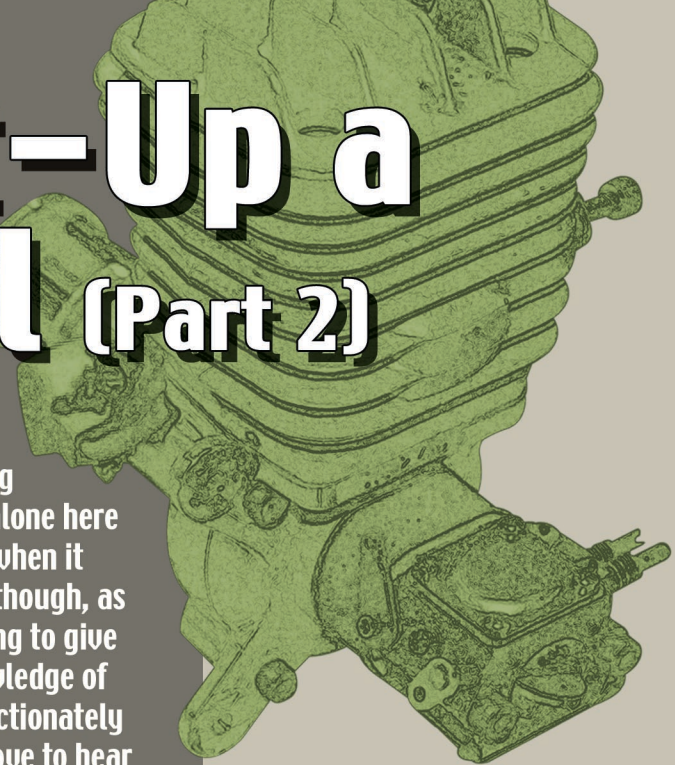


How to Set-Up a 50cc Model (Part 2)

So you've been enticed by the appeal of the larger wingspan, the big gas donk and the ever increasing variety of 'planes in the 50cc range, but been confused by the various and differing schools of thought on how to set the bugger up! You are not alone here and never should you be reluctant to ask, observe and learn when it comes to the "how to". I will offer one word of caution here though, as we are blessed in our hobby with the abundance of folk willing to give their two cents worth of advice, often without accurate knowledge of the requirements or the reasoning behind them. My wife affectionately refers to these ones as the "wafflers"; those dear ones who love to hear themselves speak about things of which they know very little.

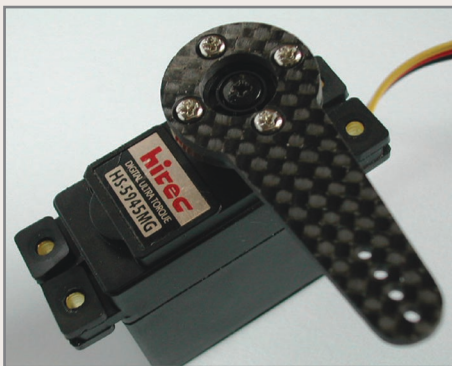


by Jason Pickering

I mention this only to make readers aware that there are certain things that are done in high performance large scale aircraft that are completely different to what most modellers will find in their entry level or smaller models. I have heard comments made in passing by such ignorant ones, which, if taken seriously by the uninitiated, would result in some very scary set ups. It is for this reason that Precision Aerobatics has sponsored this second part of a two part series of articles designed to take out some of the mysteries of what to use, why we use it and of course, where to get it.

From the outset, let me state that all the equipment shown here is available through Precision Aerobatics. Their knowledge and experience has played an integral part in their selection and development of the items they provide.

Servos



There are those who are "hung up" on a certain brand or certain type here. There is, for the most part nothing wrong with this...after all we have our Holden fans and our Ford fans with little but sentiment differing the two. If you have a particular brand that you have confidence in, then by all means, explore their high end servos. There are many options out there for the open minded, and in the end it really comes down to

budget. Either way, there are some "must haves".

The requirements come down to 3 basic choices...

First would be the **torque rating**. In most cases the required torque rating will be stipulated by the manufacturer of the model. Usually this would range from 11kg/cm to 15kg/cm. I would in fact NEVER go less than 11kg regardless of what is stipulated and don't be scared to go bigger depending on the type of flying you wish to do. Working a servo at its full capacity continuously is going to be hard on it. If in doubt go bigger.

Second would be **speed**. Again here there are many various options, but in my opinion the faster the better. If an advanced style of flying is what you are trying to achieve, response speed will only help. For 3D particularly the speed becomes imperative. I have seen planes that seem sluggish and fat, be transformed into something far more sprightly and agile by using faster servos. I have had some say to me that for them, speed would be of no benefit as their fingers or reaction times are too slow for it to be worth while. This cannot be further from the truth. If your reaction times are on the slow side, this will only be aggravated by servos with slow reaction times. I would personally put servo speed as second only to torque in order of importance. It is not unreasonable to expect less than .19 sec/60 degrees speed and I personally use nothing slower than .15 sec/60 degrees.

Third would be positioning type. (**Analogue or digital**). I know some who will never use digital servos, and some who would never use analogue. We are of course referring to the positioning method employed by the servo to accurately interpret your stick command and give you a resulting position. This is most felt when the command is given to return to centre, and a badly centred servo is certainly noticed, especially if you tend to fly around centre (straight and level) regularly.

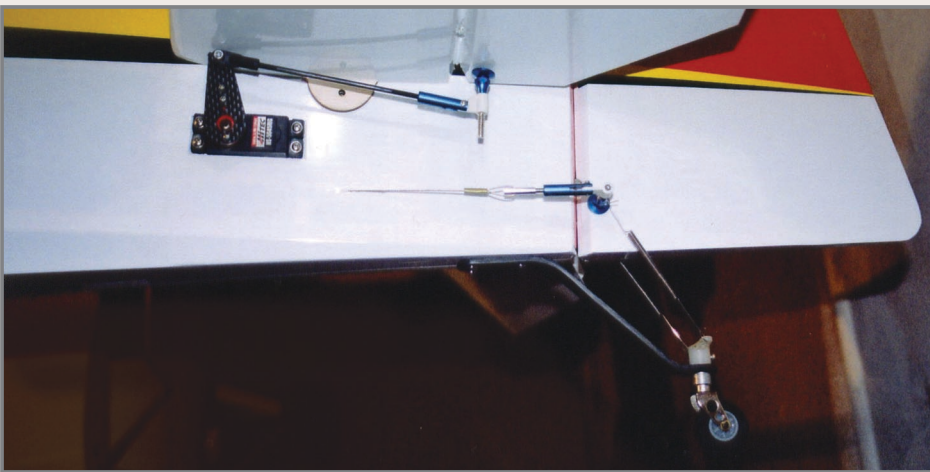
Most suppliers, PA included of course, will stock a full range of servos in the high end

brands, and provided the torque and speed are adequate, you couldn't go wrong choosing your favourite. However, you could easily spend more than the budget allows, so do not hesitate ask those at PA about some of the other options that can be easier on the pocket. As an example, a very good friend of mine who flies freestyle at an international level has chosen to use Bluebird 630MGs on his 50cc edge 540. This brand of servo is in my opinion very underrated and while being anything but over priced offers very good statistics. The afore mentioned model for example gives 15kg/cm torque at .13 sec/60deg which is very impressive and although analogue, offers centring similar to low end digitals. This in my opinion is an attractive possibility as the price is around half that of its digital counterparts.

However, another word of caution; there are some very cheap servos getting around that boast some high statistics but simply do not make the grade or even meet their published performance numbers. There are brands that can be trusted for good reason, Futaba, JR, Multiplex and Hitec are all popular choices among large scale guys and for good reason. Hitec come with the advantage of being programmable (with a separate programmer) to match speed and arc, saving the need for a separate match box, but this is usually only necessary on aircraft where there is more than one servo per control surface.

Linkages & Control Arms

Right, so, we have the servo selected and installed. Now what? Well, we are setting up a high performance aircraft with 3D capability right? Step one is to get rid of those 2mm pushrods we're used to with the Z bend in one end and the plastic clevis in the other. Here is another area where we need to step it up a notch or two. Pictured is a set up I put on the Edge 540T using items directly off the PA website. These are all high grade items designed to take high loads with protection against vibration



and other forms of failure often found on smaller linkages. Lets look at them piece by piece.



Rudder control horn.



CF Control Horn Extensions

These are designed to give more throw to those surfaces to satisfy the 3D junkies among us. There are other options available, but these have several advantages. First, they will fit any brand of servo as they are attached to the supplied servo arms. Second, being Carbon Fibre they offer very good resistance to twisting action imposed by the side loading of the offset ball links. They are easy to install as per the supplied instructions and the only word of caution would be to make certain you attach them to a horn with the heavy duty boss, not the lighter nylon ones that all servo suppliers seem to 'throw into the box' with their high torque servos.

Ball Links, Clevises & Control Horns

There are ball links and there are ball links.



These ones are from Germany and the fit is very snug with excellent tensional strength and smooth rotation. They have a nice thick band that takes some real effort to remove off the ball which prevents any tendency to pop off. The obvious advantage to using ball links is their resistance to vibration.

The clevises I used are very nice anodised alloy with a through bolt that can be (and should be) Loctited into place. Spring clevises or plastic clevises should not be used EVER as they can neither take the vibration or the loads. The clevis bolt' on the ones pictured, screws through the alloy and captures the nylon tab on the adjustable horn. Once fitted and Loctited into place there should in fact be

no need to ever remove, as adjustment to the control horn length is accomplished by screwing the tab in or out (shorter or longer) as required. This does assist in getting the geometry accurate for equalising the throw of matched surfaces (i.e. two elevator halves or two ailerons) and can be locked up (again with Loctite) to prevent any loosening.

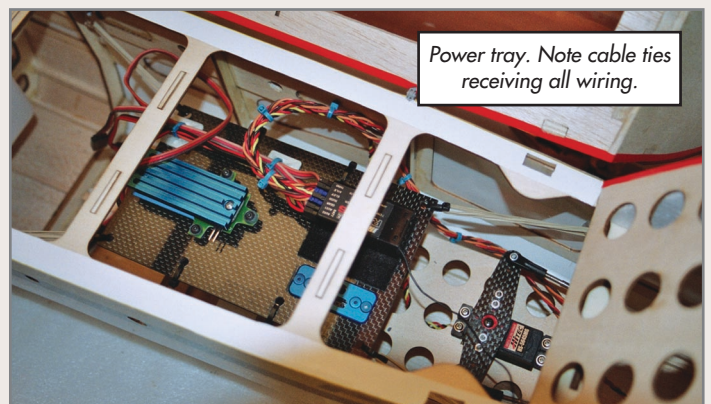
The only thing to be careful of here is that the stainless bolt on the horn does actually go through a hard point on the surface so that they can be tightened effectively without crushing the surface and weakening it in such a crucial spot. Of course this should be the case regardless of the horn used, but a through bolt control horn does become more an integral part of the control surface and has less risk of failure.

Servo Extension Leads



Here there are some things to watch out for that may not have been an issue on the smaller models. For example, those high torque servos will without a doubt require more Amps than standards. Not only that, but the measured length of the leads will be longer, meaning that the quality of wire and plug becomes important. The PA leads are again made in Germany and have several advantages. Firstly they are light but have the quality components spoken of already and exhibit very little voltage drop even over longer distances. Secondly the wires are twisted which reduces or eliminates any RF transmission, negating the need for ferrite rings. The plugs connect with a definite click that feels solid and reassuring; although I still always heat shrink the permanent connections for added security.

Once the leads are run, they really should be zip tied out of the way to stop them getting snagged or worn out on rudder cables etc. If you look at the picture of the inside of my Edge, you will notice little plastic cable clips used for this purpose. These are bought from any electronics store and are great for tidying up leads.



Power Supply



There are a few possibilities here. Pictured is what I would call the bare minimum. It's a 6V NiMH running through a high current switch harness with two tails. The tails can be run through two receivers, both into one receiver, or Y harnessed into a servo lead. There are different schools of thought here so, whilst doing my best not to offend those with other views, I will of course promote my own. First....forget having two receivers; just buy one good one (we'll look at that later). Keep it simple, and don't load up your plane with gear you don't need. Second, just plug both tails straight into your receiver. One into the battery receptacle, and one into a spare channel.

In the setup on the Edge 540T I went for a PA2200 mAh LiPo through a regulator. This CF tray is suspended by rubber bands from each corner, isolating from vibration, and has the LiPo strapped underneath. The LiPo has a Deans plug connection, but MPX plugs are becoming very popular and have the benefit of being multi poled for added security. On this one, I have used a Fromeco regulator, but PA are the sole distributors of Emcotech, and their much acclaimed BIC unit which is by far the best option I have ever seen.

Emcotech BIC

The Emcotech DSPI BIC is an electronic fail-safe switch, which will take up to two 7.4V LiPos and regulate them individually down to 6V via two separate circuits. It has a push button on - off (to switch the unit on or off, hold down the On or Off buttons for 2 seconds) and is loaded with failsafe features. Ultimately it covers the need of getting safe and reliable power to the receiver and regulates it to give the Amps that are required for those high energy manoeuvres. The other very nice feature is the LCD display that shows all the info you need about your batteries, including:

- The actual voltage of each battery pack
- The minimum voltage of each battery since the last power up (for example: 7.1v, time to charge up)

- The maximum voltage of each battery since the last power up (for example: 8.4v, fully charged batteries)
- The actual current amps at that moment (showing how much current you're taking while on the ground... over 2 Amps you get a warning that you're drawing too much power for a plane that is sitting at idle)
- Maximum current draw (in Amps) since last power up
- Average current draw (in Amps) since last power up
- Consumed mAh since last reset (e.g., since your last charge)
- Runtime in minutes since last reset (e.g., since your last charge)

These are just a few of its many features, it really is an amazing device and with a price tag of only \$174 it actually represents good value for money. Also, as with all Emcotech units, the power from both batteries is used simultaneously, synchronous, not asynchronous like many power devices. If you need 10 Amps, it's drawing 5 Amps synchronously from each pack, not 10 Amps from one pack, then the other and back.

Receivers

Here we come to the brains, the epicentre, the hub.....hopefully you get the idea already that this is not the area to go in cheap. My first radio was a budget brand and it was fine until I got my first gasser. Then I noticed a lot of bumps and twitches happening. One day they got really bad and....well....it cost me a plane. I have lost a plane before from the infamous "radio failure", but let me tell you, nothing is scarier than a big high powered plane that you own and that you can't control. Anyhow, I got some advice and was pointed to the very fine JR 9X. It came with a JR10DS PCM receiver that has been faultless in every model it has been in. When I went to get a second one (the inventory of gassers was growing), I soon discovered that the JR10DS was the finest receiver that JR produced, and as such was worth what I considered at the time, to be a small fortune.

Pay the extra few bucks. GET A GOOD RECEIVER! No point having all the bling and good gear on your pride and joy if you can't control it. It is the most crucial item in the set up.

How do you choose a good receiver? Check out what you are buying, and find out what is the best in your preferred brand. This is the area where I would emphasise you spend as much as you are able. If you have five models, don't buy five cheap receivers, just buy one good one. It's not ideal to swap the receiver around by any means but its better than having something you don't trust. There is a difference in the

way they work, and how they select and translate a signal, and there is a reason why the more expensive ones are more superior. That was actually the main reason that I set up the Edge with the carbon fibre tray suspended by rubber bands. The tray had the receiver, the regulator, the battery, and the switch all housed together. This way the entire tray could be taken out and moved to another model as a complete set up. Again, ideal would be to have a set up for each plane, but at least this way I could afford the best gear because I only had to buy it once.

Interference Check

This is an important step when it comes to gas powered planes. The CDI units and spark plugs do give of some RF noise. This is good reason to keep anything that is plugged into the receiver as far away from the ignition unit and leads (even ignition battery) as possible. Then check your range with the engine turned on and at idle. The best check is to have the transmitter aerial down, and pointing directly at the front of the model, while walking away, keeping the engine between the receiver and the transmitter. This is the worst possible scenario and you should experience lockout at the shortest range in this position. Make certain that your PCM receiver is programmed to chop engine to idle and centre all surfaces on lockout. Your range should be a respectable 50 paces.

.....And In Conclusion

As mentioned earlier, there can be a few pitfalls that newcomers to the 50cc class can fall into. However the solutions are definitely there, and the possibilities are growing as suppliers and manufacturers are recognising the needs and are filling them with new technology. This article was prepared mostly with the uninitiated in mind and in no way is to be viewed as the only way things are to be done. On the other hand, safety has to be the priority and that requires an informed approach by all who are attempting something new, especially when it comes to high performance large planes like those talked about here. For those who are tempted to step up a size or two, don't feel that there is an unattainable amount to learn or comprehend. There are many more solutions out there than problems. However do not be afraid to seek advice from those that know. There is a lot of experience around these days and most modellers I know of are more than willing to help. Of course, the guys at Precision Aerobatics are always able to give advice and can supply you with virtually any piece of hardware needed to finish that giant scale plane of yours.

All items in reviewed are available from PrecisionAerobatics.com Tel 02 9558 0443. 