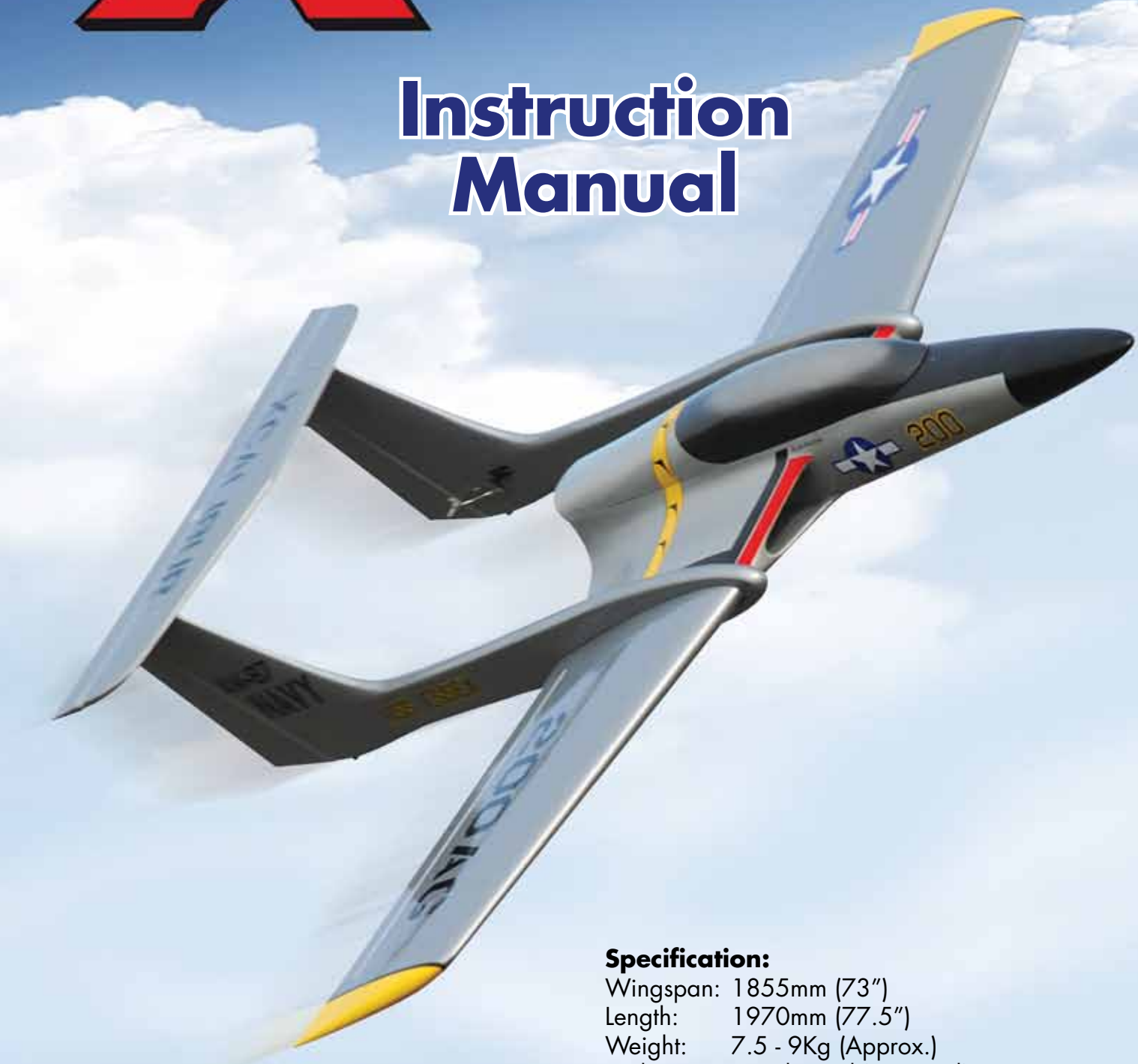
JSM
Jet Sport Models

Xcalibur

Instruction Manual



Specification:

Wingspan:	1855mm (73″)
Length:	1970mm (77.5″)
Weight:	7.5 - 9Kg (Approx.)
Radio:	6+ Channel (Required)
Turbine:	50-100N (5-10Kg) (Recommended)

Introduction

Congratulations on your purchase of the Xcalibur Jet. This performance model is ideal for use as a first jet or as a sports jet model.

Before you build the model, please read the instructions the whole way through to understand the construction sequence.

Warning: The Xcalibur has been designed to enable turbines of 50 to 100 Newtons thrust to be installed, however it is VERY important to note that if turbines of over 80 Newtons thrust are fitted, full power should not be used for any extended diving manoeuvres, as this will lead to speed in excess of the design specifications. The use of full power in level flight or climbing manoeuvres is completely acceptable. As the Xcalibur is a light and low drag airframe, turbines of more than 80 Newtons can have their maximum thrust level reduced within the ECU, which will in turn reduce the fuel consumption and thus increase flight time, extending the period between services due to the lower stress on the turbine yet still give the model superb performance including prolonged vertical climbs.

Required to Complete

- Turbine of 50 – 100 Newton (5.0 to 10.0Kg) thrust
- Retractable Undercarriage set complete with Wheels/Brakes
- Fuel tank (L-JSM001/FT recommended as this has been designed specifically for the Xcalibur)
- Suitable radio system of at least 6 channels with receiver and battery pack of at least 1800mAh capacity
- 2 Standard size servos for ailerons of at least 6.5Kg/cm torque
- 2 Mini servos for rudders of at least 4.5Kg/cm torque
- 1 Standard size servo for elevator of at least 10.5Kg/cm torque
- 1 Standard size servo for flap of at least 4.5Kg/cm torque
- 1 Standard size metal gear servo for nosewheel steering
- 2 Servos for retract and brake valves or 2 electronic valves
- Various extension leads for rudder, elevator, aileron and flap servos
- Tygon fuel line

Step 1

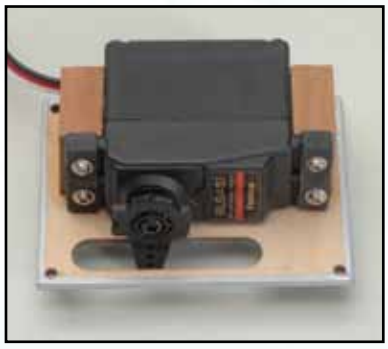
Glue the hinges into the tailplane as shown, using epoxy or a similar high quality, high strength glue, whilst protecting the hinge point with a drop of oil or grease. Allow to cure.

Step 2

Glue the exposed ends of the hinges into the elevator, and wipe any excess glue away before it starts to cure.

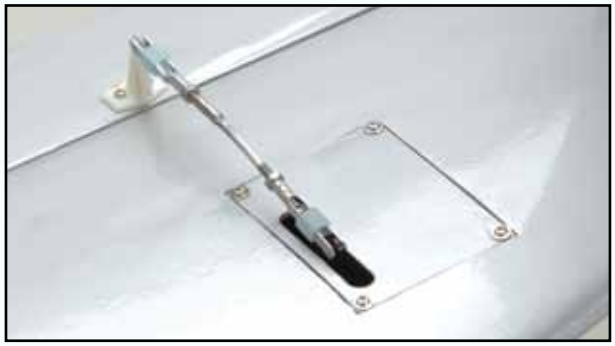
Step 3

Screw the elevator servo into place as shown, having first fitted a short extension lead to extend the servo lead out of the tailplane through the fin mounting. Use a wrap of tape to secure the plug and socket together. The minimum length lead required should be used as once the tailplane is attached to the fin there is limited space for excess lead material.



Step 4

Attach the elevator control horn and make up the elevator pushrod as shown, making sure that keepers are fitted to the clevises for security. The hatch cover is also re-fitted at this time, and the slot in the hatch should be trimmed as required to allow free movement of the servo arm and pushrod.

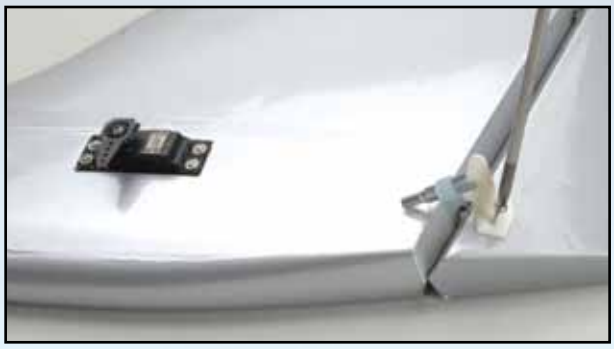


Step 5

Run extension leads through the tail booms for the elevator and rudder servos, note that the left boom carries both elevator and rudder extension leads, whereas the right boom carries only a rudder extension lead. Fit the rudders to the tail booms using hinges in a similar manner to that illustrated for the elevator, note that the rudders are handed and have hard points for the control horns on the inboard sides, and the rudder servos are consequently fitted on the inboard sides of the booms - check this before final fitting of the rudders.

Step 6

Install the rudder servos as shown, with the output arm towards the front of the boom. Attach the control horn to the rudder and make up the rudder pushrod in the same way as per the elevator connection previously making sure that keepers are fitted to the clevises for security. Repeat for the second tail boom.

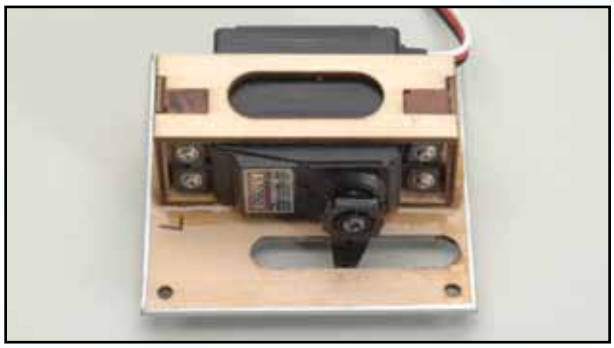


Step 7

Mount the aileron servos to the supplied mounts as shown, ensuring that the two servos are mounted in opposition to each other so as to correctly fit both wing panels.

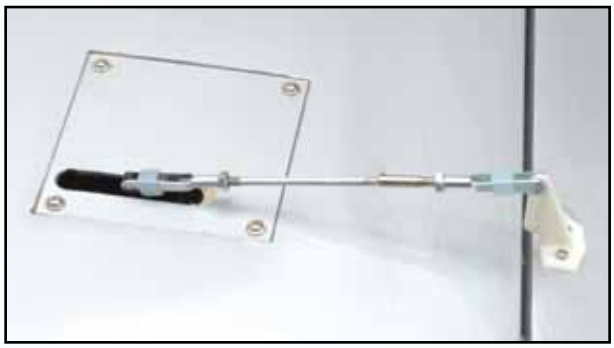
Step 8

Glue the servo mounts to the servo hatch covers as shown, ensuring that the servo is not also glued permanently into place, and that the control horn is centred in the pre-cut slot in the hatch cover.



Step 9

Fit the aileron to the wing panel using hinges in a similar manner to that illustrated for the elevator. Attach the control horn to the aileron and make up the aileron pushrod as shown, making sure that keepers are fitted to the clevises for security. Repeat for the other wing.

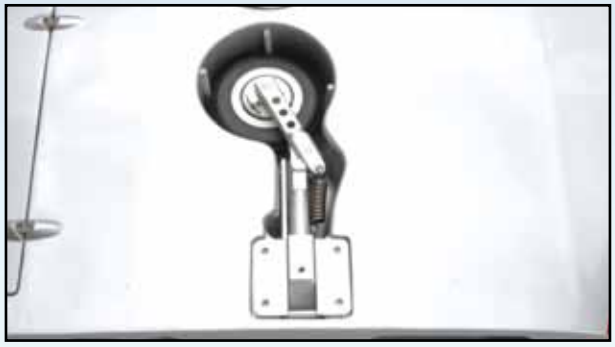


Step 10

Install the main retracts, legs and wheels as shown, running the retract and brake airlines into the fuselage and under the air intake ducting, then towards the front of the fuselage.

Step 11

Check that the legs/wheels retract fully, a small amount of trimming of the underside fuselage skin may be required to achieve this.

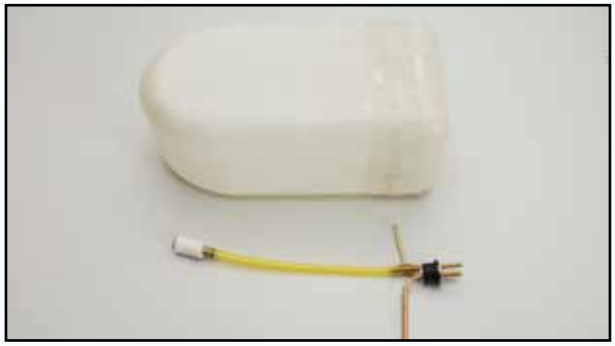


Step 12

Prepare the nose retract for fitting by attaching the closed loop cables to the steering arms, then check fit of the unit. Clearance slots must be cut into the retract recess for the closed loop cables. Once happy, fit the nose retract, having previously connected the air lines, and run these back into the main equipment bay.

Step 13

Prepare the fuel system for the tank as shown – it is strongly recommended that all fuel lines are safety wired to all tubes/fittings to eliminate any leakage or possibility of the fuel lines becoming detached. Note the use of a felt clunk to eliminate any air bubbles being passed through to the turbine.



Step 14

Fit the fuel system/bung to the tank making sure that the clunk is free to move up and down at the rear of the tank, and that it does not jam anywhere. Ensure the clamp screw through the centre of the bung is tight, then check for leaks by sealing the fill and vent tubes and immersing the tank in hot water – the expansion of the air within the tank will quickly produce a stream of bubbles from any leakage point. Note safety wiring.

Step 15

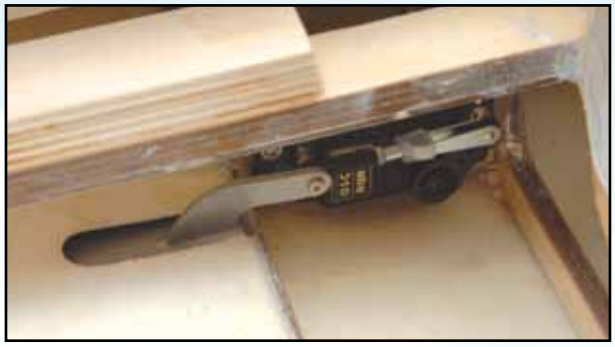
Test fit the flap to ensure the control horn moves freely through the pre-cut slot in the fuselage without binding.

Step 16

Fit the flap to the fuselage using hinges in a similar manner to that illustrated for the elevator, hold the flap in correct position with tape whilst the glue cures, to ensure free movement without jamming.

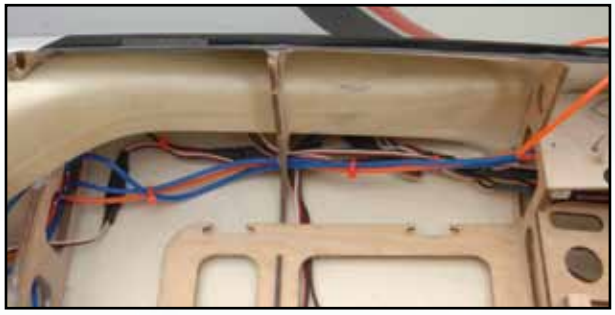
Step 17

Install the flap servo and make up and fit the linkage as shown.



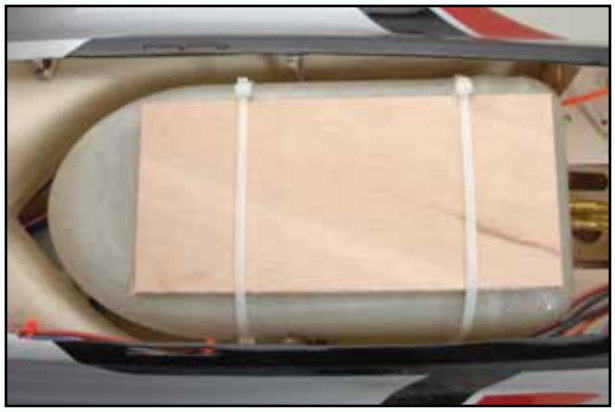
Step 18

Make sure that all extension leads, airlines etc are installed and secured so that they cannot move or get damaged, we used cable ties and sections of rubber bands glued to the fuselage to retain these safely.



Step 19

Fit the fuel tank and retain with a small amount of servo tape onto the mounting plate and two heavy duty cable ties – tighten these snugly, but do not overtighten, as the fuel tank may be damaged. Glue a short length of brass or aluminium tubing through the bottom of the fuselage and connect the overflow pipe from the tank to this. Note the fitting of a ply plate for the air tank mounting. Alternatively the air tanks can be glued direct to the tank.



Step 20

Offer up the turbine to be used to the mounting rails, depending on the turbine being used either 2 or all 4 of the supplied mounting blocks can be used to bring the turbine centreline level with the centreline of the air intake duct, ensuring that the turbine is positioned as far forward as possible.

Step 21

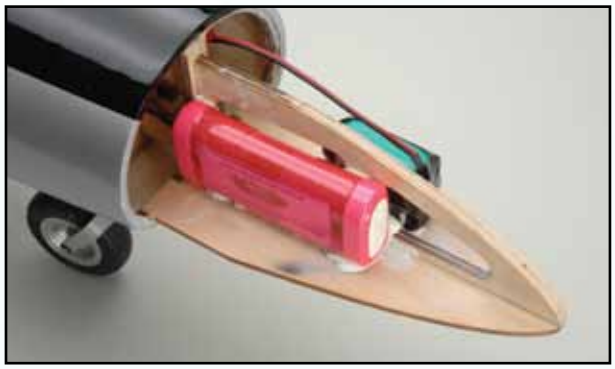
Epoxy the turbine mounting blocks into place, ensuring that they do not move whilst the epoxy is curing.

Step 22

Mount the turbine being used with self tapping screws, note the use of a FOD guard and the run of the fuel and starting lines. The electrical cable/s to the engine should be run down the side of the fuselage.

Step 23

ECU and receiver battery packs should be mounted as far forward as possible to reduce the amount of noseweight required. Do make sure that the nose moulding will still fit correctly when the battery packs are installed. Other heavy items should also be mounted as far forward as possible – the prototypes had the fuel pump mounted in the nose to aid balance.

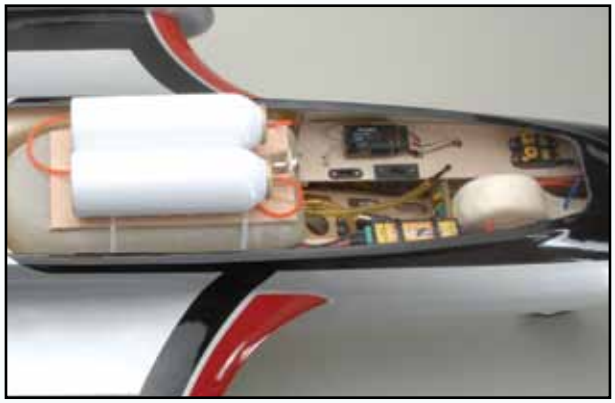


Step 24

The nosewheel steering servo should be installed as shown, then the closed loop cables to the noseleg can be connected to the servo horn.

Step 25

General installation will be affected by the turbine being used and thus the type and size of ancillary equipment – illustrated is a typical layout for a P-60 turbine with large ECU, more modern engines with smaller ECUs and kerosene start will enable a simpler and less cluttered layout. Note the air tanks on top of the fuel tank – as the air tanks are very light there is no problem in mounting them here, it will not adversely affect the balance of the model.

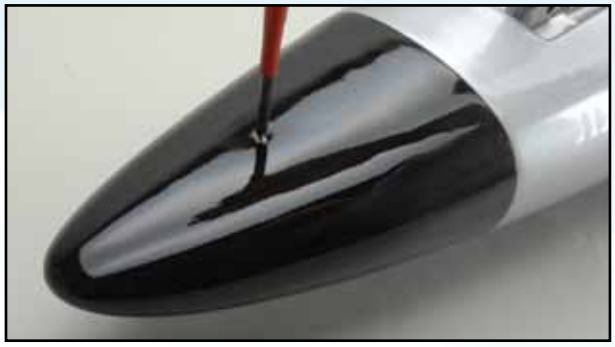


Step 30

More installation detail showing ECU and I/O board, as well as the retract and brake air valves and servos. Note the small screw at the rear of the left side equipment tray, this retains the rear end of the tray whilst the front end locks into the former at the front of the equipment bay. The right side equipment tray is secured in a similar manner.

Step 31

The nose moulding is attached with one small self tapping screws as shown.



Step 32

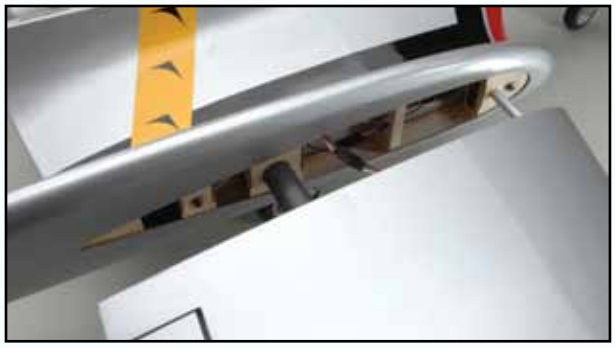
The tailplane is attached to the tail booms with two screws on each side, ensure these are tight but take care not to crush the tailplane structure, and do not forget to connect the elevator servo lead to the extension lead that was previously run up through the fin. Secure the plug and socket together with a wrap of tape.

Step 33

Tail booms are attached to the fuselage with long M4 screws and washers, at the same time connecting the elevator/rudder servo leads from the booms to the leads from the fuselage. Secure the plug and socket together with a wrap of tape. Note that the sides of the booms with the rudder servo should be facing inwards.

Step 34

Wing panels are fitted to the wing joiner tube, which is itself slid into the tube installed in the fuselage, connect the aileron servo lead up at this stage.



Step 35

The wing panels are retained using the pre-installed moulded clamps onto the wing joiner ends.

Step 36

With the model completed it is vital to go through thorough checks of every part, as it is all too easy to forget to do up a screw tightly, or neglect to safety wire fuel tubing. Any jet requires very careful assembly and maintenance if it is to be safe and reliable, and the Xcalibur deserves this care and attention. It is always wise at this point to get a second experienced modeller to go over the model, even if they have never flown a jet, as they will be looking at the model with fresh eyes and might detect a problem you may have missed.

Once the overall checks have been carried out, a further check of the fuel and air system should be done, as problems with either of these systems can mean a destroyed or badly damaged model, particularly if the turbine flames out just after take-off due to a leaking fuel fitting. It is suggested that a hand pump is used to pressurise the fuel system through the fill connector, with the overflow blocked, to check for leaks – do not overdo the pressure though as this could cause the tank to split. A low pressure is all that is required to show up a leak.

The air system should hold pressure effectively, so pump it up to around 90psi and leave for 60 minutes, after which time the very maximum pressure loss should be no more than 10psi, preferably much less. If your system leaks more than this the leak/s must be found and cured, as a landing with the undercarriage retracted, or even worse, half extended will almost certainly result in damage!

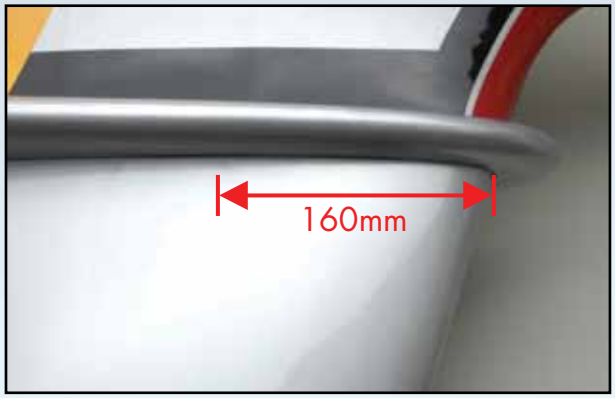
Control Throws

Aileron:	18mm each way at root of aileron, with 20% exponential
Elevator:	20mm each way at tip of elevator, with 10% exponential
Rudder:	55mm each way at base of rudder, with no exponential
Flap:	40mm deflection for take off 75mm deflection for landing

A small amount of down mixing on the elevator should be added for flap deflection, no more than 5% initially for full flap (landing) deflection.

Balancing the Xcalibur

The balance point of the Xcalibur is 160mm back from the leading edge at the root of the wing panels, this should be measured with the undercarriage extended and with any header tank (if used) full.



Flying Notes

We recommend the use of a long runway for first flights, particularly if this is the first jet model you have flown. The Xcalibur a good sized model with a matching performance, so it can cover a great deal of sky in flight – having a long runway and plenty of available air space makes the early flights much safer and more enjoyable.

Do carry out thorough range checks before flying, both with the turbine shut down and running, and check for any radio interference caused by the turbine, throughout the rpm range. Also check all the controls, ensuring that they operate in the correct direction and with the correct movements, and that there is no slop or lost motion in any of the linkages. Check that all clevises and ball joints are secure. Any clevises being used must have keepers fitted for added security. Finally check the retracts to make sure they are operating correctly and that no air leaks have developed.

Once happy, refill the fuel and air tanks, and once the turbine is running check that it will hold full power without any air appearing in the fuel lines which could then result in a flameout on take-off. Taxi the model out to the runway being used – although flap can be used for take off we suggest that this is not done for first flights. If the nosewheel is correctly trimmed then no rudder application should be required during the early stages of the take off run unless taking off cross wind, and once at flying speed a small amount of up elevator is all that is required to allow the model to lift off, whereupon we suggest that the landing gear can be retracted and the model allowed to climb to circuit height. Once at a comfortable height power should be reduced, as the model will quickly build speed being a clean low drag airframe, generally around half power is ample to maintain a comfortable cruise speed.

Fine trimming can now be carried out, and once the model is correctly trimmed we suggest that a few handling manoeuvres are performed at a safe height, for example turns in both directions, slow flight, a clean stall, etc, etc. When happy with the handling of the model it is recommended that the model be slowed down, the undercarriage lowered and flap applied into landing configuration and a simulated landing approach is flown at a safe height, so that descent rates and flight attitudes at various throttle setting can be observed. With this completed the model can be flown through basic and advanced aerobatics until it is time to land.

The Xcalibur is a fairly simple model to land, a normal approach should be flown to stabilise the model and slow it enough to lower the undercarriage, once aligned with the runway the flap can be lowered in stages until full flap is applied – note that more power will be required due to the increased drag of the flap. You will find that the Xcalibur is very stable in the landing configuration

and it should be relatively simple to position the model for an accurate touchdown, the stability once on the ground being excellent due to the wide track of the main wheels. If new to turbines then it is wise to fly a few landing approaches at a safe height to become used to the relatively slow acceleration of turbines and the descent rate of the model, this will reduce the likelihood of the model ending up too low and too slow on final approach, with power coming on too late to arrest the descent and resulting in an off runway landing.

Due to the relatively light wing loading of the Xcalibur and the clean design it is a pleasure to fly through most aerobatics, and rolls, loops, spins etc are all easily performed, as can be slow flight, particularly as the tank empties and the model weight reduces. The model is also very stable and smooth to fly and we hope that you enjoy flying your Xcalibur as much as we enjoyed test flying the prototypes and pre-production models!

Pre-Flight Checks

- Completely charge your transmitter and receiver batteries before flying.
- Carefully check your model over to ensure that all screws are tight and everything is well bonded.
- Double-check the Centre of Gravity.
- Check the control surfaces for both the correct throw and direction. Ensure that each surface moves freely, without any binding.
- Ensure the components are secure.

Always fly the Xcalibur in a safe location at a recognised club. For further information on flying in the UK, please contact:

British Model Flying Association (BMFA)
Chacksfield House,
31 St Andrews Road,
Leicester. LE2 8RE

Tel: (+44) 116 2440028
Fax: (+44) 116 2440645
www.bmfa.org

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