HAWKER HUNTER

Instruction Manual

Congratulations on your purchase of the Flying Legends Hawker Hunter!

The Flying Legends Hawker Hunter MkVI is a model designed and developed for experienced modellers and pilots.

These instructions are written with the experienced modeller in mind. They are not intended to be a step-by-step guide, but highlight a few of the areas of construction to supplement your own modelling experience.

Flying Legends Hawker Hunter

Wingspan:	**1730mm (68")**
Length:	**2360mm (93")**
Radio:	**8 Channel Minimum (8/9 Servos)**
Weight:	**12-13Kg (26.5 - 28.5Lbs)**
Turbine:	**80 - 120 Newton Thrust**

ARTF
ALMOST READY TO FLY

Ripmax

241 Green Street,
Enfield,
Middlesex,
EN3 7SJ,
United Kingdom.

Part Number:
Q-FL150

HAWKER HUNTER

Introduction

Based on the original scale outline developed by world famous scale modeller Mick Reeves, the Flying Legends Hawker Hunter Mk IV comprises a fully moulded airframe, which has been completely finished at the factory. Due to this it is vitally important that the components parts are protected during the assembly process to avoid cosmetic damage to the surface finish. Ensure that your assembly area is of adequate size for a model of this size and cover your work bench with protective foam to avoid marking of the paint finish.

Ensure that only the highest quality components are fitted to your Hunter, as a high performance jet scale model such as this requires matching capability from the turbine and radio equipment to ensure safe, enjoyable and reliable flying. If you have not previously flown a scale jet such as the Hunter we recommend that an experienced scale jet pilot carry out a comprehensive check of the model and then make the initial test flights – although the Hunter is easy to fly and to land, it is a large model with a great deal of inertia, and this can take a little getting used to for a pilot inexperienced with such models.

Capable of being flown from hard surface runways or grass due to the wide undercarriage spacing and large wheels, the Hunter has impeccable flying qualities, and is suitable as a first scale jet, particularly if experienced assistance is available.

Optional Parts

Optional Items Available

Q-FL150/DT	-	Hunter Drop Tank Set
Q-FL150/SC	-	Hunter Scale Cockpit
Q-FL150/TP	-	Hunter Tail Pipe

Items Recommended

Turbine: 80 to 120 Newton turbine is recommended, with the lower powered turbines only suitable for use from hard surface runways – if using a turbine more powerful than recommended please ensure that the airframe is not overstressed in flight by the excessive use of full power.

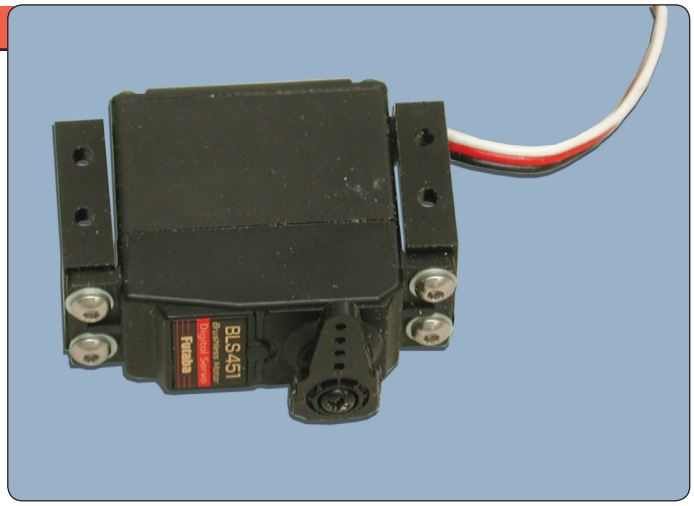
Servos:

Ailerons:	2 x 6.5 Kg.cm min torque req (Futaba BLS451 used in prototypes)
Elevator:	2 x 4.5 Kg.cm min torque req (Futaba S9650 used in prototypes)
Rudder:	1 x 6.5 Kg.cm min torque req (Futaba BLS451 used in prototypes)
Flaps:	2 x 10 Kg.cm min torque req (Futaba BLS451 used in prototypes)

Radio Battery: Due to the weight of the Hunter and the flight loads on the servos the current consumption is much higher than on smaller models - due to this we strongly recommend the use of a battery pack of at least 3000mAh, ideally of 6.0v to enable the optimum servo response.

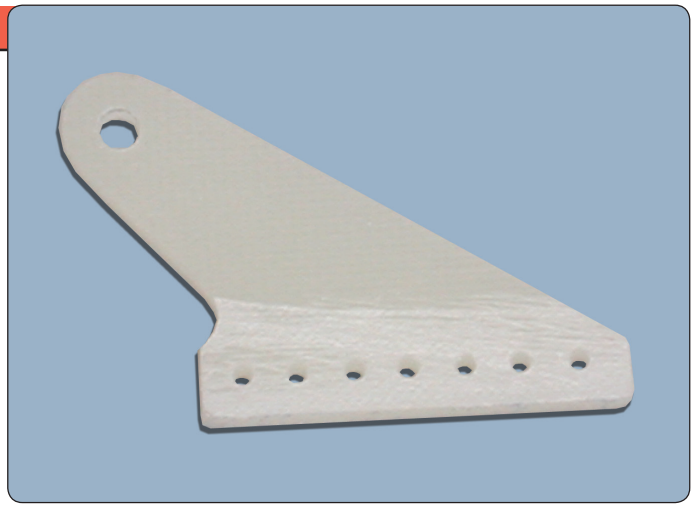
Step 1 Section: Wing Assembly

Mount the aileron and flap servos to the supplied mounts as shown, ensuring that one pair of servos is opposite handed so as to fit the other wing. Note that servo grommets are not used, as the low vibration level of turbines makes them redundant, and the solid mounting assists precise control.



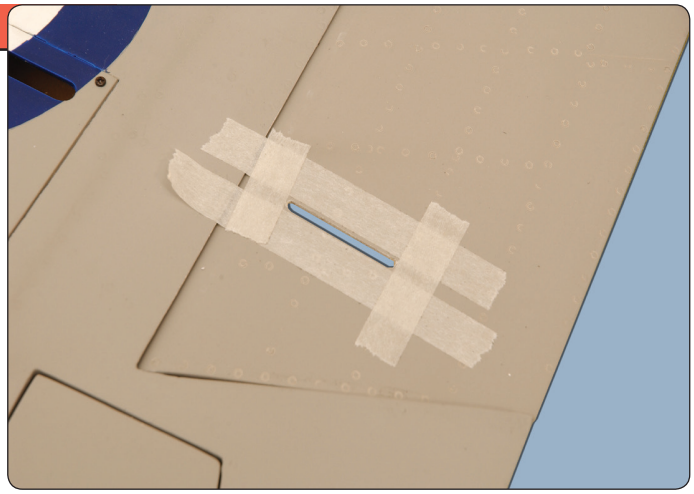
Step 2

Drill through the pilot hole in the control horn with a 3mm drill, then roughen the lower part of the horn with coarse sandpaper or similar.



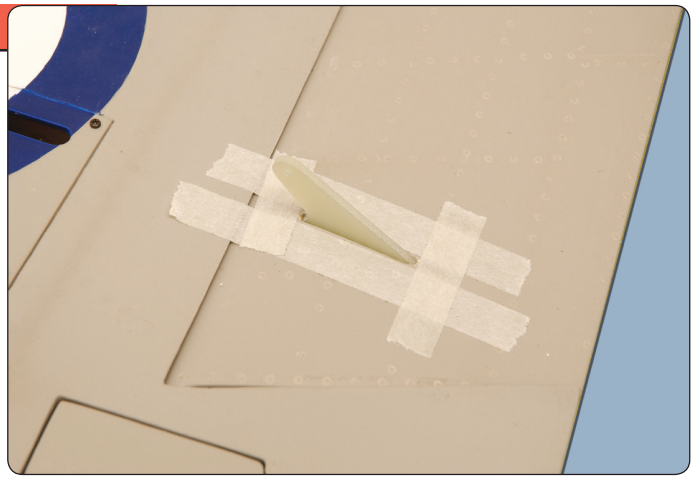
Step 3

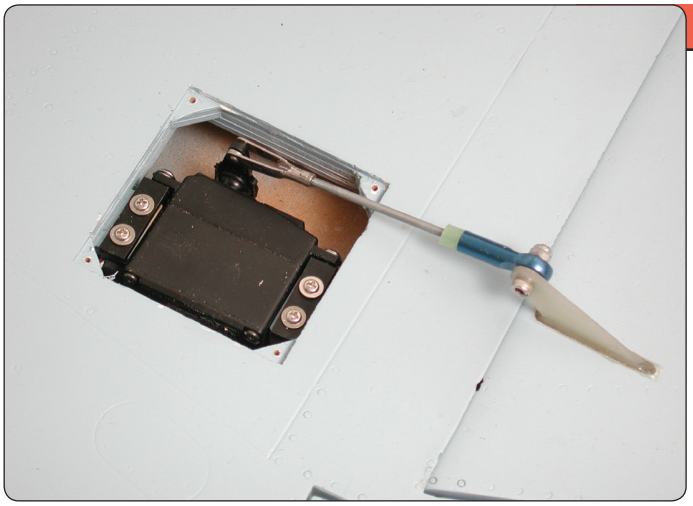
Open up the pre-cut slots in the aileron and flap for the control horn and check fit, then apply masking tape as shown to avoid excess glue getting onto the control surface.



Step 4

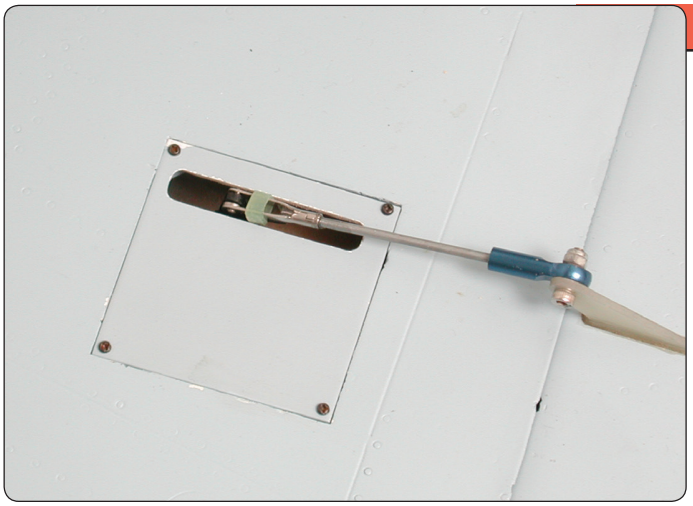
Carefully glue the horn into place in the aileron using Hysol or similar glue for utmost security.





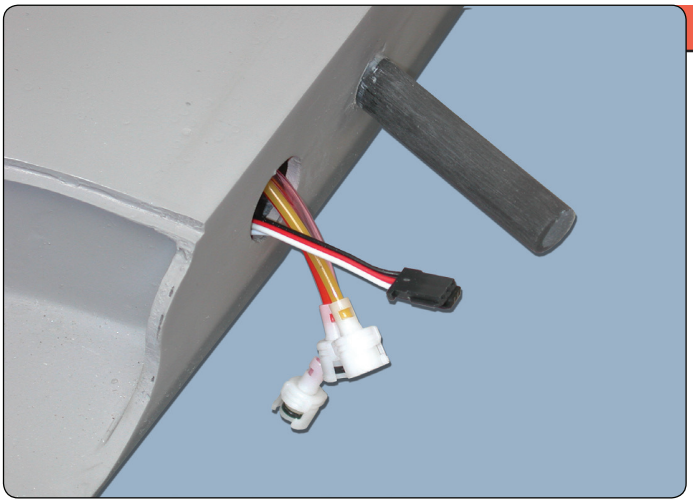
Step 5

Once the glue has fully cured fit the aileron servo with self tapping screws as shown and make up the pushrod and install. Note that for security the servo extension lead should be taped to the servo lead when they are plugged together.



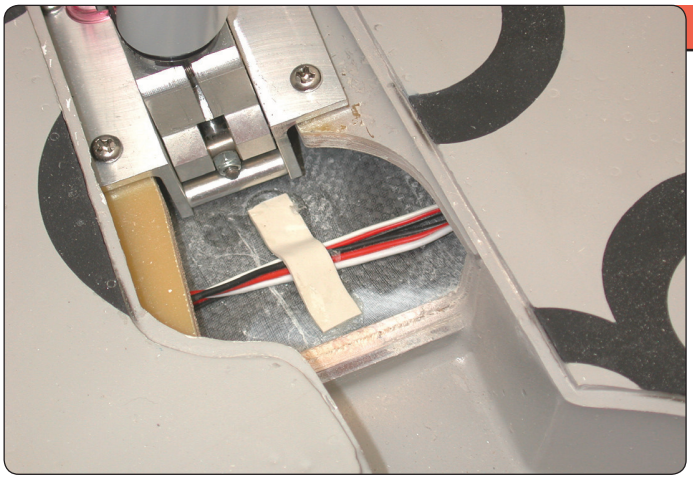
Step 6

Once the aileron servo has been centred and pushrod length adjusted to bring the control surface to neutral the servo hatch cover can be re-fitted. Repeat this process for the flap horn and servo – note that the control horn for the flap is positioned further back on this surface to provide greater leverage when the flap is lowered. Repeat process for other wing panel.



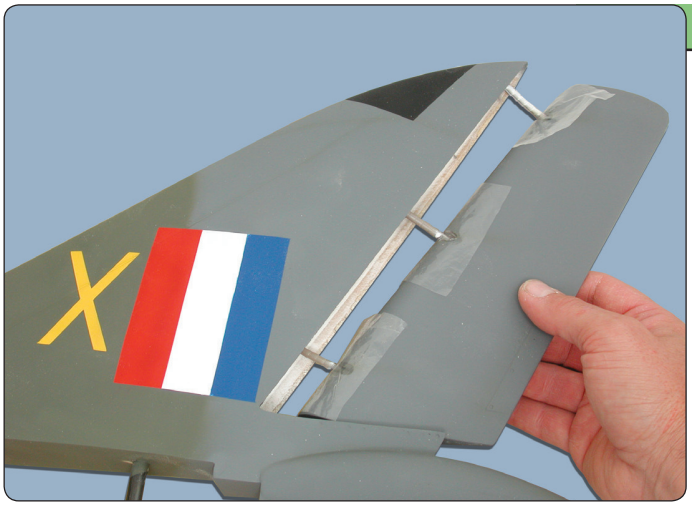
Step 7

Run the aileron and servo leads out of the wing panels as shown, along with the retract and brake air lines.



Step 8

The aileron and flap servo extension leads should be restrained within the wing panel to avoid the plug and socket being pulled apart during disassembly of the model, and to avoid loose wiring becoming caught by the undercarriage when it is retracted.

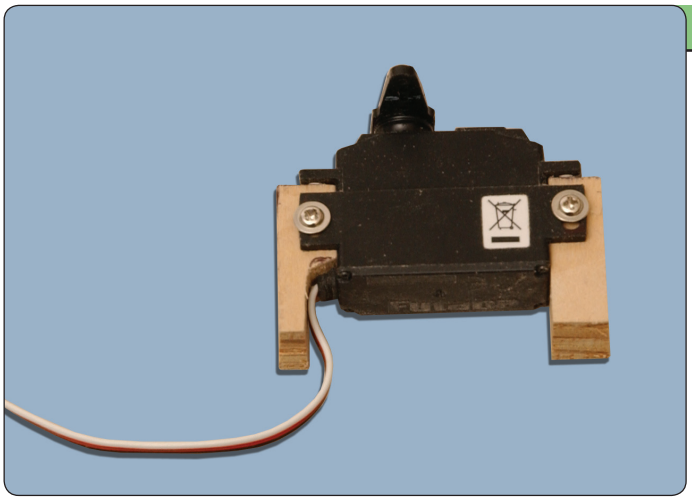


Step 9

Section: Tail Assembly

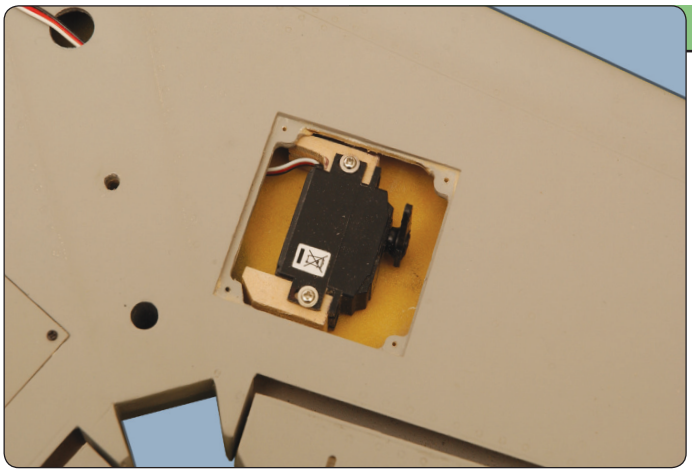
Glue the hinges into the rudder and allow to cure, then fit the rudder to the fin, using small pieces of thin plastic around the hinges to avoid gluing the rudder solidly to the fin! The plastic can be torn away once the glue has cured. Use either high quality slow curing epoxy or glue such as Hysol for this highly critical application.

It is recommended that the hinge point is protected from glue by applying a small amount of silicon oil or similar to the hinge point using a small brush – do not use too much oil, as it may affect the bond of the hinge into the fin/rudder.



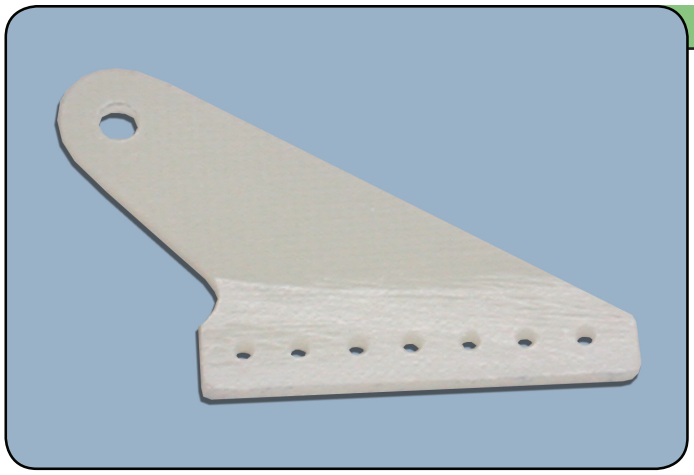
Step 10

Slim side mounted servos are recommended for the tailplane, as it is a thin surface, we used Futaba S9650 digital servos, which are ideal, having side mounts moulded into the case. Screw the servos to the mounting blocks supplied, then check the fit in the tailplane and trim or sand the bases of the blocks as required so that the servos fit neatly and below the level of the lower tailplane skin.



Step 11

Glue the tailplane servo mounts (complete with tailplane servo) into place, ensuring that only the required amount of glue is used, so that the servo is not also glued into place – more glue can be added later if necessary once the servo has been temporarily removed.

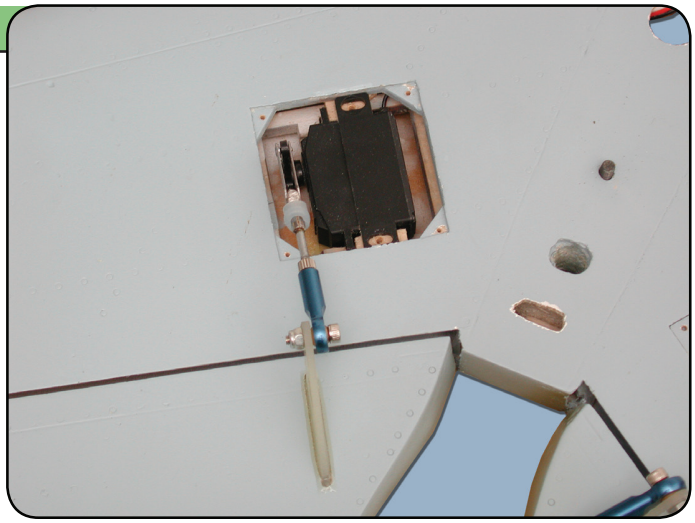


Step 12

Drill through the pilot hole in the control horn with a 3mm drill, then roughen the lower part of the horn with coarse sandpaper or similar.

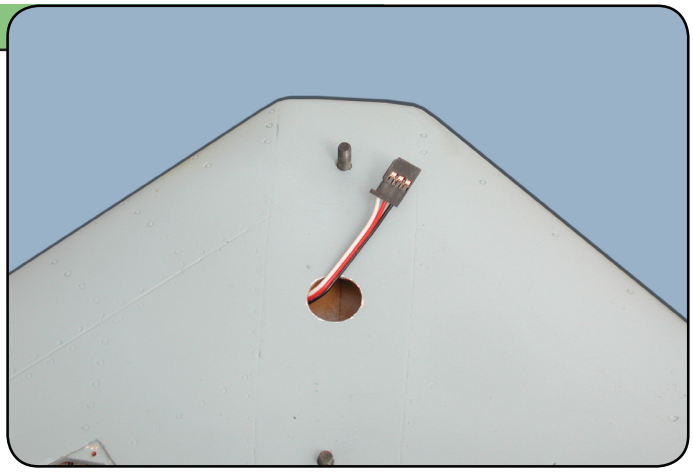
Step 13

Carefully glue the horn into place using Hysol or similar glue for utmost security – masking tape can be used around the mounting to avoid excess glue getting onto the control surface. Once the glue has fully cured make up the pushrod and install as shown. Repeat for the other elevator and for the rudder.

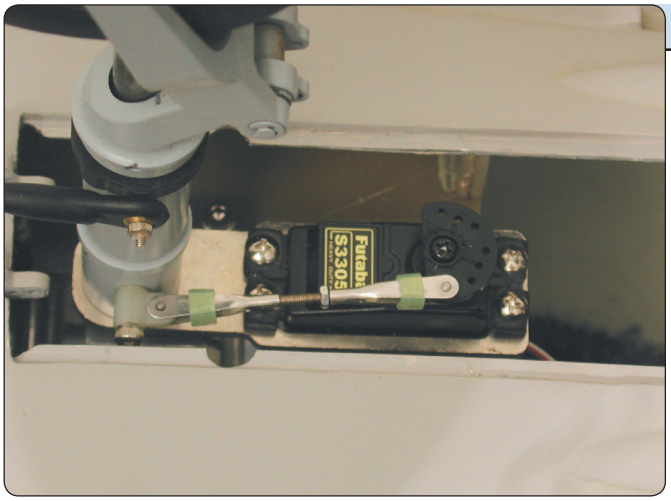


Step 14

Run the two elevator servo leads out through the base of the tailplane as shown.



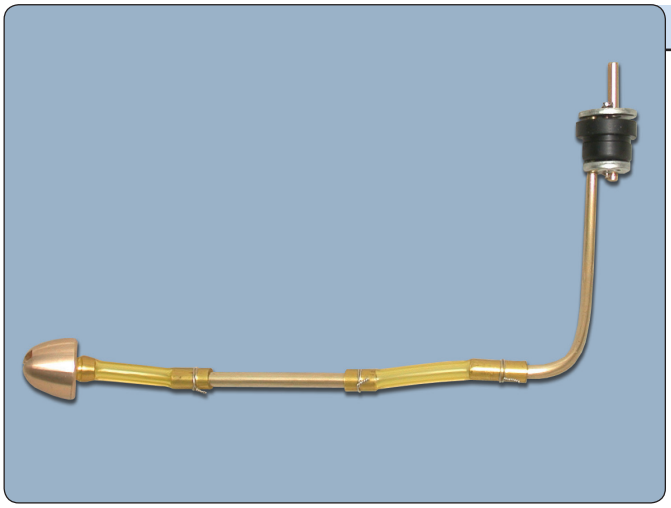
Next Stage "Fuselage Assembly"



Step 15

Section: Fuselage Assembly

Install your nosewheel steering servo as shown, and fit the steering linkage, ensuring that the nosewheel is perfectly straight with the servo centred. Use a drop of threadlocking compound on the servo mounting screws and fit keepers or short lengths of silicone tubing to the clevises for security.

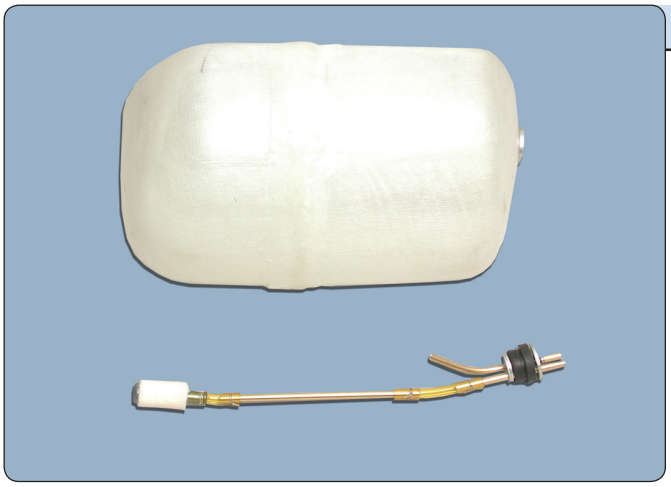


Step 16

Prepare the fuel system for the two rear tanks as shown – the use of solid tubing is to ensure that the clunk stays correctly positioned at the rear of the tank, and cannot swing forward and kink the fuel supply tubing. 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.

Step 17

Fit the fuel systems/bungs to the two rear tanks making sure that the clunks are free to move up and down at the rear of the tanks, and that they do not jam anywhere. Ensure the clamp screws through the centre of the bungs are 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. Cut fuel lines to length and fit to "T" connectors as shown, the feed and vent lines from the "T" connectors are left overlength at this stage.

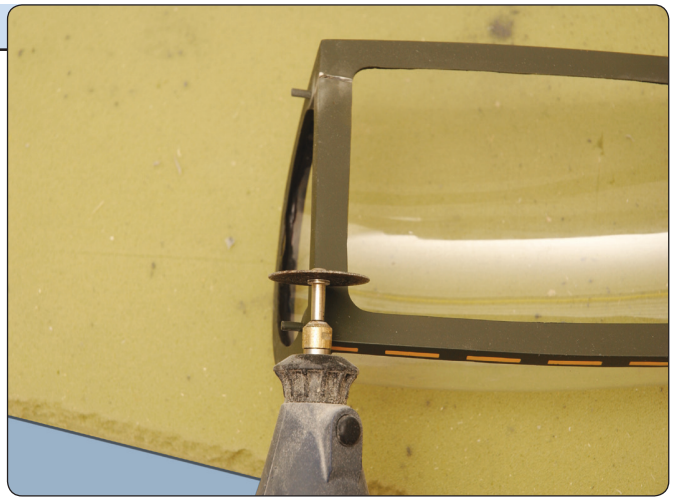


Step 18

Prepare the fuel system for the forward tank – note the use of a felt clunk in this tank to eliminate any air bubbles being passed through to the turbine. Fit the system to the tank and check for leaks as was done for the rear tanks.

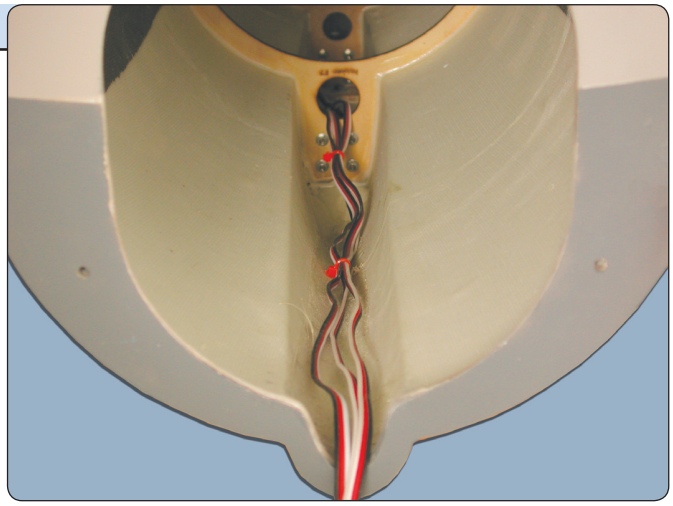
Step 19

The canopy is supplied with the forward cross brace intact to avoid any chance of distortion during transit – if the optional scale cockpit is to be installed this cross brace needs to be carefully cut away as shown, if the scale cockpit is not being installed then the brace can be left in place as preferred.



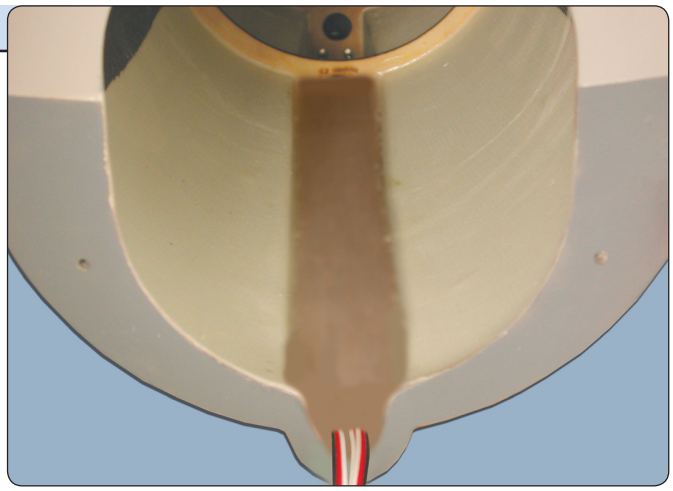
Step 20

Invert the rear fuselage and pass extension leads for the two elevator servos and single rudder servo down the fuselage spine, and out through the access hole at the tailplane seat.



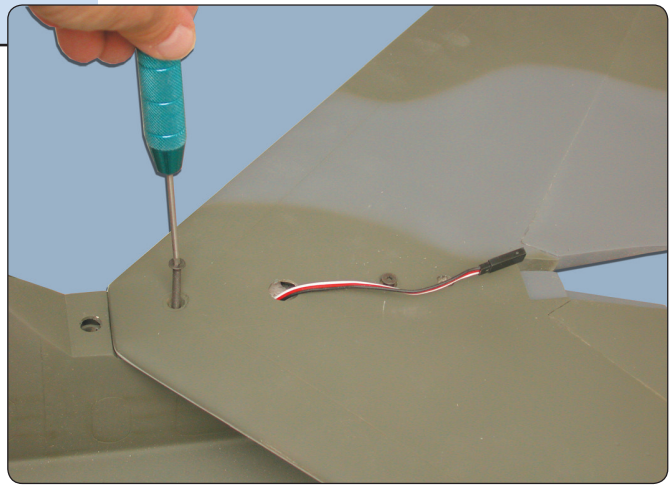
Step 21

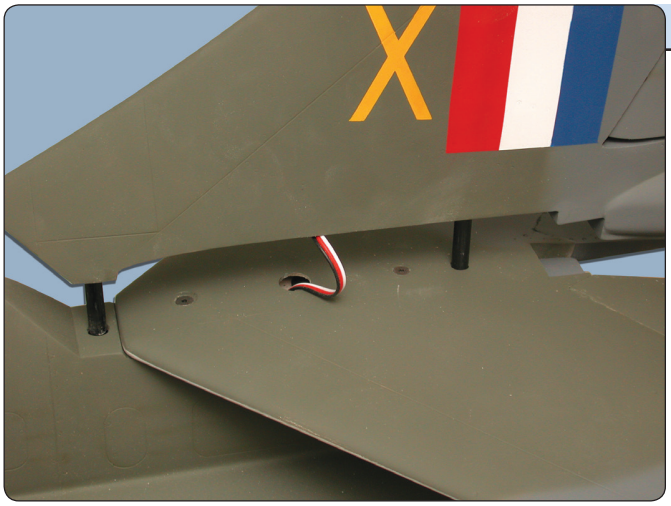
To retain and protect the extension leads we used some 1/16" balsa along the spine as shown, this being glued into place with PU glue or cyanoacrylate.



Step 22

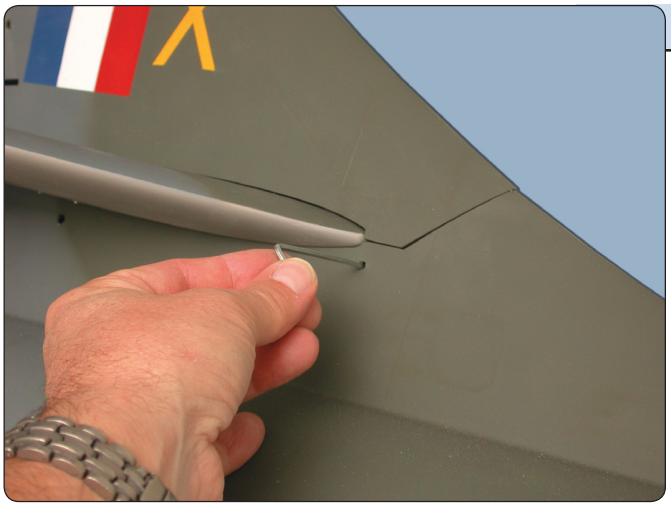
Connect the elevator servo leads to the elevator extension leads and tape the plug/socket together for security, then thread the rudder servo extension lead through the access holes in the tailplane, then fit the tailplane using the countersunk screws supplied. A small drop of threadlock on these screws should be applied to ensure they remain secure.





Step 23

Fit the fin/rudder, connecting the rudder extension lead to the servo lead at the same time – secure the connection with wrap of tape or similar. Note that the carbon mounting rods fit down through the tailplane and into the mountings in the fuselage.



Step 24

Tighten the two securing screws for the fin/rudder – note that these are U.S. screws so require the use of matching allen key.

Step 25

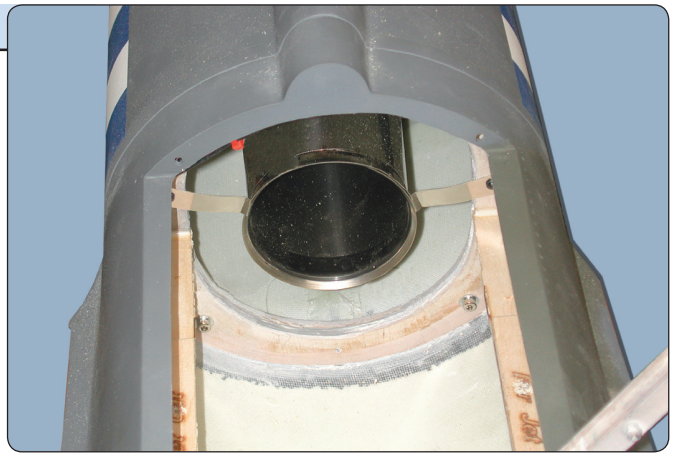
Depending on the turbine being used the extended sides of the ply turbine mountings may have to be cut away as shown. Offer the turbine to be installed to check, as well as the bypass moulding if this is being used.

Step 26 (For Non-Bypass installations only)

If using a Jetcat turbine or other turbine with offset mountings, the supplied blocks should be glued to the ply turbine mountings to raise the turbine to the correct position.

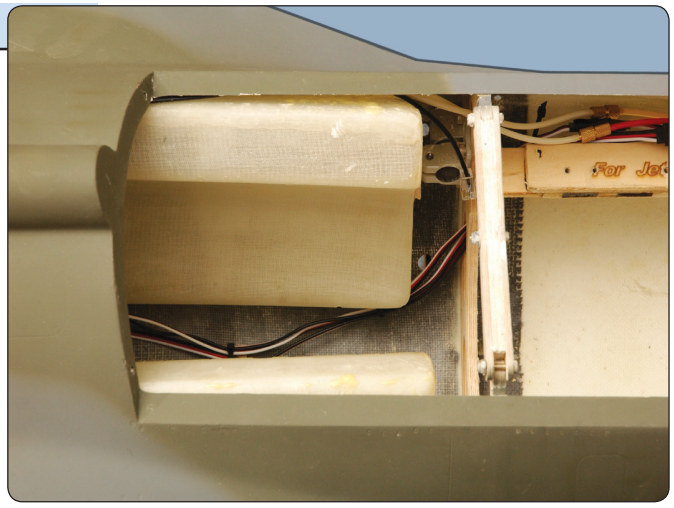
Step 27

Bolt the front and rear sections of the fuselage together using the four M4 bolts and washers supplied, then run the servo extension leads around the forward fuselage joint former, and then forward to the nose. Install the tailpipe into the fuselage and mount the two front support tabs to either the forward of the two fuselage joint formers if using a Non-Bypass installation, or to the turbine mounts if using a Bypass installation. Note this if using a Non-Bypass installation it will be necessary to obtain a suitable intake bellmouth for the tailpipe – this can be riveted into place or glued with silicon.



Step 28

Carefully install the two rear fuel tanks, using silicon adhesive to glue them to the fuselage. Take great care that silicon does not get onto the hinges for the inner main undercarriage doors. Tuck away all fuel tubing neatly and secure so that there is no chance of a pipe becoming kinked or twisted. Glue the front fuel tank into place ahead of the air intake ducts, and connect the fuel feed line from the rear tanks to the vent line from the front fuel tank. The vent line from the rear tanks should be connected to a short section of brass tube that is glued through a hole drilled in the bottom fuselage skin as an overflow.

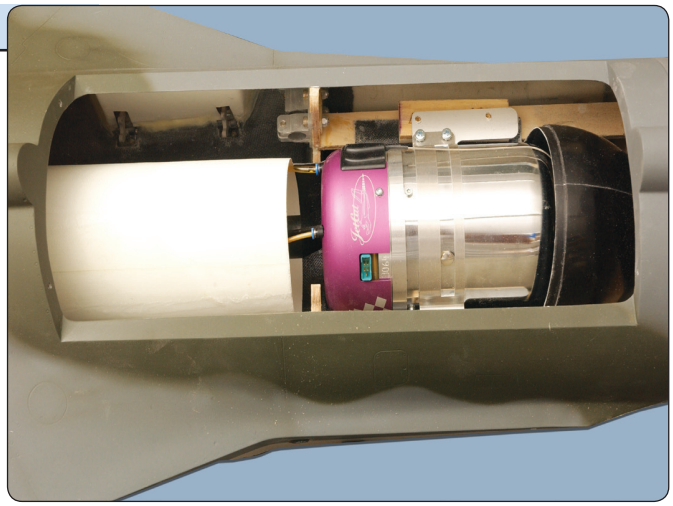


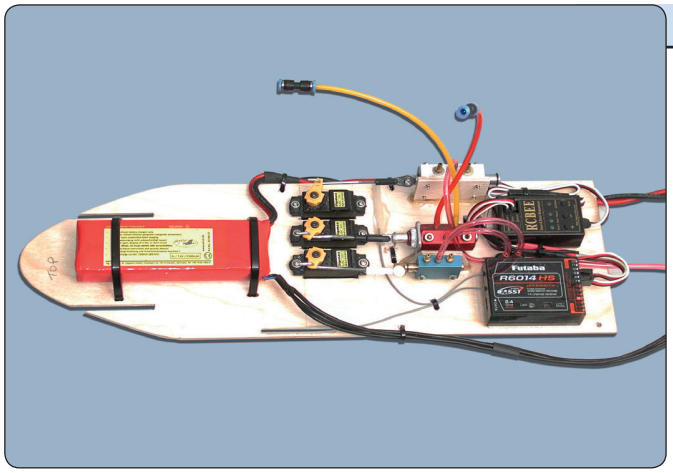
Step 29 (For Non-Bypass installations only)

Position the turbine being used centrally on the ply mounts, making sure that the gap between the rear of the turbine exhaust cone and the front of the tailpipe is as specified by the turbine manufacturer. Drill mounting holes and use suitably sized self tapping screws to mount the turbine, ensuring that the turbine is centrally positioned and aligned perfectly with the centreline of the tailpipe.

Step 30 (For Bypass installations only)

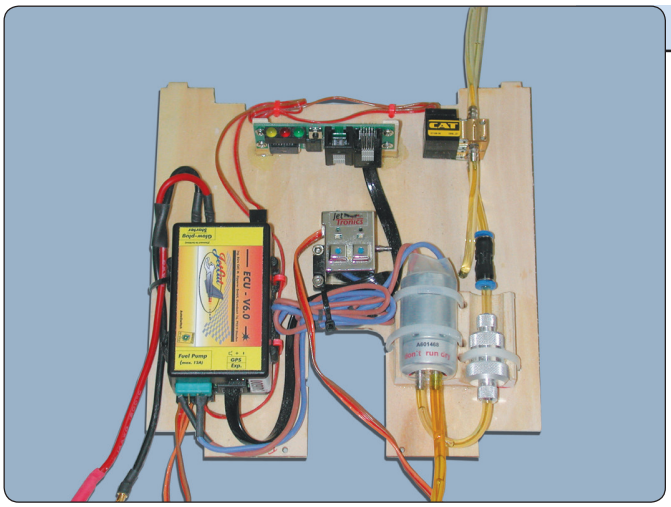
Trim the white intake trunking to length to suit the bypass moulding, then fit the tailpipe into the bypass, trimming the rear of the bypass to match the tailpipe diameter. Screw the bypass into place on the turbine mounts then add spacers if required (Jetcat and similar engines with offset mounts will require these). Finally, drill for and install turbine mounting screws, ensuring that the turbine is centrally positioned and aligned perfectly with the centreline of the tailpipe. The upper section of the bypass has to be trimmed to clear the turbine mountings, and it is then secured in place with four small self tapping screws.





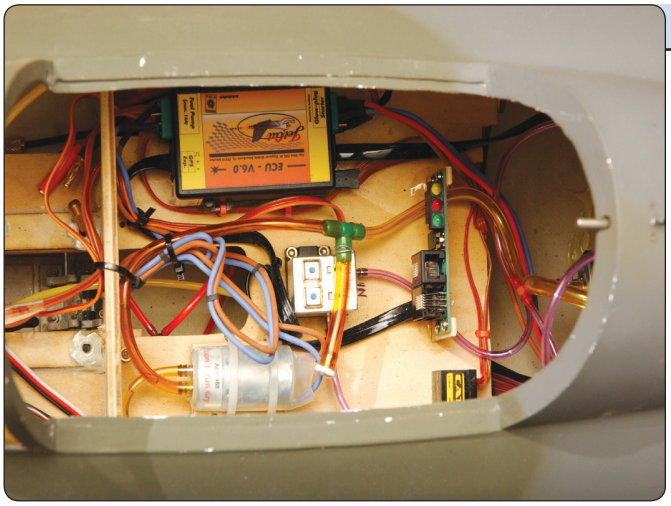
Step 31

To reduce as far as possible the amount of noseweight required we recommend installing all heavy equipment as far forward as is possible. An example of a possible layout is shown, with the ECU and Receiver battery pack being fitted above and below the front part of the forward equipment plate, with retract, door and brake servos and valves just behind, and receiver and sequencer at the rear. The forward equipment plate slots into the factory fitted support formers in the nose, and a small screw secures at the rear to the adjacent former.



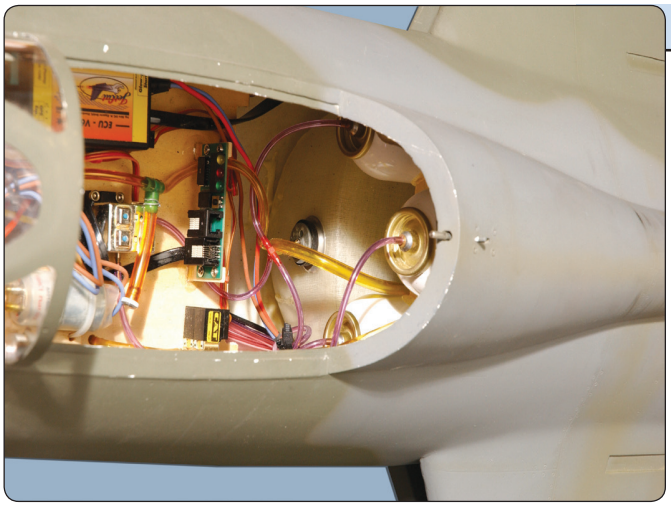
Step 32

The rear equipment plate can be used for the fuel pump, ECU, filter/s, valve/s etc as shown.



Step 33

Rear equipment plate is installed as shown, with tabs into the former at the rear, and a couple of screws at the front.

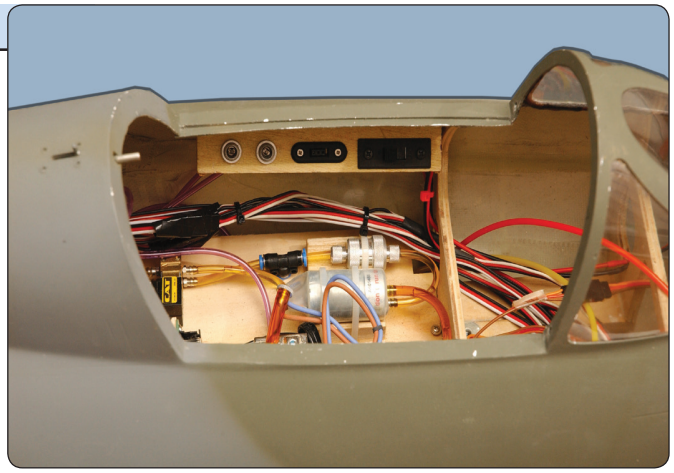


Step 34

Air tanks can be installed above the front fuel tank, either using silicon to glue into place or cable ties and hook & loop tape. The prototypes used one small tank for the wheel brakes and air brake, and one small and one large tank for the retracts and undercarriage door rams.

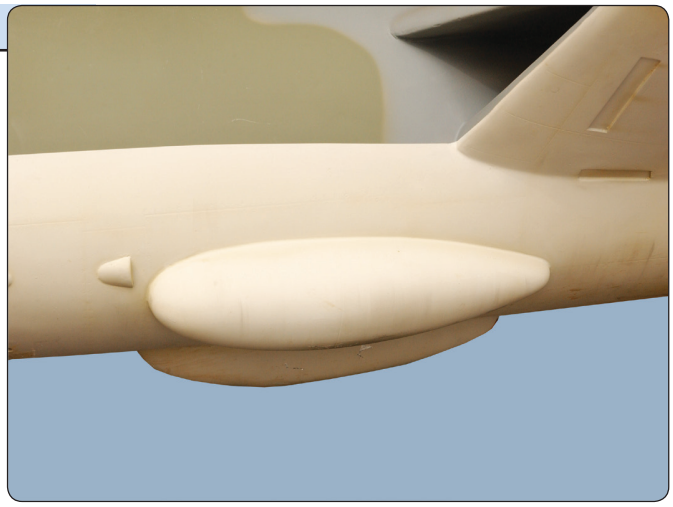
Step 35

Air fill valves, switch and charge socket can be mounted as shown using scraps of ply, and leaving room for the scale cockpit.



Step 36

If preferred, the underside bulges, nicknamed "Sabrina's" can be fitted – these were installed on many Hunters to catch the links when the cannons were fired. Small balsa blocks should be glued to the inner edges of the mouldings, and the matching section of the fuselage roughened, then the mouldings can be carefully glued into place, the balsa blocks enabling a secure bond between the mouldings and the fuselage.



Proceed to Next Stage "Final Assembly"

Step 37 Section: Final Assembly

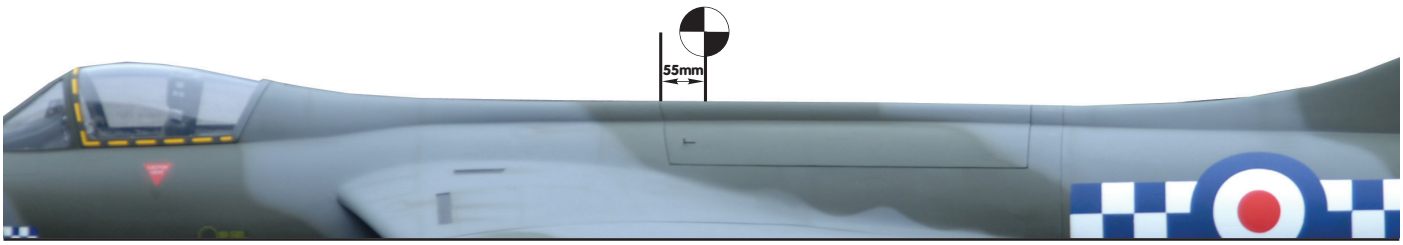
With the model completed it is vital to go through thorough checks of every part, as it is all too easy to forget to do up a screw tightly, or neglect to safety wire fuel tubing. Any jet requires very careful assembly and maintenance if it is to be safe and reliable, and the Hunter deserves this care 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 may 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 tanks 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 the Hunter is not a model that you will want to land with the undercarriage retracted, or even worse, half extended!

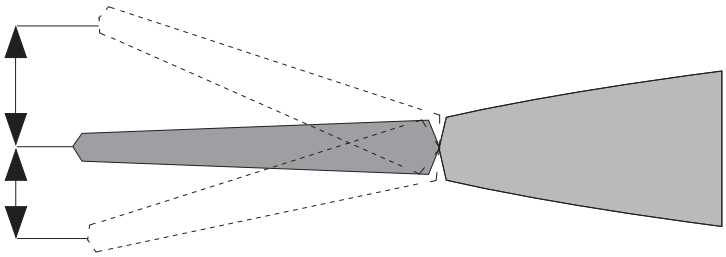
Step 38 Section: Center of Gravity

The balance point of the Hunter is 55mm behind the very front of the hatch cover on the fuselage, this should be measured with the undercarriage extended and with any header tank (if used) full.



Step 39 Section: Control Movements

Aileron:	25mm each way at root of aileron
Elevator:	20mm each way at root of elevator
Rudder:	30mm each way at root of rudder
Flap:	50mm deflection for take off 100mm deflection for landing



We strongly recommend the use of a long hard surface runway for first flights, particularly if this is the first swept wing jet model you have flown. The Hunter is a big 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.

For first flights we recommend the use of a large and open flying site with a good length of runway, not because the model is hard to fly, but in the event of a minor problem or turbine flameout, having plenty of runway available can make the difference between a safe landing and a wrecked model. If there is going to be a problem it is most likely to occur during the first few flights, so any extra time required to travel to a good open site can prove to be well worth the effort.

Do carry out thorough range checks before flying, both with the turbine off 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 and that all clevises and balljoints are secure. Any clevises being used must have keepers fitted for added security. Finally check the retracts and doors 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 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 is retracted as soon as possible, as the nosewheel retracts forwards and has to pull the rear nosewheel door closed – at higher flying speeds the loads on the leg and door become quite considerable, which the air ram may struggle to overcome. 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 flaps 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 Hunter 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 flaps can be lowered in stages until full flap is applied – note that more power will be required due to the increased drag of the flaps. You will find that the Hunter 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. Note that the underfuselage airbrake is intended for use during the normal flight regime as it was on the full sized aircraft, and not for use during the landing approach, however it can be used with care if the model is too high on final approach – be very careful if deploying then, as the airbrake is highly effective, and its misuse could result in the model descending more rapidly than anticipated. Do ensure that it is retracted before flaring for landing, as it will contact the ground if left deployed.

Happy and safe flying!

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