BIPLANE WING SETTING JIG

By Tom Hallman

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Having never built a bipe with butt joints on all four wing panels, I anticipated a bit of nonsense when it came time to line things up with the proper incidences etc. Plus, when I saw that the N struts on the Waco were not only slanted forward but also angled toward the wingtips ... well, I knew it'd be 'spinning plates time' again. I decided to make a wing jig, using foamcore to ease the pain.

This product is light yet strong and easy to cut, so the jig came together rather quickly. The plan for my 20 inch Scientific Waco YKC in New Zealand markings called for 3º of positive incidence on the lower wing, and I.5º of positive on the top. That's the opposite of what I normally do, but I figured I'd give it a shot, since I know others have had success with this setup.

The lower wing was already in place prior to using the jig. That installation was easy enough, following the line on the plan. Everything on the jig was then based off that lower wing position. Pins and balsa were used to gently anchor the model securely to the frame.

I decided to place inch markers on each upright,which were placed just short of the anchor spots for the struts. A notched piece of foamcore was used to act as the seat for each top wing panel. Using a tight friction fit, I was still able to easily slide each seat up or down accordingly to create the desired incidence. Once I was happy with the placement, I glued the root rib of each wing panel to the fuselage.

Prior to gluing the struts in position, I held the wing firmly on the seat by stretching a very thin rubber band around the foamcore uprights, spanning the chord. A scrap piece of paper cushioned the top wing tissue. Otherwise, the wingtips could have easily lifted, possibly resulting in an uneven setup. (I'm sure pins and balsa could have done the same, but I didn't want to risk moving the seat position.)
Another bonus that comes from anchoring the model to the jig is that it allows you to move the model about without actually having to hold onto the model. So the likelihood of cracking a longeron, a crosspiece, or poking a hole in the tissue is lessened. You can even set the model on the table upside down for a different view. Surprising, as that came in handy when gluing the struts.

Luckily, the foamcore seats can be slid off once the struts have been installed and dried completely... otherwise you'd have a beautiful model ready to fly, but surrounded by a jig! Talk about painting oneself into a corner. I'd like to say that I had thought this jig design through completely... planned for unexpected twists... but I didn't see that one coming. I'll admit that I lucked out on this one. Another plus, it looks as though the jig will be adaptable to future projects of similar span.

With the hardest part of the build completed, this little bird is ready for final assembly. It's gonna be great having another bipe in the hangar, one that's bright enough to be seen in the corn, should she ever choose to venture that way... knock on balsa...

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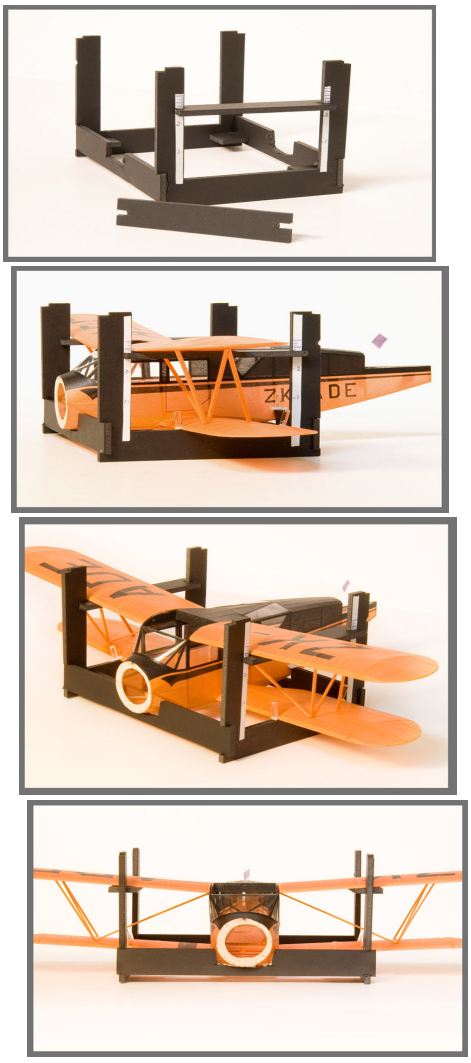

Photos by Tom Hallman

Captions clockwise from top.
One: The wing jig for the Waco biplane was made from black foamcore carefully engineered and cut out to allow for the construction sequence of attaching the upper wing of the model. This photo shows the base of the jig with cutouts for the fuselage, and the friction-fit sidebars that will cradle the top wing. One inch markers were attached to the uprights allowing chordwise angle adjustment for the top wing.

Two: The Waco is *placed in the jig. Its bottom wings were already glued to the fuselage, so they were used as the base for everything else. Note that the leading and trailing edges of the bottom wings are pinned to the base using small scraps to balsa. The friction-fit side bars can be accurately raised and lowered as they cradle the top wings, using the calibrated markers to duplicate the angles of both wings. At this point the top wings can be glued in place.*

Three and four: To finish the assembly, the jig allows accurate placement of the "N" struts as well as the diagonal struts that run from the top wing root down to the base of each front "N" strut. The fuselage and both sets of wings are held firmly in place as the struts are glued in position.

Ed. Note: You can see larger photos on Tom's website:
http://www.hallmanstudio.com/WacoJig.wrkg.jpg