

Twin-Engine Classic

The „Twin-Otter” by Hangar-9

Actually, a „Twin-Otter” wasn’t at the top of my list anymore. I had had lots of fun with the 1.5-meter model by Planet-Hobby/Lindinger (see AUFWIND 6/2009). But now at the toy fair in Nürnberg, I sat at the booth of Horizon Hobby and chatted with head-honcho Jörg Schamuhn about the new Spektrum radio. And there was this white and blue beauty hanging from the ceiling: a „Twin Otter” of the American manufacturer Hangar-9, spanning a little over two meters and sporting fantastic detail for an ARF model. Then, in the evening in my hotel room, I watched a documentary about a christian airline making supply flights in the jungle of South America – with just such a „Twin Otter.” The documentary showed outstanding footage, and I was hooked: this is a fascinating twin-engine plane. The next day, I went back to Horizon Hobby and placed my order. I simply had to have this plane!

In late April, a huge box blocked the hallway in my house. I immediately started unpacking and drooling: the big fuselage with fin attached was well-built with wood, very light-weight, had all kinds of fiberglass detail, the windows were glued in, and covering was cleanly applied. Particularly nice were the three openings with bolt-on covers and the long fiberglass nose with bayonet latches. An absolute highlight, however, was the two-panel door: mounted with hinges, easy to open, and with a spring-loaded door handle. Granted, the door has no functional value, but it’s a great gimmick and conversation piece. The wing halves with hinged ailerons and flaps also were well-built from wood and emerged expertly covered from the box. The servo covers – like the covers on the fuselage – came taped in place, but pre-drilled to be bolted on later. Stabilizer halves and rudder matched the prefabrication and build-quality of the other parts. Oh, and all these parts came individually sealed inside plastic bags. After the big pieces were unpacked, I was left with a number of smaller bags: struts, engine pods, cowls, spinners, bolts, motor mounts, and other small parts. There were parts of motor installation, and even fuel tanks in case one wanted to use IC engines. A nice touch were the additional cowls, vacuum-formed from clear plastic, to be used as templates for making the cut-outs in the fine fiberglass cowls. The landing gear came completely assembled with wheels, the nose wheel is sprung and looks very scale. The English instructions are 48 pages long and very complete. There is no

German translation, but is hardly needed, given the many photos and drawings.

Time to go shopping now: we need eight servos to work everything. I chose Dymond „D-300MG” for ailerons, flaps, nose wheel, and rudder, and one each Dymond „D-200” for the elevator halves. Regular standard servos would work and fit also, because the plane is prepared for 20-mm servos. But smaller means lighter – and that never can hurt. I used a „AR-7000” receiver by Spektrum, and the receiver pack is a 2,100 mAh LiFo pack by Orion/Avionics coupled with a 5-Amp BEC to get the proper voltage. I added a MPS switch by Emcotec which I installed in one of the fake cabin windows. I coupled the two elevator servos with a „DPSI V-Match” V-harness by Emcotec to get by with the 7-channel receiver. Oh, and the manufacturer has planned ahead and even prepared the wing servo mounts such that ailerons and flaps could be operated with V-harnesses.

I followed the power recommendations of the manufacturer, which were confirmed by actual flight experiences discussed in the US RC-Groups forum: two „Power 25” motors by E-Flite with one 60-Amp controller each, two 3s LiPo packs, and two 12x8 APC-E propellers. Hangar-9 recommends 3,200 mAh batteries, but I went with Orion/Avionics 4,000 ones. They fit perfectly into the engine pods, and they increase flying time a little.

Final assembly is limited to hanging the rudder and installing the landing gear and the engine pods. The pre-cut gear fairings fit perfectly onto the fuselage right out of the box. Per instructions, I glued them and the engine pods directly onto the foil covering with canopy glue. That looked good, but didn’t hold: the glue didn’t stick to the foil as indicated by light-colored splotches. So I removed the glue and also the foil at the glue joints as much as possible. I then glued on the parts with 5-minute epoxy, so now they’ll hold, period.

When first mounting the wings with their struts, everything fit perfectly, but the wing struts were just about impossible to get bolted on. The openings in the landing gear fairings simply were too small to give the struts enough room to be lined up and bolted on. So I enlarged the openings bit to give the struts 3 mm of room all around. This allowed easy assembly, and it

prevents cracks in the pretty gear fairings. All assembled, this model caused real excitement in the basement shop: everything fit, and the plane looked really sharp already! And it was a bit intimidating how big 2.08 meters can look inside my shop.

Installing servos, wiring everything, and making linkages was just routine, which still does take its own good time. All accessories included with the model were quite suitable for their purpose. Making the hidden linkages for the flaps was a bunch of fiddling which took as much time as making all the other linkages combined. Soldering up the wiring harness for the wing servos and wiring up the drive trains also needs to be done thoroughly and slowly. The wings are hooked up with 6-pin Multiplex plugs, which I glued into the fuselage. The servo wiring for the rudder and the nose wheel and for the two controllers was joined to a single servo plug near the receiver. Of course V-harnesses could be used here also, but I like to minimize wires and plugs in my models. For easy access, the Hangar-9 designers included a large tray in the roof between the wings onto which everything is mounted. I installed two magnets there, so that I don't always have to screw and unscrew the tray.

To help mount the motors, Hangar-9 has included a drill template which allows fitting the motors under the cowls perfectly. 17-millimeter long spacers and matching bolts were included, so mounting the motors took all of 30 minutes. When attaching the cowls, however, I noticed the motors sat too far back by about 5 millimeters; the prop adaptors could not be secured properly to the shafts. I assume that Hangar-9 is using longer prop adaptors, but I would have had to travel a ways to get those. Instead, I chose to replace the 17-mm spacers with 22-mm ones made from M3 threaded stock. And wouldn't you know it, everything now fit perfectly.

The controllers were strapped with cable ties to the insides of the engine pods in the upright position. This left enough room for the battery packs alongside. I wired up these two flight packs such that they're in parallel. This makes it impossible for one motor to shut down earlier than the other, or for the motors to run at different RPM. Just how good this idea was, became evident during maiden flight, during which the model almost was lost.

It took about 20 hours to get the model ready to fly. But thanks to the perfect preparation of the manufacturer, these were happy hours. The trip to the balance stand revealed that only 125 grams of lead shot needed to be glued into the fiberglass nose with thinned 5-minute epoxy; the center of gravity was set at 68 millimeters. The model now weighed 5,315 grams, well within the manufacturer's listed range of 5.2 to 6 kilograms.

Maiden flight came on a quiet Saturday afternoon with little wind and pleasant temperatures. Fully assembled, the „Twin Otter“ stood pretty in the sun light. What a wonderful plane! Check control throws and do a full-throttle test. The motors both turned exactly 7,520 RPM at 28 Amps. I taxied the model to the threshold and slowly added power: The „Twin Otter“ accelerated smoothly and lifted off cleanly. I had to hold in some up-elevator to climb, but a few clicks of up corrected this slight nose heaviness. I reduced power to half-throttle in the down-wind leg, and the model flew steadily and more slowly than expected around the pattern. It was a sight to behold, and I loved the performance immediately. It was as if I had flown the model many times before. First tests deploying the flaps revealed no nasty pitching moments. 85 degrees of flaps and 10-millimeter down-elevator compensation resulted in a steep descent, from which the plane recovered safely with a healthy dose of up-elevator. OK, let's apply full throttle and return to safety altitude. What the heck? The model yawed suddenly, and when I started to turn, it stalled fiercely and entered a spin. Instinctively, I throttled back, and the model allowed itself to be recovered. A fly-by at half throttle revealed nothing unusual. But shortly thereafter, the problem reoccurred, and again I narrowly avoided a crash. OK, cut power and land dead-stick... now! When taxiing back, I noticed the left motor wasn't running at all and the right one intermittently, all accompanied by madly beeping controllers. After cycling the batteries off and on again, nothing was working anymore, and the right controller signaled its complete departure with smoke signals.

So what possibly could have happened? We were speculating. Too much current? Impossible. Parallel wiring of the controllers with long wires in between them? Hmm, quite possibly. Subsequent conversation with a German controller manufacturer confirmed our suspicion: the parallel wiring of the batteries causes interference between the controllers which first affects the switching circuits and then fries the rest. There are controllers which can handle this, but not many, said the manufacturer. OK, time to chalk that up to experience and remove the parallel wiring of the batteries; install two new controllers with completely independent battery circuits; and count your blessings that the model survived the builder's mistake.

Extensive test runs on the ground showed flawless operation with the new controllers. In fact, the motors now ran at just over 8,000 RPM with only about 10 RPM difference between them. With renewed enthusiasm, I headed to the second maiden flight: I taxied the „Twin Otter“ to the threshold and stopped. Our club photographer Alexander Fromm stood at the ready to start filling his storage card. Set flaps to 10 degrees and slowly push the throttle stick forward.

The model accelerated smoothly and lifted off gently after 20 meters. Like before, the „Twin Otter“ climbed steadily. In the down-wing leg, I reduced the throttle to less than half and flew around at this setting for a while. The next eight minutes were just to admire this wonderfully looking model during low and high and slow and fast passes. No further trim corrections were needed. I flew some simulated approaches and noticed how effective the flaps were. At full-flaps, I needed 30 percent power just to maintain forward flight. So, I was able to grease on the landing, and I felt very relieved. By now, the plane has many more flights on it. Some were during gusty and sub-optimal conditions. No matter, I always enjoy flying the „Twin

Otter,” be it for its great looks, the nice twin sound, or the docile flight behavior. I just love to dive the model with full flaps, flare, and touch down at a snail’s pace. But also horsing around at full throttle in big, sky-eating curves and passes brings smiles to the face of an airplane nut.

This „Twin Otter“ is a bulls eye in Hangar-9’s line up, and we should see it fly at many flying fields. Nice that I happened to flip through the channels on that particular evening at the hotel near the toy fair.

Philipp Gardemin

Photos: Philipp Gardemin, Alexander Fromm

Data:

„Twin Otter“ by Hangar-9 - An electric-powered scale model by Horizon Hobby

Wing span:	2,080 mm	Control throws:	
Length:	1,651 mm	Elevator:	+/-12 mm
Weight:	5,315 g	Rudder:	l/r 45 mm
Wing area:	47.61 qdm	Ailerons:	+8/-12 mm
Wing loading:	111.7 g/qdm	Flaps:	10 degrees (take-off) 80 Grad (landing)
		Center of Gravity:	70 mm

Price: 459,99 €; available at dealers, www.horizonhobby.de.

Photo Captions:

Page 32:

- With its 2.08 meter wing span, the plane has the perfect size.
- The „Twin Otter“ is a popular plane, be it full-size or a model.

Page 33:

- A highlight is the functional cabin door. Note the spring-loaded latch inside the left door.

Page 34:

- Each engine pod has enough room for motor, controller, and battery. The removable covers are interchangeable.
- I used seven Dymond servos by Staufenbiel: „D-300“ for ailerons, flaps, rudder, and nose wheel, and „D-200“ for the elevators.
- The steerable nose wheel makes taxiing a breeze. The flaps are fully deployed for testing.
- Approach with the southwest slopes of the Black Forest in the background. Hard to tell if this is a model or a full-size plane. It’s easy to grease a landing with this plane. If there’s a head wind, flaps may remain at 0 or 10 degrees.

Page 35:

- The robust, sprung nose gear comes fully assembled.
- The RC switch by Emcotec was mounted to a fake window.
- The model will lift off grass after a 25-meter take-off roll. Adding 10 degrees of flaps shortens this distance. It plane looks best in flight. Appearance and performance are perfect.