Model Aviation's Sport Aviator
The e-zine for the new model pilot
www.MASportAviator.com

Cox Dust Devil

Author: Joe Cabana
10/18/2007


Introduction

Most of my RC flying is done using smaller, sport type models. I have always wanted to try out a large glider, so when Sport Aviator's Editor, Frank Granelli, offered me a Cox Dust Devil to review, I jumped at the chance. The Dust Devil is a 2-meter glider ARF from Cox Models. Yes, Cox is also the maker of all those CL Ready-To-Fly (RTF) plastic models. But Cox also manufactures a good line of Almost-Ready-to-Fly (ARF) larger RC models. (*ED. Note: See the Sport Aviator Reviews of the Cox EP380, the RTF P-47 Thunderbolt and the Tailwind 40 Basic Trainer*.)

Photo 1

The Dust Devil has a composite fuselage, built up balsa wings complete with a center spoiler and balsa ruddervators. The V-tail, similar to the one on older Bonanza Light Airplanes, performs the functions of elevator and rudder with one third less drag since the vertical fin is omitted.

Kit contents/Packaging

Photo 3

The box contains the manual, composite fuselage, three wing sections, two ruddervators and asserted small parts. The model was packaged well, with individual bags on major parts. Everything was in good shape, with only some small wrinkles in the SIG Aerokote® covering. A little heat from the covering iron smoothed them right out.

Assembly

The manual that came with the Dust Devil is very good. It explains all the assembly steps well and has a lot of pictures to help you along. There are only three gluing steps required unless you are building a one-piece wing like I did. Then, you have to open the glue bottle five times instead of three. The first step in the assembly is to modify a few servo arms to the correct length. Since servo arms sit at two different angles depending on which way they face, you should check which side of the arms you will use before trimming them as shown in the instructions.

Photo 4

The next step is to mount the spoiler servo. The instructions say to use channel 3 for this so you can use the throttle to control the spoiler. This is the standard way to setup a glider. The motor is then put on a switch channel for on/off operation. Since I wanted to be able to control the motor with the normal throttle channel I used the slider on the side of my radio for spoiler control. This also lets me set the spoiler to any position I want. It and the motor are fully proportional so I can adjust my approach angles as necessary.

Photo 5

After the spoiler comes the wing assembly. The wing can be built as one piece, or left as separate sections that you join at the field. Since I have plenty of room in the back of my truck for the 2m wing I decided to just go with one piece. I cut a block of wood to the recommended height for the wing tip and weighted the wing down with some unused ice packs (melted of course). I used the slow cure epoxy as recommended and let the joint harden overnight before gluing on the other wing tip. If you decide to also do a one piece wing, bear in mind that a 2m wing is BIG. I had to be careful moving it around my shop so I didn't inadvertently bang it into things!

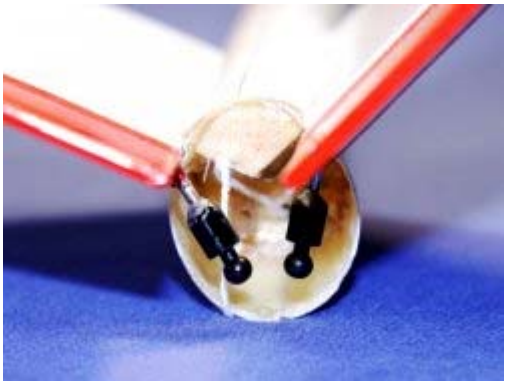

Photo 6

The tail assembly comes next and is straight forward. Once again you have the option of mounting the tail fins permanently, or using tape to hold them on. I went for the permanent mounting. Either way there is one thing you need to watch out for here, the supplied control horns come in a right and left pair. You need to make sure you put the correct one on each ruddervator. When assembled onto the airplane, the ball link on the control horn *should point downwards*. Make sure to check this before you glue them in.

Photo 7

The motor chosen for the Dust Devil was the AXI 2820-10 Outrunner spinning a 10x6 Aeronaut folding propeller. Mounting the motor is a simple procedure, but you should take your time and be sure to carefully follow the instructions. I do have one suggestion here, if you are using a brushless outrunner type motor like I was, the fuselage has a "molded skeg" in the front to allow room for the wires to get under the motor. To make sure the wires line up correctly, screw the motor mount to the front of the motor and put a mark on it where the wires exit the motor. When you glue the mount to the fuselage, make sure the mark is lined up with the "skeg".

Photo 8 Photo 9

When installing the ESC I opted for putting it under the battery tray. The 3 cell battery I used didn't leave any room for the ESC to sit on top of it. Also, I did not have enough room to position the on/off switch where the manual shows. I ended up putting it next to the battery in the front, under the canopy.

Radio Installation

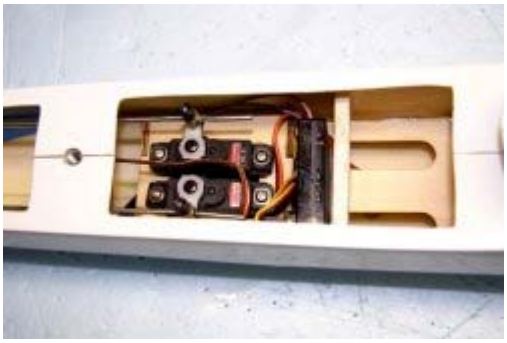

Photo 10

For the receiver I chose a Futaba R607FS 7-Channel 2.4GHz FASST unit. I was anxious to see how it performed in this application as a 2-meter glider can be flown pretty high up. The servos were the recommended HiTEC HS-81s.

One of the first steps in installing the radio gear is to put the EZ Connectors onto the servo arms. If you have trouble with this, try using a wheel collar that just fits over the post to push the clip on (*Ed. Note: Nice tip to remember)*. After that, you mount the servos into the tray already provided. Then connect the control rods.

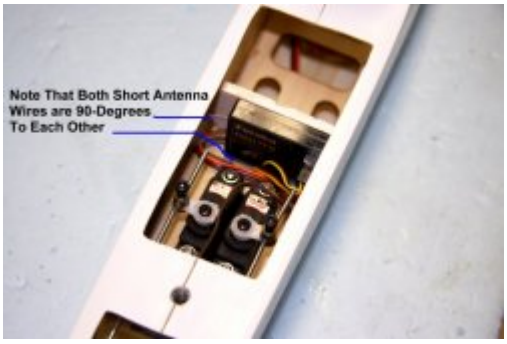

Photo 11

The instructions suggest mounting the receiver behind the servos, but I knew the Lithium Polymer (Li-Po) batteries I was using were going to be a bit light, so I fastened the receiver in just ahead of the servos using hook and loop tape. The receiver doesn't weigh much, but every little bit helps.

After that, I routed the antennas past the servos and then taped one the side of the fuse. The other one I taped to a 1/4 in. piece of balsa that I cut to fit across the fuse. That put the two antennas at the desired 90 deg. angle to each other. One of the nice things about the Futaba receiver is the fact that the first few inches of the antennas are actually a shielded cable. The real antenna is just the little silver bit on the end. This means you can route the antennas close by the servos without worrying about picking up electrical noise. This is in addition to the fact that the 2.4GHz system should be much less sensitive to that kind of problem in the first place.

(*Ed. Note :For those Sport Aviator readers who have not yet seen one of the new 2.4 GHz radio systems, the receiver has two small antennae, about 2.5 inches long, instead of the usual ~30-inch wire found on conventional 72 MHz systems. These small antennae are always mounted inside the fuselage and should have their ends positioned at 90-degrees to each other for best reception. Read the Sport Aviator article, "2.4 GHz for the Common Pilot" for more information.*)

After the radio was mounted I was concerned about the battery hitting it so I added a piece of 5/32 balsa, cut to fit into the fuse, as a stop. Overall the assembly time was just a couple of hours.

Setup/Radio Programming

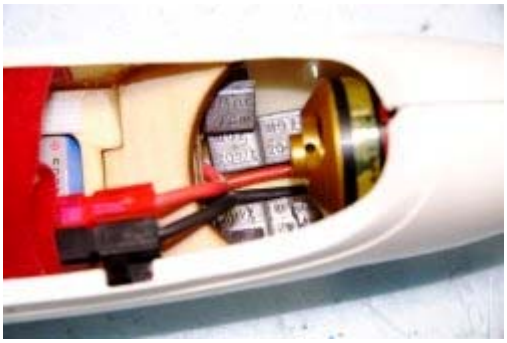

Photo 12

I installed the battery and checked the CG. As I suspected, the CG was *very* much to the rear. The PolyQuest 3-cell, 3700 mAh Li-Po battery I was using weighed quite a bit less than the Nickel Metal Hydride (NiMH) cells called for in the manual. In the end, I had to add 2.5oz to the nose to get the CG where it should be. That brought the flying weight to a total of 45.2oz. This was just under the upper weight of 48oz. specified in the manual.

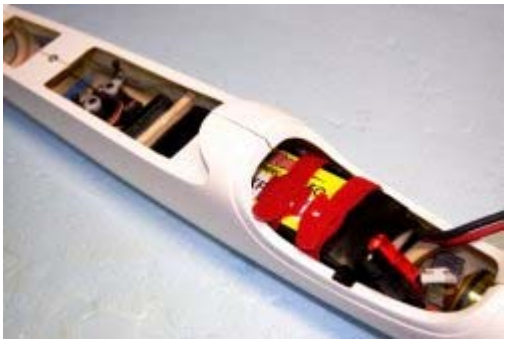

Photo 13

Even though the Dust Devil uses ruddervators, the radio setup is simple. For my Futaba 9C transmitter, the right hand ruddervator goes to channel one and the left hand to channel two (*Ed. Note: For JR that would be channels two and three)*. You then enable the Elevon function. The manual has two diagrams that show you how the surfaces move for right and left turns. This is very helpful, but my manual had a small error in the diagram showing a right turn. The drawing of the transmitter showed the control stick going to the left! But the control surface photos and descriptions were correct.

Flying

Photo 14 Photo 15

The weather for the first flight was perfect; a nice clear day with a bit of a breeze. The static test of the power system showed 34 Amps of current yielding 400 Watts of power. That gives a

power-to-weight ratio of 142 Watts per pound so I was looking forward to a brisk climb rate. I would not be disappointed. After a quick range check, I applied about 3/4 throttle and my friend Tom tossed the Dust Devil into the air. The airplane climbed quickly but needed a bit of “down” elevator to keep the climb angle constant. After I shut down the motor and leveled the airplane, I found that it needed a bit of down and right trim to fly straight and level, hands off.

Photo 16 Photo 17

The Dust Devil flew well without any bad habits. The stall was gentle and would only drop a wing if forced to do so by adding rudder. The climb under full power was great. The airplane got up as high as I wanted to go in about 5-6 seconds. For subsequent flights, I mixed in some “down” elevator with the throttle to keep the climb straight. After climbing to altitude, I had some fun dropping the nose and letting the airplane pick up some speed. The Dust Devil not meant to be a hot flyer. But I did manage to get a couple of low passes with the airplane whistling as it went by! I was also able to do a few simple aerobatics including some nice big loops.

Photo 18 Photo 19

The Dust Devil’s spoiler system worked very well. The airplane drops down nicely with the spoiler deployed. Full spoiler needed almost full up elevator to keep the airplane level. Full spoiler did block the ruddervator somewhat, making the controls a bit mushy. I mixed in “up” elevator with spoiler deployment to lower the pilot’s workload during landings. On subsequent flights, I was able to get the Dust Devil to come down quickly and land gently by adjusting the spoiler during the descent. I am glad I used adjustable spoilers and adjustable motor for easy approach management.

Photo 20 Photo 21

The Cox Dust Devil is a very easy airplane to fly. However, it does have a substantial power-to-weight ratio so steep, full-power climbs do require the pilot's attention until reaching soaring altitude. The Dust Devil does soar and should be able to "ride" a thermal for long periods. Its winning competition track record proves that it can. But there are not many strong thermals on Long Island this time of year (late September) so I have not yet had a chance to ride a few thermals. But I am looking forward to trying it next summer.

Landing the Dust Devil is so easy as to warrant little attention. The airplane flies the final approach at about 10-12 mph (estimate) and touches down more slowly still. The spoilers allow the pilot to fly a slightly "high" approach path and then, once the runway is in reach, to lower the airplane without gaining airspeed. One great thing about flying a powered glider is that the pilot can always "go around" if the approach fails for some reason. Un-powered gliders cannot do this. Each approach is a landing for them, like it or not.

Editor's Glider Training Discussion

Photo 22

Many instructors recommend using a glider for a basic trainer. Gliders have lots of advantages when flown in the trainer roll. Modern gliders like the Dust Devil fly very slowly yet respond quickly to command inputs. Gliders have so much extra wing lift that they do not tend to lose altitude once banked into a turn as do most conventional trainers. This makes level turns easier for the pilot master. Because of the slow approach speed, the new pilot has lots of "brain time" to plan and execute the approach and touchdown. Again, because of the extra wing lift, most gliders do not need excessive elevator input to flair the landing.

Before the improvements in electric power, gliders did have one major disadvantage as trainers. The initial takeoff meant either using hard to operate (for a very new pilot) small engines, a winch or a Hi-Start rubber band to get airborne. Once in the air, the small engine would be run out of fuel and the motor glider was as powerless as was the un-powered version.

Photo 23

However, that problem no longer exists and electric-powered gliders like the Dust Devil have no takeoff problems. The ESC also means that the pilot can control the airplane's motor power all during the flight. Therefore, the powered glider teaches throttle control just like a basic trainer as well as the other piloting disciplines.

About the only difference is that gliders without ailerons usually require the rudder (ruddervator in the Dust Devil's case) be held throughout the turn. If not, the airplane levels its wings and resumes normal, straight flight. This is also true of all 3-channel conventional trainers. The new pilot must then "un-learn" holding the control stick into the turn when switching to aileron-equipped aircraft. This is not a big deal but is something to consider if you decide to use a non-aileron equipped glider as your basic trainer.

Photo 24

The Dust Devil is probably one of the better and easier to build powered gliders on the market. The extra power available is a real help to newer pilots if they get into difficulties during their first solo flights. Its very slow airspeed is also a true advantage when learning to fly RC. The Dust Devil would make a very good basic trainer, especially if gliding and soaring are a major interest for the new pilot. Now, back to Mr. Cabana.

Conclusions

The Dust Devil has me hooked on powered gliders. Its gentle flight characteristics make for relaxing flying and the great climb rate is a lot of fun. The manual is very well written and easy to follow. I would recommend it to both beginners and experienced flyers alike.

As an added benefit, the Dust Devil has won several trophies, in the powered glider classes, at both the 2005 and 2006 National Soaring Championships. In addition to being a good sport and training airplane, the Dust Devil can also put you in the winner's circle if you want to compete. That is not bad for a sport/trainer airplane.

For more information on the Dust Devil, including a video, go to: website

Specifications

Manufacturer: Cox Hobby Dist.

Cost: $135.00
Radio: Futaba 9C transmitter
Servos: 3 HiTEC HS 81
Engine: AXI 2820-10 Outrunner

Length: 45.5 inches.
Wingspan: 76 in.
Wing Area: Unknown.
Wing Loading: Unknown
Weight: 2.83 lb.

ESC: Jeti Advance 40+ (40A)
Airfoil: Flat Bottom
Battery: PolyQuest 25C, 3700 mAh, 11.1V Li-Po (PQ-3700XP)

Special Airframe Features: Spoiler Equipped, Folding Propeller, Quick Assembly, and Ruddervators.

Notable Positives
Very stable handling
Extremely fast assembly
Excellent Climb Rate
Effective spoiler control
Good basic trainer performance
Competitive soaring abilities based on competition track record

Notable Negatives
Not much except for minor control photo error in construction manual

Electric Power Specifications

Prop: Aeronaut 10x6 Folding **Max RPM:** 11,200
Max Watts: 400 W **Power Loading:** 142 W/lb.
Max Voltage: 11.5V **Motor Current:** 34.4 A
Motor Run Time: ~ 8-10 min. based on throttle usage