Miles M-57 Aerovan

Now it's been a few years since I have produced a design for Model World so young Mr Van Geffen decided I had sat on my laurels for too long and it was time to get the thumb screws out and coheres me into producing a new design for 2010. Now I normally have a few subject I would like to design up my sleeve but as our Ed reeled off a big long list of subjects he would like to see modelled, one or two caught my attention and in particular, the Miles M57 Aerovan.

Miles Aircraft were one of those aircraft companies you struggle to list its successes but having said that they were always at the cutting edge of design and were definitely ahead of their time.

Take the Aerovan for example, designed during the latter stage of the second world war, the company's vision that air freight would play a big part in moving and distributing good more quickly and cheaply was indeed proved true. By the 1950s and 60s air freight transportation was big business. But like so many of Miles aircraft, the product could not live up to the vision.

The Aerovan concept of a delivery van with wings may have been sound but the design didn't really live up to expectation. Although it could carry over a ton in payload and have the accolade of being one of the first roll on roll off transporters, It was hopelessly under powered and a number of high profile crashes really sealed the aircrafts fate.

Now to create a model with such limited pedigree, does have its complication. Such were the small numbers produced that today there are no examples that currently exist either flying or in museums. Information on the Aerovan is at best sketchy, and drawings are difficult if impossible to get hold of. However our Ed did have a few 3-view drawings up his sleeve and with the help of the Internet, old photos were collected, enough to make a reasonable attempt at designing a model. The only sticking point has trying to understand how the flaps worked; these are shown as being set back from the wing trailing edge. Now it wasn't clear whether these retracted in and under the wing (like a Super Constellation). However at a recent talk I gave to the Woking Club, a club member called Peter Shaw introduced himself and said he might be able to help. True to his word, Peter sent me some sketches of the arrangement and all became clear. Apparently the flaps remained extended behind the wing trailing edge supported and pivoted from two arms extending back.

As with most of my plans and of course to make the builders life as easy as possible, CNC cut part are available which include all the necessary fuselage formers, wing ribs, tail ribs plus the skeletal framework of the nacelles. A detailed set of VAC forms are available which includes the canopy, the rear doors and the two engine cowls. Both the CNC and VAC form set are available through the Traplet plan service.

Ok so on with the build.

Start by cutting out the fuselage sides from the pattern shown on the plan, noting that the front and rear section, the grain runs vertical. Begin to apply 12mm triangle to the bottom edge of the fuselage side as shown on the plan and fit the wing seat doubler WS1. Fit fuselage formers F3 and F4 and enclose with the other fuselage side. The remaining formers F1 to F5 can now be fitted. Note that the triangle stringers need to

have saw cuts made in the position shown on the plan to aid bending of the fuselage sides. Now fit the two 4.5mm sq stringers linking the tops of F2 and F3. Now cut a small piece of sheet and bend this around the top of F2 & F3 and trim along the stringer line

The rear fuselage pieces F6, F8, F9 and the brace F10 can now be fitted along with the front pieces F7 and the wing support plate WP1

The top forward decking between F2 & F3 and the bottom decking can now be applied.

The nose block can be made up either from solid or laminated sheets of 12mm balsa. Fit this and trim to shape.

Next make up the tail boom by cutting out the boom side from the template shown on the plan. Cut out and fit the formers and enclose with the other boom side. At this point you must fit the rudder closed loop outer tubes and the elevator pushrod. Make sure there is sufficient length to extend these into the fuselage to pick up the servos. Now enclose the top and bottom with 6mm sheet and sand to shape. Make sure the elevator rod and the rudder closed loop outer tube exit through the bottom and top respectively. The tail boom can now be attached to the main body of the fuselage

Now sheet around the boom to body connection. Note the grain direction and wet the outside surface of the softest 3mm balsa you can find. This will aid bending around the corner of F6.

Before gluing into position the main undercarriage support plate UC4, pre drill the saddle clamp securing holes. Now glue into position.

As detailed on the plan, make up the steerable nose leg and mounting arrangement. Bend up the main undercarriage to shape making up a left and right hand version. Drill a 3mm hole through the fuselage at the u/c pivot point. The pre-bent u/c can now be carefully pushed into position. The clamping brackets can now be fitted to secure the u/c into position

On the plan is shown undercarriage detailing which you may wish to add once the model is nearing completion.

Wings

Each wing half is constructed over the plan which are joined at the dihedral point.

Begin by pining the 6mm (1/4”) sq obechi main spars to the plan. Now fit ribs W1 through to W15. (note; only fit the rear portions of W1 and W2).Now fit the 6mm sq obechi top spars, the 6mm x 3mm balsa rear spar and then fit the inner leading edge which is made from 3mm sheet stock. Now fit the trailing edge at the aileron. At this point the wing assembly can be removed from the plan. Fit the remaining lower rear spar.

Now glue into position the wing brace WB1 and fit the remaining forward sections of W1 & W2 and the smaller remaining section of inner leading edge.

Now construct the other wing and join the two halves together. Note that the top of the wing should be flat with a slight dihedral on the underside caused by the tapering in rib thickness towards the tip.

The top surface can now be skinned with 1.5mm (1/16") sheet balsa. The best way of sheeting large open framed wings and avoiding the ridge or step you always seem to get when butting together sheets of balsa wood, is to butt glue each planks together on a flat work bench. Splice together enough planks to cover the whole wing. Make sure you stagger the sheets so the spliced ends don't coincide with the adjacent sheets….little bit like masonry brickwork. Then use a large sanding block (300mm long) and sand the entire surface flat to removing any ridges caused by the jointing. What you will be left with is a smooth single seamless sheet of balsa ready to be glued over the ribs. Don't be too concerned if you feel the sheeting hasn't stuck to all of the ribs; once the wing is turned over, a bead of glue can be run down every rib joint.

Trim the trailing edge to the ends of all the ribs and the aileron recess.

At this point, all the power and servo wiring should be run through the wing to their respective positions and make up the aileron and flap servo mount.

There is no requirements for washout so make sure as you enclose the wing, you don't induce any twist. On the under side either leave out (or remove later) the sheeting between W5 & W6 forward of the 'main' spar for the nacelle sides to fix into

You will notice that there is an under camber on the wing trailing edge near the flap. This is sheeted also but remember to mark the position of the flap supports FL1 and FL2

Now trim any wing sheet overhang from the leading edge and then fit the outer leading edge made up from 6mm sheet. Profile this to the shape as shown on the plan.

Next, make up the ailerons. This done by cutting the bottom sheet to the correct width, then trimming and fitting the aileron leading edge. Now mark out and fit the ribs on to the bottom sheet. When this is done trim the top edge of the aileron leading edge flush with the ribs. Now trim the trailing edge to the rear edge of all the ribs. Install the aileron horn support block before finally enclose the structure with the top sheeting and then trim. Test fit the aileron to the wing to make sure the trailing edge lines up with the main wing.

Now make up the flaps. These are simply cut from 9mm sheet balsa and profiled as detailed on the plan. Glue into position the flap supports FL1 and FL2 (note; these are made from either laminated 3mm Birch ply or 6mm birch ply)

<u>Nacelles</u>

The nacelle sides and formers lock together fairly quickly so it shouldn't take too long to see each nacelle structure appear ready for skinning.

The outer sides of the nacelles are constructed using 3mm sheet balsa formed around the formers. The bottom of the nacelle is sheeted with 9mm sheet balsa
At this point make sure you feed the power wiring through the nacelle. Make up and cut to shape the nacelle tail blocks and glue into position.

A small access hatch will be required to in the underneath of the nacelle to access the speed controller.

Cowls

Firstly, trim the rear of the cowls and open up the front for the prop shaft to exit. To secure the cowl to the nacelle cut and glue four blocks to the nacelle. Before drilling and securing with small screws, position the motor so it sit centrally in the cowl, making sure there is sufficient clearance for the prop.

To finish, sand and profile the nacelles and blend the cowls smoothly into the nacelle

Tail & Fin

The tailplane is a built up affairs and constructed over the plan. The ribs are fully symmetrical so it doesn't matter which is top or bottom. You are building the tailplane upside down over the plan and by doing this flat on the building board will allow a small amount dihedral to be included when the tailplane is remove and turned over.

Cut and pin the trailing edge to the plan, pinned down the 'top' spar and fit the ribs then the inner leading edge. Now fit the bottom spar and the inner leading edge.

Trim the trailing and leading edges flush with the top and bottom edges of the ribs and sheet the underside. The tailplane can now be removed from the board. This positive dihedral should now be just noticeable. The top sheeting can now be applied and any excess sheeting overhanging the leading and trailing edges, removed. The 6mm outer leading edge, made from sheet balsa, can now be applied. Finally, shape the leading edge to a smooth flowing curve.

The elevators are made using a 3mm sheet balsa core and then a 6mm leading edge applied. Triangular riblets are added top and bottom to finish. Remember to fit reinforcement to where the control horn and torque rod are sighted.

The fin and rudders are made from 6mm sheet balsa and only need shaping. These can be glued into position once the model is covered.

On the prototype, only the centre rudder was controlled which with the movements stated was acceptable. On the plans however is shown a simple push rod mechanism for operating the outer rudders should wish for more rudder authority (knife edge passes etc!!!)

Back to the Fuselage

Fit the wing dowels and position the wing on to the fuselage. Locate where the dowel holes should go in F3 and drill these.

Cut and fit the wing bolt reinforcing plate to the top skin of the wing. Drill the two wing bolt holes through both the wing and WP1

Finally to secure the wings, use 60mm long, 6mm dia. bolts and captive claw nuts.

Now make up the front 'wing-to-fuselage' faring by laminating sheet balsa together then shaping to match the fuselage profile. Glue on to the wings, former F6A and make up the rear fairing using the template on the plan. You will need to wet the

outer surface of soft 3mm sheet balsa to achieve the tight radius on the corners of F6A.

With the wing still attached, position the tailplane on the fuselage and trim the seat so the wings and tailplane are parallel to each other. When happy glue this on to the boom

If you wish to make the rear door detachable then use F5A & F8A to reinforce the edges of the plastic VAC from. If you don't want to have it removable /opening then discard F5A & F8A and glue the VAC form straight on to the fuselage.

Detailed on the plan is an indicative design for a steerable nose wheel assembly. A close coupled servo is 'Y' leaded from the rudder output.

Covering

For covering on the prototype I white Solafilm as it avoided having to paint the VAC form rear doors and cowls…a bit lazy I know!

Finishing

As the cockpit is quite large and open it is worth doing a little work on the detailing. I added a J.Perkins 1/10th scale WW2 pilot and painted the cabin area in 'cockpit green' (Humbrol 78).

Fitting out with radio is quite straight forward and is generally as shown on the plans. I had to add around 0.20kg (7oz) of nose weight to my prototype so I guess you will have to do the same.

Powering Up

Having finished the model towards the tail end of November 2009 and endured the coldest and wettest winter for 30years the Aerovan had to wait almost 4 months before some sort normality returned to the Hastings model flying site.

Having spent some 20 years around multi engined models, I do feel pretty comfortable flying them. However good you think you are with single engined models there are few rules that apply to multi engined models that you should hold dear. Never mix the rudder with aileron, you must be able to use the rudder as a primary control just in case. The reason for this is in down wind turns need plenty of rudder to bring the model round with little or no aileron required. In some cases opposite aileron is required to hold bank angle.

Now I have to say test flying any untried design can be a bit nerve racking especially when guessing the control movements and only a calculated CofG position to rely on. So lining her up on the strip in to the face of a 15-knott wind, I held my breath. The model accelerated briskly to a racing pace. Elevator was applied and before I knew what was happening, the model reared up into a vertical stall, dropped a wing and came crashing back to earth…….. fortunately I managed to level the wings so only minor damage was done to the fuselage. At least she's been crash tested too.

Upon repair and a moments reflection, it was clear that the C of G position was a little rearwards and the elevator way too sensitive.

So repaired, with 7oz of lead added, the elevator movements reduces from 20mm to 8mm, the Aerovan was lined up for her second attempt, this time into the face of a gentle 5 knot breeze. On opening the throttle, once again she accelerated briskly but this time she was kept grounded and speed built up before very gingerly applying up elevator. As a result the nose lifted and she was airborne without too much fuss.

A fair amount of up trim was needed and a few clicks of right aileron before she was flying hands off. What was still very apparent was the elevator, even with just 7mm of movement each way, was still very powerful. So don't be tempted to add any more unless you feel you need to.

Now just looking at the model you know the Aerovan is not going to perform like a Spitfire but I have to say the performance surprised me and was very well mannered. When deploying about 5deg of flap the elevator 'soften' slightly and the model became much smoother. All in all a very nice little model.

Well there you have it. I think the Aerovan is a model that you either love or hate. However like most of Miles aircraft, it does have oodles of charm and dare I say the word 'cute'.

A word of thanks to Colin Hammond for piloting the Aerovan while I took the flying pictures….i know he was a bit worried just in case he pranged it but once he had the sticks he was smitten….

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