World War One Aircraft Models

I have always held a fascination with early military aircraft. After serving for 27 years in the Royal Air Force, I became a Military Aerospace Technical Author. As most modelers, I got involved in the world of construction kits at an early age, but stopped for most of my service career and for some years afterwards.
I started modeling again a few years ago and now enjoy the challenge of building aircraft of World War One. Since posting photographs of my completed models online, various modelers have asked if I would create 'build logs' for my future builds, which is what I now do for each build.
I don't consider myself a 'master' of this craft, but hope to be able to pass on what I have learned. As such, here is my build log of the 'Lukgraph' 1:32 scale model of the Royal Aircraft Factory (RAF) BE2c 'Quirk', BE2c Serial No. 2635 of No.13 Squadron, RFC during 1916.

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INTRODUCTION

Before I start with the build log, I'd like to show how I've set up my work area. I prefer to keep the work area as clear as I can (I've lost too many small items in the past). I think it's important to have the tools etc you need ready to hand and other, non-essential stuff tucked out of the way until needed. I'm lucky in that I have my 'man cave', which is sorted into a modelling area, airbrush spray booth in addition to my work station PC, games PC and games console.

Sorted

AFTER MARKET

AFTER MARKET

Figures

'Model Cellar' British RFC pilot and gunner (MC32026).

Resin

'BarracudaCast' British wicker AGS seats (BR32234),
'BarracudaCast' seat cushions from Camel seat (BR32332).

Seat belts

'HGW' seat belts for the RE8 (HGW132027).

Decals

'Airscale' Generic WW1 instruments (AS32 WW1),
'MicroScale' MicroSol/MicroSet (as required).

Weapons

'GasPatch' Lewis Mk.1 stripped half heatsinks (32-32052).

Rigging accessories (as required)

'GasPatch Elite Accessories' 1:48th scale metal turnbuckles (Type A and C),
'GasPatch Elite Accessories' 1:48th scale metal Anchor Points,
'Albion Alloy's' Micro-tube Brass or Nickel Silver tube (0.4 or 0.5 mm diameter).
'Steelon' or 'Stroft GTM' mono-filament (fishing line) of 0.08 and 0.12 mm diameter.

Sundries (as/if required)

'Araldite' two part epoxy adhesive, Paints ('Tamiya' Acrylic, Humbrol Acrylic, 'Mr. Metal Colour', 'AK Interactive' Primer and micro-filler (Grey AK758, White AK759), 'AK Interactive' Filters (Wood AK-261) and figure paints, Kerosene AK-2039, Oil AK-2019 and Wash AK-2033), 'Alclad II' Lacquers, 'Alclad' Aqua Gloss 600, 'Mr. Colour' Levelling Thinners, 'Vallejo' Model Colour, PVA Adhesive or 'Microscale' Krystal Kleer, 'VMS Fleky' CA adhesive (Standard and Thin) and Metal Prep 4K, 'Mr. Colour' Metal Primer R , 'Bostik' Blue or UHU White Tack, 'AV' Masilla Plastica (401) putty, 'White Spirits', 'De-Lux Materials' Perfect Plastic Putty, Sanding and/or Polishing sticks from 'Flory Models', 'Humbrol' Maskol, 'Milliput' two part putty', 'Green Stuff' two part putty, 'UHU' White Tack, 'Vallejo' Still Water (26.230), 'Mr. Surfacer 500, 1000,1200', 'DecoArt Crafters Acrylic' (water based) paints, 'Artool' Ultra Mask sheets, 'Plastruct' styrene rod, 'Mr. Surfacer' primer and filler 500 to 1200, 'Hataka' lacquer paints, 'Tamiya' liquid cement, 'PlusModel' lead wire, 'ANYZ' 0.8 mm Black braided line (AN015), 'Plastic Magic' liquid cement, 'Prismacolor' Verithin Argent Metallique 753, 'Blacken-It' solution, 'Bare-Metal' Matte Aluminium foil, 'MFH' black 0.4 mm flexible tube (P-961), 'EZ' stetch line (fine or heavy black), 'Revell' Contacta Professional cement (39604), 'Citadel' paints range, 'MRP' paints, 'Ammo' acrylic filter Ochre (AMIG0822), 'Windsor & Newton' Griffin (Alkyd) Raw Sienna paint.

Weathering mediums (as/if required)

'Flory' Clay washes, Flory Pigments, AK Interactive engine washes,
'Tamiya' Weathering Master (Set C, D and E).

Display Base

Etched Plaque (name plate),
'Inperspective' custom made Acrylic base and cover,
'Lars op't Hof' pasture, Summer long (LH10.24).

THE AIRCRAFT

THE AIRCRAFT

References:

1. RAF BE2c - Windsock Data File No:42 (J.M. Bruce).
2. RAF BE2c at War - Centenary Data File 172 (Paul R Hare).
3. Wikipedia

Background:

The BE2c (**B**leriot **E**xperimental) was nicknamed the 'Quirk' and was already in service with the RFC at the outbreak of hostilities. The aircraft was a single engine, tractor bi-plane which was designed without any armament. On arrival on the Western Front the aircraft were initially used primarily for reconnaissance operations with some bombing missions. The aircraft was designed to be inherently stable in flight, which made it a good aircraft for straight and level reconnaissance or bombing missions. However, this inherent stability was a hinderance when attempting to evade attacks from enemy fighters. Eventually all BE2 variants were withdrawn from active service and replaced by more modern designs suited to fighter, reconnaissance or bombing roles. However, the remaining BE2 aircraft did remain in non-combat roles until the end of the war.

Early BE2c:

The earlier BE2c aircraft were fitted with a 'Renault' engine with no under engine sump cowl and under fuselage engine exhaust pipes. The observers cockpit opening was smaller than later BE2c aircraft and was positioned further back in the fuselage. The landing gear was fitted with forward facing skids and the fin had a straight upper edge. Also the lower wings were attached directly to the fuselage with no gaps between the two. The later 'Renault' engine powered aircraft had an under engine sump cowl fitted and truncated exhaust pipes that faced vertically down at the sides of the fuselage.

Later BE2c:

Later versions of the BE2c had several modifications, including some made in service. These included enlarging the observers cockpit and moving it further forward in the fuselage and with a larger windscreen. The landing gear was changed to the more usual 'V' strut design and with no skids fitted. Some aircraft has one or two circular access panels fitted on the forward, left side of the fuselage and a panel fitted on the right side of the fuselage to the rear of the pilots cockpit. The lower wings were fitted to the fuselage but now with a gap between the two. The fin on some later BE2c aircraft was larger and with a curved top edge. Aircraft could also be fitted with a swivel mounting for the observers Lewis machine gun. A weapon was also mounted to the right side of the fuselage for the pilots use. A camera mounting could be fitted on the side of the fuselage for the pilots use during reconnaissance missions. Also racks could be fitted on the underside of the lower wings for carrying light bombs, which were dropped from the aircraft by the operating cables control by an externally mounted lever by the pilot. These were aimed by using a fuselage mounted CFS Mk.4 bomb sight.

BE2c Serial No. 2635:

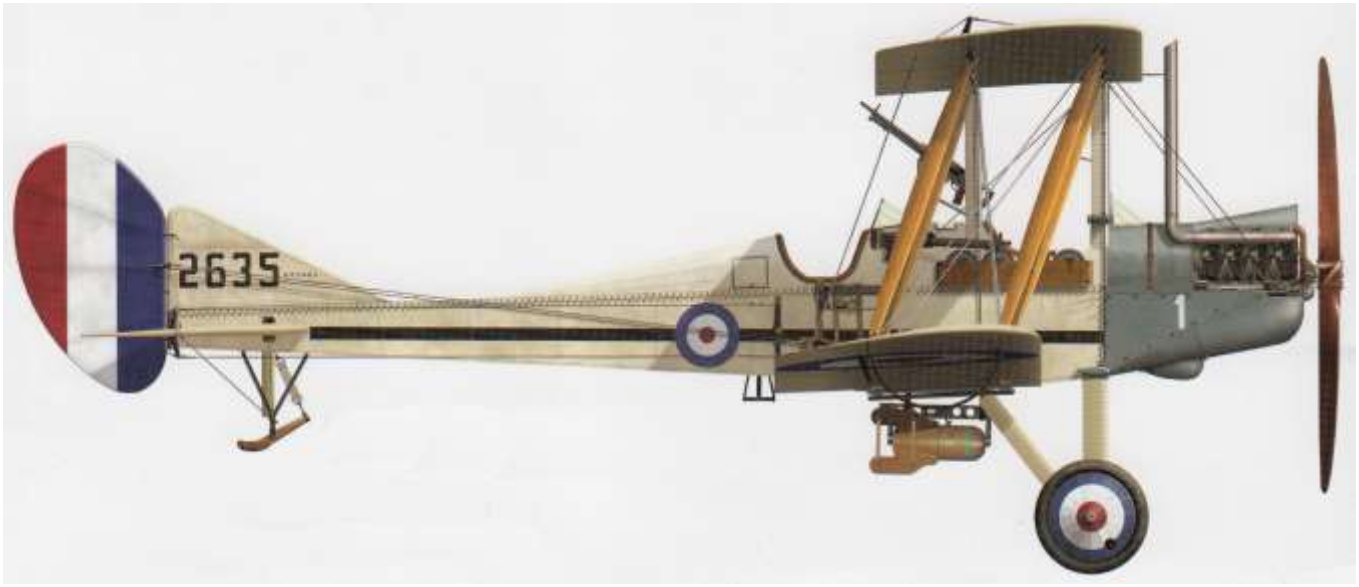
This model represents BE2c Serial No. 2635 of No.13 Squadron, RFC, operating from Savy in France during 1916.

No.13 Squadron:

No.13 Squadron RFC was formed on the 10th of January 1915, equipped with twelve newly built RAF BE2c aircraft and was dispatched as a Corps reconnaissance unit to France in October 1915. The squadron served at Savy in France during 1916. Later the Squadron was also equipped with RAF BE2d and BE2e versions. The role of reconnaissance was maintained until the armistice. In April 1917 the squadron was re-equipped with the R.E.8.

BE2c Serial No.2635

RAF BE2c, Serial No:2635 was built by Daimler & Co. (batch 2570-2669) and was delivered to the newly formed squadron as factory fresh. The aircraft were finished overall in Clear Doped Linen (CDL) with white wheel covers painted in the form of a roundel. The nose of the aircraft with panels and cowls was painted in battle ship grey. On the 23rd of April 1916, a squadron marking was allocated, which consisted of a narrow black horizontal stripe, which was applied to the sides of the fuselage and spanned between the front of the pilots cockpit and the leading edge of the tailplane. This squadron marking was retained when the squadron were later re-equipped with the R.E.8.
This particular aircraft used a 'CFS Mk.4 mounting rack mounted on the fuselage starboard side. This aircraft was also fitted with racks for carrying 112lb 'Cooper' bombs. The observer had a Lewis machine gun, which was mounted at the rear of the observers cockpit. The pilot also had a Lewis machine gun, mounted on the right side of the fuselage at the pilots cockpit. An external rack was fitted to the right side of the fuselage for carrying spare ammunition drums. It's unclear whether BE2c Serial No.2635 was lost in action or retired and eventually struck off charge.



Specifications:

Length - 27ft 3in (8.31 m)
Wingspan - 37f 0in (11.28 m)
Height - 11ft 1.5in (3.391 m)
Wing area - 371sq ft (34.5 m^2)
Empty weight - 1,370 lbs (621 kg)
Gross weight - 2,350 lbs (1,066 kg)
Engine - RAF 1a inline V8 cylinder air cooled - 90 hp (67 kW)
Propeller - Four blade, fixed pitch

Performance:

Maximum speed - 72 mph (116 km/h, 63 kn) at 6,500 ft (2,000 m)
Endurance - 3 hours 15 minutes
Service ceiling - 10,000 ft (3,000 m)

Weapons:

Standard BE2c - One Lewis machine gun 0.303 in (7.7 mm)

BE2c 2635 - Two Lewis machine guns 0.303 in (7.7 mm) - one mounted at the rear of the observers cockpit and a second, mounted on the starboard side of the fuselage, just forward from the pilots cockpit. Bombs - load total of 224 lbs (102 kg)

Location of the roundels

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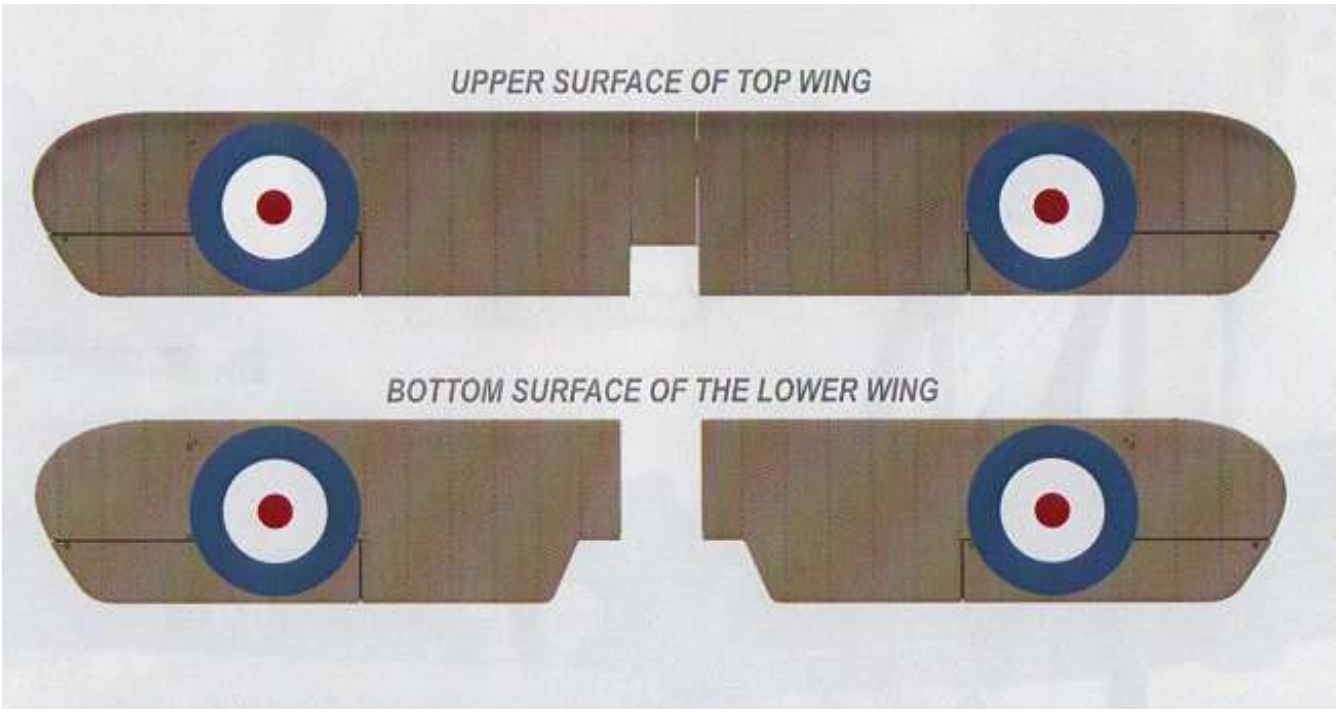
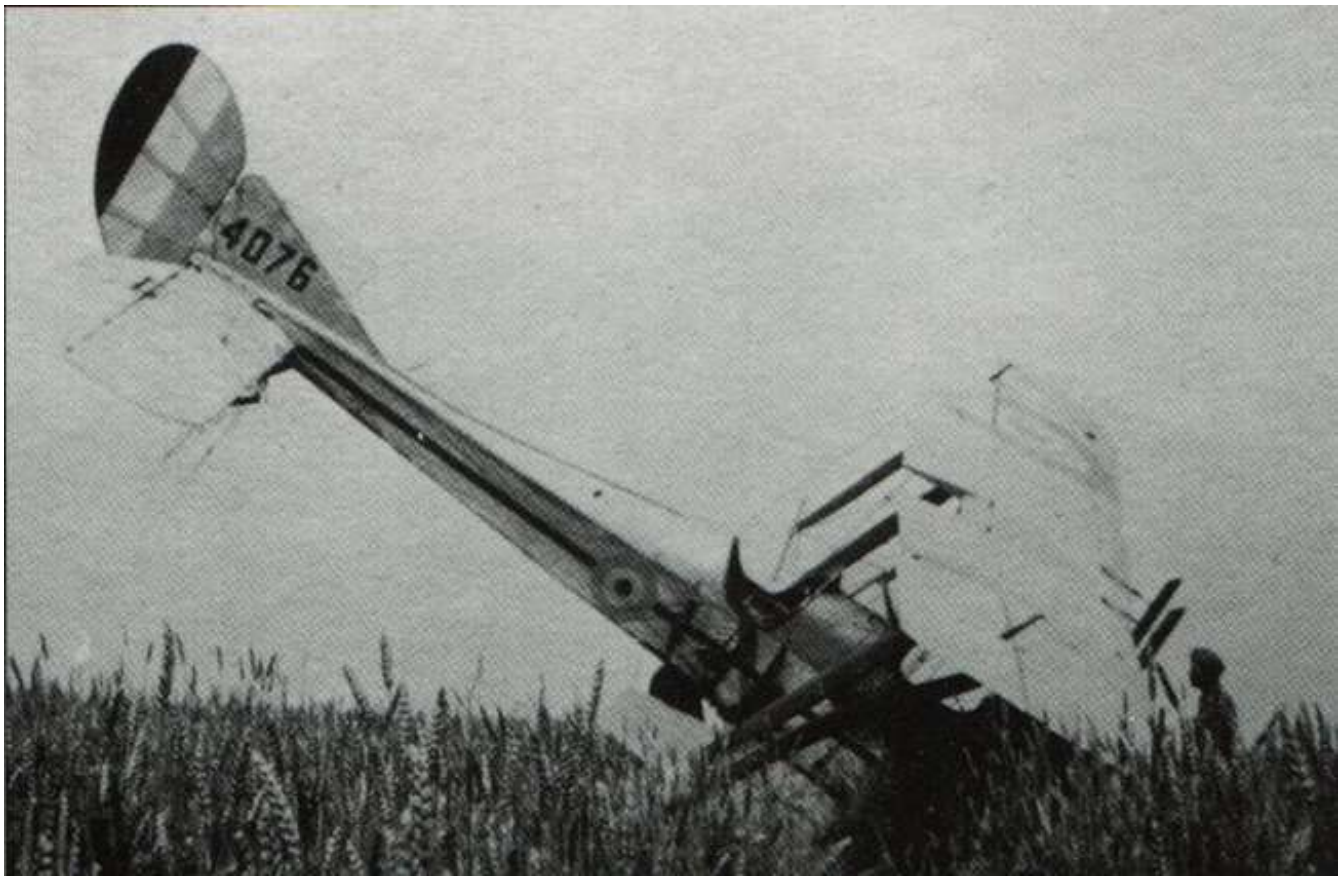
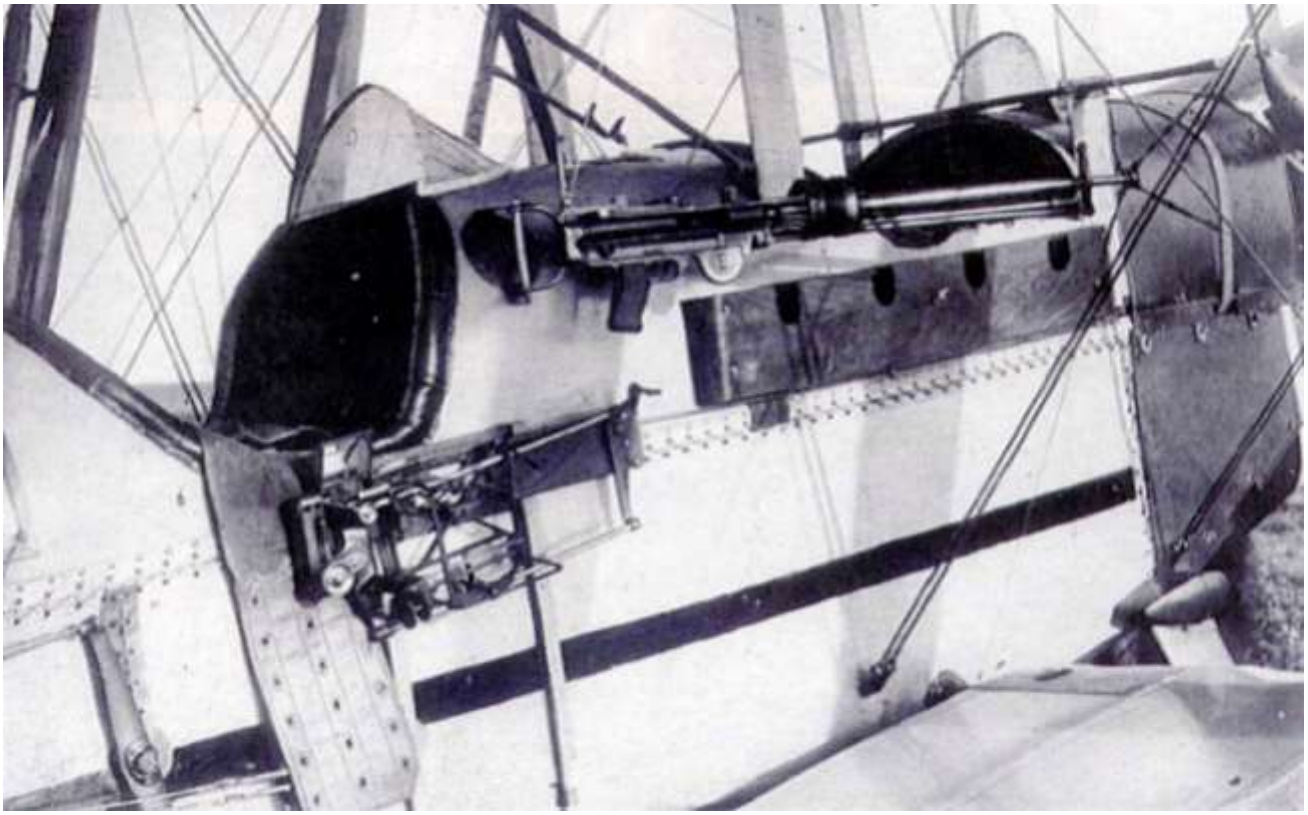
he location of the aircrafts roundels varied initially between squadrons. However, for No.13 Squadron, the roundels on the top surface of the upper wing and the undersides of the lower wings were as shown in the following illustration.



Unlike some other squadrons, No.13 Squadron did not have roundel markings on the tailplanes, as can be see in the following photograph, which shows crashed BE2c Serial No. 4076



BE2c of No.13 Squadron after capture by the Germans



PART 1
MODEL
DESCRIPTION

PART 1 - MODEL DESCRIPTION

('LukGraph' (Premium Kit 32-038)

This particular aircraft has been released by 'LukGraph' based in Poland. The model kit has been released either as a standard kit or as a **'premium'** kit, which includes extra wood effect and Clear Doped Linen (CDL) decal sheets. This model is basically **a resin model**, it being produced in both resin cast parts and 3D printed parts.

The premium kit has the following contents:

Resin cast parts

Fuselage, upper and lower wings (wire reinforced) with ailerons, tailplane, fin, rudder, elevator, wheels and the larger fuselage interior parts. All wing struts and the landing gear axle are reinforced with internal metal rod. **Care needs to taken when handling the struts** as even though they are reinforced, too much pressure will bend the struts or even break the resin covering.

3D printed parts

RAF-1 engine, exhaust pipes and water pipes, propeller, small fuselage interior parts and External parts, machine guns and ammunition magazines, fuel tanks, pilot and observer seats and other interior parts.

Photo-etch parts

Over 100 separate detail parts.

Decals

Decals for the following BE2c aircraft:

BE2c, Ser No:1709, RFC 1915 (No:8 Squadron RFC)
BE2c, Ser No:2693, RFC 1916
BE2c, Ser No:8407, based at East Lothian 1916
BE2c, Ser No:2612, based at St Catherine's, Ontario 1916
BE2c, Ser No:9955, based at Cranwell 1916
BE2c, Ser No:7324 (night Fighter), based at Hounslow 1916
BE2c, Ser No:2097, based at Maricourt 1916
BE2c, Ser No:4131, based at Risalpur, India 1917.

The premium kit also includes the following decals, which can also be ordered from 'LukGraph' separately:

Two A4 decal sheets (transparent) representing the Clear Doped Linen (CDL) covering.
One A4 decal sheet (transparent) representing the wood grain effect.
A set of masks of 1 mm width to represent wing rib tapes.

The resin cast parts of the model are of a light grey colour and are free from any obvious surface air 'blow' holes, imperfections or artifacts, apart from slight surface striations, which can easily be sanded away.

The 3D printed parts are of a blue/grey colour, with several parts combined in nine separate prints. Again the parts are free from any obvious surface imperfections or artifacts, apart from slight surface striations, which for the most part can be sanded away.

The kit instruction manual has sixteen pages, which give a brief history of the aircraft, detailed illustrations for step by step model construction in addition to full rigging illustrations and finally colour profiles for the eight aircraft colour and decal schemes. A disadvantage is that apart from the photo-etch parts, the rest of the kit parts are not identified with numbers from a 'parts call out' page. This may cause some confusion with parts identification during assembly of the cockpit.

Care should be taken when working with parts of the model cast in resin, as in dust form and if inhaled, is dangerous to your health - see Part 5 (Resin) of this build log for more guidance.

It is becoming more common for model kit parts to be produced using 3D printing. Whilst this can be a good thing for modelers, it does present some differences to ‘normal’ kits:

The modeler has less to actually build and therefore ‘assembles’ the model rather than ‘build’ the model, which some may find detracts from the challenges of, for instance, building an engine from separate parts instead of having a completed 3D printed engine.

Care needs to be taken when separating the individual parts from a combined 3D print, as each part requires cutting away from its support structure without damaging the part. The part would then require sanding to remove any print ’tags’. Also the more fragile parts could be easily damaged during separation or subsequent handling.

Sanding away surface striations (layers of the 3D print) and subsequent painting will be difficult on complete and complex printed parts, such as the engine.

Although reinforcing rods are moulded internally within the wings, axle and struts, additional support is required for locating some parts. For example:

The lower wings have a single reinforcing rod moulded internally within the wing, intended to prevent lateral warp of the wing. However, although the instructions show that two locating rods are required to locate the wings into the fuselage, the wings have no locating rods fitted and there are no guide marks for drilling the location holes in either the wings or the fuselage.

Building this model should not present major problems for the average modeler, but care and attention will be required, particularly regards providing adequate support for the larger and more heavier resin parts, especially the lower wings.

Corrections:

NOTE: ***There are areas of the model which are not correct but can be modified. These modifications can be carried out by more experienced modelers and are covered in the relevant chapters of this build log. Otherwise, less experienced modelers can build the model as supplied.***

The lower front of the fuselage nose is too square in shape and needs to be rounded off.

The inboard edges of the tailplanes are at 90 degrees to their leading edges, which would leave too large a gap between the tailplanes and fuselage. The inboard edges need to follow the contour of the fuselage sides.

The lower wings do not fit against the fuselage sides, as may be assumed from the kit instructions. They were clear of the fuselage, exposing the front and rear wing spars and their associated attachments. This is important for correct alignment of the wing interplane struts, when fitted.

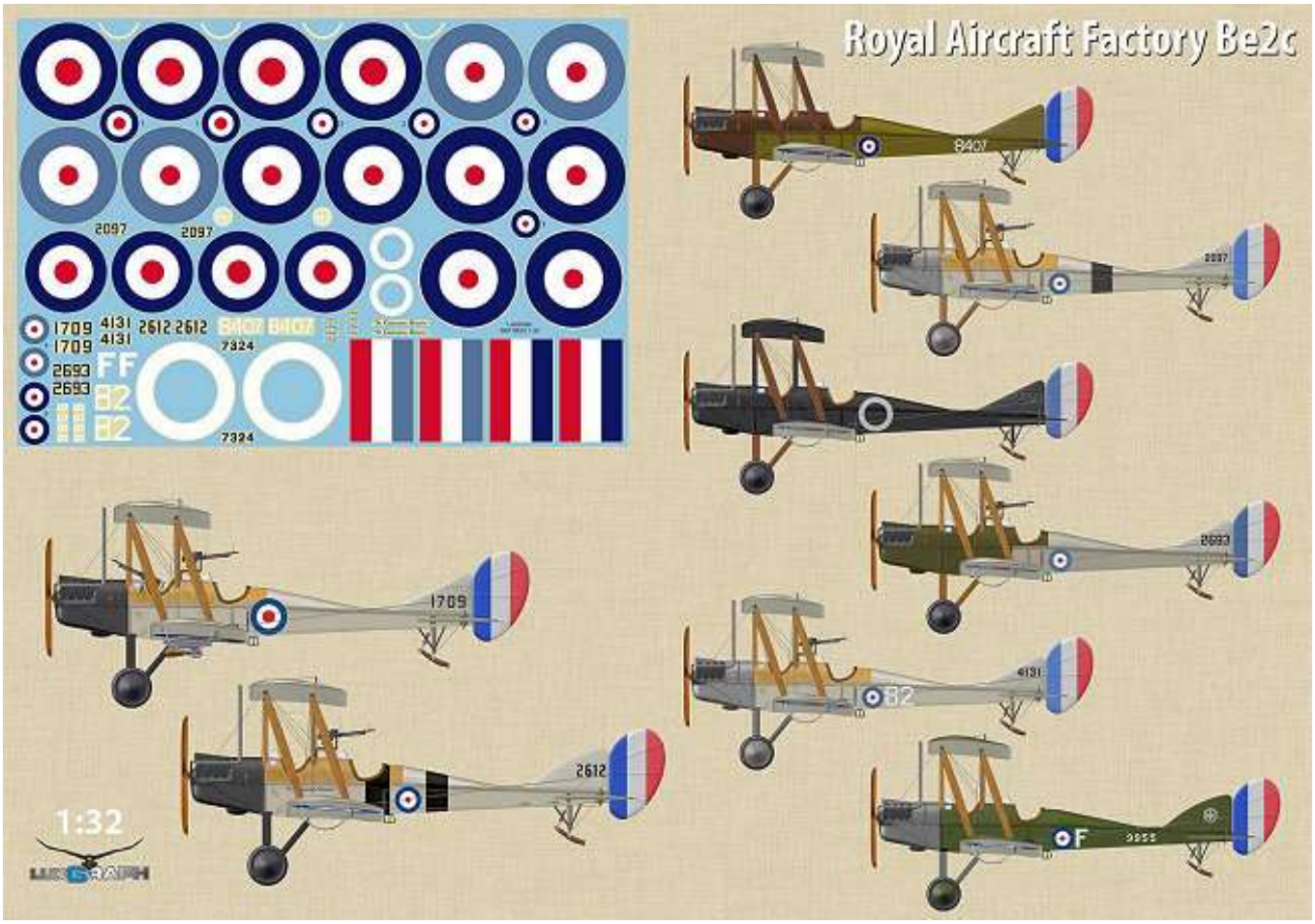
The ends of the wing interplane struts are at 90 degrees to their leading and trailing edges. Due to the forward lean angle of the struts, when fitted, the ends of the struts would have a gap at the top leading edge and a similar gap at the bottom trailing edge.

PREMIUM SET

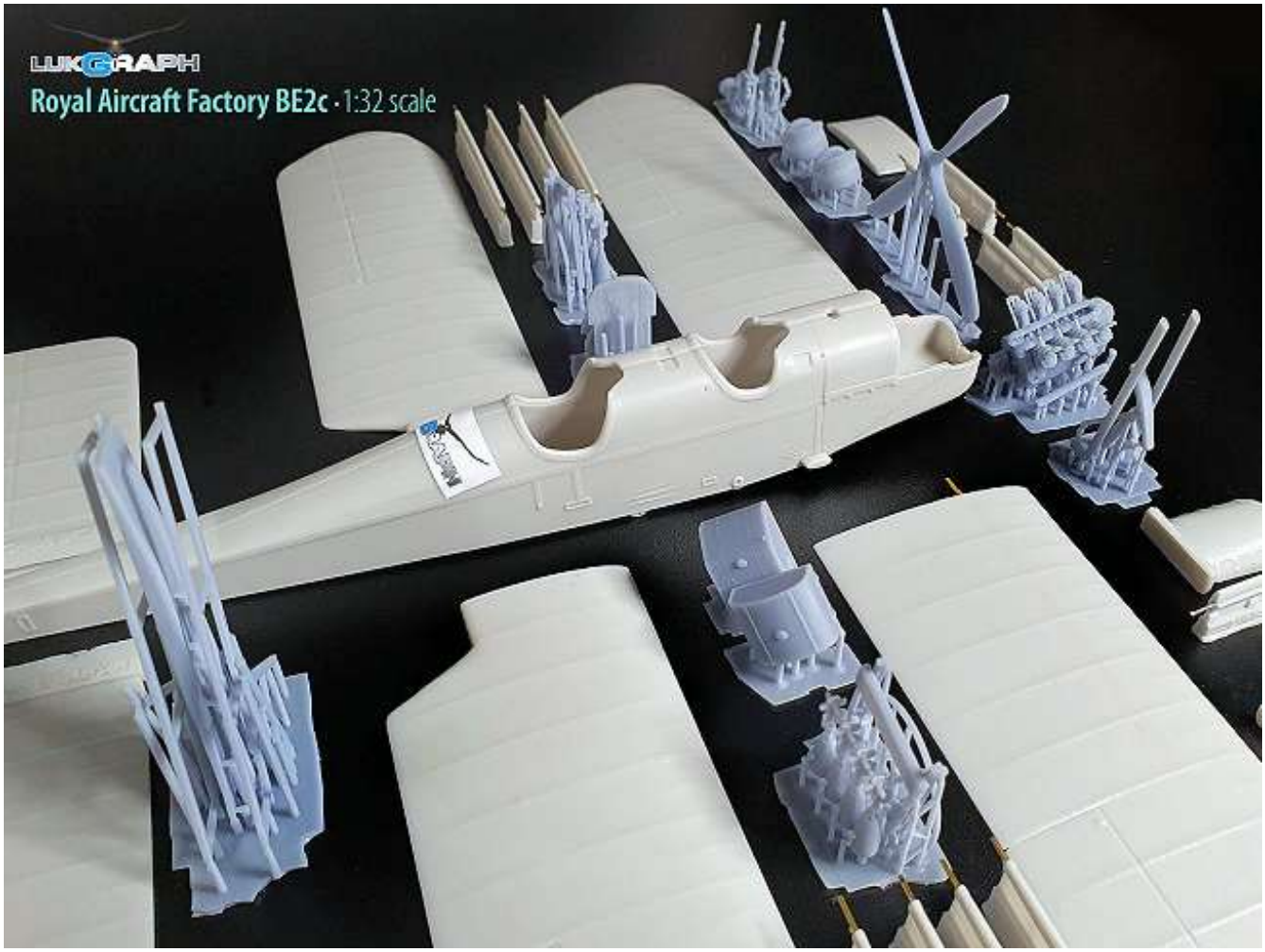
+3 sheets of A4 clear decal paper with doped linen effect

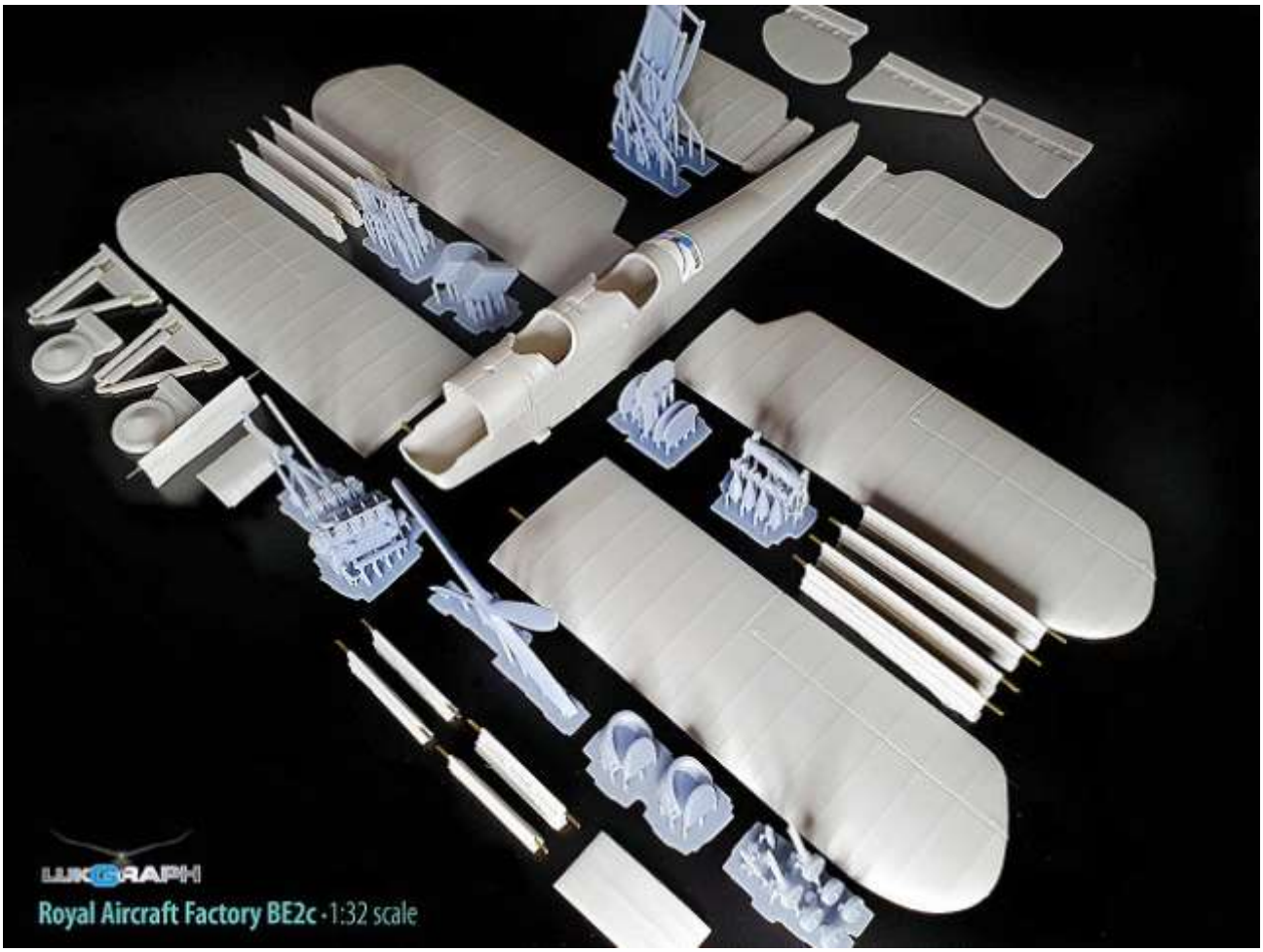
+ 1 sheet of A4 clear decal paper light plywood

+ 1 mm x 148 mm strip masks (15 m total length) – all made by LukGraph


Royal Aircraft Factory Be2c
1:32


Royal Aircraft Factory BE2c
3D PRINTED PARTS
FUEL TANKS
EXHAUST STACKS
TAIL SKID
RAF-1 Engine
INTERNAL STRUCTURE
LATTICE
SEATS
ENGINE PIPE 2
ENGINE PIPE 1
LEVERS
BULKHEADS
RUDDER BAR
MAGAZINES
GUNS
GUN MOUNT
REELS
PUMP
BOMBS
BUMPERS
BOMB RACK
PROPELLER


LUKGRAPH
Royal Aircraft Factory BE2c · 1:32 scale


LUKGRAPH
Royal Aircraft Factory BE2c · 1:32 scale

PART 2
WOOD EFFECTS
(General)

PART 2 - WOOD EFFECTS (General)

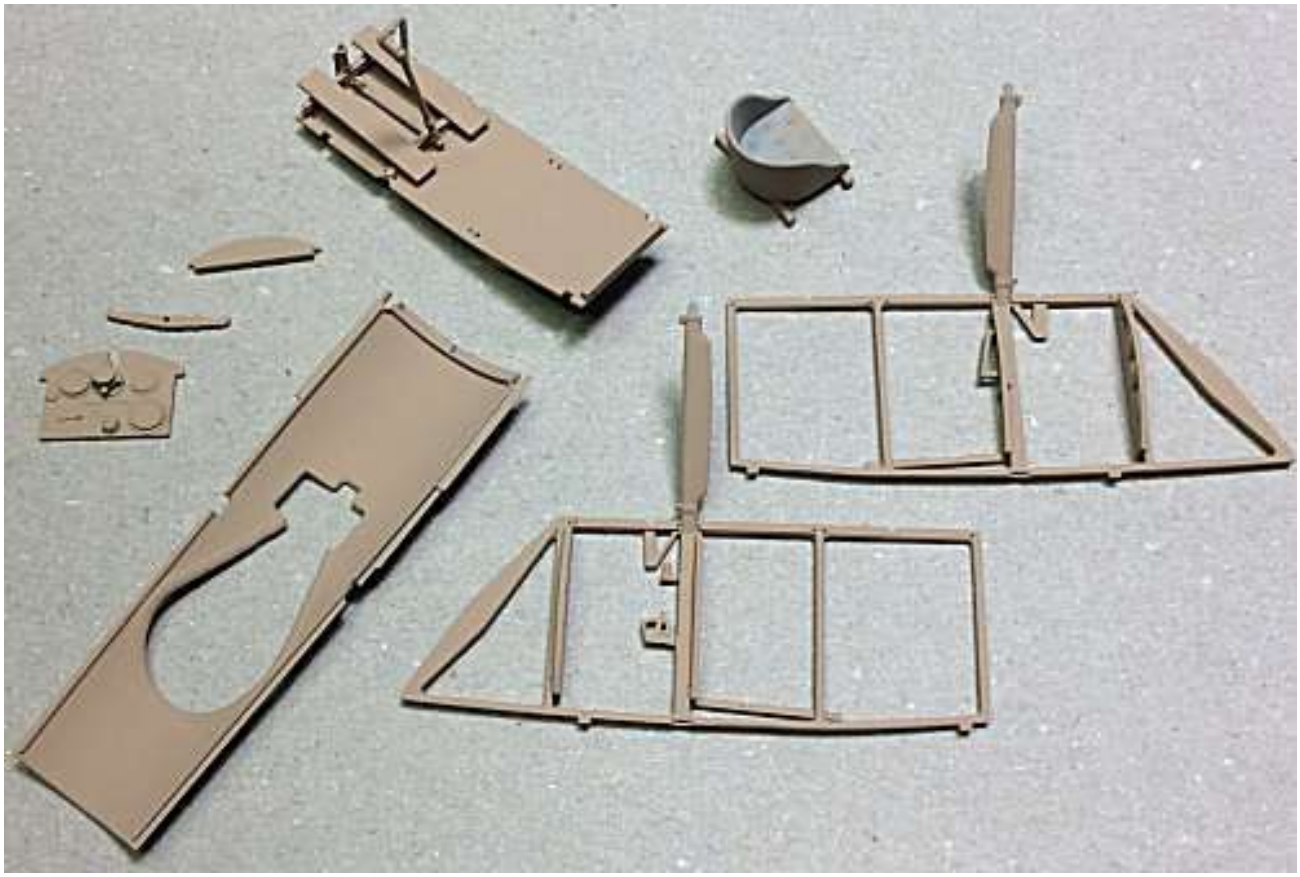
A basic technique:

Parts of the model that are supposed to be made of wood can prove to be a challenge to replicate a wood finish to the part. Some after market companies produce accurate wood decals, which can be used to cover larger areas, such as cockpit decking and fuselage panels. However, decals can't easily be used to create realistic wood finish to smaller items or parts that don't lend themselves to having decals applied. To do this requires brush painting, using such as acrylic or oil paints, which can be enhanced with various washes or filters.

The first thing to do is to ensure the model parts are cleaned, normally with warm water with washing up fluid and something like an old tooth brush. Once cleaned and thoroughly dried, the primer coat can be applied. I use 'Tamiya' Aerosol Light Grey (Fine) or White (Fine) acrylic primer. Once the primer is dry, you can start applying the wood effect to the applicable cockpit items, such the cockpit framework, decking, seat supports, rudder bar, instrument panel and of course, the wing struts. With practice, this method can also be used on fuselage panels and propellers.

To start, apply a suitable base colour. For most painting I use an airbrush and only resort to brush painting when dealing with small items, when I add a few drops of 'Mr. Colour' 400 Self Levelling Thinner', which aids brush painting. For most wood effect, I use 'Tamiya' Wooden Deck Tan (XF78) or Dark Yellow (XF60), suitably thinned with 'Mr. Colour' 400 Self Levelling Thinner'. Allow this base coat to fully dry (if you can't smell the paint, then it's dry).

Example of base coat using 'Tamiya' Wooden Deck Tan (XF78).



For the next step I use ‘DecoArt Crafters Acrylic’ paints, either Burnt Umber or Burnt Sienna. These are similar to standard acrylic oil paints, but are water based instead of oil based. This paint is not as thick as oil based paint and is more creamy, so can be brushed and controlled more easily. Also, as it is water based, it’s easy to clean your brushes, and if really necessary, can be thinned slightly with water. In addition, the paints dry as quickly as normal acrylic paints, avoiding the disadvantage of using true oil paints, which can take days to fully dry.

Place a small amount of the oil paint onto a non-absorbent surface and using a suitable oil paint brush (I use a slightly curved brush), wipe a small amount of the paint onto the brush. For larger areas, such as decking or panels etc I use a small piece of fine sponge to apply the paint.

Apply the paint to the applicable item, using light strokes and in the required direction. Apply the paint along struts and across instrument panels and other smaller items. This gives variation to the wood effect and for the wing struts, is correct for the direction of the wood grain. If you apply too much paint, just brush or sponge it off immediately before it dries. Although the paint is water based, don’t try to thin any applied paint with water as it will lift the paint, which builds up into clumps. If required, a second light coat can be applied. Always wait until a first coat has fully dried before applying a second coat, otherwise the first coat will ‘drag’ and lift from the surface.

Once painting is complete, clean the brush in water.

Below is an example of the Burnt Umber oil paint applied to a cockpit side frame.

Once the oil paint layers have dried, the final top coats can be applied to give the final effect of varnished wood.

'Tamiya' have 'Clear' coloured Acrylic paints, which are intended to be mixed with either Flat Clear (XF86), Semi-Gloss Clear (X35) or Clear (X22), to give the required finish but with a tint of the added 'Clear' colour. I use the Clear Yellow (X24) or Clear Orange (X26) to add a varnished tint to the clear coat. If using the 'Tamiya' Clear I add 'Mr. Colour' Levelling Thinners, which does improve airbrushing and avoids pooling. Otherwise I use 'Alclad' Light Sheen (ALC-311).

Although it's a lacquer, I've found that it will accept 'Tamiya' 'Clear' coloured Acrylics without any separation, which can happen with other paints. The 'Alclad' lacquers dry fast and provide a good sealing layer over the painted surfaces. When using 'Alclad' sealing coats, the golden rule is to allow the various painted surfaces to dry fully before applying 'Alclad' lacquers.

In this instance, I added a few drops of Clear Yellow (X24) into the 'Alclad' Light Sheen (ALC -311) and thoroughly mixed it. Only add small amounts to the 'Alclad' in order to control the amount of tint you desire. I increased my airbrush air pressure to around 20 psi to airbrush the sealing coats over the various cockpit items. The first coat usually dries to a more matte finish, which I assume is due to being sprayed onto the oil paint, rather than onto straight acrylic paint. Once this first coat has dried, I airbrushed several coats of just 'Alclad' Light Sheen (ALC -311), which added not only more sealing coats, but more importantly gave the desired semi-gloss 'varnished' finish I was after.

Below is an **example** of the applied 'Alclad' lacquer/X24 mix on the propeller.

NOTE: *Once you are confident using this method of replicating wood finishes, you can vary both the colour of the acrylic base coat and tinting of the sealing coat, to replicate other types of wood used in aircraft construction.*

Once the lacquer coats are thoroughly dry, any detail painting, decals or final weathering can be applied to the parts, as required, prior to fitting them to the model.

PART 3
WEATHERING
(General)

PART 3 - WEATHERING (General)

There are many different types of weathering mediums available now to modellers of aircraft, ships, vehicles and figures, in model of any type. These weathering mediums can be washes based on enamel, clay or ink. Weather pastels, applied by sponge' as well as oil paints of various sorts are also plentiful. Some modellers have even used water colour paints, and pencils. The following are the basic weathering mediums I tend to use on most of my models.

Flory Model clay washes:

The washes I tend to use are the 'Flory Models' Clay Wash 'Grime' and 'Dark Dirt', which come in various shades and consist of a suspended and very fine clay pigment. They are brushed over the surface to be weathered and dry in around 30 minutes. When dry, use either a piece of good, absorbent kitchen roll or a soft brush to remove as much of the clay wash as you need to achieve the desired effect. The kitchen roll can be used dry or very slightly dampened. If dampened, the dried clay is re-activated and the clay wash can be more easily be removed or worked as required.

First I seal the surface with an airbrushed semi-matte clear coat, such as 'Alclad' Light Sheen (ALC-311), which dries quickly. A gloss coat tends to stop the clay wash 'gripping' the surface when it is applied and it can run off or just puddle. A more matte coat can cause the clay wash to 'grip' too much, making it difficult to remove or even to wash it off completely.

NOTE 1: The more glossy the applied sealing coat is, the more the chance there is that the applied 'Flory' clay wash will not spread fully, but rather form puddles or beads of wash. If this happens, add a few drops of ordinary kitchen washing up liquid to the clay wash. This will break the surface tension of the wash, allowing it spread fully.

NOTE 2: Always decant the amount of clay wash you need, rather than dipping the brush directly into the wash bottle. Dipping into the wash bottle can transfer contaminants from the brush into the wash, will can cause the wash to become thick and unusable.

NOTE 3: When a sealing coat is applied over areas treated with clay wash weathering, the intensity of the applied wash tends to darken. This should be considered when removing the clay wash, otherwise the final effect may appear too dark.

NOTE 4: 'Flory' current range of washes are: Dark Dirt, Grime, Black, Light (white), Mud, Sand, Rust and Concrete. All of these washes can be mixed to create many colour shades for different weathering finishes.

To apply the clay wash is just a matter of brushing all over the surface to be weathered. It doesn't matter really how much is applied as it can be left on for any period, as it is easily removed without any effect on the surface underneath. If you don't achieve your desired effect, you can wash it all off and start again. Use a soft brush or absorbent kitchen roll, which are dry or ***very slightly*** dampened, to brush or wipe off the clay wash in the direction of airflow over the model. Even then, dab them onto a dry piece of the paper, until they are almost dry. Any wetter and you'll find that you are removing too much of the clay wash. If that happens you can re-apply the wash and start again. If you're not happy with the final effect, you can easily remove the clay wash by brushing with a wet brush or even airbrush water over the surface. Dry off the surfaces washed and then re-apply the clay wash and try again until you are satisfied. The technique is to 'damp' brush or wipe over the surface to re-activate the clay wash and at the same time, to smear it over areas that had no clay wash. It'll dry within 30 minutes. Then very lightly brush and/or use a piece of damp absorbent paper to remove as much you want until you get the desired effect. Once finished, run the brush under a tap to rinse out any residual clay pigments. Finally, seal the surface with your chosen clear coat, which will seal in the applied clay wash.

Chipping effects:

To give the effect of chipped and weathered paint/varnish to metal engine cowls and forward fuselage panels etc, chipping fluids can be used. To achieve this effect, first prime the areas with a suitable primer then airbrush the metallic finish desired. Once dry, a chipping fluid, such as 'AK Interactive' Medium Chipping fluid or 'Vallejo' chipping fluid is airbrushed over the painted areas. An alternative is to use a cheap hair spray. This forms a barrier which will allow the top coat to be chipped off. Finally the required top coat colour is applied.
Once fully dry, moisten the top coat with water, which softens the paint. Then with a cut down (stiff) brush and wood cocktail stick, gently teased off the top coat paint. Take care when doing this as 'too much chipping' can't really be covered up. In that event you would have wet the top coat and remove it all with an old toothbrush or similar and then when dry, re-spray the top coat and try again. Once the desired effect was achieved, I sealed the surfaces with an airbrushed coat of 'Alclad' Light Sheen (ALC-311).

'Tamiya' Weathering Master sets: Each of these 'Tamiya' produced weathering sets contain three 'tablets' of different colours and an applicator, which has a brush on one end and a sponge on the other. The tablets have a wax look and feel and can be applied onto painted surfaces to reproduce various finishes. It's best to use these as the final surface treatment, as being a 'Wax', any treated surfaces can't be painted or sealed.

Pigments: Pigments, such as those produced by 'Flory Models' or 'Humbrol' are effectively very fine 'dusts', which can be applied to a model to re-create dust, dirt, stains etc. They can be applied by dry brushing or mixed with other mediums to create paintable solutions.

Washes: Washes can be applied to either enhance panel lines etc or to add a 'filter' of colour onto a painted surface. They can be purchased ready made from various manufacturers or can be 'home made' using such as oil paints with a suitable thinning agent. I tend to use 'AK Interactive' products.

Water colour pencils:

Water colour pencils can be used to add weathering detail. The colour s applied to the model part then brushed gently with a brush, slightly dampened with water. This dilutes the pencil marking, allowing it to be faded as desired. 'AK Interactive' produce these 'weathering' pencils, which are marketed specifically for the modeller, although other artist water colour pencils can be used, such as 'Derwent' Inktense 24 ink pencils.

Oil paint: A technique used more frequently now is oil paint ‘dot and drag’. Basically an oil paint of the desired colour is placed onto a piece of cardboard, which over a hour or so, soaks out the oil in the paint, leaving a drier pigment. The pigment is ‘dotted’ onto the painted surface where it is required then dragged with a brush previously wetted with ‘Tamiya’ X20 enamel thinners then wiped virtually dry.
Softly ‘flick’ the brush to drag the pigment in the direction required, which will blend it in a thin layer.
The amount of pigment left showing depends on the effect you require. Always keep the brush wiped clean to avoid a build up of pigment and remoisten and wipe dry often. The more paint you drag, the less pigment is left showing. Blending different coloured pigments can create stains from smoke/gun blast, rain marks/runs, dirt/dust and oil/fuel stains.

A good quality oil paint and thinners are essential to produce a good finish. Some quality oil paints can be too ‘gritty’ when leached of oil, so I use ’Abteilung 502’ oil paints and ‘Tamiya’ Enamel thinners (X20).

PART 4
DECALS
(General)

PART 4 - DECALS (General)

Standard decals:

NOTE: *The following is **applicable only** for decals on a **painted surface**. If decals are to be placed on top of **previously applied decals**, the decal setting solutions, **if used**, may 'eat' into the previous decals. In this case a sealing coat of clear gloss, such as 'Alclad' Aqua Gloss (ALC-600), 'Tamiya' Clear (X22) or similar should be airbrushed over the first decals, to provide a barrier against the setting solutions.*

Ensure the painted surface is smooth and free from any surface imperfections.

Airbrush a sealing coat of 'Alclad' Gloss (ALC-310) or 'Tamiya' Clear (X22) to provide a smooth surface.

NOTE: *'MicroScale' MicroSet solution softens the decal to allow it to conform to the painted surface. Do not attempt to move the decal too much or it may tear.*

Wet the area using a light coat of 'MicroScale' MicroSet solution.

Apply the decal after it has soaked in 'warm' water enough to start to loosen the decals from its carrier backing.

Carefully move the decal into the correct position.

Once the decal is correctly positioned, use a flat brush to softly brush the water out from under the decal, working from the centre of the decal out towards the edges. I then use a dry cotton bud in the same manner. Finally, wearing cotton gloves, I apply slight pressure and slide my fingers across the decal to finally push the decal onto the surface.

NOTE: *''MicroScale' MicroSol solution will soften the decal to allow it to conform fully to the painted surface. The solution usually causes the decal to wrinkle, but this is normal as the decal semi-dissolves to the surface. Once the solution has been applied, never try to disturb the decal as it will tear. Leave the solution for several hours to do its job, after which the decal will return to a smooth surface, but conformed fully to the painted surface.*

Brush the decal surface with a light coat of 'MicroScale' MicroSol solution.

Leave the solution for several hours to fully dry and set the decal.

Once the decals have been applied and are dry I airbrush a final sealing coat of 'Alclad' Light Sheen (ALC-311) or 'Tamiya' Semi-Matt (XF35) over the decals.

'Lukgraph' linen effect decals:

NOTE: *For this model, the linen effect decals will only be used inside the fuselage.*

The 'Lukgraph' decals are very similar to those produced by 'Aviattic' and are different in both production techniques and application to those of the more traditional decal manufacturers. Traditional decals are normally created using processes such as silk screen printing and are pre-shaped for the particular model markings. When placed in warm water they will detach from the backing sheet and can then be slid onto the model surface and when they are correctly positioned, wiped with a semi-dry brush or cotton bud etc, to expel any water from under the decal. Once fully dry, decal softeners, such as ''MicroScale' MicroSol and/or MicroSet can be applied, if necessary, to 'weld' the decal to the model surface. Finally a sealing coat of acrylic or lacquer gloss, semi-matt or flat is applied over the decal, to seal and protect the seal and protect the decal. However, 'Lukgraph' decals seem to be laser printed onto a very fine carrier film and although this film is thin, the decals are remarkably resilient and somewhat 'stretchy' when being applied. This allows them to be more easily moved and positioned before being finally applied.

Also with most other decals, I've used softeners to help the decals conform to surface irregularities and contours, which is something I've found is not really required for 'Lukgraph' decals, due to the nature of the carrier film. In addition, the decals need to be cut out from the sheet, so care is required to cut the decals accurately to avoid leaving gaps, especially at the edges, where the white base colour will show. That said, minor gaps may be able to be covered with weathering. 'Lukgraph' decals are printed onto either 'clear' or 'white' backing, the 'clear' being dependent on the base coat you apply and the finished effect you desire. Pre-shading can be added to the base coat, where desired, before you apply the decals. For this model I used the 'Lukgraph' 'clear' decals, in order to show the linen effect more visibly.

Application:

As the decals are to represent Clear Doped Linen (CDL), a base primer coat of 'AK Interactive' primer and micro-filler White (AK759) or Grey (AK758) or similar is applied on all of the surfaces to have the decals applied.

NOTE: *'Silvering' is caused by air being trapped in the rough surface of the paint, such as on a matte finish, which after the decal is applied and dries, causes silver sheen patches showing in the decal ('silvering').*

Once dry, check the surfaces for any imperfections, such as trapped dust or raised areas of paint, which will cause 'silvering' under the decals. Any surface imperfections found should be carefully sanded or polished out.

Airbrush the base colour to the model surfaces.

Once dry, check the surfaces for any imperfections, such as trapped dust or raised areas of paint, which will cause 'silvering' under the decals. Any surface imperfections found should be carefully sanded or polished out.

Airbrush at least two light sealing coats of either 'Alclad' Aqua Gloss (ALC-600) or 'Tamiya' Clear (X22), which will form a gloss surface for applying the decals.

NOTE: *The surface must be pre-wet with like warm water with. Care needs to be taken when you slide the decal from the backing sheet and onto the model surface, as the thin decal can fold over on itself.*

Soak each decal in warm water for approximately 20 seconds.

Wet the surface of the model where the decal is to be applied.

Carefully slide the decal onto the wetted surface. Make sure the decal does not fold over on itself.

Align the decal to the shape of the model part.

Using a broad, soft brush, brush the decal from the centre outwards to remove ant water from under the decal.

Adhere the decal to the model part surface by either pressure rolling over the decal with cotton buds or, as I do, by wearing lint free cotton gloves and rubbing the decal with your fingers.

Check to make sure the decal is in full contact with the surface of the model part and that there are no areas exhibiting 'silvering' (trapped air under the decal). If so, gently prick through the decal and apply water then press out the water to adhere the decal back onto the model part.

Also check that there are no lifted decal edges around the model part.

Allow the decal to fully set, preferably overnight. Where decals have been applied to large areas, gentle heating using a hair dryer can accelerate the decal setting time.

Where decals cover location holes or other openings, prick or cut through the decal into the hole or opening then **sparingly** apply ‘Tamiya’ X20A thinners, which will soften and adhere the decal into the hole or opening. Using X20A can also conform decals around curves edges etc.

Protect and seal the decals by airbrushing a sealing coat over the decals. If more decals are to be added onto the applied decals a gloss sealing coat should be used. Otherwise a sealing coat of the desired finish can be applied, which should also be done once all of the required decals have been applied.

PART 5
RESIN AND 3D PRINTS (General)

PART 5 - RESIN AND 3D PRINTS (General)

Resin:

This model is cast resin with 3D resin printed parts, as opposed to the normal plastic used. In the past kits were cast in resin as resin produced much finer detail on kit parts than the plastic kit equivalents. Even today, there are many producers of resin kits and particularly after market replacement parts. Manufacturers of resin kits these days are using more modern techniques to produce resin parts and some, such as 'LukGraph' are now employing 3D printing of many model components. Working with resin does present different challenges to the modeller, especially if it's the first time of building a resin kit. The properties of resin differ radically to those of plastic kits. Below I have listed what I have found to be the primary differences for resin kits from plastic kits:

1. When resin kits are cast in their moulds, a release agent is applied to enable the cast resin parts to be more easily removed, which is similar to plastic kit moulding. This release agent can leave a film on the surface of the kit parts, which, if not removed, can prevent paint or adhesives from adhering to the surfaces. The easiest way to remove this film is to carefully and fully wash all of the model parts in warm soapy water, using an old, soft tooth brush, then rinse all of the parts thoroughly and leave to dry. Alternatively wipe the parts with isopropyl alcohol (e.g. 'Tamiya' X20A thinners).
2. Resin, by its nature, is very brittle and can be damaged or broken easily, especially when handling small parts. This is particularly evident when separating the individual items from their resin cast supports or blocks. The best way to remove item is to cut them away with a razor saw, then clean them up afterwards.
3. Once removed from the resin cast, parts can have 'resin flash' around or amongst parts, especially small items. This is easily removed with a sharp scalpel blade. Heavier residue can be scraped, filed or sanded away.
4. Plastic kits are assembled using solvent adhesives, which melt the surface where it is applied and 'weld' the parts joints together. Resin however will not react to this type of adhesive and can really **only be glued using CA adhesive (Super Glue)**. This type of adhesive reacts with moisture in the air and on the surface to be joined. As most people know, it will also bond skin to whatever it touches, if the skin has CA adhesive on it. Obviously use extreme care when assembling resin kits using CA adhesive.
5. Cutting, sanding and drilling resin will create swarf and more importantly, resin dust. The dust in particular is dangerous, especially if inhaled. Therefore always vacuum the working area, and yourself, regularly. If you have a face mask or filtered respirator and find you can wear it whilst working, then do so. Resin can easily be drilled or scraped, but remember how brittle resin is when it is being handled.
6. It is not unusual to find imperfections in resin cast parts, such as surface blemishes, small 'blow' holes or ragged edges. This can be common on some resin kits. These imperfections can be rectified by sanding/polishing and/or filling with modelling putty, then sanding/ polishing.
7. Generally CA adhesive is supplied as 'instant bond' adhesive, but there are some manufacturers, such as 'VMS Fleky', that supply CA adhesive as standard, thin, slow and specific resin adhesives. Whichever adhesive is used you must ensure parts are correctly positioned and aligned before applying the adhesive. Trying to separate mis-aligned parts once the adhesive sets will prove very difficult and may result in irreparable damage to the model parts.

3D prints:

This model contains 3D printed parts, being mainly the smaller and more complex parts
The properties of 3D printed parts differ radically to those of plastic kits. Below I have listed what I have found to be the primary differences for 3D printed parts:

1. Working with 3D printed parts requires certain precautions, especially as they can be made from resin - **refer to Part 5 (Resin)** of this build log.
2. 3D printed parts, by their nature, are brittle and can be damaged or broken easily, especially when handling small or thin parts. This is particularly evident when separating the individual items from their support struts. I have found that the best way to remove a part is to snip them away from their support struts, rather than trying to saw them off, as movement of a saw is restricted.
3. Once removed from their support struts, any residual strut tags should be removed by careful filing or sanding.
4. 3D printed parts can only be assembled using CA adhesive, as the parts are essentially resin.
5. Cutting, sanding or drilling parts will create dust, which is particularly dangerous, especially if inhaled. Therefore always vacuum the working area, and yourself, regularly. If you have a face mask or filtered respirator and find you can wear it whilst working, then do so.
6. Dependent on the type of 3D printer used and how fine it can print, layer lines (striations) are common in the printed part. These imperfections can, if accessible, be rectified by careful sanding where possible.
7. Handle 3D printed parts carefully, especially the smaller detailed parts. These parts are brittle and can easily be broken.

NOTE:

Throughout this model build I refer to CA adhesive. I use two types of CA adhesive:

> ***'VMS' Flexy 5K (XT thin)** - quicker setting and used for close joints and smaller more fragile parts.*
>
> ***'VMS' Flexy 5K (Slow)** - slower setting and used for more open joints or where positioning of parts will be necessary during assembly.*

'VMS' also produce a specific resin adhesive although I've found this to be no better than the above adhesives.

In general any good CA adhesive (thin and/or slow) from other manufacturers will be suitable to use for assembling resin models.

PART 6
RIGGING
(General)

PART 6 - RIGGING (General)

References:

1. RAF BE2c - Windsock Data File No:42 (J.M. Bruce).
2. RAF BE2c at War - Centenary Data File 172 (Paul R Hare).
3. British Military Aircraft of WW1 (Technical and rigging notes) - (RAF Museum Series Volume 4).

General:

The first thing to check is that you have already drilled out the rigging attachment points. Most models have these located on the model, but it's best to carry out research in reference books or research on line before drilling. Some modellers use micro drills manufactured for drilling printed circuit boards etc and these drill bits sometimes have identifying coloured collars fitted to the drill shanks. I have found that care needs to be taken when using these drills, as they are sharp and instead of easing their way into the plastic of the model, they tend to bite in and effectively 'cork screw' their way in, which causes jamming and lots of broken drills. This is not only expensive but can leave broken drill bits in the model, which are virtually impossible to extract. An alternative is to use High Speed Steel (HSS) drill bits, which are cheaper and have less 'bite' when in use, although again, they are very fragile and can very easily be broken.

Some modellers drill through the wings etc of the model and rig by pulling through the rigging line/EZ thread etc, gluing in position and then rubbing down the exposed line 'tag' and then re-painting that area. I prefer to drill only part way into the plastic and attach the applicable rigging fixture with CA adhesive.

With your research complete and all necessary holes pre-drilled, the rigging can start. For the Internal cross bracing rigging and flight control cables, I use mono-filament (fishing line) of 0.08 or 0.12 mm diameter. These are effectively transparent but do give a look of steel, without the need of painting or colouring with a gel pen. The turnbuckles used can be either sintered metal or resin and obtained from 'Gaspatch Models'. Although the newer resin turnbuckles are better detailed, they are resin and therefore can break is stressed in the wrong direction. If in doubt, use the metal versions, which are much stronger. The aircraft external rigging is shown on the illustrations in the instruction manual. The RFC/RAF type aerodynamic wire was used for structural rigging and standard round wire wound cable was used for control cables and some cross bracing. The external rigging points will be made using 'GasPatch' resin turnbuckles and 0.4 mm diameter blacked tube to represent the late type fittings.
The rigging materials to be used are:

'Steelon' or 'Stroft GTM' 0.08 and 0.12 mm diameter mono-filament

'GasPatch' 1/48th metal turnbuckles and Anchor Points.

NOTE: *Most metal tube can be chemically blackened by immersion is solutions, such as 'Blacken-It' or similar.*

'Albion Alloys' 0.4 mm (NST04) and 0.5 mm (MBT05) diameter 'blackened' tube.

The following illustrations are from 'British Military Aircraft of World War One', the official technical and rigging notes for the RFC and RNAS fighting and training aeroplanes, 1914-1918. This book is from the RAF Museum Series: Volume 4 and published by 'Arms and Armour Press'.

With reference to the following illustrations, it can be seen that the BE2c structure was externally rigged with 1/4” BSF, 9/32” BSF and 2BA streamlined wires and tension adjusters. Also the fuselage internal bracing.

Flight control cables (ailerons, rudder, elevator) and the tail skid control cables were round, wire wound cables with turnbuckles adjusters. As were the external drag wires and fuselage cabane strut bracing wires.

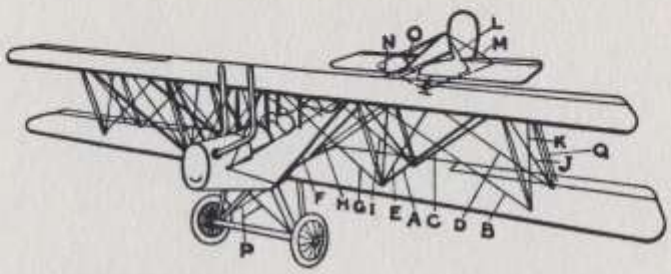
The ‘streamlined’ wires can be modelled using the relevant sized flat, such as the photo-etched sets from ‘RB Productions’. However, these can be difficult to fit and require either tiny photo-etch end fittings, tubes or special to type end fittings. It should be noted that these wires add no structural strength the a model and can be prone to ‘sag’ if the ambient temperature changes too much. **Therefore, for structural strength reasons, I chose to use mono-filament rather than photo-etch flat wires**.

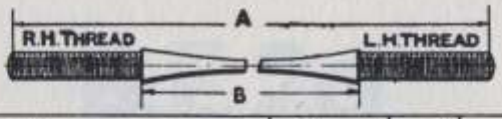
Details of how the rigging was fitted to this model can be found in the relevant chapters of this build log.

T.5. B.E.2.C.

70 H.P. Renault (Old Machine). 90-100 H.P. R.A.F. (New Machine).

RAF-WIRE LENGTHS.





Schedule	Description	Size	No off	Lengths A	Lengths B	Part No.
A	Front Outer Flying Wires	¼" BSF	4	9'-8"	9'-4"	AGS 348
B	" " Landing Wire	2 BA	2	9'-0·6"	8'-9"	" 347
C	Rear Outer Flying Wires	¼" BSF	4	9'-7·6"	9'-4"	" 348
D	" " Landing Wire	2 BA	2	9'-0·6"	8'-9"	" 347
E	Auxiliary Flying Wire	2 BA	2	7'-2½"	6'-11"	" 347
F	Front Inner Flying Wires	9/32 BSF	4	7'-11"-	7'-7"	" 349
G	" " Landing Wire	2 BA	2	7'-8·8"	7'-5"	" 347
H	Rear Inner Flying Wires	9/32 BSF	4	7'-10·5"	7'-6"	" 349
I	" " Landing Wire	2 BA	2	7'-8·5"	7'-5"	" 347
J	Incidence Wire (Long)	" "	4	7'-6·2"	7'-2"	" 347
K	" " (Short)	" "	4	5'-8"	5'-4"	" 347
L	Tail Plane Bracing Wire (Top Front)	" "	2	3'-8·5"	3'-5"	" 321
M	" " " " (" Rear)	" "	2	3'-3·85"	3'-0·95"	" 321
N	" " " " (Bottom Front)	" "	2	3'-4·2"	3'-0"	" 321
O	" " " " (" Rear)	" "	2	3'-9·3"	3'-5"	" 321
P	U/C Front Cross Bracing Wire	9/32 BSF	2	4'-2"	3'-10"	" 349
Q	Aileron Connecting Wire	2 BA	2	6'-3"	5'-11"	" 347

T.5.

B.E.2.C.

70 H.P. Renault (Old Machine). 90-100 H.P. R.A.F. (New Machine).

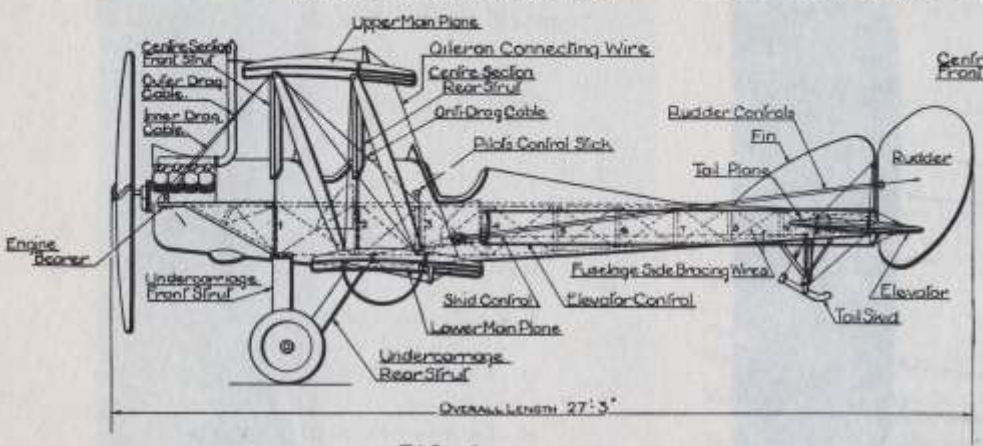


FIG. 1.

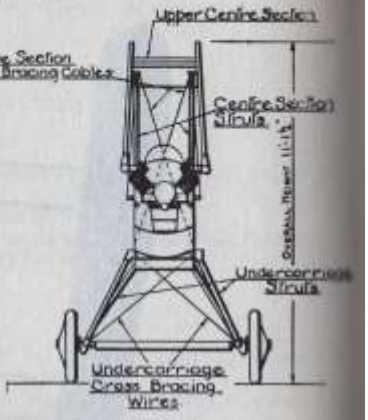


FIG. 2.

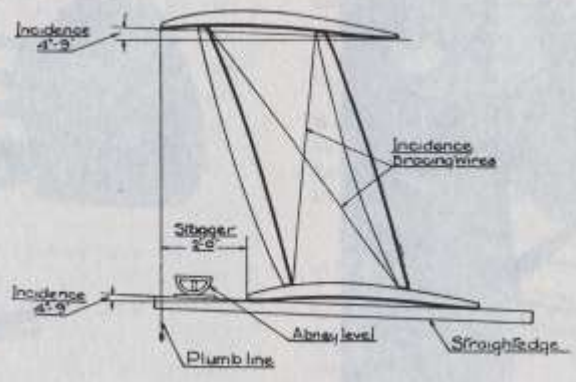


FIG. 4.

T.5.

B.E.2.C.

70 H.P. Renault (Old Machine). 90-100 H.P. R.A.F. (New Machine).

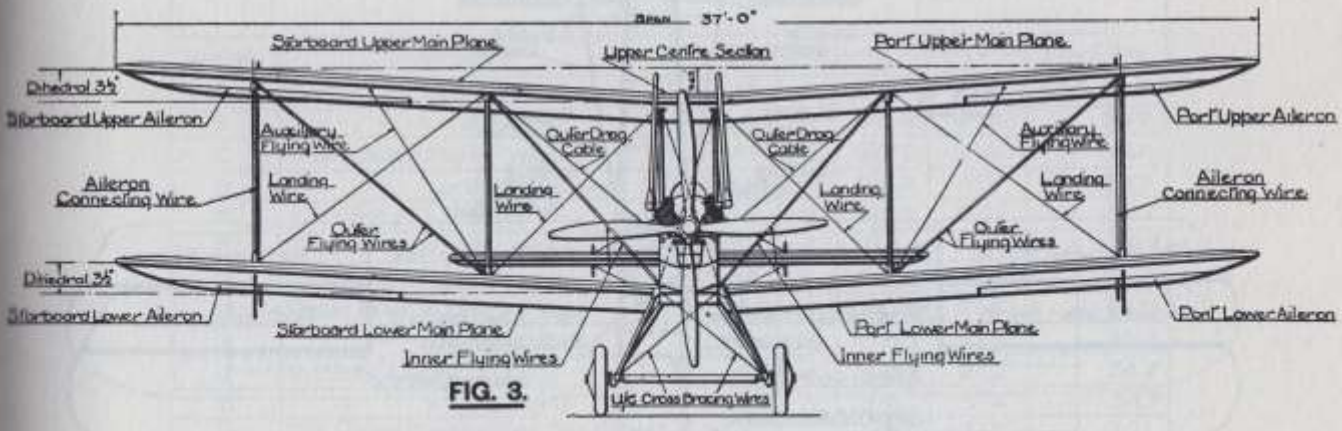


FIG. 3.

T.5.

B.E.2.C.

70 H.P. RENAULT (Old Machine). 90-100 H.P. R.A.F. (New Machine).

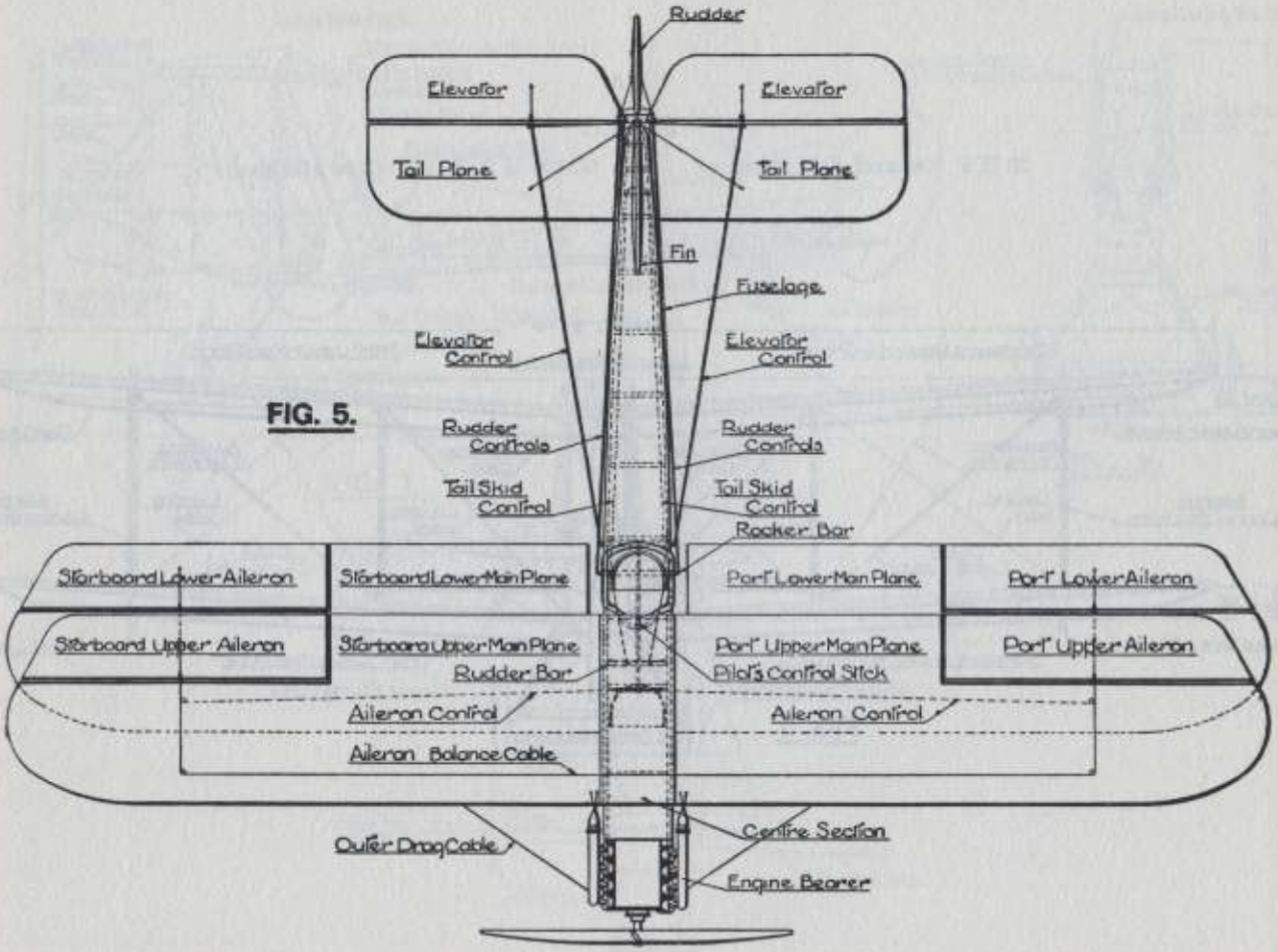
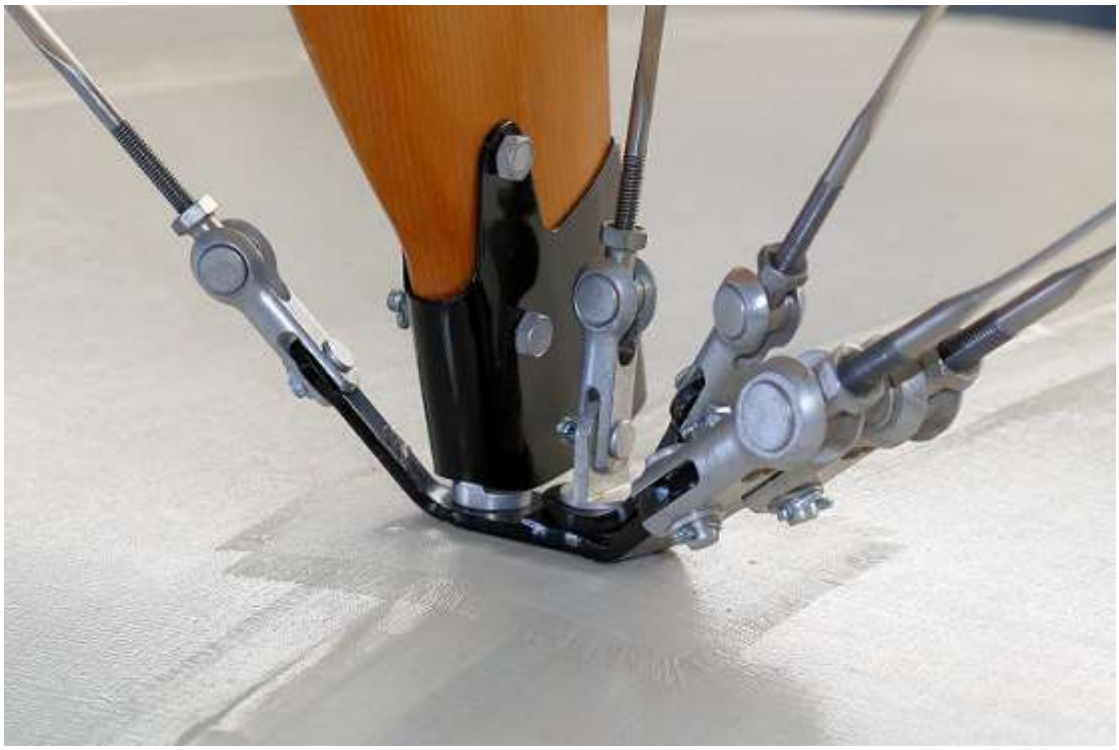
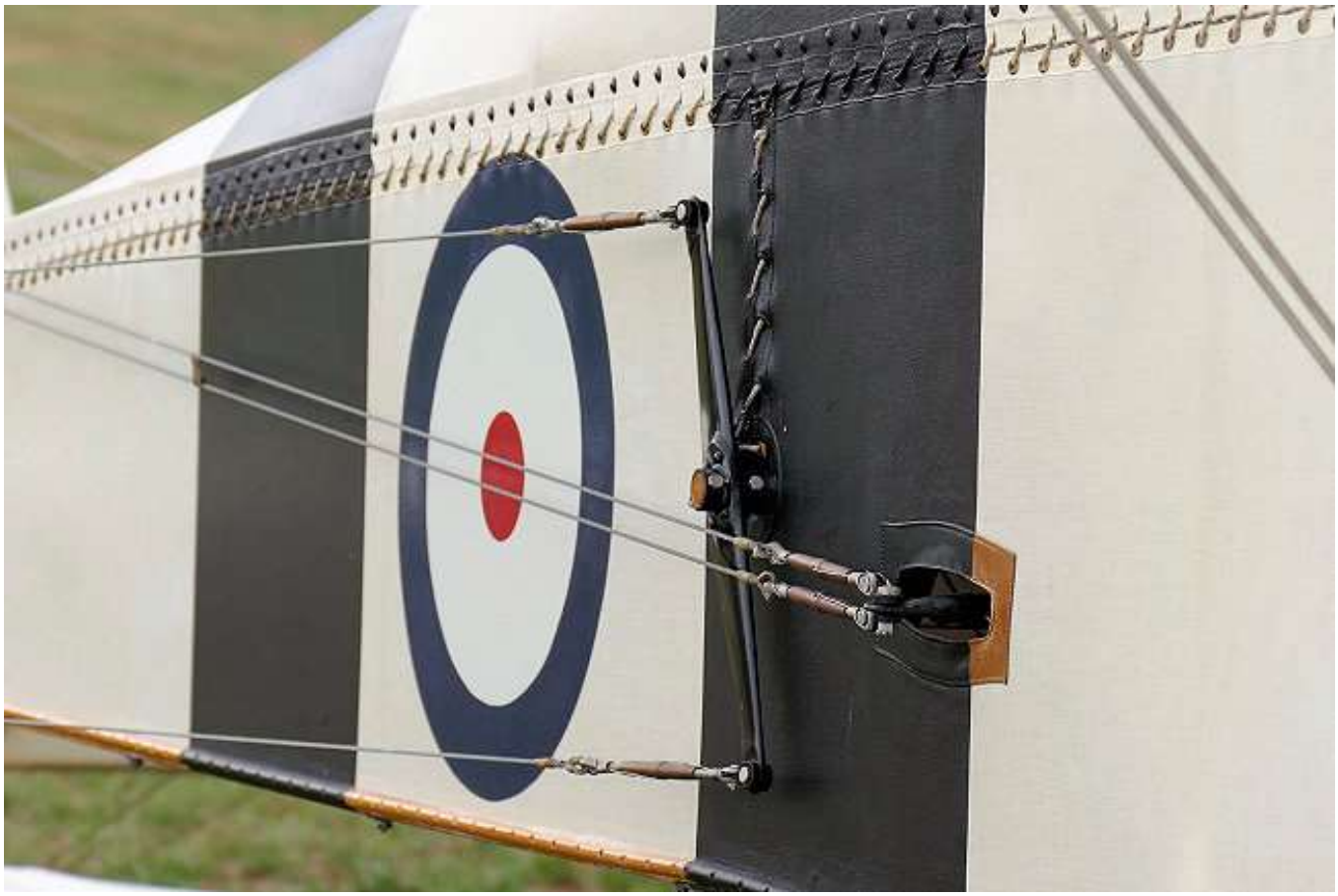


FIG. 5.

Examples of streamlined wires and adjusters



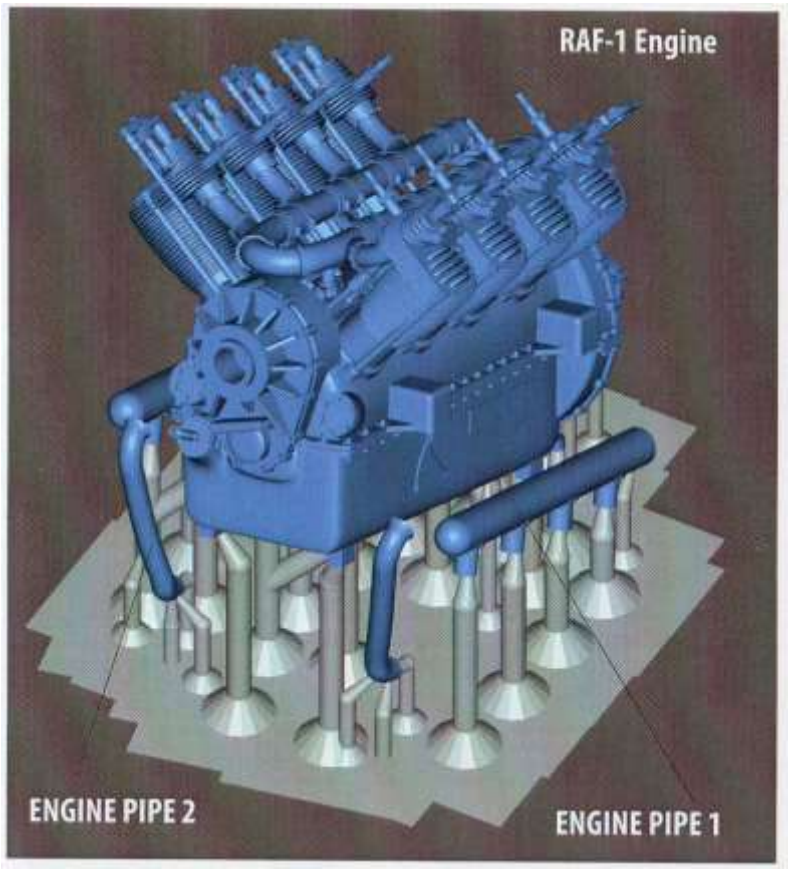
Example of round, wire wound cables and turnbuckles



PART 7
ENGINE

PART 7 - ENGINE

NOTE: *Refer to* Part 5 (Resin and 3D prints) *of this build log.*



Preparation:

Carefully remove the engine assembly, two pipes and the two exhaust manifolds from their support struts.

File or sand away any residual support struts attachment points from the parts.

Cut away the raised stub pipe on the top of the engine block, between the forward engine cylinders, the drill a hole of 0.6 mm diameter down into the engine block. This will be used for the support tube under the top engine cowl, fitted later in this build.

Airbrush the engine assembly, two pipes and the two exhaust manifolds with a black gloss base, such as 'Alclad' Gloss Black Base (ALC-305-60) or similar.

Painting:

NOTE: *For painting I mostly use 'Tamiya' acrylic paints thinned with 'Mr. Colour' Self Levelling Thinners, which is a lacquer thinner but works well with the acrylic paints.*

Brush paint the engine crankcase, including between the bases of the cylinders and the top of the casing with 'Mr. Colour' Aluminium (218) or similar.

Brush paint, as far as possible, the valve push rods and tappets on the top of the cylinders with 'Mr. Colour' Stainless Steel (213) or similar.

Brush paint the induction manifolds, the two pipes and airbrush the two exhaust manifolds with 'Alclad' Exhaust Manifold (ALC-123) or similar.

Brush paint the 'rubber' joints on the inlet manifold and the body of the magneto with 'Tamiya' Rubber Black (XF85) or similar.

Brush paint the ignition leads face on the magneto with 'Tamiya' Hull Red (XF9) or similar.

Brush paint the top of the valve push rods and the oval on the magneto with 'Mr. Colour' Brass (219) or similar.

Brush paint the bases of the spark plugs with ‘Tamiya’ Gun Metal (X10) or similar.

Rub the edge of a pencil lead around the edges of the magneto body.

Assembly:

NOTE: *The following steps are to provide a more positive location and support for the two engine pipes.*

Drill a hole of 0.3 mm diameter centrally into the bottom of both engine pipes (not the end with the hole).

Drill a hole of 0.3 mm diameter centrally into the pipe location flanges on the front of the engine.

Cut two short lengths of 0.2 mm diameter rod, such as ’Albion Alloy’s (NSR02) or similar.

Secure the rods into the pre-drilled holes in the two pipes, using thin CA adhesive.

Secure the two tubes into the pre-drilled holes in the engine, using thin CA adhesive. The pipes top ends should be aligned with the valve gear on the tops of the front cylinders.

Weathering:

Airbrush the engine assembly, two pipes and the separate two exhaust manifolds with a matte (flat) clear coat, such as ‘Alclad’ Flat (ALC-314) or similar.

Engine

Refer to Part 3 (Weathering) of this build log for more information - apply your desired weathering finish to the engine assembly (I used ‘Flory Models’ Dark Dirt fine clay wash).

Seal the applied weathering with a semi-matte clear coat, such as ‘Alclad’ Light Sheen (ALC-311) or similar.

Lightly brush ’AK Interactive’ Kerosene (AK2039) on parts such as the cylinder valve gear, push rods, around the cylinder bases and along the crankcase/engine block joint.

Lightly sponge ‘Tamiya’ Weather Master Set D (Burnt Blue) around the tops of the cylinders and exit ports of the exhaust manifolds.

Lightly sponge ‘Tamiya’ Weather Master Set C (Silver) around the cylinder sides and tops.

Exhaust manifolds

Refer to Part 3 (Weathering) of this build log for more information - apply your desired weathering finish to the two exhaust manifolds (I used ‘Flory Models’ Dark Dirt or Grey fine clay wash).

Seal the applied weathering with a semi-matte clear coat, such as ‘Alclad’ Light Sheen (ALC-311) or similar.

Lightly sponge ‘Tamiya’ Weather Master Set B (Soot) along the body of the exhaust manifolds.

Ignition leads:

Cut two lengths of 0.6 mm diameter Nickel-Silver tube, such as ‘Albion Alloy’s’ NST06 or similar. The length of the tubes should be between the spark plug of the second cylinder from the rear of the engine and the end of the induction manifolds.

Use a 0.4 mm diameter drill to remove any metal burr from the bore of the tubes.

Cut sixteen long lengths of ’EZ’ Black stretch line (Fine).

Insert four lines into each end of the two tubes.

Secure the lines in the tubes using thin CA adhesive.

Locate each tube in position on the top of the induction pipes and secure in place using thin CA adhesive.

Slightly loop each of the lines from the front of the induction tubes and secure them individually to the ends of their spark plugs, using thin CA adhesive.

Slightly bow each of the lines from the rear of the induction tubes and secure them individually to the face of the magneto on the lower, rear of the engine, using thin CA adhesive.

If necessary, repaint the face of the magneto with ‘Tamiya’ Hull red (XF9) or similar.

To represent the clamping rings holding the tubes to the induction pipes, I used a 0.1 mm nib ink pen.

NOTE: *The two exhaust manifolds will be fitted once the engine is installed in the fuselage, as this will enable correct alignment of the exhaust pipes to the manifolds.*

PART 8
PROPELLER

PART 8 - PROPELLER

NOTE: *Refer to **Part 5 (Resin and 3D prints)** of this build log.*

Preparation:

Carefully snipe or saw the 3D printed propeller from its support struts.

NOTE: *I managed to misplace the kit supplied photo-etch hub plates, I used 'spare' resin hubs from 'ProperPlane'. Therefore, these hub plates stand proud of the propeller centre boss, instead of being recessed, as they should be.*

Snipe or sand away any support tags from the edges of the propeller. Also sand away any 3D printed surface artifacts from the propeller blades and centre boss.

Remove the kit supplied photo-etch propeller front and rear hub plates (2 and 2a) from the sheet.

File or sand away any residual photo-etch tags from the edges of the two hub plates.

Painting:

Airbrush the viewable faces of the two photo-etch hub plates with 'Tamiya' Gloss Black (X1) or similar.

Airbrush the viewable faces of the two photo-etch hub plates with 'Alclad' Steel (ALC112) or similar.

Airbrush the propeller with a grey primer, such as 'AK Interactive' Grey (AK758) or similar.

Airbrush the propeller with 'Tamiya' Dark Yellow (XF60) or similar.

NOTE: *The wood effect for this model was created using 'Windsor & Newton' Griffin (Alkyd) Raw Sienna paint.*

Brush a covering coat of the 'Windsor & Newton' Griffin Alkyd **Burnt Sienna** paint over the four propeller blades and centre hub.

Leave the oil paint to settle for about ten minutes.

Decant a small amount of White Spirits into a suitable dish.

Dip a broad flat oil brush into the White Spirit then wipe the brush on a sheet of kitchen roll, which should not deposit any fibres in the oil paint.

Brush the oil paint along the four propeller blades (out to the tips) and keep wiping the brush on the sheet to remove residual oil paint.

Repeat dipping and wiping the brush in the White Spirits and brushing the oil paint until the desired density and finish is achieved.

Leave the oil paint to fully dry. It should be touch dry only in 24 hours.

Airbrush a semi-gloss clear coat, such as ‘Alclad’ Satin (ALC312-60) or similar, with a few drops of ‘Tamiya’ Clear Orange (X26) to give a varnished look to the finish.

Lightly sponge the both sides of the leading edges and tips of each propeller blade with ‘Tamiya’ Weathering Master Set A (Mud), to represent erosion of the varnish.

Using thin CA adhesive, secure the front and rear hub plates onto the centre of the propeller boss.

Lightly apply ‘AK Interactive’ Kerosene (AK2039) over the propeller hub plates.

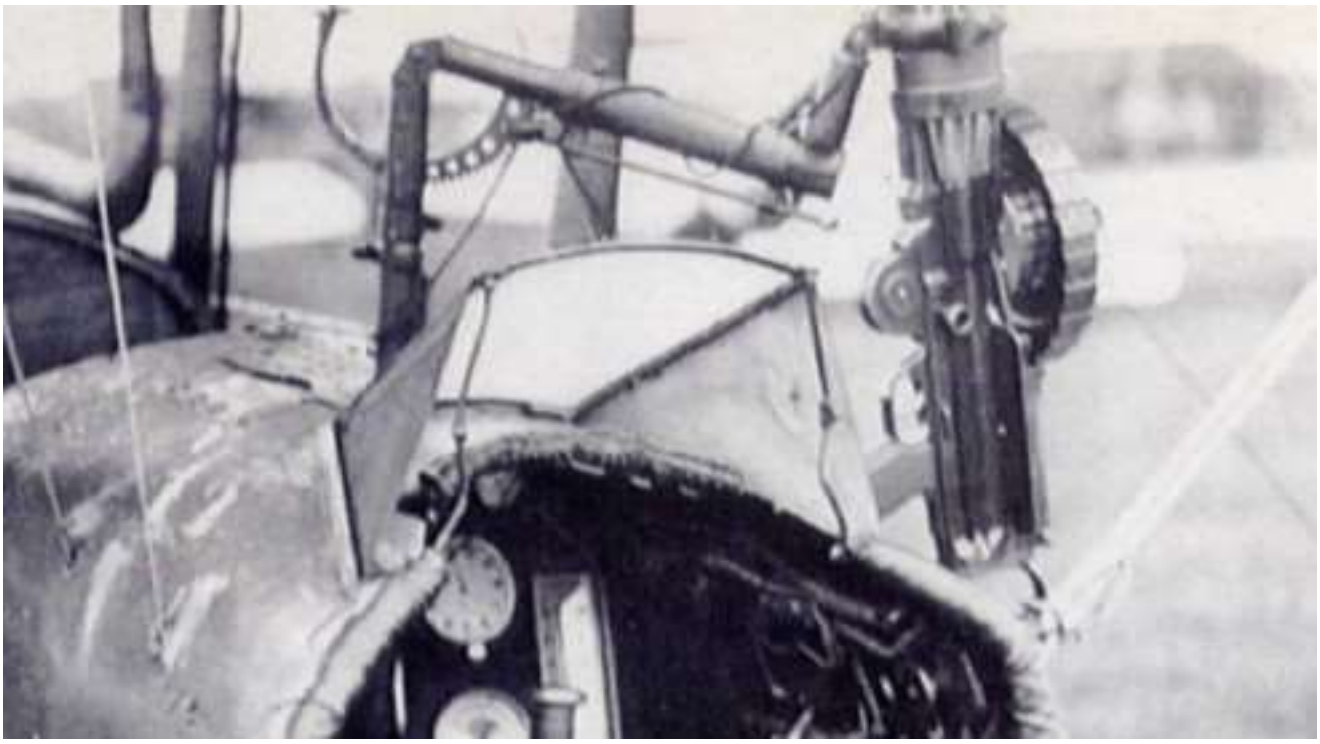
PART 9
WEAPONS

PART 9 - WEAPONS

Although the kit supplied 3D printed machine guns are well made, I felt they didn't accurately represent the weapons used. Therefore I chose to replace them with the 'GasPatch' Lewis Mk.1 stripped half heatsinks (32-32052) weapons.

Observers machine gun:

Example of a Lewis machine gun mounting



NOTE: *The Lewis machine gun for the observer was mounted on a tubular swivel arm located centrally between the observer and pilots cockpits.*

Refer to ***Part 5 (Resin and 3D prints)*** *of this build log.*

For the machine gun I used an extra and spare 'GasPatch' ammunition drum, as the four supplied by 'GasPatch' were used for the created ammunition drum rack.

The kit supplied photo-etch gun sights (18 and 19) were not used as photographs taken at the time did not show these gun sights fitted.

Preparation:

Check the 'GasPatch' Lewis Mk.1 stripped half heatsink machine gun for and resin artifacts and if necessary, carefully sand them away.

Check the kit supplied 3D printed tubular swivel mount for and resin artifacts and if necessary, carefully sand them away.

Remove the perforated quadrant (4) from the kit supplied photo-etch sheet and remove any residual tags from the edges.

Cut a length of 0.3 mm diameter lead wire, such as that from 'PlusModel' or similar.

Modifications:

Reduce the height of the upright portion (gun mount) of the swivel mounting by approximately 30%, to better represent the actual mounting.

Drill a hole of 0.3 mm diameter centrally down the upright portion (gun mount) of the swivel mounting, but do not drill all the way through the bottom of the tube.

Cut a short length of 0.3 mm diameter Brass rod, such as ‘Albion Alloy’s’ (MBR03) or similar.

Secure the rod into the pre-drilled hole in the mounting tube, using thin CA adhesive.

Drill a hole of 0.3 mm diameter centrally into the bottom of the heatsink of the machine gun, but do not drill all the way through the heatsink.

Test fit the machine gun into the mounting and if necessary, reduce the length of the exposed rod until the machine gun contacts the top of the mounting.

Using thin CA adhesive, secure the photo-etch quadrant onto the lower portion of the swivel mounting.

Using thin CA adhesive, secure the 0.3 mm diameter lead wire to the centre of the lower portion of the swivel mounting, the diagonally across to the first, then the second mounting rings.

Cut away the end of the lead wire level with the forward edge of the gun mounting tube.

Painting:

Machine Gun:

Airbrush prime the machine gun with a gloss black, such as ’Tamiya’ Gloss Black (X18) or similar.

Lightly airbrush the machine gun with ‘Alclad’ Gunmetal (ALC-120) or similar.

Lightly dry brush a worn metal effect over the weapons, with such as ‘Mr. Colour’ Super Metallic - Super Iron (203) or similar.

Using ‘Tamiya’ weathering master Set B (Soot), lightly sponge around the gun muzzle.

Brush paint the two grip handles with ‘Tamiya’ Hull Red (XF9) or similar.

Ammunition drum:

Airbrush the four ammunition drums with ‘Tamiya’ Gloss Black (X1) or similar.

Airbrush the four ammunition drums with a light coat of ‘Alclad’ Steel (ALC-112) or similar.

Brush paint the ammunition rounds in the drums with ‘Mr. Colour’ Brass (219) or similar.

Brush paint the hand straps on the ammunition drums with ‘AK Interactive’ Brown Leather (AK3031) or similar.

Lightly brush ‘AK Interactive’ Kerosene (AK2039) wash over the ammunition drum.

Swivel mounting:

Airbrush prime the machine gun with a gloss black, such as 'Tamiya' Gloss Black (X18) or similar.

Lightly airbrush the machine gun with 'Alclad' Gunmetal (ALC-120) or similar.

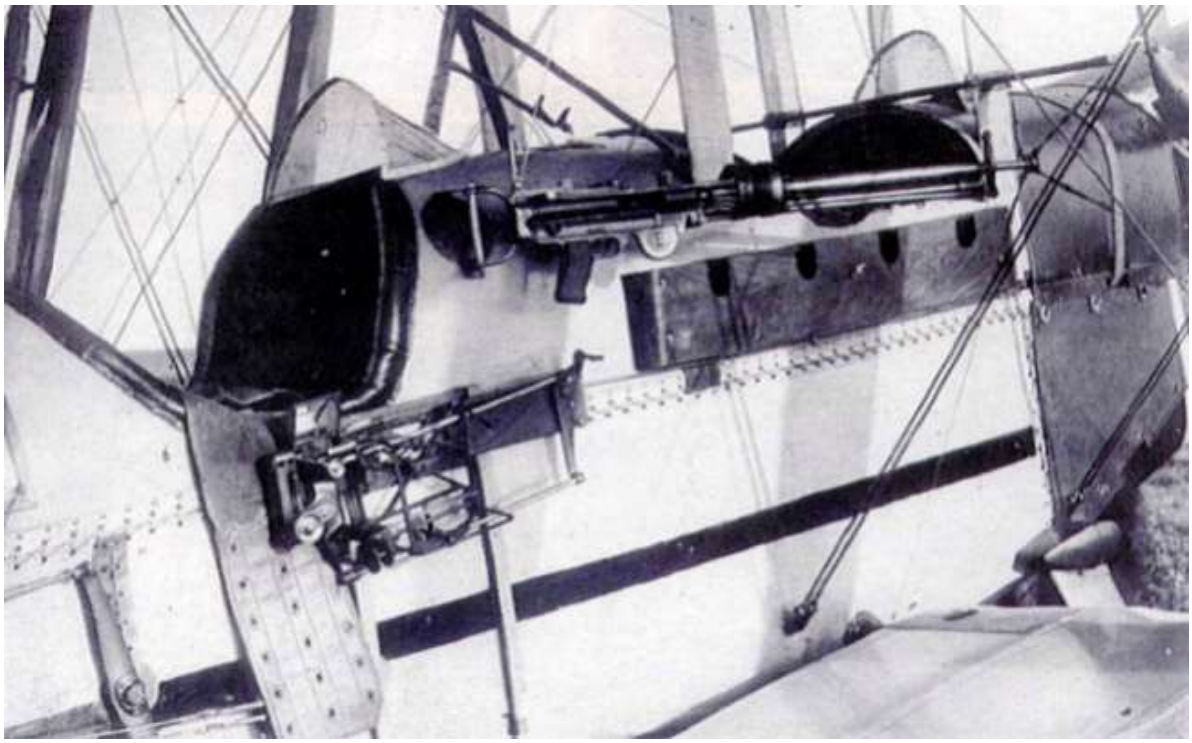
Lightly dry brush a worn metal effect over the weapons, with such as 'Mr. Colour' Super Metallic - Super Iron (203) or similar.

Assembly:

NOTE: *Final assembly of the weapons to the model will be carried out later in this build.*

Pilots machine gun:

Captured BE2c of No.13 Squadron



NOTE: *The Lewis machine gun for the pilot was mounted to the side of the cockpit and fixed angled to fire obliquely outboard.*

*Refer to **Part 5 (Resin and 3D prints)** of this build log.*

For the machine gun I used an extra and spare 'GasPatch' ammunition drum, as the four supplied by 'GasPatch' were used for the created ammunition drum rack.

The kit supplied photo-etch gun sights (18 and 19) were not used as photographs taken at the time did not show these gun sights fitted. The photo-etch mounting(5) was not used as it is too flimsy and flat.

Preparation:

Check the 'GasPatch' Lewis Mk.1 stripped half heatsink machine gun for and resin artifacts and if necessary, carefully sand them away.

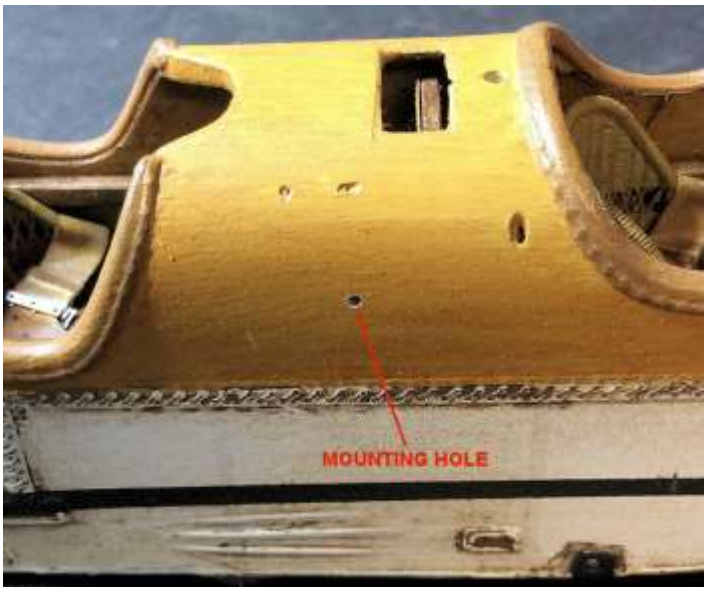
Modifications:

Cut a length of 0.3 mm diameter tube, such as 'Albion Alloy's' (NST03) or similar.

Flatten one end for 2 mm then bend the flattened end to 90 degrees.

Hold the flattened end in flat pliers the bend the straight tube to approximately 10 degrees.

Drill a hole of 0.3 mm diameter through the right side of the fuselage as shown below.



Using ‘Microscale’ Krystal Kleer adhesive, secure the flattened end of the tube onto the left side of the breech block of the machine gun, with the angled tube facing rearwards.

Insert the straight end of the tube into the pre-drilled hole in the fuselage.

Check that the machine gun is horizontal to the fuselage and the rear grab handle is close to the fuselage with the gun barrel facing outboard as shown below.

Remove the gun and if necessary, trim the straight tube such that it only penetrates through the fuselage skin, not into the cockpit.

Painting:

Machine gun:

Paint the machine gun using the same methods used for painting the observers machine gun.

Ammunition drum:

Paint the ammunition drum using the same methods used for painting the observers ammunition drum.

Gun mounting:

Airbrush prime the machine gun with a gloss black, such as 'Tamiya' Gloss Black (X18) or similar.

Lightly airbrush the machine gun with 'Alclad' Gunmetal (ALC-120) or similar.

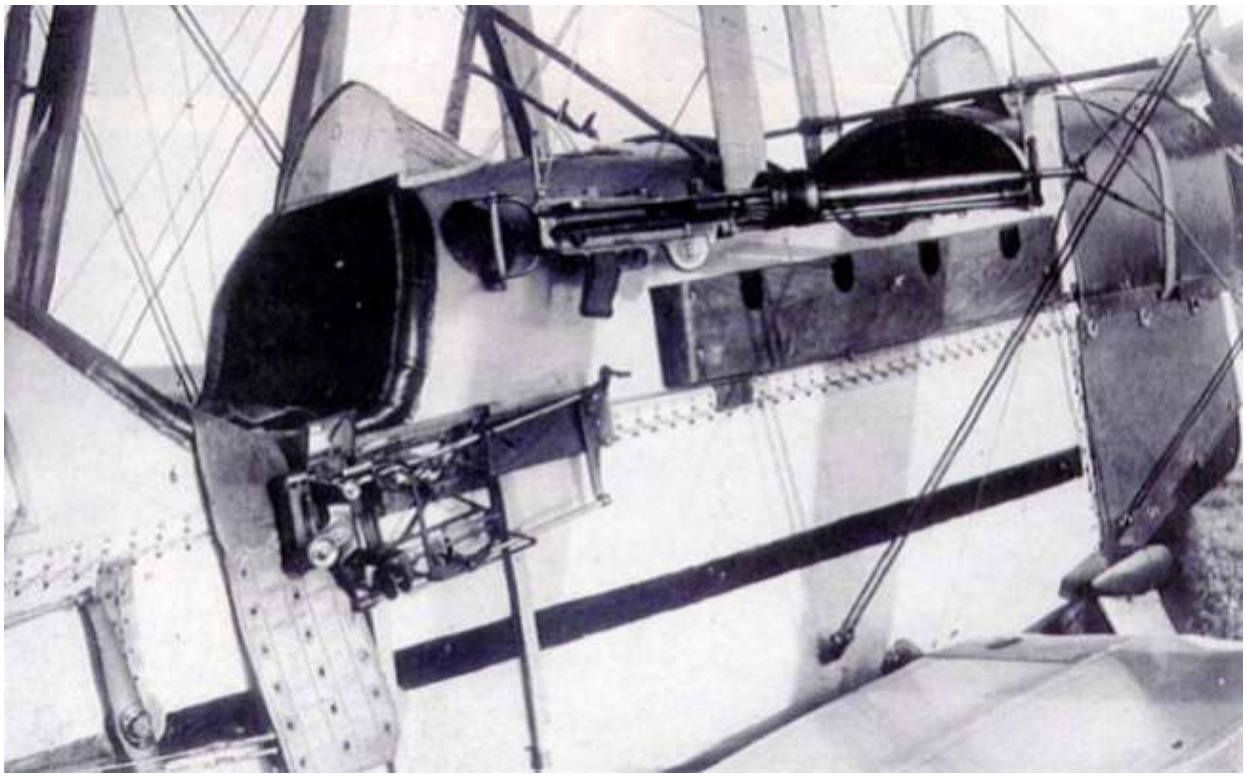
Lightly dry brush a worn metal effect over the weapons, with such as 'Mr. Colour' Super Metallic - Super Iron (203) or similar.

Assembly:

NOTE: *Final assembly of the weapons to the model will be carried out later in this build.*

Ammunition rack:

NOTE: *The wooden ammunition rack for the Lewis gun spare ammunition drums is provided as photo-etch (24) in the kit. However, this only has three slots for ammunition drums and seems to be the wrong shape from that shown in the following photograph of a captured No.13 Squadron BE2c. Therefore I chose to create the ammunition rack from 0.2 mm thick plastic card and using the four ammunition drums supplied with the 'GasPatch' Lewis Mk.1 stripped half heatsinks (32-32052) set.*



Cut three strips of the 0.2 mm thick plastic card to the following sizes:

Strip 1 - 34 mm long and 5 mm wide

Strip 2 - 30 mm long and 5 mm wide

Strip 3 - 30 mm long and 2 mm wide

Strip 1:

Cut four slots into one edge. The slots should be equidistance apart and deep enough to receive the hand strap of the four 'GasPatch' ammunition drums.

Bend each end of the strip to form curves so that between the curves is 30 mm.

Strip 3:

Cut then gently sand the corners of one side of the strip to curves that end at the edge of the opposite side of the strip.

NOTE: *The adhesive used is 'Revell' Contacta Professional cement (39604), which being thicker than liquid cement, has better initial grip and slower drying time, allowing the parts to be positioned correctly.*

Secure strip 1 onto strip 3.

Secure strip 2 onto the back of the strip 1 and 3 assembly.

Gently sand the edges of the assembly to blend them together.

Airbrush the assembly with a white primer, such as 'AK Interactive' White (AK759) or similar.

Airbrush the assembly with 'Tamiya' Deck Tan (XF55) or similar.

Brush a covering coat of the 'Windsor & Newton' Griffin Alkyd **Burnt Sienna** paint over the assembly.

Create the wood effect by using the same procedure used for applying the wood effect onto the fuselage.

Sand away any casting artifacts from the edges of the four 'GasPatch' ammunition drums.

Airbrush the four ammunition drums with 'Tamiya' Gloss Black (X1) or similar.

Airbrush the four ammunition drums with a light coat of 'Alclad' Steel (ALC-112) or similar.

Brush paint the ammunition rounds in the drums with 'Mr. Colour' Brass (219) or similar.

Brush paint the hand straps on the ammunition drums with 'AK Interactive' Brown Leather (AK3031) or similar.

Lightly brush 'AK Interactive' Kerosene (AK2039) wash over the ammunition drums.

Using thin CA adhesive, secure the four ammunition fully drums into the rack with their strap handles located in the slots.

Airbrush the assembly with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC311) or similar.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PART 10
FUSELAGE

PART 10 - FUSELAGE

NOTE: *Refer to **Part 5 (Resin and 3D prints)** of this build log. Apart from the supplied photo-etch parts, the individual model parts are not numbered and there is no parts call out illustration. Therefore take care that you select the correct parts for assembly by reference to the illustrations in the kit instructions.*

Fuselage preparation:

NOTE: *The kit supplies duplicate parts to enable a BE2c trainer to be built. These are rudder the bar and control column. These parts are not required for this model.*

Carefully remove the cockpit floor, two cockpit side frames, the two engine mounting frames, the five cockpit frames, two fuel tanks, a control column and torque tube, two elevator torque tubes, cockpit rear cross member and a rudder bar from their support struts.

File or sand away any residual support struts attachment points from the parts.

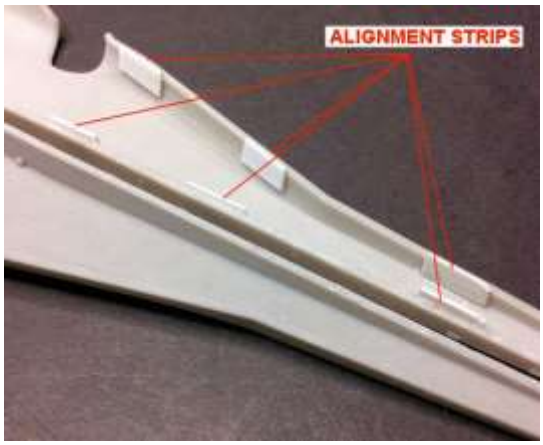
Check fit the two fuselage halves together to ensure they fit flush to each other. If necessary, sand off any artifacts from the edges to ensure a flush fit.

NOTE: *As usual for resin kits, there are no locating pegs and holes in the edges of parts, including the fuselage halves. This can cause problems in correct alignment of parts during assembly. To help correct alignment of the fuselage halves, plastic card strips can be used as aligners.*

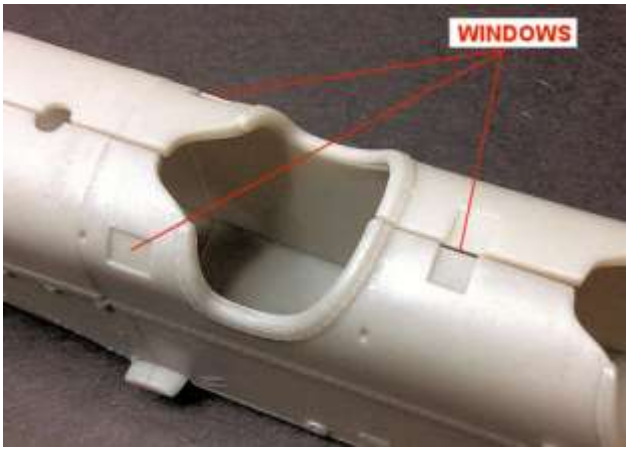
Cut six strips of 0.8 mm thick plastic card.

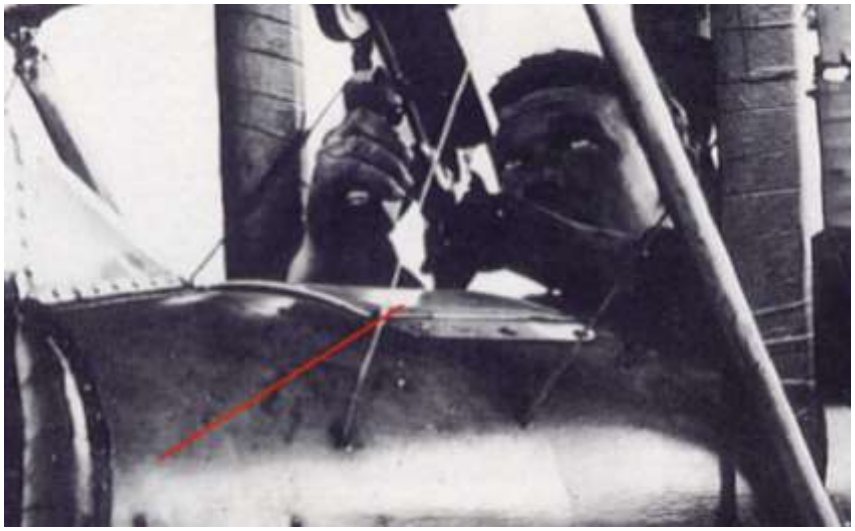
Using thin CA adhesive, secure the six strips at the edge of one fuselage half and equally spaced from the rear of the cockpit area.

Check fit the two fuselage halves together and ensure the joint between the two is gap free.



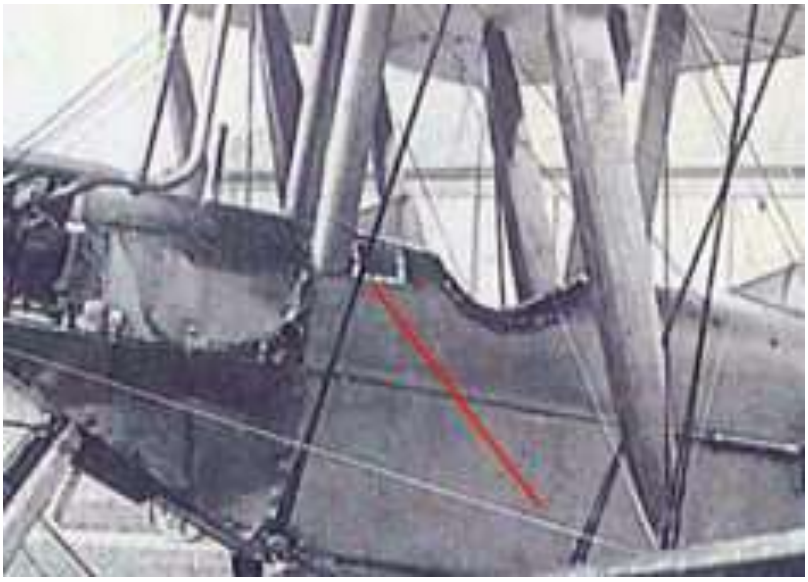
NOTE: *The fuselage halves have pre-moulded 'windows', which on the actual aircraft were used to allow daylight to penetrate into the cockpits to light up the instrument panels. The 'windows' are moulded as solid and intended to be painted. I chose to cut these 'windows' out to represent them better.*





Pilot's cockpit window

Observers cockpit windows



Using an appropriate sized drill, chain drill around the inside edge of the pre-moulded 'windows'.

Carefully file the edges of the 'windows' to match the inner edges of the kit photo-etch window frames (14 and 15).

Once the windows shapes have been achieved, carefully thin the fuselage edges from the inside to better represent the actual thickness of the fuselage window panels.

Cockpit preparation:

NOTE: *Parts 3D printed are made of resin and therefore can only be secured in position using CA adhesive. Standard styrene cement will have no effect.*

Secure the two cockpit side frames to the cockpit floor.

Test fit the assembly between the two fuselage halves, making sure the fuselage halves fully join without undue pressure. If necessary sand the outer edges of the cockpit side frames to achieve the correct fit.

Secure the pilots cockpit rear bulkhead in position onto and between the rear side members.

Test fit the assembly between the two fuselage halves, making sure the fuselage halves fully join without undue pressure. If necessary sand the curved top or edges of the bulkhead to achieve the correct fit within the fuselage, including scraping away resin from the inside of the fuselage as necessary.

Secure the observers cockpit tall rear bulkhead in position onto and between the side members.

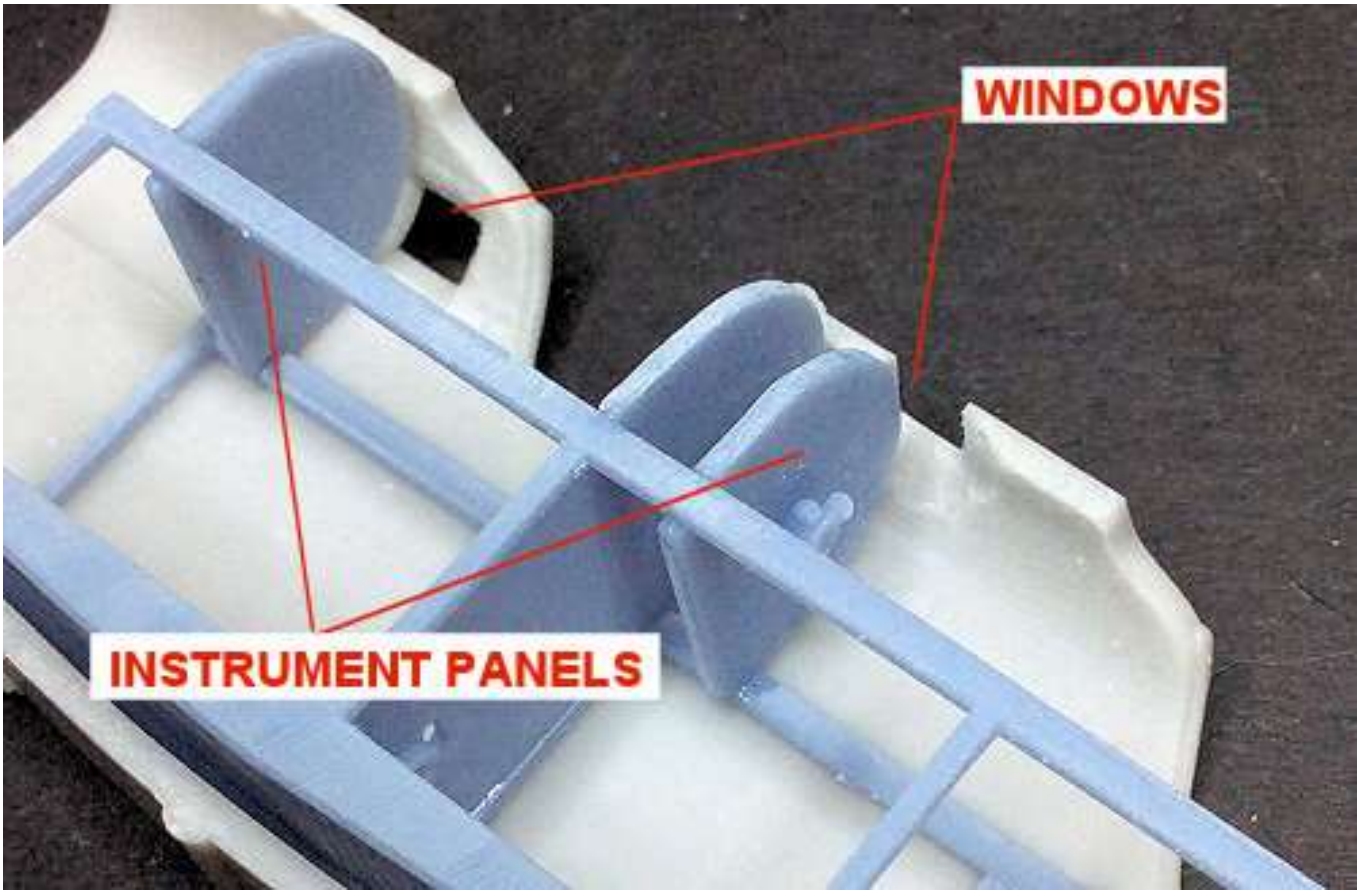
Test fit the assembly between the two fuselage halves, making sure the fuselage halves fully join without undue pressure. If necessary sand the curved top or edges of the bulkhead to achieve the correct fit within the fuselage, including scraping away resin from the inside of the fuselage as necessary.

NOTE: *The position of the tops of the two instrument panels should be aligned with the front edge of the 'window' cut-outs.*

Secure the two instrument panels in position onto and between the side members.

Test fit the assembly between the two fuselage halves, making sure the fuselage halves fully join without undue pressure. If necessary sand the curved top or edges of the bulkhead to achieve the correct fit within the fuselage, including scraping away resin from the inside of the fuselage as necessary.

Secure the half bulkhead in position onto the floor and between the side members in the pilots cockpit area..



Drill a hole of 0.3 mm diameter up into the centre of the bottom of the control column and down through the mounting boss on the control column torque tube.

Cut a short length of 0.3 mm diameter Brass tube, such as ‘Albion Alloy’s’ MBT05 or similar.

Secure the tube in the pre-drilled hole in the control column using thin CA adhesive.

Secure the tube into the pre-drilled hole in the boss of the control column torque tube, using thin CA adhesive.

Position the rudder bar on its locating stub on the cockpit floor, behind the observers bulkhead.

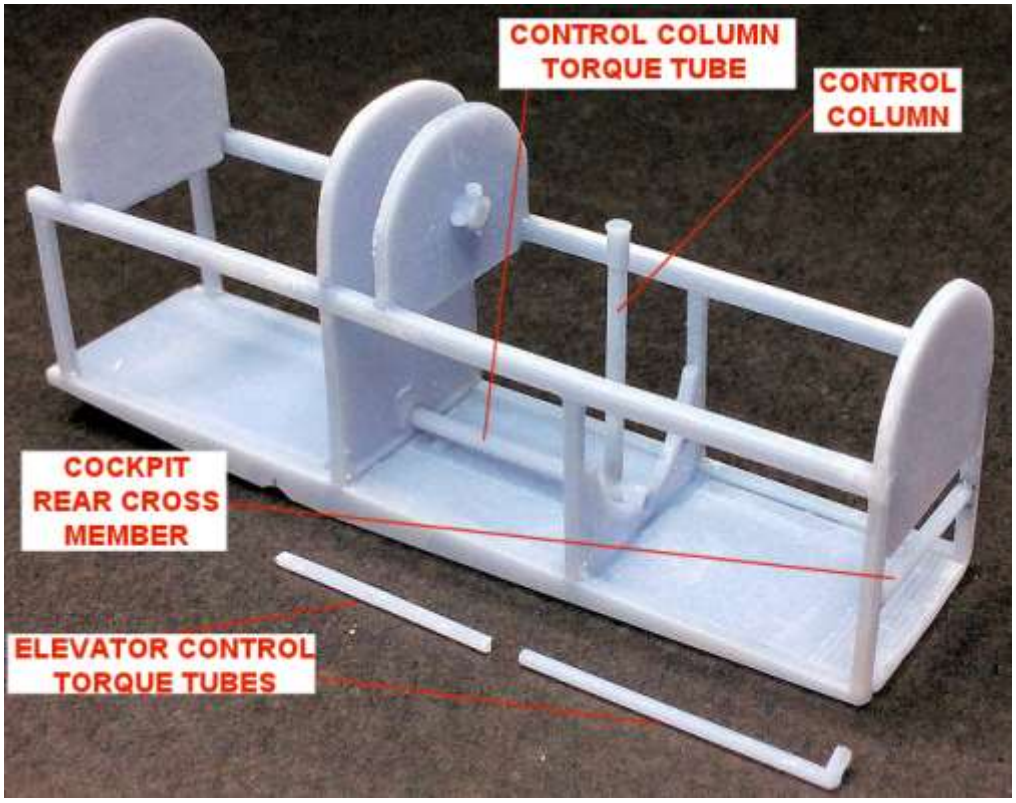
Test fit the control column assembly into the locating holes in observers bulkhead and the pilots half bulkhead. If necessary file out the curve in the rudder bar to allow the control column assembly to locate correctly.

Test fit and adjust as necessary the forward elevator control torque tube, which locates in the slot in the observers bulkhead and against the front of the control column.

Test fit and adjust as necessary the rear elevator torque tube, which spans between the rear of the control column and the cross member at the rear of the cockpit side frames (when fitted).

Hold the rear tube in position and level with the cockpit floor, with the cranked end facing vertically up. Pencil mark the cockpit rear side frames at the level of the top of the cranked end of the tube.

Test fit and adjust as necessary the cockpit rear cross member then secure in position, with its bottom edge aligned to the pencil marks, using thin CA adhesive.



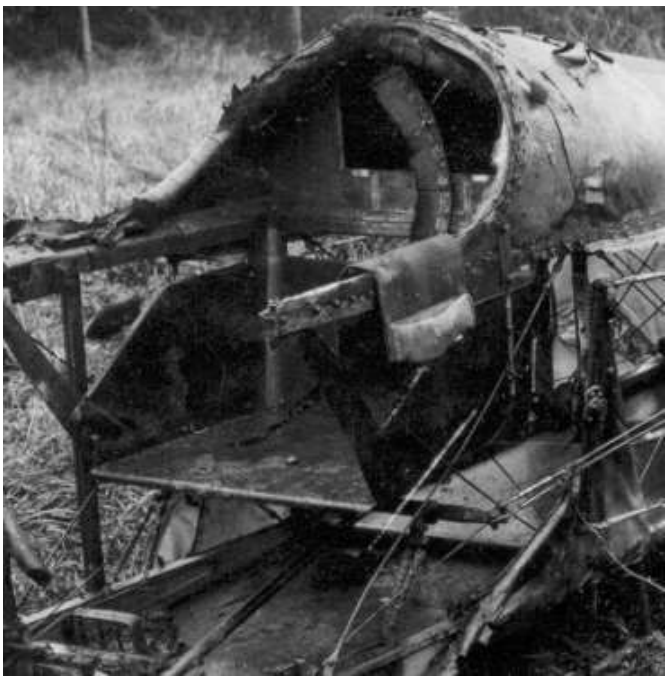
NOTE: *The control column and elevator torque tubes will be fitted later in the build. A cover plate was fitted to the front of the observers cockpit as an engine rear bulkhead.*

Cut a rectangle ‘plate’ of 0.5 mm thick plastic card to fit on the foot plate and between the cockpit side frames in the observers cockpit.

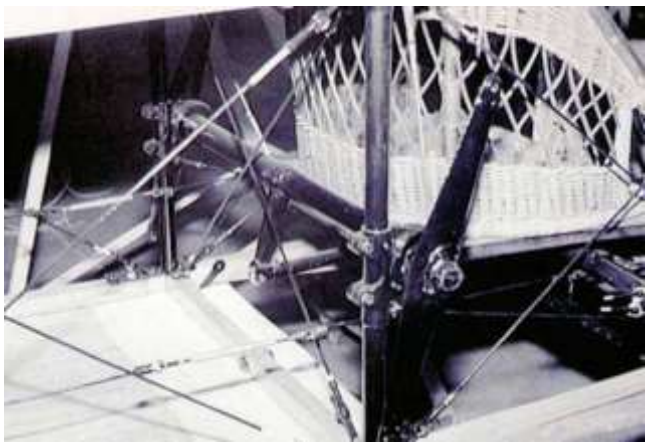
Using CA adhesive, secure the plate in position on the observers foot plate and tilting forward at the top edge.

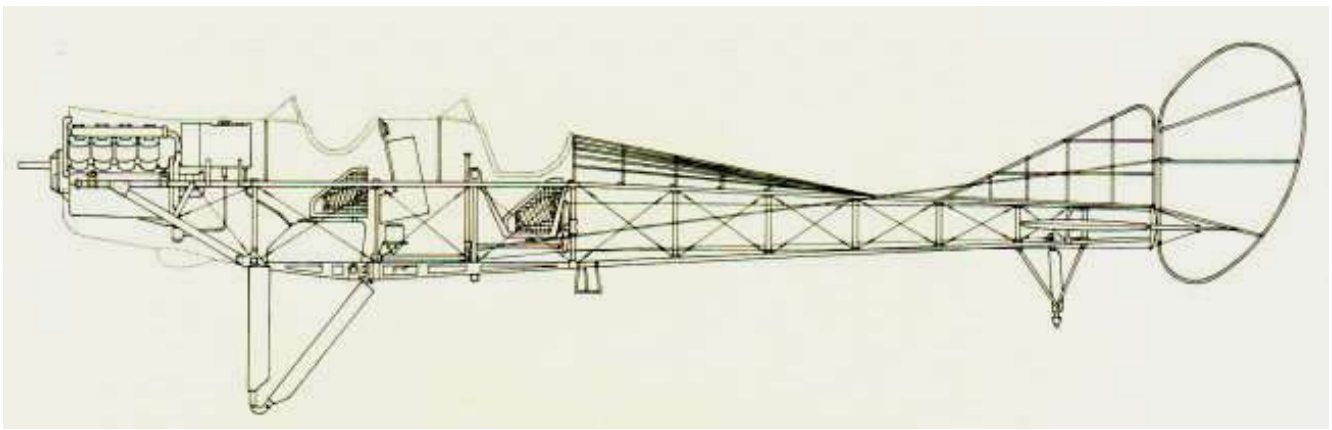
Pilots seat:

NOTE: *The 'Lukgraph' kit has the seat fitted onto an armoured metal cradle attached to the cockpit side frames. This type of seat cradle is on the 'Vintage Aviator' (TVAL) BE2c* ***reproduction*** *BE2c. It seems these seats for the pilot were introduced on the later BE2c aircraft, powered by the RAF 1a engine. The armoured seat offered the pilot some protection from ground fire.*



A BE2c ***restoration*** *was carried out at the Musee de l'Air et l'Espace on BE2c Serial No:9969. As can be seen in the following photographs, a wicker seat is mounted on a wood or metal tray attached and wire braced to the cockpit side frames. It seems this type of pilot seat was fitted to the earlier BE2c aircraft powered by the Renault engine. The 'LukGraph' model has the RAF 1a engine, so the armoured seat cradle for the pilot is correct.*





Cockpit photo-etch:

Remove the photo-etch instrument panels (1 and 1a), pilots seat cradle (25), controls (7 and 8) and rudder bar tops (9) from the kit supplied sheet:

Remove any residual photo-etch tags from the edges of the parts.

Using the fold lines, bend the two sides and rear of the photo-etch seat cradle (25) vertically to 90 degrees.

Reinforce the joins using CA adhesive.

Secure the rudder bar tops (9) and observers panel (1a) in position using thin CA adhesive.

Pilots seat cradle support:

Cut a 5 mm wide strip of 0.5 mm thick plastic card. The length of the strip should span between the rear vertical members of the cockpit side frames. This will support the photo-etch seat cradle.

Secure the strip onto the rear cross member between the cockpit side frames.

Seats preparation:

NOTE: *Generally, the wicker seat for observers often had a higher back than the pilots seat. As such I chose to replace the kit supplied 3D printed seats, which are identical, with the resin Wicker seats from 'BarracudaCast' (BR32234). The seat cushions were from the Camel seat (BR32332)*
Handle the seats with care as the resin wicker backs are very weak and liable to break.

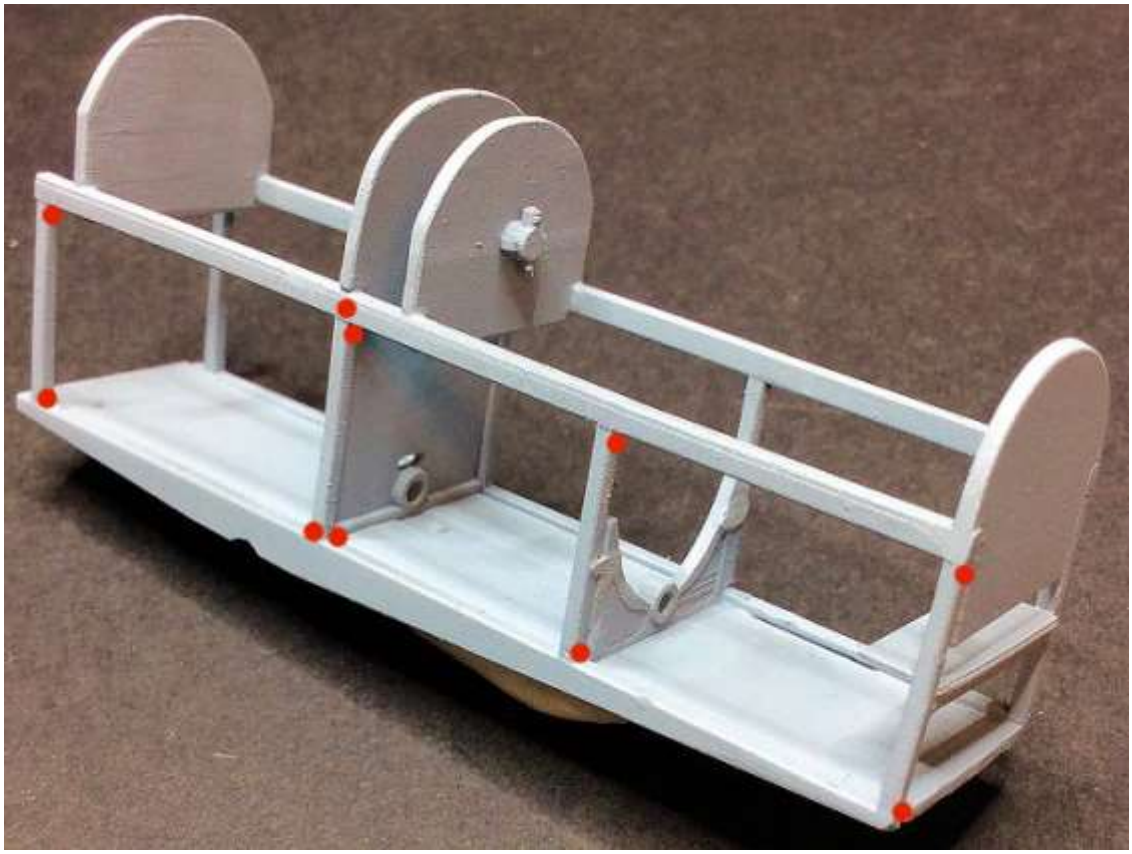
Carefully cut away the casting blocks from the underside of both resin seats.

Carefully sand away the residual resin from the underside of the two seats, making sure the sanded surfaces are flat and the seats sit level.

Rigging points:

NOTE: *The following allows the fitting of the cross bracing wires to the cockpit frame assembly.*

Drill a hole of 0.3 mm diameter through the points shown (both sides) in the following photograph.



Painting:

NOTE: *For painting I mostly use 'Tamiya' acrylic paints thinned with 'Mr. Colour' Self Levelling Thinners, which is a lacquer thinner but works well with the acrylic paints.*

Airbrush the following with a primer coat of 'AK Interactive' Grey (AK758) or similar:

Cockpit frame assembly
Photo-etch - instrument panel (1), seat cradle (25) and controls (7 and 8).
Inside surfaces of the two fuselage halves
Two resin seats and seat cushions
Two forward engine mounting frames
Control column/torque tube assembly
Rudder bar
Two elevator torque tubes
Two fuel tanks.

Fuselage halves:

NOTE: *Refer to the following photograph for painted areas.*

Locate the cockpit assembly in position on a fuselage half and pencil mark the centre of each end of the top longeron of the assembly. Then repeat on the other fuselage half. These will be where the two types of decal will join.

Mask off the inside of the fuselage halves at the forward metal panel and top half of the fuselage sides (between the pencil marks).

Airbrush the lower half inside the two fuselage halves with thinned 'Tamiya' Deck Tan (XF55) or similar.

Remove the masking from the top half of the fuselage sides.

Mask off the previously painted surfaces.

Airbrush the upper half inside the two fuselage halves with thinned 'Tamiya' Dark Yellow (XF60) or similar.

Remove all masking.

Mask off the insides of the fuselage halves to leave just the forward metal panel areas exposed.

Airbrush the exposed metal panel areas with thinned 'Tamiya' Gloss Black (X1) or similar.

Airbrush the exposed metal panel areas with 'Alclad' Duraluminium (ALC-102) or similar.

Remove all masking.

Fuselage decals:

Cut a strip from the kit supplied wood effect decal sheet large enough to cover the Dark Yellow area painted on the upper half of the fuselage.

Apply the decal with its bottom edge along the colour join on the fuselage, blending the decal around the top curves of the fuselage.

Leave the decal to dry and set.

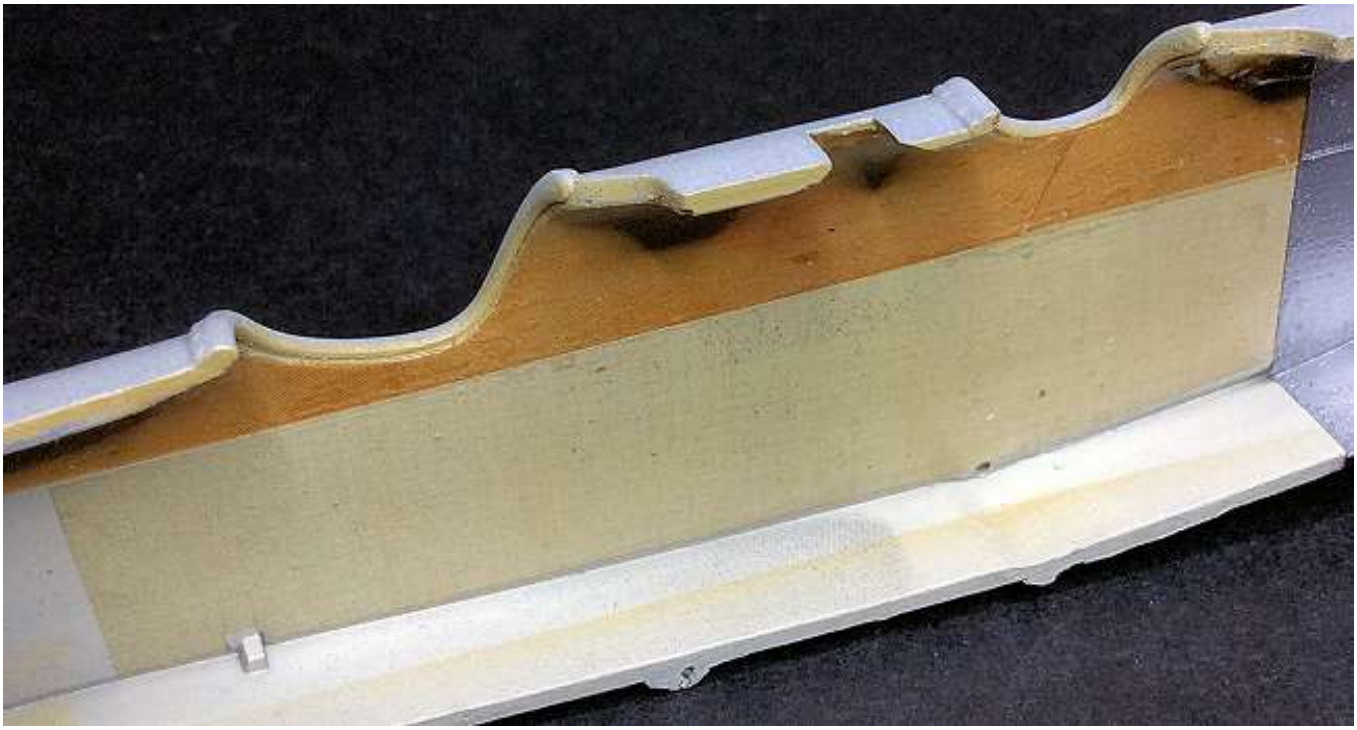
Carefully use a sharp blade to scrape the edges of the decal to remove it from the contours around the top edge of the fuselage. Slice through the window opening and scrape the edges clear of decal.

Repeat the procedure on the other fuselage half.

Cut a strip from the kit supplied CDL effect decal sheet large enough to cover the Deck Tan area painted on the lower half of the fuselage.

Apply the decal with its top edge along the edge of the previously applied decal and its bottom edge following the lower corner of the fuselage.

Leave the decal to dry and set.



Metal surfaces:

Airbrush the following with thinned ’Tamiya’ Gloss Black (X1) or similar:

Two fuel tanks
Pilots seat cradle.

Airbrush the parts with ‘Alclad’ Steel (ALC-112) or similar.

Airbrush the parts with a misting coat ‘Alclad’ Gunmetal (ALC-120) or similar.

Seats:

Airbrush the two resin seats with thinned ’Tamiya’ Dark Yellow (XF60) or similar.

Seat cushions:

Brush paint the two seat cushions with ‘Tamiya’ Hull Red (XF9) highlighted with ‘Humbrol’ Leather (62).

Wood effects:

Airbrush the following with thinned ’Tamiya’ Deck Tan (XF55) or similar:

Pilots photo-etch instrument panel (1)

Support struts on the two forward engine mounting frames

Rudder bar

Cockpit frame assembly, **except** the following areas:

Bottom half of the observers rear bulkhead

Front foot board and engine cover plate in observers cockpit

Two foot boards in pilots cockpit

Control column torque tube mounting

Face of pilots instrument panel.

Refer to Part 2 (Wood Effects) of this build log for more information - Apply your desired wood effect finish (I used ‘DecoArt’ Burnt Umber crafters acrylic) to the parts.

Detail painting:

Brush the following with thinned ’Tamiya’ Rubber Black (XF85) or similar:

Control column/torque tube assembly

Two elevator torque tubes

Engine support members on the forward support frames

Instrument on pilots panel.

Brush paint the hand grip at the top of the control column with ‘Tamiya’ Flat Earth (XF52) or similar.

Brush paint the top of the control column hand grip with ‘Mr. Colour’ Stainless Steel (213) or similar.

Brush paint ‘Mr. Colour’ Stainless Steel (213) or similar over the following areas:

Bottom half of the observers rear bulkhead

Front foot board and engine cover plate in observers cockpit

Two foot boards in pilots cockpit

Control column torque tube mounting

Metal tops on the rudder bar.

Pilots instrument panel:

Brush paint the instrument bezels with ‘Mr. Colour’ Brass (219) or similar.

Brush paint the instrument labels with ‘Tamiya’ Rubber Black (XF85) or similar.

Brush paint the fuel indicator tube with ‘Tamiya’ Clear Yellow (X24) or similar.

NOTE: *I chose not to use the kit supplied instrument decals and to replace them with appropriate decals from the ‘Airscale’ Generic Instrument WW1 (AS32 WW1) set.*

Secure the photo-etch instrument panels in position on the pilots panel, using thin CA adhesive.

Airbrush a clear gloss coat, such as ‘Alclad’ Aqua Gloss 600 or similar over the fitted instrument panel.

Apply the appropriate ‘Airscale’ decals into the instrument recesses on the panel.

Assembly:

Cockpit controls:

NOTE: *Refer to the kit instructions for the location of the photo-etch controls 7 and 8.*

Airbrush the controls 7 and 8 with a primer coat of 'AK Interactive' Grey (AK758) or similar:

Secure the controls 7 and 8 in their positions on the cockpit side frames, using thin CA adhesive.

Cut a length of 0.2 mm diameter rod, such as 'Albion Alloy's' NSR02 or similar and bend one end to 90 degrees.

Using thin CA adhesive, secure the rod with the bent end on the throttle lever and the other end against the cockpit longeron.

Brush paint the throttle lever and control rods with 'Tamiya' Rubber Black (XF85) or similar.

Brush paint the knobs ends of the controls with 'Mr. Colour' Stainless Steel (213) or similar.

Drill a hole of 0.2 mm diameter through the rudder bar.

Cut two long lengths of 0.08 mm diameter mono-filament, such as 'Stroft GTM' or similar.

Pass the lines through the pre-drilled holes and secure in position using thin CA adhesive.

Trim off any excess line from the front of the rudder bar.

Slide a blackened 0.4 mm diameter tube onto the lines and secure in place using thin CA adhesive.

Secure the rudder bar on its location stub on the cockpit floor using thin CA adhesive.

Pass the lines over each side of the control column locating boss then down to the rear edge of the cockpit floor.

Keeping the lines taut, secure them to the rear edge of the cockpit floor using thin CA adhesive.

Trim away any excess line at the rear edge of the cockpit floor.

Locate the control column torque tube into its locating holes in the observers bulkhead and the pilots mounting boss then secure in position using thin CA adhesive.

Using thin CA adhesive, secure the forward elevator torque tube in position between the lower, front face of the control column and the slot in the observers bulkhead.

Using thin CA adhesive, secure the rear elevator torque tube in position between the lower, rear face of the control column and the pilots seat cross member support.

Secure the pilots photo-etch seat cradle onto the added support strip using CA adhesive. Make sure the seat is parallel to the cockpit floor.

Airbrush a length of 0.85 mm diameter plastic rod with 'Tamiya' Rubber Black (XF85) or similar.

Cut the rod into two lengths that will fit in the rear corners of the pilots seat cradle with the top ends level with the top edge of the cockpit upper longerons. Secure the two rods in position using thin CA adhesive.

Secure the fuel tank onto the floor of the observers cockpit with its rear edge 4 mm from the bottom of the observers rear bulkhead.

Cut a long length of 0.08 mm diameter mono-filament, such as 'Stroft GTM' or similar.

Pass the line through a blackened 0.4 mm diameter tube then loop the line back through the tub, leaving a loop of line.

Slide the loop of line over the top of the control column then slide it down towards the bottom of the column.

Pass the two ends of the lines under the pilots seat to each side of the crank on the rear elevator torque tube, the up the rear face of the seat bulkhead.

Slide the tube up to the rear of the control column.

Keeping the lines taut, secure them to the rear edge of the seat bulkhead using thin CA adhesive.

Trim away any excess line at the seat bulkhead.

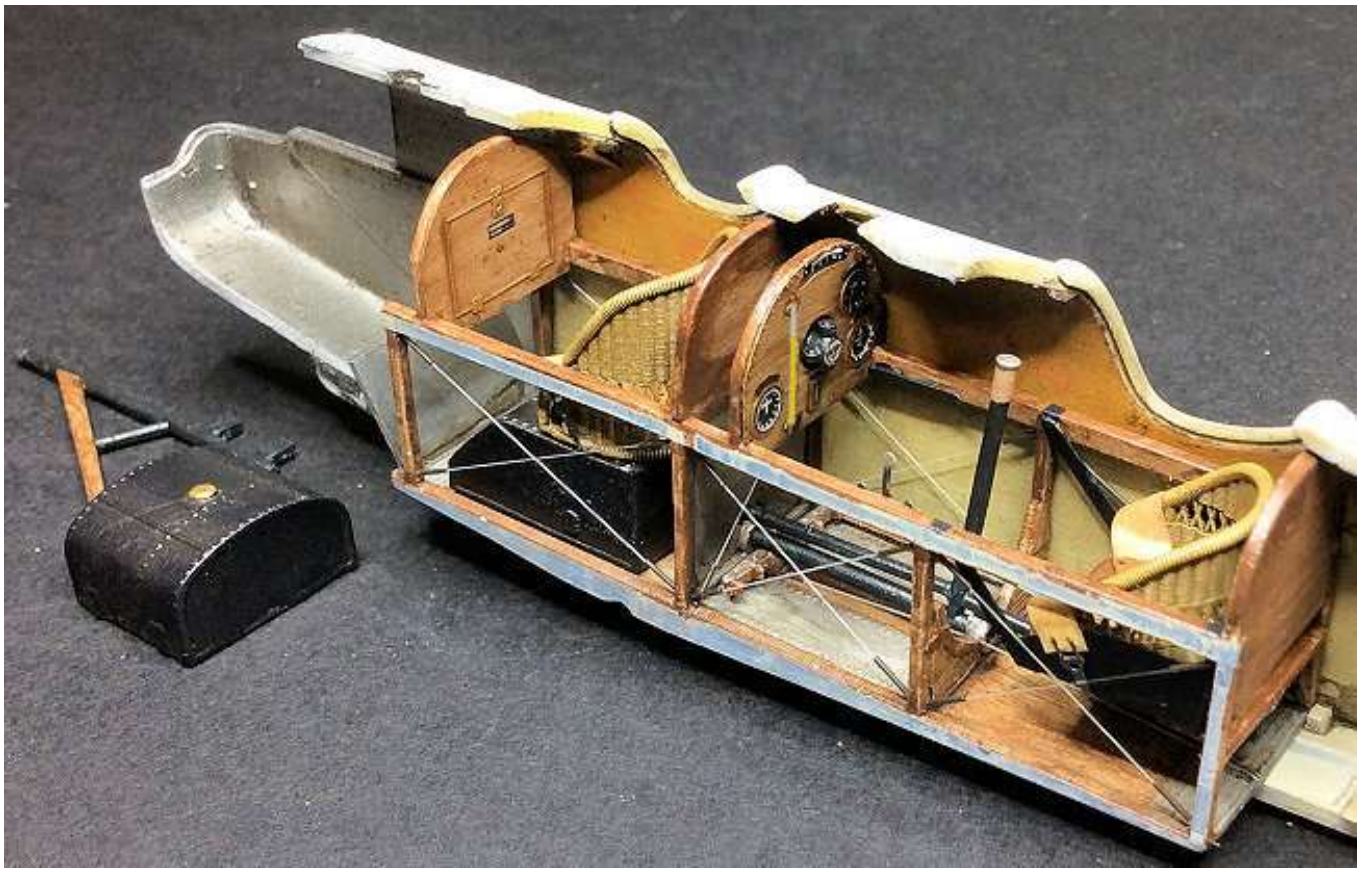
Secure the seat cushions onto their seats using CA adhesive.

Secure the observers seat onto the fitted fuel tank using CA adhesive.

Secure the pilots seat onto the fitted seat cradle using CA adhesive.

Fuel indicator tube:

Cut a length of 0.4 mm diameter Nickel-Silver tube, such as 'Albion Alloy's' NST04 or similar. The length of the tube should span between the two tube attachments at the left of the instrument panel. Dip the 75% of the tube into 'Tamiya' Clear Yellow (X24) or similar and allow to dry. Use thin CA adhesive to secure the tube on the instrument panel with the non-yellow portion at the top.



Weathering:

Airbrush the following with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC-311) or similar. This will provide a good surface for applying the weathering.

Inside surfaces of the two fuselage halves
Cockpit assembly
Remaining fuel tank
Two forward engine support frames.

Refer to Part 3 (Weathering) of this build log for more information - apply your desired weathering finish to the various parts (I used 'Flory Models' Dark Dirt fine clay wash).

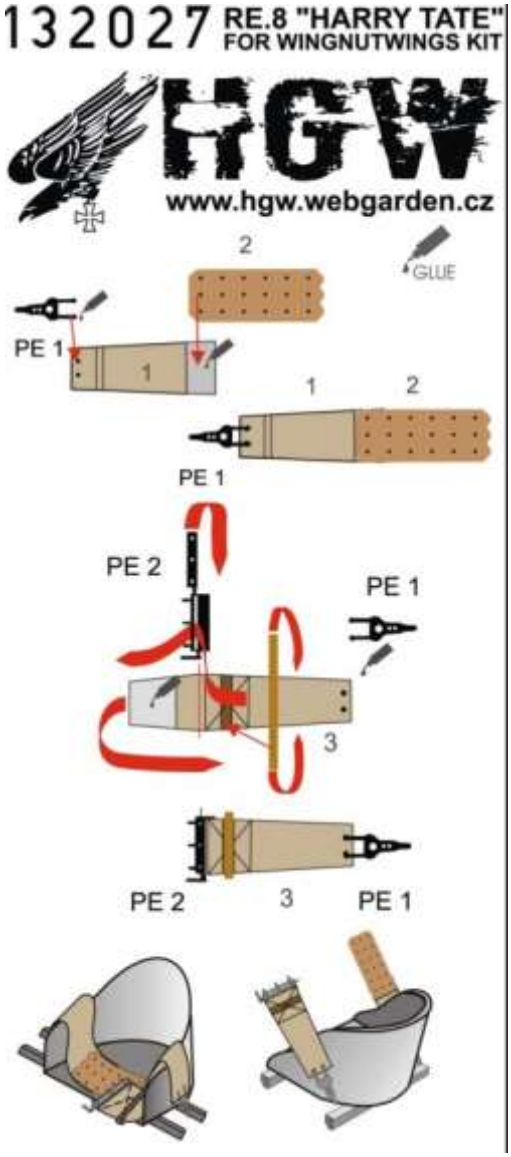
Seal the applied weathering with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC-311) or similar.

Seat lap belts:

NOTE: *I chose not to use the kit supplied seat belts and instead will replace them with the 'HGW' seat belts for the RE8 (HGW132027).The instruction card for the 'HGW' seat belts for the RE8 (HGW132027) shows a strap fitted around lap belt 3. However, this strap is not supplied.*

Select the type of finish for the lap belts then follow the instruction card supplied with the seat belt set to create two pairs of lap belts.

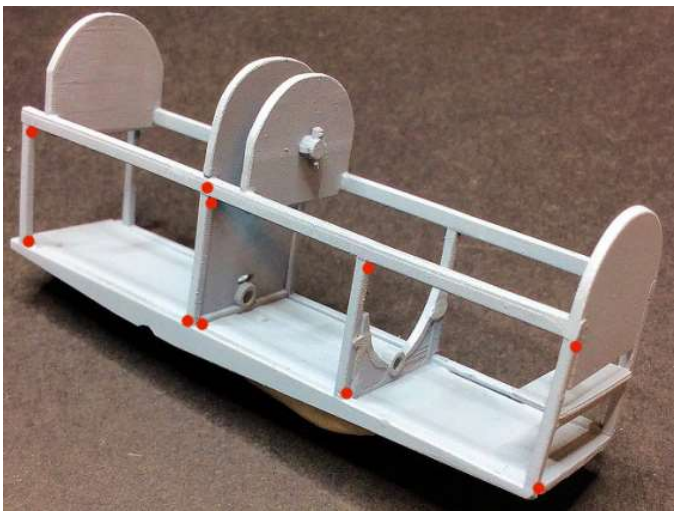
I used thin CA adhesive to join the belts and secure the photo-etch fittings in place.



Cockpit bracing:

Cut six long lengths of 0.08 mm diameter mono-filament, such as ‘Stroft GTM’ or similar.

Cut twenty eight short lengths of blackened 0.4 mm diameter tube, such as ‘Albion Alloy’s (NST04) or similar.



Pass the free ends of a line through the pre-drilled holes in the top and bottom of the vertical frame member at the observers rear bulkhead.

Secure the lines in the holes using thin CA adhesive.

Slide two tubes onto each line.

Pass the free ends of the lines diagonally across the rear of the bulkhead and through the pre-drilled holes in the opposite side of the cockpit assembly.

Keeping the lines taut, secure them at the frame, using CA adhesive.

Cut away any excess line at both ends of the cockpit assembly.

In turn, slide each tube up to the corner of its frame and secure in position using thin CA adhesive.

Pass a line through the pre-drilled hole in the top and bottom of the cockpit front vertical frame member.

Secure the lines in the holes using thin CA adhesive.

Slide two tubes onto each line.

Pass the free ends of the lines diagonally up and down then through the pre-drilled holes in the cockpit vertical frame member at the observers rear bulkhead.

Slide two tubes onto each line.

Pass the free ends of the lines diagonally up and down then through the pre-drilled holes in the vertical frame member at the pilots half bulkhead.

Slide two tubes onto each line.

Pass the free ends of the lines diagonally up and down then through the pre-drilled holes in the vertical frame member at the pilots rear bulkhead.

Keeping the lines taut, secure them at the pilots rear bulkhead, using CA adhesive.

Cut away any excess line at both ends of the cockpit assembly.

In turn, slide each tube up to the corner of its frame and secure in position using thin CA adhesive.

Repeat the procedure to add the two bracing lines to the other side of the cockpit assembly.

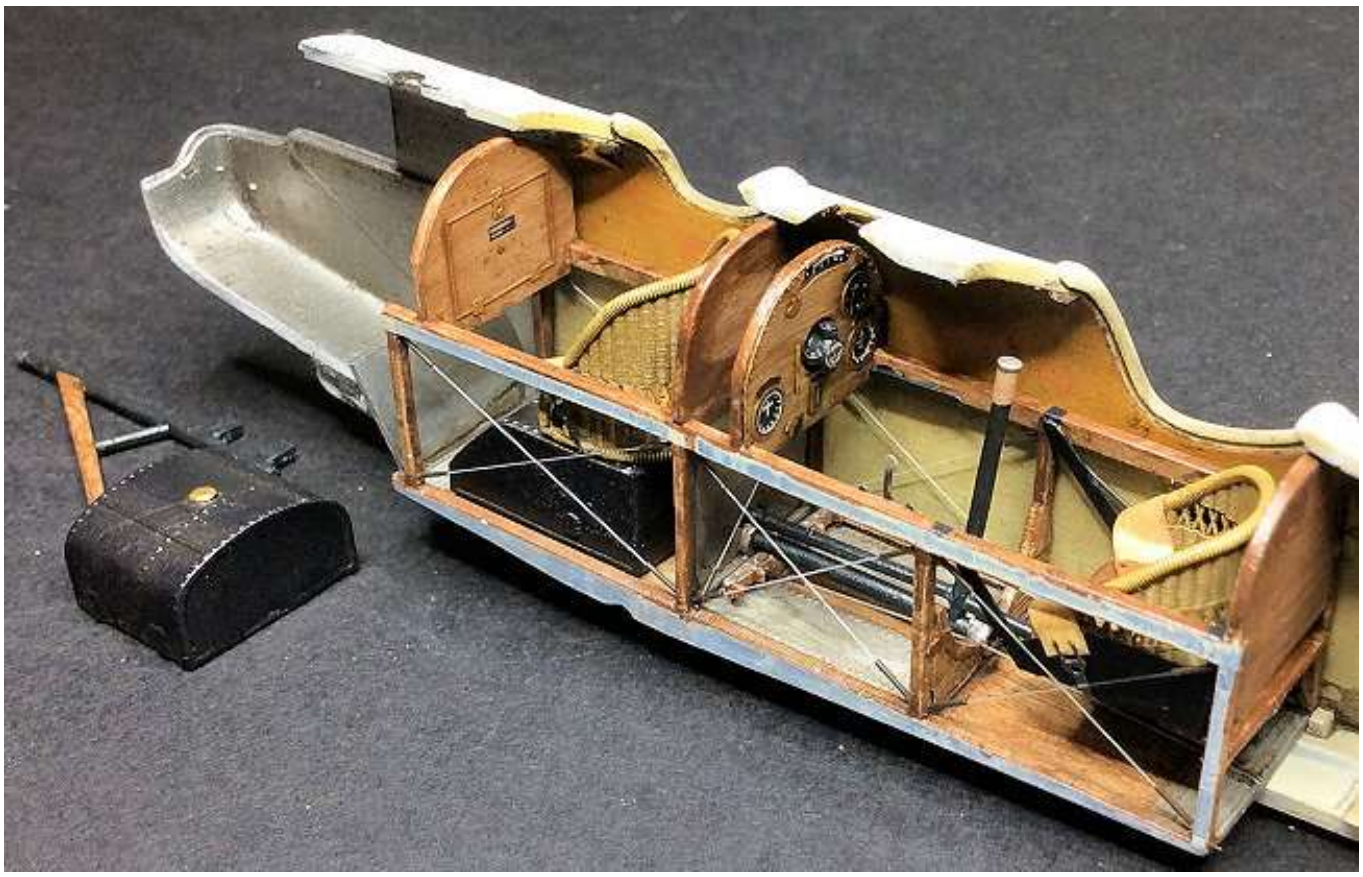
Detail painting (continued):

Brush a gloss clear coat over the faces of the instruments, using ‘Tamiya’ X35) or similar.

Brush paint ‘Tamiya’ Rubber Black (XF85) or similar, onto the cockpit longerons to represent the attachment brackets for the cradle for the pilots seat.

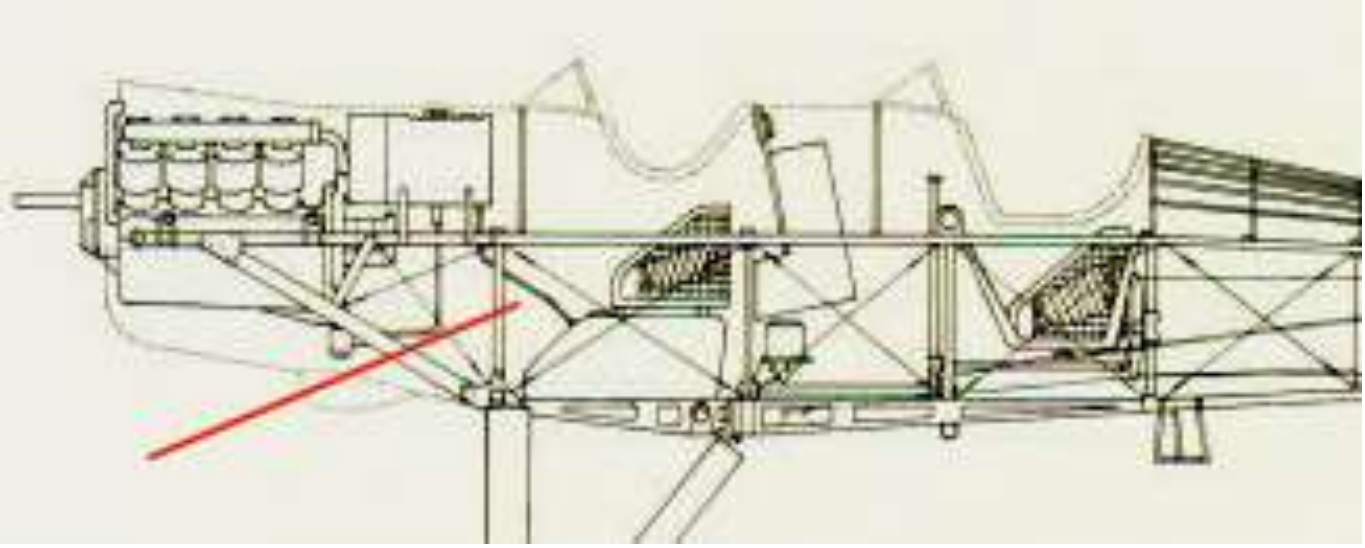
Cockpit - test fit:

Test fit the cockpit assembly in the fuselage halves, making sure the assembly can locate fully and without stopping the fuselage halves from joining fully.



Fuel pipe:

NOTE: *A fuel supply pipe was fitted between the upper fuel tank behind the engine and the lower fuel tank under the observers seat.*



Drill a hole of 0.5 mm diameter into the slanting front face of the observers seat fuel tank (see above illustration). The hole should be drilled centrally and aligned to the fuel filler cap.

Drill a hole of 0.5 mm diameter into the rear underside of the engine fuel tank (see above illustration). The hole should be drilled centrally. Make sure the hole is drilled into the rear underside of the tank (closest to the tank filler cap).

Cut a long length of 'MFH' 0.4 mm diameter Black tube (P-961).

Using thin CA adhesive, secure one end of the tube into the pre-drilled hole in the engine fuel tank. **The tank will be fitted later in this build.**

Cockpit fit:

Using CA adhesive, secure the cockpit assembly into one of the fuselage halves.

Closing up the fuselage:

Locate the two fuselage halves together, leaving a slight gap around the join.

NOTE: *During the following steps, make sure the fuselage halves are correctly aligned before apply the adhesive.*

Apply thin CA adhesive at intervals along the fuselage upper join, rear of the cockpits, then hold the fuselage halves together until the adhesive sets.

Apply thin CA adhesive at intervals along the fuselage underside join, rear of the cockpits, then hold the fuselage halves together until the adhesive sets.

Apply thin CA adhesive at intervals along the upper fuselage join forward from the cockpits, then hold the fuselage halves together until the adhesive sets.

Apply thin CA adhesive at intervals along the fuselage underside join, forward from the cockpits, then hold the fuselage halves together until the adhesive sets.

Thin CA adhesive can also be applied along the upper and lower fuselage joint from the inside of the open forward fuselage.

If necessary, any minor gaps in the fuselage joint can be filled with CA adhesive (slower setting).

Blending joint seams:

NOTE: *Inevitably there will be some degree of joint mis-alignment or gaps after joint the fuselage halves together. Blending a joint when CA adhesive has been used can be problematic if care is not taken. The adhesive, once fully set, can be harder than the surrounding resin. Therefore care is needed when sanding across this type of joint to avoid sanding away the softer resin, leaving the harder resin standing proud from the surface.*

Sand across the fuselage joint seam to remove any residual CA adhesive and to blend the joint with the surrounding surfaces.

If necessary, fill any minor gaps or recesses in the joint using 'Mr. Surfacer' 500 or 1000 as appropriate. Once the surfacer has dried and fully set, re-sand the joint until it is flush to the surrounding surfaces.

Blank off the open cockpits, windows and engine bay in the fuselage.

Airbrush a grey primer, such as 'AK Interactive' White (AK759) or similar, over the fuselage. Once dry this will show any areas of the fuselage and fuselage joint that have imperfections etc.

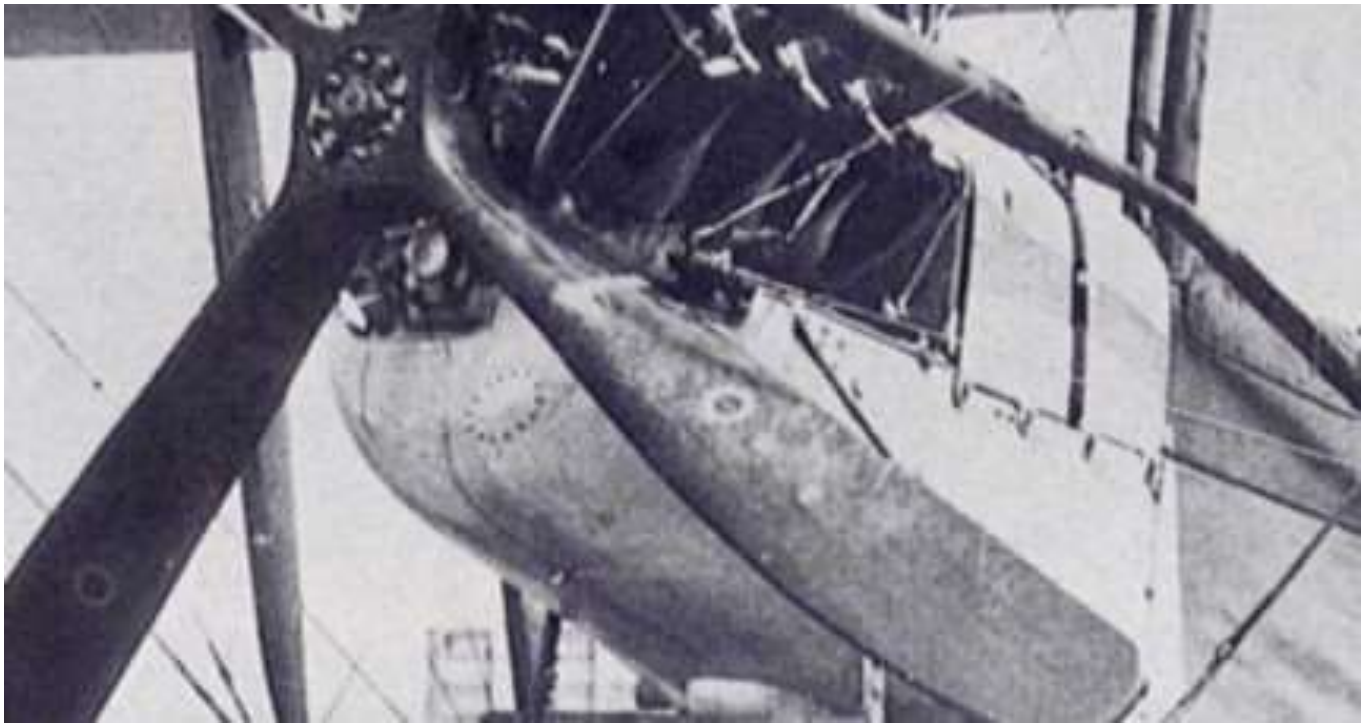
If necessary, fill any imperfections or minor gaps or recesses 'Mr. Surfacer' 500 or 1000 as appropriate. Once the surfacer has dried and fully set, re-sand then re-prime until the fuselage surfaces and joint are free of imperfections etc.

Nose shape

NOTE: *It was at this stage of the build that I found that the shape of the underside of the nose is too square. In the following photographs, one of which is the reproduction BE2c at the 'Vintage Aviator 'Ltd', it can be seen that the underside of the nose is more rounded than that of kit. The shape of the fuselage nose in the kit looks more like that od the R.E.8 aircraft.*

Nose of a R.E.8 aircraft

Nose of the BE2c aircraft



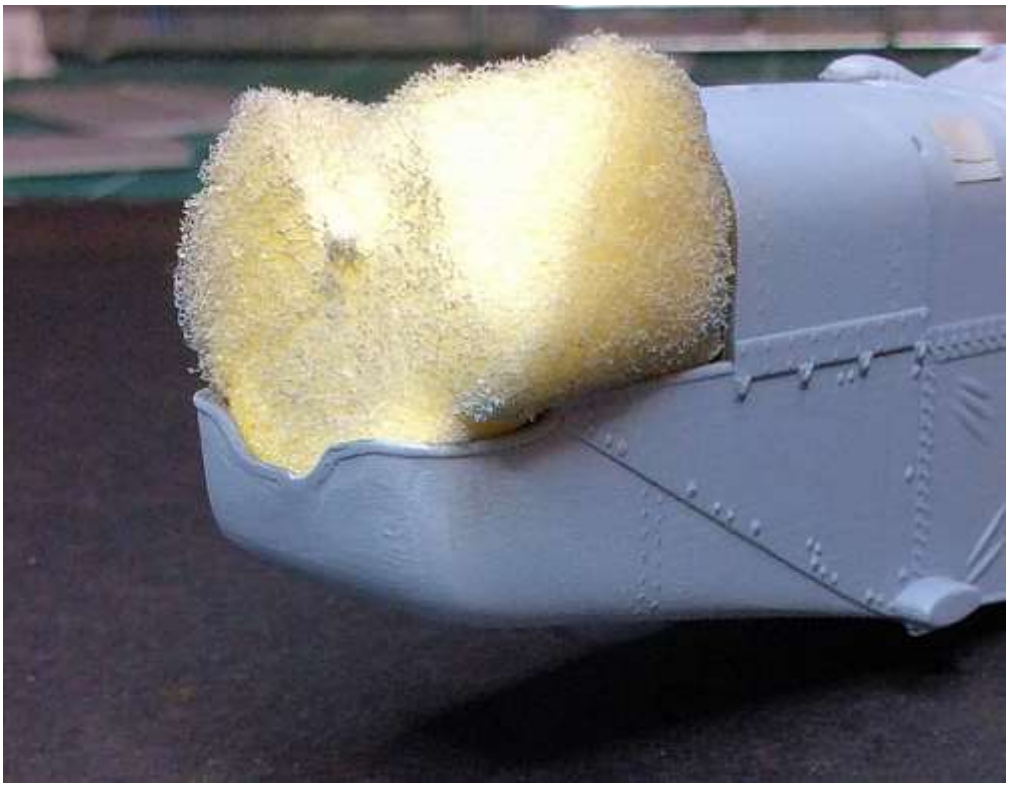
Nose of the ‘Vintage Aviator Ltd’ reproduction BE2c aircraft

NOTE: *During the following steps, take care not to break through the fuselage nose, particularly at the lower corners. This will avoid having to fill and sand any cracks or holes.*

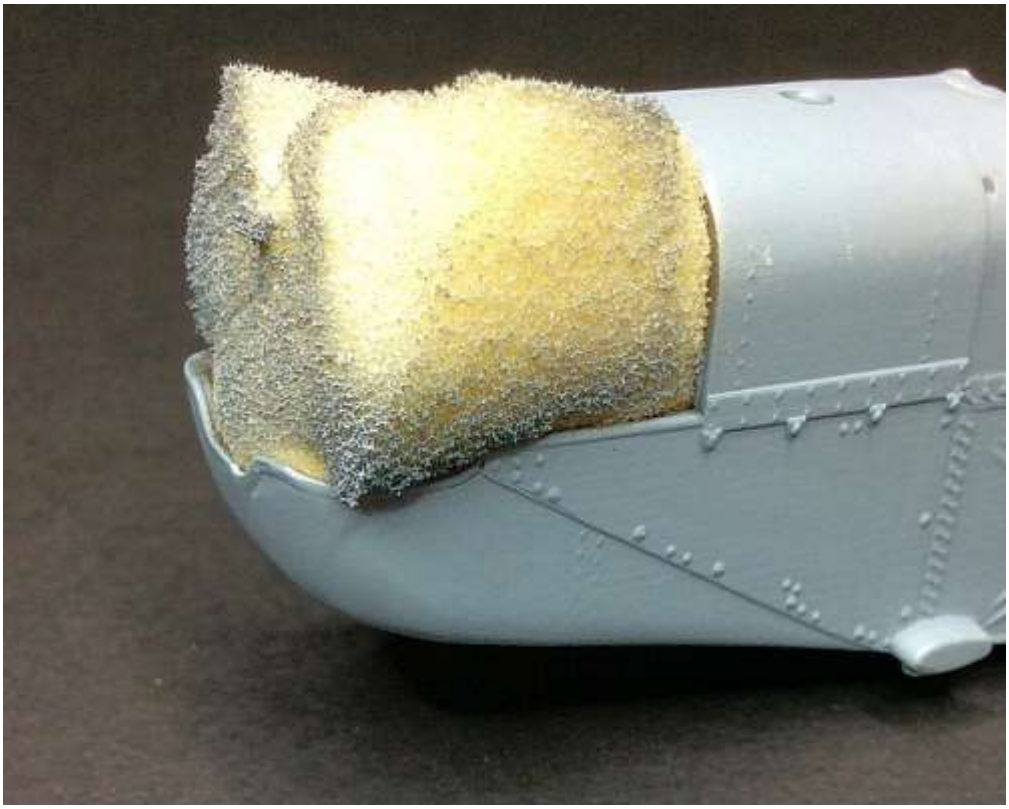
Use either a flat needle file or sand and **carefully** re-profile the underside shape of the fuselage nose to round off the corners to better represent that of the BE2c.

Re-prime the area and check for any imperfections and general shape. If necessary, fill or re-sand the area then re-prime until the correct shape and surface finish is achieved.

Kit nose - BEFORE modification

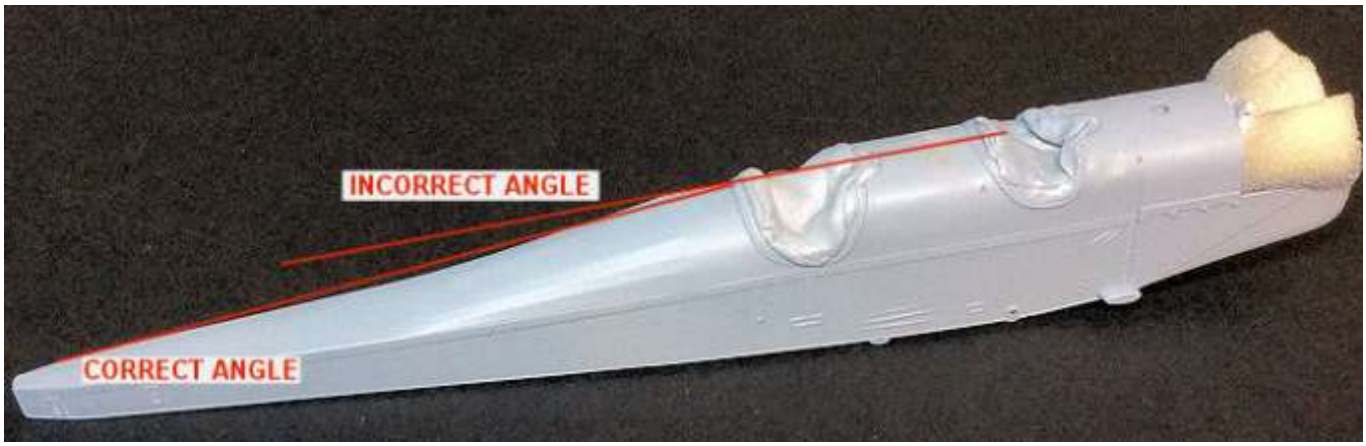


Kit nose - AFTER modification



Fuselage rear shape

NOTE: *The top of the fuselage, at the rear of the pilots cockpit, is not correct. The kit fuselage flattens of at the plywood decking panel at the rear of the pilots cockpit. In reality, it should be at the same angle at the top of the fuselage stringers. The following photograph is not very clear, but does show the angled rear decking panel, which was the same for all BE2 aircraft versions.*



NOTE: *During the following steps, do not remove too much of the materials or you may 'break through' the fuselage surface.*

Carefully file or sand away the resin from the rear of the horizontal decking panel behind the pilots cockpit, following the shape around to the sides of the fuselage (stop at the top of the stitching along the top of the fuselage sides). Avoid removing material from the pre-moulded 'stringer' lines along the fuselage. The angle of the decking panel should merge with the angle of the top of the fuselage and align with the rim of padding around the cockpit opening.

Using tracing paper laid over the cockpit and fuselage, trace the outline of the rear edge of the cockpit padding rim to the end of the pre-moulded 'stringer' lines on the fuselage top.

Cut out the tracing paper template and check fit it onto the fuselage, making sure that:

The rear edge is at the ends of the 'stringer' lines on the fuselage

The rear edge is vertical up the fuselage sides and at 90 degrees across the fuselage, when viewed from the top and sides

The forward edge follows the contour of the cockpit padding rim down to the top of the pre-moulded stitching on the fuselage sides.

Transfer the outline of the template onto a sheet of 0.2 mm thick plastic card.

Cut out the shape from the plastic card and check fit it onto the fuselage.

NOTE: *The following step may be required to allow the plastic card to be in full contact with the fuselage (due to the curve of the fuselage top).*

Slice through the plastic shape along the centre line of the fuselage, but only from the rear edge towards the front edge, but not cutting it into two separate halves.

Secure the plastic card onto the fuselage, using thin CA adhesive and working from one side of the fuselage across to the other side. Make sure the plastic is fully in contact with the fuselage, to avoid any gaps between the two. Where necessary, carefully cut away any plastic card overlap at the sliced centre line.

NOTE: *During the following step take care not to sand away the ends of the pre-moulded fuselage 'stringers' lines. If necessary the flats between the 'stringers' can be scrapped with a flat blade to re-instate the 'stringer' lines.*

Sand across the joint seam and any other areas to remove any residual CA adhesive and to blend the joint with the surrounding plastic card surfaces.

If necessary, fill any minor gaps or recesses in the joint using 'Mr. Surfacer' 500 or 1000 as appropriate. Once the surfacer has dried and fully set, re-sand the joint until it is flush to the surrounding surfaces.

Blank off the open cockpits in the fuselage.

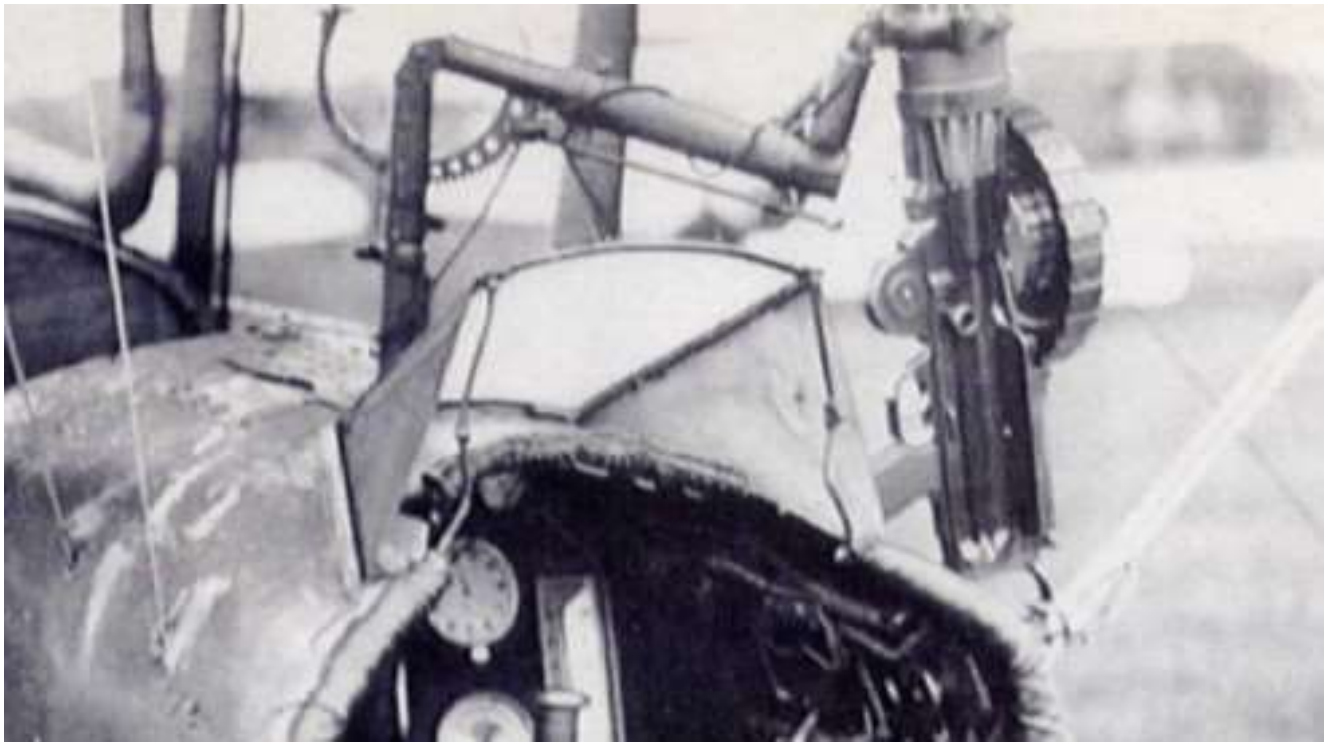
Airbrush a white primer, such as 'AK Interactive' White (AK759) or similar, over the fuselage. Once dry this will show any areas of the fuselage and joint that have imperfections etc.

If necessary, fill any imperfections or minor gaps or recesses 'Mr. Surfacer' 500 or 1000 as appropriate. Once the surfacer has dried and fully set, re-sand then re-prime until the fuselage surfaces and joint are free of imperfections etc.

Observers weapon mountings:

NOTE: *This particular aircraft had a Lewis machine gun mounted on the right side of the fuselage just forward from the pilots cockpit. The observers machine gun was mounted on a swing arm located on the top of the fuselage, between the observer and pilot cockpits.* ***The pilots machine gun and mounting will be fitted later in this build.***

Example of an observers Lewis machine gun mounting



Drill a hole of 1.2 mm diameter vertically through the top of the fuselage and between the rear of the observers cockpit and the window cut-out for the pilots instrument panel.

NOTE: *The following step is required to allow the swivel gun mounting to be fully inserted into the pre-drilled hole.*

Carefully sand away the ridge around the two ends of the 3D printed swivel gun mounting.

Landing gear struts:

Loosely fit the axle across the two landing gear 'V' struts.

Position the assembly at the underside of the fuselage to gauge where the locating holes should be drilled into the fuselage for the strut locating rods.

Drill a hole of 0.8 mm diameter into, **but not through**, the forward strut location lugs on the underside edges of the fuselage. The holes should be drilled outwards into the lugs at the required angles.

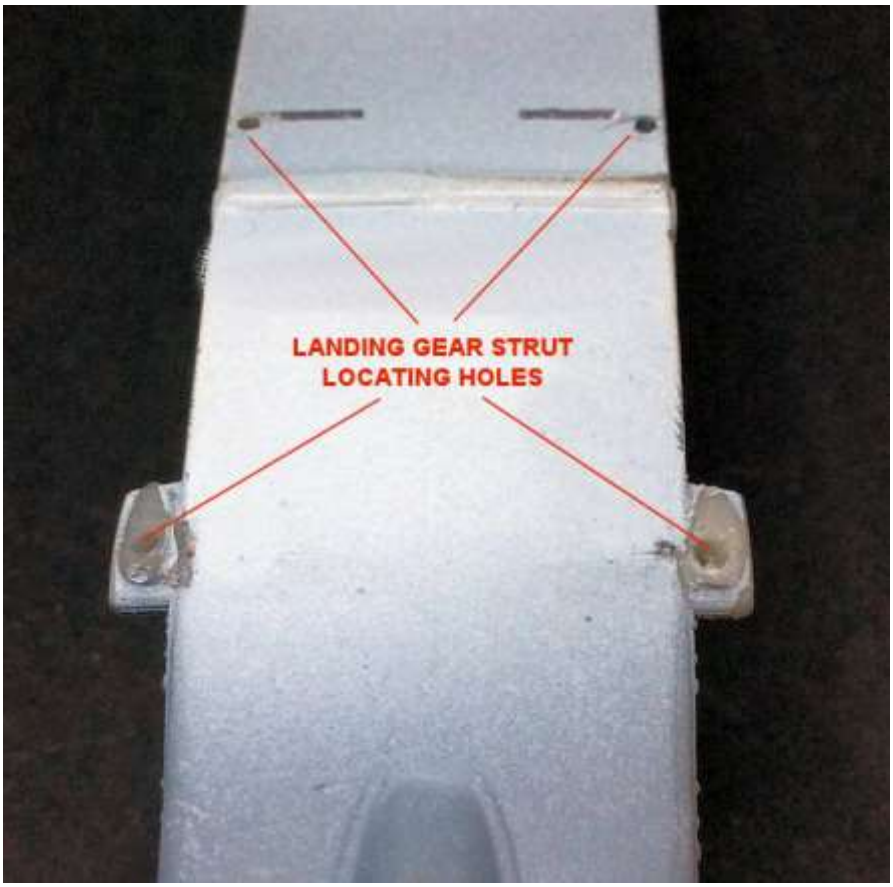
Carefully bend the rear strut locating rods such that when fitted, the rods will insert vertically into the outer edges of the underside of the fuselage.

Test fit the forward struts into their pre-drilled holes and mark the underside of the fuselage the position of the locating rods in the rear struts.

At the marks made, drill a hole of 0.8 mm diameter into, **but not through**, the underside edges of the fuselage. The holes should be drilled vertically into fuselage.

Trim the length of the four locating rods such that they can be fully inserted into their pre-drilled holes in the fuselage.

Test fit the landing gear struts with the axle located, into the fuselage. Check that the assembly to parallel to the fuselage when viewed from the front and at 90 degrees to the fuselage when viewed from the underside. If necessary, carefully bend the locating rods to achieve the correct positioning.



Tail skid:

Preparation:

NOTE: *Take care when handling the 3D printed tail skid assembly as the struts are weak and easily broken.*

Carefully remove the tail skid assembly from its 3D support struts.

Gently sand away any residual support strut tags from the feet of the four support and the central strut.

Test locate the assembly onto the rear, underside of the fuselage. The central strut should be aligned with the forward tailplane locating rods in the fuselage. If necessary, sand the end of the central strut until it and all four support struts are in contact with the fuselage.

NOTE: *The following steps are to provide a more positive and stronger fit to the fuselage.*

Drill a hole of 0.5 mm diameter centrally into the end of the central strut.

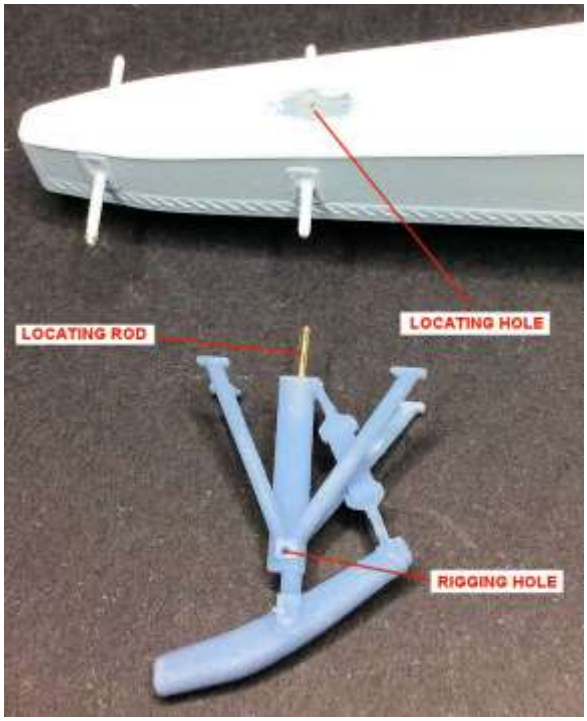
Cut a length of 0.5 mm diameter Brass rod, such as that from 'Albion Alloy's' (MBR05) or similar.

Using thin CA adhesive, secure the rod into the pre-drilled hole in the central strut.

Drill a hole of 0.5 mm diameter centrally through the underside of the fuselage and aligned with the forward locating rods for the tailplanes.

Test fit the tail skid assembly onto the fuselage, making sure all of the struts are in contact with the fuselage.

Drill a hole of 0.3 mm diameter centrally through the bottom of the central strut. This will be used for the tailplane bracing rigging later in this build.



Painting:

Airbrush the tail skid with a grey primer, such as ‘AK Interactive’ Grey (AK758) or similar.

Brush paint the tail skid with ‘Tamiya’ Dark Yellow (XF60) or similar.

NOTE: *The wood effect for this model was created using ‘Windsor & Newton’ Griffin (Alkyd) Raw Sienna paint.*

Brush a covering coat of the ‘Windsor & Newton’ Griffin Alkyd **Burnt Sienna** paint over the tail skid.

Leave the oil paint to settle for about ten minutes.

Decant a small amount of White Spirits into a suitable dish.

Dip a broad flat oil brush into the White Spirit then wipe the brush on a sheet of kitchen roll, which should not deposit any fibres in the oil paint.

Brush the oil paint in the required direction and keep wiping the brush on the sheet to remove residual oil paint.

Repeat dipping and wiping the brush in the White Spirits and brushing the oil paint until the desired density and finish is achieved.

Leave the oil paint to fully dry. It should be touch dry only in 24 hours.

Brush paint the suspension ‘bungee’ cords ‘Tamiya’ Deck Tan (XF55) or similar.

Brush paint the centre support strut with ‘Tamiya’ White (XF2) or similar.

Brush paint the four bracing struts and metal fittings with ‘Tamiya’ Rubber Black (XF85) or similar.

Airbrush a semi-matte clear coat over the tail skid, such as ‘Alclad’ Light Sheen (ALC311) or similar.

Engine - fit:

NOTE: *The profiled cut-out at the bottom of the nose cowl is off-set to allow for access to the lower left of the engine (when viewed from the front). Therefore, the engine may appear to be off centre when viewed from the front.*

Locate the upper fuel tank into the fuselage, making sure to route the fitted flexible fuel pipe through into the observers cockpit.

Hold the tank in position with the fuel filler cap centrally position under the fuel opening.

Trim the length of the flexible fuel pipe such that it can be inserted into the pre-drilled hole in the front of the fuel tank under the observers seat.

Move the upper fuel tank away from the inside of the fuselage and apply CA adhesive across the top surface of the tank, but avoiding the area around he filler cap.

Re-position the upper fuel tank against the inside of the fuselage, making sure it's in full contact with the fuselage and the fuel filler cap in central under the fuselage opening.

Using thin CA adhesive, secure the flexible fuel pipe into the pre-drilled hole in the front of the fuel tank under the observers seat.

NOTE: *During the following step, make sure the two engine locating lugs on both of the frames are facing inboard, as the engine must slide fit between those lugs.*

Test fit the two engine support frames into the fuselage and under the added fuel tank, making sure they are fully against the sides of the fuselage, in contact with the front of the cockpit side frames and level at the front with the cowl side walls.

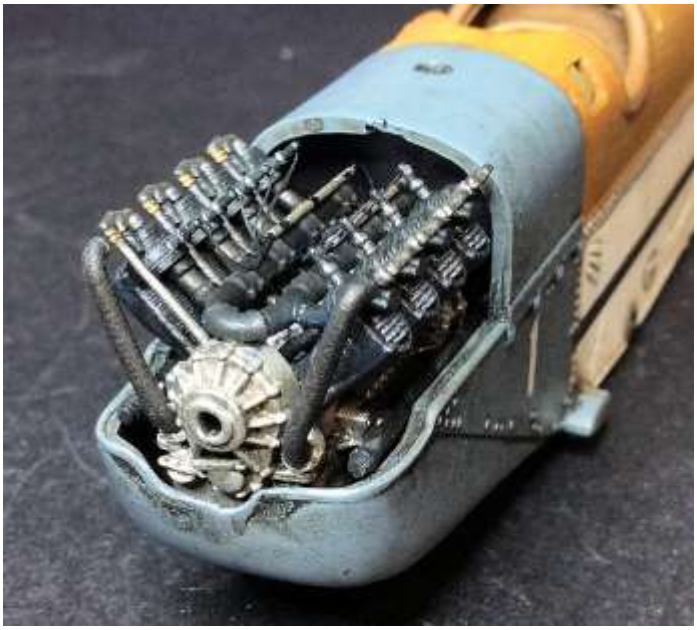
If necessary to achieve the correct fit, reduce the height of the two tank support stubs on each frame and the rear ends of each frame.

Once the correct fit is achieved, secure the two frames in position inside the fuselage, using CA adhesive.

Test fit the engine into the fuselage and between the two locating lugs on the two support frames, making sure the top of the engine locating lugs are level with the frame locating lugs. If necessary, carefully sand the engine lugs until the engine can be fully located **without being forced.**

Once the correct fit is achieved, secure the engine in position using thin CA adhesive.

Fuselage after painting (Part 11 Construction)



Engine cylinder baffles:

NOTE: *The RAF 1a engine had triangular shaped cylinder baffle plates fitted between the three forward engine cylinders. These are not supplied in the kit.*

Cut out six flat top triangles with a base of 2.5 mm, height of 5 mm and top width of 1.5 mm.

Airbrush both sides of each triangle with a white primer, such as ‘AK Interactive’ White (AK759) or similar.

Airbrush both sides of each triangle with ‘Tamiya’ Neutral Grey (XF53) or similar (to match the colour of the engine panels).

Using thin CA adhesive, secure the triangles at and between the bases of the forward three engine cylinders (narrow top uppermost).

Refer to Part 3 (Weathering) - I applied ‘Flory Models’ Dark Dirt fine clay wash over the struts.

Seal the weathering wash by airbrushing the taped struts with a semi-matte clear coat, such as ’Alclad’ Light Sheen (ALC311) or similar.

Fuselage after painting (Part 11 Construction)

Engine top cover:

NOTE: *The kit supplies to options for the engine top cover, being a resin and a photo-etch version. The resin version is extremely fragile and liable to break when cutting out the openings for the engine cylinders. Both the resin and photo-etch version are not curved enough at the top front of the cowl when fitted and the cylinder retention plates are too thin and do not align correctly with the tops of the engine cylinders.* ***Therefore I chose to fabricate the top cover using plastic card and the main portion of the photo-etch panel supplied in the kit****.*

Cut a length of 0.6 mm diameter plastic rod, such as that from ‘PlusModel’ or similar.

Bend the rod such that it follows the contour of the forward edge of the fuselage at the rear of the engine bay.

Cut the bent rod such that it spans between half way down the spark plugs of the two rear engine cylinders.

Using thin CA adhesive, secure the bent rod in position on the fuselage edge, with its top edge just below the top surface of the fuselage.

Fuselage after painting (Part 11 Construction)

Remove the photo-etch top panel (10) from the kit supplied sheet and cut away the cylinder retention plates on both sides of the panel, along the bottom edge of the lower hinge rivets.

Anneal (soften) the photo-etch panel by moving it across a flame, such as that from a cigarette lighter, until the panel colour changes to a light grey.

Wipe any flame soot from the panel.

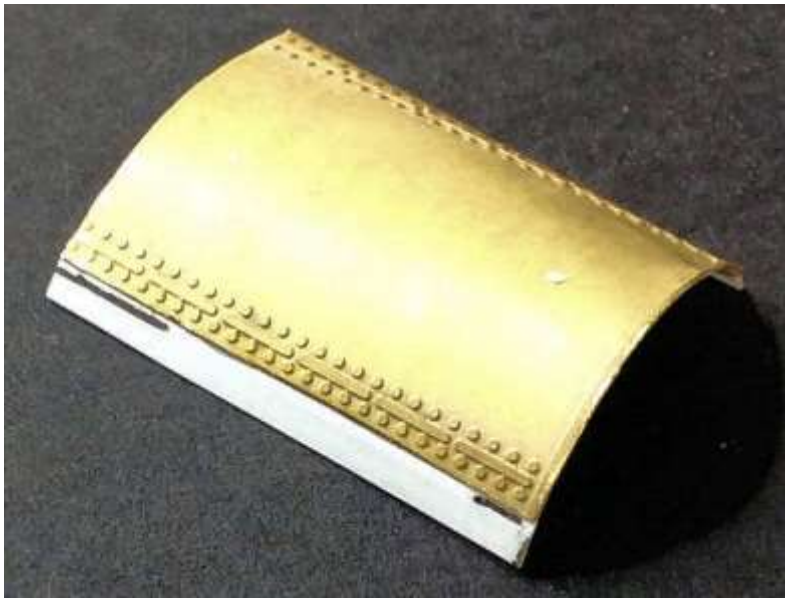
Carefully bend the front edge of the panel into a curve, but keeping the rear edge more or less flat.

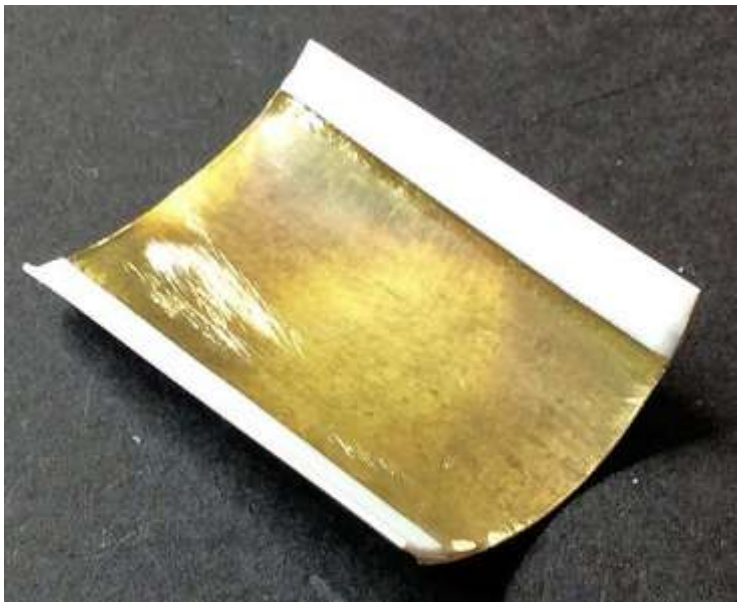
NOTE: *The panel hinges should be horizontal when the panel is located correctly. However, when the panel shape has been correctly adjusted, the hinges will be angled upwards towards the front, which is not correct but can't be corrected.*

Locate the panel over the engine with its rear edge resting on the added rod and the curved front end angled upwards. Adjust the panel shape to achieve a good location over the engine.

Cut from 0.2 mm thick plastic card two 'blanks', which should be the length of the panel with one end 2 mm wide and the other end 3 mm wide.

Using thin CA adhesive, secure the 'blanks' to the inner surface of the photo-etch panel. The 'blanks' should be secured along the centre line of the panel hinges with the 2 mm wide end aligned to the rear edge of the panel and the 3 mm wide end aligned to the front (curved) edge of the panel.





Cut a length of 0.5 mm diameter Nickel-Silver tube, such as ‘Albion Alloy’s’ NST05 or similar.

Insert the tube into the pre-drilled hole in the top of the engine block, between the forward engine cylinders.

Test fit the panel over the engine.

The front of the panel should be angled upwards with the rear edge aligned to the edge of the fuselage.

The side ‘blanks’ should rest along the inner tops of the cylinders.

The top of the inserted tube should just rest under the inside of the panel.

If necessary, slightly bend downwards the side ‘blanks’ to achieve the correct fit and trim the tube height of the tube.

Secure the tube vertically in the pre-drilled hole using thin CA adhesive.

Brush paint the tube with ‘Tamiya’ Neutral Grey (XF53) or similar (to match the colour of the engine panels).

Brush paint the added rod on the fuselage edge with ‘Tamiya’ Neutral Grey (XF53) or similar.

Airbrush both sides of the panel with a white primer, such as ‘AK Interactive’ White (AK759) or similar.

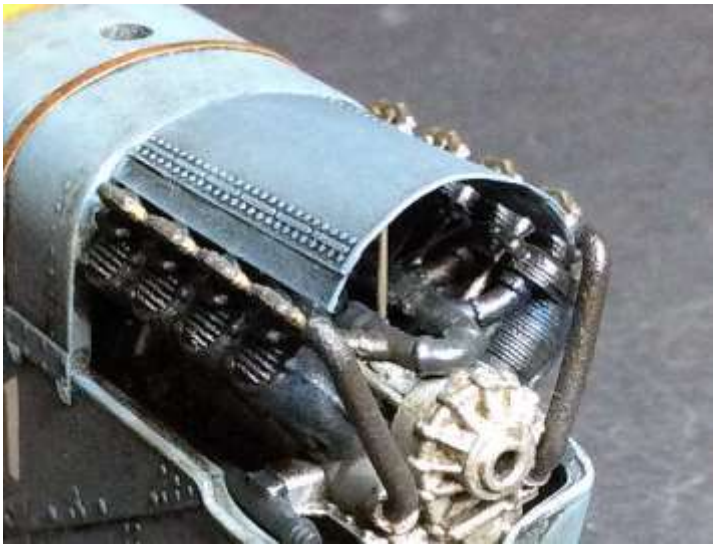
Airbrush both sides of the panel with ‘Tamiya’ Neutral Grey (XF53) or similar (to match the colour of the engine panels).

Seal the panel by airbrushing a light coat of semi-matte clear, such as ‘Alclad’ Light Sheen (ALC311) or similar.

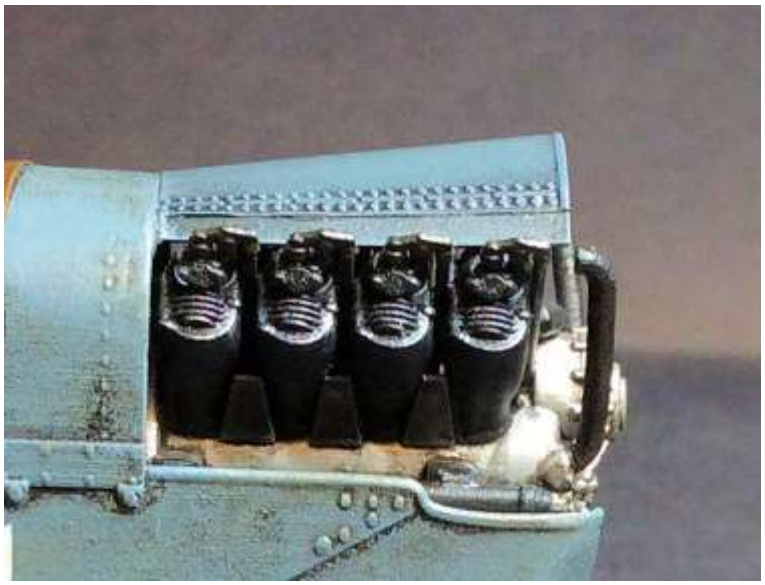
Refer to Part 3 (Weathering) - I applied ‘Flory Models’ Dark Dirt fine clay wash over the grey painted panel.

Once the desired level of weathering is achieved, seal the surfaces by airbrushing a light coat of semi-matte clear, such as ‘Alclad’ Light Sheen (ALC311) or similar.

Using thin CA adhesive, secure the panel in position against the edge of the fuselage and against each of the engine cylinder heads.



Fuselage after painting (Part 11 Construction)



Fuselage after painting (Part 11 Construction)

Cowl retaining plates:

NOTE: *As I chose to cut away the retaining straps from the photo-etch top cowl, the side retaining straps need to be created using 0.2 mm thick plastic card.*

Long straps - left side:

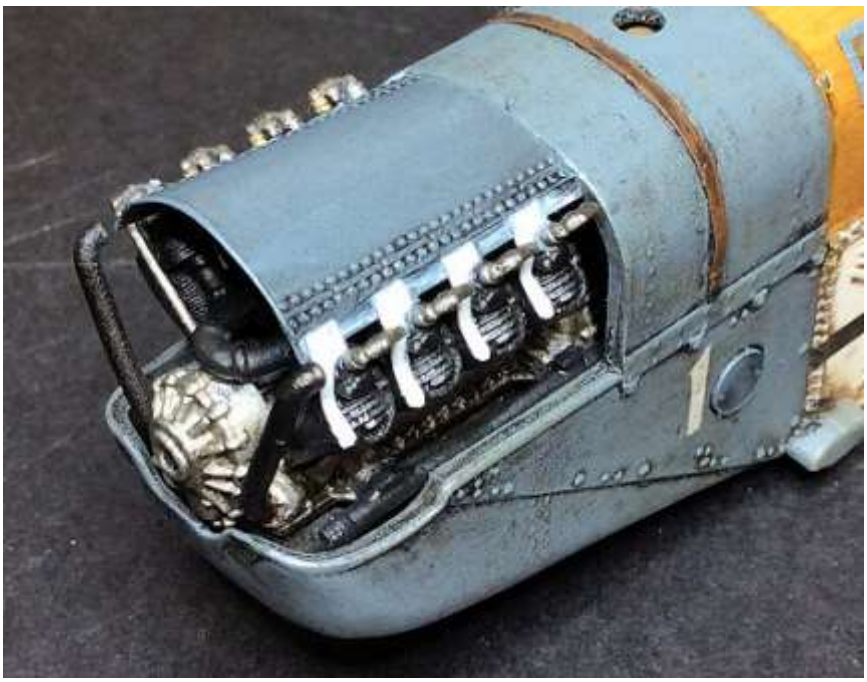
NOTE: *The long retaining straps on the left side of the engine are located on the forward side of the cylinders.*

For the left side of the engine, I cut out four long retaining straps from 0.2 mm thick plastic card. Each was cut to locate on the added side strip on the lower edge of the top cowl. They were cut to fit around the top of the cylinder heads and down to the bottom, left bolt head on the cylinders. The top edges were cut to align with the bottom edge of the hinge on the top cowl. The inner face of each was airbrushed with 'Tamiya' Neutral Grey (XF53) or similar, to match the colour of the existing cowl and nose panels. Before attaching to the top cowl, the paint on the inner top edge of the straps and their location on the top cowl strip were scrapped clean of paint. The four straps were then cemented in position, making sure the bottom of each aligned to the cylinder bolt head.
Once the cement had fully set, the bottom of the straps were secured onto the cylinder bolt head, using thin CA adhesive.
Finally, the outside face of each strap were brush painted with 'Tamiya' Neutral Grey (XF53) or similar.

Long straps - right side:

NOTE: *The long retaining straps on the right side of the engine are located on the opposite (rear) side of the cylinders.*

For the right side of the engine I repeated the procedure, making sure they are located correctly.



Fuselage after painting (Part 11 Construction)

Infill strips:

From 0.2 mm thick plastic card, cut small rectangles to insert on the top cowl between the added long straps.

Cement the infills in position between the long straps on both sides of the engine.

Brush paint the infills with 'Tamiya' Neutral Grey (XF53) or similar, to match the colour of the existing cowl and nose panels.

Short straps - left side:

NOTE: *The short retaining straps on the left side of the engine are located on the rear side of the cylinders.*

For the left side of the engine, I cut along strip from 0.2 mm thick plastic card, which was airbrushed with 'Tamiya' Neutral Grey (XF53) or similar, to match the colour of the existing cowl and nose panels. The strip was then cut into short strips, to fit at the valve gear push rods and down to the top, right bolt head on the cylinders. The four straps were then secured in position using thin CA adhesive.

Short straps - right side:

NOTE: *The short retaining straps on the right side of the engine are located on the forward side of the cylinders.*

For the right side of the engine I repeated the procedure, making sure they are located correctly.

Rear firewall:

NOTE: *A firewall was fitted between the rear of the engine and the observers cockpit.*

From 0.2 mm thick plastic card, I cut a shape that fitted between the fuselage front edge and behind the rear engine cylinders.

Using thin CA adhesive, secure the fire walls in position between the fuselage and engine rear cylinders.

Brush paint the fire walls with ‘Tamiya’ Neutral Grey (XF53) or similar, to match the colour of the existing cowl and nose panels.

Weathering:

Seal the added details by airbrushing a light coat of semi-matte clear, such as ‘Alclad’ Light Sheen (ALC311) or similar.

Refer to Part 3 (Weathering) - I applied ‘Flory Models’ Dark Dirt fine clay wash over the grey painted details.

Once the desired level of weathering is achieved, seal the details by airbrushing a light coat of semi-matte clear, such as ‘Alclad’ Light Sheen (ALC311) or similar.

Exhaust manifolds:

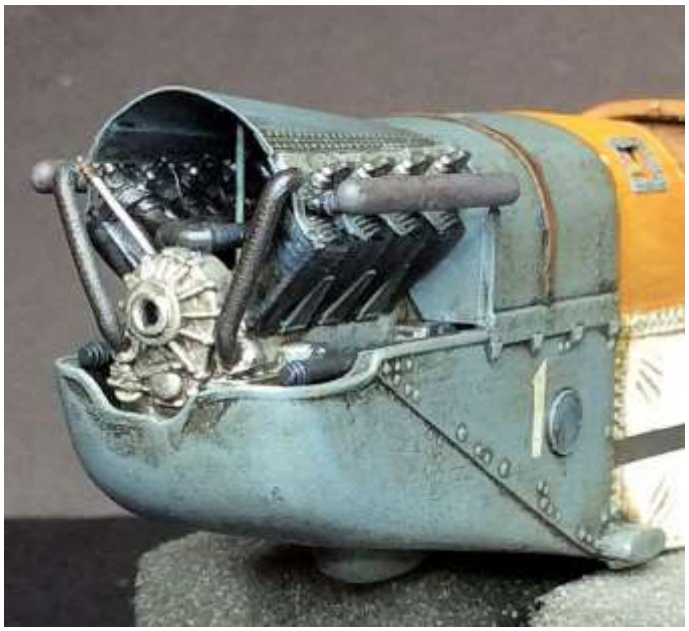
NOTE: *The two exhaust manifolds have already been prepared and painted in Part 7 (Engine) of this build log.*
The engine exhaust consists of an exhaust manifold attached to the engine exhaust ports on each side of the engine. The rear ends of the manifolds are attached to a ’L’ shaped exhaust pipes, which are directed vertical up to the leading edge of the upper wing, where they are held in positioned with metal stays.
When test fitting the exhausts to the engine, I found that the bottom of the exhaust pipes contact the sides of the fuselage, which causes the pipes to angle outwards.
Circular lock rings were used to secure the pipes of the exhaust manifolds to the engine exhaust ports. Therefore, I decided to make these lock rings, which when fitted, will move the exhaust manifolds out slightly allowing the exhaust pipes to be vertical. They also add more authenticity to the engine.

Using the ‘Thinnerline’ circular cutter, I cut eight 1.0 mm diameter disc from 0.2 mm thick plastic card.

Each of the discs were secured to the ends of the exhaust pipes from the manifold, using thin CA adhesive.

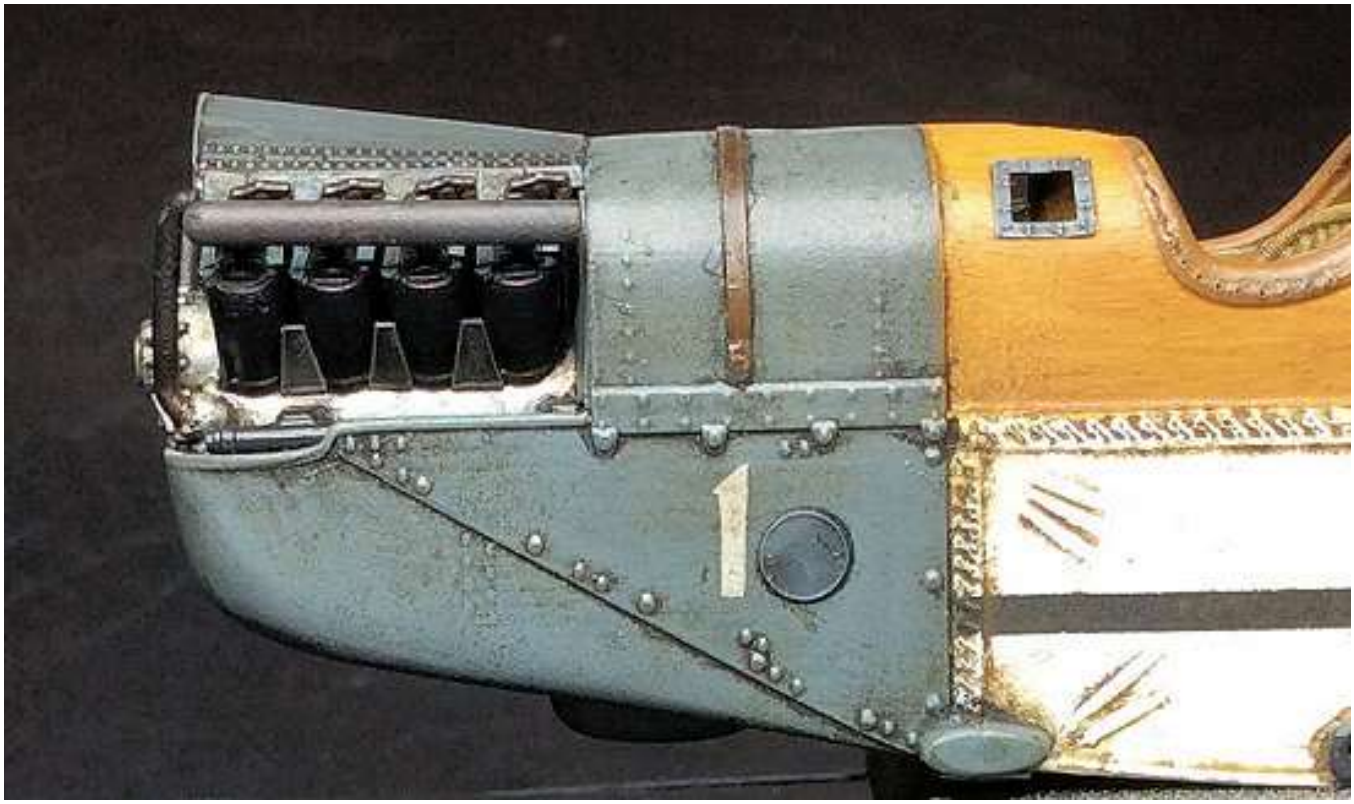
The discs were brush painted with ‘Tamiya’ Gun Metal (X10) or similar.

Secure the two exhaust manifolds onto the exhaust ports on the engine, using thin CA adhesive.



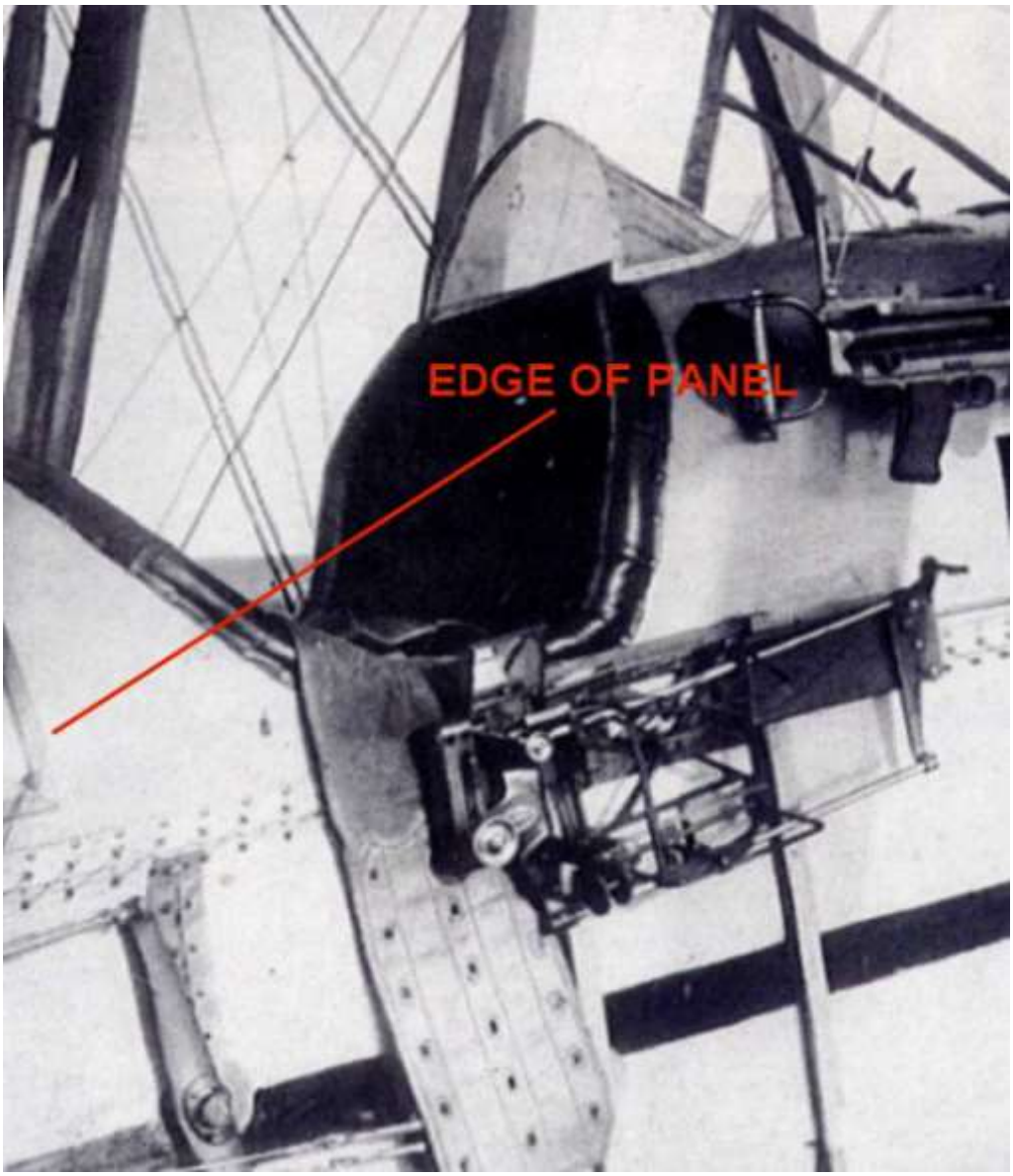
Fuselage after painting (Part 11 Construction)

Fuselage after painting (Part 11 Construction)



Fuselage access panel:

NOTE: *Some, but not all, later versions of the BE2c had an access panel on the right side of the fuselage and rear of the pilot's cockpit. Photographs of No.13 Squadron BE2c aircraft show this panel. This panel is not included on the kit fuselage and will need to be created.*



To represent this panel, I used a spare photo-etch panel from the PART photo-etch set for the Albatros (S32-034).

The panel was primed with 'AK Interactive' White (AK759), then airbrushed with 'Tamiya' Neutral Grey (XF53) or similar.

The panel was then secured in position of the fuselage at the rear or the pilots cockpit, using thin CA adhesive.

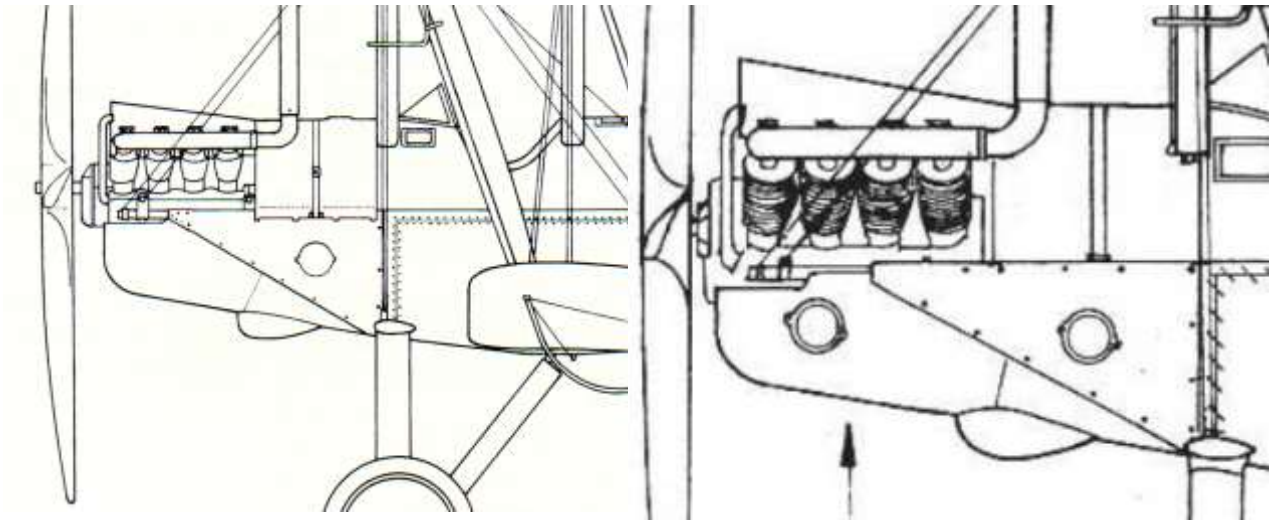
The panel was sealed with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC311) or similar.

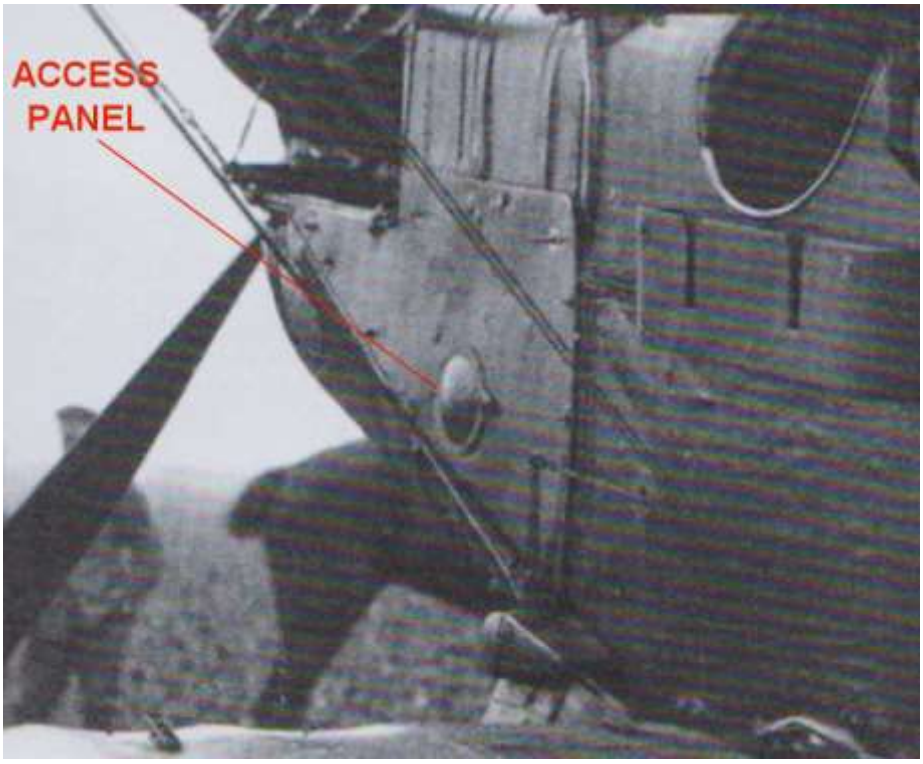
Refer to Part 3 (Weathering) - I applied 'Flory Models' Dark Dirt fine clay wash over the grey painted panel.

The panel was then sealed with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC311) or similar.

Nose access panel:

NOTE: *Later versions of the BE2c had either one or two circular access panels on the left side of the nose, on the triangular panel. This panel is not included on the kit fuselage and will need to be created. I chose a single panel.*





Using the ‘Thinnerline’ circle cutter, I cot a circle of mm diameter from 0.2 mm thick plastic card.

Airbrush the disc with a white primer, such as ‘AK Interactive’ White (AK759) or similar.

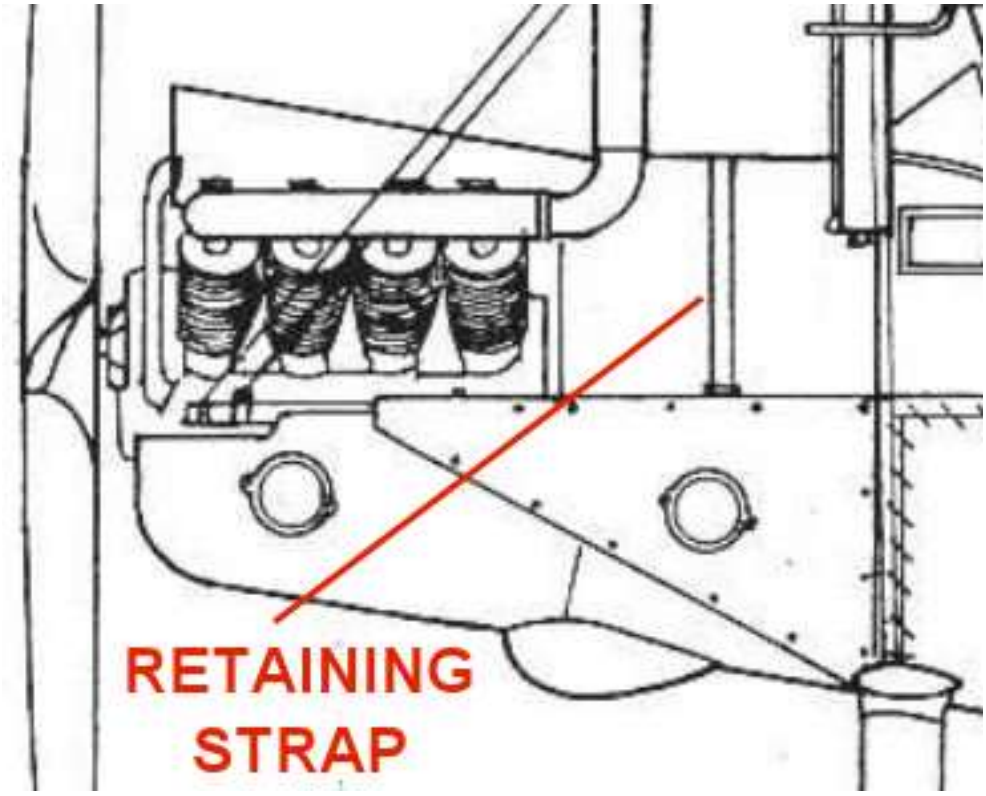
Airbrush the disc with ‘Tamiya’ Neutral Grey (XF53) or similar.

Secure the disc in position on the left side of the nose of the fuselage, using thin CA adhesive.

Refer to Part 3 (Weathering) - I applied ‘Flory Models’ Dark Dirt fine clay wash over the grey painted nose of the fuselage.

Once the desired level of weathering is achieved, seal the surfaces by airbrushing a light coat of semi-matte clear, such as ‘Alclad’ Light Sheen (ALC311) or similar.

Retaining strap:



Cut out the kit supplied photo-etch cowl retaining strap (11) from the sheet and carefully sand away any residual photo-etch tags.

Lightly sand the rear surface of the strap to provide a better surface for attaching the strap to the fuselage.

Soften the strap (annealing) by using a heat source, such as a cigarette lighter. Pass the flame along the strap until it changes colour. Do not allow the flame to stop otherwise the photo-etch can distort or melt.

Position the strap centrally on the fuselage with the strap buckle on the right side of the fuselage. Then bend the strap over the fuselage to the other side, making sure the ends of the strap are positioned on the seam of the fuselage lower panel. Trim the length of the strap to achieve the correct fit.

Prime the outer surface of the strap with ‘Ak Interactive’ White (AK759) or similar.

Brush paint the outer surface of the strap with ’AK Interactive’ Brown Leather (AK3031) or similar.

Brush paint the strap buckle with ’Mr. Colour’ Iron (212) or similar.

Apply a small amount of thin CA adhesive to one end of the strap and carefully position the strap onto the fuselage.

Apply small amounts of thin CA adhesive, in stages, on the mating surface of the strap, carefully positioning the strap over the fuselage.

Refer to Part 3 (Weathering) - I applied ‘Flory Models’ Dark Dirt fine clay wash over the strap.

Once the desired level of weathering is achieved, seal the strap by airbrushing a light coat of semi-matte clear, such as ‘Alclad’ Light Sheen (ALC311) or similar.

Windscreens:

NOTE: *The clear acetate windscreens will be fitted to the frames, which will be fitted later in this build.*

Cut the two windscreen frames (13) from the kit supplied photo-etch sheet.

Remove any residual photo-etch tags from the edges of the frames.

Anneal (soften) the frames by moving them across a flame, such as that from a cigarette lighter, until the windscreens colour changes to a light grey.

Wipe any flame soot from the frames.

Windows:

Cut the two side window frames (14) and the pilots window frame (15) from the kit supplied photo -etch sheet.

Remove any residual photo-etch tags from the edges of the frames.

Anneal (soften) the frames by moving them across a flame, such as that from a cigarette lighter, until the windscreens colour changes to a light grey.

Wipe any flame soot from the frames.

Carefully bend the frames over their window locations on the fuselage decking panel to create the required curvature. This will ensure the frames position fully onto the fuselage decking panel.

Airbrush the frames with a white primer, such as ‘AK Interactive’ White (AK759) or similar.

Airbrush the frames with ‘Tamiya’ Neutral Grey (XF53) or similar (to match the colour of the engine panels).

Seal the frames by airbrushing a light coat of semi-matte clear, such as ‘Alclad’ Light Sheen (ALC311) or similar.

Side windows:

Using thin CA adhesive or PVA adhesive (white glue), carefully secure the two side window frames (14) in position over their openings in the fuselage decking panel.

NOTE: *During the following step, gradually build up the adhesive to avoid seepage into the cockpit below.*

Using a wood tooth pick or similar, apply a clear setting PVA adhesive, such as ‘Microscale’ Krystal Kleer or similar, around the inner edges of the window frames (14) until a film covers the opening.

Leave the adhesive overnight to fully cure, when it should be firm and clear.

Pilot’s window:

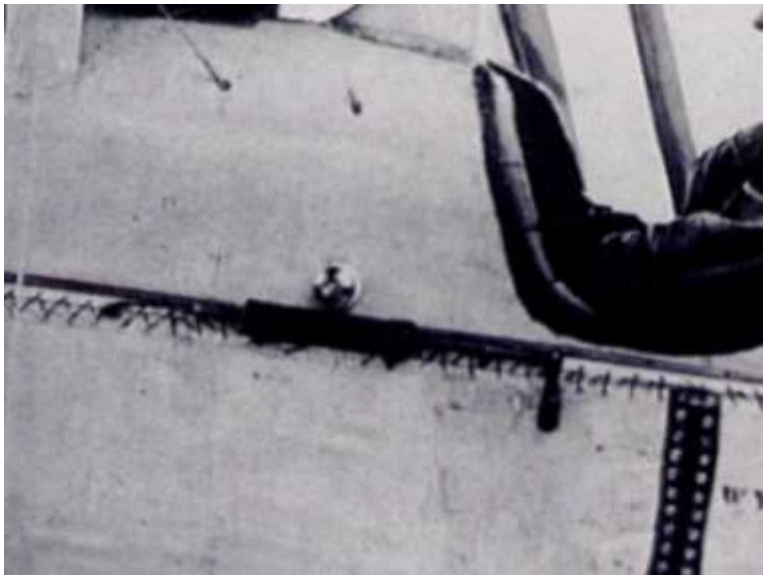
Using the acetate sheet provide in the kit for the windscreens, cut out a thin strip just wide enough the span across the centre, underside of the photo-etch window frame (15).

Using a wood tooth pick or similar, apply a clear setting PVA adhesive, such as ‘Microscale’ Krystal Kleer or similar, around the inner edges of the two openings created in the frame (15) until a film covers the openings.

Leave the adhesive overnight to fully cure, when it should be firm and clear.

Fuel pressure pump:

NOTE: *A hand operated pressure pump was fitted the side of the fuselage, to be operated by the pilot. This pump supplied air to pressurize the fuel tank.*



Preparation:

NOTE: *The pump will be fitted later in this build.*

Carefully snipe or saw the 3D printed pressure pump from its support struts.

Snipe or sand away any support tags from the edges and surfaces of the part.

Cut away the extended ‘pipe’ from the end of the pump.

Drill a hole of 0.4 mm diameter into the centre of the pump where the pipe was removed.

Drill a hole of 0.4 mm diameter into, **but not through**, the centre of the side of the pump body to be located against the side of the fuselage (see above photograph - pump handle to the rear).

Cut a length of 0.3 mm diameter lead wire, such as that from ‘PlusModel’ or similar.

Using thin CA adhesive, secure the wire into the pre-drilled hole in the end of the pump.

Cut a short length of 0.3 mm diameter rod, such as that from ‘Albion Alloy’s’ MBT03 or similar.

Using thin CA adhesive, secure the rod into the pre-drilled hole in the side of the pump body.

Drill a hole of 0.4 mm diameter through the side of the fuselage, in the centre of the fuselage stitching, for locating the pump onto the fuselage (see above photograph).

Drill a hole of 0.4 mm diameter through the side of the fuselage, in the centre of the fuselage stitching, for locating the lead wire ‘pipe’ into the fuselage (see above photograph).

Painting:

Airbrush the pump and pipe with a grey primer, such as ‘AK Interactive’ Grey (AK758) or similar.

Brush paint the body of the pump with ‘Tamiya’ Metallic Grey (XF56) or similar.

Brush paint the pump stem with ‘Tamiya’ Chrome Silver (X11) or similar.

Brush paint the pump handle with ‘Tamiya’ Hull Red (XF9) or similar.

Brush paint the pipe with ‘Tamiya’ Rubber Black (XF85) or similar.

Airbrush a semi-matte clear coat over the pump, such as ‘Alclad’ Light Sheen (ALC311) or similar.

PART 11
CONSTRUCTION

PART 11 - CONSTRUCTION

NOTE: *Refer to **Part 5 (Resin and 3D prints)** of this build log. Apart from the supplied photo-etch parts, the individual model parts are not numbered and there is no parts call out illustration. Therefore take care that you select the correct parts for assembly by reference to the illustrations in the kit instructions.*

Preparation:

NOTE: *The kit supplies two versions of the fin, dependent on the aircraft you are to build. Make sure you select the correct fin for your build (refer to the colour illustrations for the correct fin).*

Remove the following parts from their moulding blocks:

Upper and lower wings.
Eight interplane struts.
Four fuselage cabane struts.
Two tailplanes.
Fin.
Rudder.
Two landing gear V struts.

File or sand away any residual resin from the cut edges and any resin flash or surface artifacts from their edges.

If necessary, carefully sand away any surface imperfections, such as resin build up or mould marks. If there are air 'blow' holes present, fill them with a modelling putty and once set, sand the area flush with the surrounding surface.

Animation and pinning:

NOTE: *The following is only required if you wish to have the wing ailerons and tailplane elevators positioned (animated).*

Use a scriber to score along both sides of the pre-moulded joins between the wings and their ailerons and the tailplanes and their elevators. This will be easier to separate the parts rather than using a saw.

Use a saw to cut along both sides of the pre-moulded joins between the fin and rudder with their moulding blocks.

File or sand away any residual resin from the cut edges and any resin flash or surface artifacts from their edges.

If necessary, carefully sand away any surface imperfections, such as resin build up or mould marks. If there are air 'blow' holes present, fill them with a modelling putty and once set, sand the area flush with the surrounding surface.

NOTE: *Make sure to keep the ailerons and elevators matched together with their wings and tailplanes.*

Upper wing:

Drill holes of 1.0 mm diameter centrally in the aileron leading edge at the aileron outboard and inboard pre-moulded hinge locations and also centrally between the two.

Cut three lengths of 1.0 mm diameter Brass rod, such as that from 'Albion Alloy's' or similar.

Secure the three rods into the pre-drilled holes in the aileron using thin CA adhesive. Make sure the rods are aligned with the aileron when viewed from above and the side.

Position the aileron in the wing cut-out and pencil mark the trailing edge of the wing at the rod locations.

Using the marks as a guide, drill holes of 1.0 mm diameter centrally in the wing trailing edge.

Cut three lengths of 1.0 mm diameter Brass rod, such as that from ’Albion Alloy’s’ or similar.

Test fit the aileron into the upper wing, making sure it locates fully and its upper and undersides are aligned with the upper wing.

Remove the aileron.

Repeat the procedure for the opposite aileron.

Lower Wings:

Repeat the above procedure for the two ailerons in the lower wings.

Tailplanes:

Repeat the procedure for the two elevators in the two tailplanes, but adding rods at the four hinge locations.

Fin:

Drill two holes of 0.5 mm diameter centrally into the bottom edge of the fin, using the location indents as guides.

Drill a hole of 0.5 mm diameter centrally into the rear edge of the fin at the centre rib tape.

Cut three lengths of 0.5 mm diameter Brass rod, such as ’Albion Alloy’s’ MBR05 or similar.

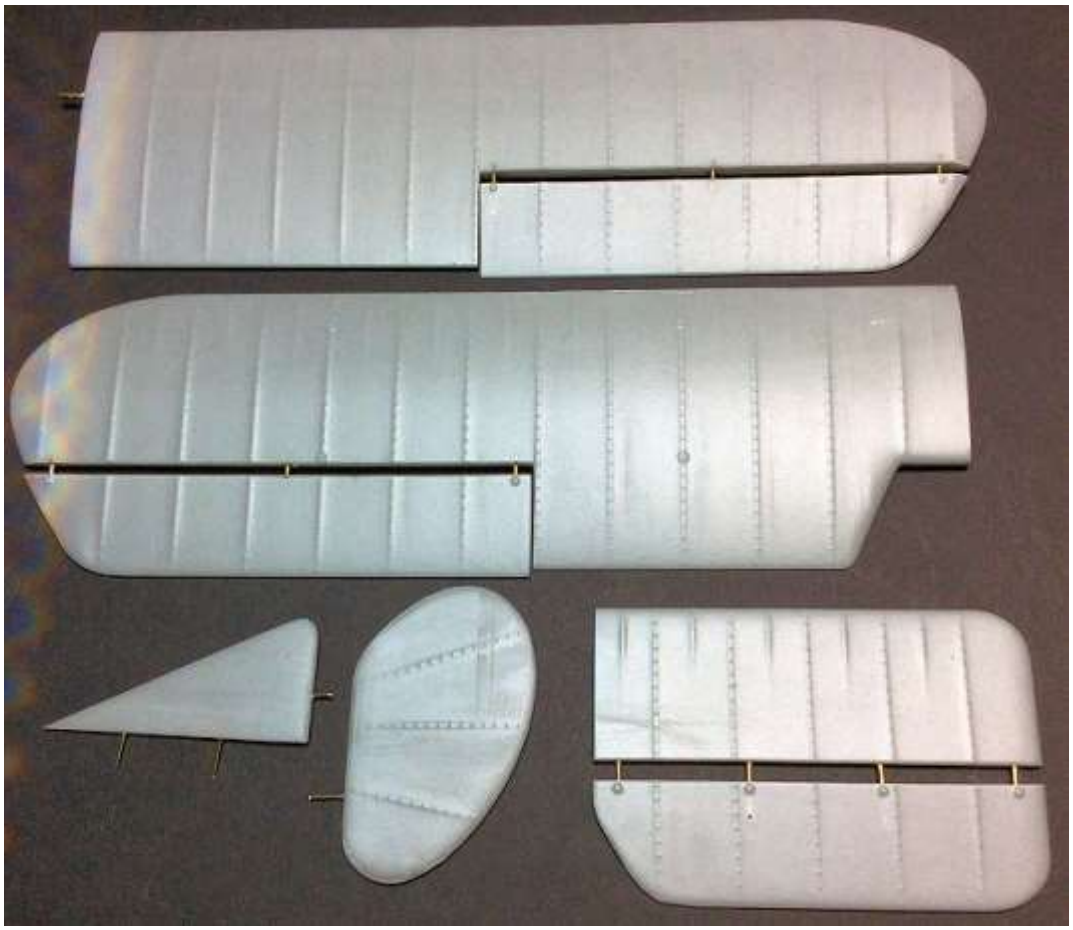
Secure the three rods into the pre-drilled holes in the fin using thin CA adhesive. Make sure the rods are aligned with the fin when viewed from the front and the side.

Rudder:

Drill a hole of 0.5 mm diameter centrally into the leading edge of the rudder, using the bottom rib tape as a guide.

Cut a length of 0.5 mm diameter Brass rod, such as ’Albion Alloy’s’ MBR05 or similar.

Secure the rod into the pre-drilled hole in the rudder using thin CA adhesive. Make sure the rod is aligned with the rudder when viewed from the front and the side.



Upper wing assembly:

NOTE: *The kit has the upper wing in three parts, two outer wings and the centre section. A single reinforcing and locating rod is mould internally within the two outer wings. The locating holes in the centre section need to be accurately drilled for correct alignment of the outer wings. I decided not to use this single rod location as it can lead to the outer wings not being aligned correctly to the centre section.*

Cut away then file flush the locating rods in the two outer wings.

Refer to the following photograph. Point mark in the centre of the outer wings mating faces two guide points.

Using the guides marks drill holes of 1.0 mm diameter, as far as possible, into the outer wings. Make sure the holes are drilled a 90 degrees to the wings when viewed from above and the front.

Cut four lengths of 1.0 mm diameter rod, such as 'Albion Alloy's' MBR01 or similar.

Secure the rods into the pre-drilled holes in the outer wings using thin CA adhesive.

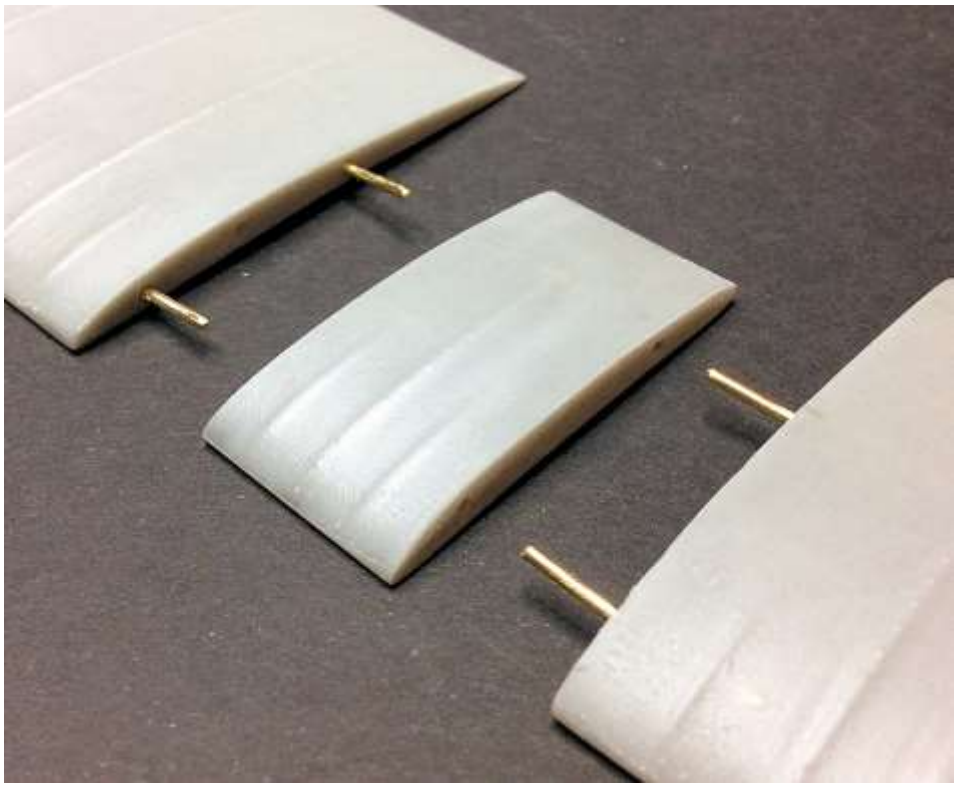
NOTE: *In the following step, make sure the centre section is the correctly positioned. The underside of the centre section has two pairs of location indents for the fuselage front and rear cabane struts. The end of the centre section with the pair of indents farther away is the end that should be positioned with the leading edge of the upper wing.*

Position the centre section against an outer wing and pencil mark the location of the rods onto the centre section.

Using the marks as guides, drill holes of 1.0 mm diameter, as far as possible, into the centre section. Make sure the holes are drilled a 90 degrees to the centre section when viewed from above and the front.

Repeat to drill holes in the centre section for the other outer wing.

Test fit the outer wing into the centre section, making sure the mating faces are in full contact.



NOTE: *The outer wings should be fitted to the centre section at an angle of three degrees. To aid in achieving the correct location angle I marked the outer edges of the centre section onto the edge of an A4 card. Using a protractor I marked a point for a three degree angle from the two centre section marks, then drew a line for each. This was used to achieve the correct wing angles.*

Slightly bend the locating rods in the outer wings upward.

Fit the outer wings into the centre section then position the wings along the drawn lines on the A4 card. Note how much more bending will be required to the locating rods to achieve wing alignment along the drawn lines with the **centre section horizontal**.

Bend the locating rods to achieve the correct wing angles with the centre section horizontal.

Using CA adhesive, secure the outer wings into the centre section, making sure the wings locate fully in the centre section.

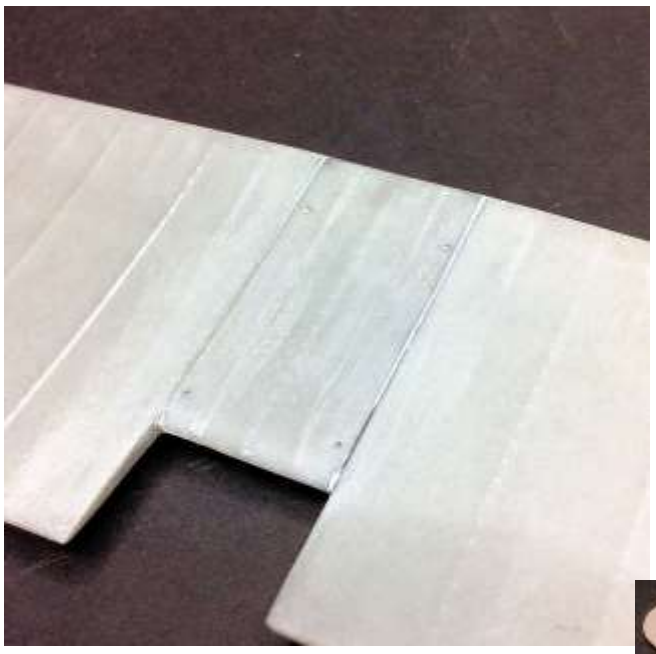
Using the A4 guide lines, re-check the wing alignments.

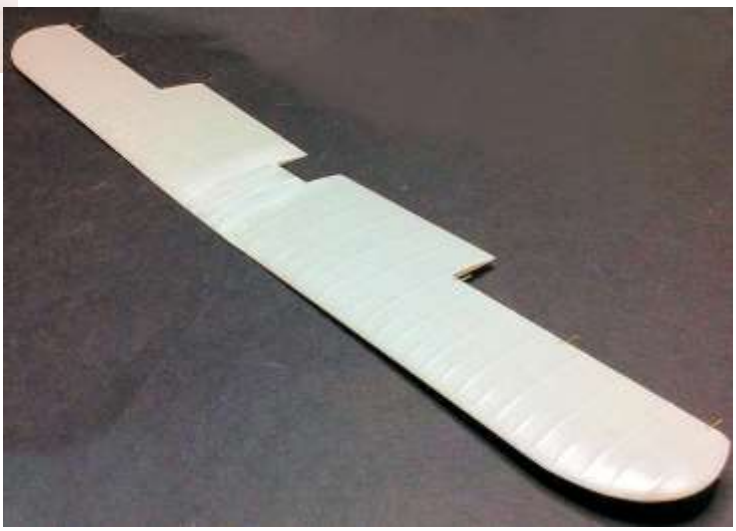
If necessary, fill any larger minor gaps with a thicker CA adhesive or any minor gaps with 'Mr. Surfacer' 500 or 1000 surface primer/filler.

To blend the wing and centre section surfaces together, do either:

Sanding the wing joints to remove residual CA adhesive

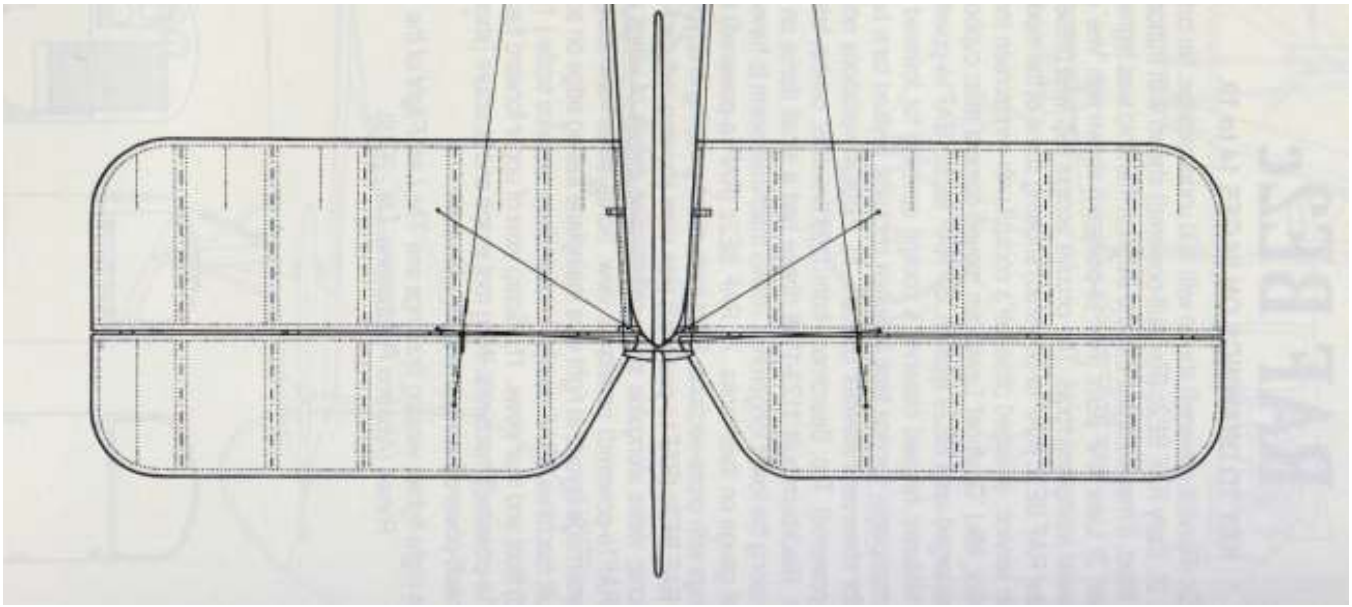
Use lacquer thinners on a cotton bud, to wipe across (not along) the joints to remove any residual 'Mr. Surfacer'.

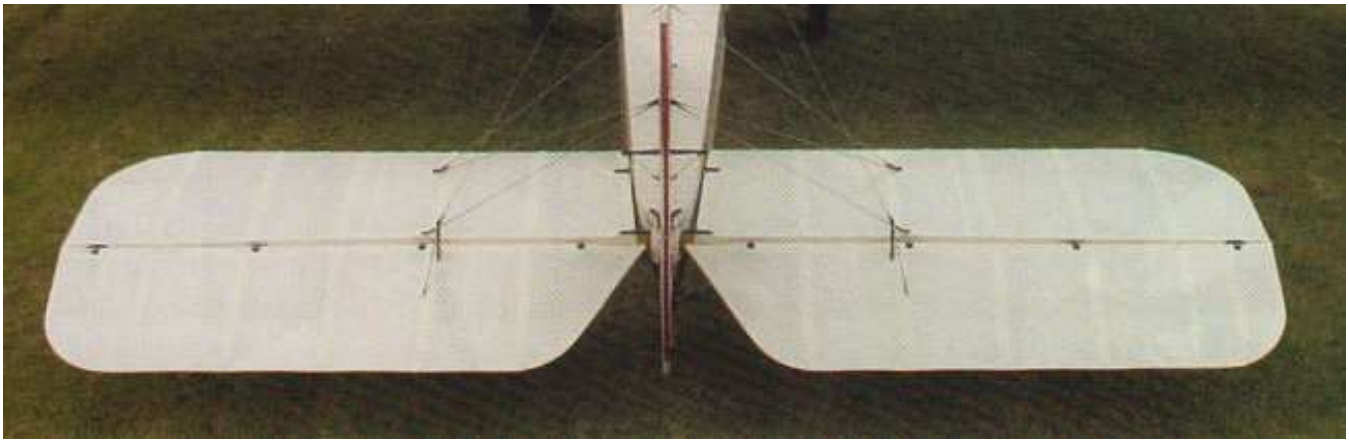




Tailplane to fuselage:

NOTE: *The kit instruction indicate that the left and right tailplanes should be attached to the rear sides of the fuselage, using two rods. The illustration shows the inboard ends of the tailplanes being 90 degrees to their leading edges and noticeably clear of the fuselage sides along their entire length. However, it seems that in reality, the inboard ends of the tailplanes were angled to follow the sides of the fuselage and the only noticeable gap was at the rear, where the fuselage tapered to its end.*





Refer to the following photograph.

Position the tailplanes under fuselage sides with their trailing edge level with the rear end of the fuselage.

Pencil mark the inboard ends of the tailplanes such that they align with the sides of the fuselage.

Using the pencil guide lines, saw away the inboard edges of the tailplanes.

Position the tailplanes against the sides of the fuselage, making sure they are in contact and at 90 degrees to the fuselage centre line.

Point mark in the centre of the pre-moulded tailplane locations each side of the fuselage rear.

Using the guides marks drill holes of 0.8 mm diameter through the sides of the fuselage. Make sure the holes are drilled a 90 degrees to the centre line of the fuselage and horizontal to the fuselage when viewed from above and behind.

Cut two lengths of 0.8 mm diameter rod, such as ’Albion Alloy’s’ MBR08 or similar.

Pass the rods through the pre-drilled holes in the fuselage, with equal lengths protruding at each side.

Secure the rods in the pre-drilled holes using thin CA adhesive.

Position the tailplanes under fuselage sides with their trailing edge level with the rear end of the fuselage.

Pencil mark the tailplanes with the location of the fuselage rods.

Using the marks as guides, drill holes of 0.9 mm diameter, as far as possible, into the centre of the tailplane inboard edges. Make sure the holes are drilled a 90 degrees to tailplane edges when viewed from above and the front/rear.

Test fit the tailplanes onto the fuselage rods.

Fin and rudder:

Position the fin on the top, rear of the fuselage, with its trailing edge aligned with the rear edge of the fuselage.

Mark the position of the two fin locating rods on the centre line of the fuselage.

Point mark the locating rod positions.

Drill holes of 0.5 mm diameter vertically through the top of the fuselage at the point marked positions.

Test fit the fin into the fuselage, making sure the fin is vertical to the fuselage when viewed from the rear. Also that the fin is centrally aligned along the fuselage centre line, when viewed from above.

With the fin located, locate the rudder upper locating rod into its fin locating hole.

Mark the location of the rudder lower locating rod at the rear edge of the fuselage.

Remove the fin and rudder.

Using the mark as a guide, drill a hole of 0.5 mm diameter centrally through the rear end of the fuselage.

Refit the fin onto the fuselage.

Test fit the rudder into the pre-drilled holes in the rear edge of the fin and the rear end of the fuselage.

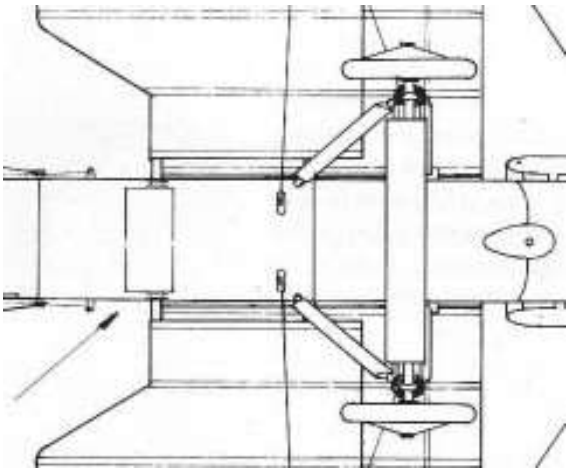
Make sure both the fin and the rudder are aligned and are vertical to the fuselage when viewed from the rear and aligned along the fuselage centre line, when viewed from above.

Remove the fin and rudder.

Lower wings to fuselage:

NOTE: *The two lower wings have an integrally fitted brass rod to keep the wing level and warp free. The instructions state that the wing roots of the lower wings should be drilled in two locations for inserting 1.0 mm diameter rods. These rods are then to be inserted into holes, drilled into the fuselage pre-mould spar cross members under the fuselage. Those holes need to be aligned with the rods in the wings. The front spar 1.0 mm diameter location holes can be drilled into the pre-mould cross member under the fuselage, as the cross member is thick enough to be drilled without 'break through'. However, the rear spar cross member is too thin to be drilled with a 1.0 mm diameter hole and the resin may very well break away. Therefore I chose to drill those holes in the lower wings and the fuselage using a 0.8 mm diameter drill.*
Also the kit instructions indicate that the front of lower wings are more or less against the sides of the fuselage. However, as can be seen in the following photographs/drawing, the lower wings are clear of the fuselage with exposed wing spars and their attachments.

'Vintage Aviator Ltd' reproduction BE2c



File the integral brass rod in the two lower wing flush with the wing root ends of the wings.

NOTE: *In the following step, if drilled correctly, the two holes should join within the cross member.*

Drill a hole of 1.0 mm diameter centrally into the pre-moulded locations for the wing front spars, at the bottom of the fuselage sides. Drill the holes from both sides of the fuselage, making sure the remain centred and at 90 degrees to the fuselage when viewed from above and from the front.

Check that a 1.0 mm diameter Brass rod, such as that from 'Albion Alloys' or similar, can pass through the fuselage in the pre-drilled holes and that it is at 90 degrees to the fuselage when viewed from above and from the front.

Drill a hole of 0.8 mm diameter centrally into the pre-moulded locations for the wing rear spars, at the bottom of the fuselage sides. Drill the holes from both sides of the fuselage and into, **but not all the way through**, the rear cross member. Make sure the drill is centred and at 90 degrees to the fuselage when viewed from above and from the front.

Check that a 0.8 mm diameter Brass rod, such as that from 'Albion Alloys' or similar, can be inserted into pre-drilled holes and that they are at 90 degrees to the fuselage when viewed from above and from the front.

Position the lower wings close to the fuselage sides with the trailing edge of the lower wings aligned with the rear edge of the rear spar cross member under the fuselage.

Pencil mark the lower wings with the location of the pre-drilled holes in the cross members for the front and rear spars.

Using the forward spar pencil marks as a guide, drill a hole of 1.0 mm diameter centrally and as far as possible, into the wing root of the lower wings. Make sure the holes are drilled centred and at 90 degrees to the lower wings, when viewed from above and from the front.

Using the rear spar pencil marks as a guide, drill a hole of 0.8 mm diameter centrally and as far as possible, into the wing root of the lower wings. Make sure the holes are drilled centred and at 90 degrees to the lower wings, when viewed from above and from the front.

Cut a long length of 1.0 mm diameter Brass rod, which should be long enough to be fully inserted into one wing then passed through the fuselage and inserted fully into the other wing, leaving a 1.5 mm gap between the wing roots and sides of the fuselage.

Cut two lengths of 0.8 mm diameter Brass rod, both of which should be long enough to be fully inserted into a wing then inserted fully into the pre-drilled holes in the cross member for the rear spar, leaving a 2.0 mm gap between the wing roots and sides of the fuselage.

Using thin CA adhesive, secure the 1.0 mm diameter rod fully into the forward pre-drilled hole in the root of the right wing.

Using thin CA adhesive, secure the two 0.8 mm diameter rods fully into the rear pre-drilled holes in the wing root of both wings.

NOTE: *The following step is carried out so that the diameter of the exposed wing rods (wing spars), when the wings are fitted with the 'spacers', are more to scale for the size of the spars.*

Cut two 'spacers' 1.5 mm long lengths of 1.6 mm diameter Brass tube, such as 'Albion Alloy's' MBT16 or similar.

Cut two 'spacers' 2.0 mm long lengths of 1.6 mm diameter Brass tube, such as 'Albion Alloy's' MBT16 or similar.

Slide a 1.5 mm long ’spacer’ onto the forward rod fitted into the right wing and a 2.0 mm long ’spacer’ onto the rear rod.

Secure the two ‘spacers’ against the wing using thin CA adhesive.

NOTE: *The dihedral angle of the lower wings should match the same for the upper wing, which is 3 degrees.*

Slide the two wing rods into their locating holes in the fuselage until the ’spacers’ are in contact with the fuselage with the front rod protruding from the other side of the fuselage.

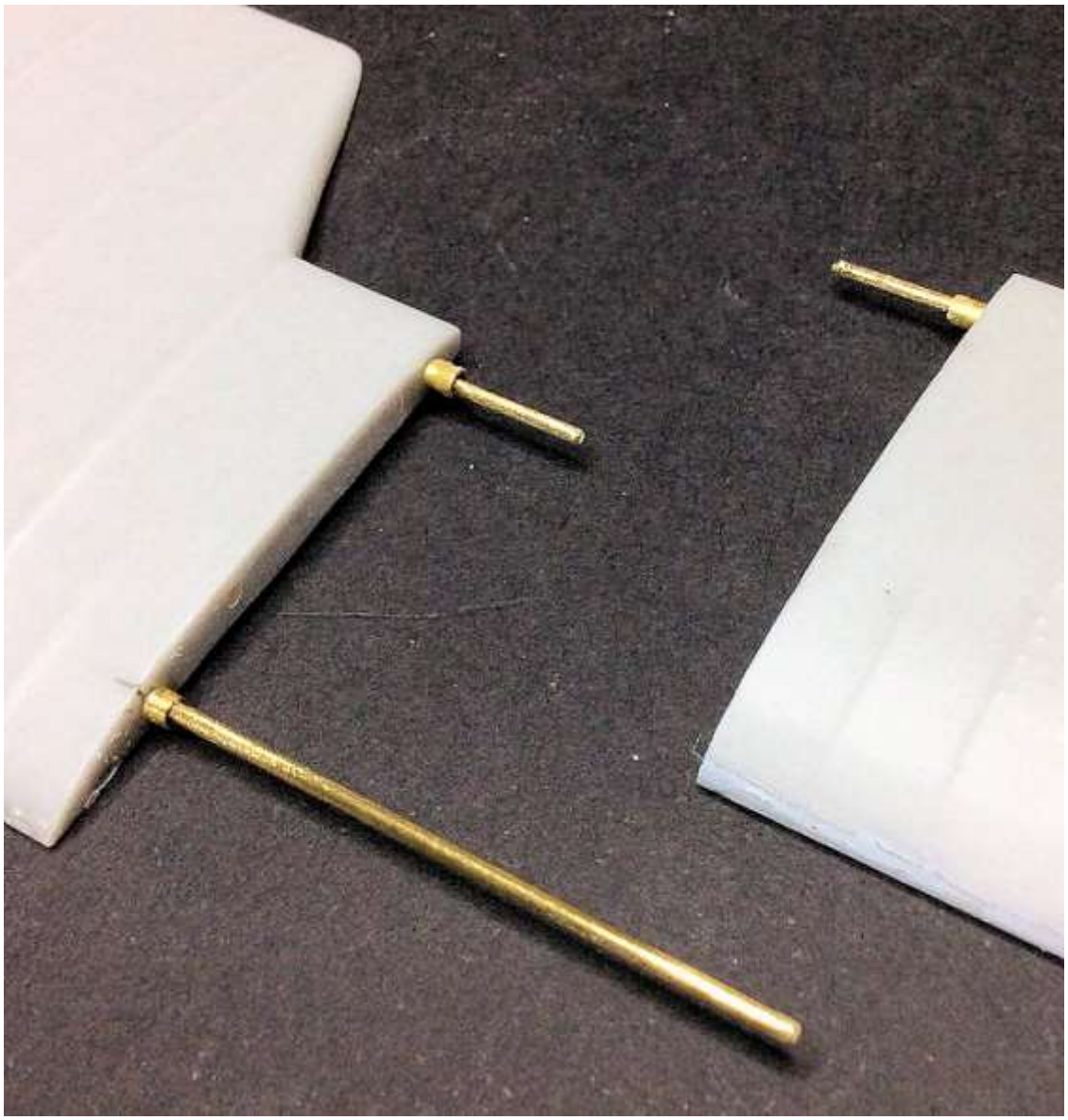
Slide the remaining 1.5 mm long ’spacer’ onto the protruding forward rod and the remaining 2.0 mm long ’spacer’ onto the rear rod of the lower left wing.

Carefully push the lower wings towards the fuselage until the ’spacers’ are in contact with the side of the fuselage.

Check that the lower wings are aligned to each other and are 90 degrees from the fuselage when viewed from above.

Remove the wings from the fuselage and each other. **Retain the loose front spar ‘spacer’ for fitting later in the build when the lower wing are fitted.**

Using thin CA adhesive, secure the loose 2.0 mm long ‘spacer’ onto the rear spar locating rod of the left wing, making sure it’s against the lower wing.



Struts:

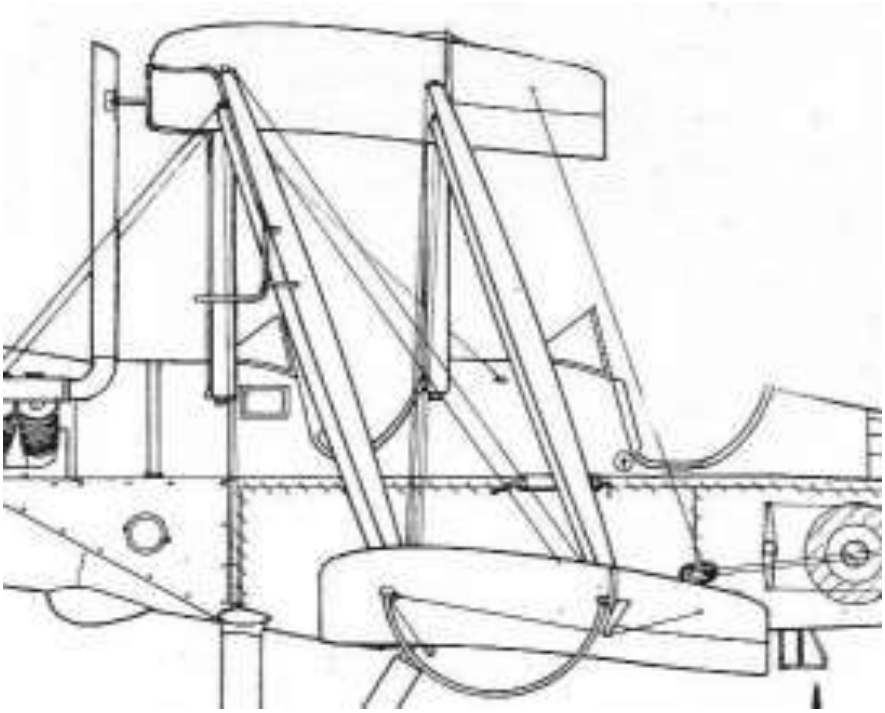
NOTE: *The ends of the wing interplane struts are at 90 degrees to their leading and trailing edges. Due to the forward lean angle of the struts, when fitted, the ends of the struts would have a gap at the top leading edge and a similar gap at the bottom trailing edge.*

Carefully file or sand the edges of the eight interplane and the four fuselage cabane struts, to remove any resin flash or surface artifacts.

Test fit the locating rod in each end of each of the interplane and fuselage cabane struts into their pre-drilled holes in the upper and lower wings and the fuselage. Where necessary, trim the length of the rods such that they fully locate into the holes.

Insert each interplane strut into a hole in the lower wing and carefully push the strut forwards to bend the rod and achieve the approximate forward lean angle for the struts.

Bend the rods at the top ends of the struts to align with the lower, bent struts.

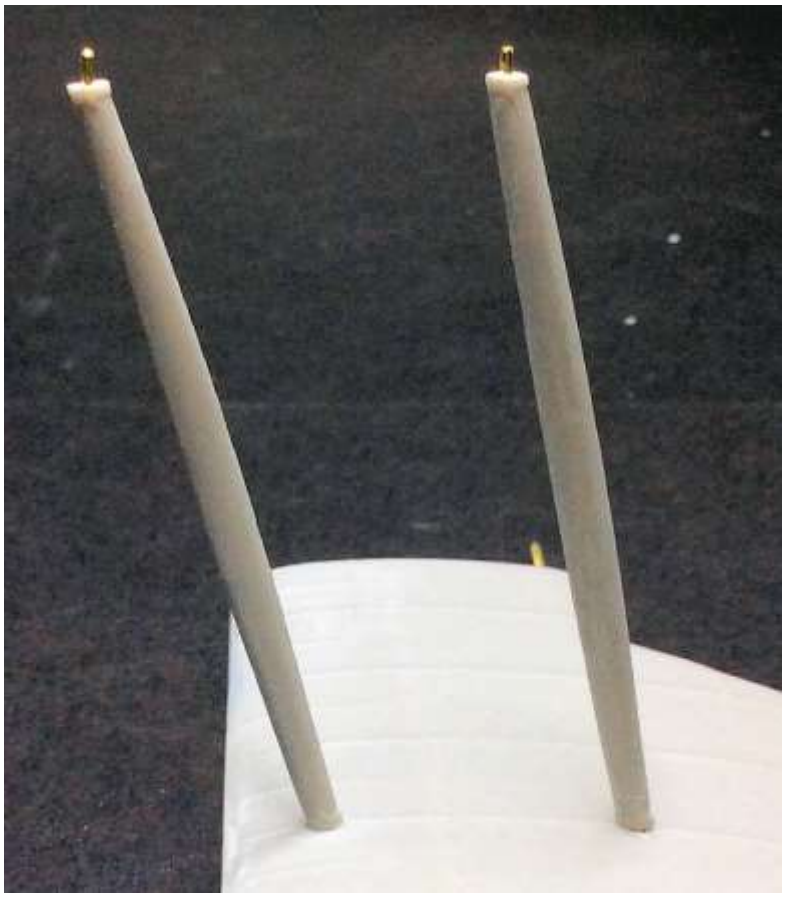


NOTE: *The locating holes for the interplane struts in the upper and lower wings have a pre-moulded surrounds, which stops the ends of the struts from contacting the surface of the wings.*

Using a curved blade, carefully scrape away the hole surrounds.

NOTE: *During the following step, make sure the cut ends of each strut are in the direction (parallel to each other).*

Using the kit drawings or other line drawings of the BE2c, note the angle of forward lean for the eight interplane struts. Carefully cut away the resin around the locating rods at the top and bottom of the struts, such that the strut ends lay against the wing surfaces when fitted.



Internal structure:

NOTE: *The following illustrations shown the internal structure of the aircraft. These are used to pre-shade the structures before applying the final top coat of paint.*
The internal structure of the aircraft was visible, but dependant of the colour of the dope that was applied. The linen covering of the aircraft was either:

Clear Doped Linen (CDL) - Dope was applied but without any additional colouring. However, over time the doped finish would weather and get contaminated with dirt, fuel or oil stains. This tainted and stained the dope colour darker from the initial whitish cream colour.

Protective Covering (PC 10 or PC12) - Although not applied to the model of this particular aircraft, PC coloured dopes were applied to other BE2c aircraft. These doped finishes were equally tainted and stained with the resultant change in colour. Also the mix of available ingredients for the dopes varied and this effected the colour when initially applied or when weathered.

Generally, the external visibility of the internal structures of the aircraft were dependent on not only the strength of the ambient light, but also the type of dope applied, particularly on the upper surfaces.
Aircraft with only clear dope (CDL) applied overall would tend to show the internal structures more from the undersides than the upper surfaces, due to light penetration through the wings etc from above. The upper surfaces would show the rib tapes more than structure, as the tapes were effectively double thickness linen. Roundels or other markings applied to the top surfaces of the upper wing would show as faded 'ghost' markings on the undersides, but not show through the lower wings from their undersides, due to light from above.
Aircraft with PC coloured dope applied on the upper surfaces would tend to show the internal structures less from the undersides, due to light penetration through the wings etc from above being blocked by the coloured dope. The upper surfaces would show the rib tapes to a lesser degree than aircraft with CDL

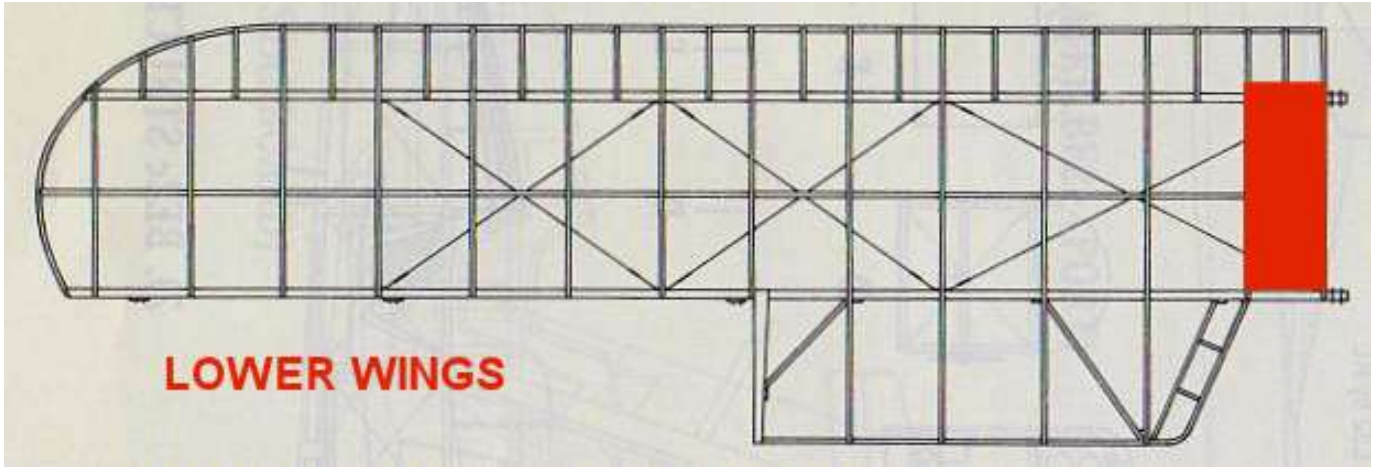
Example of CDL dope finish from above

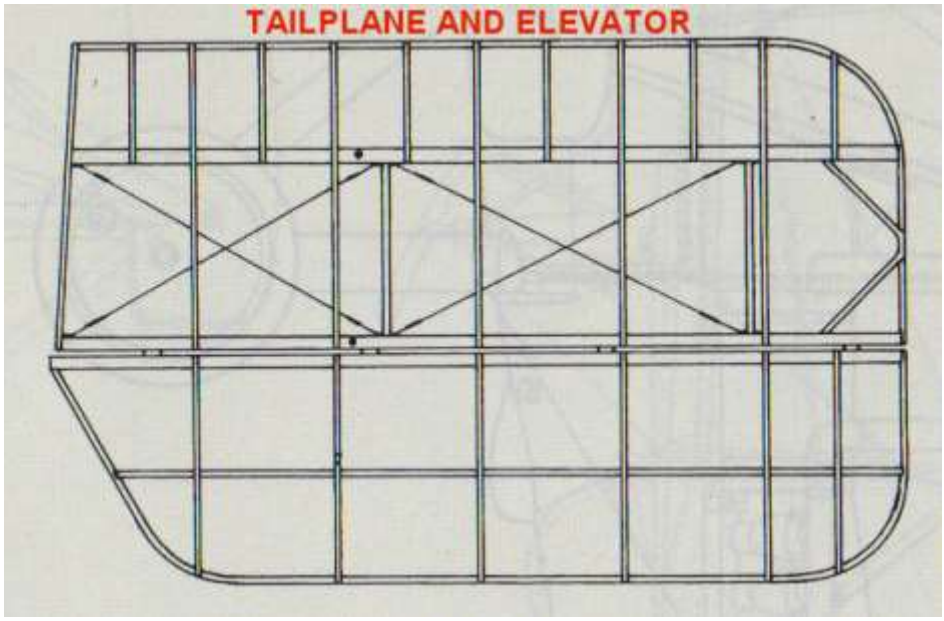
Example of CDL dope finish from below

Example of a ‘ghost’ roundel viewed from below

NOTE: *The red area on the above lower wings is where walk boards were fitted and the internal wing structure will not be visible.*

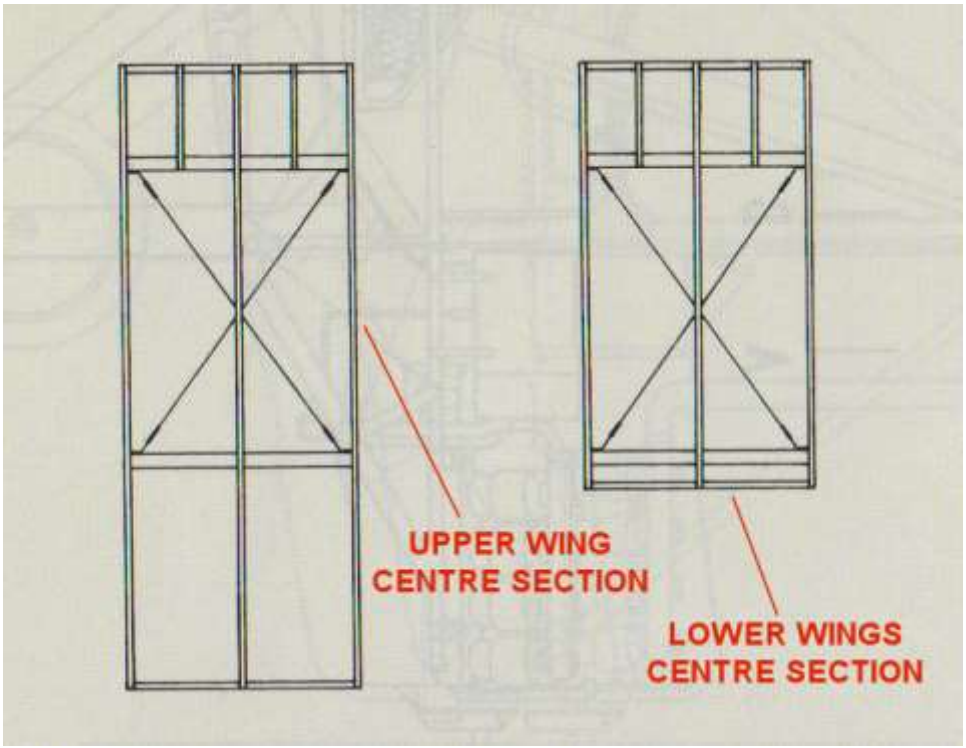
Lower wings internal structure



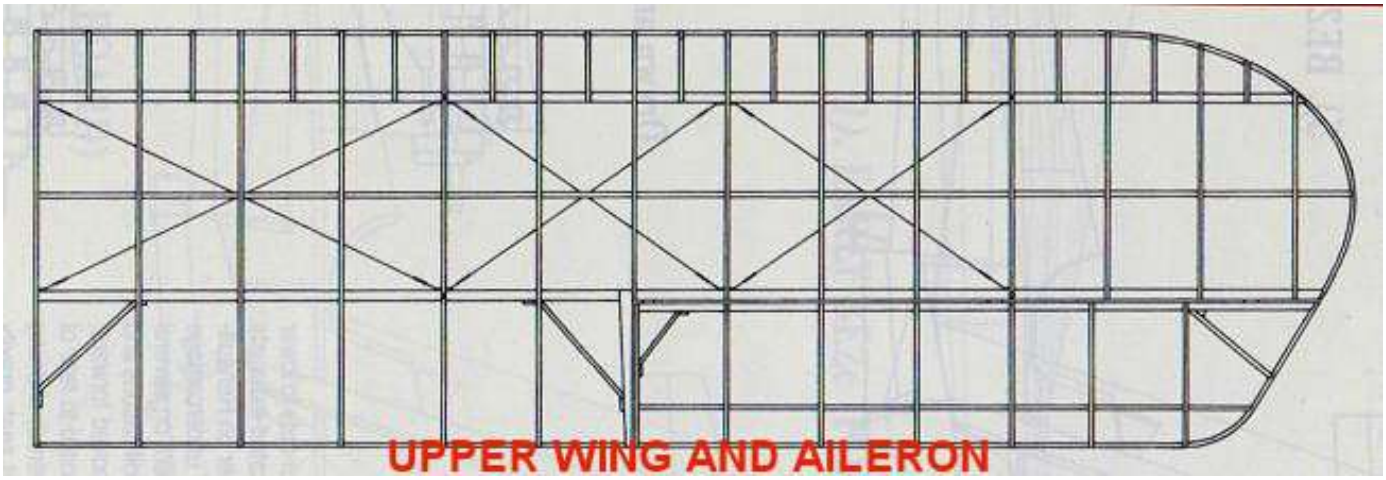


Tailplanes and elevators internal structure

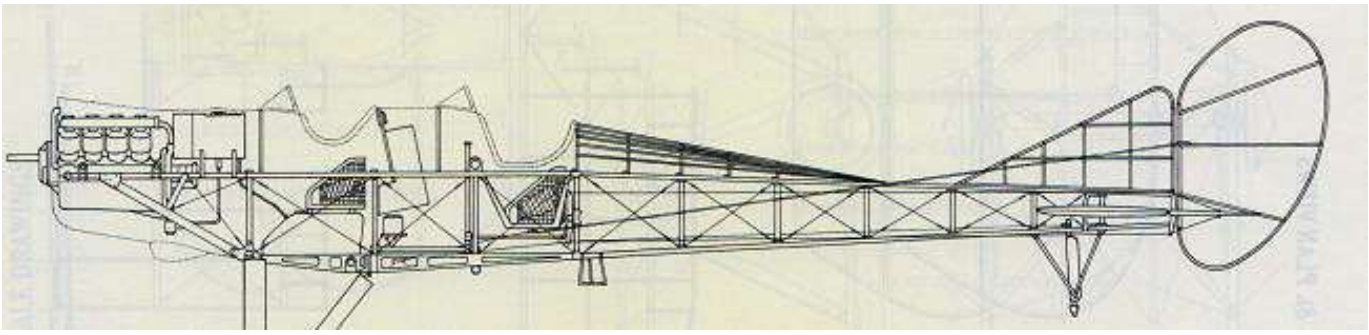
Wing centre sections internal structure



Upper wing internal structure



Fuselage internal structure



NOTE: *The underside of the fuselage for BE2 aircraft is a minefield to research, as I could not find any reliable photographs or information of the underside of the fuselage. Several reproduction aircraft have been built, including those by 'Vintage Aviation Ltd' in New Zealand and the RAF Museum aircraft, built by John McKenzie, which was built partly from actual BE aircraft parts and was extensively researched by John.*

'Vintage Aviator Ltd':

'Vintage Aviation Ltd' have four BE types, namely an early BE2c (with skid landing gear, a later BE2c with the 'V' landing gear, a BE2f and a BE12. Photographs of these aircraft seem to show that the early BE2c and the later BE2c had plywood undersides to the fuselage, rear from the pilots cockpit, whereas the BE2f and the BE12 had what appears to be linen covered undersides.

John McKenzie - RAF Museum):

When asked in the 'Aerodrome' forum about the underside covering for BE2c aircraft, he stated that:

All BE2 machines **up to and including early BE2C** aircraft, had 3/32" **plywood sheet covering**, top and bottom of the rear fuselage section. The single bay under the pilots position was 1/8" ply. The fabric cover went on over all of the ply surfaces, sides being laced shut for access to the wire bracings.

The pilot/observers cockpit panel (3/32"ply) was fabricated on the BE2c and supposed to be painted battleship grey. This part was removeable, hence the 1/2 round beading at its lower edge, against which it sits.

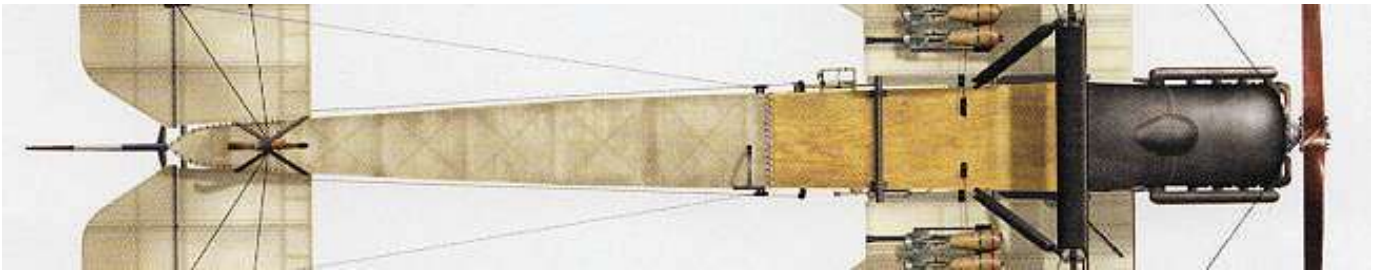
Up until the "C" ,the fabric sides came down at the front fuselage portion, slightly curved, via a mid-way stringer, just to as far as the top of the lower longerons (some like to call these "patterns"), also fixed by 1/2 round beading, thus these lower front portion longerons were initially exposed and Shellac varnished .
However with the introduction of the "C", the lower wing was brought back by one fuselage bay, in conjunction with a new non-lifting tailplane and the front portion fuselage fabric was then enabled to continued down to cover these lower longerons. The mid-way stringer was omitted and the sides now made flat. Forward of the plywood, the floor was composed of 1/2" tongue and groove spruce panelling.
With "low" exhausts , this was protected by aluminium sheet. This was not necessary with the introduction of the "high "exhaust system.
BE2A fuselage frames that were otherwise spare or obsolete were updated to the BE2C specification, with plywood sheeting top and bottom remaining and additionally conversion drawings made for alterations to RAF1 motor replacing the Renault engine.
The **plywood and spruce sheeting served to brace** the frame in the horizontal plane on these earlier machines, so that wire bracing was not employed in the horizontal planes on all the BE2 series up till **part way through the BE2C production**, these frames having much commonality to the earlier "A & B " models.
Later, during it's production, BE2C machines underwent a number of alterations and in respect to the fuselage, these included lightened and altered fittings and " **replacement " of the 3/32" ply sheeting of earlier "C " models with wire horizontal cross bracing top and bottom**.
The actual wires now used were round swaged wires with end forks, as opposed to the 12 SWG "piano" wire and turnbuckles of the earlier BE2C 's. New fuselage drawings were issued, at every stage, for all these changes.

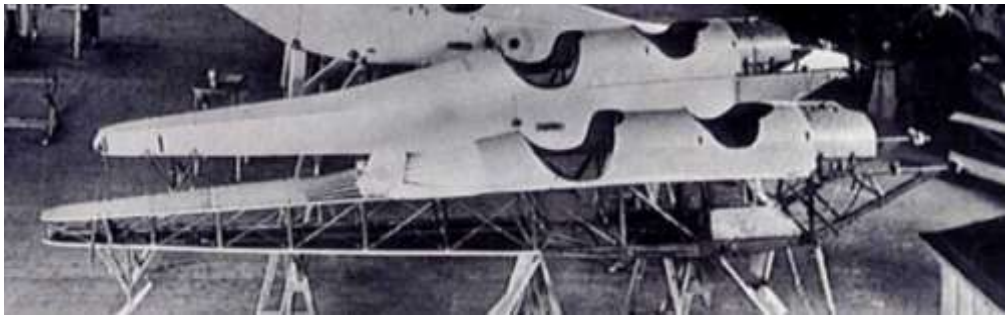
Later BE2C did not have the 3/32" ply from position "G" back. Instead swaged wire bracing was used.

Conclusion:

It would seem that from the prototype to the last variant of the BE2 aircraft, the underside of the fuselage (rear of the pilots cockpit) had either Shellac varnished plywood, linen covered and wire braced covering or indeed linen covered plywood.

The aircraft being modelled is a later BE2c and has the Serial No. 2635. As such my assumption is that this aircraft had plywood underside panelling from the metal nose panels to the rear of the pilots cockpit, after which is was wire braced and linen covered.
The illustration below, not of the BE2c being modelled, shows this configuration.





Example of early BE2c plywood underside

Internal structure:

Priming:

Airbrush a thinned coat of ‘Tamiya’ NATO Brown (XF68) over the following:

Both sides of the fin

Both sides of the rudder

Both sides of the fuselage and underside

Undersides only:

Upper wing, Lower wings

Four ailerons, Two tailplanes

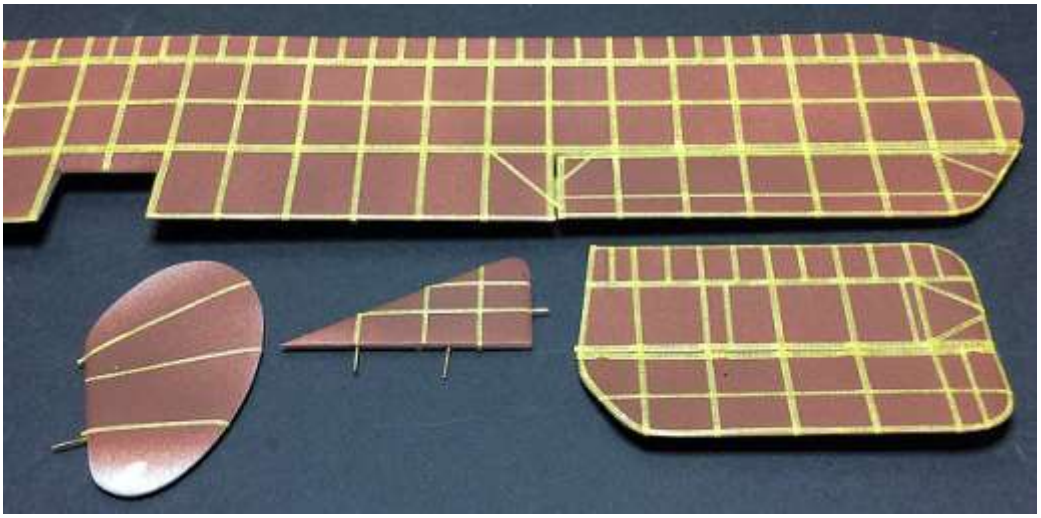
Two elevators.

Underside upper wing:

Temporarily locate the ailerons fully onto the upper wing.

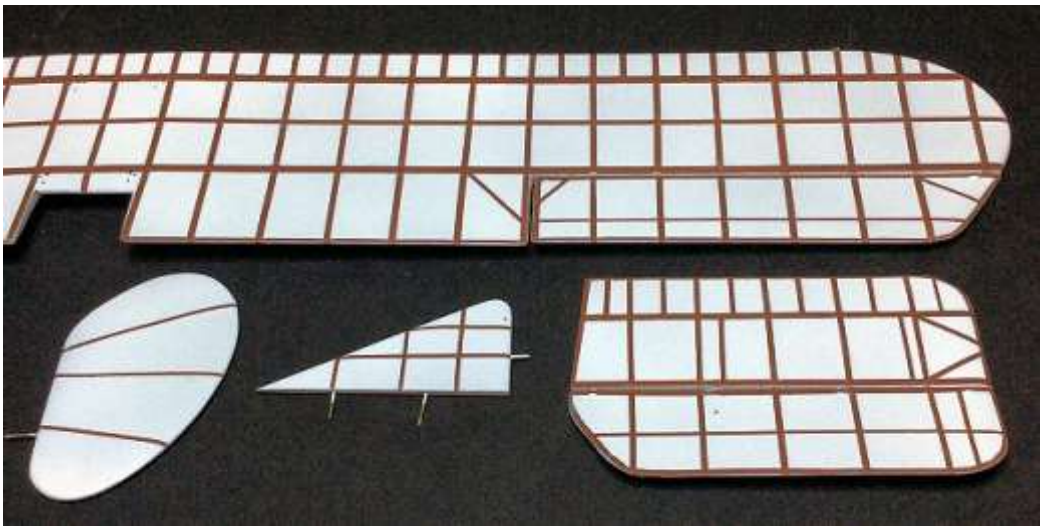
Cut strips of ‘Tamiya’ masking sheet or similar and using the previous structural illustrations as a guide, mask of the internal structure of the underside of the upper wing. Note that the front and rear wing spars are slightly wider than the wing ribs.

Examples of the masking for pre-shading



Airbrush all of the un-masked areas with white, such as ’AK Interactive’ White (AK759) or similar.

Remove all of the masking.

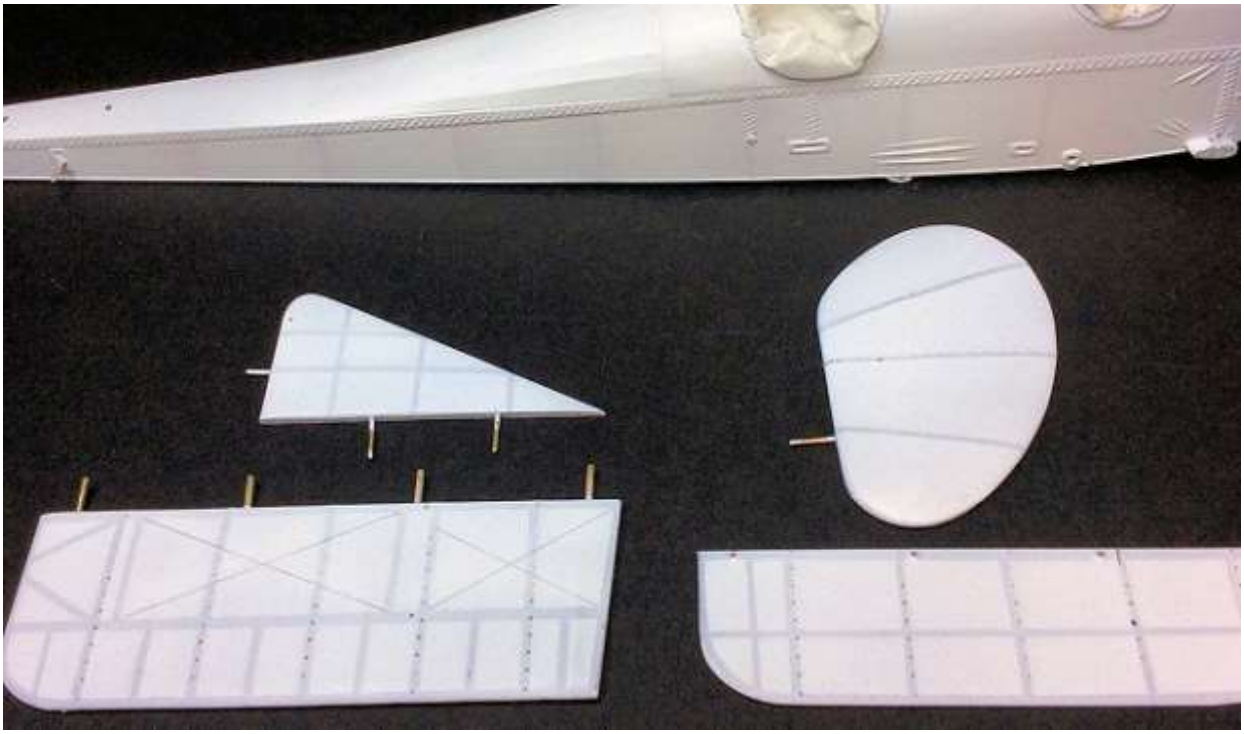


NOTE: *During the following step, apply light coats over the areas. It's best to apply a light coat then stop and allow the paint to dry. If necessary, further coats can be applied in the same manner until the pre-shaded structure has 'faded' sufficiently to give the required effect.*

Lightly airbrush the underside of the upper wing with white, such as 'AK Interactive' White (AK759) or similar, to create a blended, faded look to the pre-shading.

Make sure the painted surfaces are smooth and clear of any surfaces imperfections.

Referring to the previous structural illustrations, use a pencil to **lightly** draw where internal bracing wires were located.



'Ghost' roundels:

NOTE: *As this particular aircraft had a CDL finish, the roundels on the upper and lower wings would have shown as 'ghosts' through the wings. The roundels on the top surface of the upper wing would show through the underside of the wing. The roundels on the underside surface of the lower wings would hardly, if at all, show through the top surface of the wings.*
The 'ghost' roundels are best painted at this stage onto the wing surface. Doing this will enable matching the colour of the roundels and subsequently the internal wing ribs and spars to the already over coated structure. To cut the circular masks I used a 'Thinnerline' circle cutter. There are other similar cutters available, such as that from 'DSPIA'.

Cut two large holes from ‘Tamiya’ masking sheet. The holes should be the same diameter as the kit supplied roundels for the wings.

Cut around the holes to create two large masks.

Position the two masks onto the underside of the upper wing in the same position as for the roundels on the top surface of the upper wing (when applied).

Lightly airbrush the exposed wing surface with ‘Tamiya’ Smoke (X19) or similar.

Remove the masks from the wing.

Undersides of lower wings:

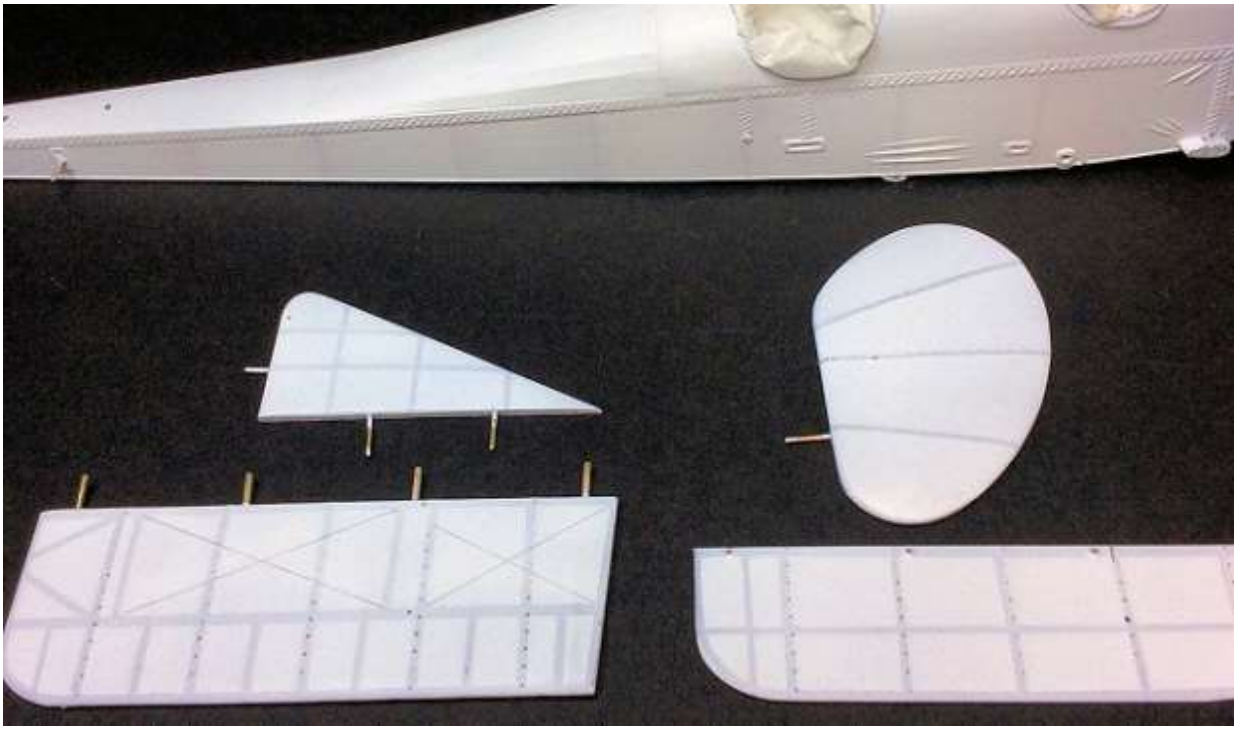
Repeat the procedure for the underside of the upper wing to pre-shade the underside of the lower wings, but **without roundels**.

Tailplanes and elevators:

Repeat the procedure for the underside of the upper wing to pre-shade the undersides of the tailplanes and elevators.

Fuselage, fin and rudder:

Repeat the procedure for the underside of the upper wing to pre-shade both sides of the fuselage and underside (only rearwards from the rudder control lever openings in the fuselage sides) and the fin and rudder.



Fuselage - painting:

Nose panels:

Mask off the front metal panelled nose of the fuselage.

Airbrush the masked off nose with ‘Tamiya’ Neutral Grey (XF53) or similar.

Remove the masking.

Wood surface:

Mask off the painted nose and sides of the fuselage, leaving just the cockpit decking panel.

Mask off the underside of the fuselage at the painted nose and rearwards from the rudder control lever openings in the fuselage sides

Airbrush the cockpit decking panel and the exposed underside of the fuselage with ‘Tamiya’ Dark Yellow (XF60) or similar.

NOTE: *The wood effect for this model was created using ‘Windsor & Newton’ Griffin (Alkyd) Raw Sienna paint.*

Brush a covering coat of the ‘Windsor & Newton’ Griffin Alkyd **Raw Sienna** paint over the decking panel.

Leave the oil paint to settle for about ten minutes.

Decant a small amount of White Spirits into a suitable dish.

Dip a broad flat oil brush into the White Spirit then wipe the brush on a sheet of kitchen roll, which should not deposit any fibres in the oil paint.

Brush the oil paint in the required direction and keep wiping the brush on the sheet to remove residual oil paint.

Repeat dipping and wiping the brush in the White Spirits and brushing the oil paint until the desired density and finish is achieved.

Repeat the painting procedure to apply the wood effects to the exposed underside of the fuselage.

Remove the masking, taking care when over decals.

Leave the oil paint to fully dry. It should be touch dry only in 24 hours.

Fuselage detail painting:

Brush paint the cockpit surround padding, the fuselage rudder lever ports and the tailplane front and rear spar locations with ’AK Interactive’ Brown Leather (AK3031) or similar.

Brush paint the location ’lugs’ or the landing gear front struts with ’Tamiya’ Neutral Grey (XF53) or similar.

Brush paint the locations for the front and rear spars of the lower wings with ‘Tamiya’ Rubber Black (XF85) or similar.

Bruss paint the starter switch on the fuselage left side with ‘Mr. Colour’ Brass (219) or similar.

Brush paint the underside cross member for the lower wings front spar with ‘Tamiya’ Rubber Black (XF85) or similar.

Brush paint the underside cross member for the lower wings rear spar with ‘Mr. Colour’ Stainless Steel (213) or similar.

Raised detail:

NOTE: *The model parts have some details that can be highlighted rather than being painted. This is done by lightly sanding the raised details.*

Using a fine sanding stick, lightly sand through the base coat of the following raised details to reveal the darker plastic underneath:

The stitching along the sides of the fuselage

The linen creases on the sides of the fuselage

The primary and secondary wing ribs on the top surfaces of the upper and lower wings.

Aircraft markings decals:

NOTE: *Refer to Part 4 (Decals) of this build log for more information.*

Wing roundels:

Temporarily fit the ailerons to the upper and lower wings.

Position the wing roundels correctly, then mark (not on the decals) the join between the wings and the ailerons.

Cut the decals along the marks to separate the roundels into the two parts.

Apply the separate decals onto to underside of the lower wings and ailerons and the top surface of the upper wing and ailerons, making sure the roundels are aligned correctly to each other.

Fuselage:

NOTE: *The black strip for No.13 Squadron needs to be applied along the sides of the fuselage before the roundels are applied.*

Mask the sides of the fuselage to create the black stripe.

Airbrush the black stripe using ‘Tamiya’ Rubber Black (XF85) or similar.

Remove the masking.

Cut out two fuselage roundels from the kit decal sheet. Make sure the type of roundel matches those on the wings.

Cut the decal backing sheet away from the two rounds so they are within a square of backing sheet.

Position the roundels correctly onto the fuselage sides and over the applied black strips.

Gently cut across the black strips at each side of the roundels.

Carefully remove the cut section of the black strip.

Apply the two rounds onto the fuselage sides and between the cut ends of the black strip.

The ‘lift here’ decals at the lower edges of the fuselage were from my ‘spare decals’ from other built kits.

Rudder:

Cut out two rudder decals from the kit decal sheet.

Cut away the decal backing sheet along the blue and the red sections.

Position the rudder onto the white back of the decal with the blue section of the decal aligned to the leading edge of the rudder.

Trace the outline of the rudder onto the decal backing.

Cut out the rudder shape.

Apply the decal to that side of the rudder.

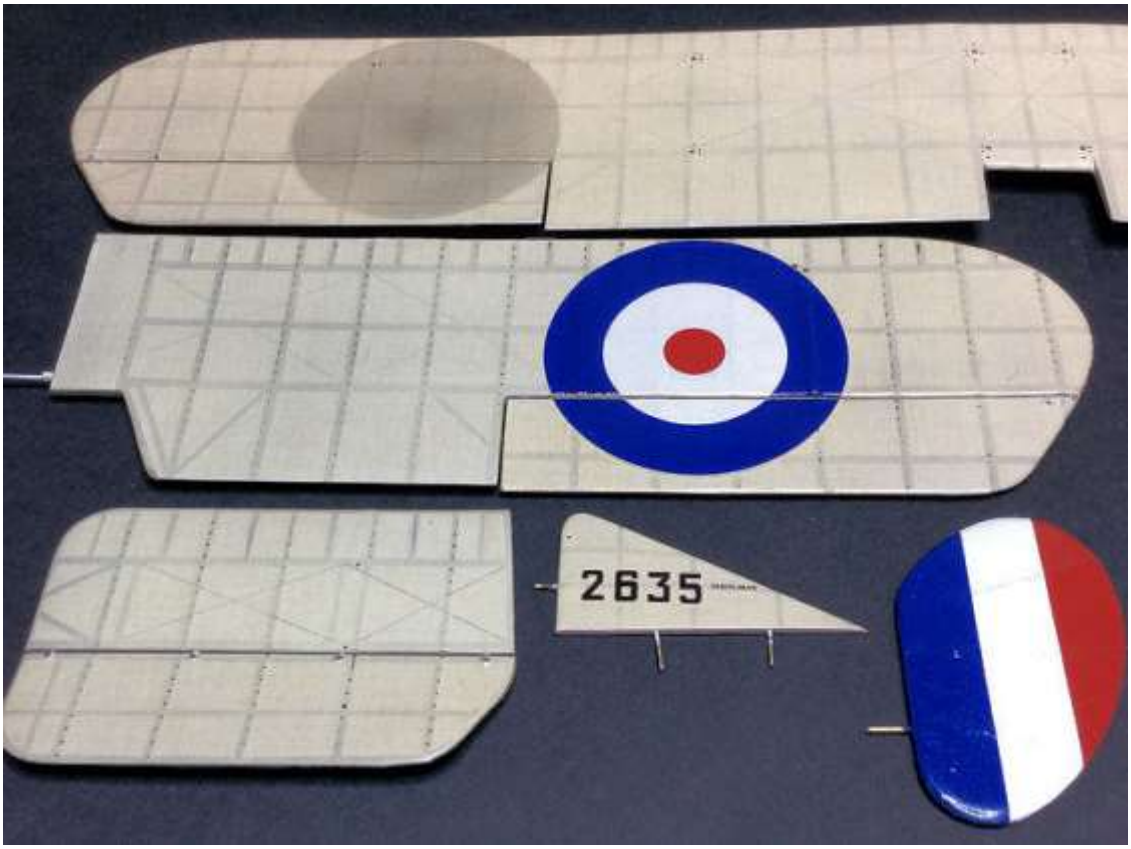
Repeat the procedure to apply the other decal to the opposite side of the rudder, making sure the coloured stripes are aligned to the existing decal.

Fin:

NOTE: *The aircraft serial number of 2035 has to be applied to each side of the fin. As this number is not supplied in the kit decals, it will need to be created. Also the No.1 on each side of the nose of the aircraft.*

The individual black numbers 2,3,6,5 were used from 'spare decals' from other built kits.

The white number 1's were airbrushed using a mask cut from my 'Cricut' Air 2 cutter.

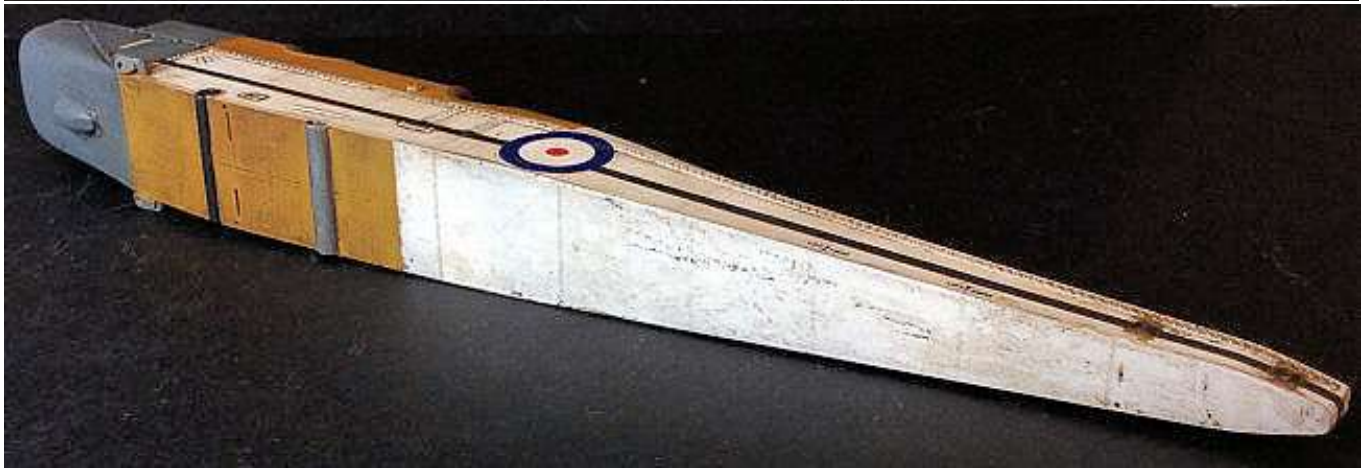


Fuselage weathering:

Refer to Part 3 (Weathering) - I applied ‘Flory Models’ Grime fine clay wash over the fuselage (not the grey painted nose), wings, ailerons, fin, rudder, tailplanes and elevators.

Refer to Part 3 (Weathering) - I applied ‘Flory Models’ Dark Dirt fine clay wash over the grey painted nose of the fuselage.

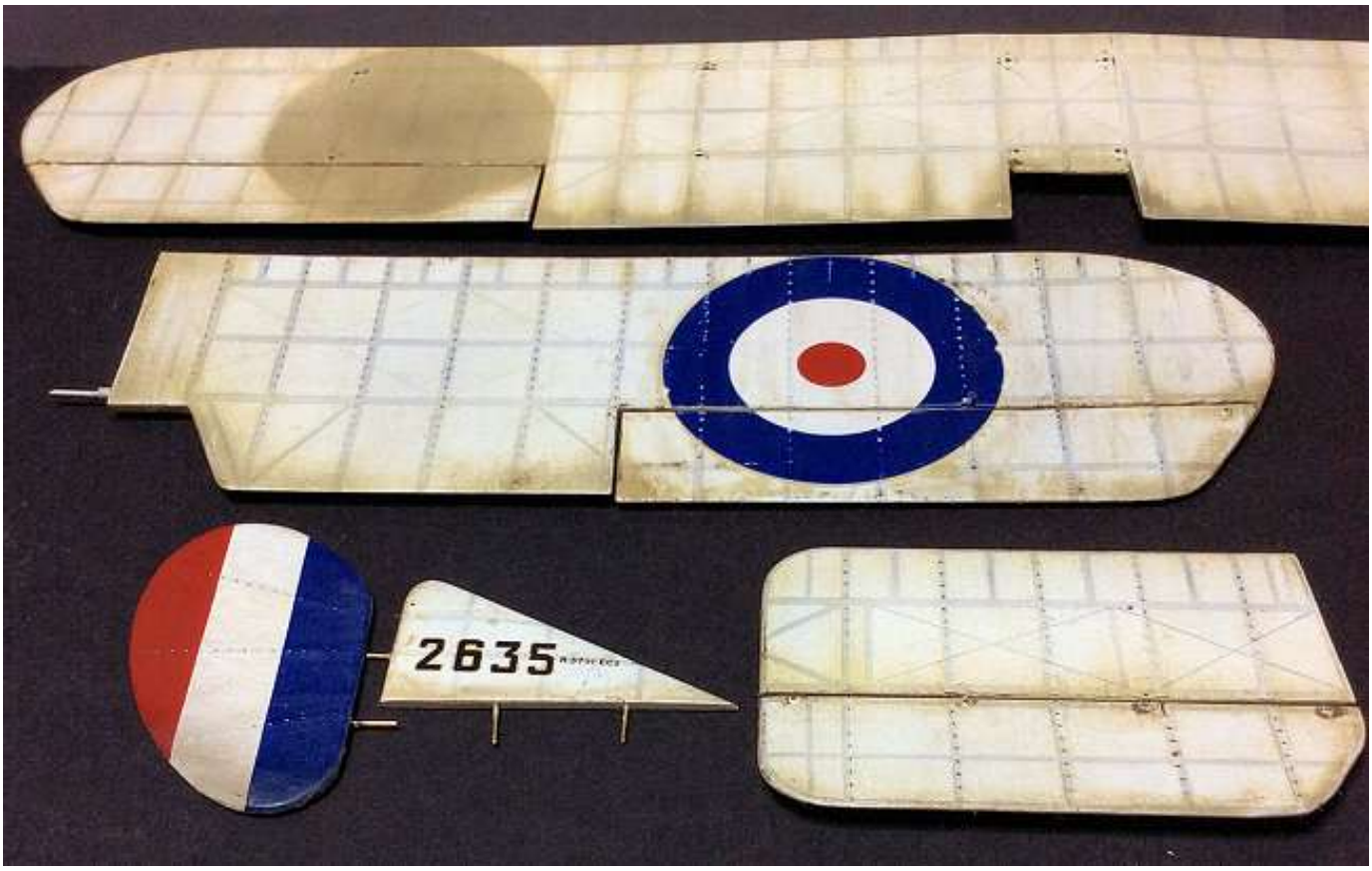
Once the desired level of weathering is achieved, seal the surfaces by airbrushing a light coat of semi-matte clear, such as ‘Alclad’ Light Sheen (ALC311) or similar.



Flight surface weathering:

Refer to Part 3 (Weathering) - I applied ‘Flory Models’ Grime fine clay wash over the flight surfaces.

Seal the flight surfaces by airbrushing a light coat of semi-matte clear, such as ‘Alclad’ Light Sheen (ALC311) or similar.



Interplane struts:

Airbrush the eight interplane struts with a white primer, such as ‘AK Interactive’ White (AK759) or similar

Airbrush the eight interplane struts with ‘Tamiya’ Dark Yellow (XF60) or similar.

Brush a covering coat of the ‘Windsor & Newton’ Griffin Alkyd **Raw Sienna** paint over the struts.

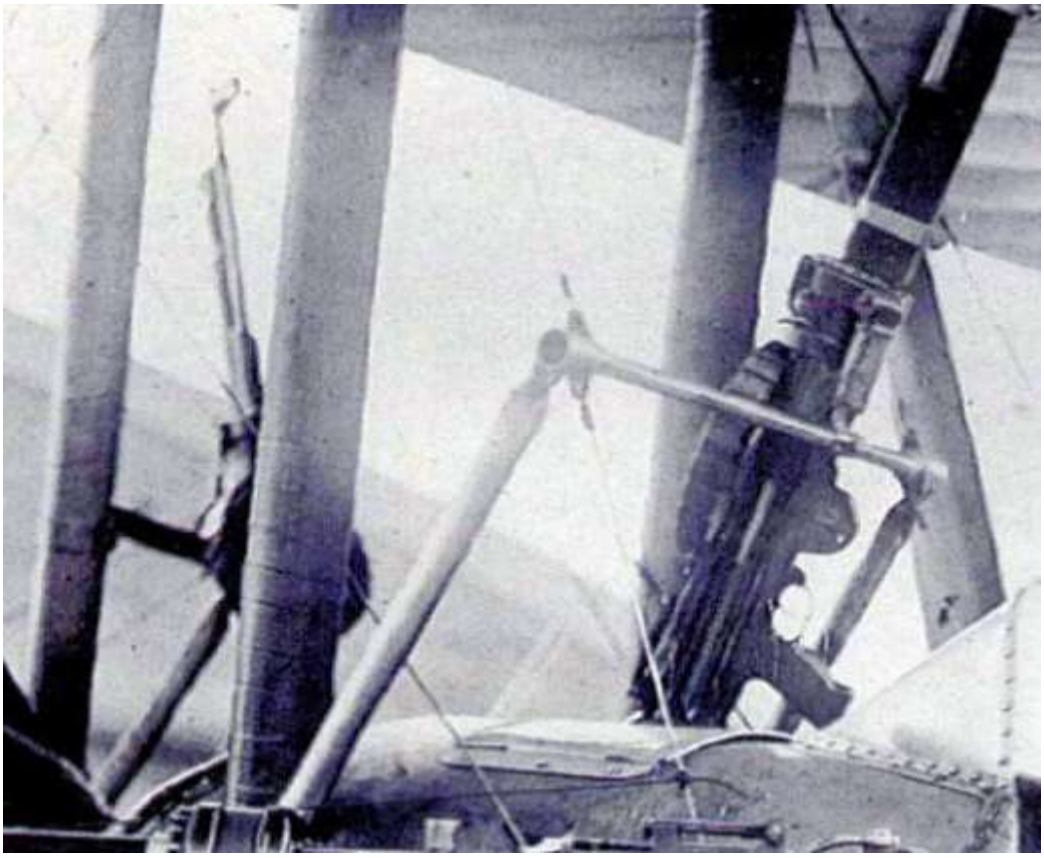
Create the wood effect by using the same procedure used for applying the wood effect onto the fuselage.

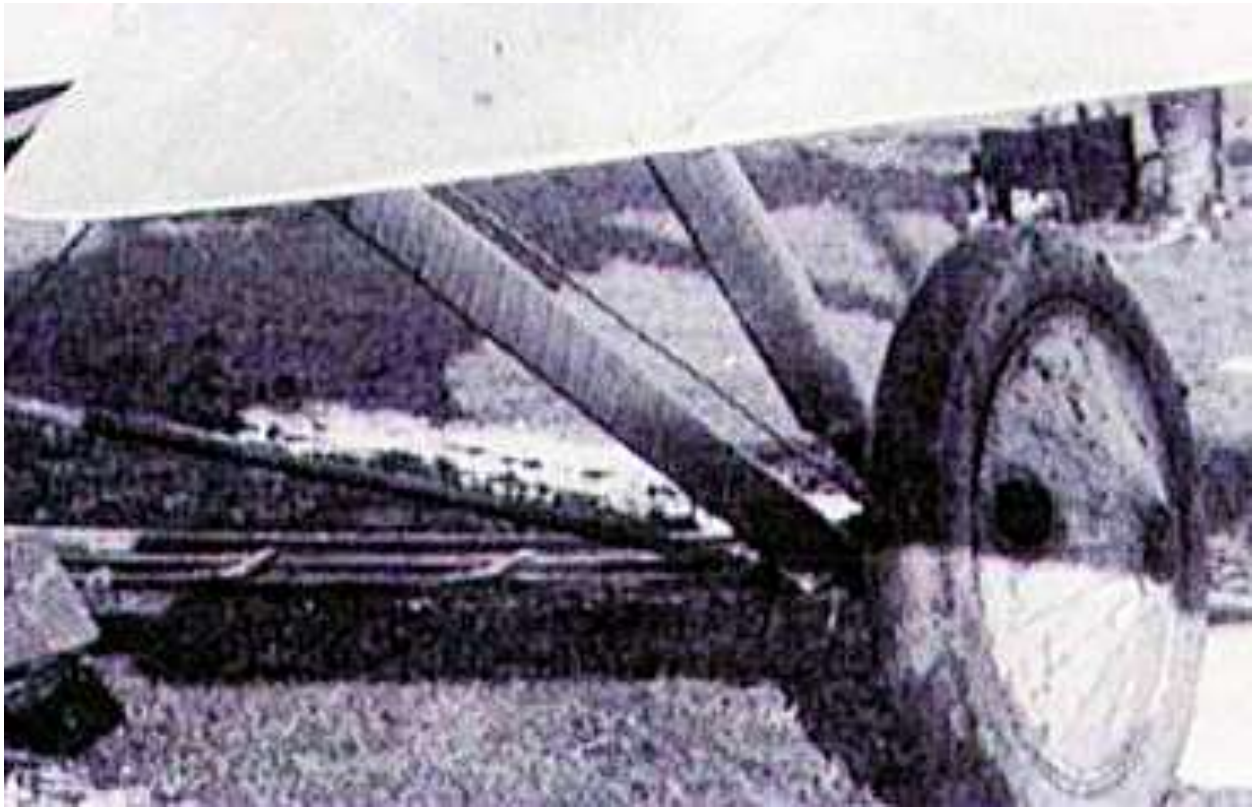
Brush paint the end fittings with ‘Tamiya’ Rubber black (X85) or similar

Airbrush the struts with a semi-matte clear coat, such as ‘Alclad’ Light Sheen (ALC311) or similar.

Strut wrapping:

NOTE: *On most BE2c aircraft, linen was wrapped around the cabane and the landing gear struts. This was done to protect the struts and to help prevent the wood from splitting. This needs to represented on these struts.*
To represent the linen wrapping I used cut thin strips of plumbers Polytetrafluoroethylene (PTFE) tape. This tape is by nature very thin and will self-grip to tools and your fingers, so patience and repeated cutting will be necessary.





Cut a length of PTFE tape approximately 50 mm long. Any longer and the tape will be unmanageable.

Lay the tape onto a smooth flat surface and to help it grip to the surface, gently press it down.

Lay a straight edge, such as a steel rule, along the edge of the tape and holding it down, slice along the tape with a sharp curved scalpel blade to create a straight edge.

Move the rule back and slice a strip of 1.5 mm width along the tape.

NOTE: *The following procedure should be used to wrap the four fuselage cabane struts and the two landing gear 'V' struts.*

Apply a small amount of thin CA adhesive onto one end of a strut and lay the end of the strip of tape onto the adhesive.

Gently tension the tape and at a slight angle, wrap the tape around the strut, gradually working along the strut. Make sure to leave a slight gap between the wraps (for retaining the weathering wash).

Secure the end of the tape to the strut, wherever it ends.

Slice another strip of tape and repeat the procedure, starting at the finishing end of the previous strip.

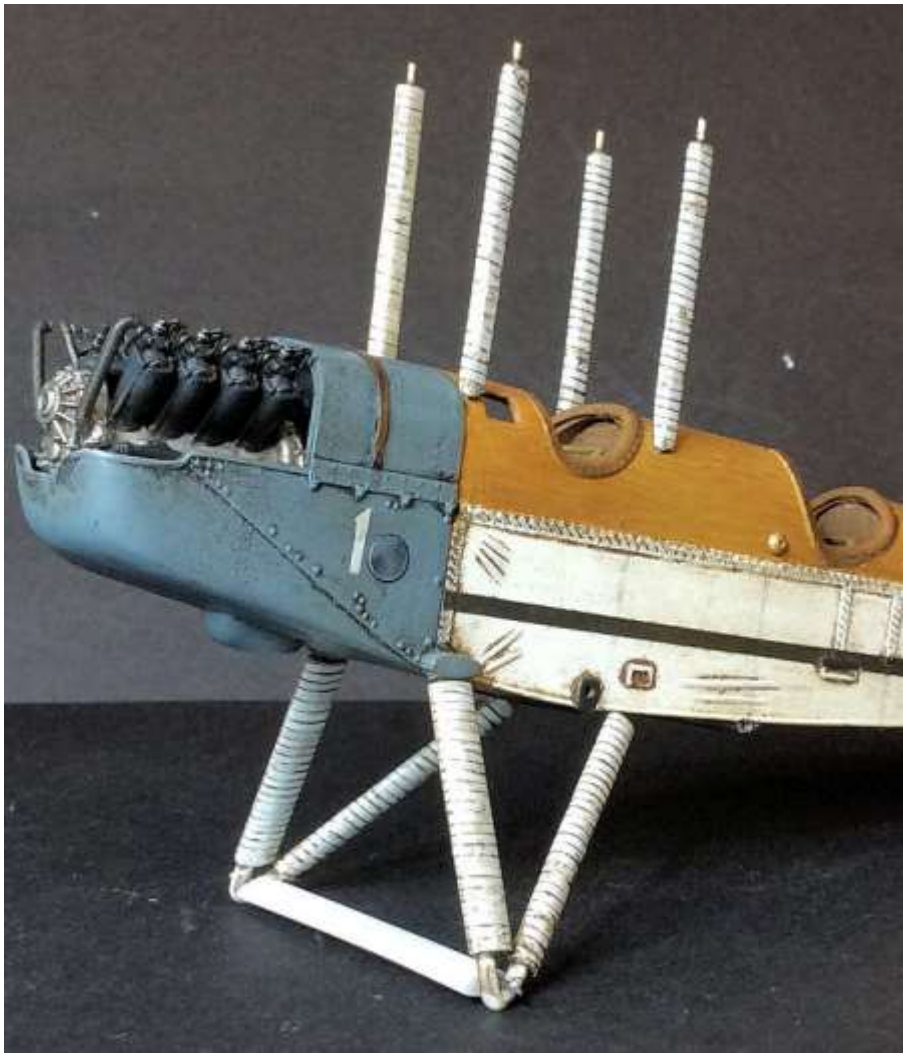
Continue until the length of the strut has been wrapped with tape strips.

Airbrush the taped struts with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC311) or similar.

Refer to Part 3 (Weathering) - I applied 'Flory Models' Grime fine clay wash over the struts.

Use a damp cotton bud to remove most of the wash, leaving where possible the wash in the gaps between the wraps.

Seal the weathering wash by airbrushing the taped struts with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC311) or similar.



Exhaust pipes:

Sand away any 3D print tags from where the exhaust pipes were separated from their supports.

If necessary, lightly sand the sides of the pipes to remove and 'fish scale' type surface print marks.

Airbrush the pipes with a black gloss base, such as 'Alclad' Gloss Black Base (ALC-305-60) or similar.

Airbrush the pipes with 'Alclad' Exhaust Manifold (ALC-123) or similar.

Airbrush the pipes with a matte (flat) clear coat, such as 'Alclad' Flat (ALC-314) or similar.

Refer to Part 3 (Weathering) of this build log for more information - apply your desired weathering finish to the two exhaust pipes (I used 'Flory Models' Dark Dirt or Grey fine clay wash).

Seal the applied weathering with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC-311) or similar.

Lightly sponge 'Tamiya' Weather Master Set B (Soot) around the top, exits of the exhaust pipes.

Bombs and rack:

NOTE: *The eight 3D printed bombs supplied in the kit represent the High explosive 'Hale' 20 lb heavy case Mk.II/C bombs. To provide a more positive location for the bombs onto the bomb racks, minor modification of both is required.*

Preparation:

Carefully snip or saw the two 3D printed bomb racks and the eight bombs from their supports.

Sand away any print tags or surface artifacts from the parts.

Pencil draw a line across the forward cross members of the bomb racks, 1.0 mm in from the rear edge.

Pencil draw a line from the centre of the bomb rear support struts across the previous drawn line.

Where the lines cross, drill a hole of 0.6 mm diameter through the cross members.

Drill a hole of 0.5 mm diameter vertically into, **but not through**, each bomb, just forward from the top mounting lug.

Cut eight short lengths of 0.5 mm diameter rod, such as 'Albion Alloy's' MBT05 or similar.

Secure the rods vertically into the holes drilled in the bombs, using thin CA adhesive.

NOTE: *When located on the bomb racks, the top tail fin of the bombs should align with the centre of the rear bomb supports.*

Test fit the rids in the bombs into the holes drilled in the bomb rack cross members.

Trim the length of the rods such that they just protrude through the cross members.

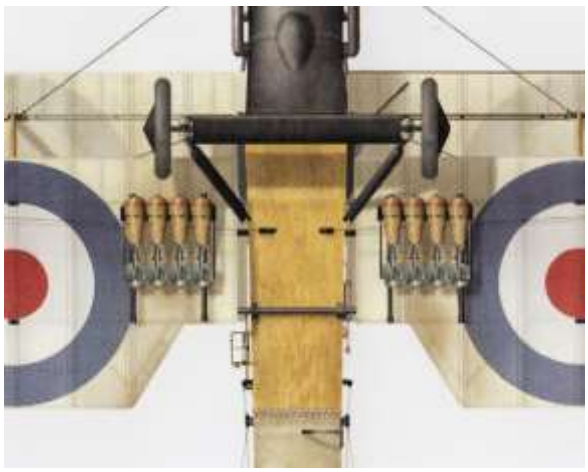
NOTE: *To give a more positive location for the bomb racks onto the underside of the lower wings, locating rods are added.*

Drill a hole of 0.3 mm diameter centrally into, **but not through**, two diagonally opposite 'feet' of each bomb rack.

Cut four short lengths of 0.3 mm diameter tube, such as 'Albion Alloy's' MBT03 or similar.

Using thin CA adhesive, secure the rods into the pre-drilled holes in the 'feet' of the two bombs racks.

Position the two bomb rack onto the underside of the lower wing (see following illustrations) and mark the position of the rods.



Using the marks as guides, drill locating holes of 0.4 mm diameter into, **but not through**, the underside of the lower wings.

Test locate the bomb racks onto the lower wings, making sure the four 'feet' on the racks fully contact the lower wing.

Bomb rack painting:

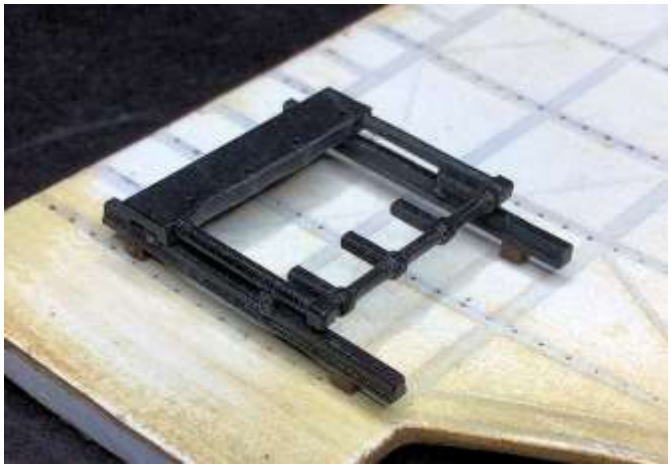
Airbrush the two bomb racks with a grey primer, such as 'AK Interactive' Grey (AK758) or similar.

Airbrush the two bomb racks with 'Tamiya' Rubber Black (XF85) or similar.

Brush paint the four 'feet' of each bomb rack with 'Tamiya' NATO Brown (XF68) or similar.

Airbrush the two bomb racks with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC311) or similar.

Lightly sponge the two bomb racks with 'Tamiya' Weathering Master Set C (Silver) or similar.



Bomb painting:

Airbrush the eight bombs with a grey primer, such as ‘AK Interactive’ Grey (AK758) or similar.

Airbrush the body of the bombs with ‘Tamiya’ Yellow Green (XF4) with approximately 10% of Desert Yellow (XF4).

Brush paint the tail and fins of each bomb with ‘Tamiya’ Metallic Grey (XF56) or similar.

Airbrush each bomb with a gloss clear coat, such as ‘Alclad’ Aqua Gloss 600 or similar.

NOTE: *For the red and green stripes around the body of the bombs, I used ‘spare’ decals from a previous kit. I applied the decals as for the previous photograph and illustrations.*

Airbrush each bomb with a matte clear coat, such as ‘Alclad’ Light Sheen (ALC314) or similar.

Lightly sponge ‘Tamiya’ Weather Master Set B (Soot) along the body of the of each bomb.

Lightly sponge ‘Tamiya’ Weather Master Set C (Silver) onto the nose of each bomb.

NOTE: *The eight bombs will be fitted later in this build.*

Bombs test fitted on the bomb racks only

Landing gear axle and wheels:

NOTE: *The outer wheel covers on this particular BE2c were painted in the form of a roundel.*

Sand away any surface artifacts from the two wheels and axle fairing.

NOTE: *I chose to replace the exposed spoke in the opening of the outer wheel cover as the moulded part is too thick.*

Carefully cut away the exposed spoke in the opening of the outer wheel covers.

Using a 0.8 mm diameter drill, drill into, **but not through**, the axle hole in the two wheels, to give a more positive and secure location for the axle rods.

Airbrush the two wheels with a grey primer, such as 'AK Interactive' Grey (AK758) or similar.

Airbrush the axle/fairing with a white primer, such as 'AK Interactive' White (AK759) or similar.

Mask off the axle fairing leaving just the axle bar exposed.

Airbrush around the tyres and the axle bar with 'Tamiya' Rubber Black (XF85) or similar.

I used two 'spare' roundel decals for the outer wheel covers. The decals were sliced at their Centres to allow them to fit over the centre axle protrusions. They were also sliced on one side only, from the centre outward. This allows the decals to overlap and align correctly when applied.

Airbrush the two wheels with a gloss clear gloss coat, such as 'Alclad' Aqua Gloss 600 or similar.

Apply the decals onto the outer covers of the two wheels.

Apply the 'Palmer' manufacturers decals around the sides of the tyres, making sure the decals are positioned at the same place on both sides of the tyres.

Cut two short lengths of 0.3 mm diameter Nickel-Silver rod, such as 'Albion Alloy's' NST03 or similar.

Using thin CA adhesive, secure the rods in the openings of the outer wheel covers, making sure they are aligned centrally in the openings and the centre of the wheel axle.

Airbrush the two wheels and the axle/fairing with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC311) or similar.

Refer to Part 3 (Weathering) - I applied 'Flory Models' Dark Dirt and Grime fine clay wash over the wheels and axle/fairing.

Once the desired weathering effect is achieved, seal the weathering by airbrushing with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC311) or similar.

Lightly sponge the both sides of the 'Palmer' manufacturers decals with 'Tamiya' Weathering Master Set B (Soot), to 'knock back' the whiteness.


PALMER CORD AERO TYRE
700 x 100

PART 12
PRE-RIGGING

PART 12 - PRE-RIGGING

NOTE: *The following steps are necessary for attaching any control horn or structural rigging lines to the model parts. This is best carried after applying paint and decals and before continuing with further model construction. These steps will include the fitting of 'GasPatch' 1:48th scale metal 'Anchor Points, photo-etch control horns and their locating holes or slots.*

Preparation:

NOTE: *Drilling the rigging holes through the control horns and levers is easier while they are still attached to the kit supplied photo-etch sheet.*

Point mark the rigging hole location in the end of each of the control horns and at both ends of the elevators control levers.

Four aileron control horns (in ailerons - 22)

Two rudder control horns (in rudder - 20)

Four elevator control horns (in elevators - 20)

Two elevator control levers (21).

Supporting the control horns and levers on a hard surface, drill out the rigging holes using a 0.2 mm diameter drill.

Cut out the control levers and horns from the kit supplied photo-etch sheet.

Remove any residual photo-etch tags from the edges of the parts.

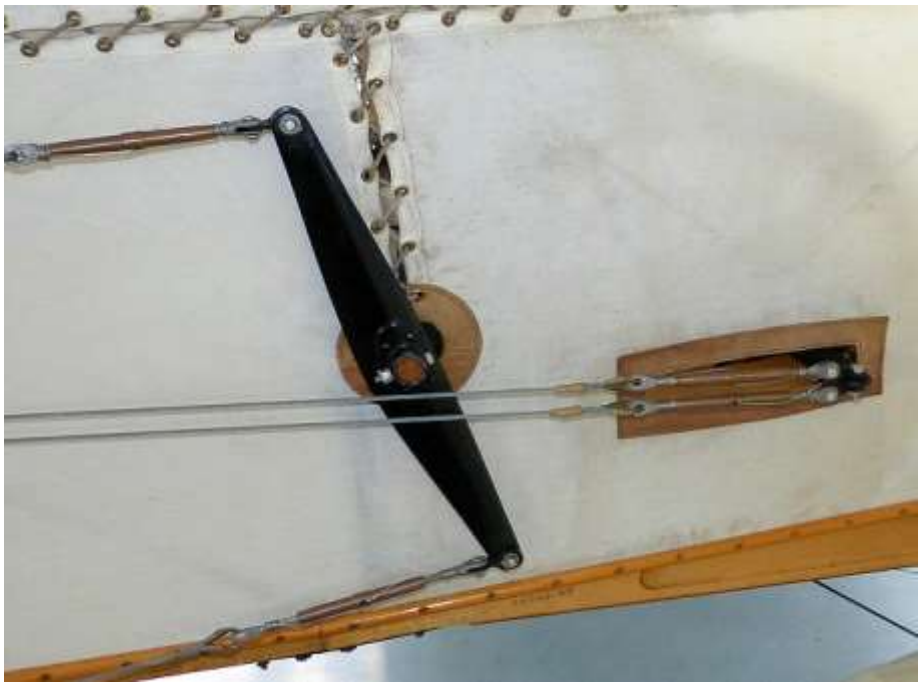
Bend the elevator control levers over themselves to create a double thickness and secure them together using thin CA adhesive.

Blacken the photo-etch horns and levers with such as 'Blacken-It' solution or paint them with 'Tamiya' Rubber Black or similar.

Control horns and levers:

NOTE: *The following steps are necessary for attaching the various control horns and levers for the rudder, aileron and elevator control wires.*

Elevator control levers:



NOTE: *The following steps are to give a more positive and stronger attachment of the elevator control levers to the fuselage sides.*

Support the prepared elevator control horns (21) on a hard surface (to prevent distortion when drilling) and point mark the centre of the levers.

Using the point marks as guides, drill a hole of 0.4 mm diameter through the centre of both levers.

Cut two lengths of 0.3 mm diameter Brass rod, such as 'Albion Alloy's' (MBR03) or similar.

Insert the rods into the pre-drilled holes in the elevator control levers.

Keeping the levers at 90 degrees to the rods, secure them in position using thin CA adhesive.

On the fuselage sides, point mark the centre of the pre-moulded locations for the elevator control levers.

Using the point marks as guides, drill a hole of 0.4 mm diameter through the fuselage.

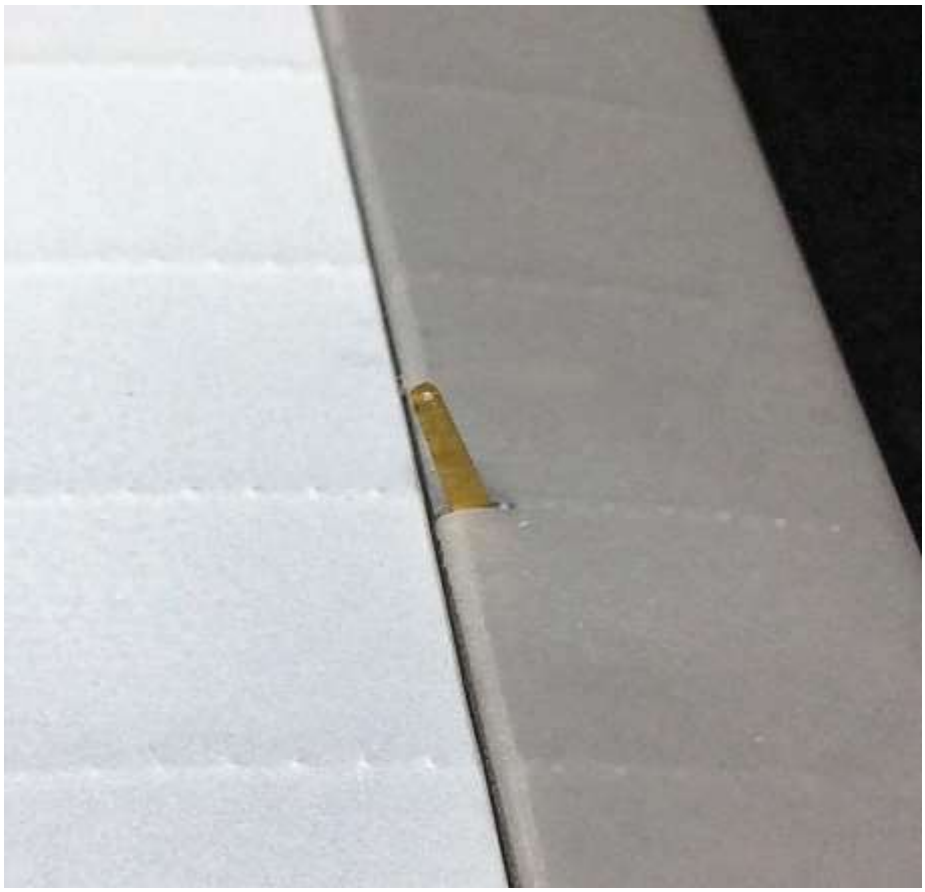
Ailerons:

NOTE: *The following steps are necessary to have more positive securing of the photo-etch control horns in the flight surfaces.*

Using a sharp scriber, slice a shallow groove centrally at 90 degrees to the leading edge of the upper wing ailerons. The groove should be along the pre-moulded rib tapes as shown on the illustrations in the kit instructions.

Repeat the procedure, but for the undersides of the lower wing ailerons.

Test fit the photo-etch control horns (22) in the created grooves.

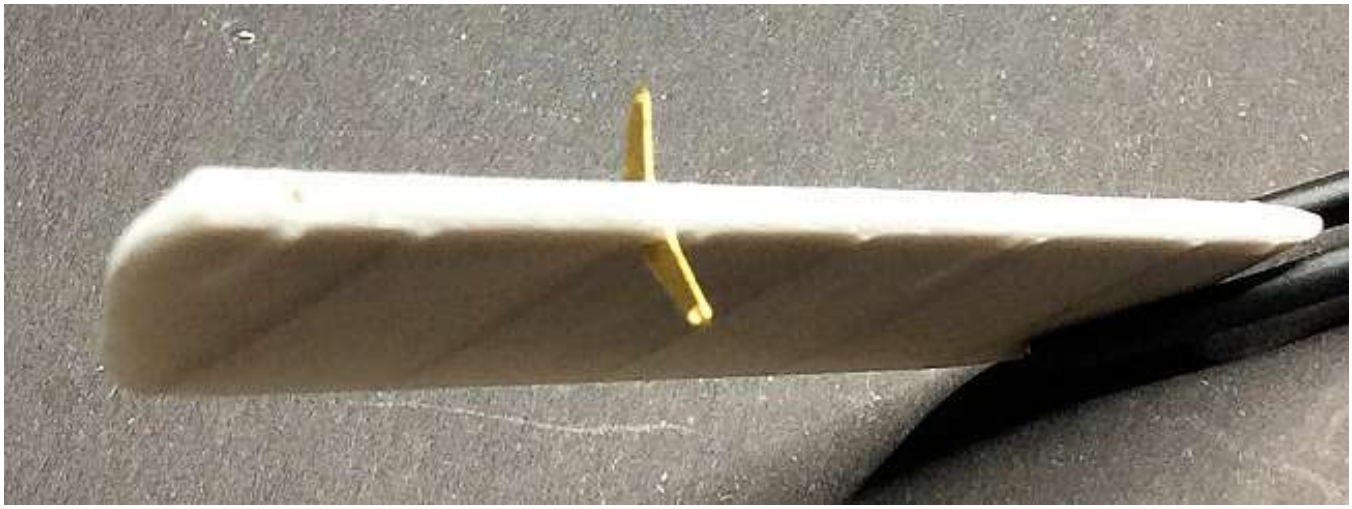


Using a sharp scriber, slice a shallow groove centrally along the pre-moulded slots on the under-side of the fuselage. Avoid slicing completely through the fuselage.

Test fit the photo-etch control horns (22) in the created grooves.

Elevators:

Using the same procedure as for the aileron control horns, created the elevator control horn grooves, using the photo-etch control horns (20). The elevators have a control horn fitted in the same location and on both sides. If at all possible, make sure the grooves do not ‘break through’ into each other.

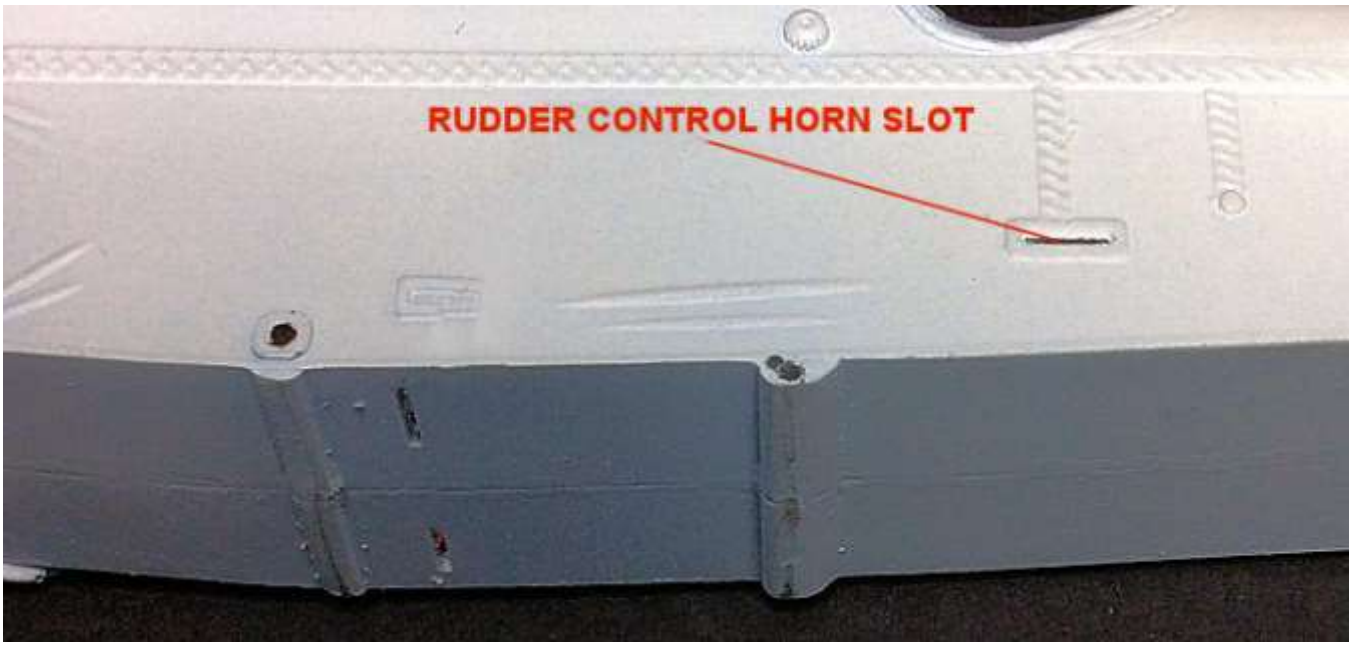


Rudder:

Using the same procedure as for the elevator control horns, create the rudder control horn grooves, using the photo-etch control horns (20). The rudder has a control horn fitted in the same location and on both sides. If at all possible, make sure the grooves do not ‘break through’ into each other.

Using a sharp scriber, slice a shallow groove centrally along the pre-moulded slots on sides of the fuselage. Avoid slicing completely through the fuselage.

Test fit the photo-etch control horns (20) in the created grooves.

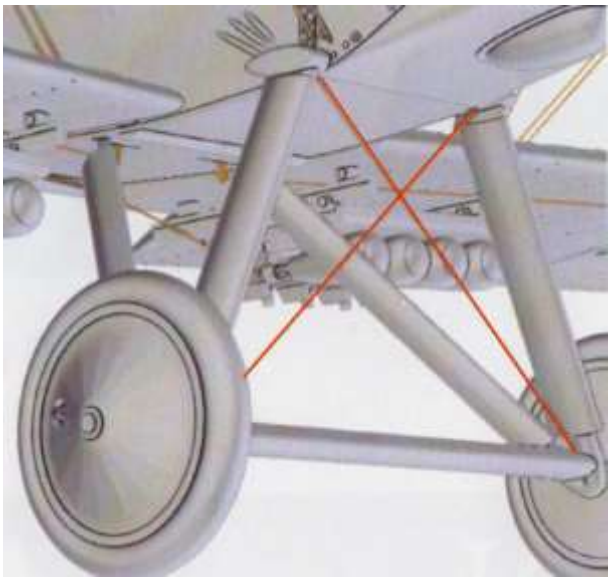


Rigging anchor points:

NOTE: *The following steps are necessary to provide rigging anchor points for flight control wires and structural rigging wires. The illustrations are from the rigging guide in the kit and the photographs are from the 'Vintage Aviator Ltd' reproduction BE2c.*

Landing gear:

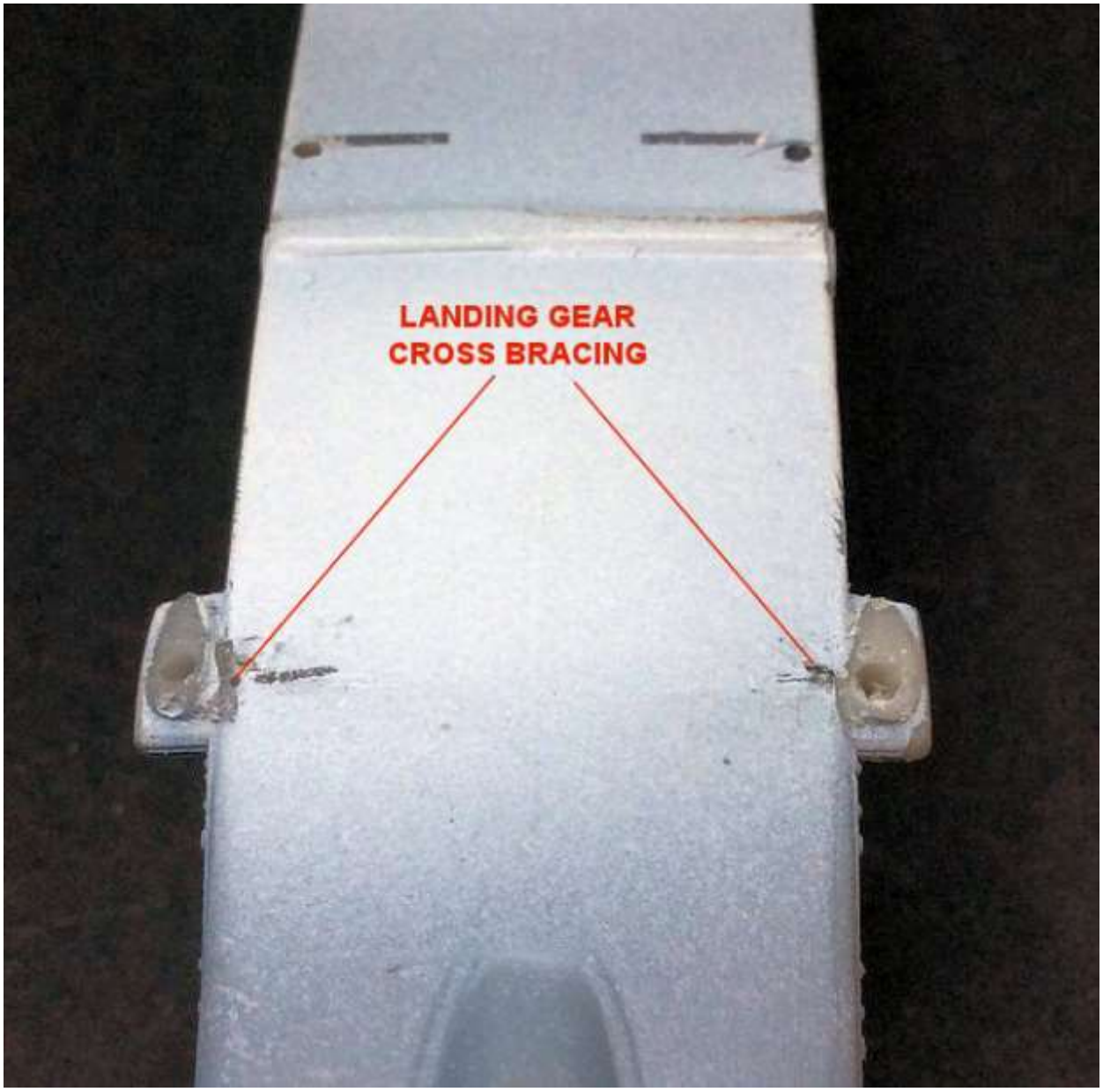
The landing gear was braced with two diagonally crossed wires, spanning between the tops of the forward landing struts and the forward outer ends of the landing gear cross member.



NOTE: *During the following step, drill the rigging holes at the approximate angle for the rigging wires when the landing gear is fitted later in this build.*

Drill a hole of 0.3 mm diameter, at the approximate rigging wire angle, into the centre, inboard edge of the pre-moulded locating lugs for the forward landing gear struts.

Drill a hole of 0.3 mm diameter into, **but not through**, the forward ends of the axle cross member.


LANDING GEAR
CROSS BRACING


BRACING WIRES

Twin flying wires:

Two pairs of flying wires were fitted at both sides of the aircraft:

The rear pair between the fuselage above the lower wings and the underside of the upper wing, at the rear inboard interplane struts.

The forward pair between the tops of the rear landing gear struts and the underside of the upper wing, at the forward inboard interplane struts.

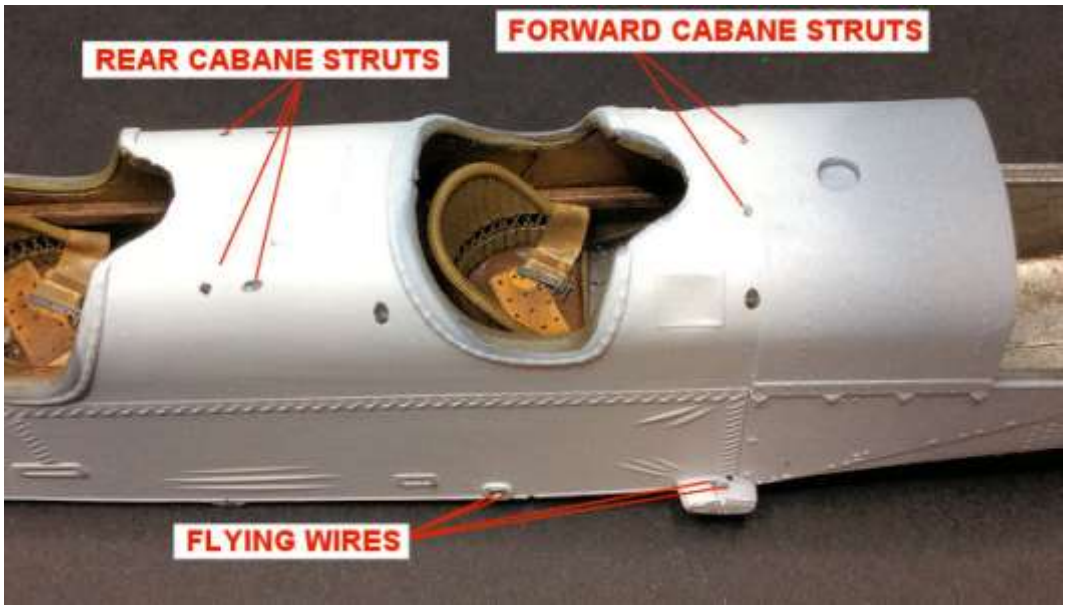
NOTE: *During the following step, drill the rigging holes at the approximate angle for the rigging wires when the interplane struts are fitted later in this build.*

Rear wires:

Drill two holes of 0.3 mm diameter, at the approximate rigging wire angle when the forward inboard interplane struts are fitted, along the centre of the pre-moulded rectangle on both lower sides of the fuselage.

Forward wires:

Drill two holes of 0.3 mm diameter, at the approximate rigging wire angle when the rear inboard interplane struts are fitted, on the top of the forward landing gear location lugs on both sides of the fuselage.



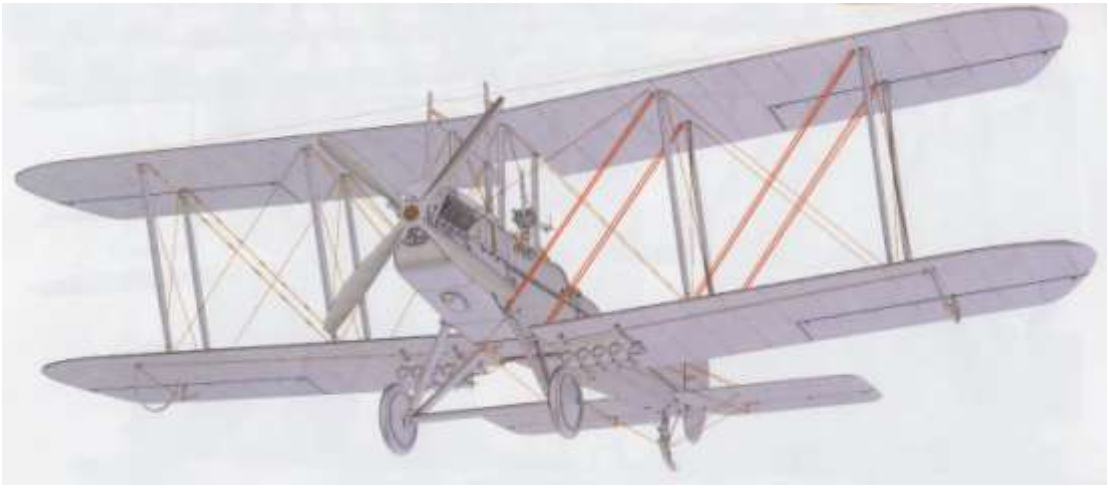
Four **twin** flying wires were connected to each side of the aircraft and were used the hold the wings in position during flight.
On each side of the aircraft, a pair of flying wires were attached between the tops of the inboard interplane struts (front and rear) and attachment points on the bottom edge of the fuselage at the lower wing roots (rear wires) and the top of the landing gear forward struts (front wires). The second set of wires were attached between the bottom of the inboard interplane struts and the tops of the outboard interplane struts.

Upper wing:

Drill two holes of 0.3 mm diameter into, **but not through**, the underside of the upper wing. The holes should be approximately 0.6 mm apart and aligned with the front to rear (chord) of the wing. They should also be located centrally and inboard from the locating holes (strut fitted) of the inboard and outboard interplane struts.

Lower wings:

Drill two holes of 0.3 mm diameter into, **but not through**, the top surface of the lower wings. The holes should be approximately 0.6 mm apart and aligned with the front to rear (chord) of the wings. They should also be located centrally and outboard from the locating holes (strut fitted) of the outboard interplane struts.



<u>Landing wires:</u>

Four **twin** landing wires were connected to each side of the aircraft and were used the support the wings when the aircraft was on the ground.
On each side of the aircraft, a pair of landing wires were attached between the tops of the fuselage cabane struts (front and rear) and the bottom of the inboard interplane struts. The second set of wires were attached between the top of the inboard interplane struts and the bottom of the outboard interplane struts.

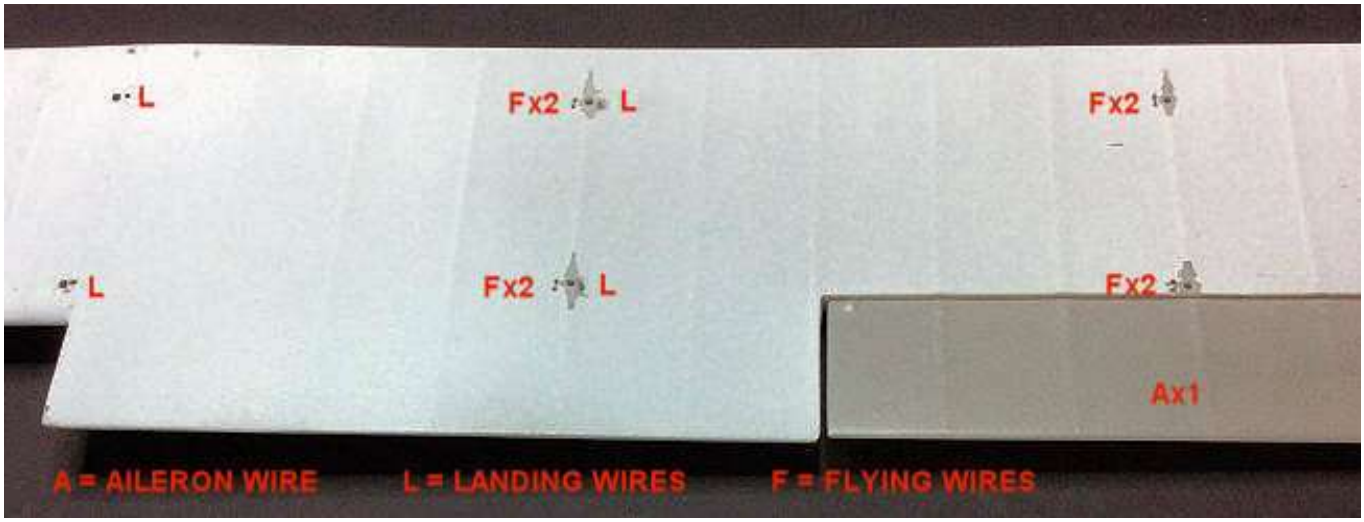
Upper wing:

Drill holes of 0.3 mm diameter into, **but not through**, the underside of the upper wing. The holes should also be located centrally and outboard from the locating holes (strut fitted) of the fuselage cabane struts and the inboard interplane struts.

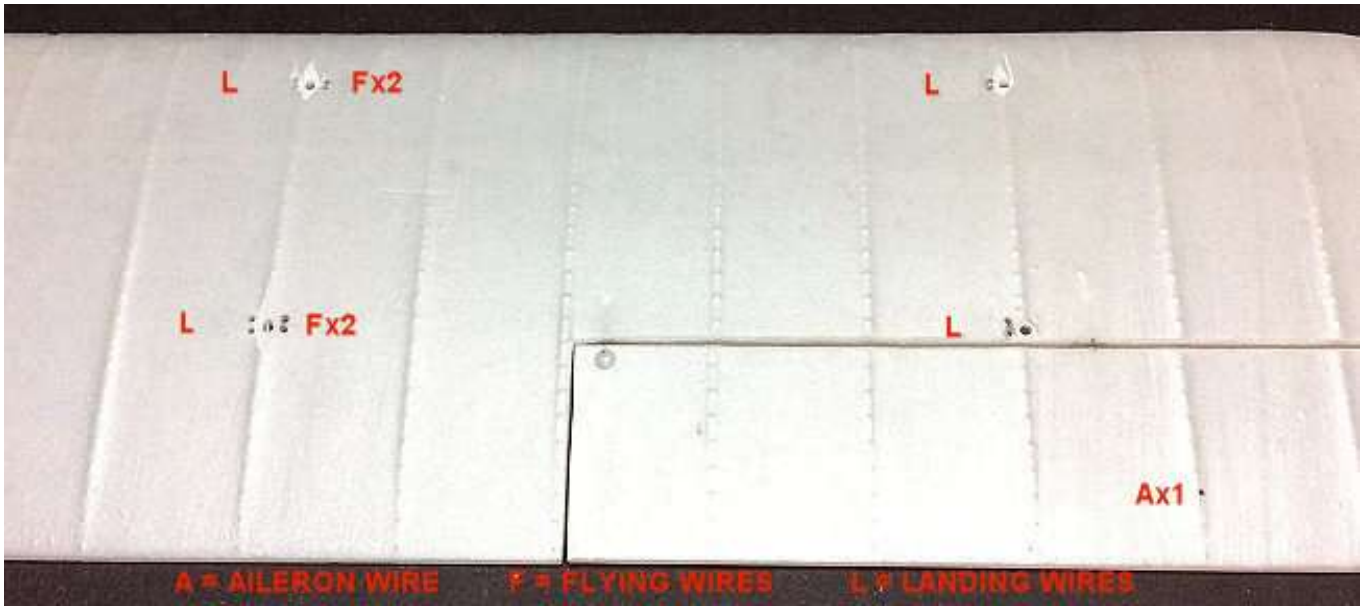
Lower wings:

Drill holes of 0.3 mm diameter into, **but not through**, the top surface of the lower wings. The holes should be located centrally and inboard from the locating holes (strut fitted) of the inboard and outboard interplane struts.

Upper wing

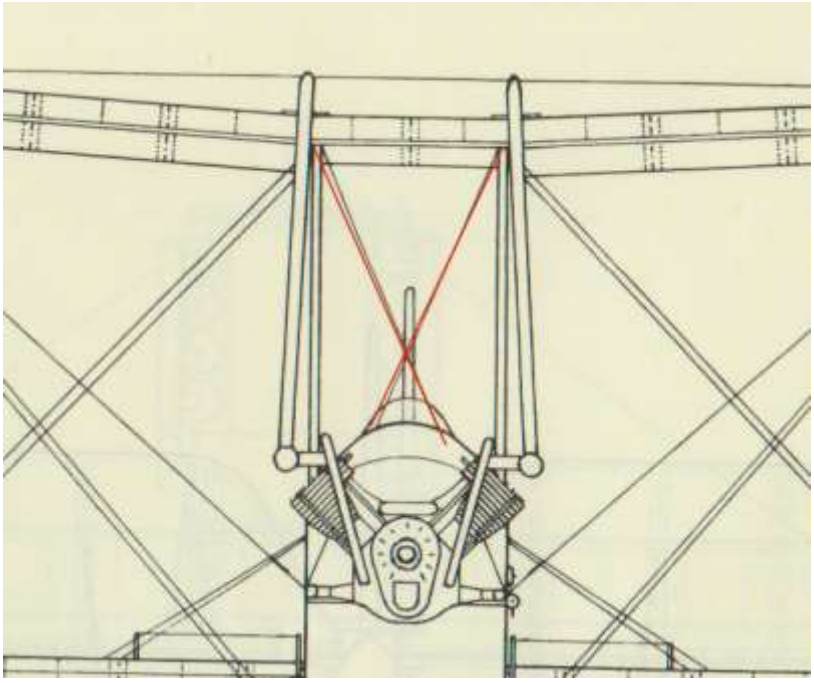


Lower wings

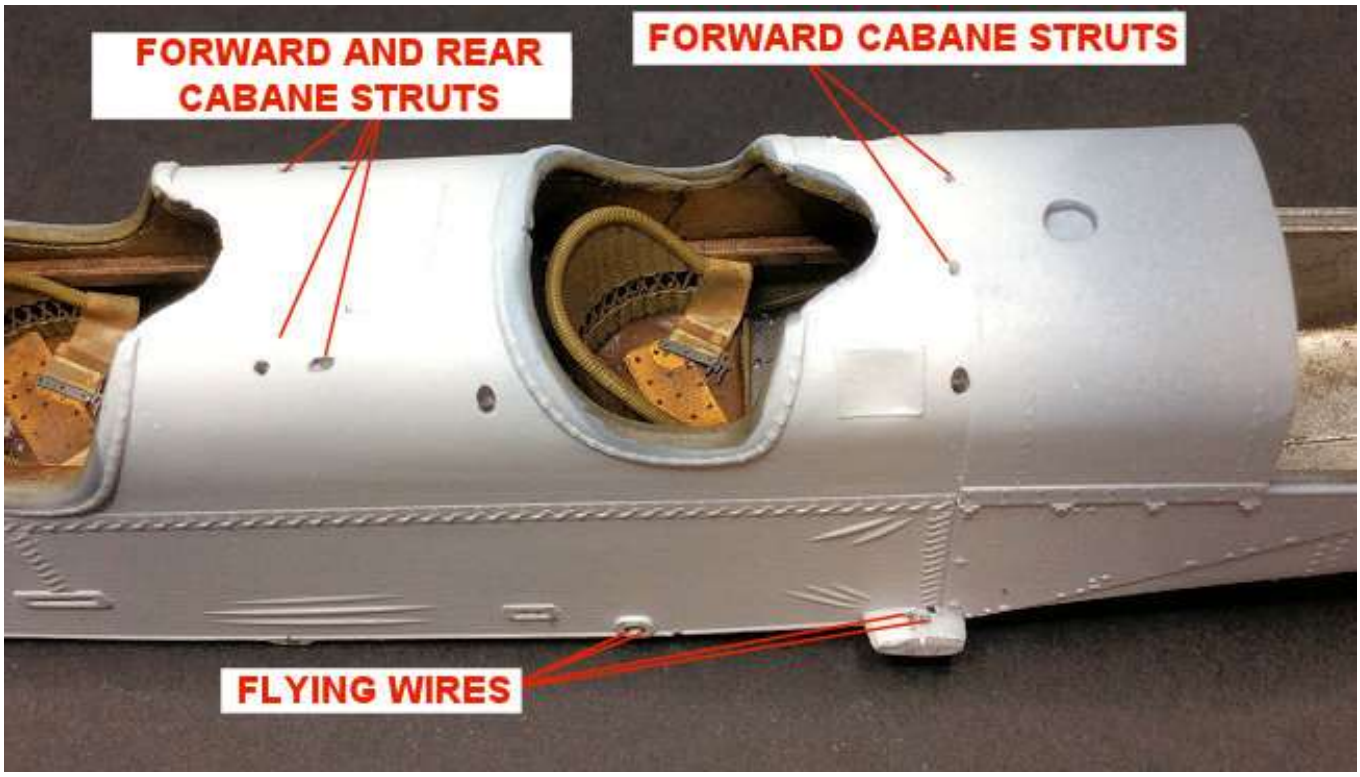


Cabane strut bracing:

The fuselage forward cabane struts were braced with two diagonally crossed wires that were routed between the tops of the forward cabane struts and through the fuselage centre top, between the bottom of the cabane struts.

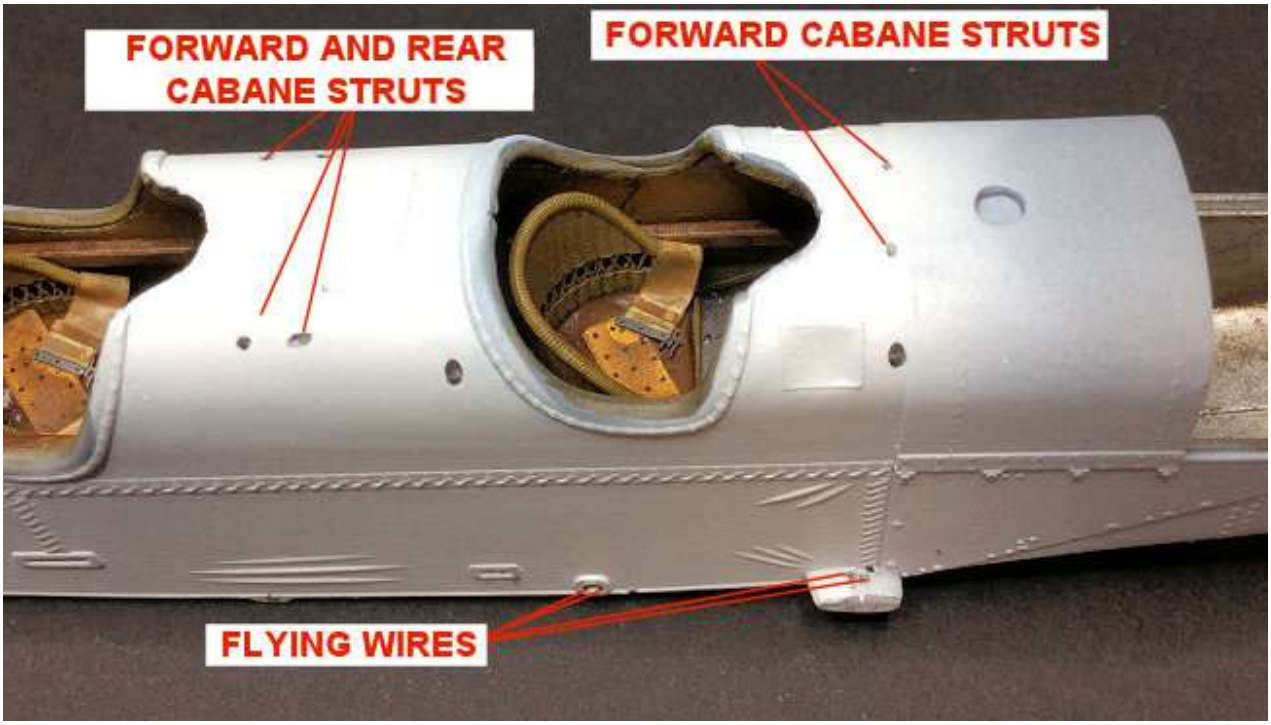


Drill a hole of 0.3 mm diameter, at the approximate rigging wire angle where the forward cabane struts are fitted, each side of the fuselage centre line and between the cabane struts.

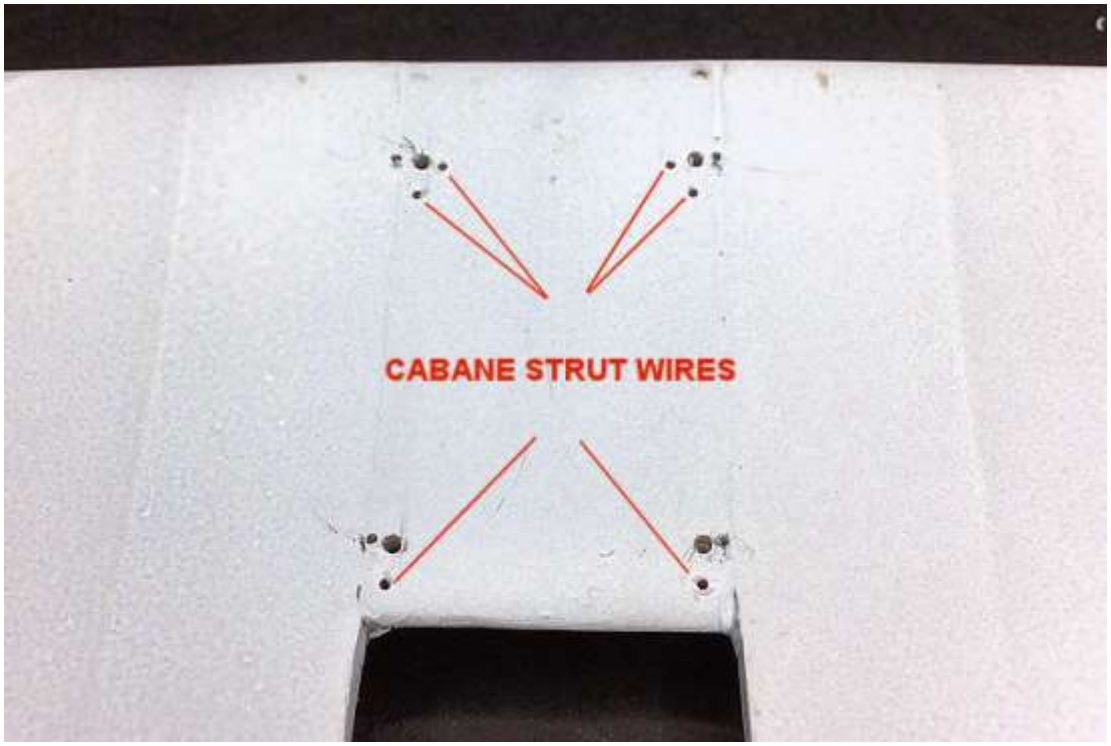


The fuselage forward and rear cabane struts were braced with wires that were routed between the tops of the forward and rear cabane struts and through the fuselage at the forward, side of the pilots cockpit and onto the cockpit side frames.

Drill two holes of 0.3 mm diameter, at the approximate rigging wire angle when the forward and rear cabane struts are fitted, each side of the fuselage.



Drill holes of 0.3 mm diameter into, **but not through**, the underside of the upper wing. The holes should be aligned to the locating holes (struts fitted) of the front and rear cabane struts. The holes should be at the rear of the forward and rear cabane struts and centrally inboard from the forward struts.



Aileron control wires:

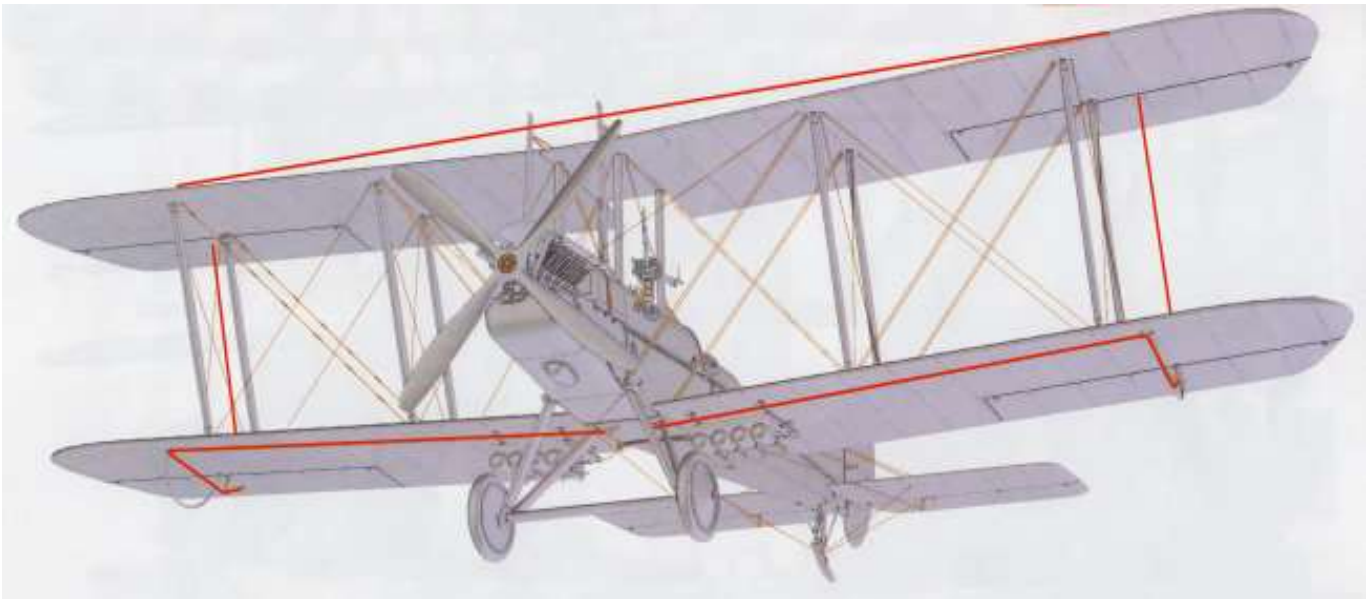
NOTE: *The kit instructions **do not show** the aileron control wire that spans between the ailerons on the upper and the lower wings. These wires are connected to the rear tops of the aileron control horns, enabling the ailerons on the same side to move in unison (together).*

The external aileron control rigging consists of a wire that is connected to one of the aileron control levers under the fuselage (pilots cockpit). The wire is routed outboard and around a guide pulley then rearwards to the top of that lower wing aileron control horn. The wire is then routed rearwards and through the aileron, then vertically up between the wings and through the upper aileron to the top of its control horn. From there the wire is routed forwards and around a guide pulley then across the upper wing to a guide pulley on the opposite side of the wing, then rearwards to the top of that aileron control horn.

The wire is routed rearwards and through that aileron, vertically down between the wings and through the lower wing aileron to the top of its control horn. From there the wire is routed forwards and around a guide pulley then across that lower wing to the other aileron control lever under the fuselage.
As the pilot moves the control column either left or right, a set of linkages connected to the control column torque tube, moves both of the control levers under the fuselage in the required direction. This pulls the control wires in the same direction cause the ailerons on one side of the aircraft to move up and the opposite ailerons to move down, causing the aircraft to roll (bank) either left or right.
Using the pre-moulded dimple in the underside of the lower wings, drill a hole of 1.1 mm diameter into, **but not through**, the underside of the lower wings (aileron pulley locations).

Using the pre-moulded dimple in each side of the top surface of upper wing, drill a hole of 1.1 mm diameter into, **but not through**, the upper wing (aileron pulley locations).

Drill a hole of 0.5 mm diameter through the four ailerons. The holes should be aligned to the previously created slices (for the control horns) and 12 mm from the aileron leading edges (aileron control wires).

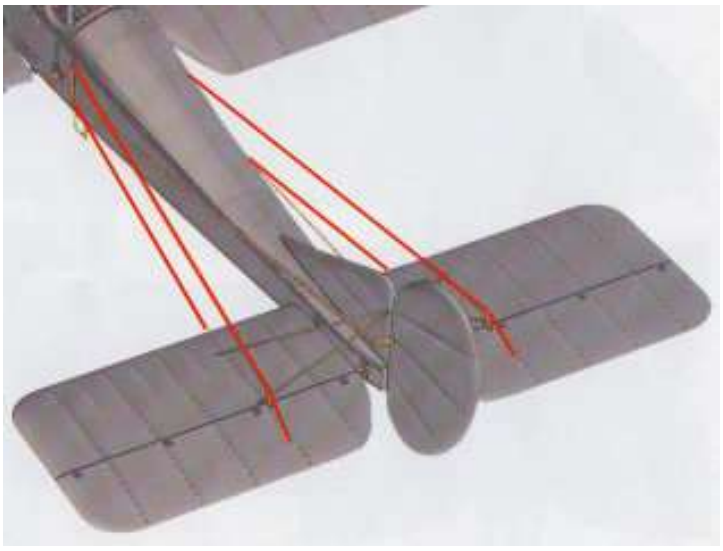


Elevator control wires:

NOTE: *Rigging for the elevator control wires will be attached to the previously prepared fuselage and elevator control horns.*

The external elevator control rigging consists of wires attached to the top and bottom of the control levers located on the sides of the fuselage, to the rear of the pilots cockpit. The upper wires on both sides of the fuselage are routed rearwards and over the tailplanes to the top of the upper elevator control horns. The lower wires on both sides of the fuselage are routed rearwards and under the tailplanes to the top of the lower elevator control horns.
As the pilot moves the control column either forward or rearward, a torque tube connected to the rear of the control column rotates a cross shaft under the pilots seat. This shaft is attached to the external elevator control levers. Pulling the control column rearwards or pushing it forwards causes the external control levers to rotate in the required direction. This pulls one set of control wires and relaxes tension on the other set of wires, causing the elevators to move up or down and the aircraft to climb or dive (pitch).

Drill a hole of 0.5 mm diameter through both elevators. The holes should be located 9 mm back from the elevator leading edges and aligned with the previously created slice for fitting the control horns.

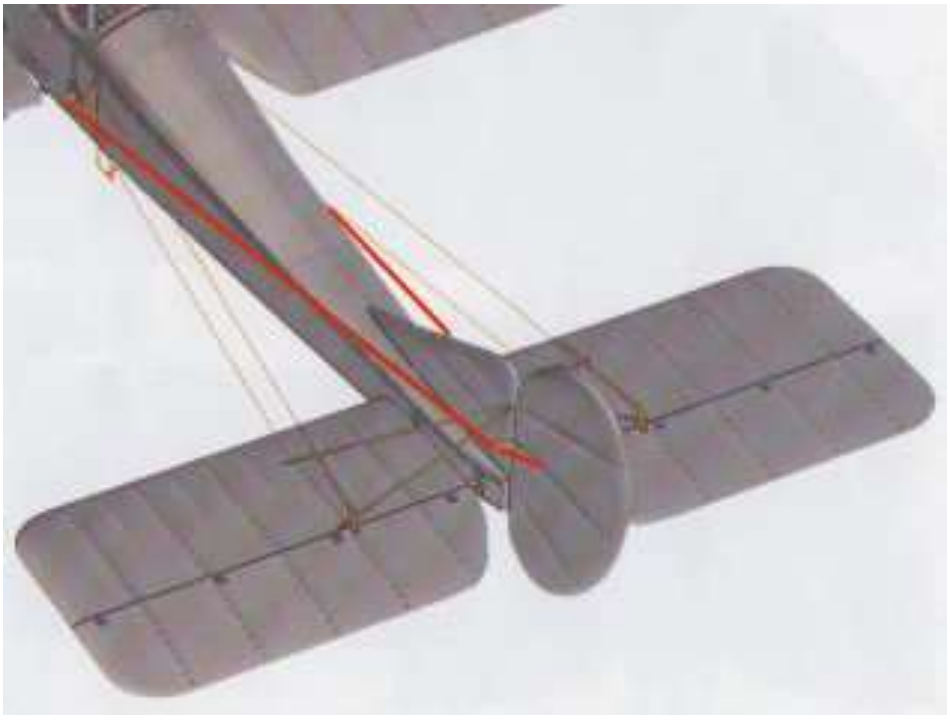


Rudder control wires:

NOTE: *Rigging for the rudder control wires will be attached to the previously prepared fuselage and rudder control horns.*

The external rudder control rigging consists of **twin** wires attached to the ends of the rudder control levers that protrude from the sides of the fuselage, at the pilots cockpit. The left rudder control wires are routed rearwards and over the tailplanes to the end of the left rudder control horn. The rudder control wires on the right side of the fuselage are routed the same, but to the end of the right rudder control horn.
As the pilot moves the rudder bar left or right, wires attached between the rudder bar and the rudder control levers causes one pair of control wires to be pulled in tension and the other pair of wires to relax tension. This causes the rudder to move either left or right and the tail of the aircraft to swing in the required direction (yaw).

Drill a hole of 0.5 mm diameter through the rudder. The hole should be located 7 mm from the rudder leading edge and aligned on the pre-moulded
central rib tape.



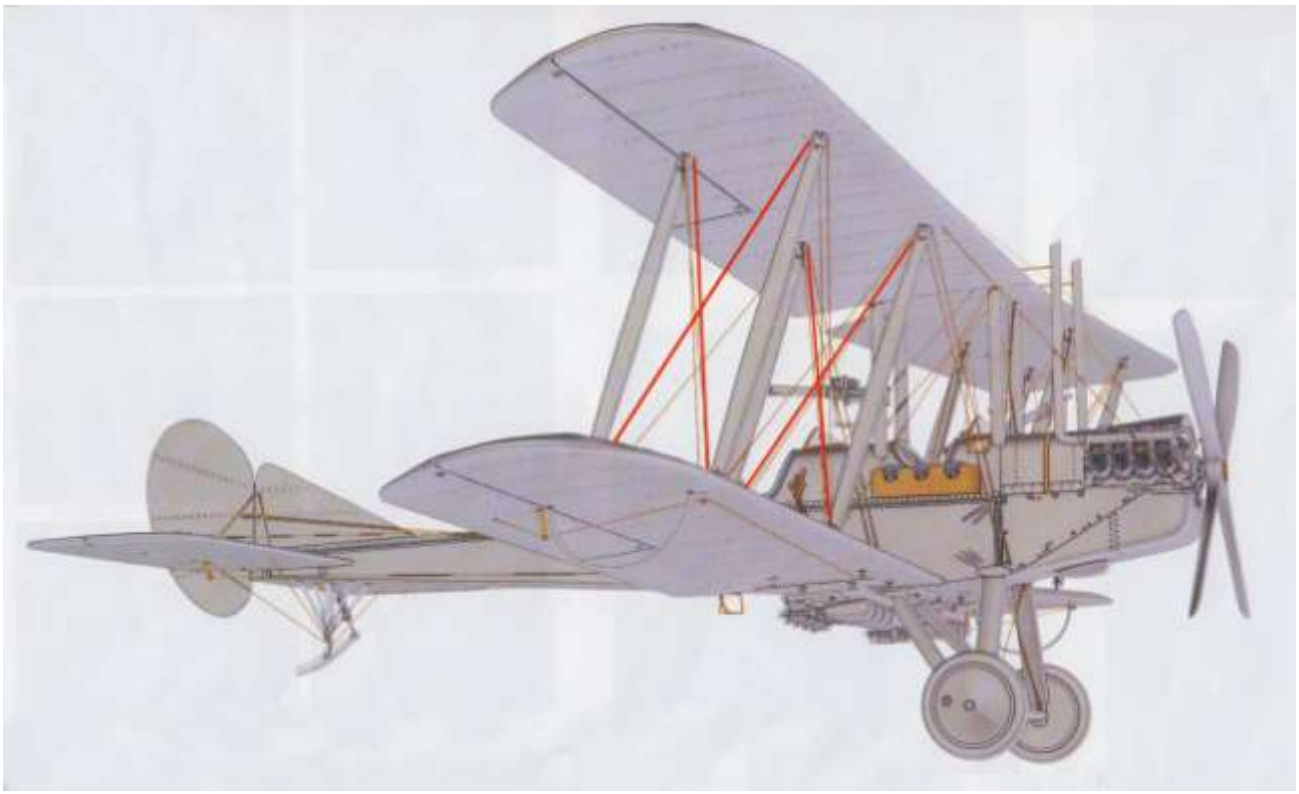
Incidence wires:

The inboard and outboard interplane struts (on both sides of the aircraft) were braced by two diagonally crossed wires. These wires were attached between the tops of the interplane struts and crossed down to the bottom of the interplane struts.

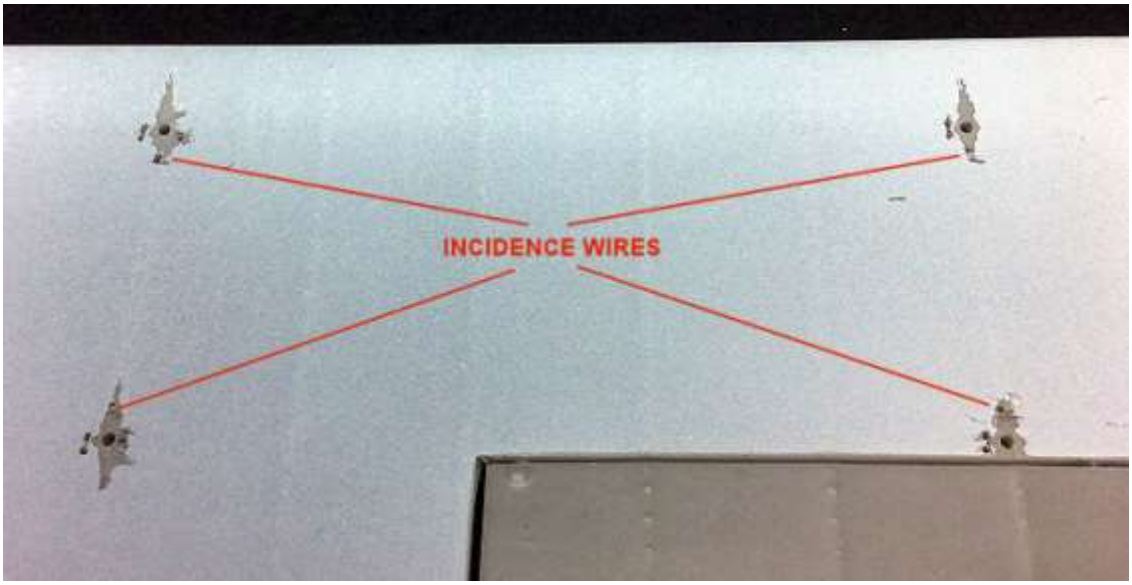
Upper and lower wings

Drill holes of 0.3 mm diameter into, **but not through**, the top surface of both lower wings. The holes should be aligned to the locating holes (struts fitted) of the inboard and outboard interplane struts. The holes should be forward from the rear interplane struts and to the rear the forward interplane struts.

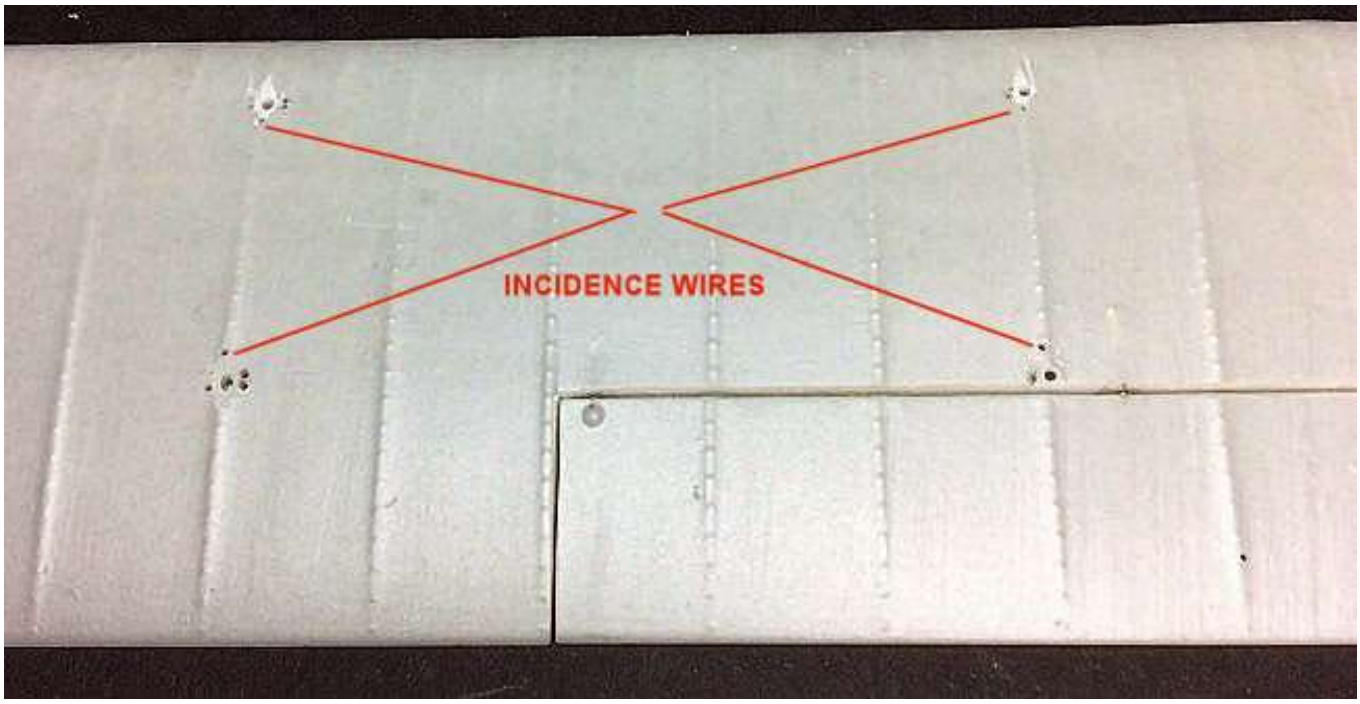
The same should be carried out on the underside of the upper wing.



Upper wing



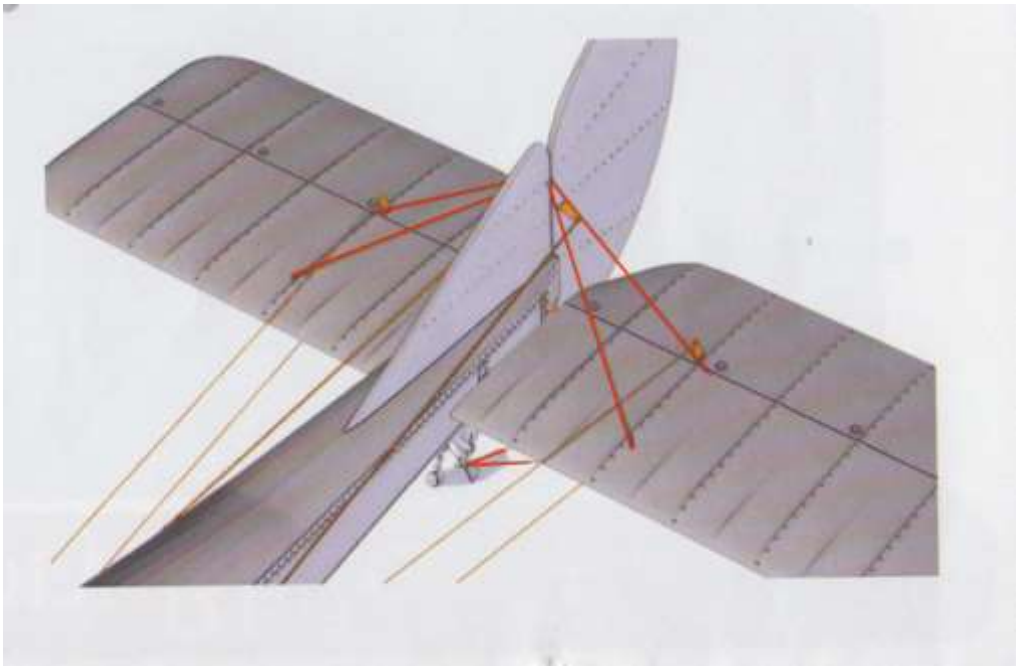
Lower wings



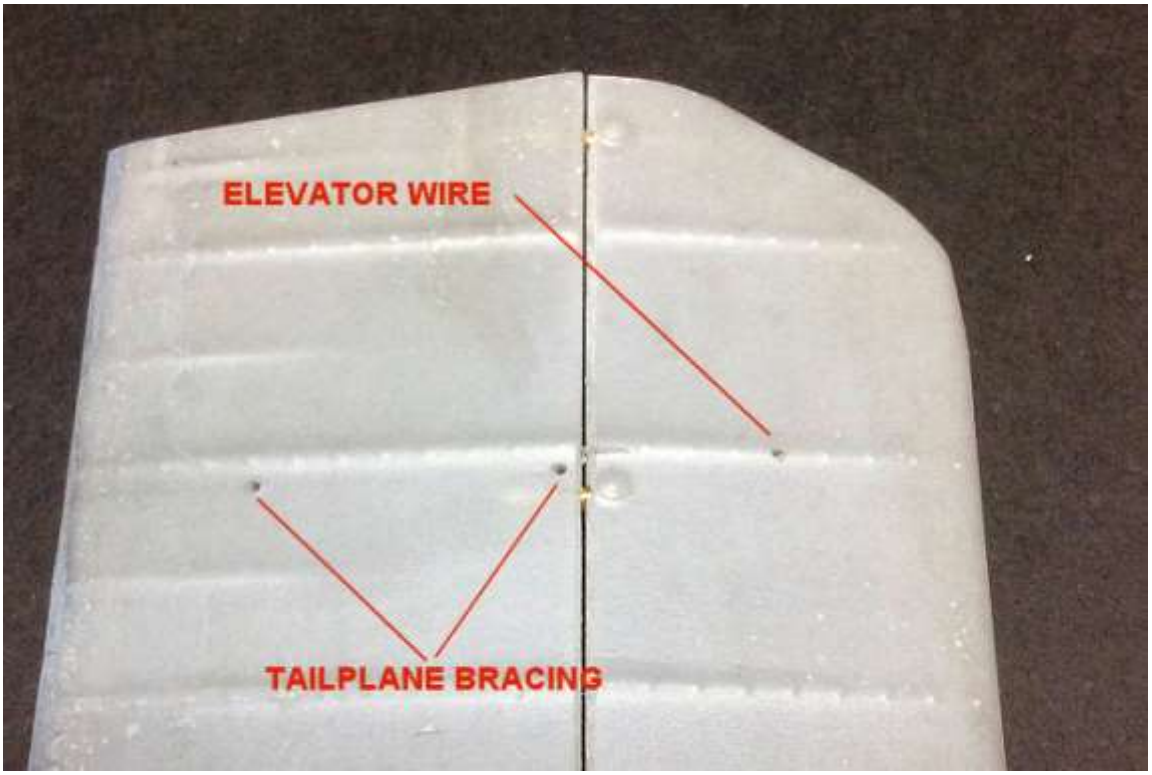
Tailplane/rudder bracing wires:

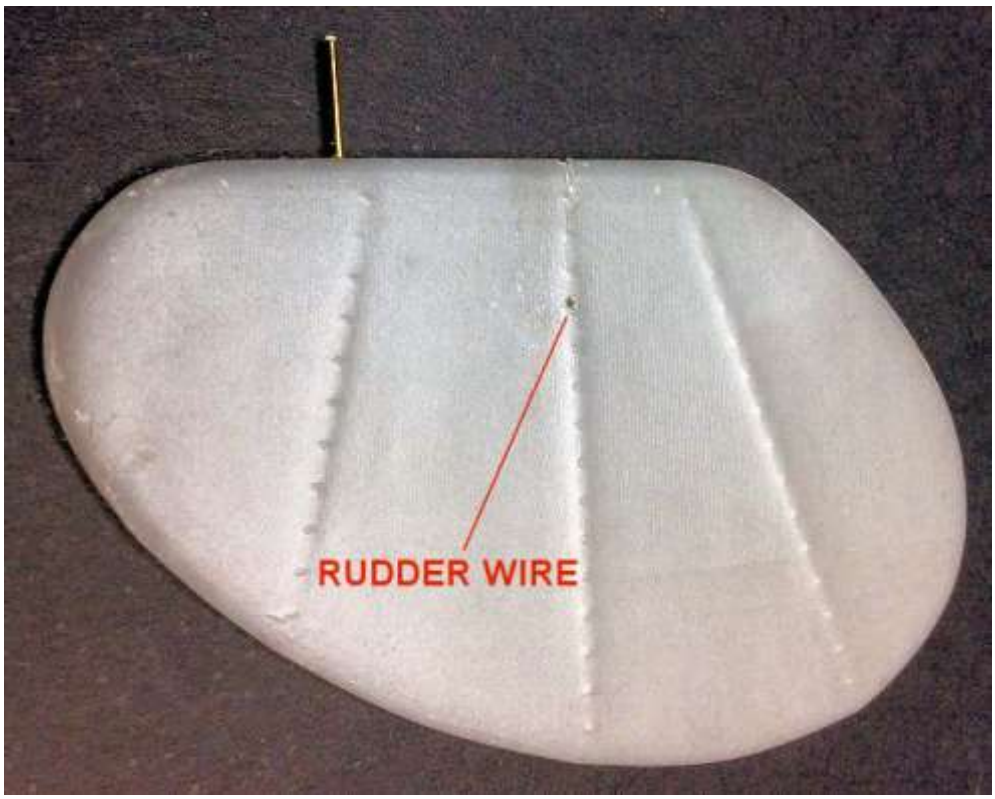
NOTE: *The rigging hole in the tail skid was previously drilled in the fuselage chapter of this build log.*

The tailplanes were braced with two wires, which were routed from the bottom of the centre post of the tail skid, then up to the outboard front and rear underside of the tailplanes. Wires were also routed from the same locations on the tops of the tailplanes then through the top, trailing edge of the fin.



Drill holes of 0.3 mm diameter through the two tailplanes. The holes should be aligned at 2.0 mm outboard from the previously created slices for fitting the control horns. One hole should be drilled at the trailing edge and the second 10.0 mm from the leading edge. Also a hole should be drilled through the trailing edge of the fin, just above the upper rib tape and through the rudder on the middle rib tape.



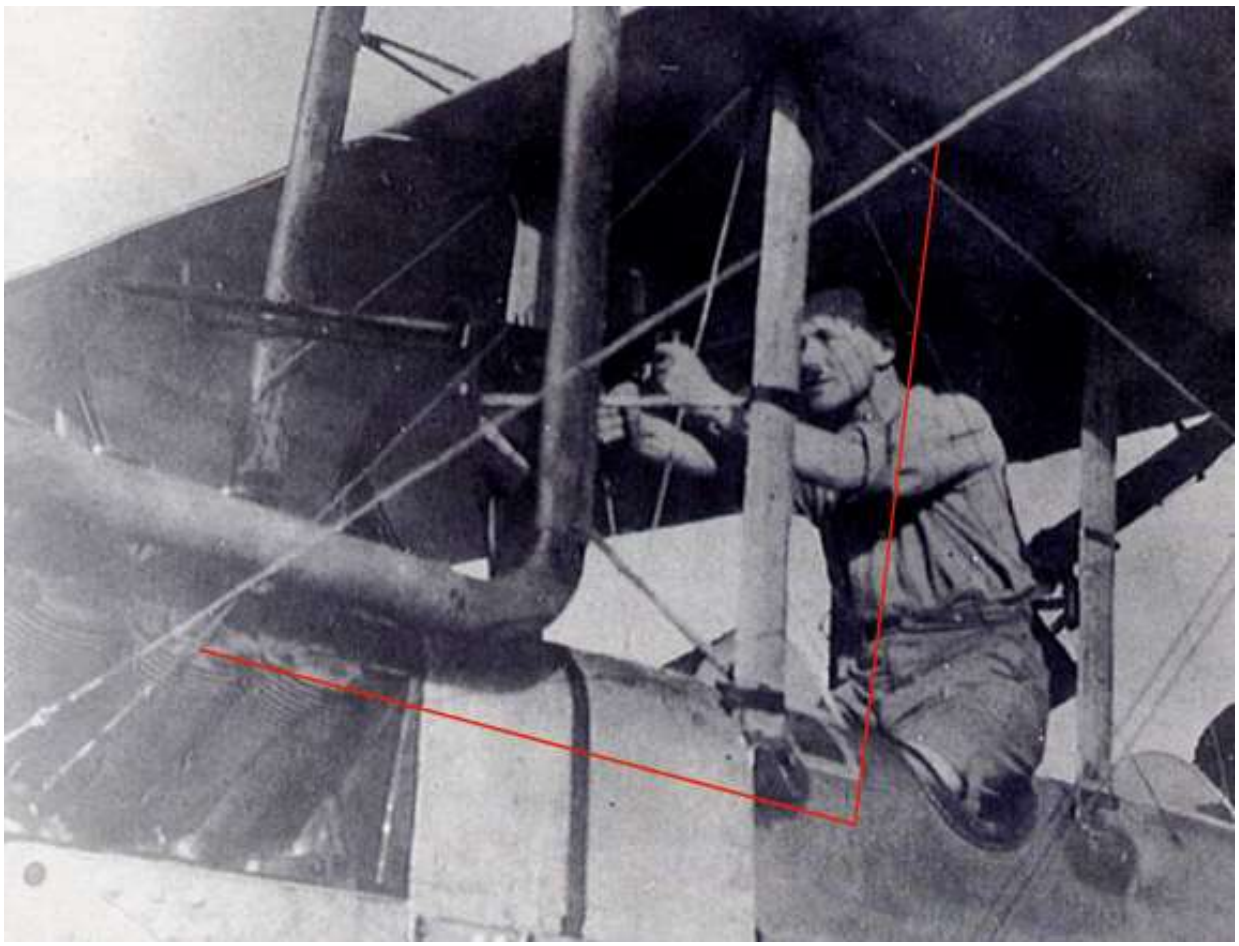


Drag wires - upper wing:

Two pairs of drag wires were fitted at both sides of the aircraft:

A drag wire between the engine bearer frame and behind the engine exhaust manifold to the top of the fuselage forward cabane strut.

A drag wire between the engine bearer frame and outboard of the engine exhaust manifold to the underside of the upper wing at the top of the forward inboard interplane strut.

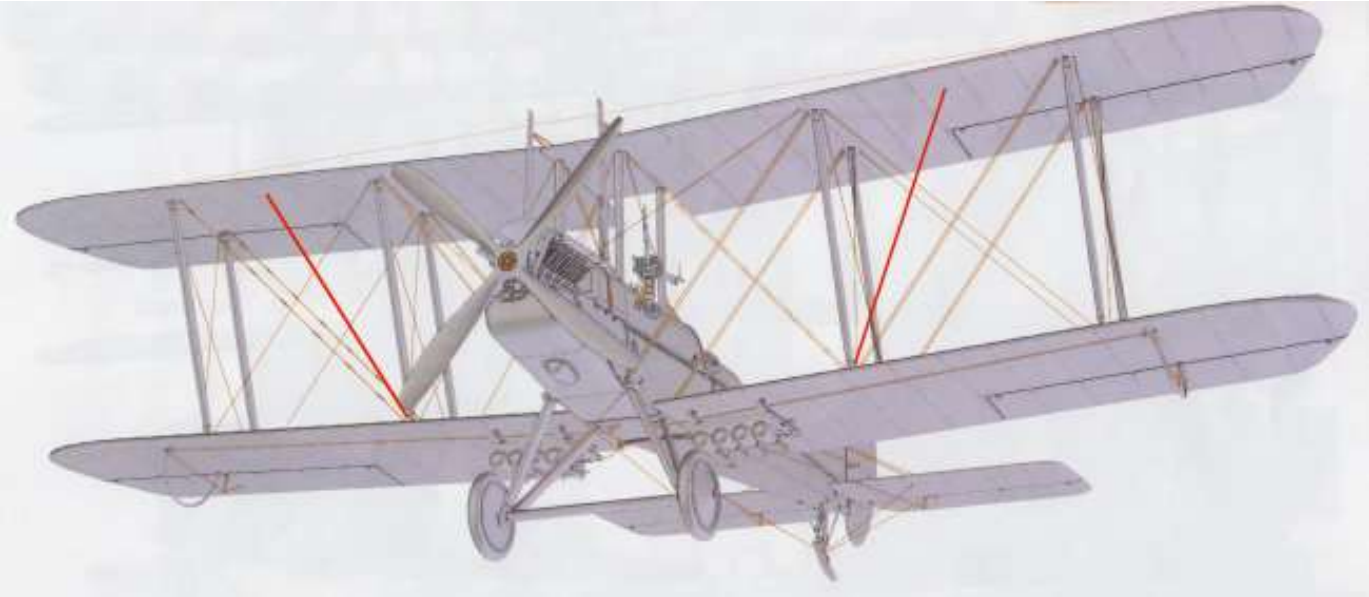


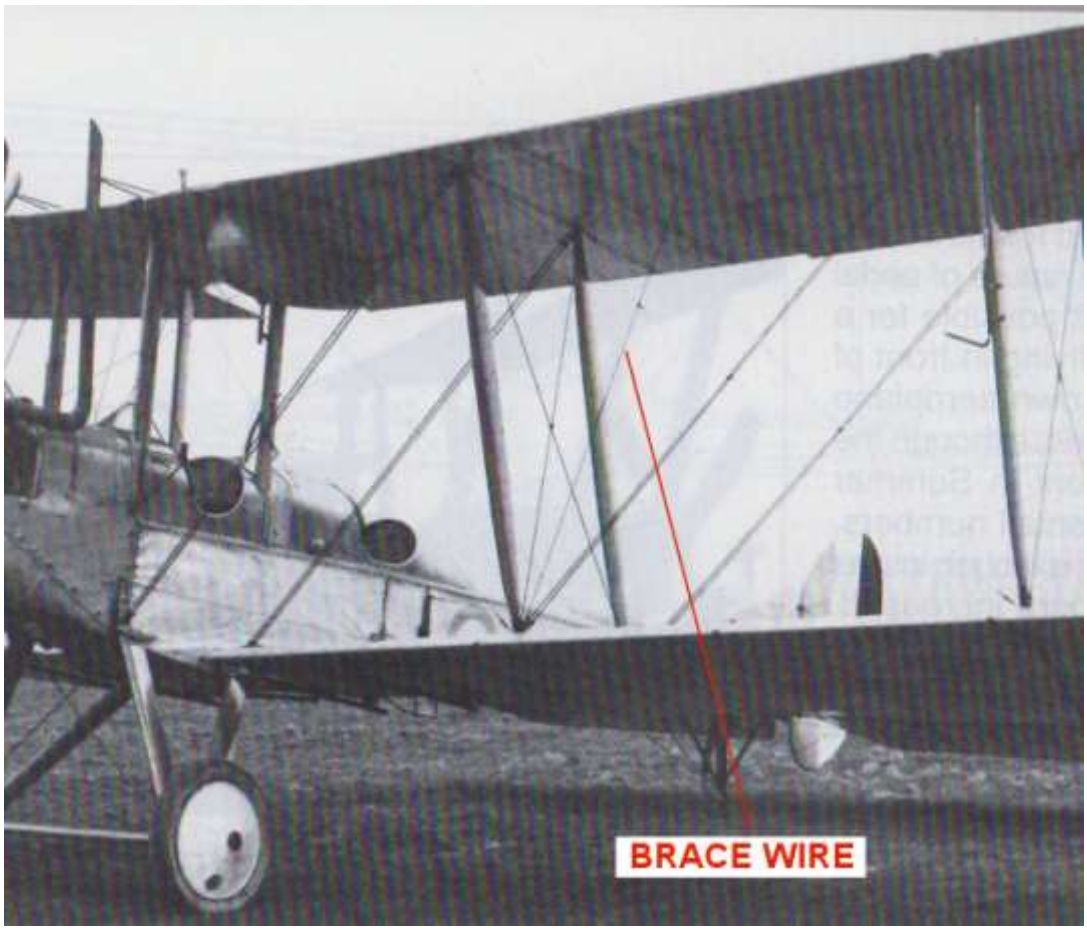
Drill holes of 0.3 mm diameter into, **but not through**, the underside of the upper wing. The holes should be centrally forward of the forward cabane struts and the forward inboard interplane struts (when fitted).

Drill holes of 0.3 mm diameter into the centre, front of the ‘tubular’ engine bearers and also into the centre of the forward ‘block’ engine bearers.

Wing bracing wire:

The rigging diagrams in the kit instructions fail to show a single bracing wire fitted outboard from the bottom of the inboard front interplane struts and routed diagonally up to the underside of the front spar of the upper wing, midway between the inboard and outboard interplane struts.





Drill holes of 0.3 mm diameter into, **but not through**, the underside of the upper wing. The holes should be drilled midway between the front inboard and outboard interplane struts and aligned to their centres. Also drill a hole into, **but not through**, the lower wings, outboard from the front inboard interplane struts (when fitted).

Pre-rigging:

NOTE: *Pre-rigging uses 'GasPatch Elite Accessories' 1:48th scale metal turnbuckles (Type C) and 1:48th scale metal Anchor Points. Also blackened 'Albion Alloy's' 0.4 and 0.5 mm diameter Brass tube. The Brass tubes are chemically blackened by immersion in 'Blacken-It' solution, although similar alternative solutions are available.*

Turnbuckle rigging example:

Cut a short length of blackened Brass tube, such as that supplied from 'Albion Alloys' (MBT04 or MBT05) or similar.

Deburr the tube by running a 0.2 mm or 0.3 mm diameter drill through the tube.

NOTE: *Always cut the length of rigging line **much longer** than needed to span between its attachment points. This allows for easier final rigging.*

Cut a long length of the relevant diameter mono-filament (0.08 or 0.12 mm diameter).

Pass the line through the tube, then trough the 'eye of a 1:48th scale 'GasPatch' Type C metal turnbuckle.

Pass the line back and through the tube.

Slide the tube up to, **but not touching**, the 'eye' of the turnbuckle.

Secure the lines to the tube end away from the turnbuckle, using thin CA adhesive.

Cut away any residual tag of line at the tube end.

Turnbuckle preparation:

NOTE: *The Type C turnbuckles are only fitted in the following control lines:*

Aileron (control horns under the fuselage)
Elevator control levers (side of the fuselage)
Rudder control horns (double turnbuckles at fuselage sides)
Cabane strut bracing wires (inside pilots cockpit , top of side frames)
Wing bracing wires (tubular and block engine bearers).

Remove fourteen Type C metal turnbuckles from their mould bases.

Remove 43 metal Anchor Points from their mould bases, then snap separate them to create 86 in total.

Remove any residual tags of metal from the ‘eye’ ends, using a diamond file, such as that from ‘Tamiya’.

Make sure the holes through the ‘eye’ ends of the turnbuckles are clear. If necessary carefully run a 0.2 mm diameter drill through the holes. This can prove difficult as the sintered metal material is both rough and hard and drill breakage is not uncommon.

Fitting anchor points:

NOTE: *Refer back to the rigging illustrations earlier in this chapter.*

Make sure the pre-drilled rigging holes are clear of material and are deep enough to fully accept the anchor points.

Anchor points should be fitted into the pre-drilled holes for the following rigging wires:

Flying wires (upper and lower wings)

Interplane strut incidence wires (upper and lower wings)

Cabane strut bracing wires (upper wing and fuselage)

Landing gear bracing wires (fuselage and axle fairing)

Drag wires (upper wing and engine bearers)

Wing bracing wires (upper and lower wings).

NOTE: *The CA adhesive used to secure the anchor points in position is of the thicker, slower setting type, such as ‘VMS’ 5K Fleky Slow adhesive. This is because the adhesive is less likely to track up and into the ‘eye’ end on the anchor points, thus blocking it.*

Hold the ‘eye’ end between the tips of your tweezers (stopping adhesive penetration) and dip the tail of the anchor point into the adhesive.

Fully locate the anchor point into its pre-drilled hole, making sure where possible, the ‘eye’ is positioned inline with airflow.

Once all of the anchor points have been fitted, test each by pulling gently with tweezers, to make sure they are fully secure in the model.

Using a 0.2 mm diameter drill, check that the ‘eye’ of each anchor point is clear of adhesive or residual metal (to allow the rigging line to pass through easily).

Control horns and levers:

NOTE: *Refer back to the rigging illustrations earlier in this chapter.*

It’s easier to pre-rig the following control horns and levers before they are fitted to the model parts:

Aileron control horn (fuselage underside)

Rudder control horns (fuselage and rudder)

Elevator control horns and levers (fuselage and elevators).

Aileron control horns:

Using ‘VMS’ 5K Fleky Slow adhesive or similar, secure an aileron control horn (22) into the pre-cut grooves at the leading edge of the four ailerons (a control on the upper surface of the upper wing ailerons and the underside of the lower wing ailerons).

Cut two long lengths of 0.08 mm diameter mono-filament, such as ‘Stroft GTM’ or similar. The lengths of the lines need to be long enough to span between the fuselage and lower aileron control horns and around the aileron pulleys (when fitted - refer to previous rigging illustrations).

NOTE: *The two aileron control horns (23) for the underside of the fuselage need to be pre-rigged, as the other end of the entire control wire run will be attached to the other control horns later in this build.*

Pass one end of the line through a cut and blackened 0.5 mm diameter Brass tube, such as 'Albion Alloy's' MBT05 or similar.

Pass the line through the rigging hole in the end of an aileron control horn (23), then back through the tube.

Pass the other end of the line through the 'eye' of a 1:48th scale GasPatch' Type C turnbuckle then back through the tube.

Gently pull on the two ends of line to position the tube between, **but not touching**, the control horn or the turnbuckle.

NOTE: *During the next step, make sure adhesive does not come into contact with either the control horn or the turnbuckle, as both need to be free to move on the loops of line.*

Secure the lines in the tube by applying a small amount of thin CA adhesive to one end of the tube.

Carefully cut away the protruding end tags of line at the ends of the tube.

Make sure the loops of line through the turnbuckle and control horn are free to move and not fixed in position with adhesive.

NOTE: *The pre-rigged aileron control wires will be fitted later in this build.*

Actual aileron control wires with turnbuckles

Rudder control turnbuckles:

NOTE: *The following procedure applies to the rudder turnbuckles on both sides of the fuselage.*

Cut a 350 mm long length of 0.08 mm diameter mono-filament, such as ‘Stroft GTM’ or similar.

Pass one end of the line through a short length of cut and blackened 0.4 mm diameter Brass tube, such as ‘Albion Alloy’s’ MBT04 or similar.

Pass the line through the ’eye’ of a ‘GasPatch’ 1:48th scale Type C turnbuckle then back through the tube.

Slide the tube up to, **but not touching**, the turnbuckle.

NOTE: *During the next step, make sure adhesive does not come into contact with the turnbuckle, as the loop of line needs to be free to move.*

Secure the lines in the tube by applying a small amount of thin CA adhesive to the end of the tube furthest from the turnbuckle.

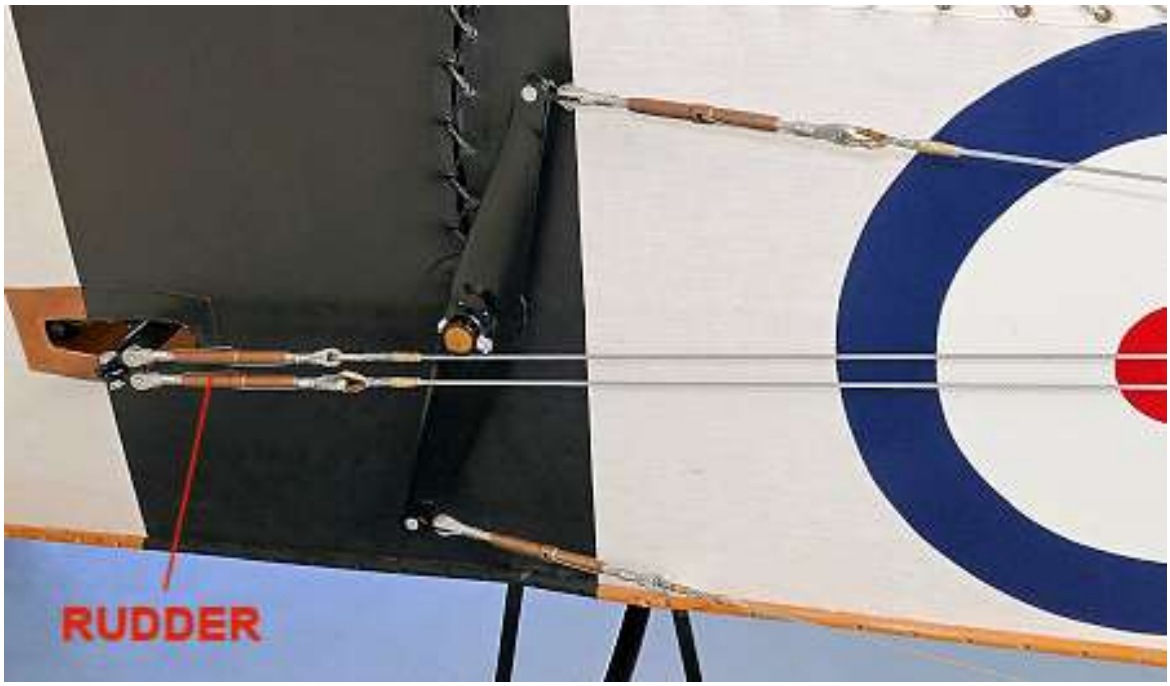
Carefully cut away the protruding end tag of line at the end of the tube.

Make sure the loop of line through the turnbuckle is free to move and not fixed in position with adhesive.

Repeat the procedure to create a second rudder control line

NOTE: *The rudder control lines will be fitted to the model later in this build*

Actual rudder control wires with turnbuckles



Elevator control horns and levers:

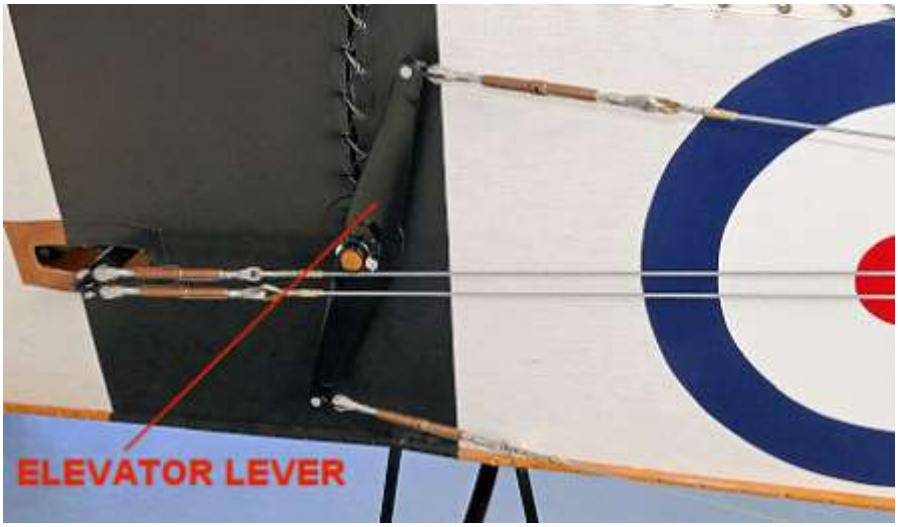
NOTE: *The elevator control horns are photo-etch parts (20) and the levers (21).During the following steps, make sure adhesive does not come into contact with either the control horn or the turnbuckle, as both need to be free to move on the loops of line. The following procedure applies to the elevator control levers on both sides of the fuselage.*

Using 'VMS' 5K Fleky Slow adhesive or similar, secure a control horn (20) into the pre-cut grooves at the leading edge of the two elevators (a control on the upper surface and underside of both elevators).

To create four elevator control wires, repeat the same previous procedure used to create the rudder control wires, but creating four lines of 180 mm length.

NOTE: *The elevator control lines will be fitted to the model later in this build*

Actual elevator control wires with turnbuckles



A pre-rigged rudder or elevator control wire

Structural wires:

NOTE: *The structural rigging wires are pre-rigged to on the model at various anchor point locations. This is to make final rigging easier once the wings have been fitted, when access becomes restricted.*

To ascertain the length of line required for a particular rigging wire, refer to the rigging illustrations and measure the distance between the model parts to be rigged. Always add more (30 mm or so) to the length of the line to allow for final rigging.

To pre-rig a line to an anchor point, carry out the ‘example’ procedure detailed earlier in this chapter.

NOTE: *For pre-rigging the structural wires,* ***use 0.5 mm diameter cut and blackened Brass tube and 0.12 mm diameter mono-filament****.*

Pre-rig the structural rigging wires to the following anchor point locations:

Fuselage cabane strut bracing wires (underside of upper wing)

Rear twin flying wires (at lower fuselage above lower wing root)

Twin flying wires (underside of upper wing)

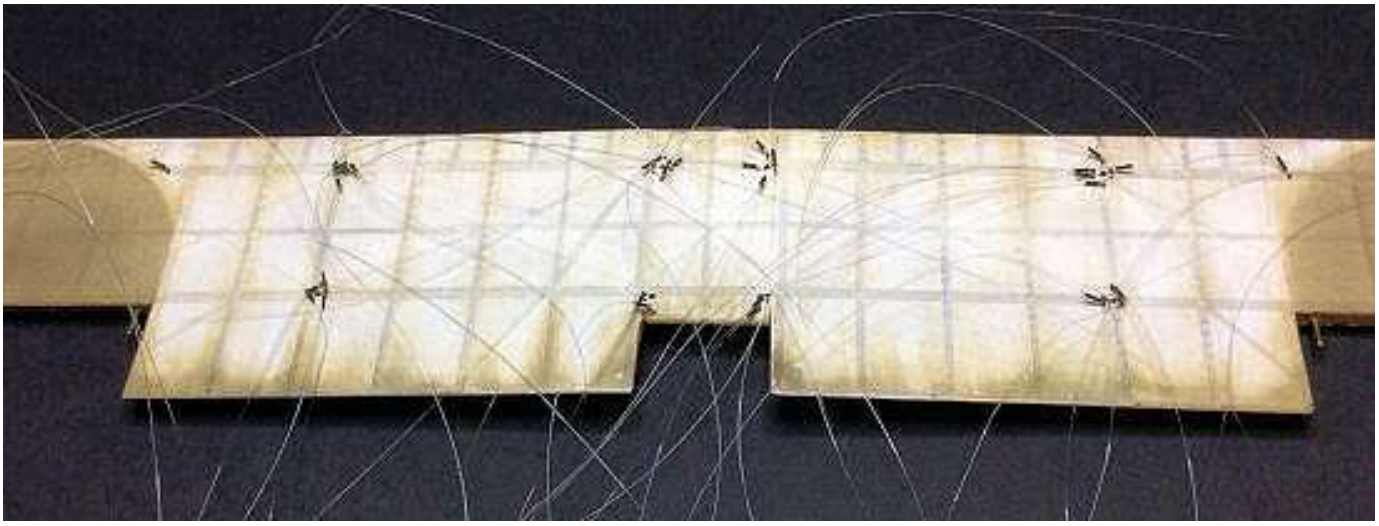
Landing wires (underside of upper wing)

Interplane strut incidence wires (underside of upper wing)

Wing bracing wires (underside of upper wing)

Drag wires (underside of upper wing)

NOTE: *As the* ***aileron, rudder and elevator control wires*** *are exposed on the sides of the fuselage and around the wings, they are susceptible to being damaged when handling the model. As such, they will all be fitted to the model later in this build.*



PART 13
CONSTRUCTION
(Continued)

PART 13 - CONSTRUCTION (Continued)

Lower wing - fit:

Make sure the locating holes in the fuselage for the front and rear rods (spars) are clear of paint etc.

Make sure the locating rods in the lower wings are clear of paint etc.

Test fit the lower wings into the fuselage, making sure the created front spar **'spacer'** is fitted onto the protruding front spar for the left wing.

Locate the right wing into the fuselage until it is 5 mm from the side of the fuselage.

Apply thin CA adhesive to the front and rear rods then fully fit the wing into the fuselage, leaving only the fitted spacers visible.

Slide the 'spacer' onto the protruding front spar rod for the left wing.

Locate the left wing into the fuselage until it is 5 mm from the side of the fuselage.

Apply thin CA adhesive to the front and rear rods then fully fit the wing into the fuselage, leaving only the fitted spacers visible.

NOTE: *Due to the weight of the solid lower wings, they will flex on the spar rods when fitted, but only until they are attached to the upper wing.*

Check that the wings are able to flex to the required 3 degrees dihedral angle (up at the tips).

Upper wing - fit:

Make sure the locating holes in the fuselage for the cabane struts and in the upper and lower wings for the interplane struts are clear of paint etc.

Test fit the rods in the ends of the cabane and interplane struts into their respective locating holes in the fuselage and wings. Make sure the struts locate fully into their wing locating holes.

Use masking tape to hold the various pre-rigged lines away from the strut locating holes.

Test fit the cabane struts into the fuselage. The for struts need to be vertical and with the slightly chamfered edge inboard against the fuselage.

Test fit the interplane struts into the lower wings. The eight struts need to be angled so that their tops are aligned to the tops of the cabane struts.

Test locate the upper wing onto the cabane and interplane struts, making sure all struts fully locate and that there are no obvious gaps between the ends of the struts and the wings.

Using thin CA adhesive, secure the four cabane struts vertically into their fuselage locating holes.

Using thin CA adhesive, secure the eight interplane struts at the correct angle into their lower wing locating holes.

Lay the upper wing down with it's pre-rigged underside uppermost.

NOTE: *During the following step, make sure the CA adhesive does not contaminate the 'eye' ends of the fitted rigging anchor points or pre-rigged lines.*

Carefully apply thin CA adhesive into the pre-drilled holes for the cabane struts. **Do not** apply too much adhesive as it may be squeezed out when locating the strut, thereby contaminating the pre -rigging.

NOTE: *During the following steps, the ends of the interplane struts should be clear of the lower wings, due to the flex in the lower wings rods (spars).*

Hold the fuselage/lower wings assembly upside down and locate the tops of the four cabane struts into their upper wing locating holes.

Once the adhesive has fully set, carefully turn the assembly over.

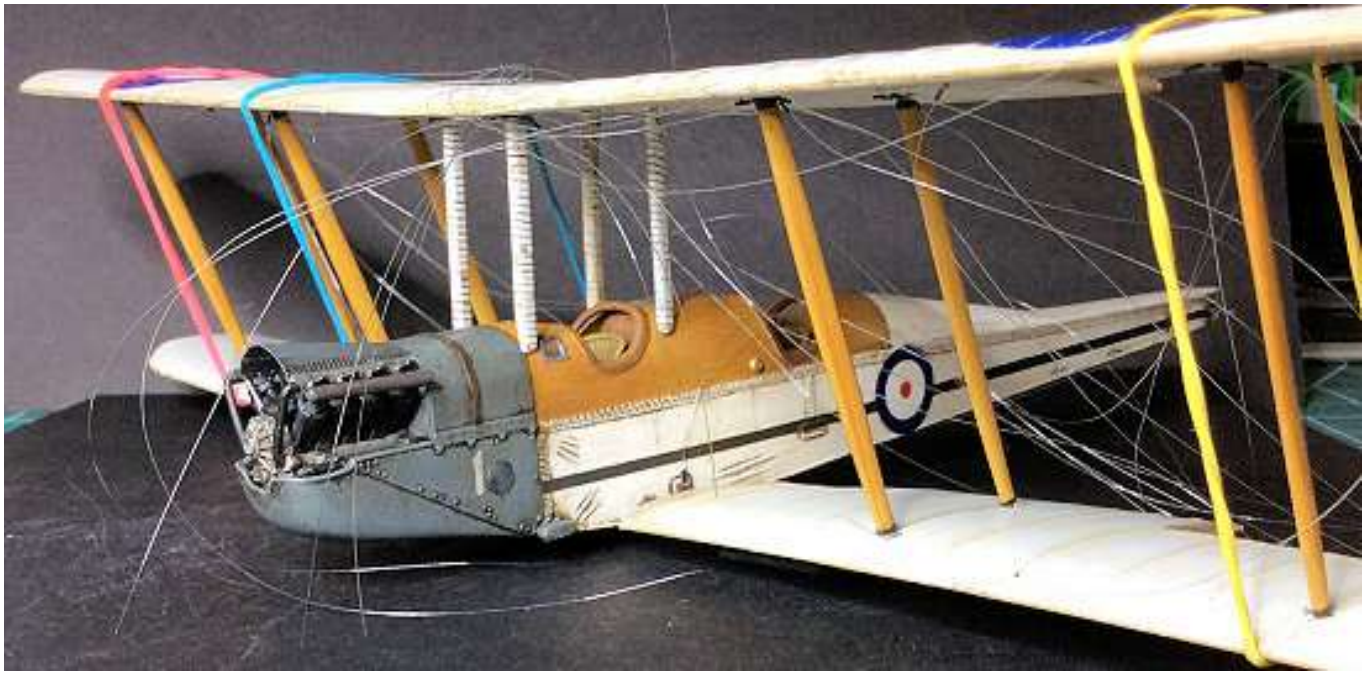
Partly locate the inboard interplane struts into the lower wing locating holes.

Apply thin CA adhesive to the locating rods the fully locate the struts into the lower wing. Use an appropriate elastic band around the upper and lower wing to hold the together.

Partly locate the outboard interplane struts into the lower wing locating holes.

Apply thin CA adhesive to the locating rods the fully locate the struts into the lower wing. Use an appropriate elastic band around the upper and lower wing to hold the together.

NOTE: *To make sure the interplane struts remain secured to the wings, it's best to leave the elastic bands around the wings until most of the wing rigging has been completed. The rigging will assist in hold the wings together.*



Final rigging - example:

Pass one end of the line through a short length of cut and blackened 0.5 mm diameter Brass tube, such as 'Albion Alloy's' MBT04 or similar.

Pass the line through the 'eye' of a fitted 'GasPatch' 1:48th scale Anchor Point, then back through the tube.

Keeping the line taut, slide the tube up to, **but not touching**, the Anchor Point.

NOTE: *During the next step, make sure adhesive does not come into contact with the Anchor Point, as the loop of line needs to be free to move.*

Secure the line in the tube by applying a small amount of thin CA adhesive to the end of the tube furthest from the Anchor Point.

Carefully cut away the protruding end tag of line at the end of the tube.

Make sure the loop of line through the turnbuckle is free to move and not fixed in position with adhesive.

Rigging - final tensioning:

Invariably after rigging has been completed, some lines may be slack. This can be remedied by careful application of heat along the line, but should only be carried out once all rigging has been completed. Only then will you be able to see which lines require additional tensioning.

NOTE: *Take care not to linger at one area of a line with the heat source as this will melt the mono-filament causing the line to break. Also take care not to touch any part of the model or any other rigging, as this will also cause damage through melting.*

WARNING: *Care needs to be taken when using this method to tension line, as using a heat source is required.*

Carefully move a suitable heat source (I use a small electrical soldering iron) close to and along the slack line, keeping the heat source always moving. You will see the line tension as the applied heat takes effect, shrinking the line.

Wings - final rigging:

Order of rigging:

NOTE: *During the following steps, leave the rigging loops in the Anchor Points loose.*

For access to the various lines and their Anchor Points, I found the following order the best for final rigging at both sides of the aircraft:

Inboard interplane strut cross bracing wires
Outboard interplane strut cross bracing wires
Outboard front and rear single landing wires
Outboard front and rear twin flying wires
Inboard front and rear single landing wires
Inboard front and rear twin flying wires
Wing single bracing wires.

NOTE: *During the following steps, leave the rigging loops in the Anchor Points loose.*

Following the previous final rigging example, loosely final rig the wing structural wires following the above order.

Once all of the wires have been attached to their Anchor Points, tighten and secure the wires following the previous rigging example. Work from the inboard wires outwards to the wing tips.

Cabane bracing - final rigging:

Front strut crossed bracing:

Trim the pre-rigged lines such that when diagonally crossed they can be inserted fully into the pre-drilled holes in the top decking panel of the fuselage (between the two struts).

Keeping each line taut, insert the ends into their respective holes, but not fully.

Apply thin CA adhesive to the lines then fully insert them into the holes.

Hold the lines taut to allow the adhesive to set.

Front and rear strut bracing:

Insert the lines for the forward struts into their pre-drilled holes in the top decking panel of the fuselage, forward and to the side of the pilots cockpit. Pull the ends of the lines out from inside the cockpit.

Internal turnbuckles for the cabane strut bracing wires.

On one side of the cockpit, pull each of the two lines taut and onto to the top of the cockpit side frames, making sure the lines are not deflected, but are straight from the upper wing to the cockpit side frames.

Note the position of two lines on the top of the cockpit side frame and point mark their location.

Using the point mark as a guide, drill a hole of 0.4 mm diameter angled down and through the cockpit side frame.

Pass a long length of ‘Stroft GTM’ 0.08 mm diameter mono-filament through the free ‘eye’ end of two Type C turnbuckles.

Leaving a loop of line at the turnbuckles, twist each pair of lines together and secure them using thin CA adhesive.

Pass the joined ends of the two 0.08 mm lines down through the pre-drilled hole in the cockpit side frame.

Pull the two ends of the lines taut and apply CA adhesive to the underside of the cockpit side frames at the two lines.

Carefully cut away the residual tails of the lines under the rail of the cockpit side frame.

Slide a cut and blackened 0.5 mm diameter tube onto one of the lines then pass the line through the ’eye’ end of one of the Type C turnbuckles.

Pass the end of the line back through the tube then slide the tube up to, **but not touching**, the turnbuckle.

Keeping the line taut, apply thin CA adhesive at the end of the tube to secure the line.

Cut away any residual tag of line.

Repeat to final rig the other turnbuckle.

Repeat the procedure to rig the two lines and turnbuckles on the opposite cockpit side frame.

Drag wires - final rigging:

Refer to the previous rigging illustrations.

Pass the ends of the pre-rigged drag wires (at the centre section of the upper wing, inboard from the tops of the forward cabane struts) down and between the forward exhaust pipe ports from the engine.

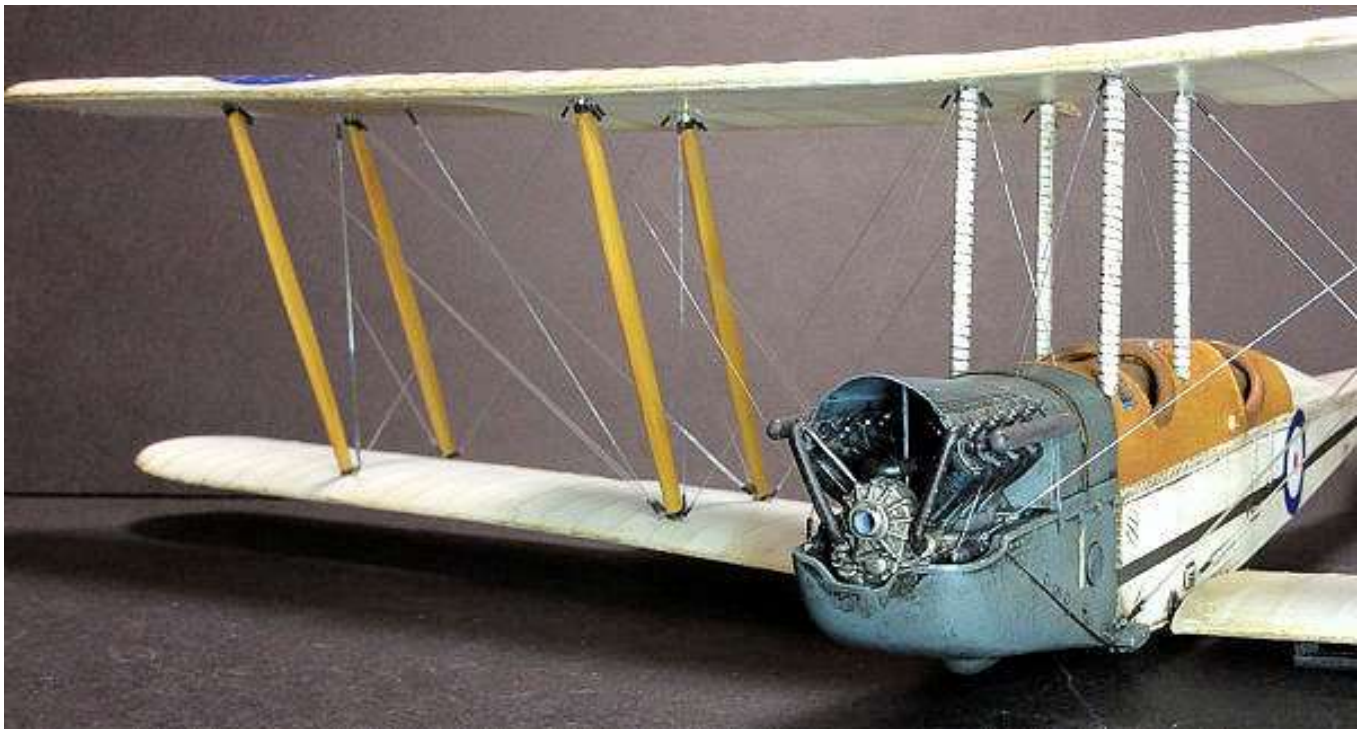
Slide a cut and blackened 0.5 mm diameter tube onto the lines then pass the lines through the 'eye' ends of the anchor points fitted in the front of the engine bearers.

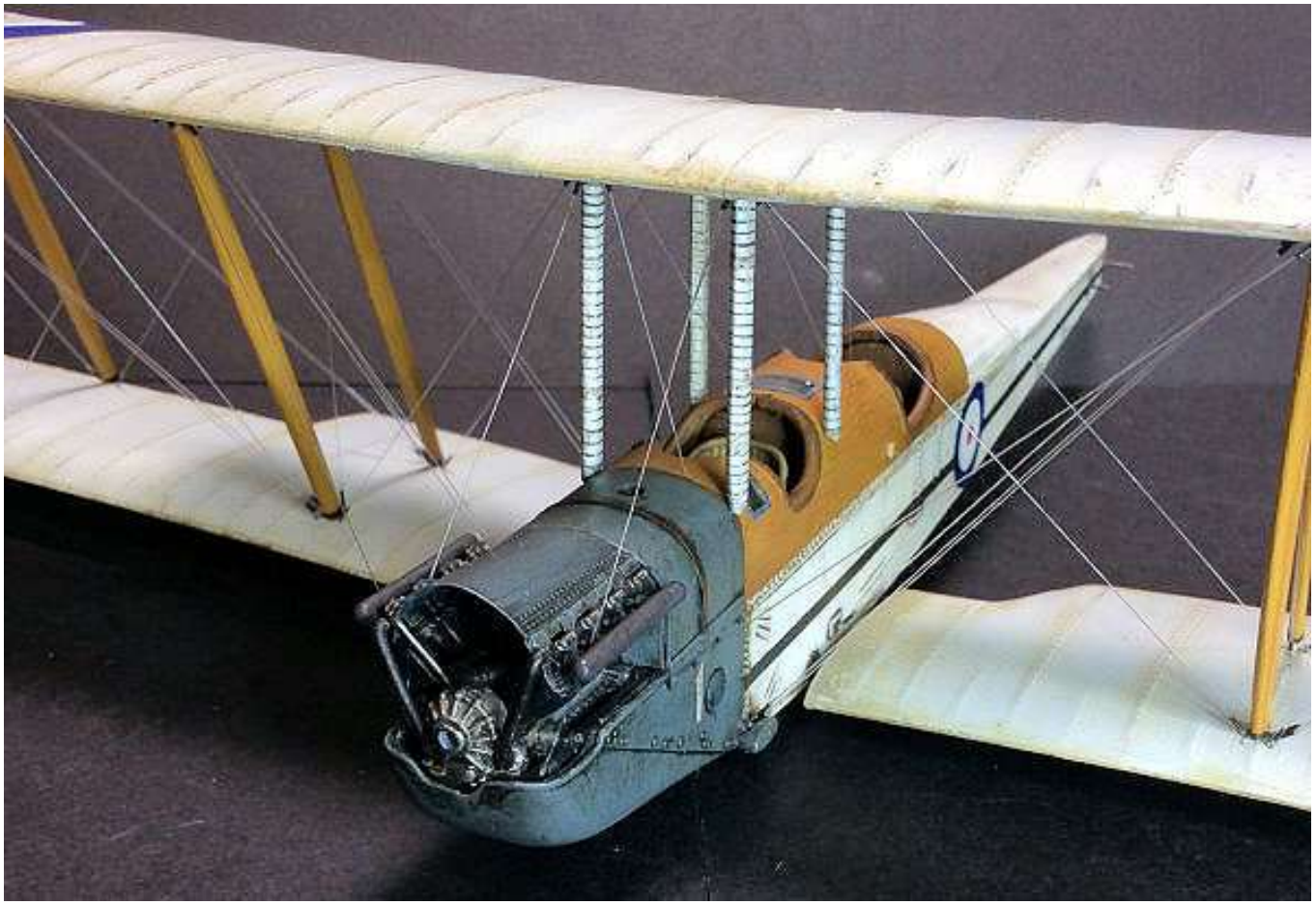
Pass the ends of the lines back through their tubes the slide the tubes up to the anchor points.

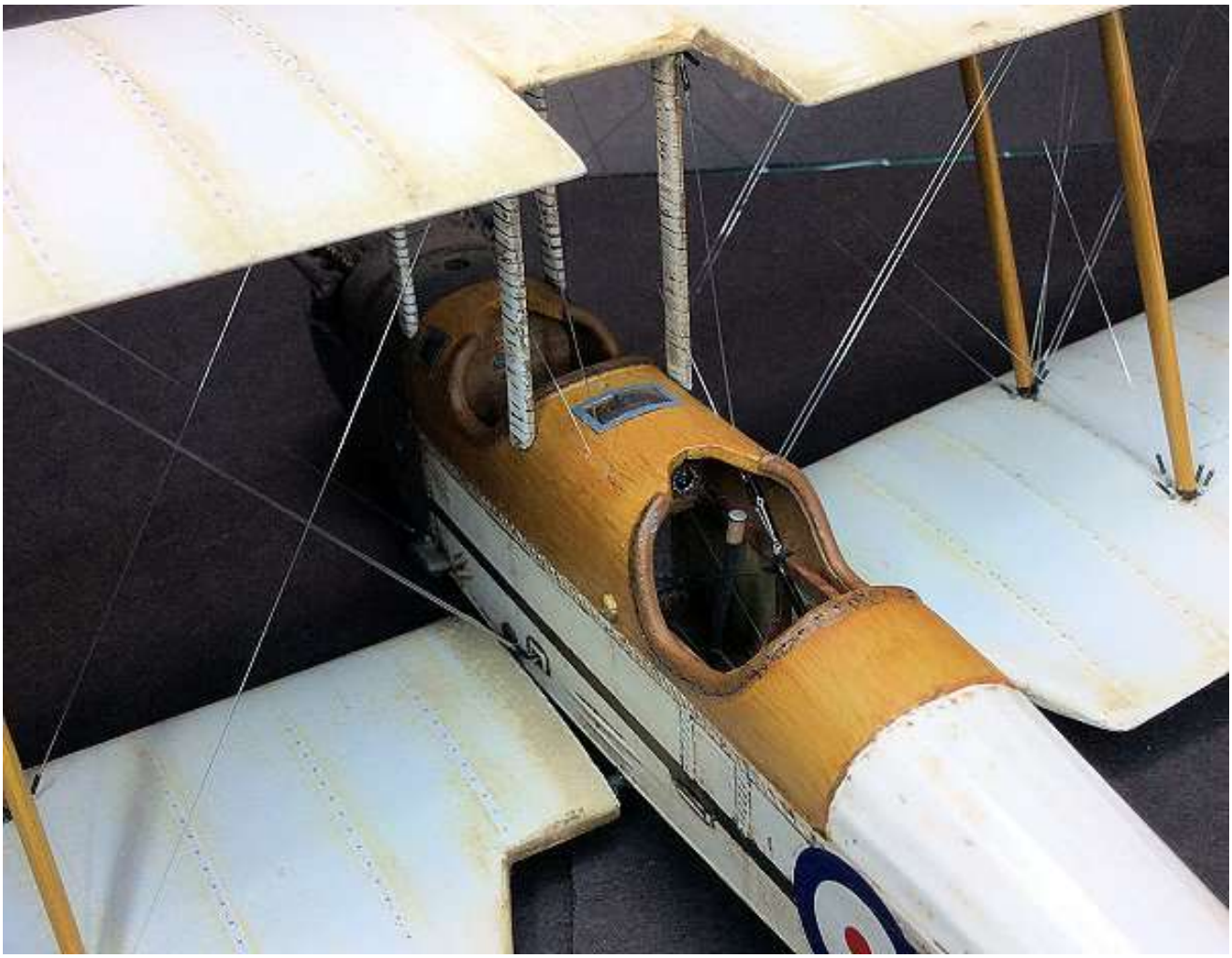
Keeping the lines taut, apply thin CA adhesive at the end of the tubes to secure the lines.

Cut away any residual tags of line.

Repeat this procedure to final rig the drag lines from the mid-wing to the anchor points fitted into the engine bearer blocks.







Ailerons - fit:

NOTE: *The ailerons and their control lines will be fitted before the landing gear. Due to the size and weight of the model, too much handling and movement could cause damage to the fitted landing gear. Take care handling the model until the landing gear is fitted as the photo-etch control hons on the ailerons are easily damaged.*

Brush paint the four 3D printed aileron pulleys with 'Tamiya' Metallic Grey (XF56) or similar.

Using thin CA adhesive, secure the pulleys into their locating holes in the top surface of the upper wing and underside of the lower wings.

NOTE: *During the following step, angle the ailerons on each side of the aircraft to suit the position of the pilots control column. If you positioned the control column centrally, the four ailerons should be inline with their wings. If positioned to the left or to the right, the ailerons on each side should be angled up or down.*

Fit the upper and lower wing ailerons fully onto their pre-fitted locating rods. Avoid touching the fitted photo-etch control horns.

If necessary, secure the ailerons in position using thin CA adhesive.

Aileron control- rigging:

Carefully lay the model onto its back to expose the underside.

Make sure the two slots for the aileron control horns (on the underside of the fuselage) are clear if paint and weathering etc.

NOTE: *The two control lines with control horns for under the fuselage were pre-rigged earlier in the build.*

Using thin CA adhesive, secure the control horns on the two pre-rigged aileron control lines into their locating slots on the underside of the fuselage.

Pass the ends of the lines outboard and under the fitted bomb racks to the aileron pulleys on the underside of the lower wings.

Pass the lines around the front of the pulleys then rearwards towards the lower wing ailerons.

Keeping the lines taut, secure them onto the pulleys, using thin CA adhesive.

Slide a cut and blackened 0.4 mm diameter tube onto the lines then pass the lines through the holes in the end of the aileron control horns of the lower wings.

Pass the end of the lines back through the tubes the slide the tubes up to, **but not touching,** the control horns, leaving the loops of line loose.

Cut two long lengths of 0.08 mm diameter mono-filament and slide a cut and blackened 0.4 mm diameter tube onto the lines.

Pass the lines through the loops of the previous lines at the control horns, then back through the tubes.

Slide the tubes up to, **but not touching,** the control horns, leaving the loops of line loose.

Pass the other end of the lines rearwards and through the pre-drilled hole in the aileron of the lower wings.

Pass the lines between the wings and through the pre-drilled holes in the upper wing ailerons.

Pull on the tags of the lines to draw the tubes to the control horns and to tighten the previously pre-rigged lines.

Keeping the lines taut, apply thin CA adhesive at the end of the tubes to secure the lines.

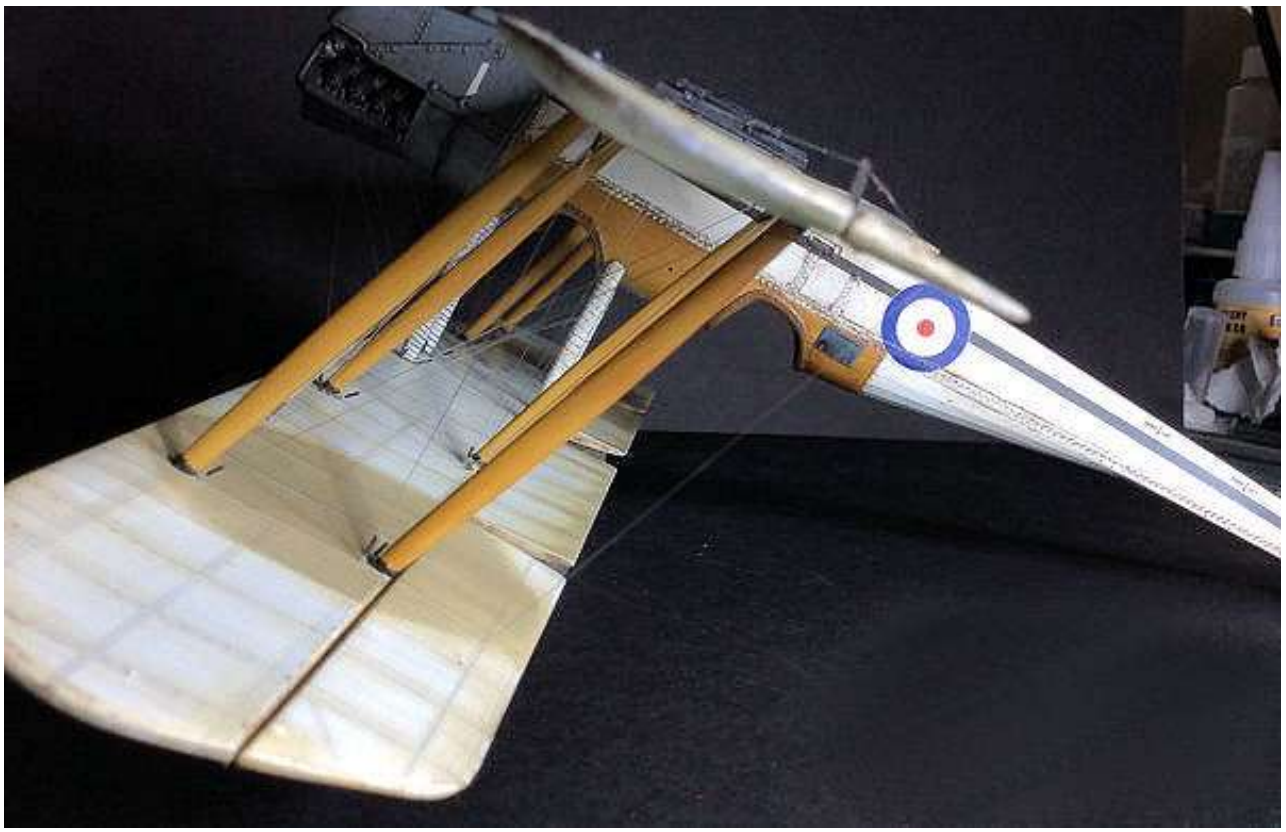
Cut away any residual tags of line.

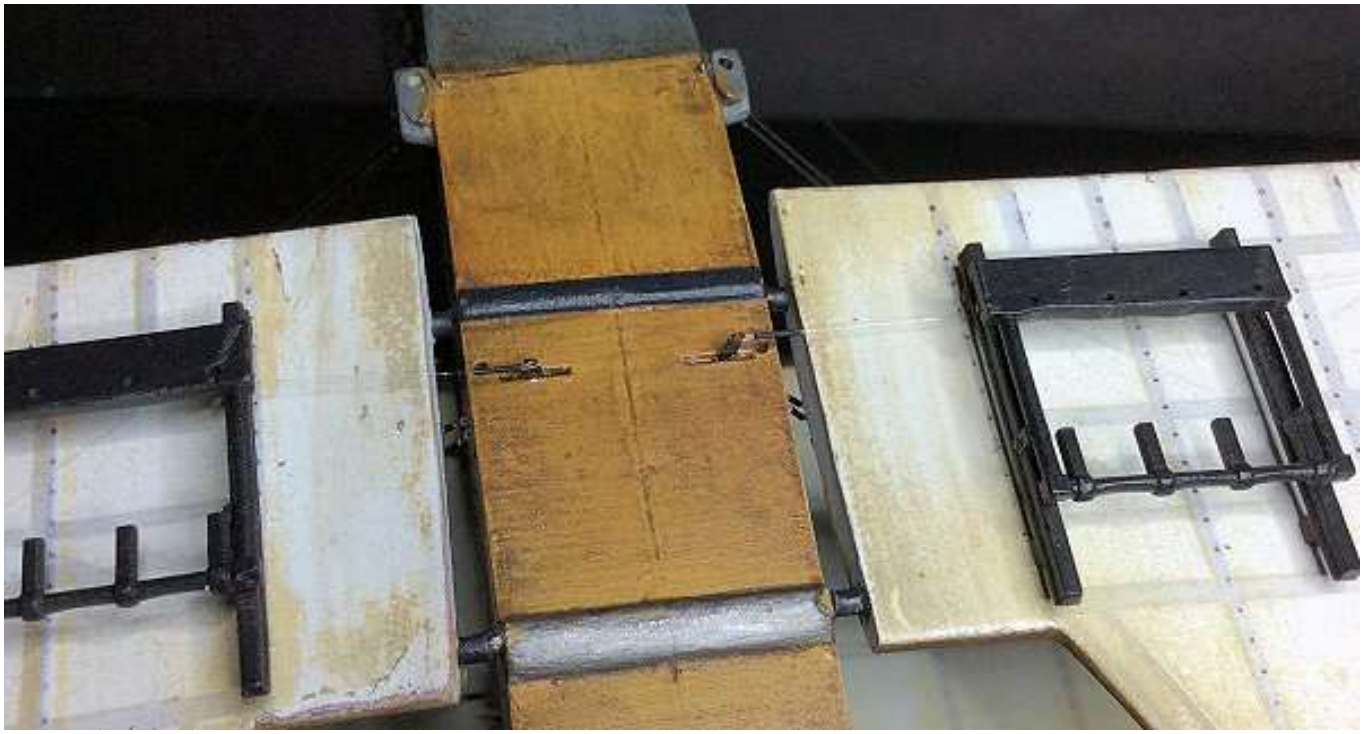
NOTE: *During the following step, make sure the model is supported such that the aileron control horns are protected from being damaged.*

Turn the model over to expose the upper surfaces.

Using the previous procedures, rig the two inter-wing control lines to the rear of the aileron control horns on the upper wing.

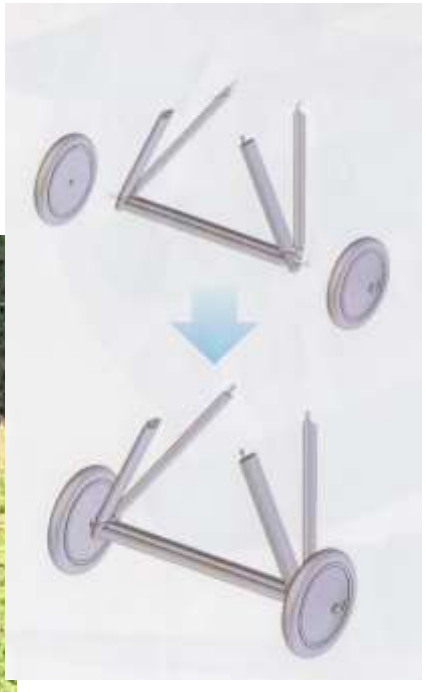
Using the previous procedures, rig the a control line between the aileron control horns on the upper wing and forward and around the two upper wing pulleys, connecting the two ailerons with a single control line.





Landing gear - fit and rigging:

NOTE: *The landing gear axle assembly was wrapped at each end with 'bungee' cord. The landing gear axle/fairing and the two 'V' struts were prepared earlier in the build.*
The kit supplied landing gear comprises two 'V' struts and the axle/fairing. The axle is intended to be glued to the bottom of the two 'V' struts. However, there is nothing to retain the axle at the bottom of the struts, except the CA adhesive under the axle and onto the bottom of the struts. The weight of the model bearing down on the axle and wheels with only the CA adhesive taking the weight is a joint failure waiting to happen. Therefore this needs to be addressed. Also the 'bungee' suspension cords are retained between two discs on the ends of the axle, which are not represented in the kit. Finally the internal strengthening rod within the axle protrudes from either end for mounting the wheels. However, the protrusions do not go far enough into the wheels, which is another weak point.



Holding the axle/fairing firmly, use pliers to twist the internal rod from side to side to break its adhesion with the fairing. Carefully twist the rod whilst pulling it out from the fairing.

Drill out the mounting holes in the two wheels (as deep as possible without breaking through) with a 0.8 mm diameter drill.

Cut a length of 0.8 mm diameter rod, such as that from ‘Albion Alloy’s or similar. The length of the rod should span the axle/fairing plus 9 mm protrusion at both ends.

To create the four discs for retaining the ‘bungee’ cord, I used the ‘Thinnerline’ circle cutter to cut four discs of 3.5 mm diameter. I then drill a hole of 0.85 mm diameter through the centre of each disc.

Brush paint the four discs with ‘Tamiya’ Metallic Grey (XF56) or similar.

Brush paint the bottom of the two ‘V’ struts with ‘Humbrol’ Leather (62) or similar.

Slide the cut 0.8 mm diameter rod through the axle fairing, leaving 9 mm protruding each both ends.

Secure the rod in the fairing using thin CA adhesive.

Slide one disc onto the protruding axle rods and against the ends of the fairing.

Secure the discs in position using thin CA adhesive.

Locate the axle/fairing between the two landing gear ‘V’ struts.

Dry fit the two ‘V’ struts into their pre-drilled holes on the underside of the fuselage.

Stand the model on the landing gear and check the ‘V’ struts are fully located into the fuselage and the struts are equidistant from the fuselage centre line.

Position the axle/fairing centrally between the ‘V’ struts leaving a slight gap between the fitted discs and the bottom of the ‘V’ struts.

Apply CA adhesive to secure the axle ends to the ‘V’ struts.

Cut a length of 0.2 mm diameter copper wire and anneal (soften) the wire by movement it across a naked flame, such as a cigarette lighter.

Bend the wire into a tight ’U’ shape and pass it over the axle, bending the ends of the wire around the bottom of the ’V’ struts and back over the axle.

Making sure the wrapped wire is tight, secure it in position using thin CA adhesive.

Repeat to secure the other end of the axle.

Cut a length of ‘EZ’ stretch line White (Heavy).

Using thin CA adhesive, secure one end of the line to the bottom of a ‘V’ strut.

Wrap the line over and across the inboard and outboard sides of the ‘V’ strut and secure with thin CA adhesive.

Brush ‘AK Interactive’ Kerosene (AK2039) over the wrappings.

Using thin CA adhesive, secure the wheels onto the axle rods.

Cut a length of 0.12 mm diameter mono-filament, such as ‘Steelon’ or similar.

Pass one end of the line through a short length of cut and blackened 0.5 mm diameter Brass tube, such as ‘Albion Alloy’s’ MBT04 or similar.

Pass the line through a pre-fitted Anchor Point in the forward, out board end of the axle fairing, then back through the tube.

Keeping the line taut, slide the tube up to, **but not touching**, the Anchor Point.

NOTE: *During the next step, make sure adhesive does not come into contact with the Anchor Point, as the loop of line needs to be free to move.*

Secure the line in the tube by applying a small amount of thin CA adhesive to the end of the tube furthest from the Anchor Point.

Carefully cut away the protruding end tag of line at the end of the tube.

Make sure the loop of line through the turnbuckle is free to move and not fixed in position with adhesive.

Repeat to add a line to the other Anchor Point on the axle fairing.

Locate the landing gear ’V’ struts into their locating holes in the underside of the fuselage and secure in position using thin CA adhesive.

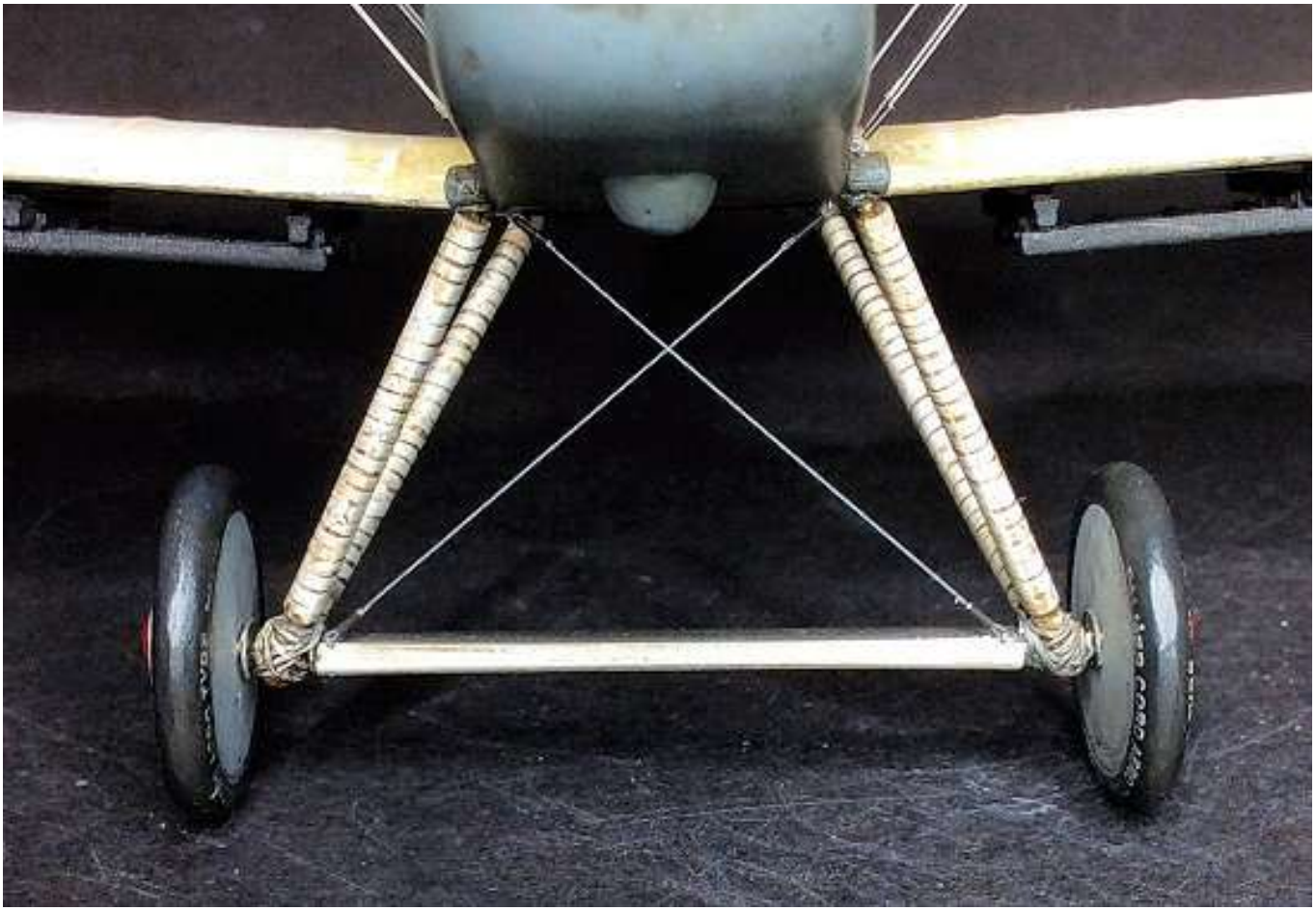
Diagonally cross the two fitted lines and **loosely** attach them to the fuselage Anchor Points, using the previous procedure.

Keeping the lines taut, slide the tubes up to, **but not touching**, the Anchor Points.

NOTE: *During the next step, make sure adhesive does not come into contact with the Anchor Points, as the loops of line need to be free to move.*

Secure the lines in the tube by applying a small amount of thin CA adhesive to the end of the tube furthest from the Anchor Point.

Carefully cut away the protruding end tag of lines at the end of the tubes.



Dulling down rigging:

NOTE: *The mono-filament used has a high gloss finish. Some modelers colour the mono-filament by painting, but I prefer to use a semi-matte clear coat. This both dulls the gloss finish and makes the rigging more visible, especially for the smaller diameter lines, which are difficult to see against a light coloured aircraft.*

Before airbrushing the rigging, carefully cover the three windows in the fuselage to avoid them being contaminated.

Mask over the three windows in the fuselage.

Airbrush all of the rigging with a light coat of semi-matte clear coat, such as ‘Alclad’ Light Sheen (ALC-311) or similar.

Remove the masking from the three windows in the fuselage.

Tail skid - fit:

NOTE: *The tail skid assembly was prepared earlier in this build.*

Clear any paint from the added locating rod and the top of the for bracing struts.

Using a 0.5 mm diameter drill, clear any paint from the pre-drilled locating hole in the underside, rear of the fuselage.

Apply CA adhesive to the locating rod and the top of the for bracing struts.

Secure the tail skid onto the underside rear of the fuselage, making sure it is aligned to the fuselage centre line.

NOTE: *As the model will need to be handled by holding the fuselage, the fitting of the elevator and rudder controls and wires will be fitted later in this model.*

Windscreens - fit:

NOTE: *Fitting the windscreen for the observer is restricted as it will need to be located behind the crossed bracing wires for the forward cabane struts. The pilots windscreen will be located between the four bracing wires for the front and rear cabane struts. These photo-etch frames were prepared earlier in this build.*

Airbrush the frames with a white primer, such as ‘AK Interactive’ White (AK759) or similar.

Airbrush the frames with ‘Tamiya’ Neutral Grey (XF53) or similar (to match the colour of the engine panels).

Refer to Part 3 (Weathering) of this build log for more information - apply your desired weathering finish to the windscreen frames (I used ‘Flory Models’ Dark Dirt fine clay wash).

Cut out two windscreens from the kit supplied acetate sheet.

Secure the acetate windscreens onto the rear face of the windscreen frames, using ‘Microscale’ Krystal Klear adhesive or similar.

Once the adhesive has set, use a damp cotton bud to wipe away any residual adhesive from the edges of the frames.

Carefully bend the annealed frames over a round former to create the required curvature to locate the frames in position in front of the cockpits and fully onto the fuselage decking panel.

Apply a thin layer of ‘Microscale’ Krystal Klear adhesive or similar onto the bottom edge of the observers windscreen, then passing it between the bracing wires, secure it in position at the front of the observers cockpit.

Apply a thin layer of ‘Microscale’ Krystal Klear adhesive or similar onto the bottom edge of the pilots windscreen, then passing it between the bracing wires, secure it in position at the front of the pilots cockpit.

Ammunition rack - fit:

Using ‘Microscale’ Krystal Kleer adhesive or similar, secure the prepared ammunition rack onto the side of the fuselage to left side of the observers cockpit.

Weapons - fit:

Using thin CA adhesive, secure the prepared swivel mounting for the observers machine gun into its pre-drilled hole in to top of the fuselage at the rear of the observers cockpit.

Locate the observers machine gun locating rod into the pre-drilled hole in the top of the swivel mounting. Apply thin CA adhesive to then secure the machine gun in the desired position.

Using ‘Microscale’ Krystal Kleer adhesive, locate the pilots machine gun locating rod into the pre-drilled hole in the right side of fuselage.

Bomb controls - fit:

Using ‘Microscale’ Krystal Kleer adhesive or similar, assemble the bomb release control quadrant from the supplied photo-etch parts (3 x 2, 3a and 3b).

Brush paint the quadrant assembly with ’Tamiya’ Rubber Black (XF85) or similar.

Using ‘Microscale’ Krystal Kleer adhesive or similar, secure the quadrant assembly onto the right side of the fuselage and forward from the pilots cockpit.

Cut two long lengths of ’MFH’ Black tube (P-961).

Using thin CA adhesive, secure the end of one tube under the bottom the control quadrant, then down the fuselage side. Continue across the rear wing spar under the fuselage then up to the inboard end of the rear rail of the bomb rack on the opposite lower wing.

Using thin CA adhesive, secure the end of the remaining tube under the bottom the control quadrant, then down the fuselage side. Continue up to the inboard end of the rear rail of the bomb rack on that lower wing.

Bombs - fit:

Using thin CA adhesive, secure the locating rods of the eight bombs into their locating holes pre-drilled in the front cross member of the bombs racks. Make sure the tail of each bomb is aligned centrally on its rear rail of the bomb rack.

Hand pump - fit:

Using thin CA adhesive, secure the hand pump and its tube into the pre-drilled holes in the left side of the fuselage, forward from the pilots cockpit.

Engine exhaust pipe - fit:

Temporarily locate the engine exhaust pipes into their location holes in the rear ends of the exhaust manifolds on the engine.

Remove the two retaining frames (17) from the supplied photo-etch sheet and remove any residual tags from their edges.

Blacken the frames by immersing them in blackening solution, such as 'Blacken-It' or similar.

Position the two photo-etch retaining frames onto the upper wing and against the rear edge of the exhaust pipes.

Make sure the two exhaust pipes are vertical when viewed from the front and sides and the retaining frames are inline with the wing ribs and are parallel to each other.

Apply thin CA adhesive to secure the two exhaust pipes into their exhaust manifolds.

Apply thin CA adhesive to secure the two retaining frames to the exhaust pipes and the upper wing.

Wing straps - fit:

Remove the two wing straps (16) from the supplied photo-etch sheet and remove any residual tags from their edges.

Blacken the straps by immersing them in blackening solution, such as 'Blacken-It' or similar.

Apply thin CA adhesive to secure the two photo-etch wing straps (16) in position on the upper wing.

Wing skids:

NOTE: *The kit supplies 3D printed 'hoop' type skids, which were fitted on the underside of the lower wing and below the outer interplane struts. However, they are printed flat whereas the actual wing skids were most likely round in section. Therefore, the kit wing skids will be replaced with tube versions.*

Cut two lengths of 0.6 mm diameter brass tube, such as 'Albion Alloy's' MBT06 or similar.

Anneal (soften) the tubes by moving them across a flame, such as that from a cigarette lighter, until the tubes colour changes to a light grey.

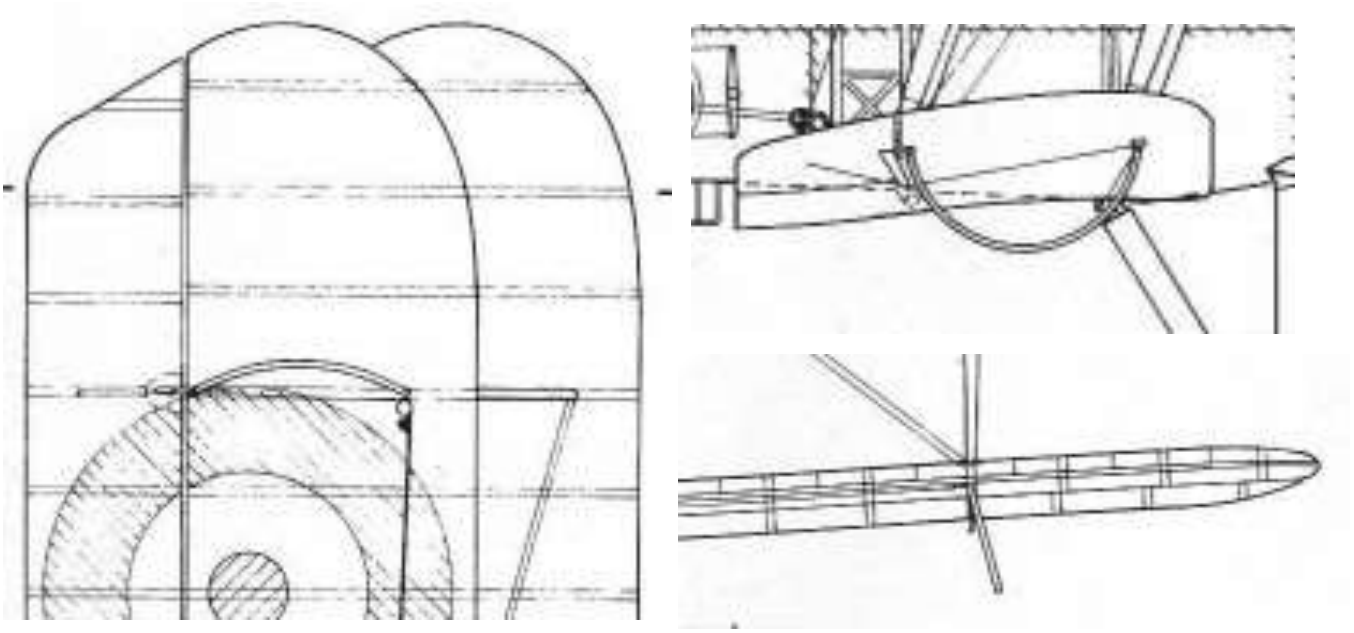
Wipe any flame soot from the tubes.

Carefully bend the tubes into a curve, using 20 mm diameter former.

NOTE: *When laying the model onto its back, make sure areas subject to damage, such as the control wires, levers and horns, the fin/rudder and ailerons and the engine exhausts.*

Turn the model over and lay it on suitable soft packing, such as foam.

Drill two holes of 0.7 mm dimeter into the underside of both lower wings. The holes should be located just outboard from the aileron control horns and wires and should be aligned across the wing chord. Drill the holes into the centre of the front and rear wing spar shadows and angled slightly outboard and towards the centre of the wings (see following illustration for the angle of the wing skids).



Lay the bent tubes onto the underside of the lower wings and over the pre-drilled holes.

Mark the tubes where the cross the drilled holes.

Cut the ends of the tubes at the marked positions.

Blacken the tubes by immersing them in blackening solution, such as ‘Blacken-It’ or similar.

Secure the tubes into the pre-drilled holes, using thin CA adhesive.

Elevators - final rig:

NOTE: *When final rigging the elevator controls, take care to not pull too much on the rigging lines as doing this may distort or dislodge the control levers or horns. The rigging lines were prepared earlier in this build.*

Cut a long length of 0.08 mm diameter mono-filament, such as 'Stroft GTM' or similar.

Slide a cut and blackened 0.5 mm diameter tube onto the line then pass the line through a hole in the end of one of the elevator control levers.

Pass the line back through the tube.

Pass the other end of the line through the free 'eye' of the 'Type C' turnbuckle fitted to one of the prepared rigging lines.

Pass the line back through the tube.

NOTE: *During the following step, make sure a small loop of line is left through the turnbuckle and the control lever, to allow the lines to be free to move and self-align.*

Pull on the two ends of line to draw the turnbuckle and control lever up to, **but not touching**, the ends of the tube.

Carefully apply thin CA adhesive to one end of the tube only, to secure the lines in the tube.

Cut away any residual tags of line.

Repeat the procedure to add lines to the other end of the control lever and to both ends of the other control lever.

Trim the length of the locating rods on the control lever. The length should be enough to be able to full locate the control levers into their pre-drilled holes in the sides of the fuselage.

NOTE: *During the following step, make sure the control levers are positioned correctly for the position of the elevators. If the elevators are aligned with the tailplanes, the levers should be vertical. If the elevators are angled down the levers should be angled back at their tops and vise-versa if the elevators are angled up (not normal on the ground).*

Secure the elevator control levers into their pre-drilled holes in the sides of the fuselage, using thin CA adhesive.

Slide a cut and blackened 0.4 mm diameter tube onto the end of one of the lines then pass the end of the line through the hole in the end of its elevator control horn.

Pass the end of the line back through the tube then slide the tube up to, **but not touching,** the control horn.

NOTE: *During the following step, make sure when tightening the line, that all tubes and turnbuckles are aligned along the line.*

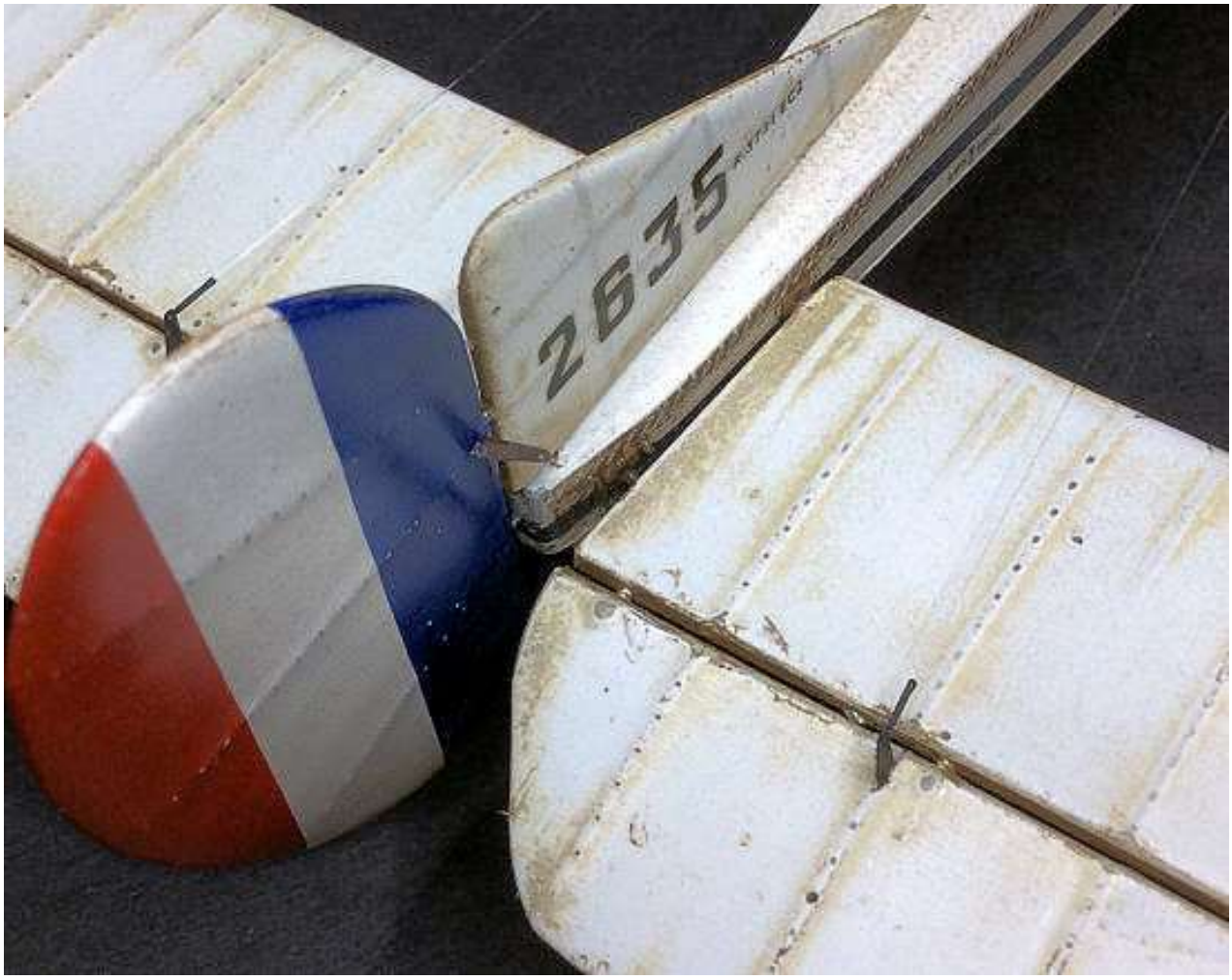
Keeping the line taut, apply thin CA adhesive at the end of the tube to secure the lines in the tube.

Cut away any residual tag of line at the end of the tube.

Repeat the procedure to add lines to the other three elevator control horns.

Using previous methods, add a line (with 0.4 mm tubes) from an upper elevator control horn, through the pre-drilled hole in the elevator to the underside control horn.

Repeat for the other tailplane.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Rudder - final rig:

NOTE: *The rudder control horns are photo-etch parts (20 x 4). Twin control wires with turnbuckles were fitted at both sides of the fuselage. These will be created using the 350 mm long pre-rigged lines.*

Make sure the slots created in the sides of the fuselage to locate the rudder control levers, are clear of paint etc.

Test fit the control levers in their slots, making sure they are fully located.

Secure the two rudder control levers into their slots, using thin CA adhesive.

Slide a cut and blackened 0.4 mm diameter tube onto one pre-rigged rudder control line then pass the line through the hole in the end of one of the rudder control horns.

Slide another cut and blackened 0.4 mm diameter tube onto one line then pass the line through 'eye' of a 'GasPatch 1:48th scale turnbuckle (Type C).

Pass the line back through the tube.

Slide the tube up to, **but not touching**, the 'eye' end of the turnbuckle leaving the loop of line loose.

Cut a long length of 0.08 mm diameter mono-filament, such as 'Stroft GTM' or similar.

Route the two lines from the rudder control horn between the two fitted elevator control lines.

NOTE: *During the following step, make sure the line from the top of the rudder control horn is position on at the top of the rudder control lever in the fuselage, with the bottom line to the bottom of the lever.*

Pass that 'retaining' line through the free 'eye' end of the top rudder control cable, then down through the hole in the rudder control lever and through the free 'eye' end of the bottom rudder control cable.

NOTE: *During the following steps, take care not to apply too much tension in the lines otherwise the photo-etch control levers or control horns may be damaged or dislodged.*

Using appropriate tools, such as self-locking tweezers, hold both ends of the line taut, preferably from the front of the aircraft.

Hold the tag end of line at the loose turnbuckle 'eye' end and carefully work the line such that both lines are taut.

Pull on the end of the loose turnbuckle line and carefully draw the tube up to, **but not touching**, the 'eye' end of the turnbuckle with 'both' lines taut.

Carefully apply thin CA adhesive to the end of the tube only, to secure the lines in the tube.

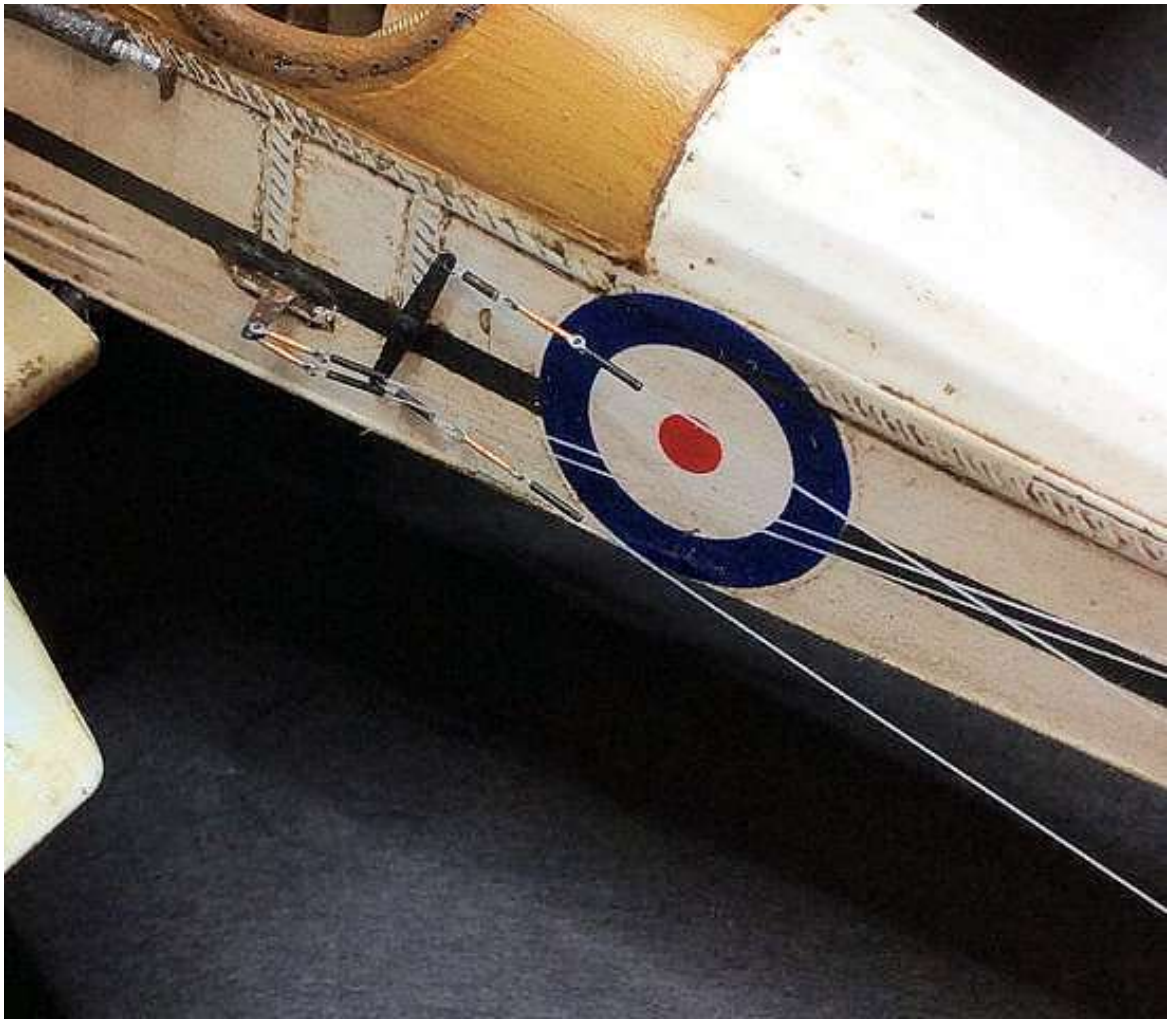
Cut away any residual tag of line.

Carefully cut away the two residual tags of the 'retaining' line from the control lever.

Slide the tubes on the top and bottom rudder lines up to the rudder control horn and secure to the lines using thin CA adhesive.

Repeat the procedure to add the two rudder control lines to the other side of the fuselage.

Using previous methods, add a line (with 0.4 mm tubes) from a rudder control horn, through the pre-drilled hole in the rudder to the other control horn.

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Fin bracing - final rig:

Cut two long lengths of 0.08 mm diameter mono-filament, such as ‘Stroft GTM’ or similar.

Slide two cut and blackened 0.4 mm diameter tubes onto the line then pass the line from above through a forward pre-drilled hole in a tailplane.

Pass the line through the pre-drilled hole in the trailing edge of the fin.

Slide two cut and blackened 0.4 mm diameter tubes onto the line then pass the line down and through the forward pre-drilled hole in the opposite tailplane.

Repeat to add a bracing line to the trailing edge of the tailplanes.

Turn the model over onto its back, making sure the model is adequately protected from damage.

Slide two cut and blackened 0.4 mm diameter tubes onto the two forward lines then pass the lines through the pre-drilled hole through the tail skid.

Repeat for the two rear lines.

Using appropriate tools, such as self-locking tweezers, grip the ends of the line and carefully pull all for taut.

NOTE: *During the following step, keep the tubes clear of the tail skid.*

Apply thin CA adhesive to the two side of the tail skid to secure the lines.

Slide each of the eight tubes up to the fin, tailplanes and tail skid and secure the in position on the lines using thin CA adhesive.

Carefully cut away and residual end tags of line.

Rigging - final tensioning:

Invariably after rigging has been completed, some lines may be slack. This can be remedied by careful application of heat along the line, but should only be carried out once all rigging has been completed. Only then will you be able to see which lines require additional tensioning.

NOTE: *Take care not to linger at one area of a line with the heat source as this will melt the mono-filament causing the line to break. Also take care not to touch any part of the model or any other rigging, as this will also cause damage through melting.*

WARNING: *Care needs to be taken when using this method to tension line, as using a heat source is required.*

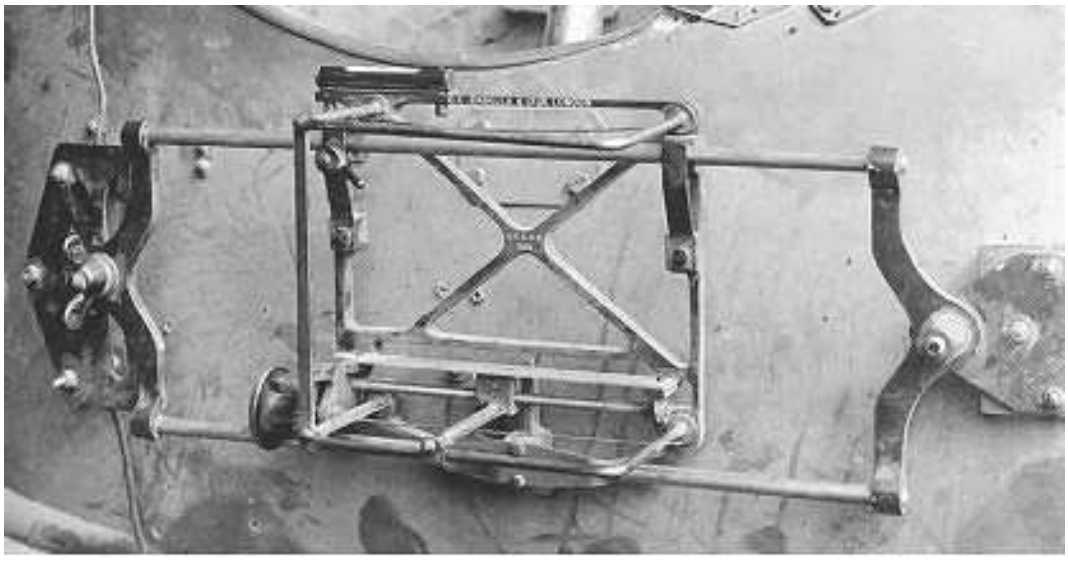
Carefully move a suitable heat source (I use a small electrical soldering iron) close to and along the slack line, keeping the heat source always moving. You will see the line tension as the applied heat takes effect, shrinking the line.

Bomb sight:

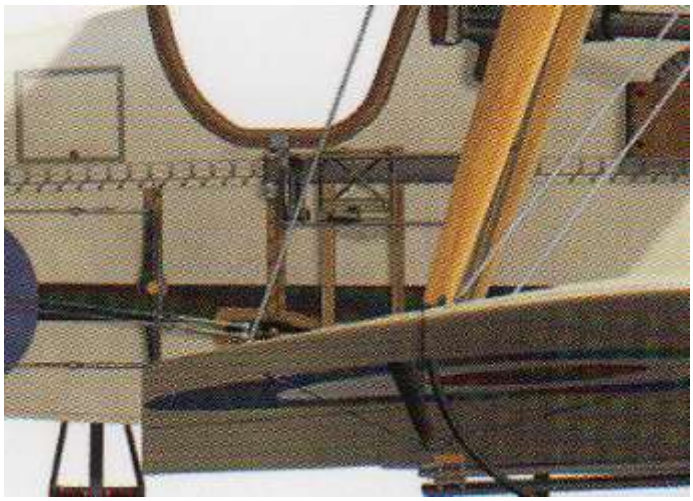
NOTE: *The kit supplied photo-etch part (6) represents a CFS Mk.4 bomb sight. However the photo-etch supplied is very fragile and was easily broken during bending into shape. With great care when bending and subsequent handling, you should be able to you the kit bomb sight.*

However, I chose to create a representation of the bomb site with the mounting frame shown for this particular aircraft. The CFS Mk 4 bomb sight was invented by 2/Lt (later Colonel) Bourdillion, when he was working with the CFS Experimental Flight in early 1915. Ultimately, nearly 4,000 CFS bomb sights would be produced.

CFS Mk.4 bomb sight



Profile showing the bomb sight on a mounting frame



I created the bomb sight by using the three plates only. These were cleaned the secured together at their edges, using thin CA adhesive. Brass rods of 0.3 mm diameter from ‘Albion Alloy’s’ (MBT03) were cut and used for the cross bars. The ‘V’ end ‘brackets’ were created by bending 0.3 mm diameter Brass tube into a shallow ’V’ then flattening them with flat faced pliers. These and the cross bars were secured in position using thin CA adhesive. The control ‘disc’ was cut from 0.2 mm thick plastic sheet and secured in position on the frame. Thin strips of 0.2 mm thick plastic sheet were cut to represent the two mounting uprights. The bomb sight assembly and the two strips were airbrushed with ‘Tamiya’ Rubber Black (XF85). With reference to the previous profile illustration, the two uprights were secured in position on the fuselage right side at the pilots cockpit and the bomb sight assembly secured to them, all with using thin CA adhesive.

Sump drain - fit:

NOTE: *The sump cover on the underside, front of the fuselage had a drain connection fitted, which is not represented on the model.*

Cut a short length of 0.6 mm diameter brass tube, such as 'Albion Alloy's' MBT06 or similar.

NOTE: *When laying the model onto its back, make sure areas subject to damage, such as the control wires, levers and horns, the fin/rudder and ailerons and the engine exhausts.*

Turn the model over and lay it on suitable soft packing, such as foam.

Drill a hole of 0.8 mm diameter into the centre of the sump.

Drill into the hole to 0.5 mm depth using a 1.8 mm diameter drill.

Cut a short length of 0.8 mm diameter Brass tube, such as 'Albion Alloy's MBT08 or similar.

Using thin CA adhesive, secure the tube into the 0.8 mm diameter hole, leaving 1.0 mm protruding.

Refer to Part 3 (Weathering) of this build log for more information - apply your desired streaking behind the added tube (I used 'Flory Models' Dark Dirt fine clay wash).

Pitot tube:

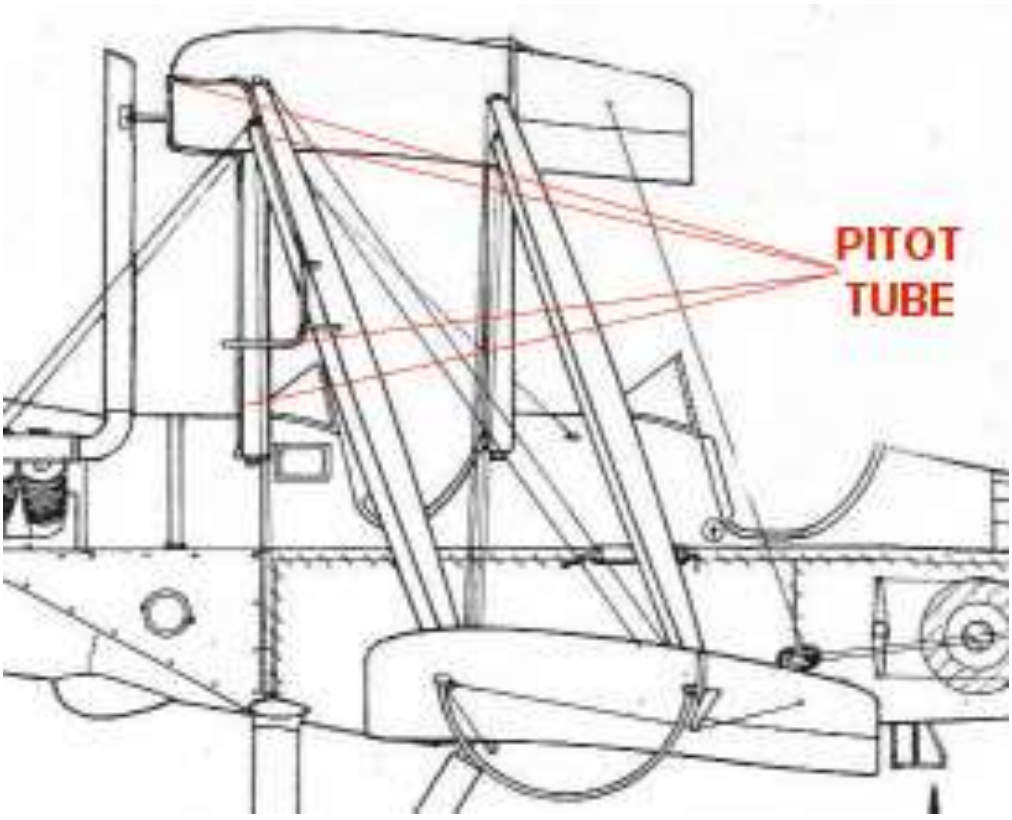
NOTE: *Airspeed indicators were supplied with airflow through 'Pitot' tubes, mounted externally on the aircraft and away from the effects of the propeller wash. The BE2c aircraft had single (operational aircraft) or twin pitot tubes (trainer aircraft) fitted on the leading edge of the outboard, forward interplane strut. For this model, the supply tube from the pitot 'head' was routed up the strut, along the leading edge of the upper wing then rearwards to the fuselage forward cabane strut. The tube was routed down the strut and into the fuselage at the observers cockpit and then rearwards to the airspeed indicator in the pilot's cockpit.*

To create the pitot tube as a single piece, the 0.4 mm diameter Brass tube used is the c, which is supplied in 300 mm lengths. For ease of fitting, the pitot tube will be created as two pieces. The longest tube will be between the forward left outboard interplane strut to the top of the forward left cabane strut. The second, shorter strut, will be from the top of the forward left cabane strut to the bottom of the strut at the fuselage.

When laying the model onto its back, make sure areas subject to damage, such as the control wires, levers and horns, the fin/rudder and ailerons and the engine exhausts.

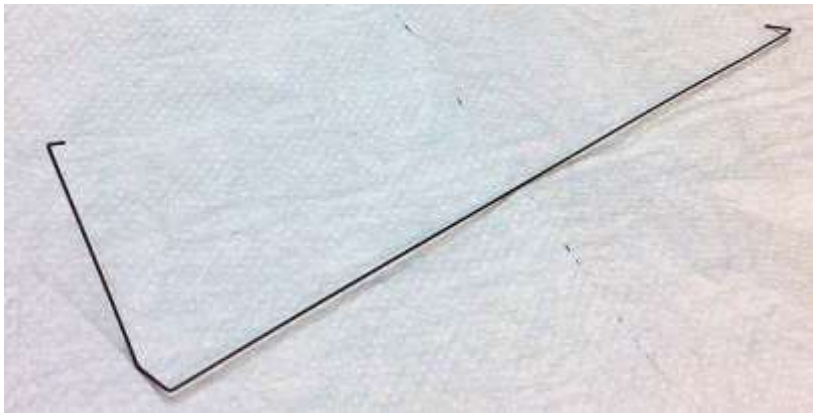
Turn the model over and lay it on suitable soft packing, such as foam.

Using the following illustration and the model as a guide, bend a length of the 0.4 mm diameter Brass tube ('Albion Alloy's' MBT04) into shape to fit between the leading edge of the forward left, outboard interplane strut and the top of the forward right cabane strut.



Check the position and fit of the tube and adjust as necessary.

Once the tube shape is correct, blacken the tube with such as 'Blacken-It' solution or paint it with 'Tamiya' Rubber Black or similar.



Position the tube against the leading edge of the forward left outboard interplane strut and the top of the forward left cabane strut.

Secure the tube to the interplane strut and the underside of the upper wing, using thin CA adhesive.

Follow the same procedure to create the second tube, to fit between the end of the previously fitted tube at the top of the forward left cabane strut to the bottom of the strut at the fuselage.

Check the position and fit of the tube and adjust as necessary.

Once the tube shape is correct, blacken the tube with such as ‘Blacken-It’ solution or paint it with ‘Tamiya’ Rubber Black or similar.

Secure the tube to the leading edge of the cabane strut and the underside of the upper wing, using thin CA adhesive.

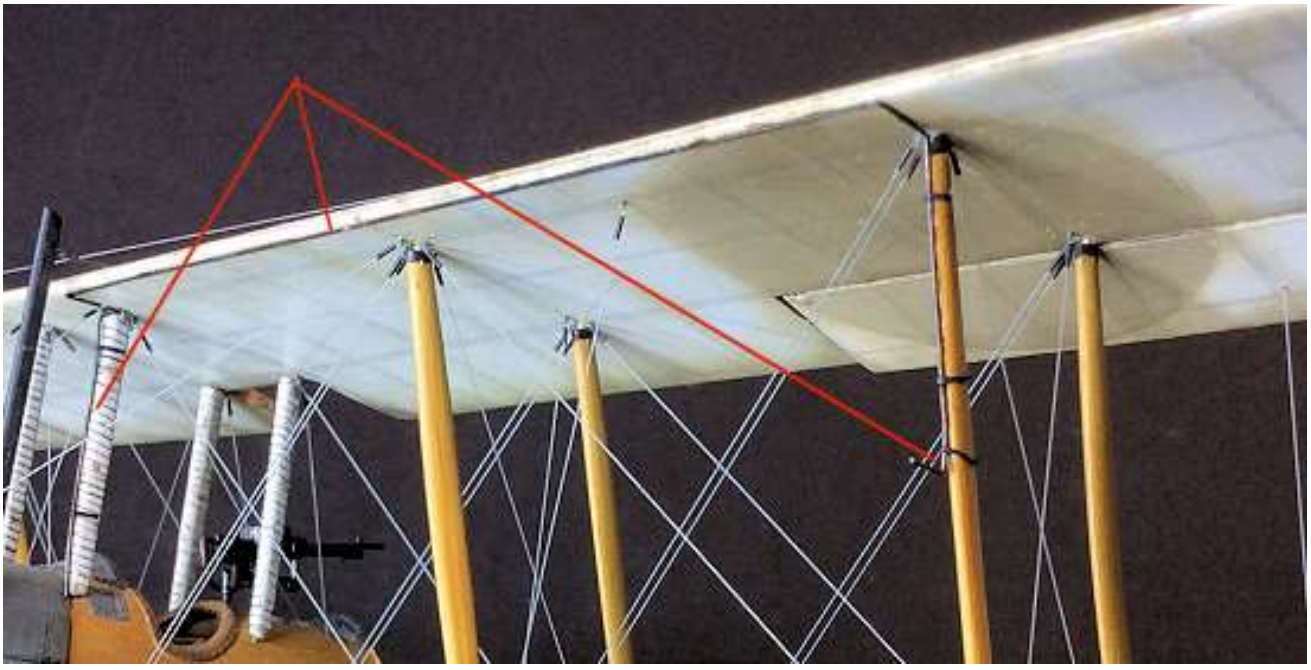
NOTE: *The pitot tube was secured to the interplane and cabane struts with strip brackets. These strip brackets are required on the interplane strut (x3) and the cabane strut (x2). Refer to the following photograph for the locations of the lines.*

Cut long lengths of ‘EZ’ stretch Black (heavy) line.

Pass the lines over the leading edge of the struts with the two ends at the rear of the wings.

Pulling on the ends of the lines to keep then taut, secure the lines onto the sides of the struts.

Cut away the tails of the lines leaving the lines secured against the sides of the struts.



Foot step:

NOTE: *The kit supplied photo-etch foot step (6) is very fragile and was easily broken during bending into shape. With great care when bending and subsequent handling, you should be able to you the kit bomb sight.*
However, I chose to create a representation of the foot step using flattened 0.4 mm diameter Brass tube, such as 'Albion Alloy's' (MBT04) or similar.

I created the foot step frame by bending Brass 0.4 mm diameter tube to shape, then flattening it with flat nosed pliers. The retaining strap was made in the same manner then soft soldered onto the frame.

Two holes of 0.5 mm diameter were drilled into the underside edge of the fuselage (left side) below the elevator control lever. The assembly was painted with 'Tamiya' Rubber Black (XF85) then secured in positing using thin CA adhesive.

Propeller - fit:

Using CA adhesive, secure the prepared propeller into its locating hole in the front of the engine.

PART 14
FIGURES

PART 14 - FIGURES

NOTE: The figures are made from resin, as opposed to the normal plastic used. Working with resin does present different challenges to the modeller, especially if it's the first time of building a resin kit. The properties of resin differ radically to those of plastic kits. Refer to **Part 5 (Resin and 3D prints)** of this build log.

The figures I chose to use are from 'Model Cellar' - British RFC pilot and gunner(MC32026).

Pilot RFC:

NOTE: *This figure set consists of two parts, being the figure and the head.*

Gunner:

NOTE: *This figure set consists of three parts, being the figure, head and weapon (not used in this model build).*

Preparation:

Cut the parts away from their moulding blocks.

Scrape or sand away any resin artifacts or mould seam lines.

Drill a hole of 0.8 mm diameter up into one of the legs.

Cut lengths of 0.8 mm diameter rod, such as 'Albion Alloy's' MBR08 or similar.

Secure the rods into the pre-drilled holes in the legs, using thin CA adhesive. These rods will be used to hold the figures for painting and for mounting on the display base.

Drill a hole of 0.8 mm diameter up into the neck of the heads and temporarily fit the heads onto 0.8 mm diameter rods, so they can be held for painting.

Painting:

Airbrush the two bodies and heads with a grey primer, such as 'AK Interactive' Grey (AK758) or similar.

Brush paint the parts as follows:

Helmet, coat and gloves :

Base colour - 'AK Interactive' Brown Leather (AK3031)

Highlights - 'AK Interactive' British Uniform (AK3081)

Airbrush the helmet and coat with a semi-matte clear coat, such as 'Alclad' Light Sheen (ALC311) or similar.

'Fug' boots:

Base colour - 'AK Interactive' British Uniform (AK3081)

Shadows - 'AK Interactive' British Uniform Light (AK3082) mixed with British Uniform (AK3081)

Overshoes and straps - 'AK Interactive' British Uniform Light (AK3082).

Collar, boots and helmet lining - 'AK Interactive' Faded White (AK3029) with British Uniform (AK3081) highlights.

Jacket and trousers - 'Tamiya' Khaki Drab (XF51).

Pilots scarf - 'AK Interactive' French Uniform (AK3101) with 'Tamiya' Weathering Master Set B (soot) dusting.

Gunners scarf - ‘AK Interactive’ Faded White (AK3029) with ’Tamiya’ Weathering Master Set B (soot) dusting.

Goggles - British Uniform Light (AK3082), lenses ‘Mr. Colour’ Stainless Steel (213) with ‘Tamiya Clear Yellow (X24) tint applied on top.

Buttons and buckles - ‘Tamiya’ Gun Metal (X10.

Flesh:

NOTE: *The **‘Citadel’** paints used for painting the flesh are water based and can be thinned as required using water, which is also used to clean the brushes. It’s easier to use a ‘wet palette’ when applying these paints as this keeps the paint from drying and allows mixing of paints as required. A basic wet palette can be a water proof plastic lid with dampened kitchen roll paper laid inside. The paints are then dripped onto the damp paper and applied from there.*

The paints used for the flesh of the figures are from the ‘Citadel’ colour range:

Base coat - ’Bugmans Glow’.

Shading - ‘Reikland Flesh Shade’.

Flesh tone - ‘Cadian Flesh Tone’.

Flesh highlights - ‘Kislev Flesh’.

Brush ‘Bugmans Glow’ over the exposed head and hands of the figure and allow to dry.

Brush thinned ‘Reikland Flesh Shade’ over the painted head and hands of the figure and allow to dry.

Brush thinned ‘Cadian Flesh Tone’ over the painted head and hands of the figure and allow to dry. Do not apply the paint such that it completely covers the previous coat, as subtle shadows are necessary around such as the ears, eyes, nose and chin etc.

Brush thinned ‘Kislev Flesh’ over the painted head and hands of the figure and allow to dry. This application is very light and intended to highlight areas such as the eye brows, ears, bridge of the nose and jaw line etc.

Using a needle point, apply ‘Tamiya’ Rubber Black (XF85) or similar to create the eye pupils.

Assembly:

Remove the temporarily fitted rods in the heads and secure the heads onto the bodies, using thin CA adhesive.

Pilot figure

Gunner figure

PART 15
DISPLAY BASE

PART 15 - DISPLAY BASE

The display case is made from two sheets of 3mm thick Piano Black Acrylic sheet cemented together with a transparent top fabricated from 3mm thick Clear Acrylic sheet. This was custom made for me by Paul Moss at 'Inperspextive' (Ebay). The name plaque was also made by an on -line retailer 'The Engraving Shop'.

The grass mat was cut to shape from a sheet of 'Lars op't Hof' pasture, Summer long LH10.24). The cut mat was then positioned on the base and the model and figures test placed to achieve the best effect and to make sure the transparent cover of the case would be able to be located without touching the model. The model and figures were then removed with the grass mat left in position on the display base. The edges of the grass mat were then carefully lifted and a soft marker pen was used to mark the outline of the grass mat, but approximately 5 mm inside the mat edge. The grass mat was then removed and the area of the display base inside the marks was scuffed using a coarse grit sand paper, in order to give a key for the adhesive.

NOTE: *When applying the adhesive, make sure it is not applied too thickly and close to the edges of the finally positioned grass mat. Otherwise the adhesive may be squeezed out from under the grass mat once weight is applied to hold down the mat during setting of the adhesive.*

A coat of PVA adhesive (white glue) was applied to the scuffed area on the display base. The grass mat was then laid onto the PVA adhesive and positioned correctly. Light pressure was applied to ensure the mat was in contact with the adhesive.

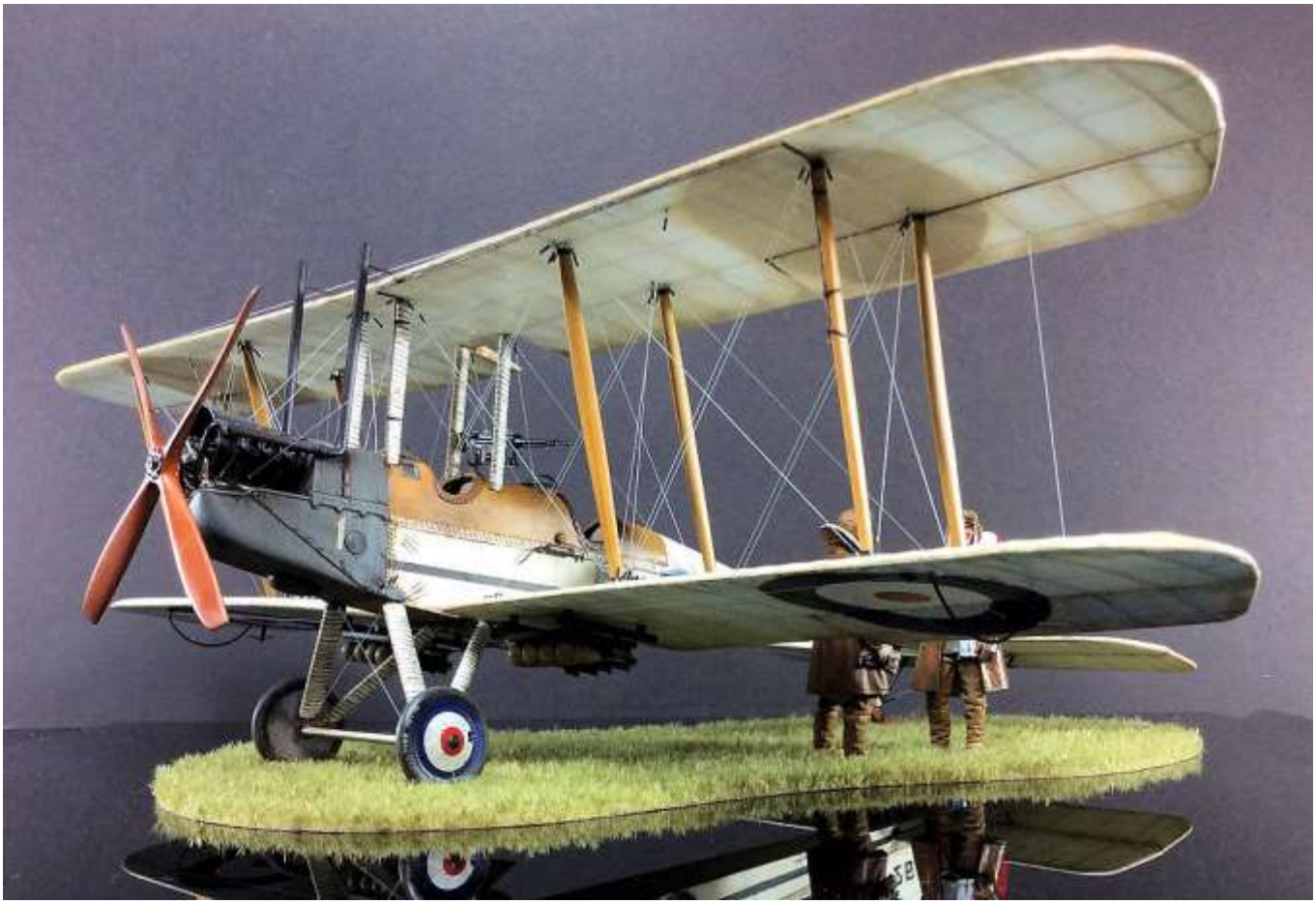
Finally an acrylic plaque stand was positioned to the left, front corner of the display base (just in from the edges of the shoulder for locating the transparent acrylic cover. The area on the underside of the stand and its contact are on the display base were scuffed using a coarse grit sand paper, in order to give a key for the adhesive. A thin coat of contact adhesive was then applied to both scuffed areas and once the adhesive started to set, the stand was carefully position onto the display bae and pressed down to make full contact. The self-adhesive backed information plaque was the positioned onto the stand and pressed to make full contact.

The model and figures were then positioned on the base in their final positions and the support pins in the figures leg marked into the grass mat. Holes of 1.0 mm diameter were then drilled through the grass mat and into, but not through, the base. The holes were cleared of residual acrylic to ensure the pin in the figures would fully locate. The figures were then test fitted and where necessary, the support pin was snipped to the required length to fully locate into the display base.

NOTE: *The aircraft model is not secured to the display base as this can cause shock damage to the model if the display is transported to shows etc. For that the aircraft model would be packed separately for transporting.*

Thin CA adhesive or PVA adhesive was then applied to the support pins of the figures, which were then located, in the desired positions, into their pre-drilled location hole. The aircraft itself, being light in weight, will tend to sit on top of the grass on the mat, rather than seat fully down, as would a real aircraft. Therefore the location of the aircraft wheels and tail skid were marked onto the grass mat and those areas scrapped through the mat to create slight and unobstructed troughs, into which the aircraft could be located.

PART 16
COMPLETED MODEL PHOTOGRAPHS

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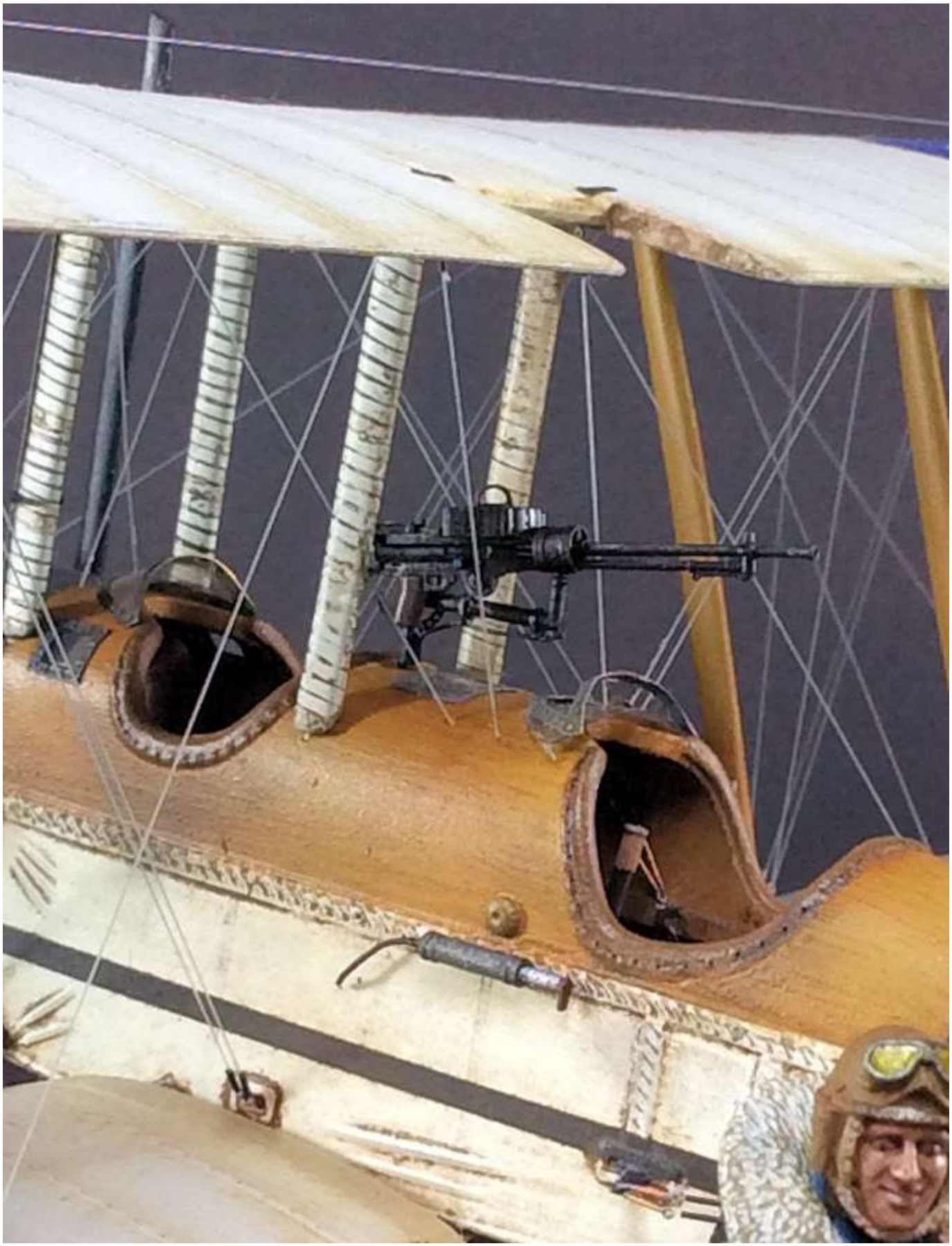

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