouTube video's on how to open Phantom.
4. Watch YouTube video's on soldering together wire (Learned from Phantom Pilots that it it might be best to cut the motor wires and solder the wires rather than soldering directly to the board. I took that advice and watched video's relating to that process.
5. Take some pictures along the way (if I remember).

Here are some of the pictures below.

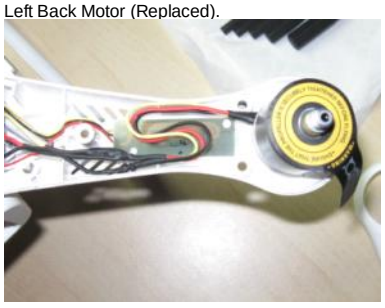
My work Bench.

First time my AC is opened up by me not DJI.

Left Back (old) Motor.



Left Back Motor (Replaced).



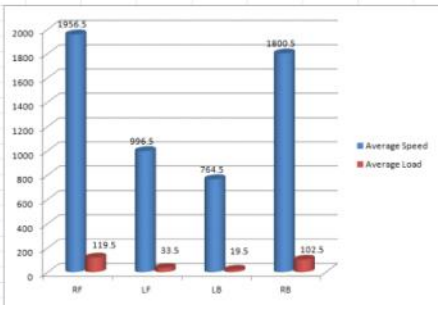
Motor Replacement process complete. Put the AC back together again and tested the motors without the props just to see how I did. SUCCESS! Wahoo! I was so happy. I also tested the noise level of the new motor using the mechanics stethoscope. No noise. It was running as smooth as the other 3 motors previously tested in the same manner. But, I still have to take Whirlybird (that's what I call her) out for an actual flight. That is the real test and to extract the data from the flight as I did prior to the replacement and evaluate the two sets of data. So, here goes.

Below is the Motor Speed and Load graphs after the New Motor is installed after completing the first test flight on 9-20-2016. As my previous analysis went, I find it hard to evaluate this graph. I can see however, that the Left Back Motor (blue color) is much more pronounced than previously. A point of interest… The Right Front Motor (red color) which was previously performing at much lower speeds is barely seen in these graphs.

Now I will try to show the previous data and the newest data after the replacement below to make it easier to compare. These are graphs of the Averaged Speed versus the Heat while hovering graphs, both before and after. As you can see, it appears that all motors are performing along the same speed within 64rpm.

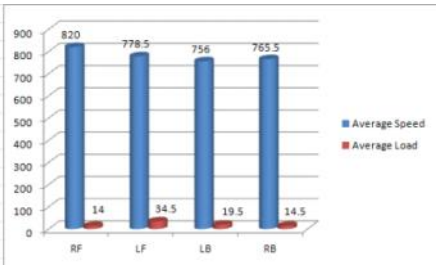
This is the previous **speed data** showing the Left Back Motor underperformance.

Motor	Average Speed	Load
RF	1956.5	119.5
LF	996.5	33.5
LB	764.5	19.5
RB	1800.5	102.5



This is the newest **speed data** after the **Left Back Motor has been replaced.**

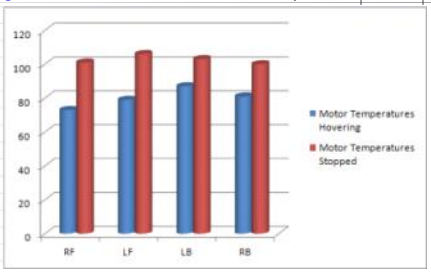
Motor	Average Speed	Load
RF	820	14
LF	778.5	34.5
LB	756	19.5
RB	765.5	14.5



Below are the graphs with the heat or thermal data as measured by the infrared thermometer of each motor measured. On the first graph, ignore the RED data as it does not relate to the motor thermals while under a full load. It seems that because of the obvious change in speed and thermals, that this motor was drastically affecting performance. The evidence of this is not only in the new data, but also in the overall performance of the aircraft.

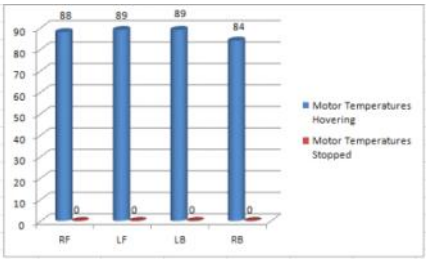
These are **thermal readings** before the Left Back Motor was replaced.

Motor	Hovering	Stopped
RF	73	101
LF	79	106
LB	87	103
RB	81	100



These are the **thermal readings** after the **Left Back Motor has been replaced.**

Motor	Hovering	Stopped
RF	88	0
LF	89	0
LB	89	0
RB	84	0



During this last testing flight after the replacement of the LF Motor, I have notice a big improvement in silence, maneuverability, gain in speed, 0 to 60 ability (takes less time to get to full speed), smoothness of flight, and when coming in for a landing, the descent of the aircraft is no longer jerky.

Being that nothing has changed on my aircraft except the replacement of the Left Back Motor, I have to determine that if I were to experience the decline in performance of any of the above items, that possibly, I should start testing my motors again for speed performance, possibly load, and Motor Heat. I am ecstatic at how nicely my Whirlybird is flying now.

Well, I have to give credit where credit is due. Without naming anyone in particular because I remember only a few names and if I put your name and not the others (ones I can't remember) someone will be slighted. **So, I have to especially thank all of you experts on the Phantom Pilots forum.** The many video's I have reviewed on YouTube pertaining to DJI Phantom repairs, opening of drones, and processes, and the YouTube video's pertaining to soldering of different sorts. Thanks for putting up with my long rants attempting to get to a point of understanding from your really good responses and for hanging in there with me too.

Sincerely… NRJ