

ESPRIT MODEL'S Angelis 400 ARF

by David Baron daveb@flyrcmag.com

It all began while touring the vendor area at the Neat Fair... I was especially looking for extra-extra light sport models for schoolyard flying. First of all, it had to look like a plane. More importantly, I really wanted a classic low-wing sport model, definitely not a profile. Secondly, I wanted to explore a theory I had about flying models whose behavior in the air are more obviously affected by drag than gravity—that is, about models with very lightly loaded wings. I wanted this plane to fly like a feather on steroids! To achieve this, my quest was to get a model into the air that would have a wing loading of less than five ounces per square foot. I knew that such a plane would be able to ROG well, even from grass, and be able to maneuver so aggressively as to seem to defy gravity, but all the while, be flying on it's wings.



A custom-configured, lightweight aerobat for any park or schoolyard

PHOTOS BY WALTER SIDAS

AIRBORNE

The point of this ship was to take outrageous advantage of the super-light wing loading (under 5 oz./sq. ft.). The lighter the aircraft the better it can roll across the grass even with relatively small wheels, and the better it can takeoff from grass. Whatever the surface, the Angelis leaps into the air after about a four or five-foot rollout, and easily takes off from a picnic table.

It has a wide airspeed range. Given its light weight, it never displays any inertia problems—you can pullout of a dive in a flash and “yank and bank” to change your heading in an instant. Drag, not weight, is the enemy when you are quickly recovering from a stall or a 3D maneuver where the ship is behind the power curve. Like the ant falling off the picnic table, the Angelis does not have enough energy and mass to easily hurt itself. Yet when you do start to fly faster it does have a nice personality in the air. It gets to its top speed very quickly and then drag sets the limits.

With this particular power setup the Angelis can Harrier (fly very slowly at a very high angle of attack, hanging on the prop) but not hover. Of course, if you want to trick the spectators, in a light breeze a Harrier maneuver flying into the wind can result in negligible ground speed and so be made to look like a hover...

The Angelis does have unlimited vertical but you need a little more than that to hover easily. It does not groove really well through high speed aerobatics and shows some tendency to yaw and slightly wander given its light-weight, somewhat draggy configuration. On the other hand you can do an outside loop only a few feet off the ground and you are unlikely to have a collision with terra firma

because the aircraft just goes where you want it to. It rolls well but does not have the side area to knife edge really well. I'd call it a sweet all-around middle-of-the-road aerobatic ship.



SPECS

PLANE: Angelis 400

MANUFACTURER: Soft Model
DISTRIBUTOR: Esprit Model

TYPE: Sport (Schoolyard size)

FOR: Electric flight buffs

FLYING Weight: 12.8oz. (With Kokam/FMA 1020ma, 3S)

LENGTH: 31.5 in.

WINGSPAN: 40 in.

WING AREA: 400 sq. in.

WING LOADING: 4.8oz./sq. ft. (With

RADIO: number of channels required: 4, flown with: JR 8103 transmitter, Hitec Electron 6 receiver, (4) FMA PS20 micro servos

POWER SYSTEM: Astro 010 geared 2:1, 9x6 APC slow flight prop, 10-amp Astro speed control, 3S, 1020ma FMA Li-poly cells.

FULL THROTTLE POWER: 6 amps, 66 watts; 5.1 Watts/oz. 81.6 Watts/lb

TOP RPM: 6000

DURATION: 10 minutes of full throttle or 20 minutes of lively cruise

MINIMAL FLYING AREA: ball field or large indoor facility

PRICE: \$119.00

COMPONENTS NEEDED TO COMPLETE: Motor, radio system, speed control, battery; I used Velcro tape for mounting batteries, speed control and receiver, and I built in hard points to mount the servos. Mounting systems for non-supplied components are the builder's preference

Summary

The Angelis as configured here is a well-rounded park flyer configured for spritely low and medium-speed aerobatics; it's a great platform for expanding your aerobatic skills.

ZB of Esprit Model showed me the Angelis and demonstrated that the empty weight was just over six ounces covered! This model has nice proportions and reminds me of a miniature Trainermaster, the old Lou Andrews design and later, a Great Planes kit. With 2.8 square feet of wing area, I new this plane could deliver the wing loading that I was trying to achieve. I am really happy with the results of my quest. The Angelis incorporates a really attractive design and quality and attention to detail that I have come to rely upon from the models that Esprit Models imports.

The second half of my task was now to



equip the plane with servos, receiver, power system and motor in less than eight ounces. Here is how it ended up.

Four micro servos @ .2 ounces each: .8 oz.
Receiver: .6 oz.
Battery: 2.6 oz.
Motor, gearbox, prop and controller: 3.8 oz.
Total added weight: = 7.8 oz.

I selected each component carefully, and I'll explain my thinking.

Servos—There are a lot of great mini servos out there, but FMA's little PS20 makes the most sense to me because of its incredible ratio of low weight to available torque. Keep in mind that this model is for sporting around and general backyard barnstorming, so the 13 ounces of torque that this servo delivers makes it a top choice. This servo is also very attractively priced, and is available from many sources for about \$20. It has been my experience that hardware such as pushrods, clevises and control horns can end up weighing as much as a servo, so I began to calculate the location of the different control surfaces and came to the conclusion that I might be able to squeeze a performance edge out of my system installa-



Geared Astro 010 detail.

tion. I am a true believer in separate aileron servos for each aileron, even though this would mean an extra servo. I like the simplicity of the installation and the ability to mix flap coupling to the elevator.

Receiver—I have grown tired of micro receivers that I can't use safely when flying with lots of other transmitters in the area. I have settled down on two great receivers that have yet to give me any conflicts. The first is the FMA M-5, and the second is the Hitec Electron 6. The M-5 has the edge in weight, but I elected to use the Hitec given its 6-channel capability. Since I had elected to have two separate aileron servos, I needed the 6th channel.

Speed Control and Motor—There are a lot of neat, small and efficient motors available,



A Kokam 3S 1020mAh Li-Poly pack and Hitec Electron receiver fit comfortably in the Angelis.

and after much consideration, I settled upon AstroFlight's "improved" 010 Geared motor. The "new" part is the gearbox; AstroFlight has pared it down to a substantially lower weight than previous versions and that lets us modelers better enjoy the tremendous efficiency that this motor produces. The AstroFlight 010 system comes stock with a 10-amp controller that is light and probably one of the most efficient available in this size. I was happy to add this great controller to the project.

Propeller—Never take your prop for granted. I have seen planes that are dogs, turn into awesome performers by a simple prop change. I played with a few props to achieve the desired affect with this plane, and had two reasons to do so. First, and most important—I could not load the motor to the point that I exceeded the "C" limit on the batteries. I used my AstroFlight Whatt Meter to establish the largest prop that I could swing without exceeding six amps. Secondly, I knew that I needed velocity as well as thrust, so I was looking for a prop that had a little bit of pitch to it. I explored my selection of props that were over seven inches in diameter, and over six inches of pitch. The final winner was the APC 9-6 slow flight prop. It tipped the

scale at 6.1 amps, but clearly delivered more thrust than my other choices.

Batteries—I chose Li-Poly batteries because of the project's weight requirements. After choosing the Astro 010 system, I established that the FMA / Kokam 1020 cell would be the smallest and lightest pack in my inventory that would fly the plane for the 10-minute duration that was my goal. The 1020mAh Kokam is limited to 6C discharge (hence the 6-amp current limitation).

Flaperons—I really like a lot of deflection and dedicating a servo to each aileron gives me the power that I need to achieve nearly the same deflection in flight as I get on the ground. I also like to be able to mix flaperons. I find this to be indispensable for hot dogging with planes large and small. I can reduce the loop diameter of the Angelis from 8 feet to around 5 feet by using a flaperon to elevator mix (the control surfaces swing in opposite directions). I use this mix "full time," and do not program it in onto a switch. The reason is that the first time you do a loop close to the deck and don't have flap-coupling engaged, you are setting yourself up for an embarrassing crash. Trust me, I've done it! Besides, the plane does everything better with flap cou-

pling. It takes off better because of the additional lift generated as the flaperons descend, and it lands sweeter and slower for the same reason, and the flare feels much longer and smoother.

CONCLUSION

If you'd like a good-looking, low-wing aerobat that is so maneuverable and light you can easily do "carrier style" touch and goes on a picnic table, consider outfitting an Angelis with a low-weight power and control system as discussed here. It's a great configuration for sharpening your flight skills. It's also too much fun!

Links

APC Propellers, distributed by Landing Products, www.apcprop.com, (530) 661-0399.

Astro Flight Inc., www.astroflight.com, (310) 821-6242.

Esprit Models, sales@espritmodel.com, (321) 729-4287.

Hitec RCD USA, Inc. www.hitecrcd.com, (858) 748-6948.

Kokam Li-Poly cells are distributed by FMA Direct, www.fmadirect.com, (800) 343-2934.

For more information, please see our source guide on pg. 161.