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# **SUPERMARINE SPITFIRE NIGHTFIGHTER**

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# **SUPERMARINE SPITFIRE – THE ONE AND ONLY SPITFIRE**

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The Spitfire was designed by Reginald Mitchell of The Supermarine Aviation Works and is arguably the most elegant but deadly aircraft of World War 2.

The beautiful fuselage curves, the distinctive elliptical wings, plus its legendary service in action, make it one of the most recognisable and loved aircraft in the world.

The prototype first flew from Eastleigh Aerodrome, near Southampton, England in March 1936. The Spitfire was an advanced aircraft when first designed and unlike its similarly Merlin-engined stablemate the Hawker Hurricane, used new complicated

monocoque construction techniques. As a result of these complexities and production difficulties at Supermarine, the move from prototype to full production was slow and problematic. However, once this was overcome, the Spitfire was produced in huge numbers. This is in part due to the more advanced initial design, which was able to be constantly developed and improved to increase performance, ironically the very thing that hindered it in the early days. Production only ceased in 1948, making it the only allied aircraft to be manufactured for the entirety of the war.



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# YOUR KIT

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This kit is designed for you to build a traditionally constructed, rubber powered, free flight model of a Spitfire. Depending on the model you purchased, the kit is provided with the materials (other than paints) to complete either the authentic scheme of an all black night fighter Spitfire that served in the 111 Squadron that flew from RAF Debden in 1941 or with plain covering so you can decide to do your own favourite scheme.

Construction of the model from this kit uses the traditional method of 'stick and tissue', that consists of a built up balsa wood skeleton (framework), covered with a tissue skin. The balsa frameworks are built over a plan that is printed at the exact scale of the model, which is in essence a real engineering drawing.

Power is provided by rubber strip motor that is wound up before flight. Free flight means just that – once the model is launched, it is on its own. It must follow a predetermined flight path established when the model is initially adjusted for flight or 'trimmed'. This type of traditional building technique and flying requires a degree of patience and skill, but is extremely rewarding.

The Spitfire is just one of a series of kits designed and manufactured by the Vintage Model Company. Aeromodelling was very popular from the 1950s until the 1980s and following a decline and the loss of UK manufacturers such as FROG, KeilKraft and Veron, a revival is now underway. The advent of modern technology such as laser cutting of parts and the growth of the internet giving access to information on the skills and techniques required to successfully build and fly these models, means new enthusiasts are discovering the joys of aeromodelling every day.

Typically for a small model and in the spirit of the traditional kits, profiles are simplified and adjusted from the original and a relatively large propeller is used. This is done so that the model is light and stable enough to fly on its own, is simple in construction and can work with the rubber motor.

## KIT CONTENTS

- Three balsa sheets with precise laser cut parts and strip wood.
- PVA glue for building the wooden frames.
- One 150mm diameter plastic propeller.
- One pre-bent motor hook and shaft.
- Three low friction plastic 'nose' bushings – one for the propeller and two for the undercarriage wheels.
- One vacuum formed canopy and spinner.

These adjustments have been done with care and sensitivity so that the shape and spirit of the original aircraft is preserved as much as possible. Also in the spirit of the traditional kits, additional items required to build the model are things that can be found in the kitchen drawer or are easily available on the high street.

- Piano wire for the main undercarriage and tail wheel legs.
- One motor peg (cocktail stick or toothpick).
- Rubber motor strip.
- Tissue to cover the model.
- Parts reference sheet (W), full size summary plan sheet (X), scheme diagram sheet (Y) and scheme markings (Z) printed on lightweight paper.

# OTHER THINGS THAT YOU WILL NEED

## CONSUMABLES

- Glue. 'Cyano' (sometimes called 'superglue'), quick setting epoxy and a 'glue stick'.
- Cling film or waxed paper to cover your plan or a wax candle to rub over it.
- One sheet of standard printer paper (80gsm).
- Tissue sealant – if you want to fly your model outdoors (see 'Covering' for details).
- Paints (Humbrol-style enamels) if you want to give your model an authentic scheme.

## TOOLS

- A flat piece of wood or cork that is large enough for the largest part of the model and soft enough for pins to be pushed into.
- Some modelling pins. If these aren't available, dress making pins or drawing pins with tall heads will suffice.
- A sharp craft knife or scalpel.
- Pliers and wire cutters.
- 180 and 600 grit sandpaper and a small sanding block, or a disposable nail file with rough and smooth sides.
- A small engineers square or a plastic set square from a school geometry set.
- 30cm rule (preferably steel).
- 'Blu-Tack' or plasticine.
- A fine marker pen.
- Brushes – one thin and fine, one flat and soft 10-12mm wide.
- An old perfume bottle or similar that can deliver a fine mist of tap water.
- Some sprung wooden clothes pegs to use as clamps.

# THE PLAN, GENERAL BUILDING TECHNIQUES, TERMS, HINTS AND TIPS

The plan provides most instructions for the construction of the major components.

Major components are all built over the outlines on the plan provided.

*Cover your plan with cling film or waxed paper or rub it all over with a wax candle to stop the parts sticking to it.*

There are some terms used on the plan that you may not be familiar with:

- **Laminate:** This means to make a glued sandwich of various parts, often with the grain of the parts crossed to make a single thicker and stronger part. When laminating, ensure that the parts are held together or weighted down and are aligned according to the plan instructions. Make sure that you remove excess glue that squishes out, as not doing so can make the parts harder to sand and in internal corners, may leave an undesirable glue 'fillet'.

- **Cut through section:** This is simply a way of showing parts on the plan in more detail – as if you had cut through the parts on the line shown. The parts that are 'cut' are shown 'cross hatched'.
- **Bevel:** This means to angle the edges of a part, usually by sanding.

## SAFETY

This kit is not a toy and as such is not suitable for children below the age of 14. Read and follow any instructions and warnings given on the various glues, adhesives and paints, etc. When flying your model, follow the guidelines in the section 'Trimming and flying your model'.



## TIPS TO MAKE A GOOD JOB OF YOUR MODEL

Read and follow the instructions and the plan carefully.

- A light model will fly much better than a heavy one, so use glues and adhesives sparingly. Work neatly and remove excess adhesive that squishes out from joints – glue weighs far more than the balsa wood! A piece of stiff 1.6mm square scrap wood with the end cut at an angle makes an ideal scraper to remove excess glue from corners or slots.
- To avoid losing the parts, remove them from the laser cut sheets only when you need them. Use the parts reference sheet to identify the required part(s). Keep what remains of the balsa sheets once the parts have been removed. This ‘scrap’ can be useful later to replace a broken part, or make other detailed parts of your choosing.
- Balsa wood is very delicate – a light touch is required and this is especially true when sanding. If you have not sanded balsa before, practice on the scrap edges of the balsa sheets. You will be surprised by how quickly the material is removed!
- When using glue (especially cyano), don't use it from the tube directly. Instead, drop some onto a non-porous disposable surface such as clean

foil from a yoghurt pot lid. Alternatively, save pistachio nut shells – one held upright and firm on a piece of Blu-Tack or plasticine makes an ideal disposable glue container. You can then pick up precise amounts of glue on the end of a pin or piece of wire to apply to the parts. This saves overuse of the glue and the potential embarrassment of sticking yourself or other items to your model!

- **All** of the contact surfaces of the parts to be joined should be covered in glue.
- To remove the balsa parts, cut through the tabs that join them to the sheets with a sharp craft knife or scalpel – do not try to snap them from the sheets as they may split. Remove the remains of the tab with a light sanding.
- Some parts have a laser engraved letter ‘T’ on them – this means that the part should be orientated with the letter T to the top when it is correctly assembled.
- If you decide to paint your model, then use paint sparingly. It is very easy to add weight with paint and your model will not fly well if it is too heavy.



- The balsa sheets are graded. Sheet 1 is hard and strong but heavy – it is used for parts where strength is in preference to weight. Sheets 2 and 3 are weaker and softer but light and are used for parts where lightness is key, obviously at the expense of strength. There are long lengths of cut balsa (known as strip) on both the 'light' and 'heavy' sheets, so use strip wisely and as suggested by the instructions to make things as strong and light as possible.
- Never push pins through the balsa parts or strip – it will weaken them or cause the wood to split. Use pins each side of the parts either angling them or using the head to hold the parts down.
- Never force a part to fit – check and adjust it until it fits snugly but without force.
- Pin parts together tightly but be careful not to crush or damage the wood – a tight joint is a strong one.
- Trial fit the parts before gluing and carefully adjust them if required. They are cut accurately, but small errors can occur between the parts and the printed plan. Wood is a natural material and its thickness may vary – it will contract and/or expand after the parts are laser cut.
- You can work on several parts at one time. For instance, you can make up the wheels and undercarriage at the same time as something else is setting. Just make sure you read through the instructions first and follow a logical sequence.
- If you have never bent wire parts before, then grab a few paper clips and practice on those with your pliers, before committing to bend the (expensive) piano wire in the kit. Use a fine Sharpie marker to mark the position of each bend as you go along.
- The internet contains a huge amount of information to help you build your model. Searching for terms such as 'free flight scale' and 'stick and tissue' will yield example builds and a lot of useful information to help you with your build.
- **Above all... take your time!**

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# MAIN PARTS AND FRAMES BUILDING SCHEDULE

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## THE CENTRE SECTION

- 1) Identify and remove all of the parts on the laser cut sheets: **CS1, CS2, CS3, R1, R2 (2 off), R2A (2 off) and 8 off corner gussets.**
- 2) Cut a 1.6mm square strip from the stiff sheet for the lower rear spar and pin it in position.
- 3) Pin down CS1 and CS2 over the outlines on the plan, check the fit at each end using the ribs R2 as a guide.
- 4) Glue in position rib R1 between CS1 and CS2 and over the rear spar ensuring that it is upright and that the ends are located in the notches.
- 5) Glue in place part CS3, locating the slot into the slot in Rib R1. Ensure that it is upright.
- 6) Glue in position ribs R2, tilting them to meet the angled end face of CS3. Allow the glue to set for a while before proceeding.
- 7) Glue in parts R2A tilting them so that their faces are parallel with R2.
- 8) Referring to the cut away section 'Z-Z', cut lengths of the stiff 1.6mm square strip to make the stiffeners that run along the top of CS3 from R2A to R1 and that run along the bottom of CS3 from R2 to R1. Glue them in place.
- 9) Glue the corners gussets where shown. Allow the whole assembly to dry and then lift it from the board.

## THE MAIN WING PANELS

- 1) Identify and remove one set of parts in the following quantities from the laser cut sheets:  
**1 off each W1-W7, R3-R8 and special corner gussets L and T.**
- 2) On the left hand wing outline, pin down the two trailing edge parts W2 and W3, making a neat and tight glued 'scarf' joint where shown.
- 3) Pin down the leading edge W1 along with two pieces of stiff 1.6mm square strip that forms the two lower wing spars, noting that the rear spars finish inside the notch of R8, whilst the front spar butts up to it.
- 4) Trial fit the tip piece W4 and the inner and outer ribs R3 and R8. Once you are satisfied, glue W4 to the leading and trailing edges ensuring neat and strong butt joints.
- 5) Fit and glue all of the ribs making sure that they are upright and properly located in the lower spars, leading and trailing edges.
- 6) In the two 'bays' between R3 to R4 and R4 to R5 fit the parts W6 and W7 on top of the lower spar as shown on the plan.
- 7) Fit a stiff 1.6mm square strip as the upper spar, noting that it runs from the notch of R8 and extends out from R3 as shown on the plan.
- 8) Glue W5 in position, along with special corner gussets L and T.
- 9) Repeat for the right hand wing panel. Leave both panels to set before removing them from the building board.

## COMPLETING THE WINGS

- 1) Pin the wing centre section back over the profile on the plan. Ensure it is nice and flat and that it is accurately positioned.
- 2) Take the left hand wing panel and apply glue to the end face of R3 and the mating face of the top spar extension and glue to the face of R2 on the centre section ensuring it is correctly aligned to both the centre section and the profile on the plan. Prop up the wing tip 25mm using a match box or similar. The two pieces can be clamped together using a sprung clothes peg or gentle modeller's clamp. Just make sure that the wood is not crushed as it is clamped.
- 3) Repeat step 2 for the right wing panel. Leave the entire assembly to set before removing it from the building board.
- 4) Round off the leading edge of the wing assembly and taper the trailing edge as shown on the plan. Carefully give the entire structure a light sanding to smooth the joints, remove lumps and bumps and the burnt edges of the laser parts.

## THE TAIL PLANE (STABILIZER)

- 1) Identify and remove all of the parts on the laser cut sheets: **1 off T1, 2 off T2- T6, 1 off T7 and 2 off corner gussets.**
- 2) From the stiff 1.6mm square strip, cut a length for the central rib (that runs from T1 to T7) and set it aside.
- 3) From the light 1.6mm square strip, cut all of the other ribs using the plan to get the right length and set these aside.
- 4) Pin down the tail plane central spar T1.
- 5) Lay out the parts starting at T7 and work round in each direction, trial fitting T2 and T3. When you are satisfied, glue all parts in position, making sure that you have nice neat butt joints.
- 6) Trial fit parts T4, T5 and T6 each side. Once you are satisfied they are a good fit, glue into position. Allow this outline to set.
- 7) Once the outline is set, glue all of the ribs in place, adjusting the length if necessary. Glue the 2 off corner gussets in position.
- 8) Leave to set, then remove from the board and give both sides as well as the outside edges a light sand. Be careful not to make the structure too thin or cause unevenness in the surface by over sanding.

## THE FIN AND RUDDER

- 1) Identify and remove all of the parts on the laser cut sheets: **FR1-FR9 and 1 off corner gusset.**
- 2) From the stiff 1.6mm square strip, cut a length for the base rib (which eventually sits on top of the tail plane) and set it aside.
- 3) From the light 1.6mm square strip, cut all of the other ribs using the plan to get the right length and set these aside.
- 4) Pin down the fin and rudder central spar FR1.
- 5) Lay out parts FR7, FR8 and FR9. When you are happy they are a good fit, glue them together and to FR1 with snug butt joints.
- 6) Add the stiff base rib. Glue in position along with FR6 and the corner gusset.
- 7) Lay out parts FR2, FR3, FR4 and FR5. When you are happy they are a good fit, glue them together and to FR1 with snug butt joints.
- 8) Fit the light 1.6mm square strips from step 3.
- 9) Leave to set, then remove from the board and give both sides as well as the outside edges a light sand. Be careful not to make the structure too thin or cause unevenness in the surface by over sanding.

## THE FUSELAGE

This is built by building one half over the plan on top of a central keel using half formers which along with 1.6mm square strip 'stringers' provide the fuselage shape. It is then lifted from the plan before the other half formers and stringers are added to complete it. NB. some parts of the fuselage are added after covering as indicated on the plan.

### To build the left hand fuselage side:

- 1) Identify and remove parts in the following quantities from the laser cut sheets: **1 off each: F4-F13, K2, and K4, plus: 2 off F2 and F3, and 1 off K1. Note that part K1 is quite delicate and large so carefully cut it from the sheets and handle it with care.**
- 2) Make two opposite hand (ie one left hand one right hand) laminations from parts F2 and F3, pinning them to the board to keep them flat and aligned. Ensure that the parts are orientated correctly by referring to the 'T' markings and that the rectangular cut out in each part lines up perfectly. Ensure any excess glue is removed from the slots in F3 otherwise the stringers added later may not fit. Leave the parts to dry thoroughly and remove from the board before proceeding.
- 3) Carefully pin down part K1 over the profile on the plan, aligning it carefully to the profile and the slot positions. Avoid placing pins where they will get in the way of other pieces to be added later on.
- 4) Glue in position the F2/F3 lamination, making sure that the 'T' is at the top. You must make sure that it is accurately located and that it is perfectly at right angles to the board using your square. Allow it to dry before proceeding.
- 5) Trial fit the formers F4 to F13 in the relevant notch in the side keel K2 referring to the positions of the notches on the plan. These should be a snug, but not overly tight fit. Also check their fit in the notches of main keel K1.
- 6) Apply a stripe of glue on K1 adjacent to each notch (but not in the notch) for the formers F4 to F13 but not F9, then position each one of the formers in the notches, with the 'T' letter towards the top. Then without hesitation, apply glue to the notches and ends of the side keel K2 and fit it carefully to the formers, being careful not to crush them. Make sure that the front end of K2 is properly located in the F2/F3 notch, and check



again that F2/F3 has remained upright. Use extra pins if required to make sure that everything stays flat. Leave the glue to set for a while.

- 7) Fit part K4 ensuring its top edge is flush with the edge of K1. This forms the seat for the tail plane later.
- 8) Add stringers in the notches from 1.6mm square strip. Use stiff strip for the two stringers 'A' and 'B' (each side of where part F17 will fit), the two lower front stringers that run from the nose to F5, and the two uppermost stringers that run from the nose to F7. Taper to fit those stringers that meet the stern post at the rear of the main keel.
- 9) Fit part F9 by carefully twisting it in place. Ensure it is well glued and leave to set for a while
- 10) Fit all remaining stringers using the light 1.6mm square strip. Taper to fit those stringers that meet the stern post at the rear of the main keel.
- 11) Allow everything to dry for as long as possible, then remove it from the board. Carefully cut out the five temporary crosspieces from the main keel.

### To build the right hand fuselage side:

- 12) Identify and remove parts in the following quantities from the laser cut sheets: **1 off each: F1, F4-F13, K2, and K4, plus the F2/F3 lamination from step 2.**
- 13) Glue in position the F2/F3 lamination, making sure that the 'T' is at the top, then add former F1 aligning the square hole. Pin the assembly nose down on to the board to ensure all is flat square and true. Allow this to dry before proceeding.
- 14) Now follow previous steps 5 -10 for this side, checking at each stage of adding a stringer that the fuselage is staying straight and true.
- 15) Remove parts in the following quantities from the laser cut sheets: **2 off F14, and 2 off F17.**
- 16) Starting with the left hand side, fit F14 tilting it to match the fuselage and former profile, then trial fit F17 bevelling the edges to meet the stringers each side to ensure a snug and flush fit to the outer profile. Glue F14 and F17 into position.
- 17) Repeat step 16 for the right hand side. Set the fuselage aside and complete the nose block.

## THE NOSE BLOCK

- 1) Remove parts in the following quantities from the laser cut sheets: **1 off each NB1-NB5, and 3 off NP1.**
- 2) With the cross markings and the letter 'T' on part NB5 **facing outwards**, laminate the parts NB1-NB5, aligning the central hole. Also make sure that the 'T' on each part is in the same orientation and that the profiles are evenly matched. Allow this nose block assembly to dry, then set it aside.
- 3) Laminate the parts NP1, aligning the central hole. Make sure that the 'T' on each part is in the same orientation and that the edges are all flush. Allow this nose plug assembly to dry. Once dry, trial fit it to the square hole in the fuselage nose, adjusting it to have an easy fit. Cyano adhesive can be run around the hole and the edges of the part to harden the wood. **DO NOT glue this plug to the fuselage.**
- 4) Glue the nose plug to the nose block, ensuring that it lines up with the cross markings on NB5 and the holes remain in line. Make sure that any glue that squishes out between the parts is removed, otherwise it will prevent the parts from sitting together properly. Allow the completed nose block to dry.
- 5) Glue a plastic nose bush in to the hole in the nose block using cyano adhesive. **DON'T ALLOW THE ADHESIVE TO GO INSIDE THE BUSH.**

## FINISHING THE FUSELAGE

- 1) Fit the noseblock, **BUT DO NOT GLUE IT IN PLACE!** Sand it to match the fuselage to the profile shown on the plan. NB The very front nose block piece (NB1) should be sanded to a round profile on the front face to match the spinner disc later on.
- 2) Sand the fuselage all over to remove the burnt edges of the parts. Be careful not to over sand and ruin the profile of the formers, especially around the cockpit area.
- 3) Carefully cut out the section of the keel in the cockpit position between F7 and F8, then set the fuselage and nose block aside.

## THE WHEELS , UNDERCARRIAGE AND SPINNER

- 1) Using wire cutters and pliers make up the undercarriage legs and tail wheel from the wire provided. **Make sure that you make two legs and they are opposite hands.**
- 2) Identify and remove parts in the following quantities from the laser cut sheets: **4 off WH1, 4 off WH2, 2 off WH3 and 2 off WH3. NOTE: PARTS WH4 ARE VERY DELICATE SO TAKE EXTRA CARE!**  
Note that the tail wheel part TW1 is positioned inside one of the WH1 parts so make sure it is retained for step 10.
- 3) Sand the internal diameter of the WH1 parts to remove the 'tags' and burnt edges using a piece of sandpaper wrapped round a pencil or similar
- 4) Laminate the parts cross-grained as shown on the plan to make two wheels ensuring all of the parts stay concentric. Once they are set, round off the edges as shown on the plan. If you want to paint the wheels, they should be coated with full strength dope and sanded to a smooth finish beforehand.
- 5) Fit a plastic nose bush to each wheel using cyano adhesive – **DON'T ALLOW THE ADHESIVE TO GO INSIDE THE BUSH.**

- 6) Identify and remove parts in the following quantities from the laser cut sheets: **2 off LG1, 2 off LG2 and 2 off LG3.**
- 7) In parts LG1 and LG2, make a groove following the line etched into the parts. This is best achieved using the left over piece of wire from the undercarriage legs or failing that an empty ball point pen drawn along to simply 'dent' the wood.
- 8) Follow the instructions on the plan to make up the two main undercarriage leg assemblies. Be very careful to make sure that you make a left hand and right hand assembly. If you want to paint the leg assemblies they should be sealed and sanded to a smooth finish beforehand.
- 9) The wheels can then be added to the axles of the legs, and retained by simply bending up the wire or using the insulations from some thin electrical flex held with a blob of glue. NB Make sure that the glue does not enter the wheel centre bushing and that the wheel can rotate freely.
- 10) Take part TW1 retained from step 2 and glue it to the centre of the tail wheel wire with cyano. Allow it to dry then sand the wood flush to the wire.
- 11) Identify and remove parts in the following quantities from the laser cut sheets: 1 off SP1, and 1 off SP2 and 2 off SP3. Laminate them together as shown on the plan, making sure that they are cross grained and that glue does not enter the radial slots in part SP2.
- 12) Once set, locate the plastic propeller to the slots formed by the two parts SP3 and centralise the radiused boss to the hole in part SP2. Once you are happy with the fit, glue the propeller in place with cyano, once again ensuring that glue does not go into the radial slots or into the hole that locates the radiused boss. Once this has set, cut out the centre part that located the boss.

## RADIATOR, OIL COOLER EXHAUSTS AND AIR INLET

- 1) Identify and remove parts in the following quantities from the laser cut sheets: **4 off EX**, **1 off A1**, **2 off A2**, **2 off A3**, **2 off A4** **1 off RD1**, **2 off RD2**, **2 off RD3** plus **1 off each OC1**, **OC2** and **OC3**.

Make up these parts as shown on the plan. If you want to paint these they should sealed and sanded to a smooth finish beforehand.

## FILLET PIECES

- 1) Identify and remove parts in the following quantities from the laser cut sheets: **2 off F15** and **2 off F16**. Make a left hand and a right hand fillet. These are sanded to fit on final assembly of the model.

- 2) This should only leave parts: **2 off WF** and **K3** on the laser cut sheets. Remove these carefully and set them aside along with the laminations from step 1 until final assembly.

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# COVERING

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The tissue in the kit is used to provide a 'skin' over the balsa wood framework. The basic idea is that the tissue is attached to the framework and then sprayed with water and then left to dry. As the tissue dries, it shrinks and tightens. For flying indoors this can be left 'as is', however, sealing the tissue is advisable if you intend to fly your model outside, as it makes the tissue more durable and stops it going 'saggy' if it is damp or humid. Traditionally, cellulose dope was used for sealing the tissue (thus the process is often called 'doping'). Cellulose dope is pretty smelly and is now frowned upon for shipping by post making it hard to obtain unless you have an old fashioned model shop in your locality. Two alternatives are available:

**Clear lacquer** This is available at many DIY stores in spray cans. The model can be given a single coat of it once it is built, but before the paper decals are applied. If you use this method then make sure that you only apply a light coat. It is very easy to get carried away with it and add a lot of weight!

**Eze Dope** This is a modern replacement for cellulose dope, and being water based it is fine to be shipped by post. This is thinned (30% Eze-Dope to 70% water) and then brushed on the tissue after it has been shrunk. If you choose to use the Eze-Dope, then you should shrink the tissue with a 5% solution of it (rather than plain water) and pin the model parts down each time you apply a coat, as you do when you shrink them following the instructions overleaf:

## THE FIN, RUDDER AND TAIL PLANE

- 1) For the covering you will need a glue stick, PVA, fine brush, scissors, an old perfume bottle or fine mist sprayer and a sharp knife. It is also worthwhile to get a sponge and a dry cloth so that you can keep your fingers clean and dry as you work. Thin the PVA by around 50% with water (err on the strong side if unsure) in an old jar lid or similar.
- 2) Cut out some spacers (about a dozen or so) about 20mm long and 5mm wide from the edges of the left over sheet, and apply one layer of sticky tape to one surface. These spacers are used when shrinking the tissue – the sticky tape simply prevents the spacers sticking to the parts.
- 3) Starting with the fin and rudder, cut out two pieces of tissue that are about 10mm bigger than the outline of the part. Lightly apply the glue stick only to the outside edges of the part. Keep the covering smooth and avoid it gathering in blobs on the surface and in corners. With the tissue flat on the work surface, put the glued side down onto it. Turn the tissue covered side towards you and gently tug and tease the tissue until there are no wrinkles and the tissue is nice and smooth. You do not have to make the tissue tight, the water shrinking will do that later. Give the glue stick a few minutes to do its job.
- 4) Once the glue has set a little, cut the tissue carefully leaving an edge about 1mm wider than the part all the way around, apart from where it fits to the fuselage and tail plane. Here you should cut it flush to the structure.
- 5) Working in stretches of a couple of inches at a time, apply the thinned PVA to the tissue edge that is sticking out and carefully roll the tissue up so that it sticks to the edge of the part. Rub all round the edge with a dampened finger to ensure that the edge is fully stuck down and nice and smooth. Do not get the PVA on the tissue any other place other than the edges or the tissue will not shrink properly later.
- 6) Repeat for the other side, once again overlapping the tissue at the edges. Let the glue dry for a few hours or preferably overnight.



- 7) Spray the part with a fine mist of water on both sides, then use the spacers that you 'sticky taped' to hold the edge of the part off the board. Use pins set at an angle to hold it flat until it dries. Holding the part down in this way helps prevent

warps. Note the tissue is very delicate when it is wet, so handle the part at the edges and with care so that you don't damage it.

- 8) The method for the tail plane is the same.

## THE WINGS

- 1) Cover the underside of the wings with three pieces of tissue, one for each wing and one for the centre section, overlapping the joints at the R2/R3 position. Cover each wing panel first and the centre section last. As with the fin/rudder and tail plane use a glue stick to attach the tissue at the outlines only, then seal the edges and joints with 50/50 thinned PVA to ensure that it is well attached. At tissue to tissue joints brush the thinned PVA through the top later tissue, and gently rub the joint with a damp finger to ensure a good joint
- 2) Cover the top of the of the wings in a similar manner, but with 5 pieces of tissue. This time the wing panels themselves are covered with two pieces, one that runs from the R2/R3 position to R8, then from R8 to the wing tip.

- 3) Allow the glue to go off for a few hours or preferably overnight and then shrink each panel (top and bottom) one at a time doing the wing panels first, then the centre section. Pin or weight down the outline of each panel with spacers underneath as you did for the fin, rudder and tail plane. Note that you should add 'washout' (twist) to the wings at this point by putting a 1mm spacer (approximately the thickness of a credit card) under the trailing edge of the wing at the R8 position.

## THE FUSELAGE

- 1) Cover the fuselage in longitudinal strips running from F6 to the stern post at the rear. Gluing them in place to the stringers with a glue stick, then using PVA through the overlapped joints. The following is a suggested order for the strips on each side:

- a) The stringer that forms the lower edge of the cockpit (Stringer 'A') to the stringer above the wing position.

Then working downwards:

- b) The stringer above the wing position, to the next but one stringer down (from F8 back), cutting across to the central keel past F12.

Then working upwards:

- c) From F9 back, the stringer that forms the lower edge of the cockpit, to the next but one stringer up.

- 2) Once both sides are complete, there should be two areas top and bottom that are not covered. Do these as follows:

- a) The top area in one piece, that goes from side to side, from F9 to F13.
- b) The bottom area in one piece from side to side that runs from F8 to F12.

- 3) Fit tissue from stringer A to A and F6 to F7 in front of cockpit.
- 4) Allow the glue to go off for a few hours or preferably overnight, then shrink the tissue. You need not constrain the fuselage in any way, the tissue shrinkage should be equal on both sides and no warps should occur.
- 5) **Trace 2 off of each of the paper parts W, X and Y**, onto standard printer paper (80gsm) following the solid lines.

- 6) Take 1 set of paper patterns W, X and Y, and using a glue stick glue them to an area of tissue leaving a gap between them, especially at the front edge of pattern W, where you need to leave around 10mm.
- 7) Once the glue has dried, cut the patterns from the tissue sheet, leaving extra all the way round as indicated by the dotted lines on the plan.
- 8) On the rear edges of the parts only, fold the tissue back on itself and glue to the rear of the pattern thus hiding the white edge of the paper, to ease the tissue around the curves 'knick' the edges of the tissue so that it folds round easily and smoothly.
- 9) Repeat with the second set of paper patterns W, X and Y, **but glue them to the tissue the other face down to make opposite hand parts.**
- 10) Fit the parts to the fuselage using a glue stick working from pattern Y forward overlapping them. They fit from F6 forwards and the stringer one down from the top keel, right round to the bottom keel. Use the tissue overlap at the bottom keel to make a good almost invisible joint.
- 11) **Trace 1 off of paper pattern Z** and cover in tissue, folding back the rear edge only as before. Fit over the gap at the top of the nose from side to side completing it. Use the tissue overlap to make a nice neat joint.
- 12) Dampen the long tissue overlaps on the front edge of patterns W and Z and then use thinned PVA to smooth and glue them over the nose.

# FINAL ASSEMBLY

- 1) If you want to draw on the control surfaces, do so now using a fine marker or strips of black paper referring to the chain-dashed lines on the plan.
- 2) If you want to cover or paint bare wood parts such as the wheels, radiator, etc. do so now. This is much easier when the parts are not fitted to the model.
- 3) Cut out and cover the remaining paper patterns in the same manner as those in the earlier steps, leaving extra tissue in the areas indicated and ensuring that you make one left hand and one right hand of paper pattern U.
- 4) Fit the cockpit canopy by trimming the flash (excess plastic around the canopy) and back end off very carefully from the moulding provided (curved nail scissors are handy here). The canopy can be secured with tiny drops of cyano, but do not use too much or the fumes will 'fog' the plastic. Add the canopy framing, made from thin strips of tissue glued onto printer paper. A gluestick can be used to secure these strips. Any smudges or finger prints can be removed with a wet cotton bud (Q tip).
- 5) Assemble the propeller to the nose block using the wire prop hook as shown on the plan, making the shaft as short as possible. Now fit the spinner. The spinner should be trimmed so that it measures approx. 23mm from tip to rim. Cut two slots into the spinner to house the prop blades. The angled slots should finish approx 10mm from the spinner tip. Carefully tack the spinner in place with cyano, making sure that it does not wobble.  
**DO NOT GET GLUE ON THE SHAFT OR IN THE BUSH.** When you are satisfied, use quick setting epoxy to secure the spinner to the propeller blades with a neat glue fillet. Once set you can paint the propeller and spinner.
- 6) Glue the wings in position, applying glue to all of the contact surfaces and ensuring that the wing locates properly and that they look square and true to the fuselage. Allow to set then glue in place part K3 and the paper pattern V, which should be tissue covered – use the tissue overlap to make a smooth joint.
- 7) Glue the tail plane in position making sure it is square and true, and in line with the wings.

- 8) Glue the fin and rudder in place, ensuring it is properly located on the tail plane and at right angles to it, then carefully sand the fillet pieces to fit tapering them to the rear and glue them in position between the tail plane and fin.
- 9) Fit the wheels to the axles. Note that the 'spoked' side of the wheels fit away from the wheel covers. Fix the wheels as outlined on the plan.
- 10) Unless you are going to fly your model 'wheels up', carefully slit the tissue between R2 and R2A and fit the undercarriage legs with quick setting epoxy, angling them correctly and **noting that the wheel well covers are on the inside.**
- 11) Noting the correct location of the tail wheel, make a pin hole in the tissue and glue in the tail wheel wire using epoxy.
- 12) Bevel the edges of parts WF left over from the laser sheets, so that they fit against the wing trailing edge and up to the bottom stringer and glue them in position.
- 13) Fit one paper pattern U each side, curving them to fit along the wing, fuselage and WF, overlapping the tissue for a neat joint. These parts are tricky to fit and you should take your time trying them, then adjusting the position or the curve and then trying them again until you are satisfied.
- 14) Cover the exposed side of parts WF, overlapping the tissue.
- 15) Fit the radiator, oil cooler, air inlet and exhausts, referring to their positions on the plan.
- 16) Markings are provided on lightweight paper; they should be cut out, and glued in position with a glue stick using the colour scheme diagram (Y) included at the back of this booklet.
- 17) Fit the motor peg made from the cocktail stick/toothpick provided, cutting it to length and leaving about 5mm sticking out each side. Dip the scrap ends of the cocktail stick in cyano and roll glue around the peg hole to harden it. Try the motor peg in the holes for a good 'squeaky' fit each time you add more cyano.  
**BE CAREFUL! – Wait for the cyano to dry at each stage before trial fitting the motor peg to avoid it being permanently bonded!**

# TRIMMING AND FLYING YOUR MODEL

**When flying your model, choose a large area free from any obstructions. Do not fly it towards people or property.**

To fly successfully, your model must be correctly trimmed. Trimming is a normal procedure for any aircraft, but for a free flight model it is especially significant as once the model is released, you have no control over it. Trimming takes some time and skill and the basics are outlined here. More detailed information and help are available from the many

experienced free flight modellers who have websites dedicated to the subject or post information on numerous on-line forums.

The first step involves fitting the motor and checking the balance. Short flight tests should then be carried out during which the behaviour of the model can be observed. Following initial flight tests, the number of winds on the motor and thus the duration of the flights can be slowly increased.

## TO MAKE UP AND FIT THE MOTOR

The motor consists of the rubber strip provided. This strip is more refined than that used in rubber bands and is very stretchy, allowing it to hold lots of energy. A single loop should have enough power for the model if it is built lightly as per the instructions. Contrary to popular belief, the rubber motor is not designed to hold in the nose plug, and motors that are much longer than the distance from the propeller hook to the rear peg are used by experienced modellers. This requires a geared winder to 'stretch wind' the rubber motor. If this is your first model and you do not have a stretch winder, tie a knot in the rubber to make a loop that is roughly the distance between the peg and the

hole in the nose. Wetting the rubber makes it easier to tie a knot, however, do not pull the knot too tight otherwise it can tear. Once knotted, apply a tiny drop of cyano to the end 'ears' of the knot, taking care to avoid putting cyano on the actual working part of the rubber. To make your rubber motor more efficient it can be lubricated with castor oil or spray silicone trim polish that can be bought from motor factors.

Put the rubber loop down into the nose of the model, lower it down to the peg position and trap the loop with the peg, then connect the other end to the motor hook, and fit the nose plug.

## TO BALANCE THE MODEL

Referring to the arrow on the plan labelled 'balance', hold the model with your fingertips under the centre section at that position. It is likely that the model will want to tip backwards. If it does, add Blu-Tack

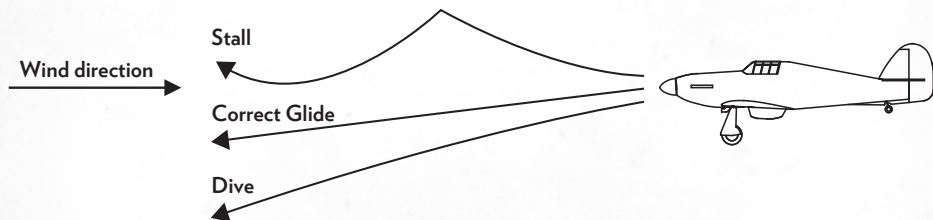
or plasticine to the nose of the model, adjusting the amount until the model balances at the correct position with the tail plane approximately level.



## TEST GLIDES

Choose a calm, dry day if you are trimming your model outdoors. This is a small model and slight gusts and disturbances will make it hard to judge how your model is behaving. It is useful to find a field with nice long grass to act as a gentle landing spot during these early flights.

Gently throw your model towards an imaginary point on the floor about 7-8 metres in front of you into any wind. If the model nose rises then falls then there is insufficient nose weight. If the model heads nose first downwards, then there is too much nose weight. Carry on test gliding and adjusting the nose weight until the glide is smooth, and the model lands about halfway towards the imaginary point.



## POWERED FLIGHTS

Wind up the motor with approximately 50 turns (wind clockwise looking at the front of the model) and launch it into the direction of the wind (if present). This should achieve a gentle powered glide. Aim for a gentle left turn by adding a tab made from clear acetate (the clear film that you might find on a chocolate box 'window') to the trailing edge of the rudder. Adjust it towards the left to make the plane turn left and to the right if the left turn is too sharp. If the left wing 'dips' and

the model spirals in, then add an acetate tab to the left hand wing and bend it down a little. Gradually increase the turns on the motor in steps of 50 turns up to approximately 250 for the short simple loop. At each step make adjustments to the tabs to control the flight pattern. If you struggle to get your model to fly well, then check for warps in the flying surfaces of the model. These can be removed by twisting them over a bowl of steaming water.

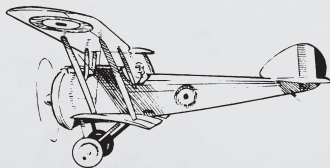
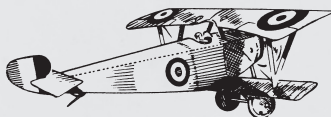
# THANK YOU FOR CHOOSING A VINTAGE MODEL COMPANY KIT

We hope that you have enjoyed building and flying your model.

Be sure to collect and build the whole range, available from many high street gift shops or direct from our website [www.vintagemodelcompany.com](http://www.vintagemodelcompany.com) where you will also find a wide range of modelling accessories and tips.

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# BUILDING NOTES

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Use this sheet for notes during your build

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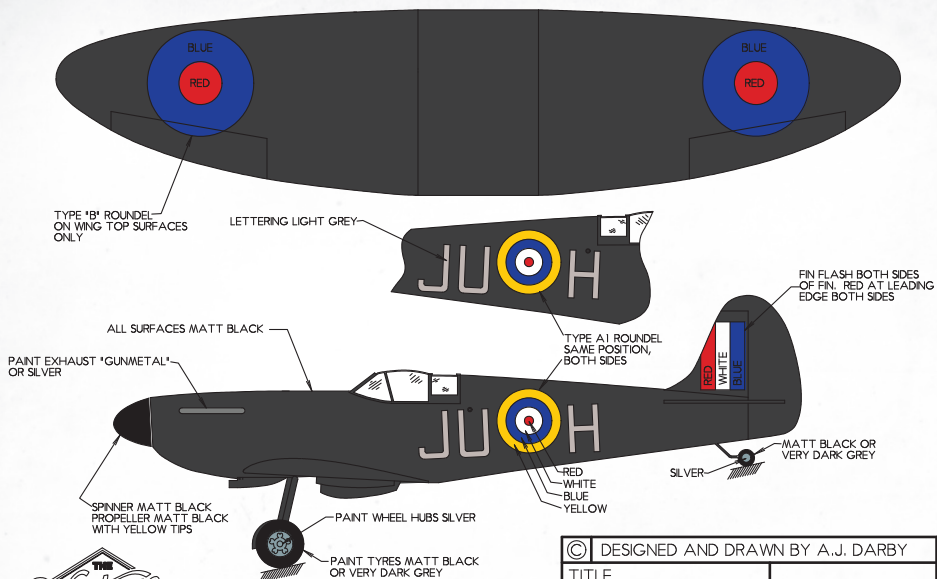
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TITLE SPITFIRE NIGHT- FIGHTER SCHEME	SHEET Y
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# Magnificent Flying Machines



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