CARF-MODELS

Skygate Collection

BAE Hawk Mk 66

Assembly Manual

Thank you very much for purchasing our CARF Models Skygate Collection BAE Hawk, made with the revolutionary Total Area Vacuum Sandwich (TAVS) technology.

Before you get started building and setting-up your aircraft, please make sure you have read this instruction manual, and understood it. If you have any questions, please don't hesitate to contact your dealer, rep or CARF Models directly. Below are the contact details:

Email: feedback@carf-models.com
Telephone: Phone your CARF Dealer or rep - he will be there for you. A full list of dealers and reps can be found on the CARF website:- http://www.carf-models.com

Liability Exclusion and Damages

You have acquired a kit, which can be assembled into a fully working R/C model when fitted out with suitable accessories, as described in the instruction manual with the kit.
However, as manufacturers, we at CARF Models are not in a position to influence the way you build and operate your model, and we have no control over the methods you use to install, operate and maintain the radio control system components. For this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect application and operation of our products, or which are connected with such operation in any way. Unless otherwise prescribed by binding law, the obligation of the CARF Models company to pay compensation is excluded, regardless of the legal argument employed. This applies to personal injury, death, damage to buildings, loss of turnover and business, interruption of business or other direct and indirect consequent damages. In all circumstances our total liability is limited to the amount which you actually paid for this model.

BY OPERATING THIS MODEL YOU ASSUME FULL RESPONSIBILITY FOR YOUR ACTIONS.

It is important to understand that CARF Models is unable to monitor whether you follow the instructions contained in this instruction manual regarding the construction, operation and maintenance of the aircraft, nor whether you install and use the radio control system correctly. For this reason we at CARF Models are unable to guarantee, or provide, a contractual agreement with any individual or company that the model you have made will function correctly and safely. You, as operator of the model, must rely upon your own expertise and judgement in acquiring and operating this model.

Attention !

This 'jet' aircraft is a high-end product and can create an enormous risk for both pilot and spectators,

if not handled with care & used according to the instructions. Make sure that you operate your 'Hawk' according to the laws and regulations governing model flying in the country of use. The engine, landing gear, servos, linkages and control surfaces have to be attached properly. Please use only the recommended servos and accessories. Make sure that the 'Centre of

Gravity' is located in the recommended place. Use the nose heavy end of the CG range for your first flights. A tail heavy plane can be an enormous danger for you and all spectators. Fix any weights, and heavy items like batteries, very securely into the plane. Make sure that the plane issecured properly when you start the engine. Have a helper hold your plane from the nose before you start the engine. Make sure that all spectators are far behind, or far in front, of the aircraft when running up the engine. Make sure that you range check your R/C system thoroughly before the 1st flight. It is absolutely necessary to range check your complete R/C installation first WITHOUT the engine running. Leave the transmitter antenna retracted or in the case of 2.4ghz depress the range check button, and check the distance you can walk before 'fail-safe' occurs. Then start the engine, run at about half throttle and repeat this range check. Make sure that there is no range reduction before 'fail-safe' occurs. If the range with engine running is less then with the engine off, please DON'T FLY at that time. Check that the wing and stab retaining bolts are tight, and that all linkages are secured. Please don't ignore our warnings, or those provided by other manufacturers. They refer to things and processes which, if ignored, could result in permanent damage or fatal injury.

Important/General Notes

Servo Choice
We strongly advise that you use the recommended servos and equipment listed in the manual.

Servo Screws
Fix the all the servos into the milled plywood servo mounts using the 2.9 Ø x13mm or 16mm sheet metal screws provided in the kit, not the standard screws normally supplied with servos by the servo manufacturer. This is because all the holes in our milled servo mounts are 2mm diameter, due to our CNC manufacturing process, and this is too big for the normal screws

Building Sequence
The actual building sequence is your choice, but it is usually most efficient to start at the back of the fuselage and work forwards.

Take Care
Composite sandwich parts are extremely strong, but fragile at the same time. Always keep in mind that these contest airplanes are designed for minimum weight and maximum strength in flight. Please take care of it, especially during transport, to make sure that none of the critical parts and linkages are damaged. Always handle your airplane with great care, especially on the ground and during transport, so you will have many hours of pleasure with it. To protect the finished paint on the outside of the model from scratches and dents during building, cover your work table with a piece of soft carpet, cloth or bubble- plastic. The best way to stop small spots of glue getting stuck to the outside painted surfaces is to give the whole model 2 good coats of clear car wax first, but of course you must be sure to remove this 100% properly before adding any additional paint, markings or trim.

Adhesives and Solvents
Not all types of glues are suited to working with composite parts. Here is a selection of what

we normally use, and what we can truly recommend. Please don't use inferior quality glues - you will end up with an inferior quality plane, that is not so strong or safe. Jet models require good gluing techniques, due to the higher flying speeds, and hence higher loads on many of the joints. We highly recommend that you use a slow filled thixotropic epoxy for gluing highly stressed joints (eg: Hysol 9462). The self-mixing nozzles make it easy to apply exactly the required amount, in exactly the right place, and it will not run or flow onto places where you don't want it! It takes about 1 - 2 hours to start to harden so it also gives plenty of time for accurate assembly. Finally it gives a superb bond on all fibreglass and wood surfaces. Of course there are many similar glues available, and you can use your favourite type.

1. CA glue 'Thin' and 'Thick' types. We recommend ZAP, as this is very high quality.
2. ZAP-O or Plasti-ZAP, odourless, or ZAP canopy glue 560 (for clear canopy)
3. 30 minute epoxy (stressed joints must be glued with at least 30 min & NOT 5 min epoxy).
4. Loctite Hysol 9462 or equivalent (optional, but highly recommended)
5. Epoxy laminating resin (12 - 24 hr cure) with hardener.
6. Milled glass fibre, for adding to slow epoxy for stronger joints.
7. Micro-balloons, for adding to slow epoxy for lightweight filling.
8. Thread-locking compound (Loctite 243, ZAP Z-42, or equivalent)

We take great care during production at the factory to ensure that all joints are properly glued, but of course it is wise to check these yourself and re-glue any that might just have been missed. When sanding areas on the inside of the composite sandwich parts to prepare the surface for gluing something onto it, do NOT sand through the layer of lightweight glasscloth on the inside foam sandwich. It is only necessary to rough up the surface, with 80/120 grit, and wipe off any dust with acetone or de-natured alcohol (or similar) before gluing to make a perfect joint. Of course, you should always prepare both parts to be joined before gluing for the highest quality joints. Don't use Acetone for cleaning external, painted, sur- faces as you will damage the paint. Tip: For cleaning small (uncured) glue spots or marks off the painted surfaces you can use old-fashioned liquid cigarette-lighter fuel, like 'Ronsonol' or equivalent. This does not damage the paint, as Acetone and many other solvents will, and this is what we use at the factory. At CARF Models we try our best to offer you a high quality kit, with outstanding value-for-money, and as complete as possible. However, if you feel that some additional or different hardware should be included, please feel free to let us know. Email us: feedback@carf-models.com. We know that even good things can be made better !

Did you read the hints and warnings above and the instructions carefully? Did you understand everything in this manual completely?

Then, and only then, let's start assembling your Skygate Collection Hawk
If not, please read it again before you continue.

Accessories

This list will help you chose the main additional items needed to finish your Skygate Collection BAE Hawk.

Some of the recommendations are mandatory and some can be sourced and chosen by you. The items we list here are highly recommended by CARF Models, and have been tested on various prototype aircraft used during the development of this aeroplane.

1. Servos (minimum 8 high quality servos) All the main control surfaces require a minimum 20kg digital servo (two matched servos for the elevator control) such as the JR 8711 metal geared servos. All the prototype Hawk models used JR 8711 servos.

2. Heavy duty aluminium servo arms are recommended for all flight surfaces

3. A receiver power supply system like the excellent Powerbox units are recommended using two separate batteries through separate regulators. We used the PowerBox Cockpit SRS unit for the example in this manual.

4. Turbines in the 160 - 200N thrust range have been used in the prototype aeroplanes. We used a JetCat 180RX in the example for this manual.

5. Scale retractable Landing Gear sets are available from CARF Models (item no. 130500). The Hawk was designed specifically around the German manufactured high quality sets that include three units, plus specifically manufactured trailing link legs with associated ball raced wheels and high quality brake units. A landing gear support pack is also available (item no. 130600). We strongly recommend you use this proven high quality set comprising Jet Tronic valves, all gear door rams, tubing, t-pieces and filler.

7. CARF models recommend a quality system radio system is used with 9 or preferebaly more channels to allow individual servo connections to the receiver system. High quality extension leads are required and a guide to the sizes and quantities required are listed below.

8. The Hawk features a large cockpit area which benefits from some additional detail. A very detailed scale cockpit kit is available from CARF models to really complete your aircraft (item no. 130400)

9. CARF Models also have available an optional Speedbtake and associated pneumatic set.

Hardware List

Nose Cylinders

M3 x 15 plus nylock x 2 pcs
M2 x 10 plus nut x 2 pcs
Plastic ball link to take M3 rod and M2 bolt x 2 pcs

Nose gear

M3 x 10 x 4pcs for n/g servo mounting
M3 dome head x 1pc
30mm M3 threaded rod x 1 pc
M3 ball link
M3 clevis
M3 x 10 bolt x 1pc
Large self tapping screws for N/G mounting x 4pcs

Intakes

2.9 x 13 sheet metal x 2pcs

Gear doors

M4 x 20 plus spike nuts x 2 pcs
M3 clevis x 2 pcs
M4 x 15 plus nylock x 4pcs
M2 ball links x 4pcs plus M2 threaded rod

Fuselage joining

M4 x 30 plus washer x 4pcs
M4 x 40 plus washer x 2pcs

Turbine / tailpipe mounting

M4 x 20 plus washer x 4pcs (8 pcs ideally if using 180 class turbines)
3mm pop rivets x 4pcs OR 2.9 x 10 self tapper x 4 pcs
2.9 x 10 sheet metal x 2 pcs for tailpipe rear mount

Elevator servos

2.9 x 13 sheet metal x 8pcs
M3 ball links x 4pcs
M3 threaded rod 60mm x 2pcs
M3 x 12 x 2pcs
M3 x 15 plus nylock x 2pcs

Canopy

1 x canopy spring canopy release mechanism

Horizontal stab

M4 x 20mm plus 2 washers plus nylock x 1pc
M4 x 35 plus washers x 4pcs
M3 x 15 x 1 pc for stab cover

Vertical stab

M3 x 15 plus nylock for rudder horn x 1pc
Metal ball link to take M3 rod and M2 bolt x 1pc
M2 x 10 plus nut x 1pc
M3 threaded rod 105mm x 1pc

Wings

M3 x 135mm threaded rod x 2pcs
M3 x 90mm threaded rod x 2pcs
M3 metal ball link with M2 fixing x 4pcs
M3 metal clevis with 3mm pin and circlip x 2 pcs
M2 x 15 screw and nut x 2pcs
M3 nut x 4pcs
2.9 x 13 sheet metal x 16pcs
2.9 x 10 sheet metal x 8 pcs
M3 ball link x 2pcs
M3 x 15 with nylock x 2pcs
M6 x 40 x 2pcs
8 x large self tappers for gear mounting

Thrust Tube Assembly and Turbine Installation

The thrust tube is manufactured as a stainless steel inner pipe rolled and spot welded for you at the factory. At the tail end of the pipe there is an outer aluminium augmenter designed to help draw cool air through the fuselage and over the pipe as well as to give a scale appearance.

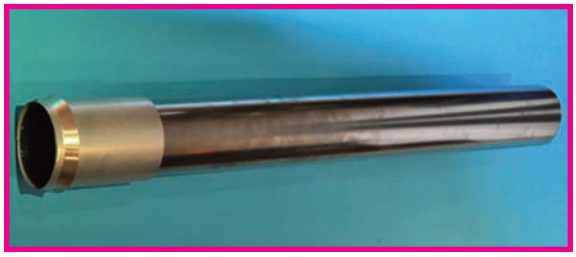


Fig. 1

This tube is designed to work with the sizes of turbine intended for the BAE Hawk. Turbines in the 180 to 200N thrust class are perfect.

The first job is to fix the carbon bellmouth to the stainless inner tube. The bellmouth is designed to go inside the tail pipe and be fixed by M3 cap head screws or pop rivets if available to you.

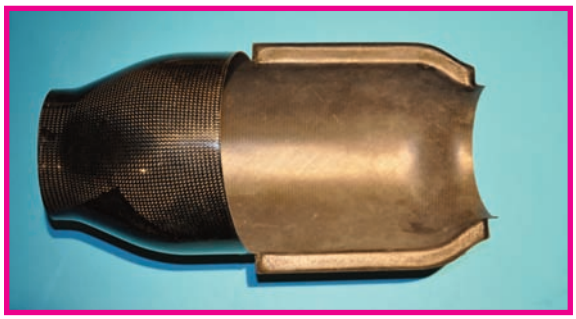


Fig. 2

The Hawk was designed without full ducting and the numerous examples in existence built as the original Skygate models have used this system perfectly. It has been found howver that it is a good idea to trim the bottom of the bypass as shown as it benefits thrust output particularly when using turbines at the lower end of the scale.

Start by locating the 2 ply pieces which are CNC cut to fit in the bypass as shown. These can be fixed in place with epoxy.

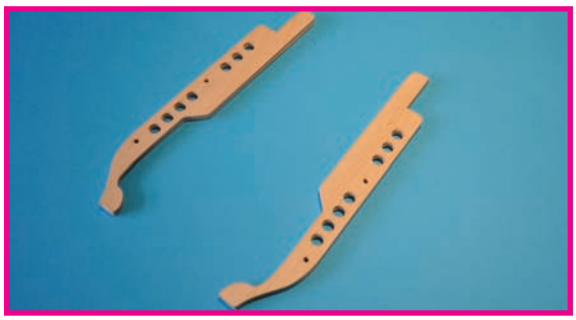


Fig. 3

In this example we fitted the thrust tube to the bypass before trimming the bypass but trimming can be carried out at any stage.

The pipe is made to fit securely over the bypass. The best way to join the two pieces is to bring them together and then rotate one or the other so the pipe slides over and on to the bypass. Slide it up to the point it can go no further where the diameter of the bypass diverges to form the bellmouth. It must cover the bellmouth by at least 12mm.

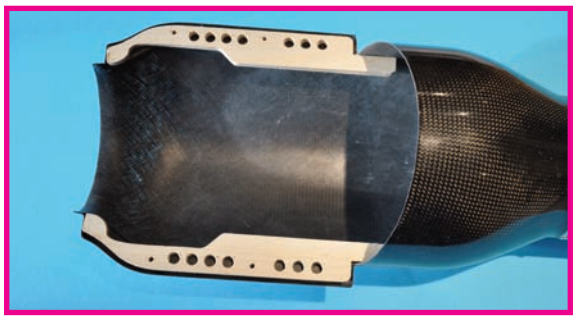


Fig. 4

The setup has been designed to position the seam of the pipe at the very top. Once you have fitted the pipe you must check that it is square before permanently attaching the two pieces. Then mark and drill the pipe through the bypass Ø3mm, at 4 points equally spaced around the pipe. Secure with 4 x pop rivets supplied.

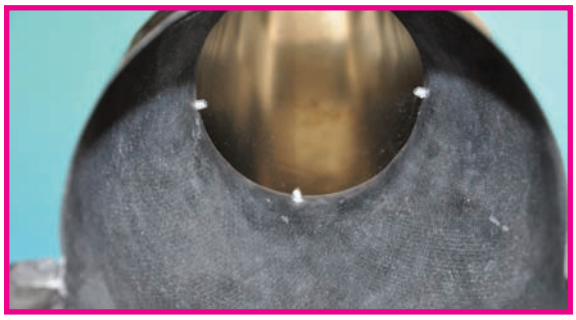


Fig. 5

At this point the bypass can be measured for trimming. See figure 5 and 6 to show how to mark and measure the area to be cut. Trim outside of the cut lines with a dremel or suitable rotary tool and tidy with files as appropriate.

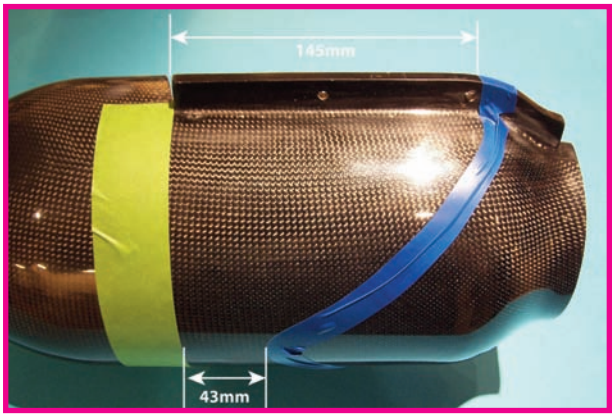


Fig. 6

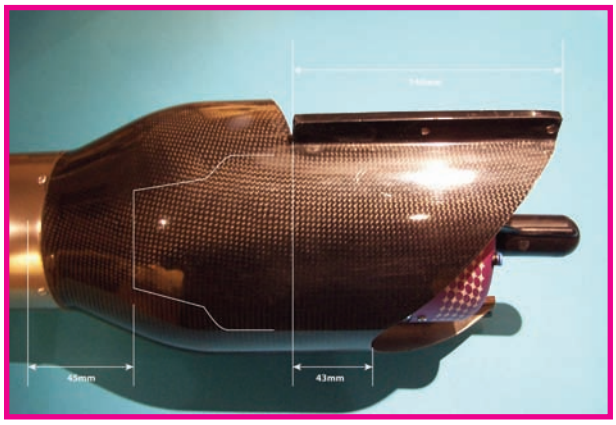


Fig. 7

We then move on to fitting the turbine. It is easiest to do this whilst the assembly is outside the model as the thrust pipe / bypass / turbine is effectively a self contained unit. This manual describes fitment of the JetCat P180RX turbine however the bypass and mounitng rails will accommodate a larger case turbine such as the JetCat P200SX without modification.

The rear of the tailcone of the turbine should be set at 45mm from the rear edge of the bypass (see figure 6). Ensure this measurement is carried out carefully. Once you have this position set, ensure the turbine is central within the pipe by observing through the rear end of the pipe. Adjust as necessary and drill the 4 mounting holes Ø3.2mm then tap to M4. To provide additional strength to the cut threads apply a drop of thin cyano to each hole and allow to set. Mount the turbine with 4 x M4 allen head screws and re-check positioning.

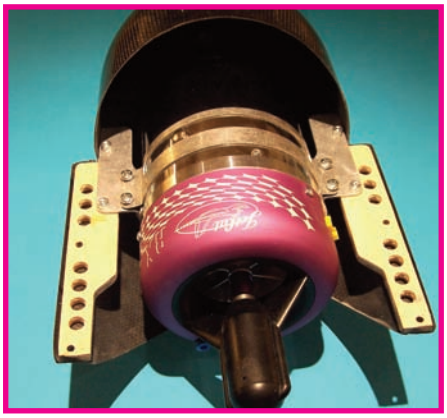


Fig. 8

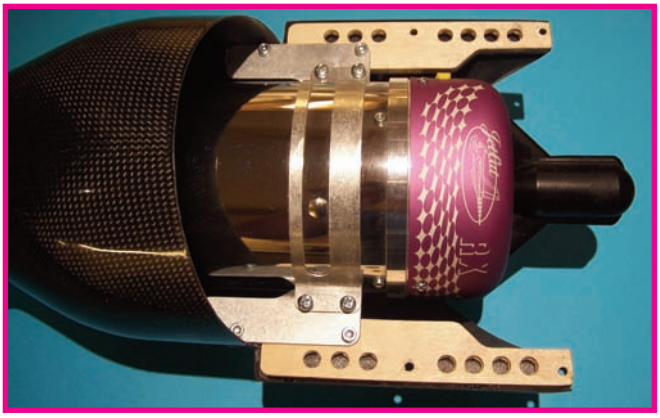


Fig. 9

The turbine assembly can now be installed in the fuselage as a complete unit. Feed the pipe through the rear half of the fuselage and position so the bypass is centred on the bearers and at the rear the outer flange piece running at 45 degrees to the tailpipe is just within the rear of the fuselage - see figure 9. You will notice there are 4 pre drilled holes in the ply pieces fitted to the bypass in figure 4. These holes can be used to drill through to secure the turbine assembly to the bearers. We recommend using a 90 degree drill attachment to achieve this easily. Drill Ø3.2mm then tap to M4 and apply a drop of cyano to the thread leaving to set before inserting screws. Fix with M4 allen head screws and washers.

The rear of the thrust tube must be supported in some way to stop it from moving up / down or left / right. Early kits are not shipped with a fixing method but one can make up a ply piece as shown above to secure the tube. Some support may be needed at the bottom as well.

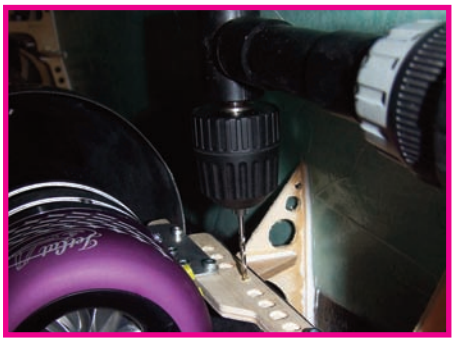


Fig. 10

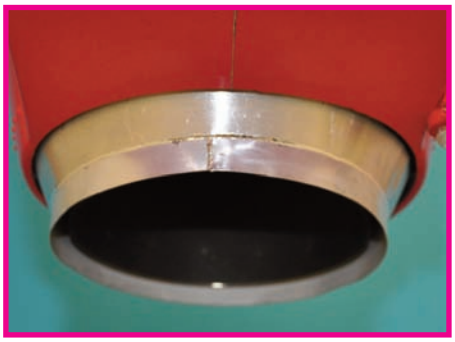


Fig. 11

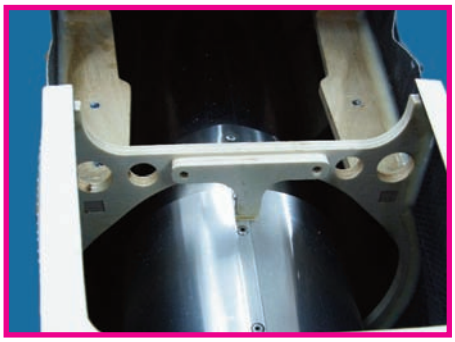


Fig. 12

Fuel tank

CARF Models offer an optional moulded Kevlar fuel tank of 5.2 ltr capacity, which is installed in the fuselage on the C of G . The tank is moulded with a deeper rear trough to retain fuel towards the end of the tank and a blister in the front forward section for the vent to go up to allowing maximum fill capacity.

Before starting assembly of the moulded tank it is important that any manufacturing debris left over in the tank is washed out. Washing the tank with warm water and some washing detergent works well. Ensure the tank is completely dry before you assemble it.

The tank comes fully joined and has been tested in the factory for leaks. The recommended hardware is provided in the kit. Take great care when you are assembling all parts of the fuel system . To start with de-burr inside the brass tubing with a new sharp scalpel blade and remove any raised edges on the outside caused by cutting. To aid sealing and help prevent the fuel tube coming off, solder the short lengths of tube provided a few mm back from each end of the feed line and on the outside of the breather line only.

Fig. 13

Use Tygon tube for the clunk line, where the clunkline passes through the baffle insert a section of brass tube as the glass fibre edge can easily cut through the tygon tube. The supplied soft clunk will become heavier when charged with fuel and easily reach all areas of the fuel tank.

Affix a small piece of tygon to the top pf the breather pipe cut at an angle on sides as shown in figure 14 so there is less chance of the breather being obstructed. The breather should be fashioned to so the top protrudes into the blister at the top of the tank made for this purpose.

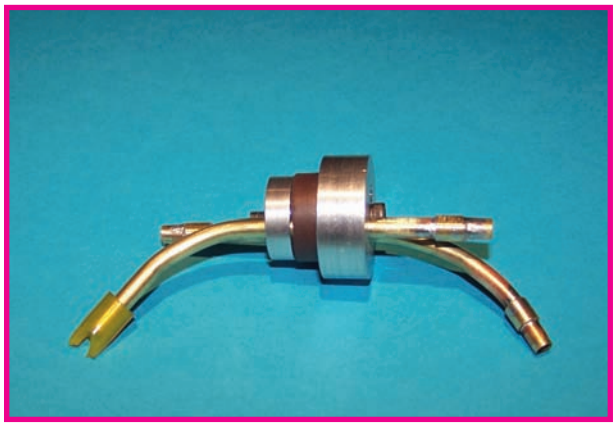


Fig. 14

The tank is very easily installed in the airframe on to the pre-formed tray in the rear fuselage and secured with the velcro straps provided. At this point you may wish to consider where you will want to place your turbine and radio anicllaries. Unlike many jet models the Skygate Hawk does not need all equipment to be as far forward as possible. As you will see from figure 16 we have placed the turbine ancillaries on top of the fuel tank. This is ideal, not only by allowing for short lines between tank, fuel pump and turbine but also allows for the rear section to be more self contained should you wish to remove the front fuselage section for transport.

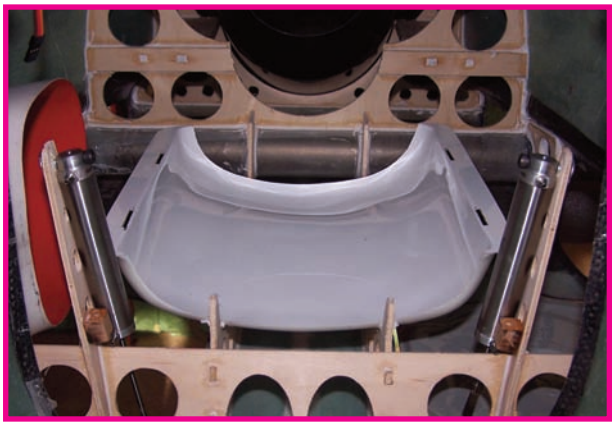


Fig. 15

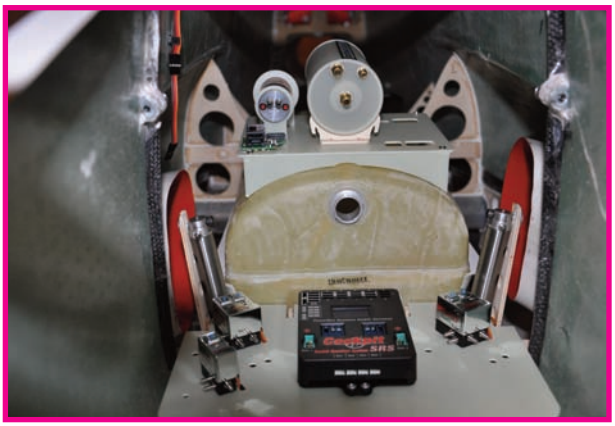


Fig. 16

Tailplane description

The Hawk features an all flying tailplane that is easily removable for transport.Access to the tailplane mount support is through a factory fitted rear fuselage hatch held in position by two pins at the front and a single M3 screw at the rear. The tailplane itself is actuated by means of a 6mm carbon tube with rose jointed fitting going forward to the two elevator servos mounted behind the canopy opening. The tailplane bolts to two substantial rose jointed bearing blocks. You may feel that these mounting blocks are a little stiff to the touch. This is normal , please do not try to loosen up in any way as this is a highly precision fitting.

IMPORTANT NOTE: On early kits the elevator servos are fitted towards the front of the fuselage with a carbon pushrod actuating the tailplane. The following work **MUST** be carried out on the pre-fitted elevator pushrod. Do not skip this step.

You will notice there is a join in the pushrod assembly with a sleeve over the join approx 200mm from the front end of the pushrod. This area needs to be worked as follows:-
1) Use a dremel with sanding drum and grind the reinforcement sleeve down as much as you can.
2) Prepare some 80g/sqm 10 cm (4") wide fiberglass and mix some laminating resin or 30 min epoxy (or Hysol/Aeroproxy)
3) wrap at least 4-5 layers of this 80g (4oz) glass cloth in full width around the joint area and soak it with the resin/epoxy glue.

The above work is absolutely necessary to attain the strongest joint. Once completed it will provide for a very secure mechanism. Later kits are provided with a method of installing the elevator servos in the rear behind the stab.

Main tailplane assembly

A piece of material is provided to attach between the bearing blocks in order to keep their position making it easier to attach and detach the taiplane for transport. To fit this piece, line up the blocks

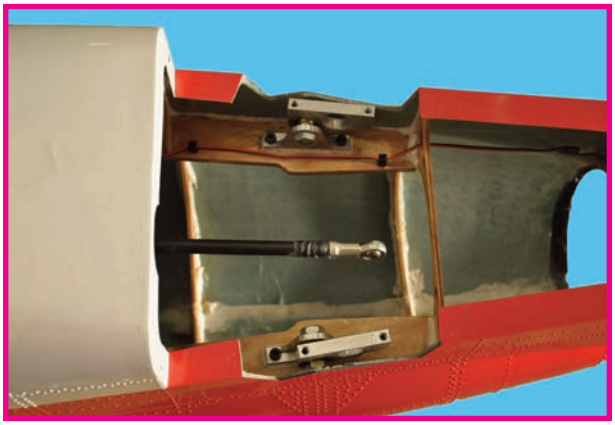


Fig. 17

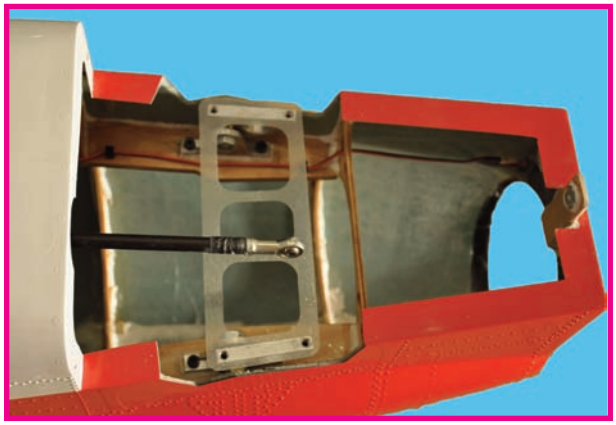


Fig. 18

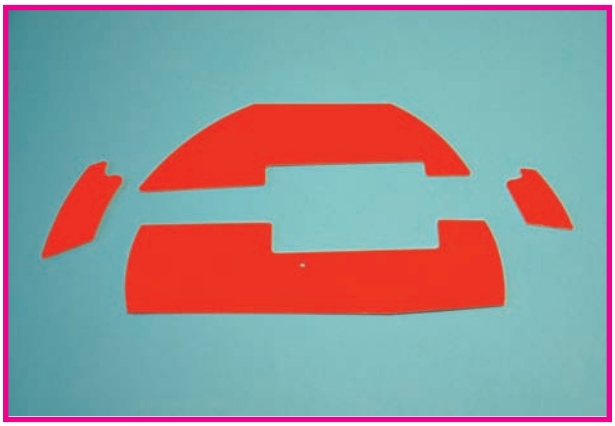


Fig. 19

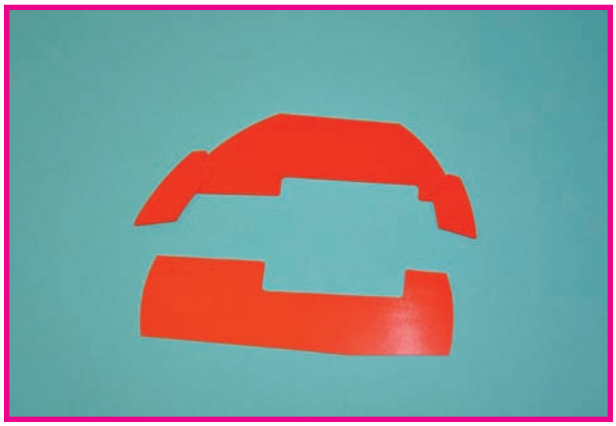


Fig. 20

and bolt the tailplane to them and then unbolt, carefuly remoiving the tailplane without disturbing the blocks. You can then attach the holding piece to both blocks with a few drops of cyano. Make sure you do not get any cyano in the threads of the bearing blocks.
It is advisable at this point to fit the “bacon slicers” to the tailplane. These are not functional in any way on the model but are a scale feature and enhance the looks of the aircraft. Assemble the parts provided by gluing the 2 smaller side pieces for each unit to the top half as shown in figure 20. Temporarily fix the tailplane in place on the aircraft and then tack the top and bottom half of the “bacon slicers” to the central tailplane block with cyano ensuring that there is no binding against the fuselage. Install the top hatch and again check there is no binding in this area. When you are happy with the position fix in place permanently with hysol or similar.

Fig. 21

Secure the tailplane assembly to the bearing blocks using the 4 of M4 x 35mm allen bolts with washers.

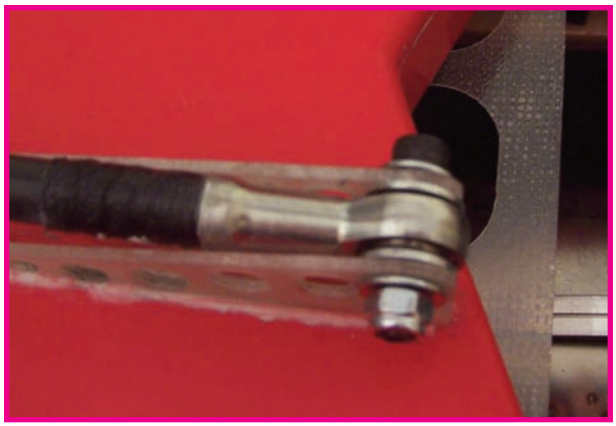


Fig. 22

To attach the taiplane assembly to the elevator pushrod use the M4 x 20mm allen bolt with nylock using a total of 4 washers - one each side of the rose joint on the pushrod and one each at the outer nut and bolt end. For ease of mounting and dismounting you can cyno the inner washers to the glass uprights. Make sure before each flying session that all bolts are suitable tight and there is no binding in the mechanism.

Elevator servos

The elevator servos are mounted in the top of the rear fuselage just behind the canopy opening. CARF Models recommend each servo to be at least 25kg of torque. We have used 2 x JR8711 servos fitted with 1.25 inch aluminium servo horns. Nylon or plastic servo horns must not be used here. Installation is very simple using 4 of 2.9 x 13 sheet metal screws supplied for each servo. Using the two

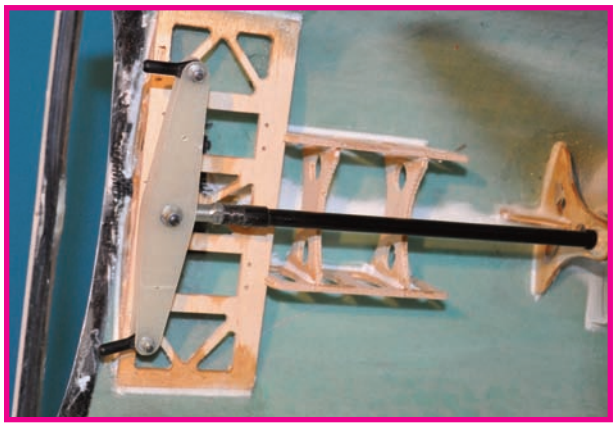


Fig. 23

lengths of 60mm M3 rod supplied make up one pushrod for each elevator with an M3 ball link supplied on one end and screw into the M3 ball links already attached to the elevator pushrod assembly. The pushrod length should be 87mm between centres. For extra strength you can sleeve the pushrod with brass or carbon tube.

Make sure both servos are centred and moving in the correct direction to work together moving the tailplane up and down before attaching.

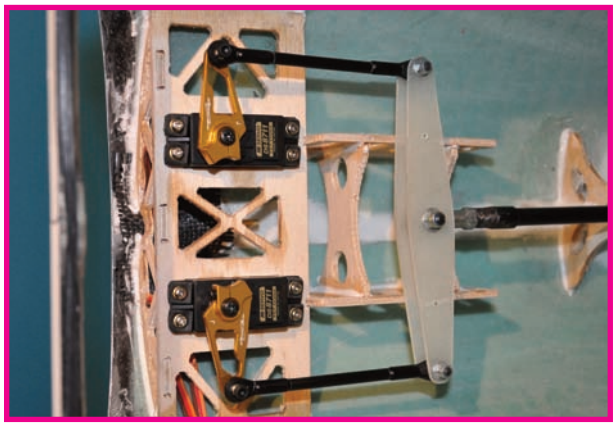


Fig. 24

Ventral Fins

Install the ventral fins in the rear of the model before final fit of the turbine and thrust tube assembly. The three tabs on each fin should be scuffed with a sheet of sandpaper before inserting on the pre cut slots in the bottom of the fuselage note the larger end of the fin is towards the front of the fuselage. From the inside of the fuselage apply enough thick cyano at each of the three mounting tabs to ensure a secure bond to the pads.

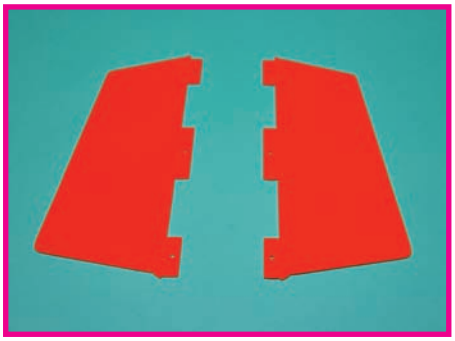


Fig. 25

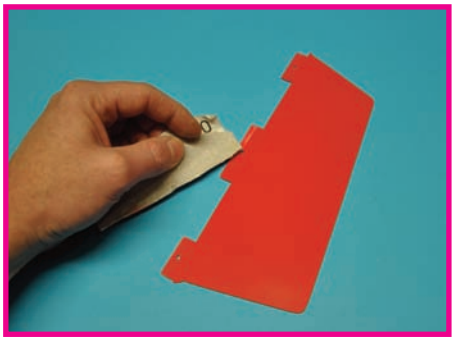


Fig. 26

Fig. 27

Vertical Stabiliser / Fin & Rudder Assembly

The fin assembly is supplied virtually completed for you with the rudder pre-hinged and control horns in place. All you have to do is fit the servo and pushrod assembly.

CARF Models recommend a 25kg digital servo for the rudder such as the JR8711. The servo mounting

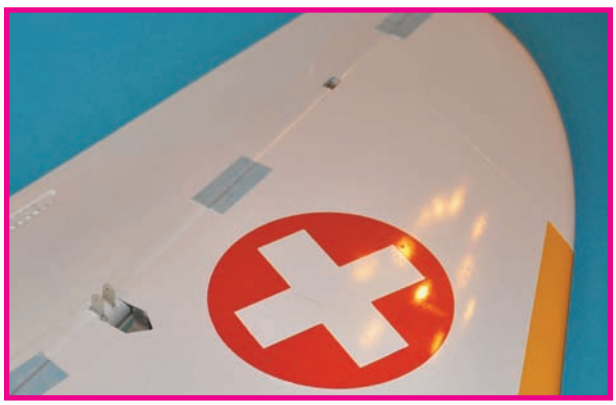


Fig. 28

plate is integral to the fin structure and the mounting holes are pre drilled for you. Before installing the servo make sure it is centred and fit a high strength servo arm (aluminium or carbon reinforced is recommended). A 10 - 11mm arm is the maximum size that will fit in this area. This length of arm will give plenty of rudder throw. Again before installing the servo in the fin attach the metal ball link supplied with M2 screw and nut, securing with loctite. Now you are ready to install the servo in the fin with 4 of 2.9 x 13mm sheet metal screws. You will find you need to attach a short extension lead - 100mm or so to the rudder servo.

Fig. 29

Taking the 105mm M3 threaded rod supplied for the rudder pushrod, screw on one of the M3 ball links supplied to one end. For the next step you might find it easier to remove the rudder form the fin. This is done by simply pulling out the piano wire hinge from the bottom of the rudder. This will give you access to screw the open end of the pushrod through the rear of the fin and into the ball link attached to the servo arm earlier. Take note from the pictures that the rudder pushrod is operated on a “diagonal” plane to give the best throws without any binding.

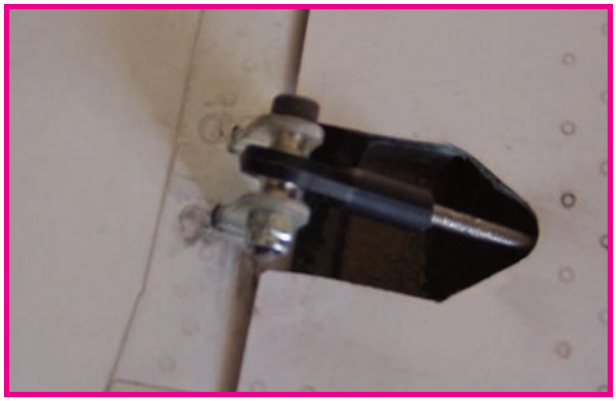


Fig. 30

Re-attach the rudder ensuring the piano wire has not missed any of the hinge points and affix the rudder ball link with M3 x 15 allen screw and nyloc nut.

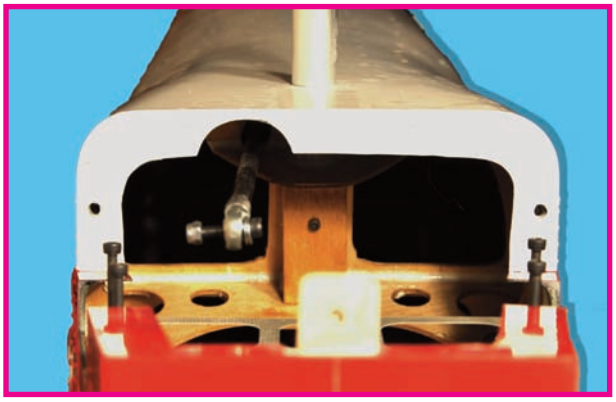


Fig. 31

The fin assembly is secured to the fuselage using the supplied aluminium spar which you will find is pre drilled and fitted with an M3 captive nut for securing inside the rear of the fuselage - see figure 31.

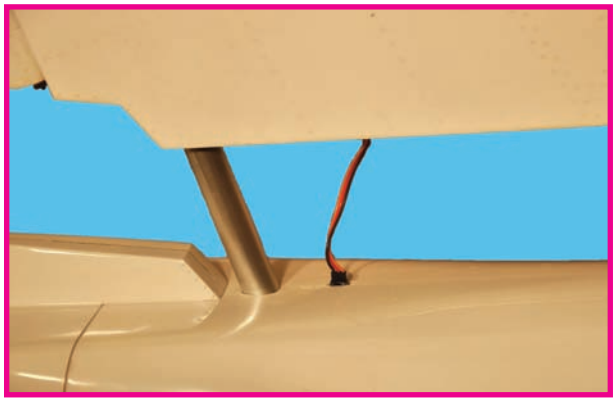


Fig. 32

Using a dremel tool or similar cut an opening for the

servo extension lead to exit the top of the fuselage near the fin post - see figure 32.

The fin fits over the aluminium fin post at the rear and locates with the carbon peg at the front, finally securing with an M3 x 15 allen bolt at the very front.

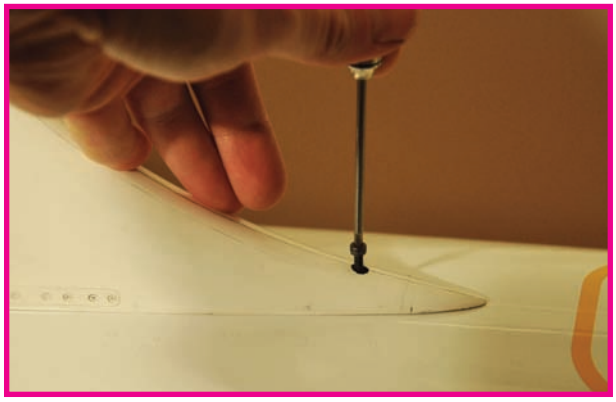


Fig. 33

Wings

The wings have been largely pre-finished for you at the factory. The ailerons and flaps are all hinged and control horns glued in so all you need to do is install your servos, the landing gear and the small scale parts to the leading edge and top surface of the wing.

Aileron

In the small wood pack you will find ply pieces to make up the aileron servo mounts. Clean the pieces with sandpaper and assemble with cyano making sure all joints are secure. For aileron actuation CARF Models recommend 25kg torque digital servos such as the JR8711. Use a suitable aluminium servo arm. We have used a JR unit installing the clevis to the hole 19mm from centre.

Screw the aileron servo with arm installed to the poly servo mount using 2.9 x 13mm sheet metal screws supplied and cyano in position on the aileron servo hatch which you have rubbed with sandpaper around the gluing area. Take care not to glue the servo itself to the hatch. Once the cyano has cured, remove the servo and apply a bead of hysol or similar around the mounting area. You MUST also add a small piece of fibreglass all around the mount and soak with epoxy to ensure the parts are securely bonded.Once cured, re-install the servo.

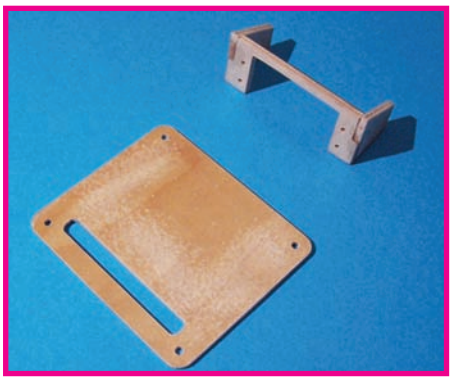


Fig. 34

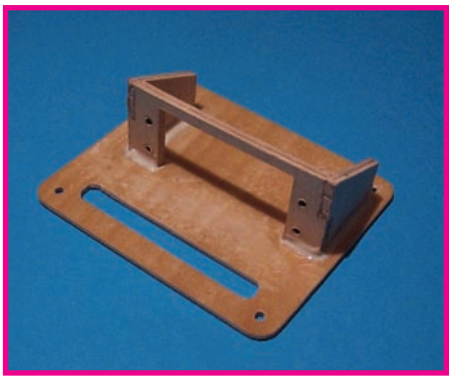


Fig. 35

Fig. 36

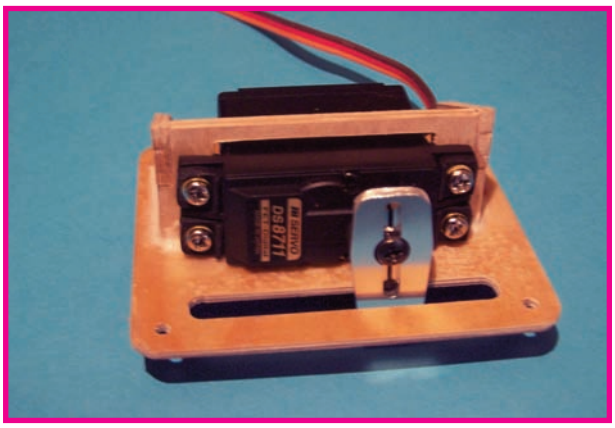


Fig. 37

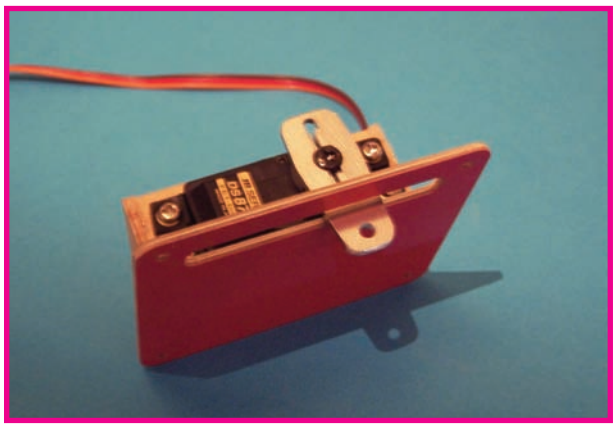


Fig. 38

The aileron servo linkage is made up using the M3 x 90mm threaded rod with 3mm ball link at one end and M3 aluminium clevis with 3mm pin at the servo end. Add a length of brass or carbon tube to the outside of the pushrod for extra strength if deired. Attach the ball link end to the aileron horns with the M3 x 15 allen screw and nyloc nut supplied. Once you are happy with aileron throws and movement you can affix the supplied plastic fairings to cover the mechansim. The servo hatch / mount is fixed to the wing with 2.9 x 10mm sheet metal screws.

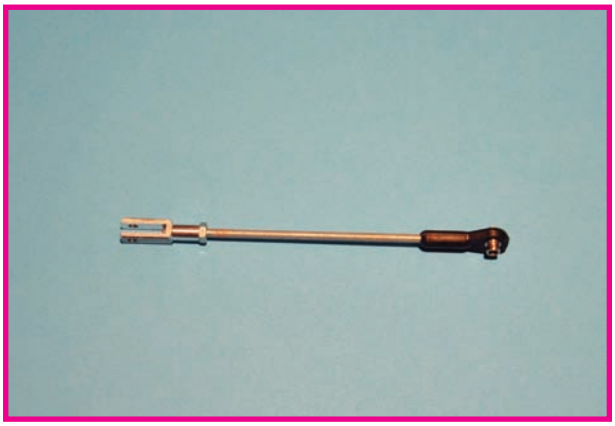


Fig. 39

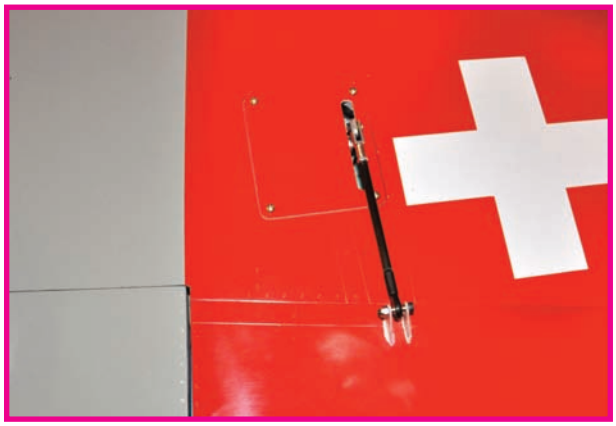


Fig. 40

Flap

The flap surfaces are installed for you at the factory with beautiful scale hinging. What remains is for you to install the servo and linkage. CARF Models recommend a 25kg torque digital servo like the JR DS8711 for the flap surfaces.

We have used a JR aluminium arm at 38mm between centres for the flap. Drill the servo arm at 38mm Ø3mm and install the aluminium clevis supplied. Install the

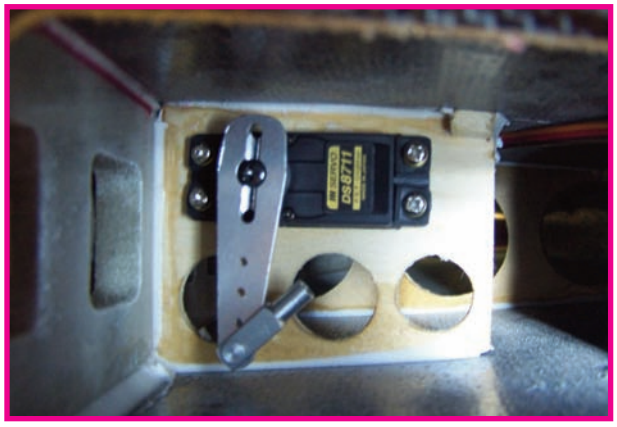


Fig. 41

servo arm on the servo and install the servo in the wing using 2.9 x 13mm sheet metal screws.

Using the M3 x 135mm threaded rod supplied screw on 2 x M3 nuts (one at each end) and then screw on the supplied aluminium ball link. Install the pushrod open end through the back of the wing and screw in to the aluminium clevis on the servo arm. It is recommended to add a length of brass or carbon tube to further strengthen the pushrod. Once happy with the flap throws tighten the nut at each end of the pushrod.

Fig. 42

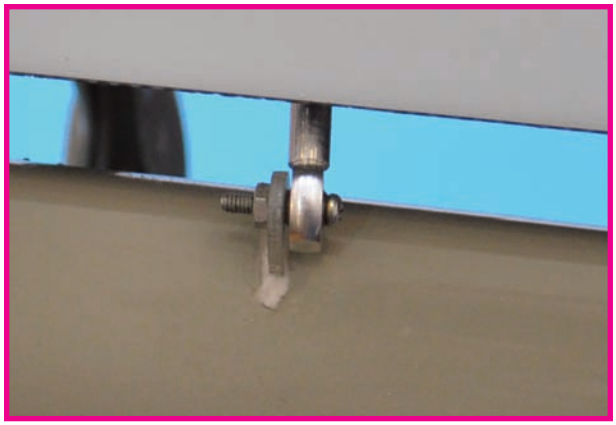


Fig. 43

Undercarriage

Main Gear Doors

The undercarriage set available for the BAE Hawk is specifically designed for this model and fits straight on to the mounting rails fitted in the wings and fuselage. The legs are supplied in plain aluminium finish for you to fit as is or paint according to the colour scheme of your model.

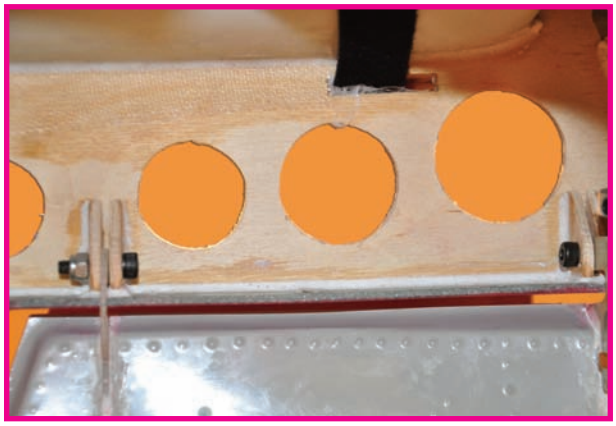


Fig. 44

The main gear legs are supplied with a set of fibreglass covers. These are not necessary for operation but greatly enhance the scale looks of the model. The front gear doors are fully fitted for you at the factory and the main gear doors simply attach to the pre fitted and drilled mounting points inside the fuselage.

Fig. 45

Fitting the main gear door rams simply requires you to drill the gear door ram mounting posts Ø4mm and attach the door rams with the supplied M4 x 20mm

allen bolts and spike nuts. Please note the orientation of the spike nuts with the flat face against the ply rather than the spiked face as would normally be the case. Fit the stop collar to the ram shaft and secure losely in place ready for final adjustment later.

Before fitting the M3 clevis to the gear door ram, you must trim 5mm from the threaded end of the clevis to ensure smooth operation when fitted. Screw the clevis on to the ram as far as it will go and attach to the pre drilled hole on the gear door hinge.

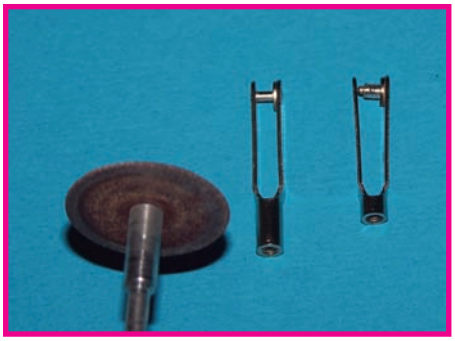


Fig. 46

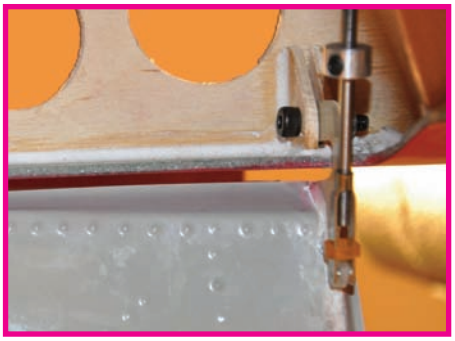


Fig. 47

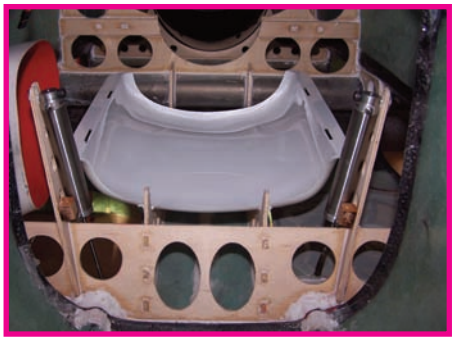


Fig. 48

Nose Gear Doors

The mounts for the nose gear door rams are installed for you at the factory. Bolt the 2 rams to the mounts with M3 x 15 allen bolts with nylock nuts. You might find the mounting holes in the rams are slightly large. If this is the cse you can sleeve the bolt with a piece of scrap fuel tubing to take up the slack. Fit the supplied plastic ball links to each ram and attach to the pre drilled holes in the gear door hinges with M2 x 10mm screws and nuts. Apply a little loctite to secure the nuts. The limits of closing the gear doors can be adjusted simply by screwing / unscrewing the ball link to achieve the optimum fit.

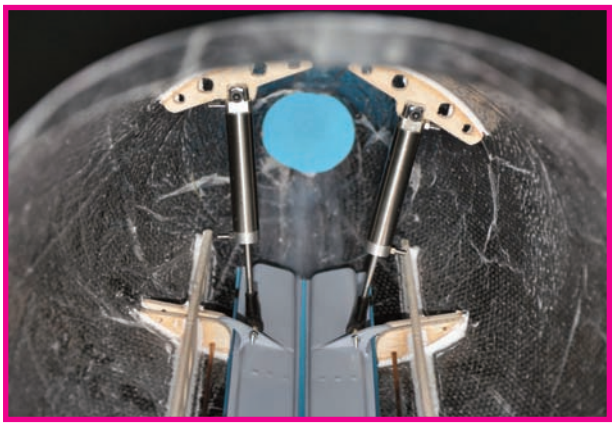


Fig. 49

Fig. 50

Nose Gear unit

The nose gear unit comes pre-assembled. In case you did not dis-assemble it for painting, ensure that all parts are secure and tight before installation.

Attach the steering servo frame to the nose unit with the M3 dome head screw supplied and fit the servo using the M3 x 10 allen bolts supplied. CARF Models recommend using an analog metal gear servo such as the JR ES579.

Using the 30mm M3 threaded rod suppplied make up the sterring pushrod with M3 ball link and M3

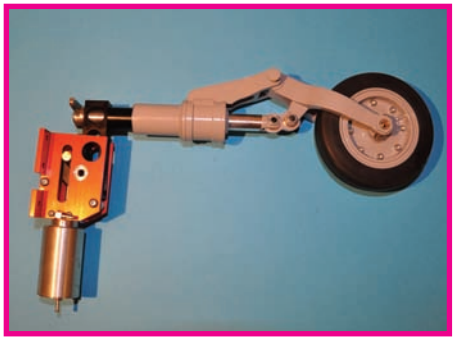


Fig. 51

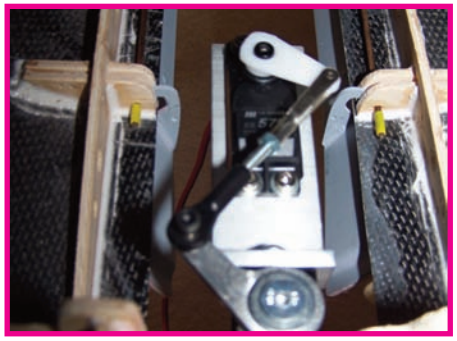


Fig. 52

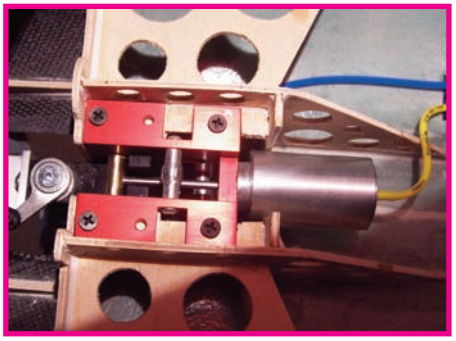


Fig. 53

clevis as shown. Install the linkage on a diagonal plane as shown in order to achieve good throws and no issues with retracting / extending the gear.

Fit the 4mm air lines supplied to the nose gear unit and install in the fuselage as shown in figure 49 using the large self tapping screws supplied.

Main Gear strut covers

You will find in your kit a pair of fibreglass strut covers for the main gear legs each in 2 halves. These covers are handed so make sure the cover set you select is correct for the gear leg you are working on. If you decide to paint your undercarriage please do this before fitting the strut covers.

Each strut cover half must be fitted and left to cure before the second half is added in order to achieve the best result. You will need to trim the top off each strut cover so the area where the leg mounts into the retract unit is kept clear. To start the joining process apply a liberal amount of silicone (we used bathroom silicone sealant) only to the area where it will come into contact with the main leg to the inside of the half you are working on. It is not necessary to put any form of glue or silicone around the knuckle joint for the trailing leg or the supporting arm for this area. See figure 54. Fit the cover to the leg on a flat surface and prop up where necessary with spacers to ensure the fit is central. Offer up the second half to see that it

will fit well and then remove it again. Leave the first half to cure.

Once the first half is securely bonded you can now add some balsa blocks to the inside of the first half. Shape the balsa blocks so they are in contact with both the leg and cover then glue in place with cyano.

Again offer up the second half to see that it fits and adjust if necessary. When you are happy apply a generous amount of silicone to the inside of the cover where it will come into contact with the main part of the strut. Apply cyano to the exposed cyano blocks and bond in place. Do not worry if there are any small gaps.

Once this has fully cured, mix up a slurry of epoxy with micro balloons and push it into all areas of the joint. Once set, sand away the excess and prepare for painting.

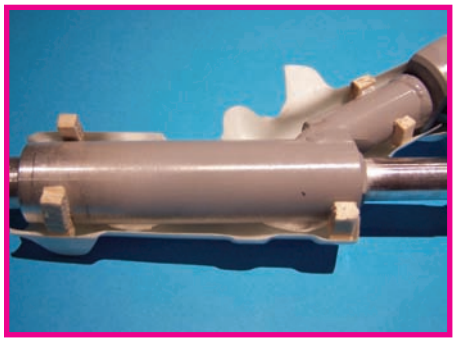


Fig. 54

Fig. 55

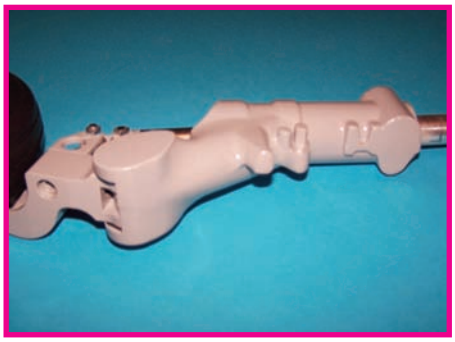


Fig. 56

Main gear units

The main gear units fit on the rails installed in the wing. This is a crucial part of the build and some sanding of the rails may be necessary to get the required fit. It is also necessary to check that the retract mechanism does not foul the operation of the outer gear door. Some adjustment here may be required to get a good fit. Once happy with the basic fit, connect a length of 4mm air line supplied to each of the nipples on the retract unit and slide the unit into place in the wing making sure not to obstruct or kink the air lines in the process.

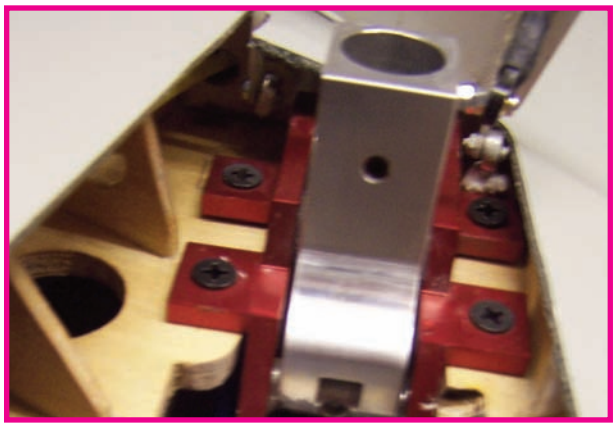


Fig. 57

Slide the retract unit into the trunion and check the movement is smooth and without obstruction. Remove the leg leaving the retrct units in place, drill the 4 mounting points and secure the retract unit

with 4 x large self tappers supplied.

When both wings are completed to this stage the wings should be fitted to the aircraft to position the legs for accurate tracking. Check the retracting motion again at this time to make sure the assembly retracts nicely into place and the fuselage gear doors can close without obstruction. You may have to do this a number of times to achieve the result you are happy with. Once you are happy with this mark the position of the legs relative to the retract trunion with a marker pen on both the leg and the trunion.

Strut door

Fitting of the strut door and smaller outer wing door but some patience and time spent in this area will reward you with a well functioning nice looking system.

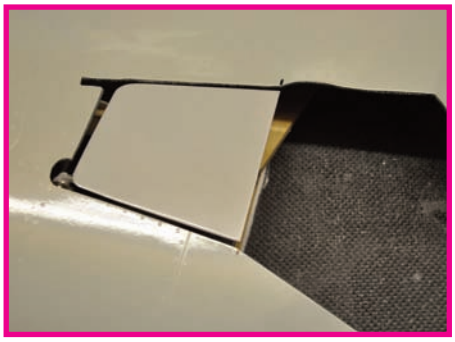


Fig. 58

The strut door is a double skinned part with scale detail on the inner skin. The first job to do here is to trim the top part of the door off where the smaller door hinged on the wing will fall. See figure 58 and with the small door closed mark on the wing skin where it ends. Then open the door and offer up the strut door taping in place and extending the marks to the strut door giving you a line to cut to. Make sure there is a few mm space left between the doors. Trim the top portion off the strut door and check the fit.

Fig. 59

You will notice that the strut door when resting on the strut is proud of the wing surface. See figures 56 through 58 below showing how to fit this door. Begin by sanding through the inner door skin with a rotary tool at the points where the skin rests against the leg. Do this in small increments so you do not remove more material than is necessary. Allow some extra space around all the touching areas for the next step. With the use of car body filler you can now create a fillet between the strut door and the stur that is shaped exactly to each. Place a layer of cling film over the strut and a separate piece over the door. Ensure that your leg is secured in its final position with the grub screws tightened so it cannot move. Mix up a generous amount of car body filler and apply carefully to the cling film on the strut. Do not worry about applying a little too much as it will be squeezed out and can be trimmed later. Fit the strut cover over the body filler and squash down so the door is neatly postioned within its opening and level with the wing skin. Tape in place and leave to set.

Fig. 60

Once the filler has set you can lift up the door and remove the perfectly profiled fillet piece. The cling film will have stopped the filler sticking to the leg or the door. Trim all the excess filler from around the edges and bond the fillet in place on the door skin with epoxy. You now have a gear door that will only fit in one position - the perfect position.

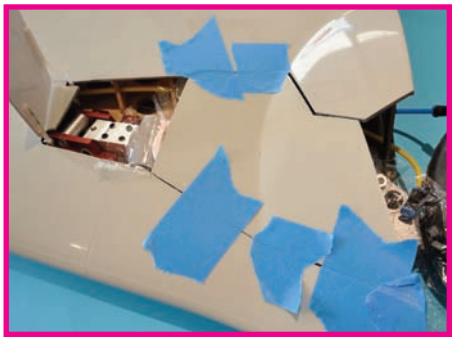


Fig. 61

There are varous ways of securing the door to the strut including gluing it on permanently. For this example we have made it removable. Cut a strip of aluminium approx 6mm wide and long

Fig. 62

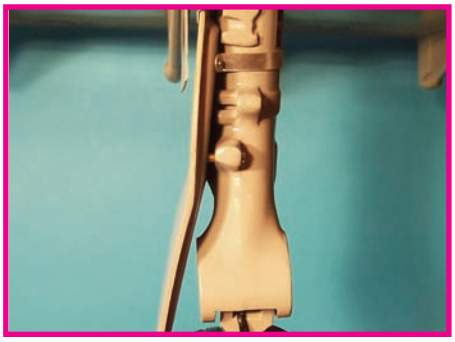


Fig. 63

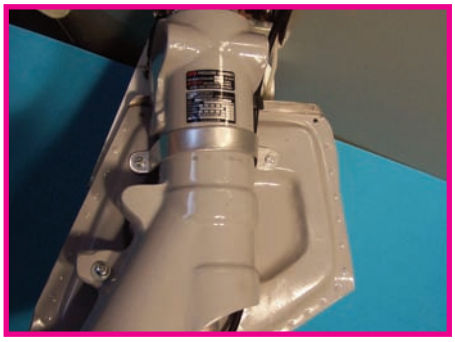


Fig. 64

enough to go around the strut and on to the door. Drill 2 x Ø1.6mm holes into the inner door skin and tap out to M2. Stengthen with a drop of cyano. Secure the door to the leg with the aluminium strap and 2 x M2 screws. Add an additional screw to the lug at the front of the leg lower down with a brass spacer as shown in figure 63 / 64.

Small gear door

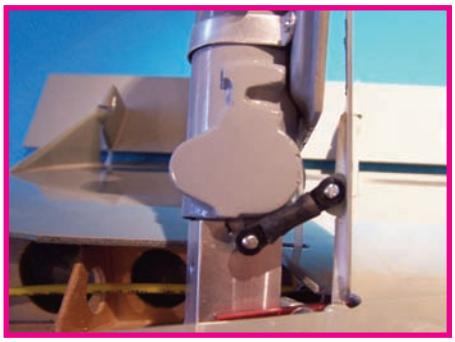


Fig. 65

The small gear door has been fitted for you at the factory. However you must make up a linkage between this door and the strut. Begin by drilling and tapping a hole to M2 in the centre of the front face of the retract trunion. This will be your first mounting point. Using 2 x M2 ball links and a length of M2 threaded rod supplied make up a linkage as shown in figure 61 the distance between centres on this example is 27mm. You may need to trim the ends of the ball links to acheive the correct length. From a scrap piece of epoxy board or ply make up a small lug to provide the fixing point on the gear door. Attach this lug to the linkage with an M2 screw and nut and screw the other end of the linkage to the hole you made in the trunion. The linkage needs to be set off the trunion by approx 6mm to provide clearance for movement

You can now locate the best place for fixing the mouting lug on the gear door by tacking it in place in the closed position and checking that it opens freely without fouling the strut door. Once you are happy with the location of the lug, secure in place with hysol or similar.

Fig. 66

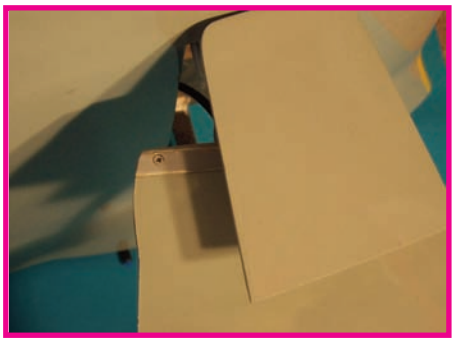


Fig. 67

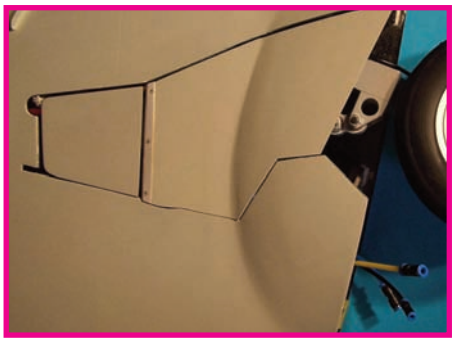


Fig. 68

For this example we found that extra smooth movement between the gear doors was achieved by adding a small aluminium plate to the top of the strut door bent downwards so that the doors did not foul each other on opening. You can choose to do this as well or leave a larger gap between the 2 doors.

Canopy

You are provided with 2 clear canopy mouldings, one smaller for the front glass and one larger for the main canopy glass. The Hawk has a very large canopy to get right but some time and patience spent getting this stage right will reward you with a beautiful looking, rigid canopy area.

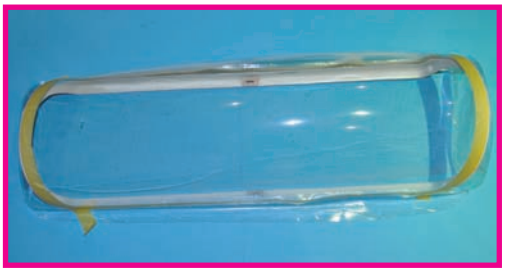


Fig. 69

First go around the whole of the inside of the intergral front frame and the removable rear frame where the glass will be glued, and look for any high spots from the laminating process, particularly on seam joint areas. Sand these areas where necessary to form a consistent thickness all the way around. Sand all of the area to be glued in order to provide a good surface to bond.

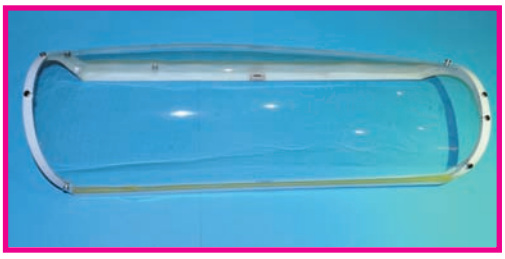


Fig. 70

It is a good idea to start with the main larger canopy glass to allow you access for adjustment through the front opening. You may wish to cover the whole glass in masking tape temporarily to prevent damage whilst taking it in and out of the frame. The first step is lay the untrimmed glass over the top of the frame and mark a rough area to cut so the front and rear faces of excess glass can be removed. Do this carefully, ideally with a pair of curved canopy trimming scissors. It is best to do this work in a warm environment so the material is more pliable.

Again by laying the glass over the frame you can now mark up the area to be cut on all sides. Make it larger rather than smaller as you can always trim more off as you go. Secure the glass to the frame with masking tape whilst you do this to get accurate lines. Be careful not to distort the frame whilst marking out.

Fig. 71

Once you have a rough cut out you can now test fit in the frame to see where you might need to trim some more. Always be careful - measure twice cut once !
The next step is vital to ensure the canopy frame is a good fit in the fuselage opening. Fit the frame and glass to the fusealge and temporarily fix the the glass with either tape or magnets or a combination of the two. Doing this ensures that you are not creating a distorted canopy when you start gluing. Once you are happy with the fit all round you can start to tack the canopy in place. We have used cyano but you can use canopy glue or similar to your preference. Be careful if using cyano to only use the tiniest amount of kicker as too much heat generated will fog the glass.

The front glass is fitted in much the same way. Firstly sand any high spots or areas of inconsistent thickness and after removing the front and rear faces of the glass, offer it over the fuselage to see where to start marking. Trim to down in stages until it is at a size where you can insert the flass from the inside and then make final adjustments. Once again hold in place with magnets, tack glue and then glue all round.

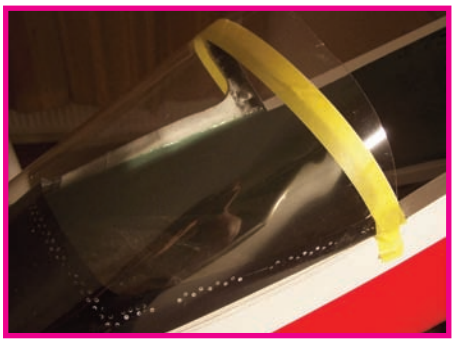


Fig. 72

Fig. 73

Fig. 74

Canopy Latch

A simple but effective canopy latch system is provided for you with 2 locating pins into the front frame, 2 phenolic lugs that go locate along the length, secured by a spring loaded latch mechanism at the rear. You will see a pre-fitted brass tube in the top of the fuselage ready to accept the 3mm canopy latching pin assembly. This has been made up for you at the factory and is installed by inserting the 3mm latch rod into the brass tube and slipping the spring over the outside of the brass tube. You might find that you need to trim approx 10mm off the spring to achieve the right amount of latch protruding from the fuselage. You should have about 15mm of latch protruding from the fuselage to achieve a good secure

fit into the pre installed latching tube in the canopy frame.
A substantial length of cable is attached to the latch pin to allow you to route it where you feel necessary. We found the simplest solution to have the pull cable just inside one of the vents behind the “bunny ears”.

Fig. 75

Fig. 76

Fig. 77

Equipment Layout

You are free to locate components for the support equipment wherever best meets your needs. We found on this model that fitting the PowerBox unit and air control systems in the rear fuselage just near the front and rear fuselage joint gave us the best solution. Engine ancillaries were mounted above the tank. If required the front fuselage section can be removed for transport relatively easily for transport and the aircraft balanced at the correct CG (with cockpit set installed) without the need for any additional weight. A picture is included for your reference.

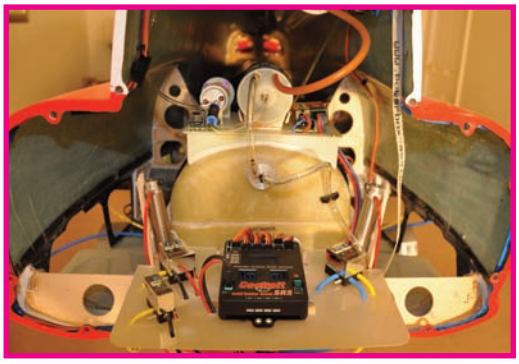


Fig. 78

Wing Fences

A set of wing fences and vortex generators is supplied in your kit and fitment is relatively easy. On each wing there is one large wing fence (see here in red) for the outboard of the wing, and 3 smaller fences (seen here in grey) to go further inboard. You will see impressions on the wings where the fences are postioned. Pay particular attention to the angles they should be set at. For the inboard fences each has a slightly different inner profile depending on its position along the leading edge. Before gluing, identify which one goes in

Fig. 79

which position. Tack each in place with cyano and then apply a bead of hysol / epoxy on each side to secure in place. The joints can then be painted to finish.

Fig. 80

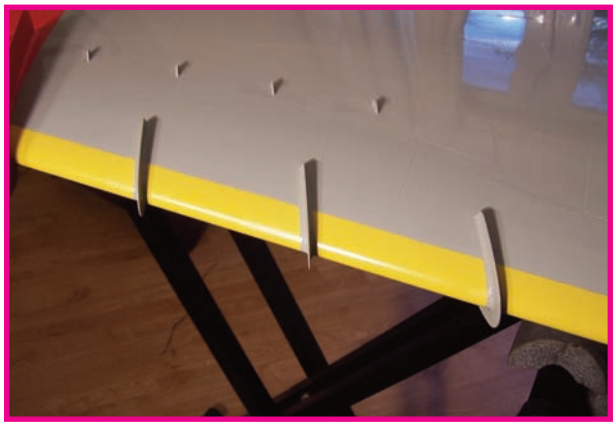


Fig. 81

Vortex generators

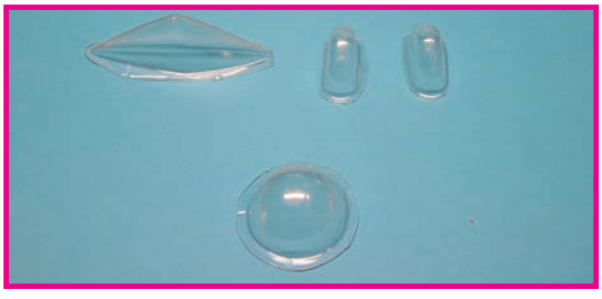
Each wing also has a number of small vortex generators. You will see the relevant positions for the vortex generators on the wings. We recommend making a small drilling template as shown to make the task of drilling the holes easier. Drill a pair of holes for each piece 1.8mm and put a drop of cyano in each hole before fixing the vortex generator in place.

Fig. 82

Fig. 83

Fig. 84

Congratulations ! You have now completed the main part of the assembly of your Skygate Hawk. A number of small scale parts are provided in your kit to greatly enhance the scale looks of your aircraft. There are numerous resin parts as well as plastic mouldings and clear lenses for lighting etc.



Balancing

The final weight of your Hawk will vary depeding on your equipment / turbine choice and the amount of scale detail you might choose to add. Prototype models have come out at just under and just over 20kg dry.

The centre of gravity is located 305mm from the leading edge of the wing at the wing root. Measure the CG with main tank empty and hopper tank full with gear down. The CARF Skygate Hawk is a large model and care should be taken when balancing. If you choose to balance the aircraft manually ensure you have suitable help to assist you in getting accurate readings.

Movements

We have listed below the movements we used to fly the aircraft built for this manual. Different pilots sometimes prefer a different feel to the aircraft but you will find that using these movements as a starting point will give you safe and smooth operation. You can then adjust to suit your flying style.

Aileron - 20 - 25mm each way (make neutral position of aileron in line with flap so a little bit "down") 25 to 35% Expo (positive for JR / negative for Futaba)

Elevator - 55mm up and 50mm down - neutral position is trailing edge in line with rear hatch joining with fuselage 25 to 35% Expo (positive for JR / negative for Futaba)

Rudder - 40mm each way 25 to 35% Expo (positive for JR / negative for Futaba)

Flaps - 20 degrees take off - 60 degrees landing. A little up elevator required with flap 3% for take off and 7% on landing

All measurements are given at the root trailing edge of each surface.