PRECISION AEROBATICS

EXTRA 330L

by Jason Pickering

A History Lesson

Walter Extra designed aerobatic light aircraft from the outset for unlimited aerobatic competition flying. The original wooden wing Extra 230 was designed by Walter to meet the requirements of competition pilots within the Swiss Aero Club. First flight occurred during 1983. Unusually for an aircraft of its type, the Extra 230 features a wooden wing with Dacron covering, while as on other aerobatic competition aircraft the 230's wing has 0∞ incidence for sustained inverted flight. Production of the 230 ceased in 1990 when Extra was experiencing difficulties in sourcing the correct type of wood. Design work on the larger, two seat Extra 300 began in early 1987, culminating in the first flight of a prototype on May 6 1988 and certification in May 1990. Production began in October 1988.

Small numbers of Extra 260s were also built in the early 1990s. These aircraft were essentially downsized Extra 300s with seating for a pilot only and powered by a 195kW (260hp) IO540 flat six. The Extra 260 was not certified and the six that were built were able to fly only under special permits.

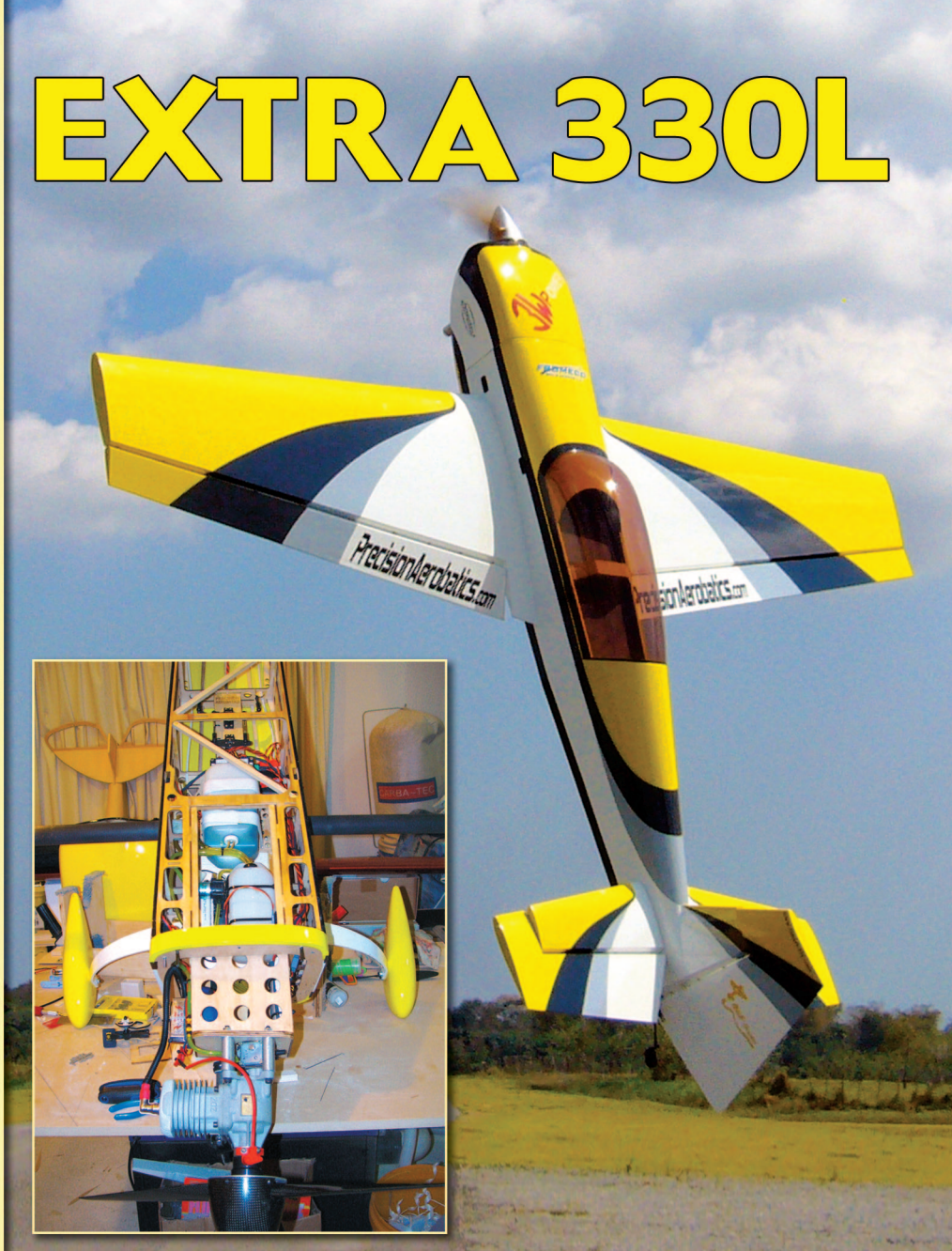
The single seat Extra 300S first flew on March 4 1992 and was certificated that same month. The 300S differs from the 300 in having a single seat, shorter wingspan and more powerful ailerons, while retaining the same power plant and basic fuselage. The 300L has a low mounted wing. The strengthened 330L has a 245kW (330hp) AEIO-580 and larger control surfaces, and first flew in January 1998.

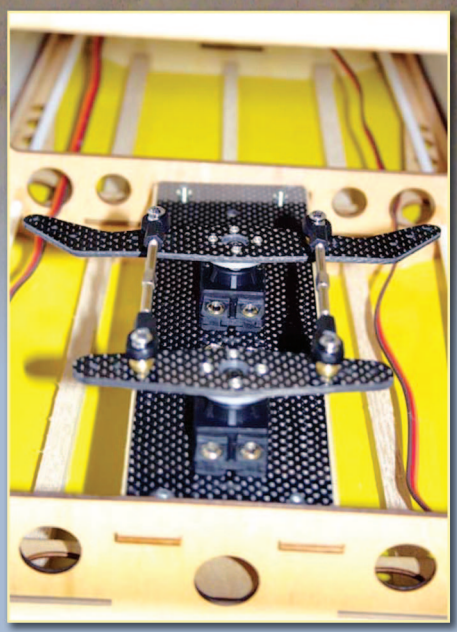
Throughout its evolution, and various forms, the Extra has featured in world championships around the globe and has earned its place as one of the most capable aerobatic aircraft on the planet.

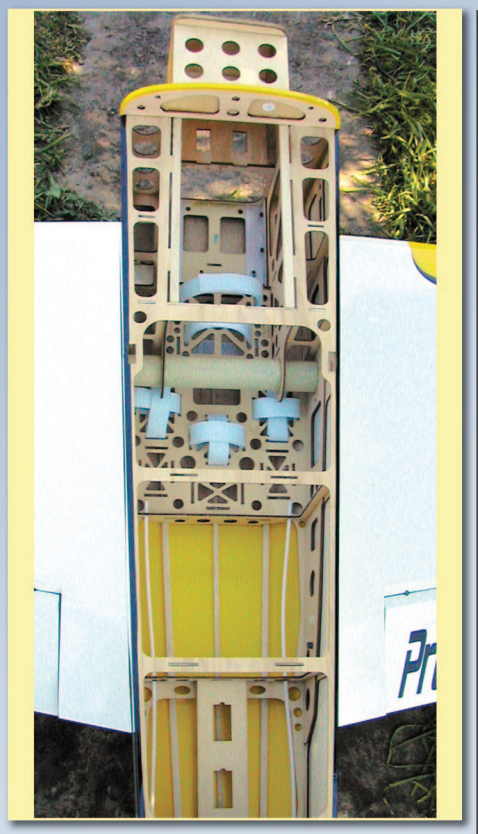
Precision Aerobatics Extra 330L

I guess any aircraft that has so many variations and the capability of unlimited aerobatics as well as the inherent stability of this aircrafts design features, is going to be a popular plane to model, particularly for those IMAC, 3D and freestyle junkies. It is to date available in many models of all sizes, and all construction types.

I first laid eyes on the Precision Aerobatics 35% Extra 330L some time ago whilst visiting PA on another matter. I have to admit, my knees went weak and I believe my voice may have squeaked like an adolescent. It was just like the first time I laid eyes on my wife…..love at first sight. If the shear size of it isn't enough to impress you, the lines, flair, colours and overall quality command a presence that is hard to ignore. Despite these aspects of this model though, the thing that impressed me the most was the construction. When the hatch is opened, what greets the eye is nothing short of a work of art. The intricate interlocking and tight fitting of parts, the well thought out gear trays and general







layout all point to a well researched and planned model. This should not be surprising as the plans for this particular aircraft have stretched over some 4years and has been a labour of love for the company over that time.

I will talk more in depth about the flying a little later, but lets just say from the outset that this is a serious competition model. Designed to excel particularly in freestyle, it has raised even some very hard to impress eyebrows. Bill Hempel, a well known competitor from the States has had one, and loved it so much, he offered to provide PA with a video. Sadly only one video was captured before it died prematurely due to radio failure and that was an early setup flight, before he started to "wring it out". Young Kyle, "The Alien" also from the states has electrified his one, and his video can also be downloaded of the Precision Aerobatics Web site. It should be noted that Kyle's' video is actually the maiden flight, taken at the end of a competition weekend and his CG was out…(don't know which way, just "out"). Viewing this particular footage will indeed make you love the plane (and hate the pilot…….and any other young punk who can fly a plane like that….) And to top it off two of them will be entering this years up and coming Tucson Shootout, one of the worlds most prestigious annual aerobatic events held in the States. My point? This is a serious aircraft with serious potential, not your average "large ARF" that's been up-sized to take a 100cc engine.

The Set Up

There are several things to consider when setting up a large scale plane with multiple servos that are ganged to provide lots of torque for the big control surfaces. Firstly, there's the power supply. Running 8 high torque, power hungry digital servos along with a ninth servo for throttle and a tenth signal to a smoker etc, all needs good reliable power and plenty of it. I chose to use 2 x 7.4v 2200mAh Lipoly batteries run through a power regulator in tandem. Of course this amount of current cannot be trafficked through your receiver so some sort of power distributor is going to be required. The much acclaimed Emcotech Mini RV5 was chosen as it accepts power from the two batteries and sends it directly to the servo along with the signal from the receiver. The Mini RV5 has many more features of course but that's a review all of its own. All I'll say for now is this unit is designed with safety in mind and has backup over backup. Now down to servos. Hitec was on the menu, so 4 X 5645MG working in pairs were used on the ailerons, and 4 X 5945MG used on the rudder and elevators. The latter are very fast at 0.13 sec/60 deg and stall at 13kg. I would consider using these all round on the next one as I believe they are worth the extra money. A mighty mini was used for the throttle.

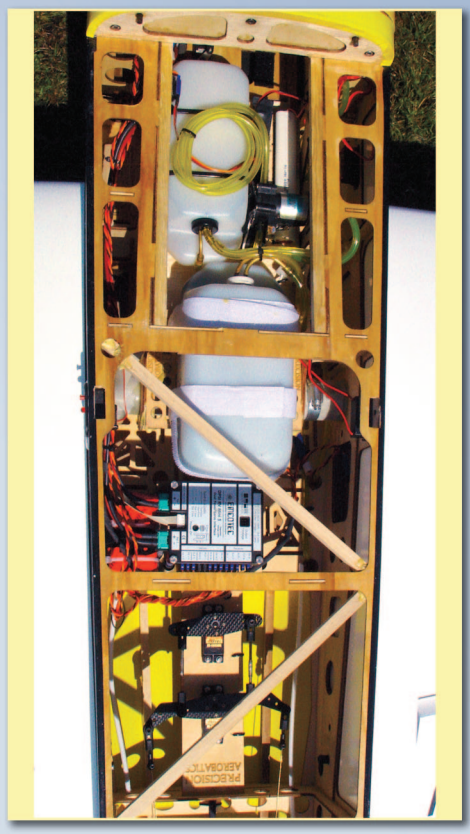
The kit comes without hardware which is common on a plane such as this, as many modelers have their own preferred ways of setting something up. PA have however, put together a hardware package that not only has very high quality components, but is offered to Extra customers for only $168. This is incredible value as the items would add up to over $300 if bought separately elsewhere. The ball links are German made, as is the pull pull rudder cable pack. All nuts, bolts, pushrods, servo horns, control horns, etc are all included. They have also made available a package containing all the extension leads required and another to include all plumbing. The extension leads are heavy duty with spiral wound wires to reduce noise emission, and the plugs are high contact to reduce voltage drop. I now use these leads on all my aircraft. A very attractive offer is made for those that wish to purchase the 3W or DA options as well.

At the business end of my Extra, a ZDZ 80cc engine was chosen exhausting through a JMB canister. Bolted to the spinning end of the ZDZ is a Mejlik 26 X 10 prop finished with a beautiful carbon fiber spinner. A Simplex smoke system completes the set up. For weights sake, the optional Carbon Fiber wing and stab tubes were purchased along with some very nice purpose made PA wing bags.

The Build

I will state from the outset that this was my most enjoyable build to date, but more about that later. The instruction manual is one of the best I've seen with very clear photos and good methodology. It goes without saying that a model of this size is more than an evening's work to put together. This is indeed a project to be taken seriously with thought and patience put into every step, however some have reported building it in no more than four days! Due to the size and nature of the model, I'm not going to go on too much about how each step is followed as this review needn't be an instruction manual of its own, rather I'll describe the process as a whole.

Essentially the build itself is not much more complicated than the everyday 60-90 size ARF in that all the intricate hard work is done for you. However as with any large scale plane, there are some additional things to be taken into consideration, such as the vibration of a 9-10HP motor that's going up front, the copious amount of force required to deflect those large control surfaces, and the high G forces you are no doubt going to inflict on the model. For instance, a snap roll can pull around 17G (subjective of course), so that custom made battery rack you want to install (not that you need to in

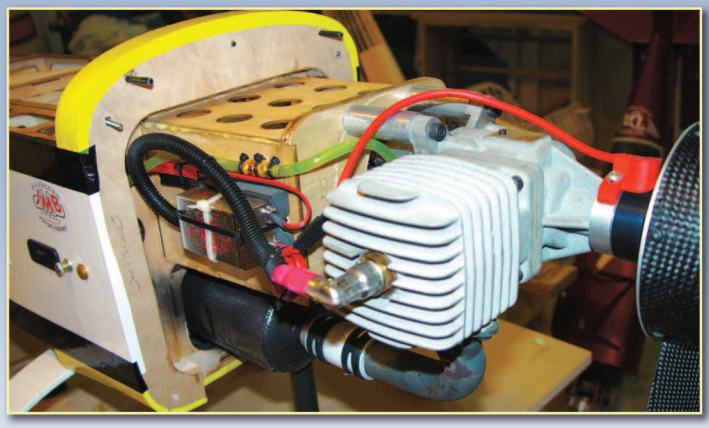


this model), needs to be able to take not 200grams, but 3.4kg plus. Those push rods and linkages all need the same consideration.

The other notable difference with a build such as this is that everything is designed to last forever, therefore each step of the build needs to be approached from that angle. For example, I know of many large planes like this that out live the servos, whereas on your smaller models, it is almost always the other way around. This means that each item must be installed in a very permanent fashion; extension leads should be cable tied, heat shrunk, and even loomed where necessary; all nuts should be thread locked etc. Do not be afraid to also go over the entire airframe to check glue joints and other crucial aspects. Remember, even the highest quality plane becomes 100% your responsibility once it's airborne. Therefore take care with each step.

There are several unique aspects to this particular kit, one being the double carbon fiber glued in control horns. These have been carefully designed to maintain good geometry, with the pivot point directly in line with the hinge point. They fit into slots and epoxy into place, becoming an integrated part of the control surface. With a ball link fitted between the two parallel horns, an extremely rigid and strong connection is achieved. The elevator servos are mounted inside the stabilizer and are accessed through the root rib. This again allows for good geometry eliminating the need for the push rod having to run through two opposing arcs. The control surfaces are hinged with point hinges and come pre drilled and trial fitted. All that is required is to remove and epoxy each one in the usual fashion.

With my particular set up, using the ZDZ 80cc I made the choice to alter things a little, adding 27mm to the fire wall (thereby moving the engine forward by the same amount) and moving the rudder servo tray forward one bay.



This was to achieve the correct CG with the lighter power option, especially with a canister that has its own center of gravity which sits further back than a Pitts style. This particular aspect is often counteracted by the extra weight of the canister and header, but still something to consider when setting up a model of this nature. Bear in mind that set up with the DA 100 or similar, these changes are not necessary, but don't be afraid to personalize a model like this if you feel the need or have reason to.

The kit comes 'canister ready' which is an important option for many these days with more and more emphasis on noise and the restriction there of. However, because this model is designed to take a large range of power and muffler options, there is most likely some additional work that will be required if inboard canisters are used. It really depends on what you decide to fit in there and how you want to set it up as to the work you may need to do. A look on the build and support forum on RCU will give many examples of the different ways of accomplishing this, so there really is no guess work. Being of wooden construction, any work you choose to do is delightfully simple and the easy access from the top also helps. On mine, I moved the fuel tank tray up for the canister, (I believe subsequent production runs will have this as standard) and back over the wing tube to allow room for smoke tray and then boxed in the compartment below.

The Emcotech Mini RV5 was installed on the more than adequate gear tray, using four silicone tube stalks to absorb vibration. Another accepted method to do this is to build a separate tray and string it off four rubber bands that span the model. High current power leads run from the two LiPo batteries up front to the power unit and charge leads are piggy backed off those leads. I used standard 2.5mm power plugs from Dick Smith Electronics as they fitted directly into spare fuel dot holes in the fuse. The unique digital remote on/off switch supplied with the Emcotech fits into the standard cutouts on the fuselage.

Servo installation is fairly straight forward, but again, be sure that connections are secured and clipped, and leads are zip tied to the airframe. To get those impressive 3D rates out of the control surfaces, I used the PA carbon fiber servo horns that are included in the hardware pack. There are other options out there, but beware of a couple of things. Most importantly, when using footed ball links, the enormous offset side loading can cause a twist flex in the arm. I have encountered this before on several types of long arms and while it doesn't necessarily lead to the demise of your model, it does affect performance and is in every way undesirable. Carbon fiber on the other hand is far more ridged and is able to resist higher twist forces. The other thing I like is the fact that you can tap out the hole and screw in the center bolt and then lock nut it in tight. The ball joints that come with the optional hardware pack are made in Germany and are of the highest quality. Again, these are very critical items and no shortcuts can be afforded.

As I said at the outset, this is by far the most enjoyable build I have had to date. All the hard work is done for you, which sets this aside from most on the market. The slots are there for the control horns, the holes are there for hinge points, switches, fuel dots, and vents. The placement of all these are well thought out and the geometry for each is spot on. Working out your own geometry can take hours, so it's an important feature to have that done for you. While this Extra could be built in just a few days with good use of time (and without my particular mods) I was happy to take my time and savor the experience. The high quality of all the components promotes a high standard of set up, so enjoy it.

Programming

Six of the nine servos are ganged into pairs so it is very important to synchronize them. With the Hitec digitals, a programmer can be purchased to take care of that. Others utilize matchboxes or the like to achieve this, but whatever is used, they need to be synchronized to stop them fighting each other. Huge amounts of current can be drained not to mention the strain on the servos if this is not done properly. The next step is to set the end points or deflection of each control surface using my 3D pro throw meter. On mine I set the elevators to 40 degrees up and down for high rates, ailerons were 35 and rudder was 45. All dual rates were set to 30% for low rates and 60% for mid rates. I always set the expo so that the central 1/3 of the stick has similar throws in all three settings to allow smooth flying in all flight modes. This is a personal choice that works for me, but of course everyone's different.

SPECIFICATIONS

Scale	35%
Wingspan	106"
Wing Area	2128 sq.in
Weight	25lb-29lb
Engine Size	80cc-120cc
	(ZDZ 80cc used in the review)
Servos	4 x Hitec 5945MG
	4 x Hitec 5645MG
	1 x Hitec 225BB
Power Supply	2 x PA LiPo 7.4V 2200mh
	1 x Emcotech Mini RV5 Power Expander
Exhaust	JMB Canister with custom smoke inlet
Smoke System	Simplex Smoke Pump

The Flying

For me, the test flight date came on the 8/09/06. Arrangements were made for a friend of mine to meet me at the field, for safety's sake, and to be my "wheel chocks" for the run up. As usual with a model of this nature, I set it up at the field and conducted a thorough pre test flight check. I don't mind spending a couple of hours on this if need be before the maiden flight as there are several things that should be carefully checked. It may sound silly, but it can be the simple things that catch you out. I have seen models go down on maiden flights from things like engines coming loose because the bolts were not tightened properly, extension leads coming out of servos, batteries coming loose, wheel axles coming loose and even servo control horns screws being left out. The latter happened remarkably easily. The builder had push fitted the horns on 'temporarily' until the servos were powered up to check that they were central, he just forgot to come back to it! While perhaps most of us who have been on the hobby for many years have lost a model due to some sort of neglect at the building stage, for the sheer safety risk alone, as well as the investment, one really does have to be sure on a model like this. The last thing I re-checked was the CG…….bang on center of wing tube (this will no doubt be pushed back later).

Once I was comfortable with everything, the engine was test run again, batteries were topped up, and she was taxied out to the flightline. The ZDZ running through the JMB canister sounded great on the taxi way, a mixture between a deep but quiet rumble and a throaty growl. I have to admit, on the maiden flight of any giant scale, I always need to take a couple of deep breaths before opening the throttle. She was opened up, and after a takeoff roll of about 3metres, she was well and truly airborne and tracking straight ahead with only a couple of clicks to the right. What a plane! I had heard others speak of how nice this thing was to fly, but it has to be experienced to be believed. She flies so light, it's incredible. The ZDZ 80 had bags of power and plenty of authority in the vertical, and seemed to handle the stop/starts in the up lines with out any trouble. This was the first flight, so not to tempt fate, I kept it to fairly sedate routine. Landing was effortless, but I was caught out by the distance it floats once in ground effect, and I used more ground than I anticipated. Landing roll was about Ω that of takeoff, and ground speed was extremely slow.

I gave it a quick check over to make sure nothing was about to fall off, wings and stab included, then three more short flights followed. As the light was failing, and the nasty cross wind was picking up, we all thought it best to wrap it up and leave the "training wheels" on till next weekend.

The next weekend . . . . .Windy
The weekend after that . .Rainy
The one after that . . . . . .Windy & rainy

I'm sure most of you can relate to the agony of sitting by the window and looking out at flight inhibiting weather, but three weeks??! Come on! While I was house bound though, quietly rethinking my recent decision to move from Australia to New Zealand, where the grass is always green…('cause it doesn't stop raining) ….I made a few small alterations. I moved the CG back some 15mm, stripped out a little bit of weight that didn't justify itself, and reinforced the fire wall with small bits if aluminum angle. The latter was done purely on account of the amount taken out of the ply firewall to fit that big ZDZ carby through, and would be unnecessary on other installations. Lastly I went over the covering again with an iron to get rid of a few wrinkles. It is covered with high quality Oracover, but even that sometimes needs a bit of work till it's acclimatized.

Finally some good weather came our way...(pheeeew)… and eager as a beaver I was out there, Extra under my arm….well three trips with both arms really. Anyhow, time to wring this baby out. Despite the fact that everything had been checked, rechecked and triple checked, over the past 3 weeks, a quick pre flight was conducted before taxiing out (the full size boys do it and so should we). This time there was no holding back…and boy did she perform! Walls were a heart stopper, harriers were super easy, hovering, it does it all with ease. As this plane is built primarily around freestyle parameters, it performs 3D like a natural. OK, it wasn't quite the same as "The Alien", Kyle Woyshnis video, but that's partly the pilot I'm sure. The ZDZ 80cc with the Mejlik puts out 50lb of thrust and the plane weighs 25lb. This gives a thrust to weight of a healthy 2:1, but I know others that want more. In any case, pulling out of a hover was a snatch, holding a knife edge was beautiful, including high alpha, and waterfalls were a piece of cake. Rudder coupling is non existent, (but that does depend on the CG placement) and rolls are nice and axial. A little bit of rudder may be mixed in to throttle later but certainly not a big problem, and again this is affected by individual set ups, such as prop size and pitch.

All in all, this thing is a winner and I don't believe anyone fortunate enough to acquire one would regret it. A comment often made about this plane is that "it's a 35% that flies like a 42%" which is testimony itself of its attributes. It is the lightest aircraft with the biggest wing area in its class and I would be quite happy to let go of all the other planes in the hanger and settle for this baby, it does it all. If you are in the market for a big, seriously aerobatic aircraft, I would have no reservations recommending this one to anyone.