How to Set-Up a 50cc Model (Part 1)

by Jason Pickering

The 50cc class, the 2mtr, the 80 incher...

...what ever you call it, it's a class that has become ever more popular in the last few years and has seen many a modeller young, old and in between take it up. Its big appeal to most is that fact that it's....well... big... but not too big. It's a well priced size that many can afford and provides a good stepping stone into some real giant scale aerobatic stuff, and of course for most it will be their first large scale gasser.

Despite all the positives there about this class, and the many models available in it, there are a couple of hidden dangers that really need to be highlighted especially to those with little or no experience in selecting or setting up a "giant scale gasser", as the yanks would have you say. So I went and approached Precision Aerobatics who were keen to sponsor this article and help to shed some light on some of the mysteries that perplex many new modellers, not to mention showing off some of their classy hardware to anyone who want to set up such a craft. There is an important reason for this article and that is simply that many, if not most modern ARF in the 80+ inch (2 metres +) come with either no hardware (which in my opinion is far better than the next) or with unsuitable hardware.

The fact is that this class of plane means risk and responsibility go up….in fact way up, so each builder and flier must recognize that and take precautions accordingly. I have had a couple of 50cc planes that were bought as ARF's and the hardware was terrible, and in one case, (because I used it as it came out of the box) it lead to the very early demise of an otherwise great model. In the case of the other model I lost one aileron and one elevator on the third flight because the supplied CA hinges (that's right, CA hinges on a 50cc model…deadly) gave way. I managed to land that one but those hinges were swapped over for Robarts very soon after.

Fortunately some manufacturers, like Precision Aerobatics, have raised the bar enormously, but sadly there are still more and more coming to our shores that just do not make the grade. I recently looked at a couple of ARF's on behalf of an interested friend that were nothing short of scary…..really, really scary. Don't forget, in this industry, there are no defined operating ISO standards to meet. That means it's up to you, the builder and flier, to judge the suitability of the airframe and hardware, rather than assume that what is supplied by our good friends in (generally) Asia is adequate.

Hence therefore….this parts review is intended to show newcomers how to set up a large model and what to use to do it. We will be setting up my beloved 1/3 scale Pitts Special (after a major remodel) using some saucy PA hardware and occasionally I will refer to my 84" Precision Aerobatics Edge 540T as reference.

Let's Go Shopping!

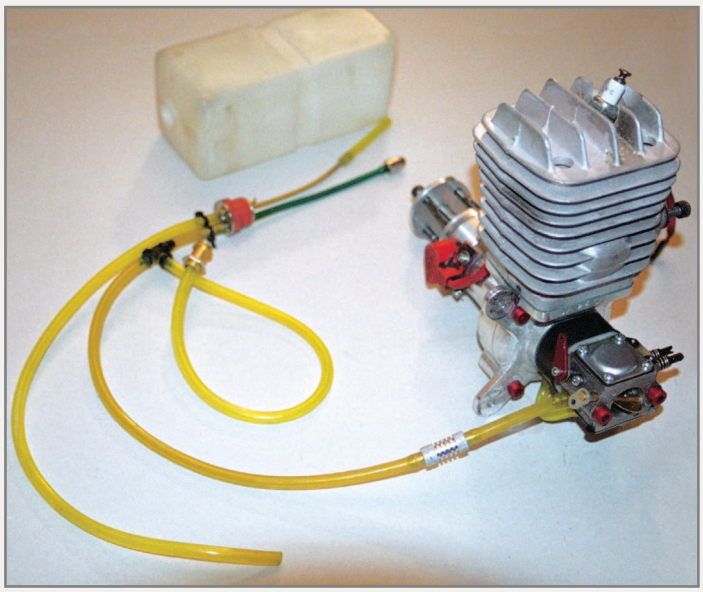
This may be a little different for many modellers who have been used to scavenging gear out of old draws, pulling servos from old planes, and a battery pack out from behind all the other bits in the cupboard. While gear that has survived the demise of another giant plane may well be reusable, you generally need to select gear that's tailored to the requirements of the setup you are after. There is plenty of assistance out there and the guys at PA are always willing to help you out as they have plenty of knowledge and experience. Either way, the main point here is select wisely and don't take shortcuts with the equipment. You will find that on any really serious 50cc aerobatic plane there is nothing in there that is not essential…(you try flying a plane with a 2.5:1 power to weight ratio at full tit 'till it runs out of fuel because that dodgy throttle servo fizzed and locked up on you!)

The same as above applies to all your connections, linkages and so forth. That being said, I will do my best throughout this series to highlight the equipment and hardware in this particular set up and the reasons for doing so.

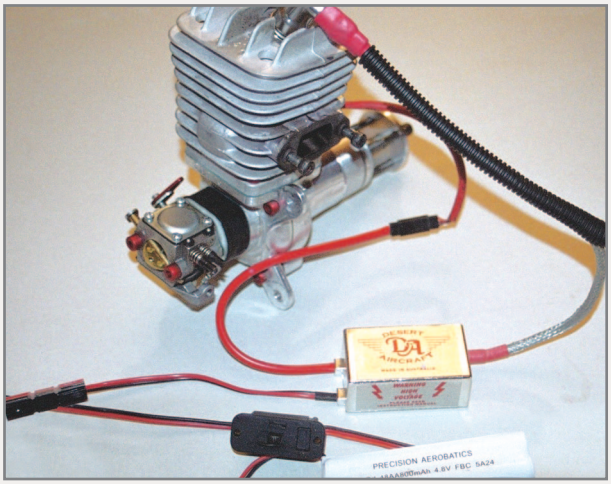
The Engine

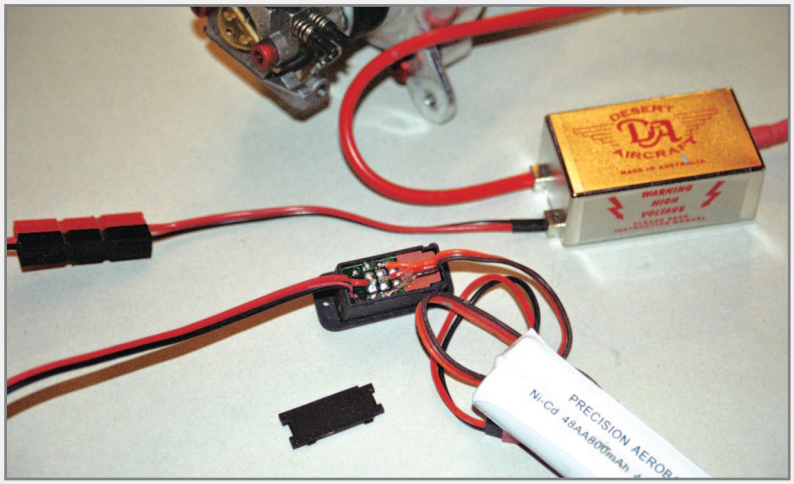
This provides the heart throb to your beast. The Pitts is going to sport my trusty DA50. There are actually very few similarities when setting up gas (read petrol) as apposed to glow engines, overall though it's not really any more complicated.

Let's start with the obvious points. First of all, the tubing and everything in the fuel system has to be petrol proof. Normal silicon fuel lines swell and fail very quickly when subjected to petroleum, so an alternative is required. Pictured here is the special tubing available from PA.. Rather than being Tygon which is the usual alternative, its manufacturer in the USA has formulated it to be more flexible and better resistant to all types of petroleum based fuels and is also ideal for smoke oil, kerosene (jet fuel). The diameter of the fuel tubing and other fuel plumbing should match your engine size. The CNC machined high flow fuel filter from Germany and is of top quality. The unique thing about this filter is it has a basket configuration to allow for a smaller micron weave and still give an impressive flow rate that will not restrict those big gas guzzling engines.



The standard stopper must be removed from the tank and replaced with a petrol stopper (metal stopper/cap is recommended to prevent stripping the plastic thread, causing a fuel leak). Be sure to also use petrol friendly tubing inside the tank



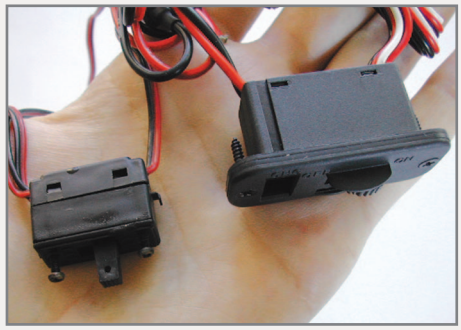


to the clunk as I have seen this missed by some in the past. You will also note that only two exits are required out of the tank as the filler line is run directly off the main feed to the carby via a plastic tee. The fuel dots are also available in various styles and sizes depending on the size tubing and your taste. It is also recommended that you solder a fuel barb to each brass tube of the fuel tank and again use a small zip tie to prevent the tubes from slipping off.

The other outlet is for a vent. This is best exited out the bottom of the fuselage and run to behind the tank (to prevent fuel dribbling out when the plane is nose down) or looped behind the tank and back to the cowl if you prefer the exit up front. Zip ties are used to secure the connections and a leak test is a good idea. This can be performed out side the aircraft by filling it, blocking the hose ends and continue filling. Not a lot of pressure is required but check for weeping and rectify if needed.

The next obvious change is the ignition. There are no real mysteries here, its really all just common sense. A separate power supply is needed, and you don't have to go overboard with the size of battery pack. The one pictured is only 800mAh and I have found that to be adequate although I definitely wouldn't go any smaller. Having said that, something in the range of 2300mAh is more often recommended, so choose according to your consumption rate. A good quality high current switch is needed as the vibration can cause a standard one to fail. The beauty with these particular ones pictured is that the back can be easily flicked off and the wires supplied with the engine can be soldered on as seen in the photo. You will also note that there is a non standard plastic sheath slipped over the wire braiding on the plug lead. I always do this as a precaution to protect the braid as the wire lead will emit some serious radio noise if the braiding is damaged. Plastic sheathing is available from Dick Smith Electronics or similar stores as well as auto electrical suppliers.

Well that's really it for the hook-up, now for the set up in the Pitts. Again things are a little different here. The tank for instance, can be placed virtually anywhere and as far away from the carb as desired. This is on account of the petrol carburettor having its own pump to drag the fuel through. Obviously the best place then to put it



is as close to the centre of gravity as possible, although in this case I'll put it in its original place for convenience.0

The stand offs are bolted to the firewall and Loctite is used on all bolts. The ignition module is cable tied to the engine box with foam under it and the switch and battery pack installed. The important thing to remember is to try to keep as much separation as possible between anything associated with the ignition, and anything associated with the receiver & radio gear including leads to prevent any chance of interference.

The easiest way to accomplish this is to have engine gear up front, radio gear down back. Size wise the allocation of space is usually not a problem, but of course the CG placement is important too. I usually find it best once the motor is bolted on to sit the major components loosely in the model and move them around until the best CG is accomplished, so I then have an idea where it's all going to go. Either way, try to push all the ignition gear as far up the front as possible to keep it a safe distance from the radio.

Propellers

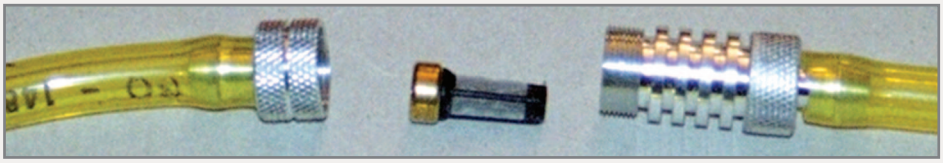
Precision Aerobatics did a fair bit of research in this area before selecting the brands they sell. I've used both the JXF and PT Carbons and both have not only exceeded the performance of any others I've used, but have also been either similarly or better priced than their well known counterparts. The PT has given better thrust than my Mejzlik of the same size & is significantly lighter and quieter. JXF wooden prop in my opinion leaves any other wooden I have used for dead. With larger wooden props there can be a tendency to twist out in the pitch at high RPM. This of course affects the efficiency, so steer clear of any props that twist easily. The JXF has good resistance to this and comes in a highly glossed finish.

The advantage of the wooden props over the carbon fibre props lies in its light weigh. This advantage goes beyond the obvious wing loading; it also allows the engine to spool up quickly therefore giving fast thrust response when doing 3D manoeuvres. The Pitts will be fitted with the JXF as it is of course cheaper than the carbon fibre option. As far as prop sizing goes, there are many variables depending on the engine you are using, so consult your manual. However as a generic guide, generally for break in you would want to go one size smaller (for the DA 50- 22 x 8) to prevent over loading the engine, then for 3D you want big diameter with a fine pitch (23 x 8). This gives you good thrust but a lower top end speed and gives you good speed control in the down lines. If you were after more sport performance you'd go for something like a 22 x 10 or even 22 x 12 for speed.

When looking at the pitch of a larger prop, do not be deceived by the 'flat' appearance of it. Remember, the pitch is in direct relation to the diameter. That is if the pitch is 8" then the propeller would in theory 'screw forward' 8" per revolution across the entire diameter. So for example the extremity of a 23" propeller has to complete a circumference of 72+" to 'screw forward' 8". Therefore its 'incidence' at that point will not be very great, yet will still be very effective.

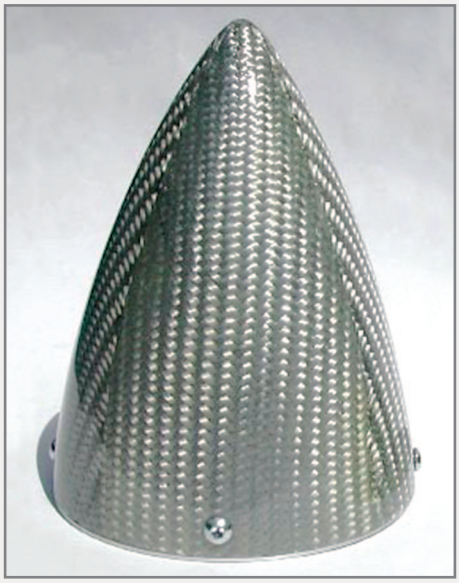
The most important thing when it comes to fitting a big prop is the balancing. Use a good balancer and balance both the blades and the hub. Do this by first sitting the prop horizontal in the balancer, and if one side drops, counter balance the other end with some clear enamel. As it dries it will lighten, so a bit of a guess is involved, but it only takes a few minutes to dry so, it can be adjusted 'till it is correct.

Balancing the prop is imperative. If you don't have a balancer; buy one, borrow one, or build one. Even if a prop is "factory balanced", as are the PT props, I always check them anyway (although I am yet to find one that's out). In any case it gives good piece of mind to know for sure that they are right. A good balanced propeller will be balanced in any position on the balancer.



Spinners

Here is an opportunity to add some serious good looks to your model. Precision Aerobatics has a few cool options here both in shape and material. With sizes ranging from 80mm up to 152mm (and even a new 38mm for electric powered models!) and a choice of the curvaceous standard shape or the sharper Ultimate, there's something to suit everybody. Add to that the options of…yep you got it…Carbon Fibre or this really funky aluminium coated glass. Both mount to a lightened CNC machined alloy backing plate. The aluminized glass is the perfect choice for those who want the look of a silver metal spinner but don't want to pay the enormous weight penalty of an alloy one. Even on a giant you don't want to have dead weight, especially if you are trying to achieve high performance.



On the PA Edge 540T, I have used a Carbon fibre spinner in the standard shape. The Pitts will sport a 4" 'aluminized glass' spinner. Both are extremely light, perfectly balanced and seriously sweet to look at. The lightness of the cone almost eliminates the possibility of balancing issues and they are much easier to cut than aluminium.

To fit, first drill out the backing plate, making sure that the prop is positioned in a way not to interfere with the attachment tabs for the cone. Then fit the backing plate along with the prop and prop plate to the motor. Once that is fitted, cut a template of the prop blade where it will exit the cone, allowing enough clearance to avoid touching. Use the template to mark the cone on both sides; then check that the alignment is ok before cutting.

I use a Dremel with a small abrasive blade to do the rough cut and then use a small sanding drum to trim it out. A couple of trial fits may be needed to get that right, especially making sure there is no contact with the prop. The main thing I like about these spinners apart from the 'bling' factor (which is a biggy) is the way the cone is attached to the backing plate. Rather that a single bolt through the centre which can allow the cone to rotate, they use button head screws around the circumference. These screws fasten to small tabs on the backing plate and secure the cone very nicely. They also eliminate the need to machine a centre bolt as is often needed with an alloy spinner.

Undercarriage

Of course we would assume your aircraft has legs, and wheels are easily come by. However; swank looking wheel pants are not so easily found….that is until now. These fella's are the nicest I have seen; nicely shaped, well priced and well made. Of course following in the tradition of everything else that comes out of the PA factory; they are super light. The sizes are to suit .40-.60 size, 27% size and 35%. Of course, they are available in Fibreglass or Carbon Fibre, both weighing roughly the same, but CF definitely being stronger.

They can of course be fitted in the usual fashion, but due to the irregular runway at my club being notorious for busting spats, I always fit mine a little differently. I start by gluing small ply blocks to both sides (on the inside of course) of the spat with epoxy. Once dry, I then drill right through the spat and out the other side for the axle. I use a 5mm cap screw (these generally are hardened to 12.6 off the shelf) for this and run it all the way through the spat (refer to Diagram). The wheel is centred with wheel collars and two nuts clamping the spat and leg together. I then use a small screw through the leg and right into the ply block to prevent rotation of the spat.

Some would prefer not to see the cap, but I have never seen a full-size spat without a bolt through here anyway, so I figure it's a scale look as well as being practical. With the extra support on the outside of the spat it helps to hold it rigid and supports it when it's bumped or knocked. Of course if you're a more conventional type of guy, there's nothing stopping you mounting them in your own way.

Tail Wheel

Again Carbon Fibre features here too. The one pictured is designed specifically 50cc sized planes; it is extremely light and very tough. I have found that many tail wheels that are supplied in this category don't 'cut the mustard'. Have a good look at the one supplied with your model (if there is one) and be sure you are satisfied. If not, this one is a great alternative. There are no real mysteries as to how to fit it; the carbon arm is screwed to the fuselage in the usual fashion and the springs are stretched up to the arm on the rudder. There is no need to put too much tension on the springs, nor is there any real need to go over board with twisting the ends on the steering arms; just a simple bend is required as can be seen in the photo. I usually start off with a bit of extra tension on the springs, then check to see how well the tail wheel tracks with the rudder and 'stretch' the springs to suit. Precision Aerobatics also offers a Kevlar version of this tail wheel (painted white) which is softer in the 'bounce' as Kevlar is more flexible.

These composites, particularly Carbon, offer more rigidity for much less weight than alloy and as you know…weight is everything. Precision Aerobatics is currently developing a range of main gear out of carbon also.

Conclusion

Well that's it for this issue. We've covered the basic hardware installation, enough to make your plane look like really trick. Next issue we will get into the nitty gritty of power supply options, set up of receivers, extension leads, servos, right through to the extension arms, linkages and control horns. This is the area where you may see most of the changes from smaller glow aircraft, and is the area that spawns most of the burning questions. Until then, happy building.