WESTLAND LYSANDER

So here we are again, another year on from the last RCM&E special and another war bird to whet your apatite. It doesn't seem like a year has passed since the last special and certainly doesn't seem a year since the hurricane was the people's choice for last years special. The great success of the Hurricane I have to say caught both myself and RCM&E by surprise. It's one thing asking the readers what there favourite model is but its another to see so many honouring that vote by getting on and building the model

So how can you top that. Well the only way to get close to it is to carryout another vote to find this years favourite model. So the challenge was set for the 2009 people's choice and voting began on the Modelflying.co.uk web site to find this years favourite the modellers would like to see as a free plan in the 2009 RCM&E Special

Now I'm always a bit wary of agreeing to design the winning subject just in case the subject wasn't a favourite of mine…would I have the same enthusiasm to design and build the model as opposed to one I did like! So as the posting on the web site came in thick and fast I was reasonable please to see two of favourites heading the leader board; the Bristol Beaufighter and the Westland Whirlwind. By the time the winning post was in site, the Lysander was making a dash and had stormed into the lead and turned out to be the clear winner. Now I have to say Lysander is not a favourite of mine and it something I would not have considered designing if I had the choice. However I had agreed to design the winning choice so the Lysander it was going to be.

So with the subject know, it was time to think about the size, power, colour scheme etc for the model. So followed the winning announcement, questions were put on to the Modelflying forum and true to form a plethora of answers came back…..you can't say we not listening!. It seemed the vast majority wanted a 60 size model again both in wing span and engine size. The previous winners for the last two years had been electric powered, so this year had to be turn of the IC engine.
Having settled on the wing span being 66" (1/9th scale) the engine I was hoping to use was a 60 size 4-stroke, however when the cowl sizing was established it was clear only a 48 size crankcase would comfortably fit. As a result of this an SC 52 4-stroke was ordered.

Based on the size of the Hurricane I had expected the all up weight to be around the 71/2 lb mark but during the build it became clear the AUW would more round the 51/2lb mark which would suit the 48 size 4-stroke perfectly

The biggest worry with this model was the time scale available. I had effectively 16 weeks to design the model, have the parts laser cut, have the vac forms moulds made for the cowl, canopy and spats, build the model, test fly it and finish the model to a high standard and of course finish the plan and write the article…This did seem a tall order!

I manage to get hold of a Dennis Bryant plan and spent a whole 5 minutes reviewing the design. Why so short? Well it was clear the design was far too complicated…..I think it would have taken me at least16 weeks just to have built the model! I have to say at this point I was seriously thinking the Lysander was non starter in the time scale. The only way I could ever achieve the deadline was to design from scratch using some 3-view

drawings I had acquired from the internet. The model needed to be very simple in construction and would have to jig-lock together with a build time (for me!) of 3 weeks (excluding the detailing)…

So the design started and I have to say it is probably the longest period I have ever spent on a model design. The fuselage was not easy but as the design came together I could see areas where I could simplify and streamline the build process and more importantly, the build time! I think by the time the fuselage design was finished I felt pretty smug. The tail and fin were kept pretty simple and very similar in design to the hurricane last year.

The wings were a slightly different matter…..simple they are not… Although the model has a 66" span, the cord is quite small and the taper is quite sharp. This all equates to a relatively small wing area and bearing in mind the type of aeroplane it was (STOL) some sort of flap was a must. The wing section was also another mine field with the section changing from flat bottom at the root to semi-symmetrical at the mid point and the tip. This was complicated further by the midpoint section being a much deeper variant than the tip section.
Fortunately Compufoil (wing design programme) came to my rescue here. I decided to use a modified RAF38 aerofoil for the root, midpoint and tip, and forgoing the flat bottomed root section. Now I have heard various tales about the Lysander being susceptible it tip stall and a host of other niggles so didn't feel too concerned about changing the wing section to one I had used on a number of previous successful designs. The key to gaining stability is making sure the C of G is well forward and you have enough movement on the elevator to overcome the models now sluggish behaviour. Of course if this was an aerobatic model or a scale fighter, a forward CofG is not always what you want, but with a model such as the Lysander it will help. Hence the CofG shown the plan is a forward position and should be used.

The plan took approximately four weeks to get the bear bones to a printable state which included a CNC cutting file ready to be sent to SLEC ltd for cutting.

Now it was around mid June when our editor enquired as to how the build was coming along. Now I thought I hadn't done too badly with getting the bulk of the plan complete, the cnc parts cut plus most of the hardware ready to start the build.
However a gentle reminder which required the model finished and flown by mid August deadline and bearing in mind the first two weeks of August was earmarked for the family holiday it really meant I had about four weeks to build, fly and finish the model. Even so a challenge is always an incentive to me but I have to say this really did take me to the wire.

My biggest bug bear with any scale model is it has to look right and this means the construction sometimes has to follow the scale design too. The Lysander is no exception and has to have a stringered rear fuselage as per the full-size. The problem here is having built a stringered fuselage for last years Hurricane it reminded me just how long it takes to do. Mind you when it was done it did look great.
So with a week of evenings spent building the fuselage I was struggling. What was needed were some long nights. So some 2am stints for the next week finally saw the model ready for covering. Three further nights (and early mornings) saw the model covered in black solar film ready for its test flight. Now normally I try and test fly without

covering but that pretty well impossible with the Lysander. However the war paint was certainly staying in the pot until the model was proved.

So after near three long weeks the model was rolled out at the Hastings Model Flying club field, on a perfect wind less Friday evening.

Now not to spoil the ending I'll continue the flying report at the end of the write-up.

Fuselage

Now I'm not a great fan of stringered balsa fuselages as patient is needed to construct it and those who know me will always expect a sort cut will appear from somewhere during the build. Well I may have to disappoint you again as you just can't produce a scale Lysander fuselage without patients. Fortunately you'll need a lot less patients for this model than any other Lysander plan out there!

Start by gluing the inner fuselage sides to BO1 to BO2 and BO3 to BO4. Note that BO1 & BO2 glue together to make a shorter right hand fuselage side. Now locate and glue into position the bottom BO5 noting that this part is 'handed' to take account of right thrust. Now glue into position the formers F1

Note that both F4 & F5 are made from both Lite ply and birch ply. From the rear, slide the fuselage formers F2,F3,F4,F5, F6, F8, F9, F10 into their relative positions over the inner box. Before gluing the formers into position, glue the tail end of BO2 & BO4 together. This should allow you to 'square up' the forms before gluing them into position. When happy, glue into position the rear most former F11 and the fit the undercarriage block UC1.

The front of the fuselage can now be sheeted using 3mm balsa. To make this easier I would suggest skinning completely between F1 & F2 and then between F2 & F4. The join on F2 can now be easily blended to a smooth radius.
The rear longerons can now be added as shown on the plan. Start by fitting longeron No. 1 and 7 to each side. This will allow you to fit former F7. The remaining longerons can now be fitted between F4 and F10. Install these in a sequential sequence and also from side to side so the fuselage remains straight and true.

The radio access hatch can now be made up using F4A & F5A and 3mm balsa sheeting

Using the plan as a guide, cut out two in-fill pieces of 3mm balsa that define the rear line of the cockpit.

Tailplane and fin

The fin is constructed from two 12mm piece of soft sheet balsa and shaped to the profile shown on the plan. The rudder is made from a 3mm sheet balsa core, shaped to the profile as shown on the plan. Make up the rudder leading edge from 9mm sheet balsa and glue the core edge centrally along the leading edge. Now mark the positions of the riblets on to the centre core. Cut a sufficient number of wedge shaped riblets to make up the rudder and fit as shown on the plan. Finally cut out the rudder top from solid balsa and fix into position.

The tailplane is made in one piece and built up over the plan. First pin the spar over the plan and glue into position the ribs. Now cut from sheet, the trailing edge and inner leading edge and glue these to the ribs. Finally fit the top spar and remove the panel from plan. Remember that the panel is built up-side-down over the plan, so when inverted the tailplane will have a very slight dihedral.
Using 1.5mm (1/16”) sheet balsa, sheet the top and bottom of the tailplane. Add the outer leading edge made from 6mm sheet balsa.

The elevators can be constructed as shown on the plan in a similar fashion to that of the rudder.

Finally cut the solid balsa tips for the tailplane to shape.

Temporarily fix the elevators to the tailplane and glue the tip blocks to both the tailplane and elevator. Using a razor plane and sandpaper, shape the tips to the profile show on the plan. Finally cut though the tip in the position shown and release the elevators

Back to the Fuselage

Now the tailplane is built it can be positioned, however before gluing, make sure the elevator torque rod is position. The fin can now also be fitted.

The rear fuselage can be completed using a mixture solid, square and 2.4mm sheet balsa. The fuselage tail is made from solid balsa and should be cut to shape and trimmed close to the finish shape before gluing into position. Use a 12mm wide sanding block to finish sanding round the tailplane, the fin and the tail block.

Check the fitment of the elevator and the rudder.

To secure the upper part of F5, two lengths of 3mm wire (coat hanger wire will do) are cut and bent to shape and used as braces between F4 & F5.

Two fuselage wing tubes made from11/32” brass tube should be cut to the width of F4 & F5 along the top edge. Epoxied these to the top of each former then secured these using glass cloth wrapped over the top as shown on the plan. 8mm carbon rod should slide neatly into the 11/32” brass tube, both materials should be available via you local model shop.

The undercarriage should now be cut from 3mm aluminium, all the necessary holes should be drilled prior to shaping. To fit the undercarriage, cut away a section of fuselage under sheeting to reveal UC1. Trim more away as necessary to allow the undercarriage to fit against UC1. When happy, secure this into position and re-sheet the cut opening.

Wings

Each wing half is constructed in two sections; the inner & outer panels. Start by pinning the lower main spar over the plan for the inner panel. Then fit the wing ribs W1 through to W9 ribs. You may have to file the spar slots at an angle slightly, as the ribs do not sit square on the spar. Now fit the top spar. Now cut from 3mm sheet and fit the inner leading edge. The trailing edge should be cut to size and then using a 3mm wide file, mark and cut notches to accept the ribs. Now glue this into position. The skeletal section can now be removed from the plan.

Now move on and build the outer wing panels, again starting with pinning the lower spar over the plan and building the wing up similar to the inner panel

Now glue the wing braces B1 & B2 to the inner panel only and when dry offer the outer wing panels into position. When happy glue the protruding part of the braces to the outer panel spars

Now cut and fit the wing strut mounting plates…

Now cut 4 lengths of 11/32" brass tube and glue the forward tube into the wing. Fit the rear tubes but don't glues them yet. Now cut two lengths of 8mm carbon (approx 250mm long) and test fit the wings onto the fuselage. If any adjustment is required, the rear wing tubes can be adjusted in the ribs before final gluing.

At this point either install the aileron extension lead or install 'draw' strings for this to be done later. Now apply the shear webbing between the forward top and bottom main spars as shown on the plan. Now sand the inner leading edge, spars and trailing edges flush with the ribs and begin to sheet the bottom side of the wing, between the inner leading edge and the main spar, with 2.5mm medium sheet balsa starting with the inner section first. There was no washout built into the wing of the prototype but I would suggest building a1/8" of washout under the trailing edge of W20. The best way to install washout is to choc up the trailing edge at W9 & W20 as shown on the drawing, then sheet the top forward wing, between the inner trailing edge and the main spar. This should 'lock' the washout into the wing. Washout adjustment can be done by inducing twist during the wing covering process if necessary.

Now trim the top and bottom wing skins flush with the leading edge and cut and fit the outer leading edge from 6mm sheet balsa.
Now shape the leading edge to the profile as shown on the plan.
Cut out the wing tips either using 1" thick balsa or a sandwiching of 6mm & 12mm sheets together to form the correct thickness and glue these tips on to W20. Roughly shape the tips using a razor plane then finally sand to a smooth flowing profile to match the wing.
Make up each individual aileron and the flaps as shown on the plan in a similar fashion to that of the elevators and rudder.

Wing struts

The wing struts are made from a sandwich of 3mm lite ply and 1.5mm balsa and constructed as shown on the plan. The wing Fixing points are made from 1.5mm aluminium and the undercarriage mounts from a 3mm bolt or length of 3mm studding

Cowl

If you have bought the vac form set this will include the cowl and spats. Trimming the cowl is fairly straight forward; the front needs to be opened out and a route for the 4 stroke exhaust found. On the prototype I used the Top Flight P47 ($1/7^{th}$ scale) dummy radial engine, which can be ordered from your Ripmax stockist. This will need a fair bit of trimming round the circumference but I think you'll agree from the photos, it surely dose set the model off a treat.

Spats

Now I have to admit, I'm not a great fan of VAC form spats especially made in two halves so I apologise to the canny modellers out there who will grown at the thought of these. However the alternative would have been to leave it up to you to fabricate the spats. On my part I spent a week of mind numbing carving making just the spat moulds so I hope my efforts will at least spares you the anguish.

Now you will need to carefully trim the two halves of each spat so they mate as closely and without gaps. Also cut away the bottom to allow the wheel to exit. Now cut some 6mm wide strips of scrap plastic and glue these strips to the edge of one half of the spat (overhanging by 3mm) This will provide a lip for the remaining half to glue on to.

Before gluing the halves together, the axels must be installed and the wheels fitted. When the two halves are joined, mark the profile of the spat where it joins the fuselage and trim the fuselage skin to the profile. The idea here is to recess the top of the spat into the fuselage and to have the tyre depth plus 5mm of the wheel hub showing below the spat. You will have to trim the top of the spat where it enters the fuselage to achieve this dimension. You may also need to trim the wheel opening further so wheel 'binding' does not occurs. When happy with the position glue the first spat into position using epoxy. Only glue the other spat once it is aligned with the now fixed spat. As long as the spat is well fix into the fuselage, you will find the spat need no other securing. It also allows the Ali undercarriage to move slightly within the spat during landing.

Fitting out

Now position the canopy and tape securely into position. Make two sets of holes on each side of the canopy to allow the 8mm carbon wing joiners to pass through. Now slide the carbon rods through the tubes on formers F4 & F5. Attach the wings and note the amount of balsa in-fill will be required between the glazing and W1. Remove the wings and make up, fit and trim the in-fill pieces to suit. Open up holes in the in-fill to allow the wing joiners to pass through and the servo cables to pass out.

All the radio, pushrods, engine, tank etc etc, must be fitted and checked if you intend to fit the canopy permanently….it makes installation so much easier.
J Perkins Distribution do a 1/9th scale WW2 pilot which is just the right scale and does finish the model off a treat.

The wing struts should now be fitted and this means you will have to find the mounting hole in the Aluminium undercarriage legs. The best way to do this is judge the approximate position from the plan and press a pin through the plastic until you locate the hole. Once located, start to open up the spat, to the profile of the strut base so eventually the strut base recesses neatly into spat and the threaded end through the hole previously found. Take you time on this and only remove small amounts of plastic at a time. On the underside of the spat you will need to create an opening to allow nut and socket spanner to fix the strut to the leg.
When happy the securing points on the underside on the wing can be located, drilled and the strut ends fixed with self-tapping screws. Before fixing the struts, make sure the wings are tight against the canopy.
The struts are not specifically designed to carry load but they are required to hold the wings in position and stop them sliding apart.

The prototype was covered in black Easycoat (Profilm) with the ailerons, elevator and rudder being covered separately. Fit all the control surfaces with mylar hinge and secured with glue and pins. No ballast was required to achieve the C of G. The model tipped the scales at 5lbs 10oz.

FINISHING

Now I always like to do a bit of research and find an interesting colour scheme which has a some traceable history associated with the particular aircraft.

In this case I decided to go for a version that flew with 138 Squadron (special duties) which was formed to undertake missions for the Special Operations Executive (SOE) to maintain contact with the French Resistance during World War Two. The Squadron used Mk III aircraft, modified and fitted with a fixed entry/exit ladder over the port side to hasten access to the rear cockpit and a large drop tank under the belly.

For those interested, the I used an empty tube of decorator's mastic, trimmed the length down and fitted balsa to the front and rear tips. The ladder was made from 2mm pushrod wire and soldered.

If you intend to painting over the Easycoat you will need to 'key' the surface to accept the paint For this I use 800 grade wet & dry paper, wet with a little soapy water. Be careful not to rub too hard on the open structure or you'll 'cut' through on the edges. I followed the colour scheme based on a current Airfix kit; for the under surfaces of the wings, tail and fuselage, the black Easycoat was left unpainted. The upper surfaces were painted with Humbrol dark sea grey and dark Green.

For the decals either paint the roundels on or use Solartrim. The squadron markings were hand painted on.

FLYING

Now with a scale model, you are pretty certain the model will fly, but just how well is another matter As for finding the C of G well fortunately Compufoils works that out for you, so apart from the control throws which can only be a best guess, you should be able to get the model airborne without too much fuss.

So after some very long nights, the model sat in its unpainted covered state, on the Hastings club strip on a beautiful calm evening ready for its maiden flight. After a few Minutes taxiing which in the calm conditions proved very easy, she was lined up and the throttle gently opened. She gently accelerated and within the space of 20m she rose smoothly and climbing away without any fuss….so far so good. Before entering the first turn the model was throttled back quite considerable and a few clicks of up and left trim was added. The first few circuits revealed what a very stable model this was, no surprises although she was quite 'sprightly' Trying to slow her down on a claim evening did take a little effort but then the flap up to this point hadn't' been touched. On a model of this size I normally tend to avoid flap but the small wing and high loading really do necessitate the need for flaps. So turning the model into wind, full flaps was applied….surprisingly only a slight up-pitch movement was notice (probably due to the forward C of G) and she gently slowed to much more pleasant and refined speed. The rest of the flight was just filled with play flap and seeing how slow the model will fly….I think I bottled out well before the model did but it did prove this Lysander wasn't going to be the model from hell as some modellers have suggested. Because of the clam conditions, the landing did require flaps to be employed and she gracefully descended on ¼ throttle to a perfect landing and controlled roll out. All in all she really is a little peach.

The next outing couldn't have been different with a 20knott wing gusting. This time the model was finished and was sporting drop tanks and access ladder, all adding to extra drag. However the model needed no coxing and lifted off in a matter of meters in the strong wind. The conditions were really not suitable but the Lysander I think coped very well considering. The use of flap wasn't really used although they did allow some very slow passes for the camera. The Landing was uneventful and even in the gusting conditions she kept her composure with only a slight bounce on the main wheels.
I think the bottom line is wait for those calmer flying days, you will certainly enjoy the model so much more.

So there you have it four months from start finish and although the Lysander has been one of the trickiest models to design, I'm pretty chuffed with the out come.

spec

weight- 2.75kg (6lbs)
wing span-1680mm (66")
length- 1220mm (49.5")
wing load- 10.23 kg/m2 (34oz/sq")
Engine 48-52 4-stroke IC
Scale- 1/9th