Balsa USA ¼ Scale J3 Piper Cub

Aircraft Link - https://balsausa.com/products/1-4-scale-j-3-piper-cub

Type	¼ Scale Piper J-3 Cub
Wing Span	108 Inches (16" cord)
Wing Area	1610 Square Inches
Airfoil	flat bottom
Wing Loading	18~20 Oz. / Sq. Foot
Fuselage Length	68 Inches.
Flying Weight	12 to 14 Pounds
Engine Size	60 to 1.08 2-stroke / 90 to 1.20 4-stroke / 20cc gas engine
Fuel Tank	12~24 Oz. (compatible with fuel requirements of engine)
Radio Equipment	4-Channel W/ 5 servos min.
Servo Requirements	High torque 60~70 In/Oz. servos for rudder and elevator.
Wheel Size	4-1/2" "Cub" wheels, 1-1/2" tail wheel (Not included in kit)
Cowl / Firewall	5-1/4" wide 7" High

For a plane of this size, you would want to go with a 6-cell LiPo battery with a 5000mah capacity or larger, depending on the desired flight time per charge. Piper Cubs are normally flown around between ½ and 2/3 throttle most of the time, so the current draw during flight is lower than it would be on the same weight pattern plane or warbird, so you do get longer flight times.

The full size Piper Cub used a 72" diameter prop, so a true ¼ scale prop would be 18 inches in diameter. You can use a 16-17 inch prop as well to get a bit more ground clearance if you fly from a grass field, but you typically need a higher Kv motor when you run smaller props to get similar performance.

Looking at the motors we have available, the BadAss 4530-360 does very well on 6 cells with 18-inch props. You could use an 18x8 or 18x10 prop, depending on the thrust and performance you were looking for. If we figure a flying weight in the middle of the range at 13 pounds, 1300 watts of power would give stellar performance for a Cub.

As a side note, with the Continental A-65HP engine that the original Cubs had, they had a power loading of only 40 watts per pound at full gross weight, and when flown solo with ¾ tank of fuel, the power loading was still only 48 watts per pound! Having 100 watts per pound is more than double what the full size Cubs had, and results in very good performance!

Going back to the BA-4530-360 motor with a BadAss 18x8 wood prop, on 6 cells you will get these performance numbers at full throttle.

Volts – 22.2
Amps – 50.9
Watts – 1131
RPM – 6821
Thrust – 195 ounces (12 pounds 3 ounces)
Speed – 52 MPH

At a flying weight of 13 pounds, this would get you a power loading of 87 watts per pound, which is about double the power level of a full size Cub, and almost a 1 to 1 thrust to weight ratio.

If you switch to a BadAss 18x10 prop, you get these performance numbers.

Volts – 22.2
Amps – 68.5
Watts – 1522
RPM – 6593
Thrust – 227 ounces (14 pounds 3 ounces)
Speed – 62 MPH

With this prop, it takes the power loading up to 117 watts per pound, along with a greater than 1 to 1 thrust to weight ratio and a 10 MPH increase in top speed. With that much extra power, from a simple prop change, you could use the Cub as a glider tow plane! Throttled back to 60% power, which is where you will spend most of your time flying this type of aircraft, you will only pull around 25 amps in the air. With a 6S-5000 battery pack, you would be able to get 9-10 minutes of flight time per charge, leaving between 20 and 25% energy in the pack at the end of the flight.

Since this motor is rated for up to 90 amps of current, it is best to run it with a 100-amp ESC. Below are links to all of the items discussed above.

BadAss BA-4530-360 Motor: https://innov8tivedesigns.com/badass-4530-360kv-brushless-motor.html

BadAss Rebel V2 100-amp ESC: https://innov8tivedesigns.com/badass-rebel-v2-series-brushless-esc-100a.html

BadAss 6-cell 5000mah LiPo Battery: https://innov8tivedesigns.com/badass-45c-5000mah-6s-lipo-battery.html

BadAss 18x8 Wood Prop: https://innov8tivedesigns.com/badass-wood-electric-propeller-18x8.html

BadAss 18x10 Wood Prop: https://innov8tivedesigns.com/badass-wood-electric-propeller-18x10.html

That would get you excellent performance for the ¼ scale Cub, with the ability to dial in the power you want with a simple prop change.