Ray Malmström's VIKING

A small 15" span rubber powered FF design suitable for indoor and calm outdoor conditions. With thanks to Bryan Gostlow and Chris Strachan of the IVCMAC.

For long term readers of AeroModeller, Ray Malmström will need no introduction. He was a contributor to AM from the mid-1940s, producing cartoons and quirky small flying model designs. After service in the RAF in WWII he became an art teacher at Impington Village College (IVC) just outside of Cambridge, and he was also the founding member of the IVCMAC Model Aircraft Club. You can find a biography on Ray by searching on the American AMA website www.modelaircraft.org.

Ray died in 2001 but his spirit is still very much kept alive by today's IVCMAC members. On Sunday 1st November there will be a large indoor event using two halls at Impington Village

An example of Ray Malmström's work is this cartoon of Fliar Phil.

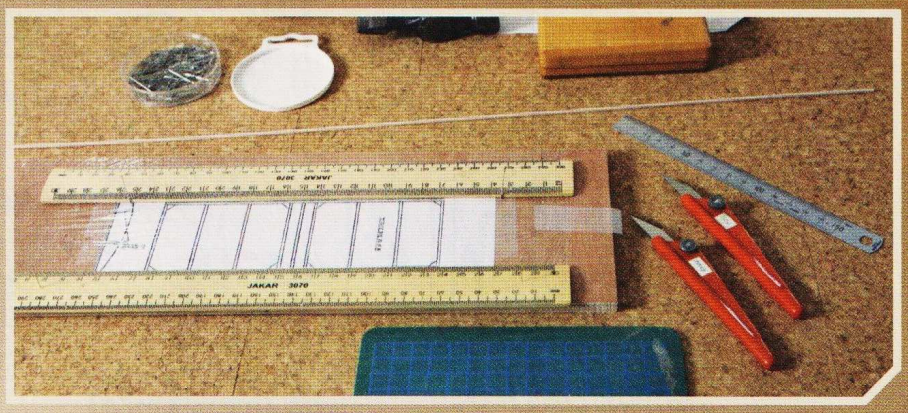
College, which will include a competition for this Viking design – so you better start building! There will also be a talk by AM Inside Indoor contributor Clive King on building and flying his INDIGO indoor duration model which will be the Free Plan in the next issue of AeroModeller. See www.ivcmac.co.uk

Ray's pretty little Viking design has not been widely available before, and with the help of Bryan Gostlow and Chris Strachan we have put together the free full-size plan and a build article. Designed as FF and rubber powered, I'm sure we will see variations using electric power and even micro RC. So on to Bryan Gostlow's description of the build.

Tail Feathers

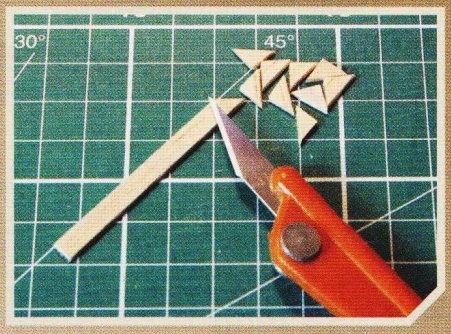
It has been a while since I last built one of Ray's designs and so I thought I'd begin with the tail-feathers, to get my eye in. I made a copy from the plan and, covering it with cling film, mounted it onto a small plywood building board and pinned on straightedges above and below. Rather than use just one scalpel I like to have two: one with a fresh blade and labelled 'Sharp' and a second 'PDS' or Pretty Damned Sharp and used most of the time. That way, when you need to make a precise cut, you always have a near perfect edge to hand. Leading and trailing edges I left long, trapping them against the straightedges (rulers in my case) with pins before cutting ribs to fit. Don't use a pencil to mark the rib length, instead fit one end in place and mark off where to cut with a scalpel. Fit all the pieces dry.

Then I squeezed enough PVA into a plastic lid and cut and shaped a length of 1/16" as a glue stick. Taking each rib in turn I applied a small amount of PVA to each end, fitted one end (to make sure some glue went to where it

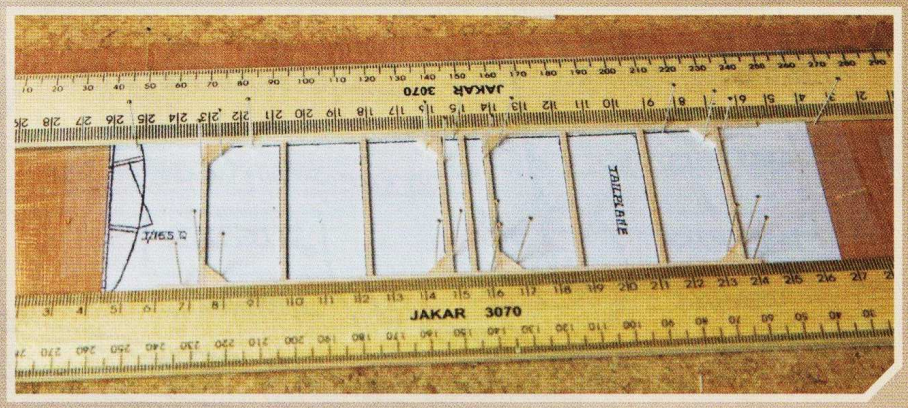


Rulers used as straightedges when building the tailplane.

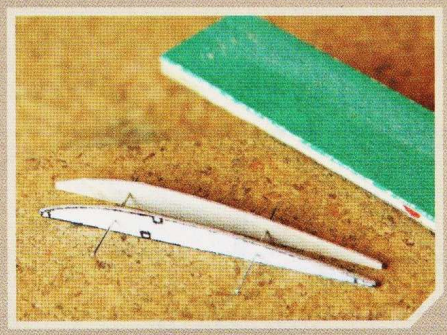
Puddle of PVA and glue applicating 1/16" stick.



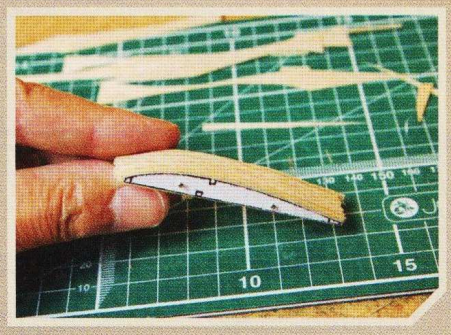
Cutting all your gussets at the same time will save time later.



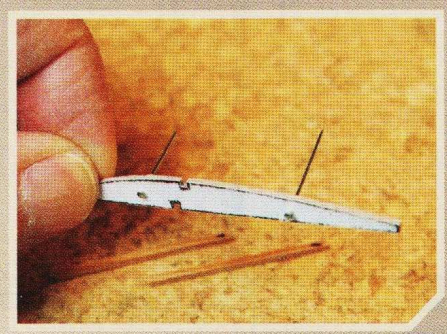
Gussets are glued and held in place by pins at the edge (not through). Then set aside and move on.



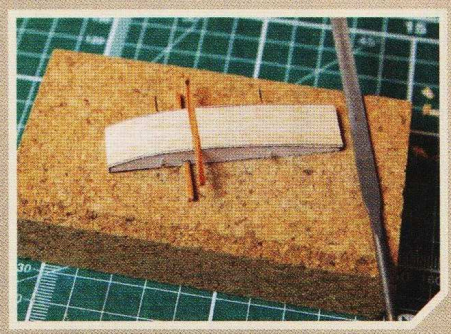
The two initial plywood rib templates without spar notches.



The sandwich of ribs in the rough.



Templates trimmed and notched for spars.



Notched ribs including a couple of spares.

was needed) then removed it to fit the other end (for the same reason) before going back to the first. If you don't then most of the glue is scraped off the end and sits on the spar. Check that all the ribs are square and pressed down against the plan before setting aside and turning to the fin.

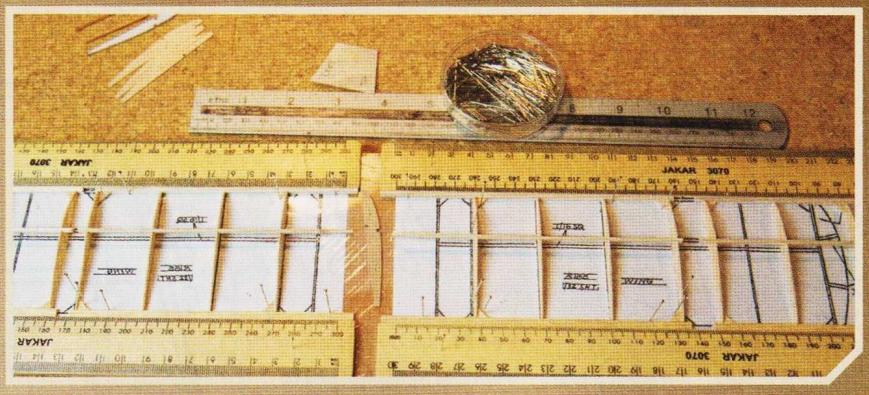
Approach the fin in much the same way, placing the upright pieces first and fitting the cross pieces dry. Aim for a really good fit before measuring out a fresh puddle of PVA and cutting a clean end to the glue stick. Glue the cross pieces in turn before setting aside.

You're going to need 15 or so gussets so cut a 5mm strip from some scrap 1/16" sheet and line it up with the 45° line on your cutting board. Holding the strip, make a vertical cut before flipping the strip over and cutting again. Keep going until you have about 20 triangular gussets cut. Don't try to make them too small as they weigh almost nothing and small ones are just too fiddly. Pick one up on the point of a scalpel and make a dry fit. If the fits isn't perfect then use the sharp scalpel to remove a sliver. Once they're all dry fitted pour yourself a fresh puddle of glue and fit, holding in place with a pin to apply a little pressure into the corner.

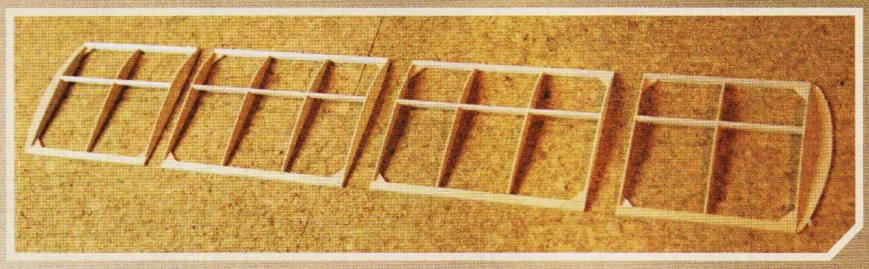
Ribs and Wings

Make a copy of the wing rib and use UHU or similar to stick it onto 0.5mm ply or whatever you prefer. Cut around the printed line but leave leading and trailing edges in place (don't cut notches for spars just yet). Pin this template onto a second piece of ply and cut around it to form a second template. Sand to a smooth and accurate finish. Use one of the templates to roughly cut ribs from a scrap of 1/32" balsa sheet, making registering pinholes as you go and transferring to the second template. Once you have all the ribs and a couple of spares make up a 'sandwich' of templates with roughly cut balsa ribs as the filling. Use a sharp scalpel to trim the ribs to the template then finish with a sanding stick. Set aside the ribs and fit the templates together. Trim off leading and trailing edges and cut the notches for the spars. Re-make the sandwich and use a combination of fine saw and needle file to cut the notches for the spars. Test with a piece of 1/6" square but be aware that small stripwood is rarely square. Trim the ends of the ribs.

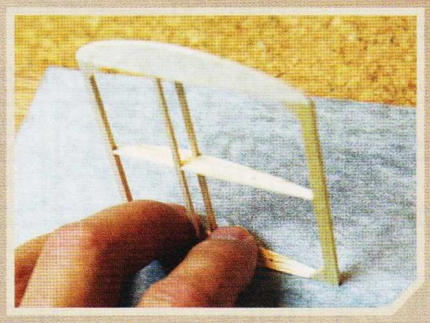
The wing has a 1 bay flat centre section, and polyhedral – only the centre section and right hand panels are shown, so you will need to produce a left hand panel copy (one way is to photocopy the RH wing panel and use a little cold cooking oil smeared on the back with cotton wool to give translucency). Cut yourself a dihedral template from ply (11° at the root Jig X, and 13° for the tip Jig Y). Build up the wings in the same way as the tail feathers, between straightedges beginning with the outer panels. The wing has to fit



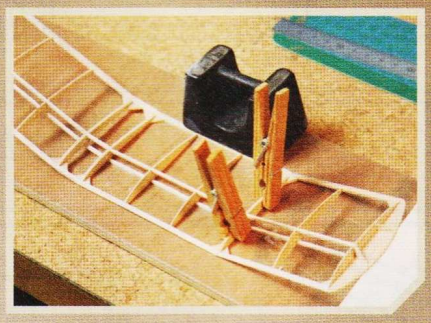
Building up wing panels. The spars, leading and trailing edges are trimmed at a later stage.



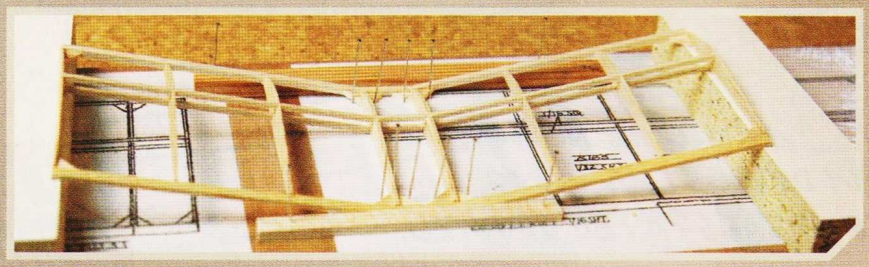
An opportunity to shape the trailing edge before joining the panels.



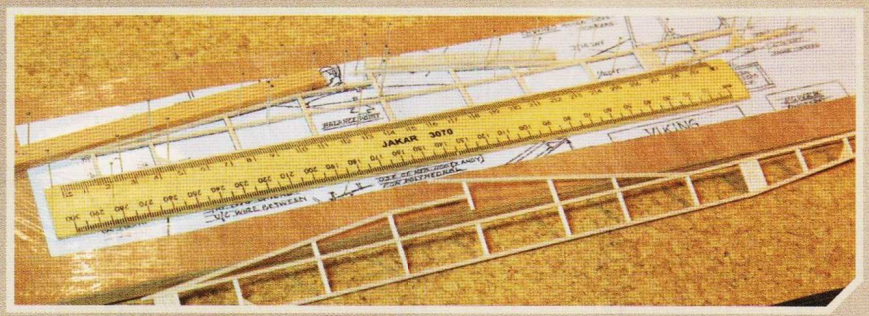
Sand spars flush with the ribs.



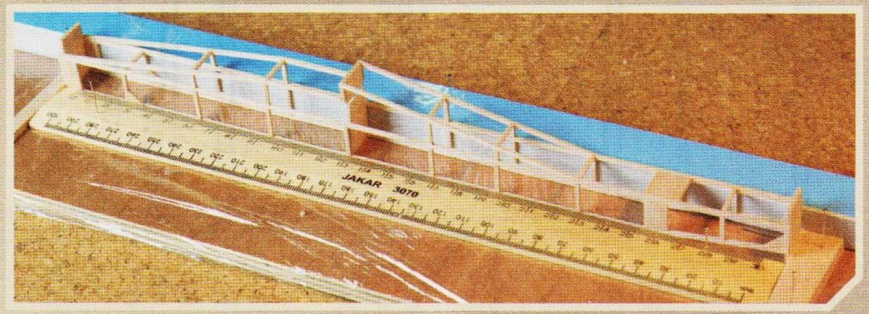
Adding the outer panel. This half of the wing must be left for the glue to dry before attaching the other outer panel.



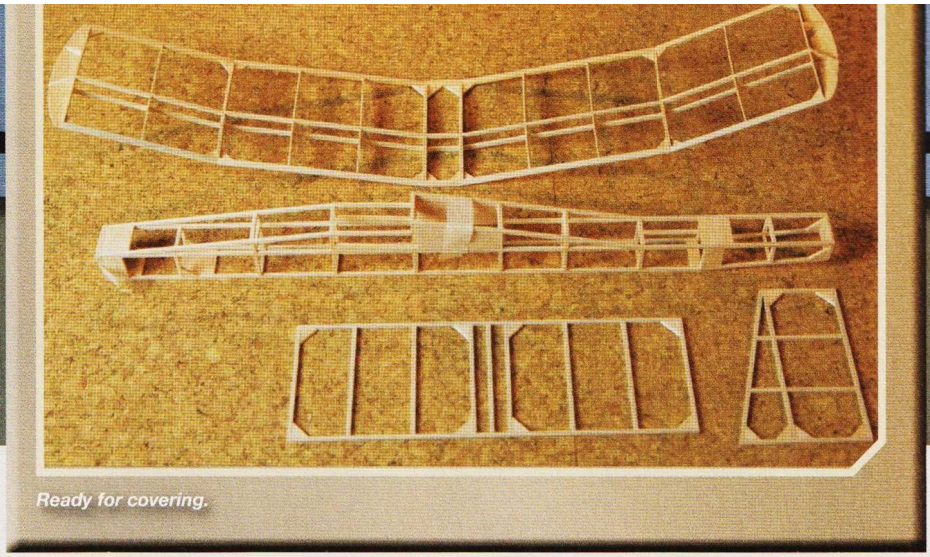
Building in the centre section while the inner panels are propped up to give the correct



Ideally an identical pair of fuselage sides.



Temporary balsa formers help keep the fuselage sides spaced correctly while the cross pieces are added.



Ready for covering.

through the fuselage so check that leading edge, rib and trailing edge add up to no more than 70.5mm. Double check that the inner ribs of the outer panels are set to 13°, and when all is set add gussets. Move the panel when dry to leave a small gap and move on to building up the inner panels. After a decent interval go back and fit the gussets.

You'll need to sand the leading and trailing edges to section and this is much easier to do before the panels are joined. Take care not to damage the ribs with your sanding stick. Trim the spars to the last rib and lightly sand. Find blocks 18 - 19mm deep to use as props when setting the dihedral. Bring the two inner panels together over the plan and build up the centre section before setting aside for the glue to set. You can use the same block(s) when adding the outer wing panels.

The outer panels are added on one at a time, with the adjacent inner panel flat on the board.

Turning to the Fuselage

I went for building a fuselage side, and then another (using the same pinholes and straightedges) but wondered if leaving the cockpit 'superstructure' until later might have been easier. Either way the fuselage is straight forwards if a bit fiddly with all those cross pieces. I chose to cut a whole bunch of them to exactly 11mm rather than trying to fit each one. I set up the sides and made up some rectangular 'formers' from sheet to hold the whole structure square as I was adding cross pieces. Later I discarded the 'formers'.

I also made up a nose block, wheel and undercart. I have a sheet of fine sandpaper (240 grit) glued to a sheet of ply and carefully sanded tail feathers and fuselage sides smooth. At this point the model weighed 6.9g (wing 2.7 fuselage 2.9 tail 0.8 and UC 0.5) and was ready for covering.

As for finishing and flying, you can find a lot of helpful advice in Clive King's Inside Indoor series within AeroModeller, or you could come along to IVCMAC on the 1st November if you need some help trimming.

At this stage the model weighed 6.9g

The Viking is a striking little design – this one was built by Chris Strachan.