

Building No-Cal indoor planes

No-Cal is a simple formula for duration competitions. You need a scale-ish model with the correct outline and markings. The maximum wingspan is 16" and rubber power. The full rules are the end of this document. The fuselage is built flat with a motor stick or tube glued on its side, so is thin hence the 'No-Calories'. Unless you are very clever with an airbrush, printed tissue is the preferred covering. Plans and tissue pictures are available free online. There is one address at the end. One problem is that the fuselages are too long for A4 so many plans have the fuselage page in a longer US legal paper size. The other pages are A4. As a result you have to experiment with the scaling-up ratios and split the fuselage printing unless you have an A3 printer.

Printing on tissue

Ink jet printers are an excellent way to add the markings and camouflage to the tissue before applying it to the airframe.

What do you need?

- **An ink jet printer.** A straight through paper path is not essential. An A3 printer often allows all the images to go on a single sheet but A4 is fine. You just need several sheets.
- **Graphics software** to design the artwork (or a good ready made image)
- **A can of spray adhesive.** You could use 3M Spray Mount, Photo Mount or ScotchWeld 77, or another brand. The advantage of the last is that it also works well for sticking film covering to light airframes, but it is more tacky.
- **A sheet of 80 g/m² printer paper** to serve as a backing sheet, the same size as the piece of tissue you will be using for printing. The backing sheet ensures the tissue doesn't crumple.
- **A piece of smooth card** the same size as the paper, or bigger.
- **Tissue.** I used white Esaki.

Making the pictures

There are two ways

1 I found that the artwork that Airfix produced to show how to paint their plastic models is available online. The quality is very good and can be enlarged quite a lot. The only part that needs changing is the fuselage side view. This has the end view of wings on it. I used the clone stamp tool on Photoshop to copy patterns over the wing.

2 Create your own artwork. You could use CorelDraw or similar software - whatever you are skilled at.

Preparing the tissue

First you must pre-shrink the tissue. I used an old window cleaner spray bottle that made a very fine spray. Put the tissue on a cloth and wet it all over. When it has dried, do it again. Depending on the type of tissue you might need to iron it flat, though some argue that a crumpled finish improves flight.

Prepare a backing sheet for the tissue. Use a piece of printer paper (80 g/m² or heavier) that is the same size as the tissue sheet to be printed. Apply a light coat of spray adhesive to the backing sheet,

less than you would normally, especially if using Scotch 77. Press the backing sheet to the card. Peel it off again. Repeat three or four times to reduce the tackiness of the adhesive. Try it out with a piece of scrap tissue.

Now apply the tissue to the backing sheet. Smooth out any wrinkles that may develop. You can peel back the tissue to reset it. I lowered the backing sheet onto a full sheet of tissue and trimmed the tissue to size afterwards.

Printing

First you need to find the printer properties dialogue boxes. Do a trial print onto normal paper. Place the airframes onto the printed images to check they will cover fully. Don't forget that wrapping round the upper curved wing surface will take a bit of extra width. If the size isn't correct measure a dimension on the frame and the image and calculate the percentage to enlarge or reduce. Set this value in printer properties and do more trial prints until you get it right.

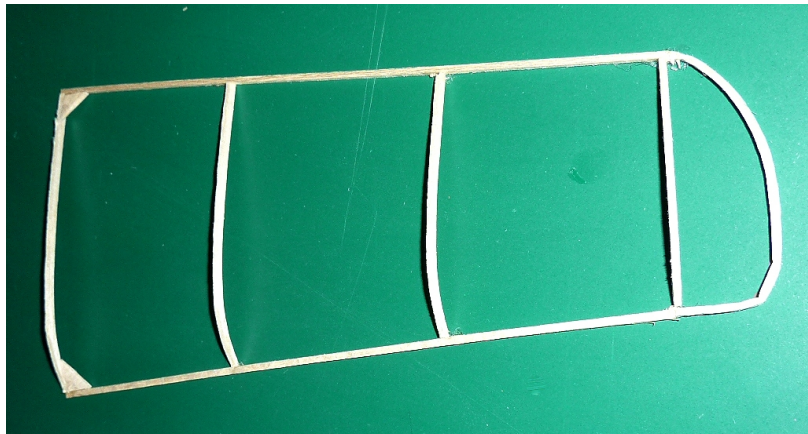
Place the tissue/backing sheet in the printer so the tissue will be the printed side, usually face down. Print the images. Allow the ink to dry before touching the sheet.

Remove the tissue from the backing sheet. Go gently, though tissue is surprisingly strong. You can re-use the backing sheet several times before it isn't tacky enough any more, even next day. You should get at least five uses out of it. It doesn't matter if the tissue isn't completely stuck down all round the edges.

Covering the airframe

This was my first attempt at a No-Cal indoor model. I chose a Focke-Wulf 190A due to its simple shapes and the fact that I had an Airfix picture of the markings that I could use to print the tissue.

Here is one bare wing



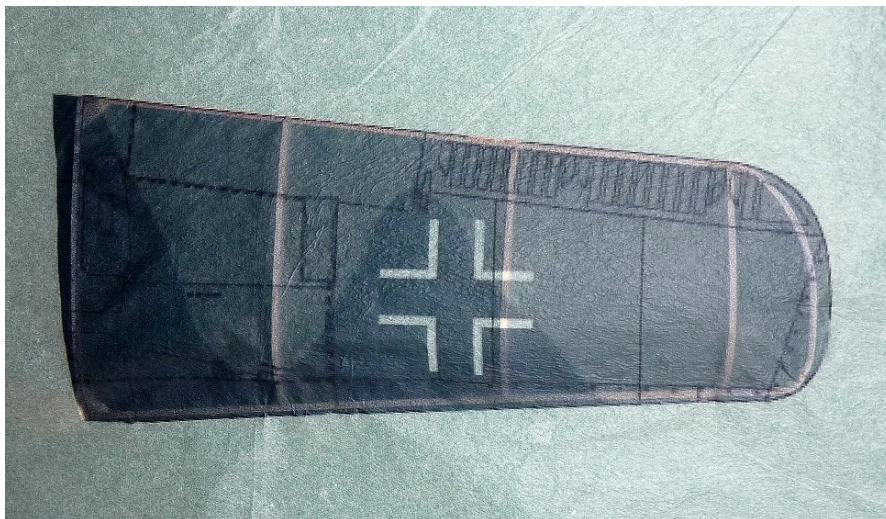
Here is the printed tissue on a 6 mm square A4 size balsa frame. I thought of using clips as it would give me a chance to experiment with the best tension and to get out all creases. It worked a treat.



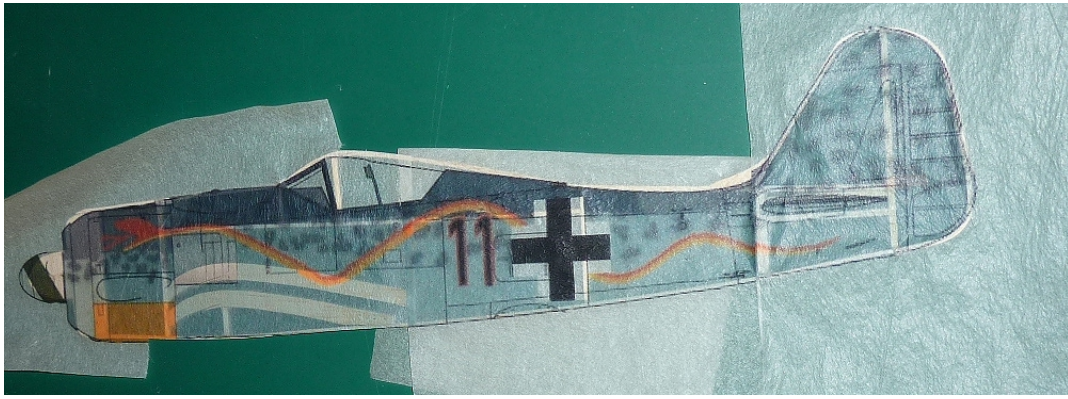
First I practiced lowering the wing onto the tissue. I found that starting with the leading edge and then rotating the wing back worked best.

I sprayed the wing framework with Scotch 77. I then pressed it onto the tissue using the method I'd practiced. You need a steady pair of hands, so relax. It is best to rest at least one forearm on the table and use your wrists to move the wing.

This is the wing after removing it from the frame, before trimming. I pressed all round to make sure the tissue was stuck. To trim I used a new No 10 scalpel blade in a Swann Morton handle.



On the next page is the fuselage. I had to use three pieces of tissue. The fuselage was too long for A4 and I had made the fin a little too large for scale. I had to print a piece for the fin at a higher magnification than the rest to ensure that the framework was covered.



This is the finished model. I am quite pleased with my first attempt. All up weight without rubber was 5.35 g. Now to see if it will fly.



Lessons I learned

- It's easier than I expected.
- Make the artwork a few percent bigger than it needs to be, to avoid bare frame showing.
- Esaki tissue is strong enough to be pulled firmly.
- You can pull the tissue off the airframe Scotch 77 for a minute or two after initial placement.
- The clip method for fixing the tissue to the frame worked very well.

My thanks to Paul Bradley for his excellent guide to tissue printing on which I based this document and for his free plans. <http://paramodels.com/Plans/nocals.htm>.

The full no-cal rules from the The Flying Aces Club rule book

VIII-1.0 NO-CAL PROFILE

Competition for recognizable profile scale models.

A. Design considerations:

1. Wing span: 16 inches maximum.
2. Aircraft with fixed landing gear must have each landing gear represented as per the original subject.
3. All wing struts must be on the model.
4. Motor sticks shall not exceed fuselage length, however, the prop may be positioned at the tip of a scale profile spinner if the real aircraft featured one.
5. Surfaces may be single covered.
6. Model must be in correct color scheme, and have control outlines, registration numbers, etc.
7. Have proof of scale. Judges decisions are final.

B. Official flight: 20 second minimum; NO MAX!

C. Scoring: Total of three flights.

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