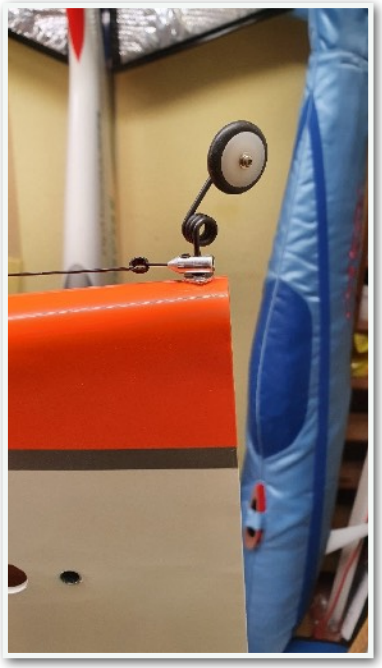
Peter Jenkins - B J Craft Anthem with TMCR, Part 2

Fuselage (contd)

The next task was to cut the fuselage for the cooling holes so out came the motor to protect it from all the dust! BJ Craft had provided ply templates for the intake and exhaust holes. First task was to mark the holes onto the fuselage using a marker pen and then to use my Dremel to cut out the waste material. I always find this the most nerve-wracking part.

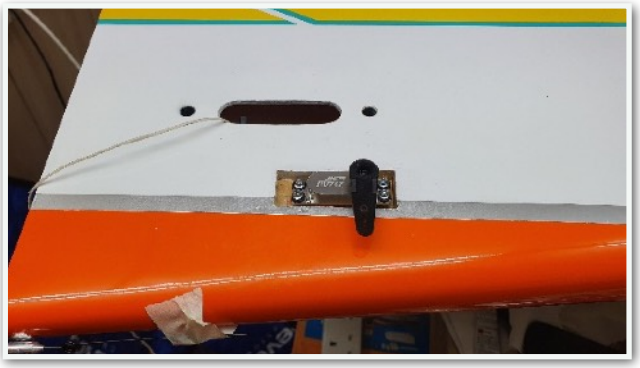
I started with the holes on the underside of the fuselage since this was flat. The photos show the initial marking and subsequent outcome. Dealing with the front intake was a bit more difficult both in transferring the pattern and in cutting out the hole!

The larger photo shows the reinforcement of the rather weak structure between the 2 front air intake holes with some carbon tows. On my Agenda, which had a similar intake, the middle divider broke and so I decided to pre-empt this problem at the build stage.



The next task was to fit the tail wheel that I had bought. It is widely used in these airframes and was relatively easy to fit. You just drill a hole, in the right place(!), and then screw the tail wheel into the fuselage. The big advantage is that if the tail wheel ever suffers damage, it is simply a matter of unscrewing the broken unit and screwing in the new one – always assuming that the manufacturer keeps on making them!

Having cleaned up the debris from this exercise, my next task was to run wires down to the tail of the aircraft for the 3 servos that would be mounted there – 2 elevator and 1 rudder. As the aircraft had come with a cut out for the rudder servo under the tail plane, I decided to go with that option particularly as the recommended rudder servo was a mini servo but with the same power as the full size rudder servo I had planned to use. The mini servo has a quoted torque of 10 Kg cm so was certainly up to the task.



In my current aircraft, I have a single servo lead with an additional single signal lead – a 4 wire harness. At the servo end, I have soldered 2 leads to give me a standard 3 lead connection to each elevator servo. This reduces the weight of the leads in the long rear fuselage. While pondering how to deal with 3 servos, a friend suggested I use the JR Xbus system. As it happens, I'd bought 2 Xbus converter leads about a year ago. This has a single connection into the Rx's Xbus port while the converter outputs to 4 standard PWM servos. Perfect. So, I made up an extension lead to stretch from the Rx to the converter and with a bit of fiddling around got the 3 leads I needed positioned to allow the 3 servos to be plugged into them.

Thank goodness for You Tube as I found a guide on how to set up the Xbus system as my Tx manual didn't mention it! However, it took several goes before I was able to sort out the process of getting the servos allocated to the Elevators and Rudder!

The next task was to tackle the tail planes but before I did that, I wanted to check that the alignment of the wing and tail plane was correct. The wing is mounted by sliding it onto a carbon tube that sits inside a tube in the fuselage. There are front and rear anti rotation pins in the wing to stop it twisting from its set position and the wing is retained in place by 4 mm screws to hold it to the fuselage. The latter are very lightly stressed since the main structure loads are taken by the carbon tube and twisting is taking by the anti-rotation pins, also small carbon tubes at the front and rear of the wing. You can see this in the photo. The oval hole is for the aileron leads to connect up.

This was also an opportunity to check the fixed relationship between the tail plane and wing incidence. I use a Robart analogue incidence gauge for this. The required incidences are:

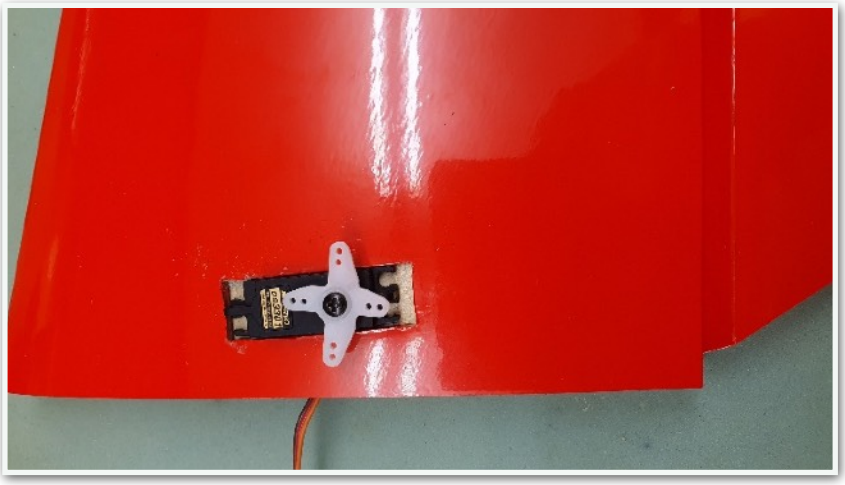
- Tailplane set as datum at 0 deg
- Wing set at 0.7 deg
- Motor downthrust -1 deg

I "booked" the kitchen for doing this task as there is much more room there than in my shed!

As it happened, the fixed location of the wing indicated that B J Craft had managed to get their jigs spot on as the wing incidence came out at 0.7 deg! While I was de-rigging the aircraft, I took the opportunity of checking the wing sweep and the kitchen floor tile pattern provided the ideal way to do so! It's about 18-19 deg sweep back.

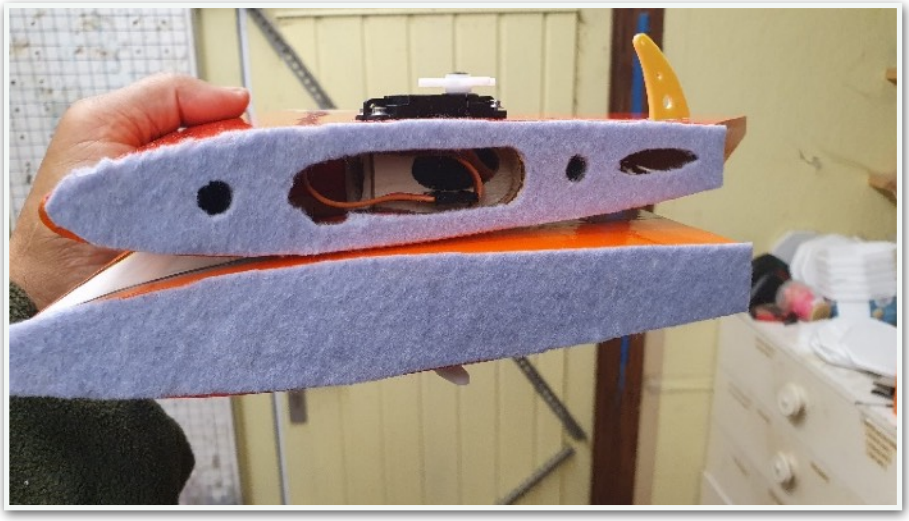
Tail Plane

It seemed a good time to put the tail plane together. The TP comes with the elevator dry hinged to the fixed part. The first job was to locate the elevator servo hole and then carefully cut the covering back but leaving sufficient around the edge to stick that down into the servo recess to stop the edge peeling off!



As you can see, the servo is a very snug fit and the provided servo tray was designed for a thinner servo. So having measured how deep I wanted the servo to go, I then eased the ply servo plate into position, sanded to give a tight fit, then secured it with cyano and cut off the ply joining the ends of the tray. That allowed the servo to be positioned, holes to be drilled and the servo bolted into place.

The 2 TP halves are retained to the fuselage by 2 carbon rods that pass through tubes in the fuselage. Each TP half is retained in place by having a long screw inserted from the underside of the TP through each carbon rod. I decided that, based on my previous experience, it was only necessary to secure one of the carbon rods in this way. Again, the B J Craft jigging was spot on and when I tried the dry fit there was a tight but exact fit. So, next task was to face each elevator root rib with some thin felt to provide a filling for any possible gap between the fuselage and the TPs. After that, the next delicate task was working out where to drill the holes for the TP retention while hitting the middle of the carbon tubes.



As you can see from the photo, I drew 2 lines to show the position of the carbon tube marking its depth of engagement as well. Careful application of the drill provided the connecting hole in the carbon tube and, phew, both screws worked as required!

The next task to connect the servos was quite a fiddle as the extension lead on the 4 wire output from the Xbus converter only just allowed them to be held with a pair of forceps! I also took the opportunity to reduce the length of the servo leads to the minimum necessary to allow them to be manipulated and plugged into the Xbus lead. I did the same with the rudder servo to reduce the amount of weight at the extreme back end of the aircraft. Once connected electrically, I fixed the servo arm as close to being parallel to the elevator hinge line. Turning over the JR servo arm provides some mechanical help in this but I need a couple of clicks of sub trim to get the arm properly positioned. The rudder servo has a Futaba type spline so can use Futaba servo arms. I have never before used a Z bend to connect to the servo on an F3A aircraft but one of the UK team pilots does this and says it works fine for him provided the Z is held tightly in the servo arm. The other end of the rod is threaded for a 2mm ball end adjuster. As BJ Craft provide all the pushrods with Z bends it was a case of winding in the ball end to get the connection to the horn right on the hinge line. B J Craft supplies a jig, ply former, for centring the elevators onto the TP which proved very helpful in getting both elevators level.

Talking of the horn, these are supplied in the kit and are fibre glass. They provide a template for cutting the slot for the horn which I then used 5 min epoxy to glue in place. Once the horns were glued in place, I re-checked the hinging and then used thin cyano to glue the hinges into each elevator half and then into the tail plane. It's a good idea to have some cyano remover handy to clean off any cyano that runs!

After connecting up the pushrods, I was then able to check that the elevators moved together over the whole range of movement. My JR Tx has a servo match function to allow you to do that by applying slight corrections to the slaved servo to make sure they both move exactly the same amount. Using Xbus disables this function as the elevators cannot be "seen" by this part of the computer program! A careful look at what was available from the Xbus screen on the Tx showed a possible way forward. After a good deal of fiddling around, I found, more by trial and error, that the Xbus allowed each servo to be matched throughout the range. In order to measure the elevator movement, I taped two brand new pencils with sharp tips to each elevator so that the 2 pencil points were aligned – not having the rudder installed helped with this. It was then a simple matter of keeping those points aligned throughout the full range of movement and tweaking the control whenever there was a divergence. Wow – another reason for using Xbus!

< End of Part 2>