

Pander E HA Models, masters and resin kit

Training and touring plane

Scale 1:72

The two seat, single engine Pander E has been built by the Pander furniture factory in the Hague. It was the second design of the enterprise, made by Theo Slot. The prototype registered H-NADI flew on February 18th 1926 with a six cylinder 45 hp Anzani engine. Although the first impression was favourable, the aircraft appeared to be underpowered and the engine was replaced by a five cylinder 60 hp Walter NZ series IV engine. With that engine it obtained its Certificate of Airworthiness in June 1926. It got the type identification EC (sometimes with the engine power added: EC 60), the EA being the prototype with the Anzani engine, the EB a single seat version, which has never been built.



The Pander E was a sesquiplane aircraft, both wings being braced by struts, no rigging was present. Wings, aft fuselage and tailplanes were a wooden construction, covered with thin plywood. The forward fuselage was a steel tube construction, covered by aluminum plates. Rudder and elevator had a tube framework, covered with cloth. The aircraft had dual controls, making it fit for training and touring. The cockpit configuration varied, a limited number had one big tub-type cockpit, seating the student pilot and the instructor, the others had two individual cockpits. Behind the cockpit was a closed luggage compartment.

Further versions were developed, major differences being the engine. The EC II with a 70 hp Walter NZ Series VI engine, the EF 85 with a 85 hp Walter Vega engine, both engine configurations being quite close to the original Series IV, the EG 100 with a 100 hp De Havilland Gipsy I, the EH 120 with a De Havilland Gipsy III of 120 hp and the EK 80 with a 78/82 hp Armstrong Siddeley Genet. Other differences between the versions were the undercarriage, being either rubber band sprung with a single axle carrying both wheels or individually, hydraulically sprung wheels. And sometimes the exhaust of the engine was different.

The first two aircraft were ordered by the Rotterdamsche Aero Club (RAC), founded in July 1926, January 1927 and were delivered 31st of May 1927. After September 1927 the aircraft were transferred to the Nationale Luchtvaart School NLS, also based in Rotterdam, which was owned by the RAC. The Pander E became the standard training aircraft of the NLS. In total 9 out of the 18 Pander E's produced have flown with the NLS. At this moment a flying replica of the Pander EC with the single tub cockpit is being built by Dick Funcke.

Subject of the kit will be the Pander E versions with the five cylinder Walter engines with some exceptions, see table below in section *Drawings*. They are:

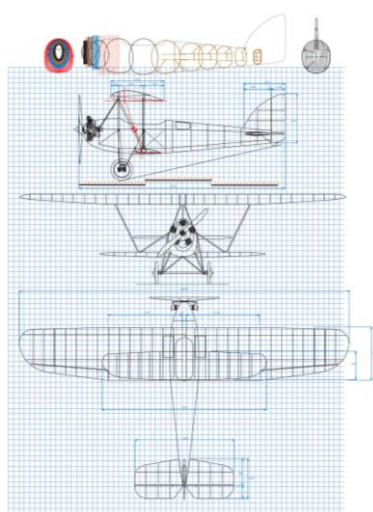
- c/n18, H-NADI first flight 18.02.28, property of Pander, crashed 26.08.26,
- c/n 22, H-NADV, registered 02.07.27, property of RAC, 24.01.29 transferred to NLS, 28.02.29 PH-ADV, removed from register after emergency landing 13.05.30,
- c/n 23, H-NADW, registered 02.07.27, property of RAC, 24.01.29 transferred to NLS, 28.02.29 PH-ADW, crashed 23.03.33,
- c/n 24, H-NAEJ, registered 19.07.27, property of RAC, 24.01.29 transferred to NLS, 28.02.29 PH-AEJ, 29.03.33 rebuild as c/n 47,
- c/n 26, PH-AEX, registered 18.02.29, property of NV T.M. Houbaer & Co. Sigaren- en Cigarillos fabriek, later NV SOPLA, 26.10.29 transferred to NLS, 07.06.34 removed from register after landing accident,
- c/n 27, PH-AKA, registered 30.04.30, property A.G. van Tol, 03.09.30 transferred to R. van Romunde, 03.09.36 removed from register after accident,
- c/n 30, PH-AFJ, registered 18.07.30, property of NLS, crashed 23.03.31,
- c/n 31, PH-AFZ, registered 12.02.31, property of NLS, 12.02.37 removed from register,
- c/n 39, PH-AIA, registered 08.07.31, property of NLS, 00.00.38 re-engined with A.S. Genet, 08.07.40 removed from register, 00.00.41 scrapped by the German occupation forces,
- c/n 39, PH-AIB, registered 06.11.31, property of NLS, 13.05.39 transferred to A.M. Noordenbos, 21.07.39 transferred to N.Hazewinkel, 06.11.40 removed from register, 22.12.41 scrapped by the German occupation forces.

There are many books and magazines containing information on the Pander D. Hazewinkel (ref. 1) and Wesselink & Postma (ref. 6) contain a dimensioned drawings of the aircraft and all contain many photographs. Other photographs I have obtained from the internet and from Dick Funcke. Ref. 1 makes a distinction between the different versions of the Pander E. I have also used building reports on the Modelbouw forum, listed as references 7 through 14. But above all two PDF files I have received from Dick Funcke, who is building a flying replica of a Pander EC, shown in detail in the section *Drawings* below.

	<i>Pander E</i>	<i>1:72</i>	<i>model</i>
<i>Span</i>	10.00 m	138.9 mm	140.0 mm
<i>Length</i>	6.20 m ¹	86.1 mm	
<i>Height</i>	2.72 m	37.8 mm	
<i>Engine</i>	Walter NZ Series IV of 60 hp Walter Vega of 85 hp ¹		
<i>Crew</i>	2		

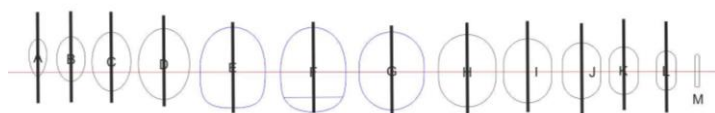
Span and length are

Drawings



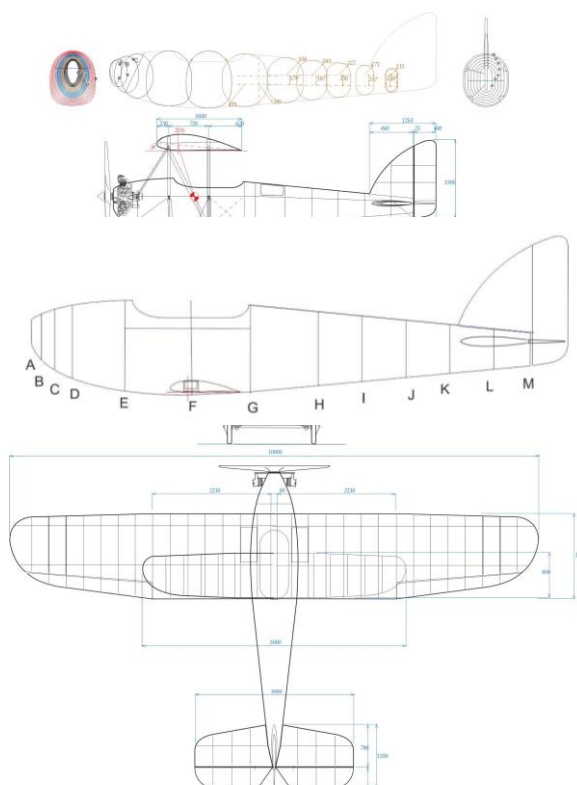
I have received a PDF file of a 1:72 scale drawing from Dick Funcke of his replica, which I will use as the basis for the kit. I first have converted the file to vector drawings by importing it in Corel Draw. I have separated the fuselage cross sections and inserted a centreline. As the half cross sections will be glued on a side view of 0.5 mm thick, I have “thickened” the centreline to 0.5 mm. The forward and aft

part of the fuselage will be casted solid, the cockpit part will be hollow, so I have made the dimensions of the cross sections E, F and G 0.6 mm smaller on all sides than the other cross

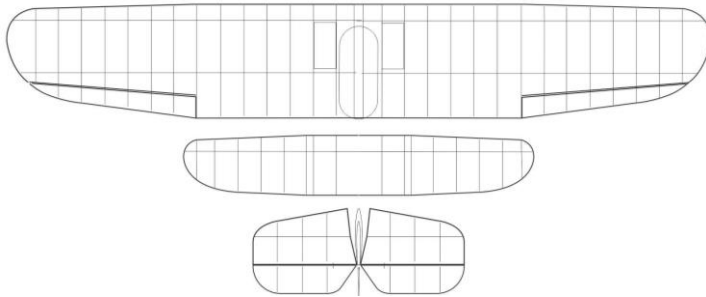
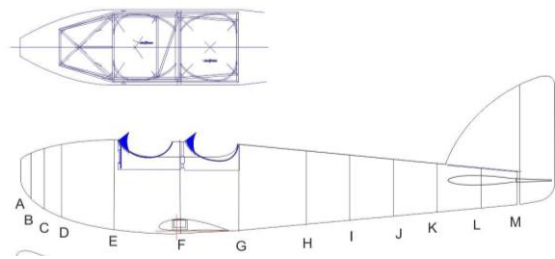
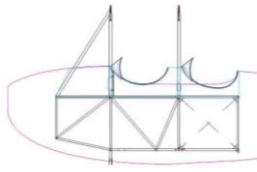


sections. For the cross sections E and G a double E' and G' is required for the end of the solid forward and aft part. They have the original size and will be applied only after the hollow cockpit section has been completely decked in.

In the side view I have indicated the place of the cross sections, the shape of the vertical tail plane and the rudder. I have also inserted the lower wing and tail plane profile in the side view. The side view has been mirrored to obtain the parts required for the construction of the fuselage masters.



I have received a second drawing in PDF format from Dick Funcke of the version with two separate cockpits and have imported that also in Corel Draw, converting it to a vector drawing. This drawing contained also details on the steel tube frame of the forward fuselage, which I will use to model the cockpit interior. After sizing the drawing to 1/72 scale I have copied the relevant parts in the side view. The will also serve to produce the frame tubes visible inside the cockpit. The master for the top fuselage part for this version will be made separately.



I have given the wing and the horizontal tail plane the same treatment, separating the different elements. For the masters ailerons, rudder and elevator will be an integral part of the wing and tail surfaces, mainly to decrease the cost of the moulds. If the builder wants to model the control surfaces in deflected position, he will have to separate them from wing and tailplanes.

I have printed the views. Using Microscale Kristal Klear I have glued the print of the upper wing on

two sheets of 2 mm styrene glued on top of each other, the lower wing of a single sheet of 2 mm thick styrene and the tail surfaces on 1.5 mm thick styrene. The parts for the fuselage have been glued on 0.5 mm thick styrene.

I have also found a three view drawing of the Pander E with individual cockpits. The relevant parts of this drawing will also be used for the two cockpit version.

The table below contains an inventory of the different configurations of five cylinder Walter engine powered Panders E. The PH-AEV and the PH-AFX cannot be modelled from the parts in the kit, as they alone require additional undercarriage struts and a long exhaust. I have designed the decal sheet such that the other aircraft can be build based on the kit. However, I have included the long undercarriage without axle, as photographs of the SOPLA version show only that configuration. This allows to build also the PH-AFX, although the only picture I have just shows the rear part of the aircraft.

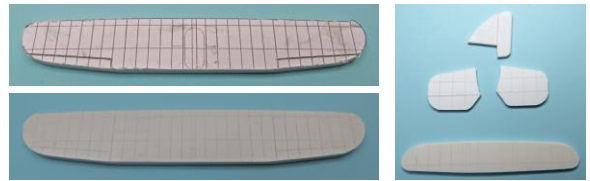
	Tub cockpit	Two cockpits	Rubber band/axle UC	UC without axle	Damper UC	Walter NZ Series IV	Walter NZ Series V	Walter NZ Series VI	Walter Vega	RAC	NLS Holland	Can be modelled
H-NADI		X	X			X						X
H-NADV (PH-ADV)	X		X			X				X	X	X
H-NADW (PH-ADW)	X		X			X				X	X	X
H-NAEJ (PH-AEJ)		X	X			X				X	X	X
PH-AEV (long exhaust)		X		X			X				X	
SOPLA (PH-AEX)		X	X	X				X			X	X
PH-AEX		X			X			X			X	X
PH-AFJ		X			X				X		X	X
PH-AFX		X		X					X			
PH-AFZ	X				X				X		X	X
PH-AIA ²		X			X				X		X	X
PH-AIB		X			X				X		X	X
PH-AKA		X			X				X			X

Producing the masters

Master parts

I have started with the fuselage, cutting out the cross sections with a scalpel. I have marked each cross section with the corresponding letter after having removed the drawing glued on the styrene. On the fuselage side view I have marked the location of the cross sections by lightly scratching with a scalpel.

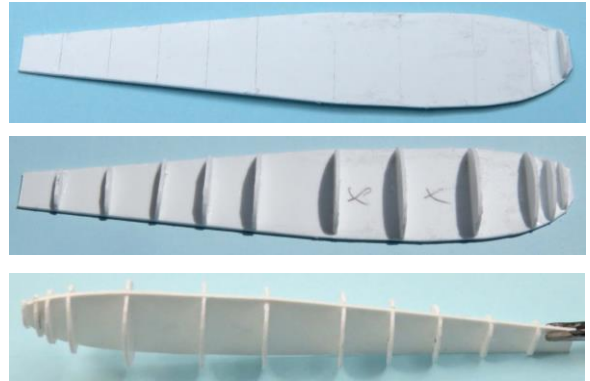
The rough outline of the wings and the tail surfaces have been cut out with a saw and, on the thinner material, with a scalpel after which I have sanded them exactly to the outline. I have also marked the location of the spars and ribs on the wings with a panel line scribe.



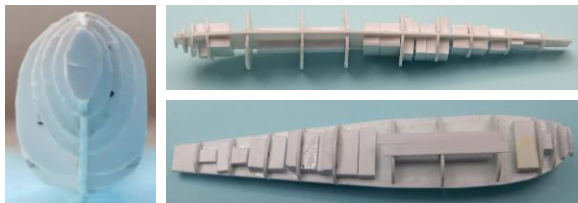
Fuselage

I have cut out the fuselage side view and the first of the cross sections (B), marking it with the cross section letter, indicating the bottom side and storing the port half for later use. I have glued the other half to the central part.

I have glued the starboard halves of the other cross sections to the central part and have left it to dry. The crosses in the picture indicate the location of the cockpits. These will be "planked" with 0.25 mm styrene strips to form the walls, the space between the other cross section will be solidly filled with styrene and putty. Next I have glued the port halves to the central part.



The top and front view showed already quite well the streamlined shape of the fuselage.



I have filled the space between the cross sections of the forward and aft fuselage with pieces of styrene strip. This decreases the volume that has to be filled with putty later and also provides some more stiffness to the fuselage structure.



I have started to cover the cockpit section with strips of 0.25 mm thick styrene, sparingly using Revell Contacta Tamiya Ultra Thin glue. I have continued until the first layer was completed, tapering some strips to shape the double curved surface of the cockpit section.

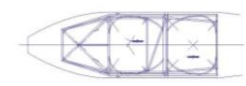
When the layer had dried well, I have sanded the surface to form a solid basis for the second layer of strips. Finally I have applied a third layer; if required to get a smooth surface it can be sanded down completely. I have removed the excess length of the strips and have glued normal sized sections E and G against the cockpit section, applying glue only to the lower part of them. This will make it easier to remove the cockpit section when the fuselage is finished.



I have sanded the centre section of the fuselage until the surface was completely smooth and no individual strips showed any more. I have filled the forward and aft fuselage with small bits of Epoxie Clay, pressing it well to eliminate any cavities and have set the fuselage aside to cure. After four hours I could start sanding it in shape, starting with coarse sanding paper on a flat piece of wood gradually going to finer grade sanding paper and taking away the excess material until the fuselage frames appeared.



I have engraved a horizontal line at the location of the top tube of the forward fuselage framework with a panel line scribe and have made a cut with the razor saw between the two fuselage frames E and G until this engraved line. I have also drilled skewed holes at the location of the struts between fuselage top and upper wing.

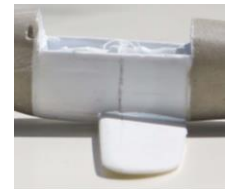
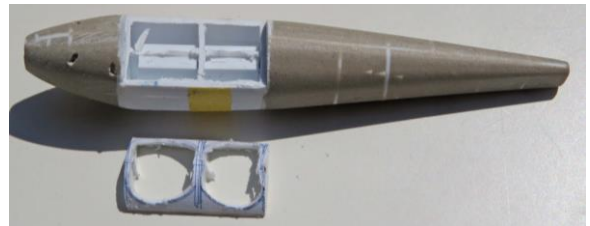
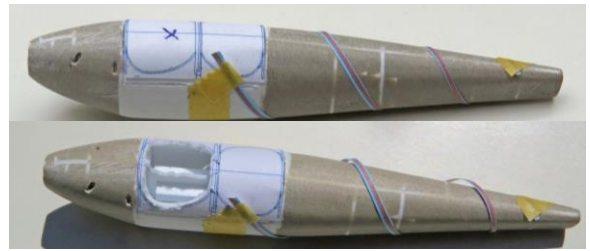
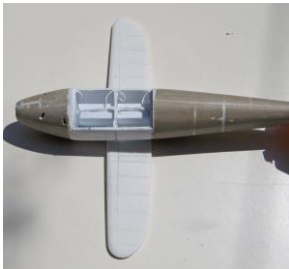


I have taken the top view of the two cockpit version and have enlarged it in width until the appearance of the cockpit section from the side looked like that on the photographs. I have glue the print on the top of the fuselage. I have also used the opportunity to check the length of the light brown spiral decal for the SOPLA version of the model.

I have drilled some holes in the cockpit opening, connected them with a knife and bit by bit cut out the cockpit opening and have repeated the process with the second cockpit.

Next I have opened up the horizontal grooves with a knife and have used a thin saw to cut trough the internal frames until I could remove the centre section with the tow cockpit openings.

I have measured the location of the lower wing and marked it on the fuselage underside. Trial and error I have enlarged it until the lower wing profile fitted it correctly. The frames in the cockpit section have been removed, which completed the work on the fuselage, so the decoration of the cockpits could started.



I have built a new cockpit top section for the bathtub cockpit opening from partial frames glued to a bottom sheet of 0.5 mm styrene and have covered that with three layers of 0.25 mm thick strips, as I had done with the centre fuselage section, gluing them with Tamiya Ultra Thick glue and sanding each layer to make the next one attach well. When dry fitting the cockpit section to the fuselage I noticed that the thickness of the bottom sheet was needed to achieve a good fit with the top surface. I have made a print of the top view of the bathtub top, scaled to widths of 14, 15 and 16 mm. The one with a width of 15 mm fitted best on the top fuselage, also showing a correct view from the side.



I have removed the material within the smallest oval on the top and have compared top and side view with the photographs. The result was satisfactory, so I have also removed the middle frame and bottom plate, leaving the edges intact. This was a tricky operation, because the material left is very thin and I had to repair some minor damage. This fished the master for the bath tub cockpit.

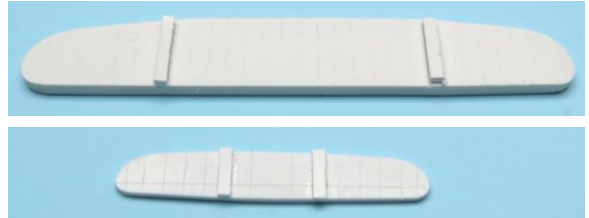


Finally I have engraved the panel lines on the nose, which is very well visible on the photographs, and some cooling slits. Due to their size these last ones are not on scale. To enable the casting of the fuselage I have closed the opening under the fuselage where the wing should be mounted with 0.15 mm thick styrene sheet. This should be removed from the casted part before mounting the wing.

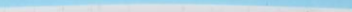


Wing

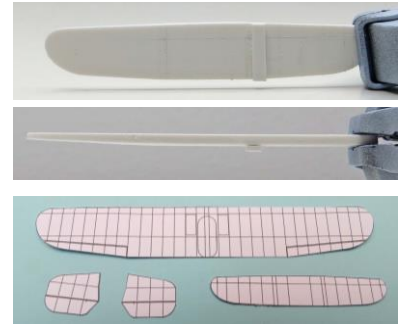
The centre wing part of both wings has constant cross section ribs, the outer parts are tapered. In the past I have sanded that “on the eye”, which generally leads to a rather vague separation between the two. This time I tried something different. The upper wing tapers from 4 mm to 2.5 mm. I have glued two small strips of 2 mm thick on the ribs where the taper must start. I have sanded the outer parts flat until the strip (almost) disappeared, constantly measuring the thickness at the tip. After removal of the remainder of the strip this resulted in a sharp reparation between the wing sections. For the lower wing, tapering from 2 mm to 1.5 mm I have used the same procedure using strips of 1 mm thick.



Sanding the outer wing taper was quite a job. The picture shows the taper of the port side of the lower wing. When the taper was complete on both sides I have sanded the profile in the wing. I have not used a template for the profile, just doing it on the eye worked quite well.



As most of the engravings disappeared during sanding I have made a print of the wing and tail surfaces on carton. I have cut these out and have transferred the rib and spar patterns to the wings and tail surfaces with pinpricks.



The upper wing has been treated the same way. The picture at the right clearly shows the resulting taper by sanding the lower surface of the outer wings down until the strips have disappeared.



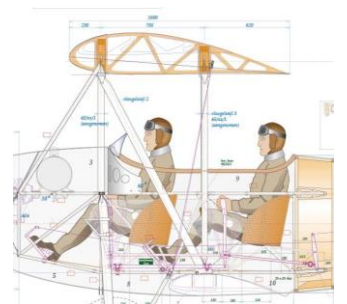
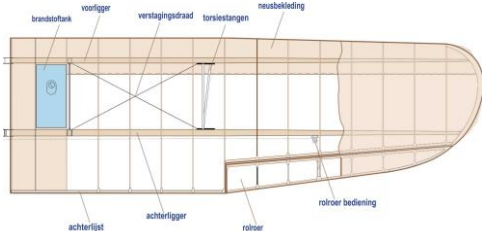
To get a better hold on the upper wing during sanding I have glued some styrene strips on the wing underside. I have also cut a template for the profile of the constant cord section to check regularly during sanding. I have started with the trailing edge and worked from there forward.



After an hour or so very dusty work the result was satisfactory. I have removed the strips glued to the wing underside and I have engraved the ribs and spars again on bottom and top.



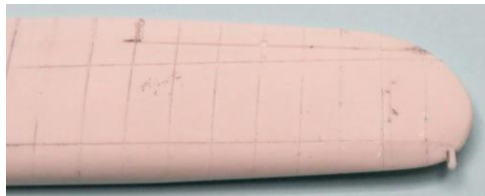
In the building reports of the replica by Dick Funcke I also found a nice drawing of the upper wing, indicating the place of the fuel tanks, the aileron control cable



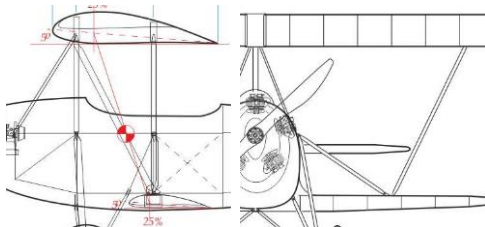
Another feature visible on many photographs of the Pader E's are the navigation lights on the wing tips



I have modelled that with two pieces of 1.2 mm styrene rod, sanded round at the front and glued into a cut in the upper wing tips. I have not found any photograph with a white navigation light on the tail. I do not know when that became mandatory.



Wing struts



I have calculated the length of the inter-wing V-struts from measurements taken from the scaled vector drawing and have made the masters out of 1.0 x 0.6 mm brass streamline profiles soldered together. The masters for the struts from fuselage to wing have been made from styrene rod of 0.9 (lower wing) and 0.65 mm diameter (upper wing), the length again calculated from the scaled vector drawing. I have tapered the 0.9 mm rods at both ends to fit between the bottom of the V-struts and the fuselage, the 0.65 mm struts at one end to fit on the fuselage, the other end must be made to fit when building the model.



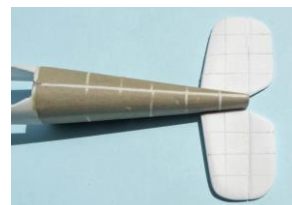
Tail planes



The tail planes have been given the same treatment as the wings. The control surface have been thinned a bit at the hinge line to better represent the real aircraft.

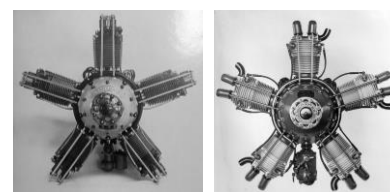


When dry fitting the horizontal tail plane halves to the aft fuselage I noticed that the curve at the root of the surfaces got lost in sanding the fuselage. After correcting that I have drilled a 0.5 mm holes in each tail plane root and have fitted a piece of 0.5 mm brass rod in it. I have also drilled a hole in the aft fuselage after measuring and marking the correct position on the fuselage. I have fitted the brass pins of the tail plane in the hole to check and have removed the pins. The pins could be casted with the tail plane, but in my experience that hardly reinforces the connection. So a better solution is if the builder of the model drills the holes on the marked places in the resin himself and fits brass pins in them. Note that on some aircraft the shape of the fin is slightly different. See for example the PH-AIA, where also the red-white-blue is on the rudder, not the fin. However, there exist also pictures of the aircraft with a "normal" fin.



Engine and propeller

The Walter NZ (left on the picture at the right) and Vega engines have all the same bore and stroke, the length is slightly different. According to ref. 1 this resulted in a length difference between the Pander EC (NZ) and the EF (Vega) of 0.36 m. The kit does not take this into account.



The cylinder shape again is a bit different but in 1:72 scale hardly noticeable. I have ordered a 1:72 copy of the HZ engine produced by Radial Engines & Wheels, of which the cylinders can be used for both versions. The engine shipment that I received included also six exhausts for the engine. The engine is taped with two-sided tape in a casted cylinder for protection during transport and is very finely detailed,

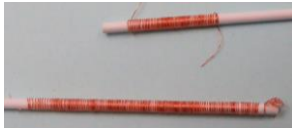
I have, however, some doubt it can be well reproduced.



I have prepared the fuselage nose to receive the individual cylinders; it is not possible to accommodate the complete engine in the nose. I have drilled five holes equally distanced around the nose circumference, increasing carefully the diameter of the holes with tenths of a millimetre. Initially I had increased the drill size too fast, which resulted in part of the nose to break away. In each hole a cylinder, reduced to the required length, have to be fitted.



I have separated the individual cylinders. In the process some of them were slightly damaged, which I have repaired with some metal wire.



As I am not sure that the cylinders can be reproduced well, I have made a backup solution modelling the cylinders by winding 0.2 mm copper wire around a 1.5 mm styrene core. The wire has been secured with some thin cyanoacrylate glue. I have cut pieces of 4 mm length



and glued two pieces of 0.5 mm styrene on the top to obtain a sufficiently realistic cylinder shape. I have given the cylinders a coat with grey glossy paint to prevent air inclusions. Before mounting the cylinders have to be adjusted to the correct length.

The engine of Radial Engines & Wheels also included a set of six individual exhausts for the five cylinders of the Walter engine. Although I doubt that it will be possible to cast decent copies, I have included it as a master in the kit.



According to the drawings the propeller has a diameter of 29 mm and is just a simple two blade wooden type. From my spare box I have selected a propeller of 33 mm with the approximately correct diameter and have sanded that to the required size.



Cockpit

The pictures show two configurations for the instrument panel. One has a simple flat one, the second a curved one along the cockpit edge. A third picture shows the instrument panel of the PH-AFN "Adelaar", but that was a Pander E with a De Havilland Gipsy I engine specially equipped for long distance flying. I will model the instrument panels as simple flat ones.



I have glued some 0.5 mm styrene rod on the inner cockpit walls to simulate the fuselage frame. On the port side that will be covered by the panel carrying the throttles and other engine controls. I have modelled that from 0.5 mm styrene sheet and rod.



The cockpits in the actual aircraft did not have a floor; the seats rudder pedals and control stick were mounted on the fuselage frame as can be seen on the picture. However, this will be a bit difficult to realise in the kit (for a scratch built model it would be easier to do this), so I have made a floor from 0.5 mm styrene, cut to fit in the fuselage.



For an earlier project I had still a seat left, which had the right shape and fitted well in the fuselage. Disadvantage is that I have only one master for two seats, so two molds will have to be made from the same master.



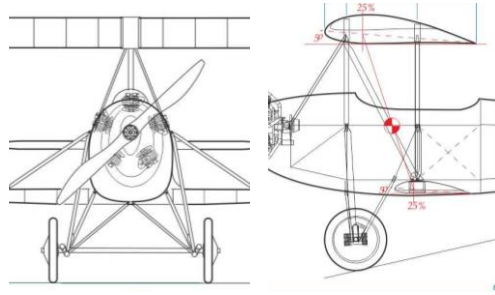
I have checked the correct position on the floor in the two cockpit version, have marked these on the floor and glued two pieces of 0.25 mm styrene on those places. In the actual aircraft the legs of the person in the forward cockpit extend into the nose. In the model I have removed some material from the

nose, but that is not sufficient to mount the rudder pedals sufficiently forward, so I will not model them. There is sufficient place for the pedals in the rear cockpit. I have also constructed two control sticks from 0.5 and 0.7 mm styrene rod. With the instrument panel decals this completed the cockpit interior.



Undercarriage

In my spares box I have found a couple of resin wheels of the correct 9 mm diameter. I have filled the rear side with a couple discs of 6 mm diameter styrene sheet to produce the masters.

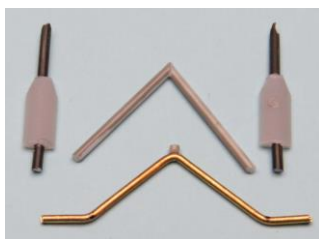
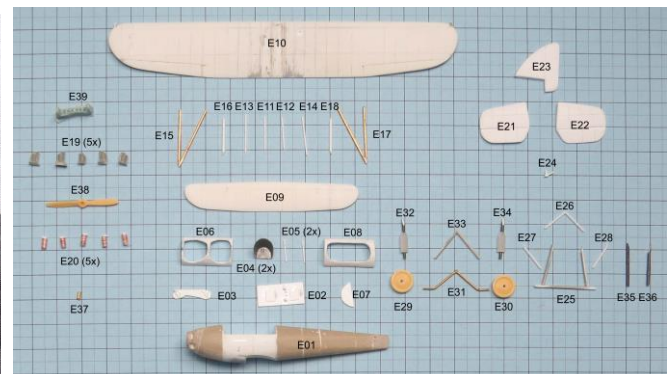
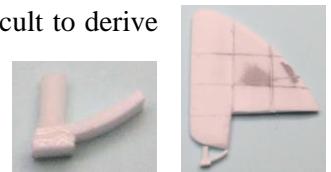


The first undercarriage configuration is has both wheels mounted on an axle, which is suspended by elastic bands to the undercarriage struts. The axle, inverted V-strut and the two main legs are approximately mounted in one plane and this construction I supported rearward by two struts to the fuselage just before the lower wing leading edge.

I have derived the dimensions from the front and side views, The axle and the main legs have been made of 1.0 mm styrene rod, the inverted V-struts and the two support struts to the lower fuselage of 0.75 mm styrene rod. These last ones have a small 0.5 mm extension that fits in the mounting holes in the fuselage. The inverted V-strut and the axle-main leg assembly are two different parts for casting feasibility.



The last piece to be made is the tail skid. Its size and form was difficult to derive from the documentation I had, but Dick Funcke provided me with some pictures of the original. I have modelled it from 0.4 x 1.0 styrene strip, bent to the right shape, and a piece of 0.75 mm styrene rod. I could not use thinner styrene, again for casting feasibility.



The second undercarriage configuration has two independently sprung and damped main undercarriage legs. I have assumed that the position of the wheels was the same as in the first configuration, hence have used the same drawing to calculate dimensions and to design the parts.

This completed the parts of the undercarriage. A front view picture

showed also some kind of scoop, which I have modelled from styrene rod and brass tube. I have no idea of the purpose of this component. In total, counting also the optional parts, the kit will contain 49 parts, as shown in the picture above.



Decals

One remarkable aspect one can observe on all photographs of the Pander E is that the registration is not painted under the lower wing, but under the upper wing interfering with the wing struts, probably due to the small surface available on the small lower wing. This will complicate the building slightly, because the decal must be applied prior to wing assembly.

Careful observation of the side view photographs of the Pander E's showed that the height of the registrations on the fuselage was quite different. Also, I did not find photographs of some registrations as included in the table in the section *Drawings* above (PH-ADW and PH-AEJ), although ref. 1 states they have been flown with these registrations. I found pictures of the PH-AEX and PH-AKA, but they were not pure side views. The registrations H-NADI, H-NADV, H-NADW, H-NAEJ were partly underlined, both on the fuselage and on the wing.

Grouping the fuselage registrations with comparable size yielded the following result:

- H-NADI, H-NADV, H-NADW and H-NAEJ: height 3.7 mm and underlined.
- PH-ADV, PH-ADW, PH-AEJ, PH-AFJ and PH-AFZ: height 3.8 mm
- PH-AIA and PH-AIB: height 4.8 mm

The difference between the first and second set registrations is very small, so I have made them all 3.8 mm high. As the PH-AEX and PH-AKA were registered at about the same time as the PH-AFJ I have assumed they all had the same registration height of 3.8 mm.

The H-N registered aircraft also carried a large H on the white painted rudder. Of the H-NAEJ it was 7.1 mm high, the others 5.2 mm. The registrations on the wing were applied both above and under the upper wing. The one under the wing filled the distance between the wing spars, the one on top of the wing is a bit higher. The SOPLA was a special case, it did not carry any formal registration, the fuselage carried the word SOPLA in 7 mm high characters, the wing the same but covering almost the full distance between leading and trailing edge. As PH-AEX it has flown with the SOPLA painting scheme, but with a black registration on the wing. I have established the height of both registrations trial and error to get the best resemblance with the photographs. The same applies to the *Rotterdamsche Aero Club* and *Nationale Luchtvaartschool Holland* texts and the Pander logo. I have drawn the wing registrations of all aircraft 11 mm high on the bottom surface and 12 mm high on the upper surface (excluding the underlining), except for the SOPLA, which are 14 mm high on both sides of the wing. All SOPLA registrations are white.

This led to the following black registration decals:

3.8, 9.8 and 12 mm high:	<u>H-NADW</u>	V	I	EJ				
3.8, 9.8 and 12 mm high:	PH-ADW	V	EJ	X	FJ	Z	KA	
4.8 mm high:	PH-AIA	B						
9.8 and 12 mm high:	IA	B						
5.2 and 7.1 mm high	H							

And the white registration decals:

6 mm high:	SOPLA
17 mm high:	SOPLA

The following black inscriptions are included:

Rotterdamsche Aero Club	Nationale Luchtvaartschool Holland	Pander logo
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The PH-AIB has also a text on the starboard nose. Unfortunately it is not readable on the photograph dated 1937.

The letters A in the NLS and RAC texts are remarkable. All decals are printed twice, except the 11 and 12 mm high decals. To limit the cost of the decal sheet I have chosen to include individual letters rather than full registrations for each version. I have drawn a first draft of the different decals in the dimensions indicated above. The H-NADI had also the text PANDER E of 4 mm wide on the top of the rudder.

I have fitted these on the model parts and have compared them with the pictures. The decals for the wings and the Pander logo needed some small corrections. The SOPLA decal took some extra work. First I had to reconstruct the S which I could not find in any of my fonts and next I had to manipulate the width of the text such that it covered almost the full span of the upper wing.

I have also drawn two tapered white and dark blue strips shown between the grey lower and aluminum upper part of the fuselage on some




pictures of the NLS aircraft and have moved all objects to a blue background to show the white objects. I have added a long, light brown decal to be applied as a spiral as could be seen on pictures of the SOPLA. I have drawn two simple instrument panels, showing roughly the instruments visible on the photographs. The decal sheet is rather large, mainly due to the very large SOPLA texts. As usual it has been printed by Mika Jernfors of Arctic Decals.



Painting scheme.

The painting scheme of the NLS aircraft is rather well known. Prior to the spring of 1938 the aft fuselage lower part was painted grey, separated from the upper part by a dark blue cheat line. At that time the “dull” grey was changed to orange and the separation was maintained. From October 1939 the complete aft part of the fuselage and the lower wing was obligatory painted orange. This implies that all NLS Pander E’s subject to the kit have flown with the early livery and the PH-AIB could also have flown with the two orange versions, although it has not flown after July 1939. Ref.1 contains a picture of the damaged PH-AIB taken probably in March or August 1938 with the orange painted fuselage and dark blue fuselage registration outlined in white. It probably has never flown with an orange lower wing, as was obligatory from October 1939.



A black and white photograph of a Pander E aircraft, registration PH-AIB, on a grassy field. The aircraft is a biplane with a high-wing configuration. The fuselage is light-colored, and the registration 'PH-AIB' is clearly visible on the side. The aircraft is angled towards the right of the frame.



The H-NADI, H-NADV, H-NADW, H-NAEJ, PH-AEJ, PH-AEX and PH-AFX had a completely grey aft fuselage and fin. The PH-ADV, PH-ADW, PH-AEJ, PH-AFZ, PH-AEX, PH-AIA, PH-AIB and PH-AKA had the lower part of the aft fuselage painted grey, the top and fin aluminum, separated by a dark blue cheatline. On some pictures the fuselage top and fin seem to be white. The color of the SOPLA fuselage and bottom side of the upper wing was mid to dark brown. Lower wing, top side of the upper wing and tail surfaces aluminum. Over the fuselage a spiraling band of a slightly darker color than white, probably light brown, staring directly behind the forward cabane struts. All Panders E had a small red-white-blue section at the top of the fin except the PH-AIA with the straight fin leading edge, which had that colored section on the rudder. The aircraft in that configuration was also missing the Pander logo on the fin. The H-N registered aircraft had a white painted rudder on which the H was applied on both sides.



Building the prototype

For the instruction sheet going with the kit I am going to build two prototypes in parallel, the H-NADW with a bathtub cockpit and the SOPLA with two cockpits and individually sprung undercarriage legs. Only this way I can get pictures of the build of all versions.

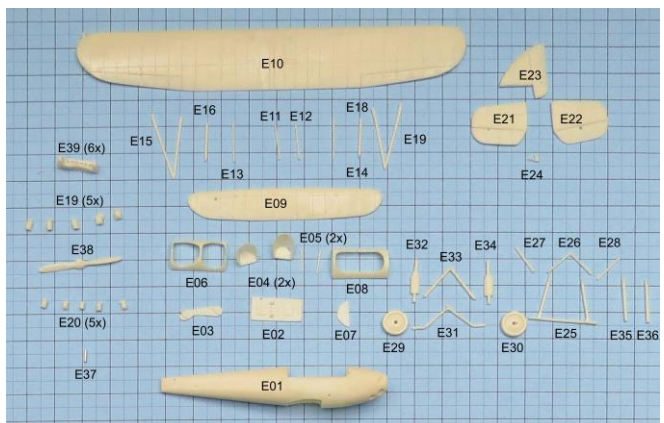
Parts

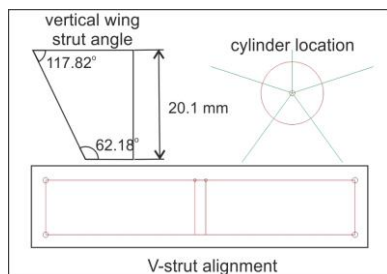
The parts of the first three kits that arrived had hardly any air bubbles, and the few that were present were easy to repair. They were also hardly deformed. One of the navigation lights on the wing tip was missing a piece and of the other kits one was missing also. I repaired that with a piece of 1 mm styrene rod, a piece of which will also be included in the kit.



The thin skin at the bottom of the fuselage, which is there

for casting reasons, had to be removed. I checked whether the lower wing fitted well, removing more material until it fitted well.





As I am going to build the models with deflected control surfaces, I have separated them from upper wing and tail surfaces with razor saw, panel scribe and scalpel.



I have also prepared a drawing of templates to vertically and horizontally align the wing V-struts and to locate the five cylinders. The head of the engine cylinders have to remain within the small red circle, their axis on the five green lines.

Cockpit

The cockpit of the first bathtub version had only an instrument panel in the forward cockpit and even the control stick was removable. For the later versions the additional instrument panel (E07) has to be glued in the double cockpit top panel (E08).



I have painted the inner cockpit walls and floor light grey, the frame tubes and the engine control panel, the seats and control sticks dark grey with black and leather accents. The seat belts I have made from strips Tamiya tape, painted leather with buckles made with a lacquer pen.



In the cockpit floor I have opened up the two casted holes and drilled two 0.7 mm holes to mount the control sticks.



I have cut out the decals for the instrument panel as close to the print as possible and dry fitted them in the cockpit top panel. After removing the lower excess part of decal with ruler and scalpel I have applied the decals to the top panel for both prototypes I am going to build.



Although that will not be part of the actual kit and the material supplied, I have produced the (leather) edges of the cockpit opening from pieces of 0.5 mm solder wire.



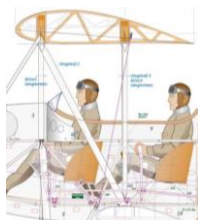
I have glued the cockpit floor in the fuselage, have inserted two 70 mm long pieces of black lacquered fishing line in the small holes in the floor and glued them by applying glue to the underside of the floor.



I have cut the forward part from the engine control panel to fit it better with the first seat and glued it to the port side of the cockpit, keeping the fishing line clear from the glue. Next I have glued the set in place and the control sticks. These last ones I have given a forward and right deflection.



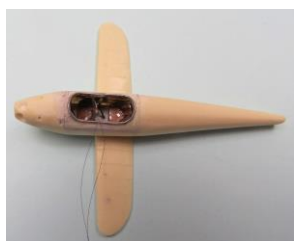
Now the top part of the cockpit can be closed, again keeping the fishing line well away from the glue and the surfaces to be glued.



For the version with two cockpits of the SOPLA model the procedure is the same. The control cables have been led through the forward cockpit opening behind the seat as shown on the drawing of the Pander E replica of Dick Funcke.



Fuselage, engine and wing assembly



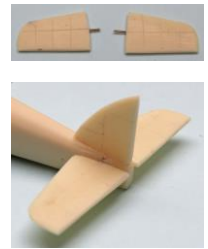
I have glued the lower wing in the recess under the fuselage keeping the wing normal to the fuselage axis and well horizontal. Between the wing trailing edge and the fuselage I have made fillets. I have produced the fillets by punching a 6 mm hole in a piece of 0.25 mm styrene sheet and cutting a rectangle around it. I have sanded the fillets flush with the wing and fuselage surface.



Next I have drilled 0.6 mm holes at the parks in the root of the horizontal tail plane halves and have glued a piece of 0.5 mm brass rod in them.



When dry I have cut off the excess length and glued them in the holes in the aft fuselage, keeping them parallel to the lower wing and keeping the elevator hinge line aligned. I have glued the fin on top of the aft fuselage normal to the horizontal tail plane.



Next I have applied putty to all joints, have sanded these and have given the lower wing-fuselage-tail planes assembly as well as the upper wing a coat of primer.

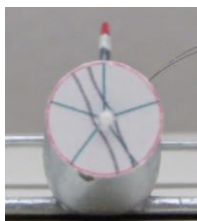
As wing and fuselage of the model are difficult accessible after assembly of the upper wing, painting is best done at this phase. I have painted the aft part of the fuselage for the H-NADW blue grey and the forward part aft the fuselage, the top side of the lower wing and the underside of the upper wing aluminium. I have also imitated the swirls on the aluminium plated forward fuselage by dotting it with steel metallic paint.



On the pictures of the Pander E the forward fuselage shows "swirls". I have simulated that by applying small spots of steel paint on it. I have painted the cockpit edge leather. Fuselage and wings have received a coat of gloss varnish in preparation for decal application. I have also painted the tip of the fin red-white-blue.



As I expected the model to be rather fragile after assembly of the upper wing, I have first mounted the engine cylinders, limiting the handling of the model afterwards. The kit contains two sets of engine cylinders, one a copy of the cylinders of the HZ engine by Radial Engines & Wheels, which worked quite well, and one set casted from scratch built masters. If the former ones are used, the holes in the nose have to be enlarged to 2.5 mm diameter, if the latter ones are used, the hole diameter needs not to be modified. For mounting the propeller a 1.2 mm diameter hole had to be drilled 2.5 mm below the nose top surface. I have cut the template to mount and align the cylinders from the carton template, drilled a 1.2 mm hole in the centre and glued the piece of 1.2 mm styrene rod in the hole and have temporarily glued the template to the nose with a drop of Kristal Klear.



I have used the Radial Engines & Wheel cylinders for the bathtub cockpit model. I have cut the cylinders one by one to the correct length and have glued them in the enlarged holes with Kristal Klear, which allows moving them to align them well with the template. When they were well enough placed, I have removed the jig and have finished the alignment spacing the cylinders equally as well as possible. I have secured them in their final position with a drop of thick cyanoacrylate glue. For the SOPLA model I have used the other set of cylinders, applying the same method. I hardly had to adjust their length, they fitted (almost) perfectly. In both cases it is however essential to align the valve rockers at the top of the cylinders accurately.



I have given the fuselage and the underside of the upper wing a coat of gloss varnish as preparation for the decal application. The black decal *Rotterdamsche Aero Club* has been applied under the bathtub edge and the small black registration *H-NADW* on the aft fuselage. I have applied the Pander logo on the fin.



The medium sized registration *H-NADW* has been applied just between the attachment points of the inter-wing V-struts the upper wing lower side and the smaller black *H* on the white painted rudder. The model has been given a coat of Microscale flat varnish to seal the decals. This results in a satin finish of the model. When dry all holes for control cables and strut attachment have been opened again.

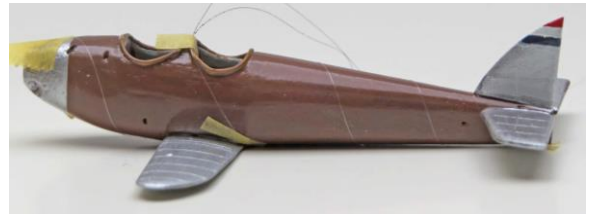




After assembling the lower wing of the dual cockpit model have painted it in the livery of the SOPLA aircraft: fuselage and underside of the upper wing brown, nose, tailplanes and top side lower wing aluminum and of course the red-white-blue tip of the fin.



All painted surfaces have been given a coat of gloss varnish before decal application. First I have applied the light brown spiraling strip running over the dark brown fuselage from the middle of the nose to the tail. I have cut out this decal as close as possible to the printed area. Because there was no room left between the two cockpits due to the leather cockpit edges I had made, I have interrupted the strip at that location.

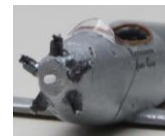


When the decal had dried and set well I have applied the small white SOPLA decal on the fuselage. I have also applied the large white SOPLA decal on the upper wing lower surface. The decals have been sealed with a coat of flat varnish.



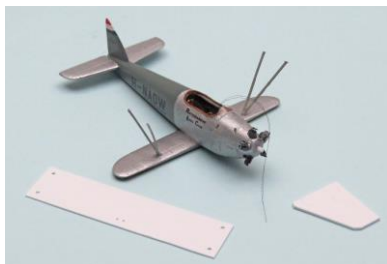
For the engine of the SOPLA I have used the other set of cylinders.

I have cut three small windshields from transparent plastic, one for the H-NADW and two for the SOPLA. After dry fitting and modifying the lower edge from straight to slightly concave I have glued them in place with Microscale Kristal Klear, applied sparingly.



Wing assembly

The assembly of fuselage and upper wing did not seem very easy. Critical point here is the single point attachment of the V-struts to the lower wing. I have made the length of both legs of the V-struts equal to each other. I have started by gluing the port wing strut to the lower wing, keeping the aft, shorter leg normal to the panel line under the cockpit opening. With the vertical wing strut angle template and thick cyanoacrylate glue this worked quite well.



Next I have glued the starboard V-strut using the angle template and the V-strut alignment template, in which the location of the strut attachment points were copied, to determine the distance between the V-struts and the alignment with the lower wing. This worked quite well.

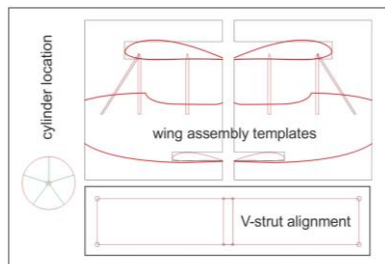
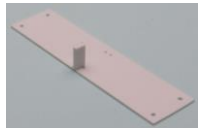
I have attached the upper wing to the assembly in inverted position, aligning wing and fuselage by means of pieces of styrene sheet. This was rather tricky, because the struts are rather flexible, but in the end it worked. Next I tried to attach the struts between fuselage and upper wing. This was even nastier, even dry fitting the struts to determine the correct length let alone handling the complete assembly made the whole construction wobble with the result that after a while the V-struts broke, of course not on the gluing interface, but in V-junction of the strut itself. I have repaired the fracture, but further work resulted in a complete failure. Conclusion: this assembly order is unfeasible.



Another unpleasant discovery: I had forgotten to produce masters for a second set of struts between fuselage and upper wing, or better I did not look well at the pictures of the Pander. As a consequence also the location of those struts was not marked on the upper fuselage section, which was all right for the bathtub versions, but had to be done for the two-cockpit versions by drilling an 0.6 mm slanted hole.

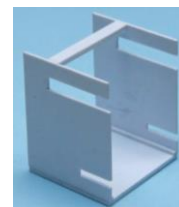


Also the template for upper wing strut alignment jig had to be changed by drilling two 0.6 mm holes behind the existing pair. The jig can then be used to mark the two missing superficial holes on the underside of the upper wing. I shortly considered also to use this jig to mount the struts between upper wing and fuselage by keeping the correct 6 mm distance between them, but decided against this in the end, as this would be a very unstable position.

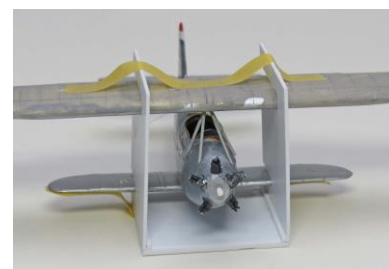


have glued them together, reinforcing the joints with pieces of strip. The model fitted quite all right in the jig. Later I have reinforced the wing assembly jig with a sturdy piece of styrene strip to fix the width better.

So I have decided to draw the template for a new jig for the placement of the upper wing, based on the side view drawing and the actual thickness of the casted parts and deleting the template for the V-strut angle relatively to the lower wing upper surface. I have glued the paper templated on styrene sheet of 0.75 mm thick cut them out and made a 30 x 32 mm ground plate from 1 mm thick styrene. I have dry fitted the wings in the slits such that the just fitted without falling out and



I have centered upper wing and lower wing-fuselage assembly well in the jig and have fixed then with some pieces of tape. As I had lost the two original struts between fuselage and wing, I have produced two new ones from 0.6 mm styrene rod,

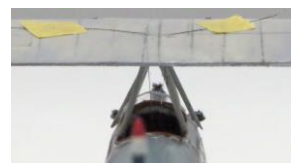


have corrected trial and error the length of the two vertical ones and glued them in place and then repeated the procedure with the two slanted ones.



Next I have first glued the V-struts between both wings in place. These had to be fitted carefully, as they are very flexible and buckled easily if not shortened enough. The rear short vertical struts have been placed between the fuselage and the edge of the bathtub cockpit and glued in place. Then the model could be removed from the jig. It appeared to be surprisingly sturdy and easy to handle.

I have cleaned up the two holes for the aileron control cables again and have led the pieces of fishing line through the holes, tensioned them and applied a couple of drops of thin cyanoacrylate glue on the top of upper wing. When examining the picture I noticed that the lower end of the forward struts still needed some cleaning.



The last set of wing struts to be applied were the struts between mounting points of the V-struts at the lower wing to the fuselage sides, approximately at the place where the aft vertical fuselage-upper wing struts ended. These struts had the correct length, but I noticed that they would end in the middle of the *Rotterdamsche Aero Club* decal if I would mount them like that. So I have shortened them somewhat such

that they ended just below the text. Apparently the decal should be applied more forward, directly behind the short vertical fuselage-upper wing strut and as close as possible to the cockpit edge. Such a direction has been included in the building instructions.

I have modified the wing assembly jig by gluing a piece of strip between the top of the side surfaces, giving it more stability. I have repeated the wing assembly procedure for the SOPLA version of the model. The slanted leg of one of the V-struts was just a bit too short. I have solved the by gluing a 1 mm piece of 0.5 mm diameter styrene rod between the strut and the upper wing.



I have modified the wing assembly jig slightly by gluing a piece of strip between the top of the side walls. This makes the jig sturdier and the model mounted in it easier to handle.

I have mounted the upper wing of the SOPLA aircraft the same way as the H-NADW, which gave no problems. The only problem occurred afterwards, I could not feed the aileron control cables into the holes in the upper wing, partly due to the bad visibility of the black fishing line on the dark brown wing surface. After many unsuccessful attempts I gave up and have cut off the fishing line. The wing construction was completed with the mounting



of the two struts between the fuselage and the lower end of the V-struts.

After cleaning the gluing spots on the top of the upper wing of the H-NADW, where the aileron control cables were attached, I have painted the wing aluminum and given it a coat of gloss varnish. Dry fitting the large H-NADW decal I noticed the underlining just overlapped with the starboard (deflected) aileron, so I have also mounted and painted the ailerons to the wing. The same "problem" will probably also occur when building the H-NADI, H-NADV and the H-NAEJ, if these are built with deflected ailerons, even if the underlining for those versions will be slightly shorter.



With the SOPLA I had avoided this problem already from the start by leaving the ailerons attached to the upper wing.

I have cut two pieces of 0.5 mm brass rod to the correct length and glued these between the underside of the horizontal tail plane and the fuselage. Again I made a mistake and glued them at the place of the forward spar instead of the rear spar. I have removed them, cut new ones from 0.5 mm styrene, painted them and glued them at the correct location.

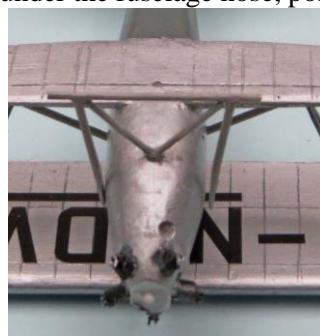


Undercarriage

I have examined the parts (E25) through (E28) for the sprung axle undercarriage thoroughly for air bubbles and have filled these with thin cyanoacrylate glue. After sanding the repaired locations of the struts I have painted the four parts light grey. The V-strut has been glued to the U-shaped part used a flat surface to align them and the assembly has been glued with the top of the V-strut in the hole under the fuselage nose, pointing the legs towards the forward vertical fuselage-upper wing strut mounting points and keeping the axle well horizontal. This results in the undercarriage struts pointing slightly rearwards. Next I have glued the top ends of the assembly to the fuselage. I have dry fitted the struts (E27) and (E28) in the holes in the lower fuselage, adjusted their length and glued them between the undercarriage and the fuselage. However, placing the model on



a horizontal surface the starboard wingtip still appeared to be 3 mm lower than the port one. After mounting the wheels this has been corrected by sanding some material from the starboard wheel.



I have also prepared the undercarriage for the SOPLA aircraft, which is the version with independent oleo strut supported stub axles, and the third configuration with dampers as an illustration for the building instructions. For the SOPLA aircraft the axle (E31) and the oleo struts (E35) and (E36) have to be glued together in a flat plane, the top of the struts being 10.5 mm separated. For the third configuration the same applies, but the damper packages should be placed normal to the strut plane. To make this easier I have supported the parts with pieces of strip.



For the sub axle undercarriage I have first mounted the assembly of parts (E31), (E35) and (E36) with a drop of thick cyanoacrylate glue in the hole under the nose, taking care that the wing tips were on equal distance from the horizontal plane. When that had set, I have glued the



top of the oleo damper struts to the sides of the nose. After mounting the wheels I have glued the V-strut (E33) in place. The upper wing was perfectly horizontal. For the undercarriage assembly of the aircraft with the alternative damper configuration of parts (E31) through (E34) the procedure is identical.

The piece of styrene rod mounted in the nose of both models has been shortened to fit the propellor close to the nose. I have painted the propellers natural wood and fished it with diluted burn sienna oil paint.



Summary

Below some pictures of the completed model are shown.





References

1. H.J. Hazewinkel, *Pander: Een Haagse vliegtuigbouwer, Opkomst van de sportvliegerij in Nederland*, pp. 9, 41-73, 132-133, 140-141, ISBN-10 90-808868-3-1, 2006
2. H.J. Hazewinkel, *Vliegtuigbouw in Fokkers Schaduw, De geschiedenis van al die andere Nederlandse vliegtuigbouwers*, p. 42, 1988
3. H. Hooftman, *Nederlandse Vliegtuig Encyclopedie, Burgerluchtvaart in Nederland, Deel 1; Van H-NABA tot PH-AEZ*, pp. 85-86, 104-107, 128, 141, Cockpit-Uitgeverij, Bennekom, 1979
4. H. Hooftman, *Nederlandse Vliegtuig Encyclopedie, Burgerluchtvaart in Nederland, Deel 2; Van H-NAFA tot PH-AIZ*, pp. 23, 48-50, 66, 80-82, 156-158 Cockpit-Uitgeverij, Bennekom, 1980
5. H. Hooftman, *Nederlandse Vliegtuig Encyclopedie, Burgerluchtvaart in Nederland, Deel 3; Van PH-AJA tot PH-AKZ*, pp. 56, 90-91, Cockpit-Uitgeverij, Bennekom, 1981
6. T. Wesselink & T. Postma, *De Nederlandse Vliegtuigen, Alle vliegtuigen ooit in Nederland ontworpen en gebouwd*, pp. cover, pp. 62-65, Unieboek B.V., Bussum, 1982 DRW
7. <https://www.modelbouwforum.nl/threads/bouw-pander-e-1-1-dick-funcke.262083/#>
8. <https://nvav.nl/node/1953>
9. <https://www.nvav.nl/nieuw-nvav-bezoek-de-werkplaats-van-dick-funcke>
10. <https://www.modelbouwforum.nl/attachments/pander-nieuwsbrief-1-pdf.299075/>
11. <https://www.modelbouwforum.nl/attachments/pander-nieuwsbrief-2-pdf.305266/>
12. <https://www.modelbouwforum.nl/attachments/pander-nieuwsbrief-3-pdf.333268/>
13. <https://www.modelbouwforum.nl/attachments/pander-nieuwsbrief-4-pdf.368442/>
14. <https://www.modelbouwforum.nl/attachments/pander-nieuwsbrief-5-pdf.432747/>
15. <https://www.hdekker.info/DIVERSEN/nedFOTO%3BA.html>
16. <http://www.houbaer.org/Sopla/Index.htm>
17. <https://museumflehte.nl/collectie/verhalen-achter-de-collectie/soplafabriek,-1930/>

Appendix Pander E documentation

Paint table

HE = Humbrol enamel (old numbering), R = Revell Aqua, T = Tamiya, V = Vallejo

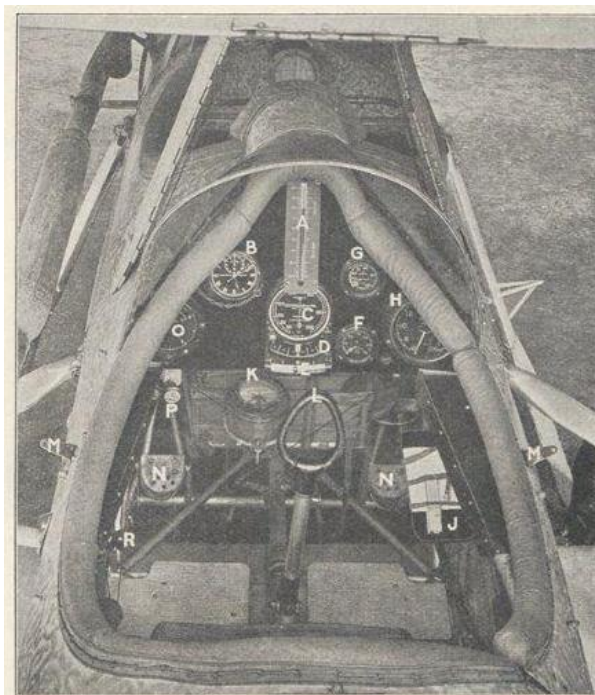
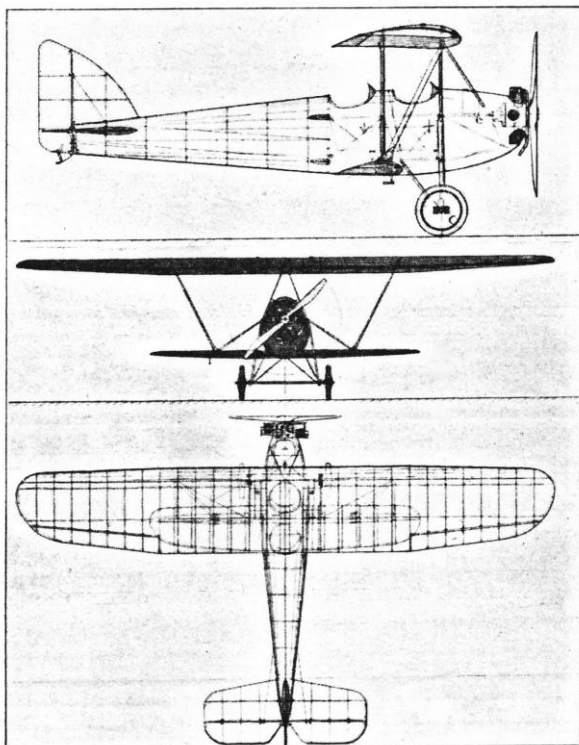
Code	Colour	Where
HE21	Black	Tip of control sticks, side control panel, throttles, rudder pedals, engine cylinders and exhausts
HE22	White	Rudder of H-N registered aircraft

Code	Colour	Where
HE62	Leather	Cockpit edges
HE125	Dark grey	Control elements, seats, cockpit frames
HE129	Light grey	Cockpit walls and floor
R 36178	Tank grey	Tires
T XF-25	Grey-blue	Aft fuselage and fin of RAC and NLS aircraft
T XF-68	Dark brown	Fuselage and lower surface upper wing of SOPLA

Code	Colour	Where
T XF-80	Light grey	Wing struts
V71.062	Aluminium	Forward fuselage part, wings, horizontal tail planes, fin of SOPLA
V71.065	Steel	Swirl pattern on forward fuselage
V71.072	Gun metal	Engine cylinders (dry brushed)

Photographs & drawings

If no source is indicated, photographs and drawings are obtained via Dick Funcke or from the website www.nederland-seluchtvaart.nl.

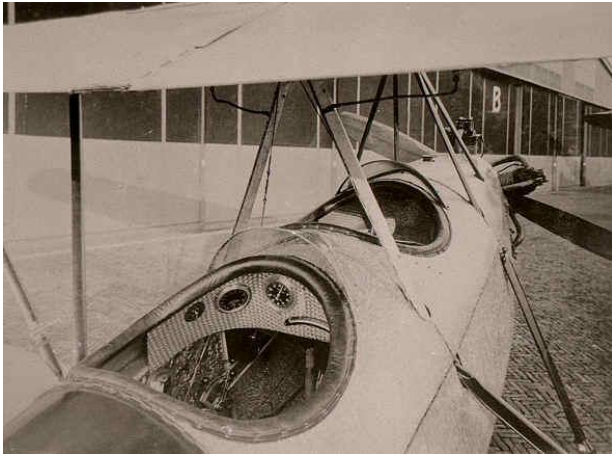


De cockpit van den „Adelaar”.

A: Langshellingsmeter. B: Klok. C: Snelheidsmeter. D: Bochtwijzer (voor vliegen in mist en wolken). E: Dwarshellingsmeter. F: Oliedrukmeter. G: Oliethermometer. H: Toerenteller. J: Schrijfbankje met papier, rekenliniaal en potlood onder elastieken banden. K: Kompas. L: Stuurknuppel. M: Vizieren voor driftmeetinrichting. N: Voetpedalen van het roer voor de zijdelingsche richting. O: Hoogtemeter. P: Brandkraan. R: Knop van de gaskraan.

[Source: private communication Dick Funcke]

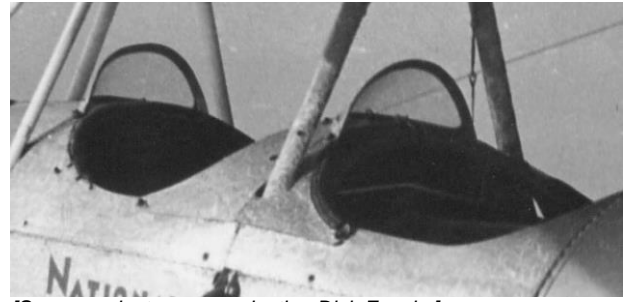




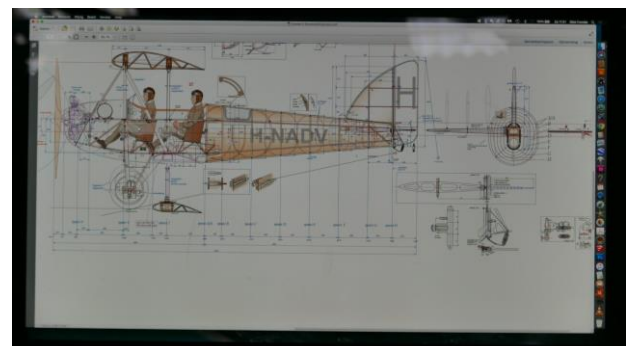
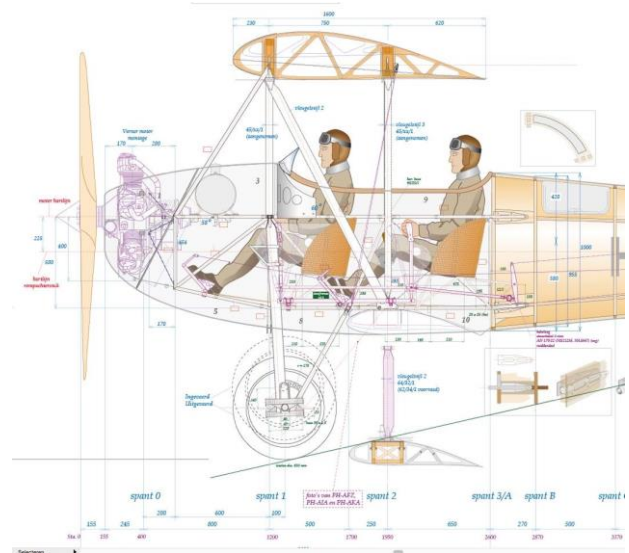
[Source: private communication Dick Funcke]



[Source: private communication Dick Funcke]



[Source: private communication Dick Funcke]



[Source: private communication Dick Funcke]



[Source: private communication Dick Funcke]





[Source: Ref.1]



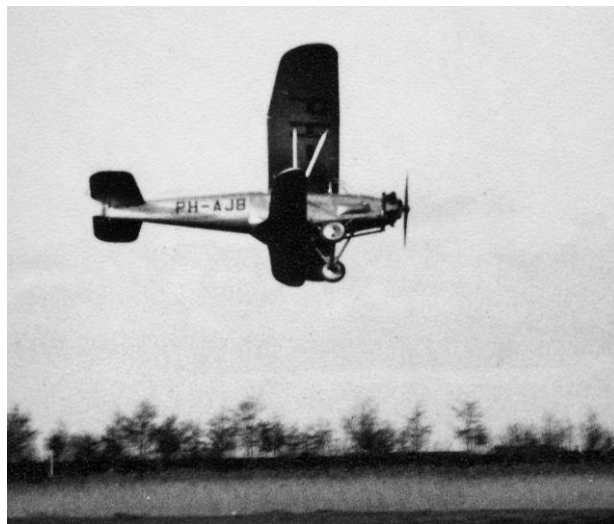
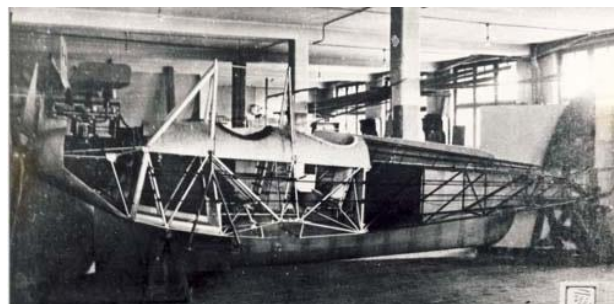
[Source: private communication Dick Funcke]



[Source: ref. 1]



[Source: ref. 1]



[Source: Ref.1]



[Source: Ref.1]



[Source: NMM]



[Source: Ref.1]



[Source: Ref 15]



[Source: Ref.1]



[Source: Ref 15]



[Source: Ref.1]



[Source: Ref 15]



[Source: NMM]



[Source: Ref 15]



[Source: Ref 15]



[Source: Ref 16]



[Source: Ref 16]



[Source: Ref 17]

¹ The difference in length (0.3 m) of the variants with Walter NZ and Vega engines has not been modeled, as it would have required a second fuselage or nose section. Also, relevant drawings of the differences are not available.

² PH-AIA has also flown with a fin with a straight leading edge, but unmodified rudder.