

From: "Tandy Walker" <rd435021@icloud.com>

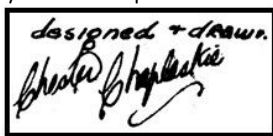
To: "Tandy Walker" <rd435021@icloud.com>

Date: 2/12/2018 3:24:02 PM

Subject: 60 Lancer 850 - Specification Review for the Lancer 850 Project

Report No. 60
New Cyclone Lancer 850
February 12, 2018

I have been working the Lancer 850 wing for 2-1/2 months now. I was thinking it might be of interest to some if I summarize the design specifications of my Lancer 850 project at this point. As you know, I am building New Cyclone's 1939 Lancer 72 configuration scaled up to a 850 sq. in. wing area. I am using the original kit plans for the Lancer 72 by the New Cyclone Company for their kits designed by Chester Chaplaskie.



Alfredo Herbon verified the plan and calculated the flat wing area to be 641.396 sq. in. as shown below using his ACAD program.



I will use the new Hyperion 1600 2S 45C LiPo battery pack, even though additional ballast weight will probably be required to meet the LMR minimum weight rule based on battery capacity. This scaled up Lancer 72 will have the following characteristics:

Wing area will be 850 sq. in.
Scale factor will be $\sqrt{850/641.396} = 1.1512$
Wing span will be $1.1512 \times 72.0 = 82.89$ inches
 $AR = (82.89 \times 82.89)/850 = 8.082$
Minimum weight is $(2 \times 1600)/50 = 64.0$ oz
Wing Loading = $64/(850/144) = 10.84$ oz/sq. ft.
LiPo will be the Hyperion 1600 2S 45C

The characteristics of the LMR power train for the 64 oz Lancer with 850 sq. in. wing area are as follows:

Motor: NEU 1506/1Y/5.2
Gear Box Ratio: 5.2:1
Prop: 15 X 8e APC
ESC: Castle Creation's Phoenix Edge Lite 75 (BEC Disabled)
LiPo Battery: Hyperion LiPo 1600 mAh 2S 45C

Jay Burkart predicted the flight performance for SAM R/C Electric Limited Motor Run (LMR) competition. The five key performance parameters with this power train are shown in Jay's chart below and are summarized here as:

Thrust: 79.8 oz
Max Current: 56.07 amps
Run Time : 1.5 Minutes (90 min)
Thrust/Weight: 1.25
Max Height: 1322 Ft/Min X 1.5 Min = 1,983 Ft Altitude

54R
Member Full Version
Lancer LMR 1506/1Y 5.2 GB
at data without guarantee - Accuracy: +/-10%

proCalc - Propeller Calculator

General: Model Weight: 1814 g, # of Motors: 1, Wing Area: 54.84 dm², Drag: 0.05 Cd, Cross Section: 0 dm², Field Elevation: 244 m ASL, Air Temperature: 25 °C, Pressure (QNH): 1013 hPa.

Battery Cell: Type: Lipo 1500mAh - 4S50C, Configuration: 2 S 1 P, Cell Capacity: 1500 mAh total, max. discharge: 65%, Resistance: 0.0001 Ohm, Voltage: 3.7 V, C-Rate: 45 C cont, Weight: 42 g.

Motor: Manufacturer: NeuMotors, KV: 5500 rpm/V, no-load Current: 3.2 A @ 10 V, Limit: 1500 W, Resistance: 0.003 Ohm, Case Length: 40 mm, # mag. Poles: 4, Weight: 170 g.

Propeller: Type: APC Electric E, Diameter: 143 mm, Pitch: 303.2 mm, # Blades: 2, PConst / TConst: 1.08 / 1.0, Gear Ratio: 5.2 : 1, Flight Speed: 0 km/h, Pitch Speed: 0 mph.

Remarks:

- Battery:** Load: 34.72 C, Current: 56.07 A, Voltage: 6.50 V, Rated Voltage: 7.40 V, Energy: 11.84 Wh, Total Capacity: 1600 mAh, Used Capacity: 1360 mAh, min. Flight Time: 1.5 min, Mixed Flight Time: 2.7 min, Weight: 84 g, 3 oz.
- Motor @ Optimum Efficiency:** Current: 56.07 A, Voltage: 5.93 V, Revolutions: 30610 rpm, electric Power: 332.5 W, mech. Power: 309.1 W, Efficiency: 93.0 %.
- Motor @ Maximum:** Current: 55.56 A, Voltage: 5.94 V, Revolutions: 30690 rpm, electric Power: 330.3 W, mech. Power: 307.0 W, Efficiency: 92.9 %, est. Temperature: 36 °C, 97 °F.
- Propeller:** Static Thrust: 2261 g, 79.8 oz, Revolutions: 5902 rpm, Stall Thrust: 1566 g, 55.2 oz, avail Thrust @ 0 km/h: 2261 g, 79.8 oz, avail Thrust @ 0 mph: 72 km/h, Pitch Speed: 45 mph, Tip Speed: 404 km/h, 251 mph, specific Thrust: 6.85 g/W, 0.24 oz/W.
- Total Drive:** Drive Weight: 405 g, 14.3 oz, Power-Weight: 227 W/kg, 103 W/lb, Thrust-Weight: 1.25 : 1, Current @ max: 55.56 A, P(m) @ max: 411.1 W, P(m) @ max: 307.0 W, Efficiency @ max: 74.7 %, Torque: 0.50 Nm, 0.37 lbf.ft.
- Airplane:** All-up Weight: 1814 g, 64 oz, Wing Load: 33 g/dm², 10.8 oz/ft², Cubic Wing Load: 4.5, est. Stall Speed: 27 km/h, 17 mph, est. Speed (level): 65 km/h, 40 mph, est. Speed (vertical): 14 km/h, 9 mph, est. rate of climb: 6.7 m/s, 13.22 ft/min.

If you remember from Report No. 5, the equipment I ordered and now have on hand is shown in the table below.....Tandy

Lancer 850 List of Placed Orders

(11/27/17)

Source	Item	Description	Cost
Landing Products, Inc.	Prop	15 X 8e APC	13.76
New Creations R/C	Adapter	MJ4706 6mm Collet	8.65
Neutronics Enterprises, Inc.	Motor	NEU 1506/1Y-5500kv-P32-5.2:1 Gear Box	357.00
Hobby King	Mount	65mm & 88mm Standoffs Sets of 4 Each	3.64
Hobby King	Mount Screws	(2) M3.5 Screw Kit	1.97
Esprit Models	ESC	Jeti Advance 70 Pro SB Brushless	95.66
New Creations R/C	Motor Battery	(2) Hyperion 1600 2S 45C 7.4V LiPo	62.68
New Creations R/C	Connectors	(2) EFLA241 Gold Bullet Sets of 3 Each	6.47
Tower Hobbies	Receiver	Futaba R617FS 2.4G FASST 7-Channel	79.99
Tower Hobbies	Servo	(2) Hitec HS-85MG	59.98
Batteries America	Rx Battery	5-AAA Cell 950 mAh 6V eneloop	37.45
Bob Holman	Balsa	Strip and Sheet Wood (Approximate Cost)	50.00
Total			777.25