

## Precision Aerobatics

# ULTIMATE



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**I have dabbled a lot with  
bipes before and from  
what I have observed and  
learnt thus far it is extremely  
difficult and rare to attain a full  
3D/Freestyle/IMAC performance on a  
biplane, until I flew this model, that is!**

All the bipes that I had owned had serious stability issues associated with slow inverted harriers and elevators that caused them to be prone to unpredictable snaps and uncontrollable spins. This phenomenon even extends to the pure 3D version. Having said that, bipes do have many attractive advantages over the monos and to actually find one that has good traits in all aspects of 3D/Freestyle/IMAC flying could very well be worth its weight in gold. With the excellent past track record of PA, I was excited to add the AMR to my fleet and see if they deliver what they promise.

### First Impressions

#### - Double or Nothing

My Ultimate AMR arrived intact neatly packed. I carefully removed the top wing from the box and visually checked things out. All carbon fibre (CF) wing mounting tabs were already pre-glued in place. I placed the wings onto a flat glass surface to check for warps and twist and there were absolutely none and were amazingly spot on. The aileron hinging is done in the factory and is similar to the ones used on top dollar composite giant scale models. I was astonished at the amount of precision that went into the manufacturing of these top quality wings.

Removing the one piece canopy revealed the internal structure of the fuselage. It speaks volumes about the extent PA's designers have gone to, to achieve the unbelievable low wing loading figures without at all sacrificing structural integrity or rigidity. This as I observed, is achieved with the well thought out use of carbon fibre reinforcements and the elimination of any non-structural material considered unessential, that if retained, would otherwise be unnecessary deadweight that degrades performance.

The second box also revealed to what extent PA went to with the carbon fibre bits, and PA's text on their website about the extensive use of carbon fibre was really an understatement for this model. This model, as I discovered later, had the most extensive use of carbon fibre, far beyond what is available on its predecessors. For starters, the centre cabane, wing mount, control horns, aileron ganging horns, control rods, wing leading edge, elevator joiner, main landing gear, fuselage stringer reinforcement, fuselage cabane base, motor box front plate, battery tray, landing gear bay, fuselage cross beams are just some of the carbon fibre or FiberFusion® components I could identify at a cursory glance.

The tail feathers revealed the massive but lightweight air foiled shaped vertical stabilizer

and rudder and a massive flat horizontal stabilizer, already pre-hinged and sealed at the factory. Interestingly enough, the flat horizontal stabilizer as I later found out after researching on the full scale Ultimate, is a standard design feature found on its full size counterpart. A closer look at the elevator tape hinges revealed the rational behind its implementation in-lieu of familiar traditional CA hinges. The reason became apparent when I found embedded carbon fibre running the entire length of both the elevator's leading and horizontal stabilizer's trailing edges. This design means that the AMR will pull a perfect vertical hard "wall" without inducing an unwanted roll to one side. The motor mount appeared substantially beefed up on the AMR, hinting at the anticipated performance the Thrust 40 motor is capable of delivering.

The AMR's airframe structural design is radically different from other contemporary mainstream models out there. The design primarily focuses on achieving the lightest possible wing loading without compromising the overall structural integrity of the model. The design of the AMR clearly shows the amount of thought, time and effort PA expended as opposed to merely regurgitating existing "standard" design elements seen on so many other model aircraft.



## The Build

### - Nut Screws Washer & Bolts

The most important tip that I could provide in the build section is to manually read the manual! It is jam packed with step by step pictorial tips and detail explanations that even extend to the programming of radio mixes. It is extremely important to follow the build sequence as described in the manual to ensure a proper and accurate build and do not attempt to skip ahead. PA deliberately arranged the build sequence to ensure accurate alignment and wing incidence (already pre-set at the factory) are maintained throughout assembly.

The assembly starts with making the required openings in the fuselage and wings to accommodate the servos, landing gear, cooling vent and horizontal stabilizer. The carbon fibre landing gear, wheels and wheel pants are then assembled to the fuselage. The AMR's painted fibreglass wheel pants have a moulded relief that ensures precise alignment and centring of the wheels. At this point I dry fitted the lower wing, canopy, motor mount, cowl, rudder and horizontal stabilizer just to check the fit without committing anything to glue. Everything fitted perfectly and appeared to visually line up without a hitch. The only work I needed to do was to lightly file the slots on the firewall in order to easily insert the motor mount without forcing.

The motor mount was the next component to be installed. I opted to use waterproof PVA glue which was generously applied to all joints on the motor mount and to the contact surface on the firewall. Three carbon fibre pins were then inserted and glued to lock the motor mount in place. This maintains a precise thrust

angle while the PVA cures and provides additional structural integrity to the assembly. The motor mount firewall is pre drilled in the factory ready to install the T40, just bolt it on and secure with thread lock. The Thrust 40 incorporates an updated version of the Rotorkool® design that now employs curved impellers for a much improved cooling efficiency.

Next came the installation of the cowl. Since flying the Ultimate without a spinner will impair the scale look, I used the recommended PA carbon fibre spinner. I was happy to note that the cowl aligned perfectly with trim on the fuselage. All four Voltec VTS 70MG servo cables extended using the optional PA lightweight solder-on servo extension cables which were then cut to length and terminated with JR compatible plugs. The four servos were then installed into their respective bays. The optional carbon fibre extended servo arms were then installed over the stock plastic servo arms to attain the design control throws and geometry. With the servo plugs inserted in to the appropriate channels, the Spektrum AR6200 DSM2 receiver was then installed in its tray and strapped down.

The aileron carbon fibre control and ganging horns were installed as per the instructions and with the ailerons taped in the neutral position and servo arms precisely perpendicular to the control rods, the CF pushrods were then assembled. The step by step pictorial guide greatly assisted the assembly of the rods.

The AMR comes with a separate bag of nuts and bolts intended for the CF cabane and wing struts. I spent a few minutes organizing the related hardware, arranging them in their respective places alongside the cabane and strut members. This proved to be a time saver when the wing struts and cabane were assembled piece by piece in the correct manner. The wing struts are specific to each side and thus not interchangeable. As such it is very important to note the orientation of the insignia "AMR" prior to assembly. With the cabane, lower wing and wing struts installed; it was now time to install the upper wing.

With both wings now installed and all bolts secured with thread lock I could immediately feel how rigid and solid the entire assembly was. All four ailerons were taped in the neutral position and it was time to assemble the carbon aileron ganging push rods to gang both ailerons. The horizontal stabilizer was installed next by slipping the assembly through a slot previously cut in the fuselage. Alignment is visually done by referencing the wings. A quick reference against both wings revealed that it lined up perfectly and was then glued. The slot at the rear of the fuselage was then revealed with the supplied balsa block, sand-

ed flush and re-covered to maintain the look.

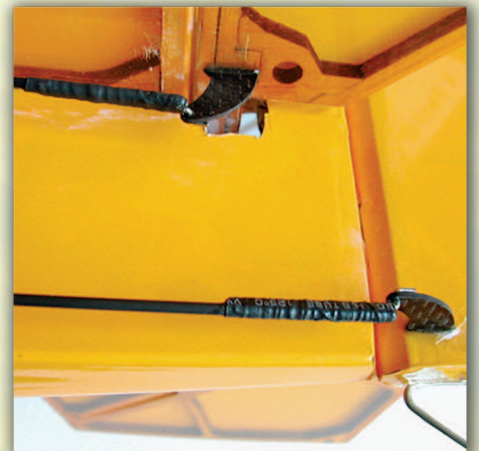
For the CG location, I opted to use the recommended 59.5mm CG location for the "sweet spot" and measured accordingly. The setting of the CG was to my astonishment a pretty easy process by merely measuring the CG length from the leading edge of the top wing tip. This CG location is achieved when the PA 2200 V2 Lipo pack perfectly lines up with the front of the battery tray as mentioned in the manual. A caveat to this easy CG only applies when the recommended Precision Aerobatics iPAs (Integrated Performance Airframe-drive system) setup is used. The great thing I got out of it was that it was so precise that I get consistent results in the air every time and it's a matter of popping the battery in, line it up, secure the Velcro strap, plug the battery and off you go on the perfect CG! How much simpler can this get? In the case of the AMR, I religiously followed the recommended radio setup including the throws and mixing and only deviated by setting up three rates tied into my flight mode switch for which the highest rate set was zero expo while the rest set at a lower exponential value than recommended as a matter of personal preference that I am used to.

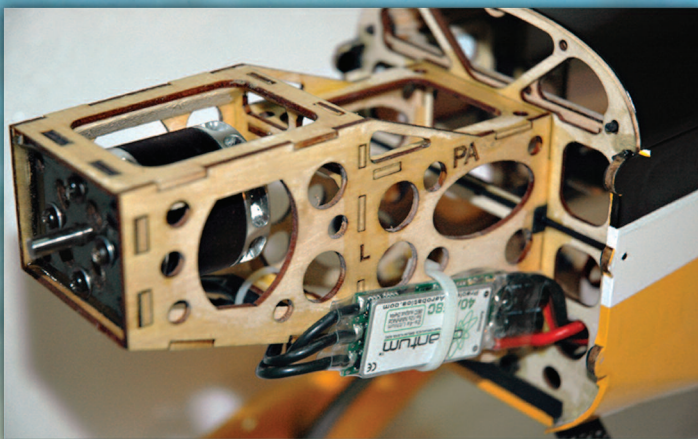
## The Check Ride

### - Putting the Art into Aerobatics!

I finally mustered enough guts to bring my AMR out for the maiden flight. With all the pre-flight checks done I switched to high rates, activated the timer and prepared for take off.

The take off was short and the AMR went straight up into a stable hover, did a few torque rolls and then a slow vertical climb out into a





beautiful slow spin. I was immediately amazed at how incredibly easy it handled and all prior fears and shakes were now gone. What a huge relief it felt and I was really stoked now to try something a little more aggressive!

Advancing the throttle beyond 3/4, the AMR felt very quick in the air and I felt confident enough to try the Lomcevak. It looked beautiful with lots of energy and momentum and I was already grinning from ear to ear after seeing how aggressive it was. Pushing to full throttle I could see the AMR accelerating vertically very quickly. Wow, the Thrust 40 motor had plenty of power. After a few high energy snaps and tumbles, I slowed her down for a set of rolling harriers. They were smooth, axial and felt very consistent. I then made a few fast straight and level flights and proceeded to make trim adjustments and all it needed was a little down elevator and proceeded to try the knife edge manoeuvre which required a little up elevator and opposite rudder correction on the sticks.

The first impression from the maiden flight, everything just seems to flow smoothly from one manoeuvre to another without the usual abrupt stop. The AMR was exceptionally exciting and an easy aeroplane to fly. The KE (knife edge) spins and blenders were simply insane while the snaps and Lomcevaks very aggressive especially on the larger but higher thrust wooden 14 X 7 prop.

I only activated the recommended KE mix after the fourth flight and the KE was now couple-free and only required holding the rudder to maintain a straight line down the runway. I found it very easy to do a range of KE manoeuvres from fast straight and level KE, descending KE, KE circles, alternating KE to slow KE. I had 20 mind blowing flights over the weekend and subsequently totalled 75 by the time of this writing.

After flying the AMR for sometime, I discovered quite a few new unique manoeuvres it's capable of doing beautifully. Its handling in the air is so predictable that I became comfortable right off the bat. I believe that most advanced beginners who have already nailed their take off and landings will have absolutely no problems flying the AMR on low rates because it feels so predictable and stable.

Hovers are simply out of this world; the slow rolling harriers are simply excellent - very well balanced, axial and coupled with the responsive aileron authority allows a multitude of variations to the rolling harrier manoeuvre; e.g. hesitation and four-point rolling harriers. As a matter of fact only I learnt the hesitation rolling harrier on the AMR during the course of this review.

The Thrust 40 motor on a wooden 14 x 7 prop is simply awesome on the AMR as it gives it almost unlimited performance to execute fast aggressive aerobatics. Stick bangers out there will simply love it and yet it has surplus thrust and punch to execute the slow 3D stuff. The fact that the AMR excels in both fast and slow manoeuvres is really mind blowing to watch and is exceptionally good fun to fly. With the performance I have experienced, I am totally baffled by the fact that this incredibly lightweight AMR is flying on only a 3S setup, yet it has the momentum and energy to carry through the insane tumbles and spins that rival my heavier 54" Hyperion Yak 54 running on an over-powered 6S setup. I am totally dumbfounded that it feels much closer to flying on a 4S pack, especially on the wooden 14 x 7.

## Conclusion

On the recommended CG, the AMR allows the modeller to switch between precision IMAC to insane fast high energy manoeuvres (matches a considerably heavier model in terms of aggression, energy conservation and rotation

rate) and then throttle down to get into slow graceful 3D without ever having the need to land and readjust the CG. This by itself opens up a whole new dimension to the mix of aerobatic manoeuvres that could potentially be done on the fly. The extreme agility, versatility and superb handling make it an excellent candidate for competition level freestyle flying or just having pure fun.

The iPA's setup for the Ultimate AMR is perfect and really the best option to consider in getting excellent performance out of the box. I am still flying on stock setup, i.e. CG, throws and mixes and I did not feel the need to change anything yet.

I will give a standing ovation to PA for, in my humble opinion, producing one of the best designs I have ever come across to date; a total synergy of form and function transformed into a beautiful engineering art piece. If I am ever asked to write a slogan for the Ultimate AMR, I will have to say, hands down it has only to be "PA Ultimate AMR: The ULTIMATE Ultimate!"

This model and accessories are available both retail and wholesale directly from the manufacturer. Website is [www.precisionaerobatics.com](http://www.precisionaerobatics.com) or call 02 9558 0443.

Or visit [www.ultimateamr.com](http://www.ultimateamr.com) for videos and testimonials. Good if you're considering purchasing the aeroplane or just like to watch.



## SPECIFICATIONS

Wingspan:	1014mm/40 inch
Length:	1095mm/43.08 inch
Wing Area:	581 sq.in
Wing Loading:	9.53 oz/sqft (approx)
	AWT 38.45 oz (approx)
Construction:	PA FiberFusion® Laser Cut Balsa ply & carbon fibre
Aircraft Type:	3D/Freestyle/IMAC
Skill Level:	Advanced beginner to Expert 3D/Freestyle/IMAC

## SETUP USED

Power Plant:	PA Thrust 40, with 5mm PA precision prop adapter
Battery:	PA 3S LiPo 2200mAh V2
Servos:	Voltac VTS 70MG with PA CF servo arm extensions
ESC:	PA Quantum 45 Programmable ESC
Receiver:	Spektrum AR6200
Prop:	14 x 7 wooden prop with PA CF Ultimate Style Spinner

