

Building instructions 1/72 scale Koolhoven F.K.46S

Aircraft history

The Koolhoven F.K.46 was a two seat biplane specifically designed as a trainer for beginners. A special version, the F.K.46S, was designed as aerobatic trainer. Adaptations were ailerons in both upper and lower wing and a smaller fin, both meant to improve the manoeuvrability of the aircraft. It was also equipped with a large fuel tank in the upper mid wing section, either above or under the wing. There were slight differences in the rudder shape. Five aerobatic aircraft have been produced, of which the first two had the fuel tank under the wing, the other above the wing. The aircraft have flown in eight different painting schemes. The first F.K.46S flew in February 1937 with the LVA (Dutch Air Department). It went back to Koolhoven and was sold to J.E.F. de Kok, who donated it to the South-Sumatra Flying Club in the Dutch East Indies. Most F.K.46S's flew with the NLS (Nationale Luchtvaartschool, National Air Training School). The fifth one was requisitioned by the ML (Militaire Luchtvaart, the Dutch air force) in 1939. One aircraft ended up in South Africa.



The kit is a reissue and upgrade of the original VAMI kit, which is sold out for a long time already. It models the aircraft with both tank configurations and three rudder versions and the wing span is corrected. It includes a decal sheet for seven out of the eight painting schemes the aircraft has flown in.

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Aircraft characteristics

Span:	8.00 m
Length:	7.30 m
Height:	2.85 m
Empty weight:	570 kg
Take-off weight:	870 kg
Engine:	De Havilland Gipsy Major I of 130 hp
Accommodation:	Pilot and trainee.

References

1. H.J. Hazewinkel, *Vliegtuigbouw in Fokkers Schaduw, De geschiedenis van al die andere Nederlandse vliegtuigbouwers*, 1988
2. H. Hooftman, *Nederlandse Vliegtuig Encyclopedie, Burgerluchtvaart in Nederland, Deel 3; Van PH-AJA tot PH-AKZ*, Cockpit-Uitgeverij, Bennekom, 1981
3. D. Top, *Frits Koolhoven en zijn Vliegtuigproductie*, 1996
4. T. Wesselink & T. Postma, *De Nederlandse Vliegtuigen, Alle vliegtuigen ooit in Nederland ontworpen en gebouwd*, Unieboek B.V., Bussum, 1982
5. T. Wesselink, *Koolhoven Vliegtuigen*, ISBN 978-90-818510-2-2, 2012
6. T. Wesselink & T. Postma, *Koolhoven, Nederlands vliegtuigbouwer in de schaduw van Fokker*, ISBN 90 228 3890 0, 1981

Additional material and information has been received from Hans Berfelo and Jan Grisnich.

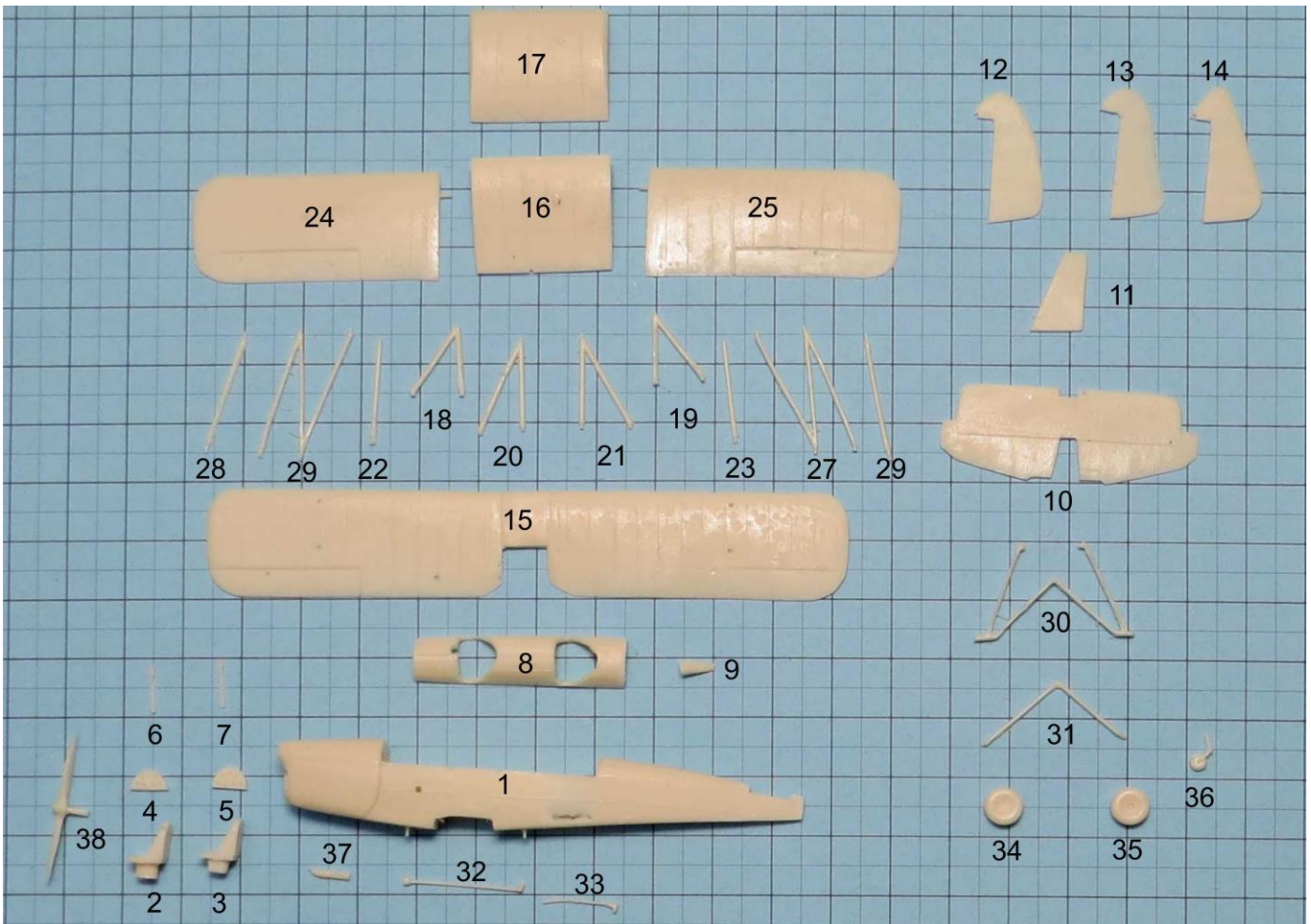
Kit contents

- 38 resin parts.
- 5 x 20 mm of 0.5 mm thick styrene sheet for control horn production.
- 10 mm of 0.5 mm brass rod for upper wing assembly.
- 10 mm of 0.5 mm styrene rod to replace broken elevator control rod supports under the fuselage, if required.
- 10 mm of 0.25 mm metallic wire to produce rigging wire stabilization rods.
- A transparent plastic sheet of 15 x 55 mm for the windscreens.

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- A decal sheet for registration numbers, orange triangles, red-white-blue-orange roundels, company logos, inscriptions and decorative strips.
- Some sheets with photographs of all individual aircraft, the rigging scheme and painting schemes.

Parts



Building instructions

Painting of parts and (sub) assemblies should be done at convenient points in the building process.

Note that most pictures illustrating the instructions below have been made during the assembly of the prototype for the kit, so small differences in assembly order and configuration may be present. Also, the model has been painted with a brush; if an airbrush is used, the painting and assembly order will probably be slightly different. And of course these guidelines reflect my building routine.

The parts of this first kit show more air bubbles than later production kits; the moulds have been corrected to avoid them.

These building instructions follow the method I use to apply rigging wires: Drilling a hole through wings and tail planes, leading 0.05 mm fishing line through them, tensioning them with pieces of tape, gluing them with a drop of cyanoacrylate glue at the reverse side of the rigging line and when dry, cutting off the excess glue and fishing line. If you use another method, adapt your building order accordingly. Rigging wires are indicated with a number between square brackets, as indicated on the last page of the document "Configuration, decals, painting scheme and rigging scheme of the F.K.46 aerobatic version".

A copy of the building instructions can be downloaded from www.hollandaircraft.nl/resin_kits.html

1. Remove the resin parts carefully from the sprues; this can best be done with a razor saw. Don't cut off the thinner parts at the end of the struts; you can shorten them later if need arises. Clean the flash.

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Clean all parts with water and detergent or IPA to remove traces of casting agents. Adjust bent parts by dipping them in hot water and letting them cool on a flat surface.

- Probably you will have to repair the air bubbles in some parts with small thickness. This is best done by using Revell Plasto, as it attaches well to the resin, and reinforcing the repair with a very thin layer of thin cyanoacrylate glue.
- Select the upper wing centre section (16) or (17) that is applicable for the aircraft tank configuration (above or under the wing) you are going to model. Although the outer wings (24) and (25) are provided with casted attachment pins, it is advised to replace them with 0.5 mm brass pins.

- Glue the outer wings (24) and (25) to the centre section (16) or (17). Make sure the wing upper surface is flat, if you are using (16), tank under the wing, or the wing lower surface is flat if you are using (17), tank on top of the wing. Sand the lower or upper surface of outer and centre wing sections as relevant flush. Engrave the rib pattern again if needed.



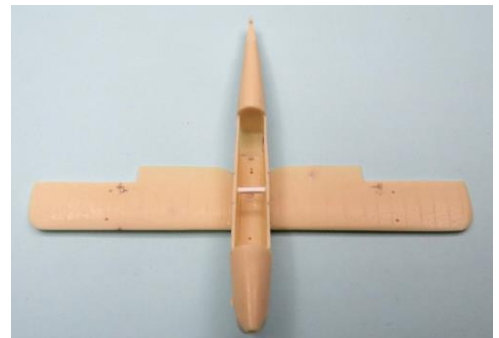
- If you want to build the model with deflected control surfaces, separate the ailerons from the wings (15), (24) and (25) and the elevator halves from the horizontal tail plane (10). Mark the control surfaces, so you can later place them at the correct location.



- Mark also the location of the aileron control horns, the exit points of the aileron control cables and the attachment points of the aileron activation struts or cables (control cables 15 through 22, see the document *Configuration, decals, painting scheme and rigging scheme of the F.K.46 aerobatic version* included in the kit.)



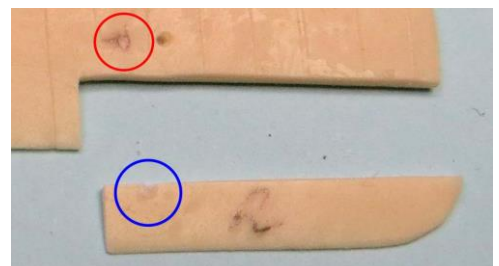
- Dry fit the cockpit cover (8) on the fuselage (1). Adjust the width of the fuselage if required by dipping it in hot water, keeping it to the correct width when cooling down.



- Glue the lower wing (15) to the fuselage, keeping it well normal to the length axis of the fuselage.

- As it is easiest to do this now, drill

- 1 mm superficial holes at the location of the control horns (control cables [15] through [18], blue circle)
 - skewed 0.4 mm holes at the exit points of the aileron cables (control cables [15] through [18], red circle)
 - 0.4 mm holes at the location of the forward and rear aileron activation cables (control cables [19] through [22])
- or
- 1 mm superficial holes at the location of the aileron activation struts (control cables [20] and [22]; for the '76', PH-ARU and PK-SAT only)



as applicable for the configuration you are building.

- Paint the inner fuselage walls and floor. Paint the inside of the cockpit cover and the instrument panels. Paint the seats (2) and (3), and the control sticks (6) and (7).



- Glue the instrument panels (4) and (5) in the cockpit cover (8).

- Adjust the seat support to 1 to 1.5 mm. Apply seat belts to the seat, if desired. Glue the seats (2) and (3) on the fuselage floor. Check their correct position relative to the cockpit openings.



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13. Glue the control sticks (6) and (7) to the cockpit floor. Give them the deflection corresponding to the desired aileron and elevator deflections.



14. Glue the cockpit cover (8) to the fuselage (1).

15. Choose which aircraft you are going to model and its painting scheme. Glue the head support (9) at the location as shown on the picture of that aircraft. I have chosen to model the '1003', which has no head support.



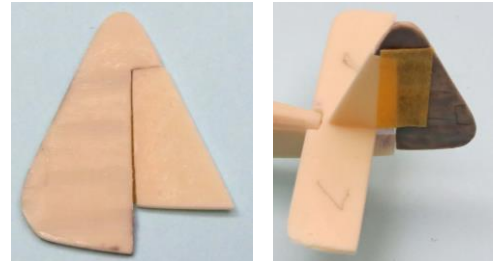
16. Dry fit the horizontal tail plane (10) to the fuselage. If it is not well horizontal, remove some material from the mounting plane until it is. Glue a piece of styrene sheet on the mounting plane and dry fit again. In my case a piece of 0.5 mm thick styrene did the trick.



17. Finish the joints and glue the horizontal tail plane (10) on the fuselage. Make sure it is parallel to the lower wing.



18. Attach the rudder (12), (13) or (14) applicable for the model configuration chosen temporarily to the fin (11) with a piece of tape. Check that the leading edge is straight. If it is not, correct with knife and sanding stick. Check also that the lower edge of the fin is normal to the rudder hinge line. Correct if necessary.



19. Glue the fin (11) on the horizontal tail plane. Use the fin plus temporarily fixed rudder as template. Make sure the fin is normal to the tail plane.

20. Select the rudder for the aircraft to be modelled, in my case (14), paint it and apply decals if required for the configuration you are building. Seal the decals.

21. Drill 0.4 mm holes in wings, tail planes and fuselage for rigging lines and control cables at the locations indicated in the document *Configuration, decals, painting scheme and rigging scheme of the F.K.46 aerobatic version* included in the kit.



22. Select the correct V-struts for the cabane; the small struts (18) and (19) if you build the model with a tank under the wing, the large ones (20) and (21) if you build it with the tank above the wing. Mark them with a piece of tape and set them apart.

23. Paint the N-struts (26) and (27), the V-struts for the cabane (18) and (19) or (20) and (21) and the struts (22) and (23). Paint the fuselage and tail surfaces. Paint the upper side of the lower wing and the lower side of the upper wing.

24. Apply the decals on the fuselage for the version you are going to build according to the instructions in *Configuration, decals, painting scheme and rigging scheme of the F.K.46 aerobatic version*. Seal the decals.



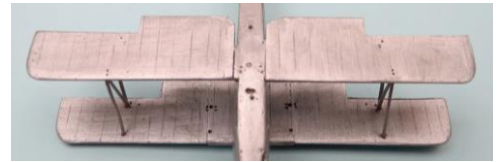
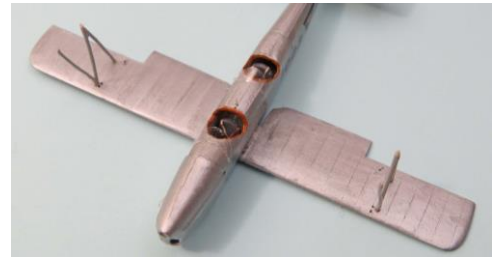
25. Paint the edge of the cockpit openings to simulate the leather padding.

26. Cut the two windscreens from the clear plastic sheet provided. The windscreens should be about 8 mm wide. Cut first the top edge well symmetrical. Bend the windscreen slightly and fit it on the fuselage top. Cut the bottom edge carefully trial and error, such that it fits the fuselage curvature well. Glue the windscreens in place with white glue of Microscale Kristal Klear.



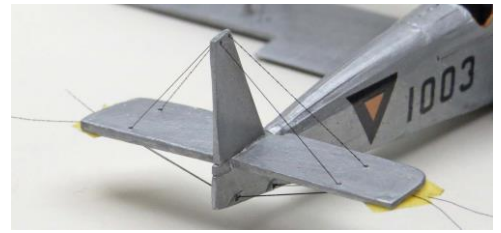
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27. Clean the holes for the N-struts in the wing with a 0.6 or 0.7 mm drill. Dry fit the N-struts (26) and (27) in the pre-cast holes in the lower wing. This is easiest done by placing first the legs of the N that are closest to each other in the holes in the lower wing. The middle strut of the N-strut should be well vertical. Adjust the bottom of the struts to achieve this. The top of the forward strut should be about 4.5 mm in front of the lower wing leading edge. Check whether both sides are equal. Apply glue to the joints between strut and lower wing and let the glue set.
28. Glue the top wing assembly in place, again checking the configuration (both wings parallel). This is best done by resting the model on the upper wing.
29. Dry fit the shorter V-struts (18) and (19) for the fuel tank under the wing or the longer ones (20) and (21) for the fuel tank on top of the wing between upper wing and fuselage. This works again best with the model upside down. Correct the length carefully bit by bit, if required, and give them a slanted lower end to fit the fuselage. Glue them in place.
30. Dry fit the struts (22) and (23) between upper wing and fuselage. Again this is best done with the model upside down. Carefully correct the length bit by bit and give them a slanted lower end to fit the fuselage.
31. Apply the rigging wires between the wings and between the wings and the fuselage to give the fuselage-wing assembly more stiffness (see the document *Configuration, decals, painting scheme and rigging scheme of the F.K.46 aerobatic version*). Start with the wires between the top of the fuselage and the cabane struts [13] and [14], as later it is difficult to reach them. Apply a drop of glue on the attachment to the fuselage, but do not glue them to the upper wing yet, as the holes in the upper wing for the wires [2] and [4] still need to be kept free from glue.
32. Thread the rigging wires [2] and [4] through the holes. Tension them on both sides of the wings and apply glue to the holes in the upper wing mid-section.
33. Next apply the rigging wires [1] and [3]. Tension them and glue them.
34. Cut small pieces of the 0.25 mm metal wire to form the crossed rigging wire stabilization rods and glue them in place.
35. Thread for all versions, except the '76', PH-ARU or PK-SAT. the forward aileron activation cables [19] and [21] through the holes next to the aileron hinge line, tension them with pieces of tape and glue them.



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36. Apply the rigging wires [5] through [12] between the horizontal tail plane, the fin and the lower aft fuselage. They can be made from two 12 cm lengths of fishing line, as all holes in the fin, horizontal stabilizer and lower part of the aft fuselage are drilled through the parts. Start at the holes in the fuselage and fix them there with a drop of glue. Remove the excess fishing line. If the horizontal stabilizer is not exactly horizontal, you may correct that somewhat with the rigging wires.
37. Paint the lower wing and the upper wing ailerons. Glue the ailerons in place and apply the rear aileron activation cables [20] and [22] for all versions, except the '76', PH-ARU or PK-SAT. When dry remove the excess glue and fishing line.
38. For the '76', PH-ARU or PK-SAT paint the lower wing and the upper wing ailerons and glue the ailerons in place. Glue the aileron activation struts (28) and (29) between the ailerons.
39. Paint the upper surface of the upper wing and the lower surface of the lower wing and the ailerons. Apply a coat of gloss varnish and apply the wing decals according to the document *Configuration, decals, painting scheme and rigging scheme of the F.K.46 aerobatic version*. Note that the orange triangles and the roundels are placed partially over the ailerons. Cut the decals on the hinge line and the aileron side. Apply some decal fluid and when dry, seal the decals.
40. Paint the undercarriage and the elevator control rod parts (30) through (36).
41. Dry fit and glue the undercarriage parts (30) and (31) in the holes in the fuselage sides and bottom.
42. Dry fit, adjust and glue the elevator control rods (32) and (33) under the fuselage. Adjust the length of the support stubs under the fuselage such that the undercarriage struts are just left free.
43. Drill a 1.0 mm hole in the wheels (34) and (35) and dry fit them to the stub axles. Glue the wheels (34) and (35) to the stub axles.
44. Drill a 1 mm hole in the aft fuselage bottom just in front of the rudder hinge line. Dry fit the tail wheel (36) and glue it in place.
45. Cut four aileron control horns from the small sheet of 0.4 mm thick styrene included in the kit, about 3 mm high and 0.5 mm at the base and glue them in the superficial holes of the bottom ailerons, slanted slightly forward. Apply the aileron control cables by first sliding the wire in the slanted holes and applying glue some drops of glue to the hole. You probably can lead them at the same time over the control horn. Cut off the excess fishing line when the glue is dry.
46. If you are building the model with deflected tail surfaces, glue them in place with the desired deflection. Give the rudder the same deflection as the tail wheel.





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47. Dry fit the propeller (38) in the nose, adjust the hole or shaft if necessary. Paint the exhaust (37) and the propeller. Glue them in place.



Painting instructions and decal placement

With the painting instructions the following abbreviations are used: HE = Humbrol enamel, RA = Revell Aqua. The paints indicated are the ones I have used; of course equivalent colours of other brands may be selected. It is recommended to finish the model with satin varnish.

Cockpit interior

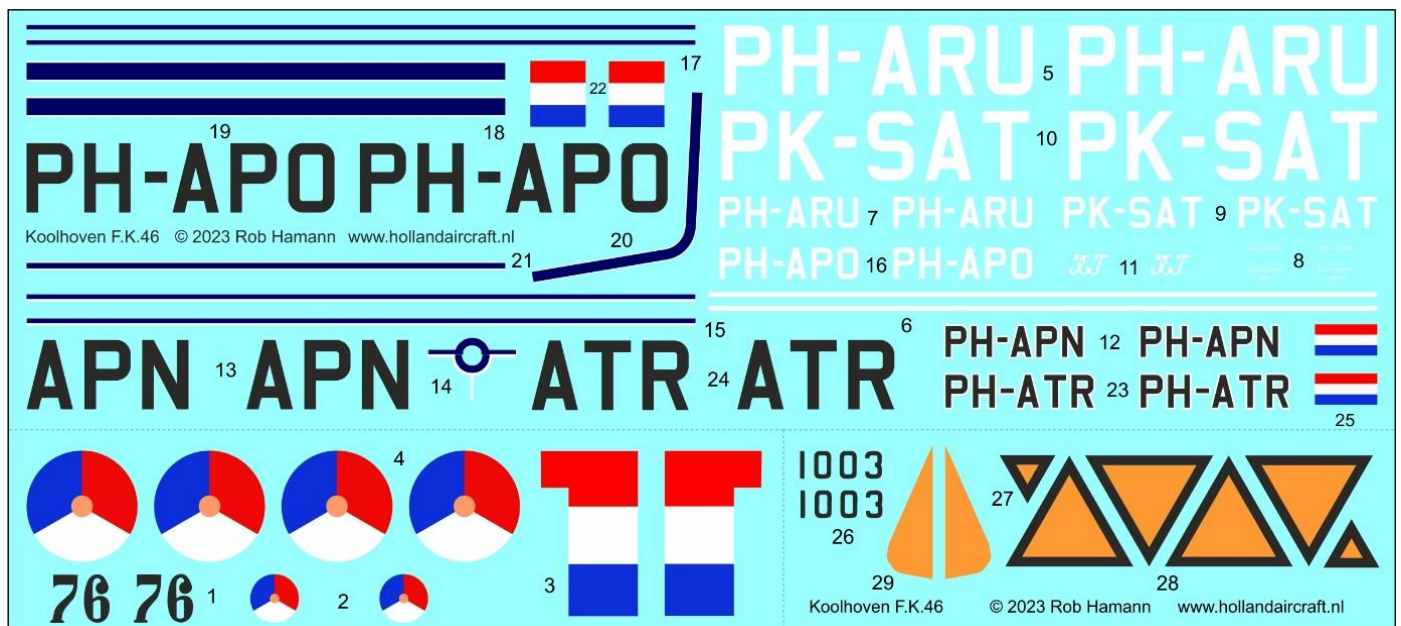
Walls and floor: Light grey (HE129). Mid console, instrument panel, control elements, seat back and frames: Dark grey (HE125). Cockpit edges: Leather (HE62).

Outer finish

See the separate document with photographs and painting instructions. Elevator control rods and control horns: Dark grey (HE125). Tires: Tank grey (RA36178).

Decal placement

See the separate sheet with instructions packed with the decal sheet how to handle the UV-printed decals. Derive the exact location of the decals from pages with the photographs and the instructions printed with it.



Enjoy your model.

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Model conception, masters and decal drawings by Rob Hamann, with the technical, commercial (and moral) support of Erwin Stam. Documentation from various books and from information provided by Hans Berfelo Jan Grisnich and the Aviodrome museum. The resin kit has been cast by Tilly Models, the decals have been printed by Arctic Decals.

A building report of the masters and the prototypes of the Koolhoven F.K.46S model can be found at <http://www.hollandaircraft.nl/K12b%20FK%2046.pdf>.