

Sport Electric Sailplanes From Woody Kits

By Randy Reynolds

Wait.....sport electrics and sailplanes are two different things, right? I mean sport electrics we fly at the soccer field and they are capable of taking off the ground and doing various stunts and then landing on their wheels. Sailplanes need a winch and a trip out to Irma Lane to fly them. So what do you mean "sport electric sailplanes"?

For sure we mostly see things that way but with the recent Woody Fly-In we learned that there are a lot of simpler gliders not designed for competitive sailplane contests. Moreover they are recent builds so there must be some sort of interest that we should explore. Also it is pretty clear that electric power has taken the model aviation world by storm over the last decade or so. With modern electric outrunner motors and powerful LiPo batteries we can power anything we choose to.

The idea here is that we can fly sailplanes in addition to our sport electrics and a lot of club members do just that. With the advent of practical electric power we can add soaring activity without the need for learning to use the winches. If you're like me, my balance isn't quite good enough to use the club winches anymore and electric power allows me to continue to participate in R/C soaring. The idea here is that we can fly sailplanes in addition to our sport electrics and a lot of club members do just that. With the advent of practical electric power we can add soaring activity without the need for learning to use the winches.

Originally I was a power flyer back in the mid-seventies and thanks to my Sig Kadet I learned to fly R/C. I have also on occasion flown sport electric at the soccer field with my Beaver and Apprentice. These models are fun to fly and I have in mind trying to relearn some simple pattern tasks I used to do back in the day. However I also believe that R/C soaring offers additional interest to the sport electric flyer.

Basically, R/C Soaring is a lot like fishing in that you're hunting for something you can't see and the techniques leading to success are just as subtle and challenging. Moreover when you fly a sailplane you can search horizon to horizon in search of your quarry. Finding a thermal and flying your sailplane up to the limits of your courage and vision is both exciting and satisfying.

Most of us think of flying sailplanes as needing to be in a contest. It is true that the core of sailplane flying is in defined contests however we also happen

to do more sport flying with our sailplanes than we do contest flying, usually every weekend on a Saturday or Sunday. In fact we do three times more sport flying than competitive flying. Those of us who fly contests usually wind up with highly developed, expensive airframes and these can be off putting to those considering sailplanes as a candidate hobby or to those who really don't care to be a contest flyer.. So let's circle back to the lead topic in our paper and find a combination of building Woody sailplanes coupled with electric power in a sport flying non-competitive venue.

Back in the day we used to build our R/C sailplanes from plans, kits or our own designs. In fact we also used to build our own winches and some even built their own radio gear. Most of us flew in competition and LSF was central to much of our on field activities. Building used to be the winter side of the hobby and consumed as much of our thoughts as did developing the skills needed for flying. It was pretty normal to see the expert designer/builder types among us have more success simply because their equipment was better. That's not so much the case these days where thanks to ready made composite sailplanes most of us can have equal gear.

Today often what we are missing is the craft of building which is very satisfying and a pleasant way to pass the time especially during the winter months and even more so during election years :0) This is the significant part of our hobby/sport that goes missing in today's molded contest sailplanes that come essentially ready to fly or with any of the foam ARF's electric gliders.

If you're a competition sailplane flyer you likely aren't interested in Woodies because the task is reproducing accurate airframes that will hold up to a club winch is pretty daunting. It certainly can be done but that isn't within the scope of this paper.

Now if we consider building a practical sport electric sailplane that is easy and fun to fly then a Woody is very suitable for that purpose. Most of the Woody designs from back in the day featured lighter construction that is marginal on powerful winches but is an excellent match for the lesser stresses of electric launched sailplanes.

In summary, a converted electric Woody offers low cost fun sport flying without the need for mastering the winch plus the missing and enjoyable year-round craft of building in wood in our home workshop. I hasten to point out that building and flying electric woody sailplanes is intended to serve to

improve on-field participation for PPSS. An electric sailplane could be flown at the soccer field in addition to Irma Lane.

Where do we find Woody kits? Most of us would first look at existing kits that are of 100" wingspan or less that used to be readily available. These days however we have to do a bit more searching to find suitable Woodies.

Commercial Woody Kits offerings that are still available:

Stevens Aero offers the Helium that is designed from the outset as an electric two-meter wingspan model. Many have been built in PPSS and they are still popular.

Mountain Models has several woody offerings.

SkyBench offers many, many woody kits including the ubiquitous Oly II in several versions. All of these can be converted to electric.

DJ Aerotech has the Chrysalis a very cleverly designed two meter with an electric option.

Isthmus Models offers the very successful Mirage 3 meter design that is so often a winner at the Nats in the Nostalgia category.

European 2M RES woody kits. – This is a new class of ultra lightweight sailplanes intended as a competition class flown from light Hi-Starts. In our case these new kits could be fun to fly in low wind conditions as they are excellent for working low level thermals.

R/C Groups Classified section

New kits from old stock are often available. This requires some knowledge of the various kits offered back in the day and if you are not up to speed on them it is best to consult with the members who won't hesitate to offer advice.

Often these kits will sell for well under \$100 however some are of collector value and will be priced a fair amount higher. Any Airtronics kit such as the Sagitta will sell for more but are still affordable.

Frequently one can find built examples of woodies that could be purchased and then converted to electric.

Scratch Building from Plans

OuterZone is a website that offers free plans in a great many categories. You can download a Zip file on to a flashdrive or CD and then have them blown up to full size plans at a FedEx office retail center.

I'm sure many long time members have stacks of plans that might be borrowed and copied for your use. I understand that there are services available for laser cutting the rib sets.

Converting a Woody kit to electric

There is a lot of electric knowledge resident within PPSS thanks to the Monday and Wednesday flying of sport electrics at the Soccer field. However there is some difference when considering powering a sailplane.

First is the matter of weight. The essence of flying a thermal seeking sailplane is efficiency meaning (usually) low weight. Thus it is necessary to consider the motor system as a launch mechanism rather than as motive power. The purpose isn't to bore holes in the sky but rather to gain enough altitude to seek thermal lift and that is a significant challenge.

Second is the matter of back-up systems in case of power failure due to problem with ESCs or batteries, etc. Usually the sport electric flyer wouldn't consider the value of carrying back-up in case the onboard BEC fails to deliver power for the receiver/servo system. However after spending the time to build a woody sailplane perhaps it deserves consideration.

Often sailplaners flying expensive "moldies" might use an external BEC since the outright failure of a battery occurs much less often than an ESC failure. There exist specially designed battery back up systems that can sense immediately when the receiver isn't being supplied with power and will cut in automatically to take up the load.

Of course one can simply carry a separate flight pack battery for the radio system and eliminate the ESC's BEC. This does involve carrying extra weight.

Starting at the front of the sailplane is the propeller. Sailplanes commonly use folding propellers which require hubs allowing this feature. Carbon blade

sets are available in a huge variety of sizes and expense. At our altitude it is better fly slightly bigger props because of the air density. Folding hubs are available from SUSA, Espirit Hobbies and others. The hubs can also be purchased that feature a skewed or angled pivot such that the blades tend to fold flatter against the fuselage nose. The first step is to measure the necessary spinner diameter that these hubs come with and then also the shaft diameter of the motor you choose.

Then there is the motor where one consideration as mentioned is the shaft diameter. Usually the thicker the motor shaft the better it is able to hold up to ground impacts. My geared inrunner Neu motors have a gearbox with a 6mm (roughly 1/4") diameter whereas non-geared outrunners commonly have smaller prop shafts starting at about 1/8" and up. The other factor is the arrangement of the outrunner power supply wires. If they come out of the front of the motor then one has to arrange for them to be protected from the rotating can. This isn't always an easy thing to do in narrow glider fuselages.

That said there are designed glider motors with the can inside a case and the connectors come out the back. Hobby King makes an inexpensive Glider Drive motor with this feature although they are often larger in diameter. Failing that there are outrunners made for rear mounting where the wires also come out the back of the case. Hacker motors are often lashed up to gear drives such that the cost is somewhat lower than the dedicated inrunner gear drives.

Ok so if I convert a Woody sailplane to electric wouldn't it wind up being too heavy? Probably not. Recall that most winch launched sailplanes require a substantial amount of lead ballast and the battery to be placed in the nose for balance. Simply put the electric gear can replace this dead weight often at little or no weight penalty over the winch launched sailplane. For example my Ava Pro weighted 45 ounces before electric conversion and now it tips the scales at just over 46 ounces. If I were to remove the towhook set-up it still carries I might actually see the Ava weigh pretty much the same.

There are a great many motors available these days and it is beyond the scope of this paper to evaluate them for each individual sailplane. There are programs that can help us to size motors speed controls, etc. and if you're inclined to use such modeling predictors you might start by searching for the candidates. Generally you can do some reading and searching on R/C Groups and find some info or simply talk to club mates who have some experience in electrics.

The basics are that you want to establish some sort of watts produced number which is the total power made by the system. A watt meter is essential for this purpose. Several club members have watt meters and they can help you in this matter. Mine for example is a "Watts Up" meter and will plug in between the speed control (ESC) and the battery. When the motor is running it will tell me about the current draw in amps and the watts produced. From this you can tell if the speed control is happy in what is being asked of it. If you have an ESC rated at 50 amps and the watt meter indicates you are drawing at 40 amps then you are reasonably safe. You do want the current to stay below the ESC amp rating.

If the draw is too high you can either use a bigger ESC, change the prop to a smaller version or use a battery with less cells (usually not the favorite option) If you're wanting to convert a 100" sailplane to electric and it weighs 3 ½ lbs estimated then you will likely want a system that will make about 300 watts as a starting point. Shop for a motor with specs that fit that description and also see if there is a recommended prop size in the table.

Speed Controls or ESC are made by a great number of manufacturers. Hobby King makes the Turnigy series and they are inexpensive. Castle Creations is a Kansas based company and while their product is made overseas, their quality is excellent and they have terrific customer and technical support. They also have a "Castle Link" program which lets you go online and set many parameters in your system. Castle Creations ESC's also feature a data logging feature that helps you to understand what is happening to your system in flight and that is very useful. The CC products cost more but you also get a lot more in my opinion.

LiPo batteries are the obvious heart of the electric sailplane system and it pays to invest in the best. Determining what is the best will get you into plenty of confusing discussions. Again if you go online to R/C Groups you will find a forum dedicated to chargers and batteries where you can learn a lot. I have learned for example that there are very few batteries that can achieve more than 30c . Maker's reputations it seems are often separate from reality. I now use Hobby King NanoTech LiPos as they are excellent performers and quite inexpensive. Revolectric is an excellent name if they make a battery in the size you want.

In your converted Woody you want first reliability first then performance from your electric system. Battery management is critical and a good balance charger will be your best friend and it should last you a good long time. Within the airframe, you will be rewarded by making sure that your wire is

properly sized and your connectors are well soldered. If you don't know how to solder there are club members who will help you and also visit YouTube for a bewildering selection of tutorials.

Getting back to the electric Woody, you do not need to make the front end nicely shaped and streamlined with a well-fitted spinner. But you will be the envy of others if you do so. Particular attention should be made to the firewall such that it will take the inevitable graceless landing that we all make sooner or later. Epoxy and fiberglass along with quality five ply firewalls pay off. As mentioned previously, when you select a motor it pays to find a shaft that is thicker rather than thinner for the same reasons listed above.

In studying the plans you may find that the Woody has been designed to stand up to the towhook pull as well as having a wing and spar that is well over-engineered for an electric. If you're confident in your re-engineering skills you can modify the sailplane to bring the structure into the loads it likely will face as an electric. Of course there are times that we need to stress the sailplane somewhat in spiraling out of tall thermals or if you're like me being wildly out of control due to disorientation. It may be that in converting to electric your Woody might gain say 10% more weight from the original but perhaps you can save that kind of weight through clever wood butchery. Also make sure to place the electrical components where needed to hit the ideal center of gravity leaving the ability to adjust after flight trimming.

In summary, it is my belief that R/C soaring and electric systems go together nicely. Further Woody kits can convert to very nice sport sailplanes at modest cost. In the end we used to term model airplanes as a hobby/sport. These days we may have lost the hobby end as we don't build out of wood as we used to. Creating a Woody is a satisfying activity and we should get back to that. There are plenty of club members who are proficient in both electrics and in building so if you are interested just ask.

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Filename: SportElectricSailplanes.docx
Directory: C:\Users\John\Documents\PPSS\Spoiler 2016\Spoiler
November 2016
Template: C:\Users\John\AppData\Roaming\Microsoft\Templat
e\Normal.dot
Title:
Subject:
Author: JDR
Keywords:
Comments:
Creation Date: 11/10/2015 8:13:00 AM
Change Number: 12
Last Saved On: 11/20/2016 7:37:00 PM
Last Saved By: JDR
Total Editing Time: 467 Minutes
Last Printed On: 11/20/2016 7:44:00 PM
As of Last Complete Printing
Number of Pages: 7
Number of Words: 2,463 (approx.)
Number of Characters: 14,043 (approx.)