All set for its first electric flight, you would never know this warbird started out as an ARF.

Upgrading a BENT-WING WARBIRD

Converting an ARF to an electric scale fighter

BY SEAN McHALE

As an RC scale enthusiast, it has always been a dream of mine to build a nice scale F4U Corsair. After a good dose of reality, I recognized that the amount of work involved to build such a project from scratch was considerable. The combination of that round, planked fuselage, complicated wing shape, six separate flap surfaces etc., is daunting for even the bravest of scale builders. Luckily, with the growing popularity in ARF models, there are a number of suitable Corsairs available to use as a starting point. The base model is the 74-inch-span ESM (Ever Soaring Models) Corsair, but these techniques can be easily applied to other similar ARF models.

Evaluating the project

The ESM model comes as a fiberglass fuselage and wing center section with wood built-up, film-covered and painted outer wing panels, stab, and control surfaces. The model is roughly 1/6.5 scale and has a weight of about 15 pounds ready to fly. It's safer to put a plane of this size in the 19 to 22-pound range if it is powered by a gas or 4-stroke glow-powered engine. After pulling all the parts out of the kit box, I found the total weight of all the parts to be just over 10 pounds, including the Sierra Precision retracts/struts I planned to use because they seemed well suited for electric power. These retracts and struts matched with some Sullivan Skylite aluminum hub wheels are a good combination and require very little trimming to fit into place.

Firewall forward

Having been bitten by the "electric bug" in recent years, it was only natural that I look to electrify the Corsair. Not only is electric power very reliable, but it's also very clean and greatly cuts down on vibration. Also, the ease that e-power allows on the flightline has really made it an enjoyable switch for me. My initial thought was that a Hacker A60-14L on a 10S LiPo pack and a 22x12 prop would be the ideal power train. However, as it turns out, a Hacker A60-16L with a 12S LiPo pack turning a 22x10 prop has proven to be more successful.

Main power access

This model was not originally designed for electric power, so there were no provisions made for accessing and installing large LiPo packs. After installing the motor with a cage-style mount, I opened up the firewall on each side to allow the packs to slide into place from the front. The packs are held in place with Velcro wrapped around a support plate on the inside of the cowl. While it would have been simpler to remove the prop and cowl to access the packs before and after each flight, I didn't want to disturb the prop hub and dummy radial engine that would be a focal point of the nose.

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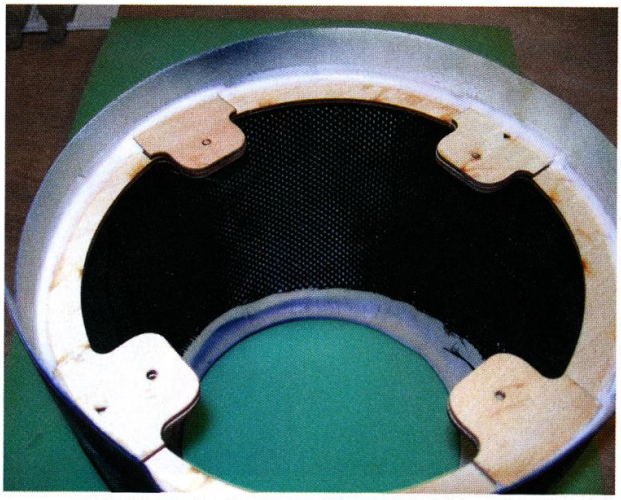
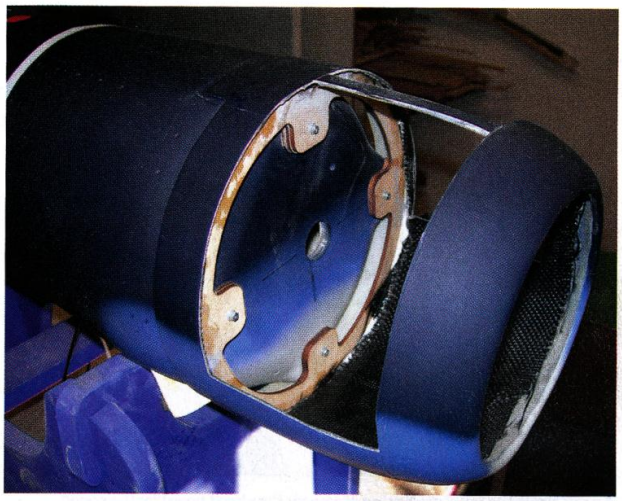
Also, the short nose of the Corsair often means that extra weight is required up front to achieve proper CG balance. This is not an exception with the ESM model as it often requires 3 to 4 pounds of lead in the nose of a glow- or gas-powered version. With the decision to go with electric power, it only made sense to put the main flight pack LiPos as far forward as possible in order to help avoid having to add any additional dead weight.

Using some carbon-fiber cloth, I began by lining the inside of the cowl for added stiffness and strength. After this cured, I cut two very generous-sized access flaps and hinged them on the bottom so that they would fall open, and allowing for easy battery access. The flaps are held closed with a pair of dzus fasteners mounted to a plate at the top of the cowl. With the goal

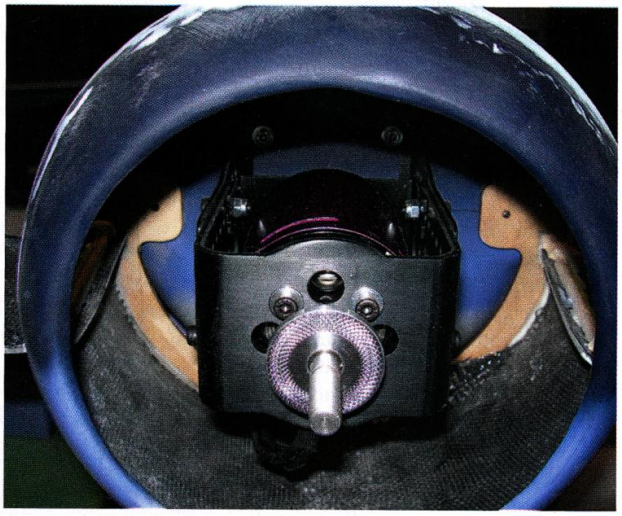


The cowl conversion starts out with the application of carbon-fiber to the inside surfaces.

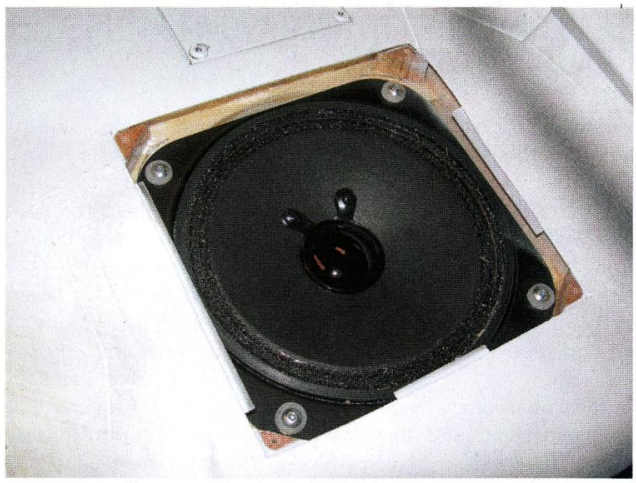


Here the side panels have been cut out of the carbon-fiber material and add a lot of strength to the cowling.

The side panels are then hinged back into place. This gives a quick way to replace the battery pack.

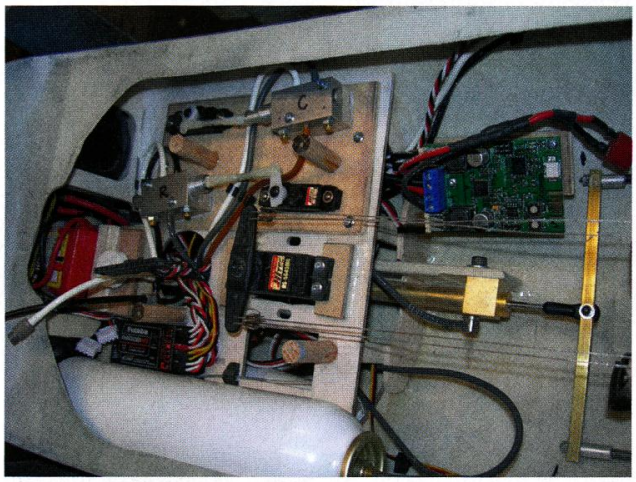


There's plenty of room in the cowling for the electric motor and mount bracket.

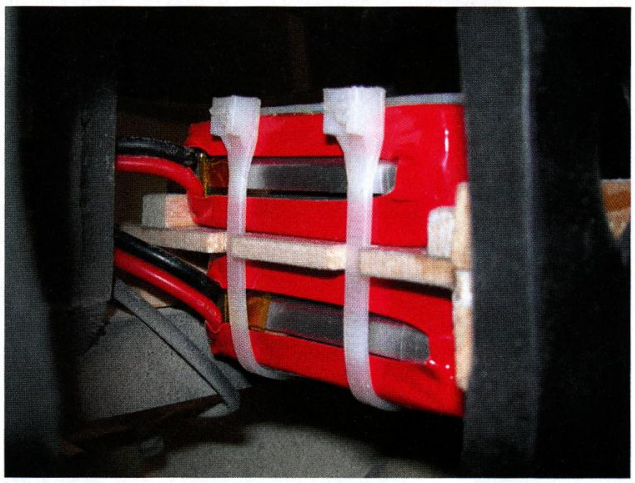


For the radial engine sound, I installed two speakers in the bottom of the wing center section.

Here the scale "dummy" radial engine is being fitted into place.



A peek inside the radio compartment reveals the circuit board for the sound system.



The battery packs for the sound system are shown on their removable tray.

of putting as much weight forward as possible, I mounted the Castle Creations ESC on a tray off the firewall below the motor. The dual 3S 910mAh LiPos that drive the sound system are mounted on a removable tray behind the firewall. The cowl openings provide access to the receiver on/off/charge switch, sound system on/off switch, and the air fill-ports for the sliding canopy and the retracts.

To finish off the front end and for a realistic scale appearance, I used a 1/6-scale Williams Brothers radial engine kit and some scrap plastic tubes for the exhaust stacks. A lot of the engine's back side was cut away for clearance, but once painted and weathered, the finished installation is very convincing. Also, the open area between all the cylinders gives adequate cooling for the motor and batteries. The static radial is mounted inside the cowl.

Real radial sound

I know what you're thinking: How could you really put an electric motor in such a popular piston-snorting beast? I like to consider myself a bit of a scale purist, and this decision would surely fly in the face of my beliefs. Enter Model Sounds Inc. (formerly known as Model Solutions of Canada) to save the day, and my reputation, with a scale sound system. This system consists of the SFX6 Sound Module and a pair of 4-inch 8ohm speakers wired in series. To optimize the performance of the system, a 6S (22.2V) LiPo pack is recommended. However, the system only draws about 75mAh per flight. Seeing as low capacity 6S packs aren't available, I elected to use a pair of 3S (11.1V) 910mAh packs wired in a series to create 6S total power in a compact package. Even with the smaller packs, I can fly for a full day and not have to recharge the on-board sound system packs.

The 4-inch speakers aren't light, weighing about 180g each, so putting them forward of the CG was critical. The engine cowl area is spoken for with the scale radial engine, Hacker motor, and flight pack LiPos. The only logical place for the speakers had to be in the wing. I installed them on ¼-inch plywood plates in the center wing section, forward of the main spar and flap servos. I made up removable wire mesh covering the openings. This has worked very well with the added benefit of the wing center section acting like a speaker box and helping to amplify the sound.

I used the radial engine package, as well as the multiple machine gun sounds that I trigger with a spring-loaded trainer switch on the transmitter. The radial sound includes engine starting, ramp up, full power, and shutdown sounds. It's really very authentic.

Finishing and flying

While researching an accurate paint scheme, I came across a nice color 3-view picture of BuNo 17735 saying it was often flown by Pappy Boyington in Bougainville during 1944. For those with a keen eye, you may notice that some of the star markings on the wing have an adjacent white band, while others don't. I'm not sure the reason for this, but it's exactly as my 3-view documents depict.

My paint of choice was Testors Model Master enamel. The paint only adds color, as all the surface imperfections are corrected and smoothed during the primer stage. The result is that the paint can go on very thin, offering virtually no noticeable weight penalty, and the enamel gives a nice opaque quality with very little effort. The other advantage is that you can get these paints already mixed to the exact FS colors required, which is another time and paint saver.

Weathering was done using greatly thinned-down paint sprayed through an airbrush, as well as dry-brushing techniques to reveal more of the surface detail, and replicating the heavy wear the Corsair faced in the Pacific. A final clear coat wasn't required, as the electric-powered model doesn't need protection against its exhaust.

Here's an "under the hood" shot of the Corsair's power system.

First flights

During the field assembly it was quite clear that the Corsair was ready for its first mission. I found the biggest challenge with the Corsair was to get it to track straight with the application of power. Most tail-draggers want to swing on takeoff, but it took some practice to tame this one. I've never used a gyro before, and the thought has crossed my mind about trying one on the rudder in the future. A few clicks of trim and the model was really grooving around the sky, even presenting a slight "waggle" common with most Corsairs. With the elevated weight, I kept the pace of the first flight quite high and landed at a speed higher than needed. The flaps are effective and in subsequent flights I've slowly dialed in more deflection to them.

The initial runs with the Hacker A60-14L motor, 10S LiPo and APCe 22x12 2-blade prop pulled 85A, 3100W at 5,588rpm. That equated to 135 watts/lb. Further tests using 12S LiPos increased the weight slightly and improved performance to 98A, 4100W at 5,905rpm; just over 175 watts/lb. At the suggestion of the knowledgeable folks at Hacker, the model was finally outfitted with an A60-16L motor running a 22x10 prop controlled with the Castle Creations 160-amp HV ESC. While this drops the power a little, it allows the power train to run a lot cooler and more efficiently.

The first few flights were done with the sound system turned off but the batteries still installed, as they are part of the balance equation on the model. Turning the sound on really brings this warbird to life and has added an enjoyable new dimension to flying the Corsair. On a typical flight I set the transmitter timer for five minutes and use just less than half of the 5000mAh Thunder Power 45C packs. Also, after two flights I put 128mAh back into the 910mAh packs that run the sound system so I can enjoy a full day of flying without the need to recharge those packs.

I have a great deal of respect for those that do dare tackle very complex aircraft in model form. Building a full-blown scale version of the F4U Corsair isn't for everyone; in fact it wasn't for me either. Luckily with today's increasing choices of ARF models, there are plenty of opportunities for owning and flying your own one-of-a-kind, unique warbird. Whatever you may choose as your next project, I hope that some of these ideas will get your creative juices flowing. The only real challenge left will be convincing your flying buddies that your new scale warbird really did start out as an ARF.

With his canopy open, "Pappy Boyington" taxis out for another sortie!