

I ran Motocalc for you choice of motor. It chose the 14 x 8 prop as the optimum. See section B.

The 16 x 10 will over heat the motor. As you can see a 14 x 8 prop is a much better choice than the 16 x 8 prop with the AXI 4130/16 motor.

A. AXI 4130/16 with 16x10 prop

MotOpinion - AXI 4130/16 with 16x10 prop

300ft above Sea Level, 29.92inHg, 58°F

Motor: Model Motors AXI AC4130/16; 385rpm/V; 1.3A no-load; 0.063 Ohms.

Battery: Kokam 3200SHD (20C); 6 cells; 3200mAh @ 3.7V; 0.008 Ohms/cell.

Speed Control: Generic Brushless ESC; 0.006 Ohms; High rate.

Drive System: Generic 16x10in Prop; 16x10 (Pconst=1.31; Tconst=0.95) direct drive.

Airframe: Great Planes Spectra; 1288sq.in; 173oz RTF; 19.3oz/sq.ft; Cd=0.06; Cl=0.6; Clopt=0.66; C_{lmax}=1.24.

Stats: 81 W/lb in; 59 W/lb out; 20mph stall; 28mph opt @ 52% (32:46, 81°F); 29mph level @ 54% (30:50, 82°F); 1113ft/min @ 27°; -246ft/min @ -5.8°.

Possible Power System Problems:

- The full-throttle steady-state motor temperature (311°F) is extremely high, which will likely damage the motor unless full-throttle is used sparingly and cooling is good (even then, damage is possible).
- Current can be decreased by using fewer cells, a smaller diameter or lower pitched propeller, a higher gear ratio, or some combination of these methods.

Power System Notes:

- The full-throttle motor current at the best lift-to-drag ratio airspeed (43A) falls approximately between the motor's maximum efficiency current (20.3A) and its current at theoretical maximum output (158.4A), thus making effective use of the motor.
- The voltage (19.8V) exceeds 12V. Be sure the speed control is rated for at least the number of cells specified above.

Aerodynamic Notes:

- The static pitch speed (55mph) is within the range of approximately 2.5 to 3 times the model's stall speed (20mph), which is considered ideal for good performance.
- With a wing loading of 19.3oz/sq.ft, a model of this size will have very sedate flying characteristics. It will be suitable for relaxed flying, in calm or very light wind conditions.
- The static thrust (127.9oz) to weight (173oz) ratio is 0.74:1, which will result in very short take-off runs, no difficulty taking off from grass surfaces (assuming sufficiently large wheels), and steep climb-outs.
- At the best lift-to-drag ratio airspeed, the excess-thrust (77.9oz) to weight (173oz) ratio is 0.45:1, which will give steep climbs and excellent acceleration. This model should be able to do consecutive loops, and has sufficient in-flight thrust for almost any aerobatic maneuver.

General Notes:

- This analysis is based on calculations that take motor heating effects into account.
- These calculations are based on mathematical models that may not account for all limitations of the components used. Always consult the power system component manufacturers to ensure that no limits (current, rpm, etc.) are being exceeded.

B. AXI 4130/16 with 14 x 8 prop

MotOpinion - AXI 4130/16 with 14 x 8 prop

300ft above Sea Level, 29.92inHg, 58°F

Motor: Model Motors AXI AC4130/16; 385rpm/V; 1.3A no-load; 0.063 Ohms.

Battery: Kokam 2100SHD (20C); 6 cells; 2100mAh @ 3.7V; 0.0114 Ohms/cell.

Speed Control: Generic Brushless ESC; 0.006 Ohms; High rate.

Drive System: Generic 14x8in Prop; 14x8 (Pconst=1.31; Tconst=0.95) direct drive.

Airframe: Great Planes Spectra; 1288sq.in; 170.2oz RTF; 19oz/sq.ft; Cd=0.06; Cl=0.6; Clopt=0.66; Clmax=1.24.

Stats: 55 W/lb in; 47 W/lb out; 20mph stall; 28mph opt @ 67% (20:15, 84°F); 29mph level @ 69% (19:58, 84°F); 704ft/min @ 16.8°; -244ft/min @ -5.8°.

Power System Notes:

- The full-throttle motor current at the best lift-to-drag ratio airspeed (26.6A) falls approximately between the motor's maximum efficiency current (20.4A) and its current at theoretical maximum output (161.2A), thus making effective use of the motor.
- The voltage (20V) exceeds 12V. Be sure the speed control is rated for at least the number of cells specified above.

Aerodynamic Notes:

- The static pitch speed (52mph) is within the range of approximately 2.5 to 3 times the model's stall speed (20mph), which is considered ideal for good performance.
- With a wing loading of 19oz/sq.ft, a model of this size will have very sedate flying characteristics. It will be suitable for relaxed flying, in calm or very light wind conditions.
- The static thrust (97.3oz) to weight (170.2oz) ratio is 0.57:1, which will result in short take-off runs, and no difficulty taking off from grass surfaces (assuming sufficiently large wheels).
- At the best lift-to-drag ratio airspeed, the excess-thrust (49oz) to weight (170.2oz) ratio is 0.29:1, which will give strong climbs and rapid acceleration. This model will most likely readily loop from level flight, and have sufficient in-flight thrust for many aerobatic maneuvers.

General Notes:

- This analysis is based on calculations that take motor heating effects into account.
- These calculations are based on mathematical models that may not account for all limitations of the components used. Always consult the power system component manufacturers to ensure that no limits (current, rpm, etc.) are being exceeded.