P11F REDISCOVERED

Michał Skawiński



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Dear Readers!

Author would like to hear from anyone having documents, manuals, photos or relics of PZL fighters used in Romania. Only through the open collaboration further discoveries can be made. I would be indebted for a contact on the following email address: PZLinRomania(at)gmail.com

I would like to warmly thank (in alphabetical order) Dan Antoniu, Dénes Bernád, Radu Brînzan, Tomasz Kopański, Marek Możdżeń, Wojciech Sankowski and most of all Horia Stoica for the openness, willingness to help, guidance, thoughts and documentation shared from their vast collections. Without them, this publication would not be possible.

Words of appreciation are also due to Adam Andrzejewski of IBG Models and Marek Możdżeń for their collaboration in the research on the Romanian story of PZL airplanes.

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History of the Type

The P.11F was the third (after P.11c and P.7a) most numerous version in the long line of PZL fighters based on the seagullwing concept of Eng. Zygmunt Puławski.

Its history starts in the fall of 1934, when after the development of a new, significantly modified version of the P.11 fighter (P.11c - see IBG set No. 72519), PZL factory began efforts to attract foreign customers for the airplane. The first step was the presentation of the fifth P.11 (P.11/V) prototype at the Paris Air Show in November and December of 1934. Romania, which had previously purchased 50 aircraft of the P.11B version from PZL (see IBG set No. 72518), decided

to purchase the license for production of the latest variant, which was to be built at Industria Aeronautică Română (IAR) in Brașov. The order was placed at the beginning of 1935 - PZL factory was to provide documentation, a complete prototype and sets of prefabricated materials and spare parts constituting the equivalent of 10 airframes. However, the transaction dragged on due to numerous political and financial obstacles. Ultimately, the aforementioned prototype (P.11/V with an engine changed to IAR 9K) was handed over to the Romanian side only at the beginning of 1936.



Aerial view of the Industria Aeronautica Romana plant in Braşov in 1927. Back then and until 1944 it was the largest and most modern aviation manufacturer in Southeastern Europe. Initially it produced mixed-construction airplanes under French licence, but already in the early thirties developed its own line of cantilever low-wing fighter aircraft (IAR.11CV– IAR.16), of which only IAR-14 was produced (in limited series). Airframe components were produced in the large factory hall to the left with the final assembly taking place in the large hangar with the IAR Braşov name painted on the roof. Factory also produced engines – in the centre-right hall. (Horia Stoica/Dan Antoniu collection)

P.11F REDISCOVERED

Production, launched with the support of Polish engineers, began at the end of 1936. In comparison to the P.11c, the Romanian version differed in the engine and its cowling (IAR 9K rated at 600 HP, locally produced under license of Gnome-Rhône), propeller, armament (4x 7.92 mm FN Browning Modèle 1932, which, owing to their rate of fire, made with the P.11F the best-armed version of the P.11), gunsights, Romanian flight instruments and other smaller equipment details.

During the service the planes underwent only a few modifications. The most important one, significantly increasing the tactical capabilities of the P.11F, was the installation of the radio. The first examples were installed probably in the first half of 1940, although their mass use is related only to the period of Operation Barbarossa. Another modification associated with the latter period was the installation of armour plate behind the pilot's seat on relatively few airframes.



All the main features of the 'F' version in one photo! Note the engine and its covers, exhaust manifold, propeller without spinner and the FN Browning machine guns in the wings. In the background there is a trolley used for moving the airplane around the field - in order to do that it was necessary to lift the tail and put the trolley under the tailskid. (Horia Stoica/Dan Antoniu collection)

The commencement of production of the all-metal P11F with a partly semi-monocoque fuselage represented a significant technological change for the IAR factory, which until then produced only airframes of mixed construction with truss hulls. This resulted in further delays in the delivery of the first P11F. On the other hand, the acquired experience with all-metal constructions turned out to be invaluable for the Romanian aviation industry and finally paid off a few years later during the construction of the most famous Romanian aircraft - the IAR 80. As a result of the aforementioned delays, the first P.11F fighters were introduced into first-line units of Romanian aviation only in July 1937, i.e. two years after the introduction of the P.11c into the Polish aviation service. The last, ninety-fifth, airplane produced was handed over in November 1938. Due to the rapid development of aviation technology, it was no longer the youngest construction, but compared to the aviation of other Balkan countries, the 95 Romanian P.11F was a significant force. In 1939, however, much more powerful opponents appeared on the horizon.



Inside of the hall where P.11F wings were produced (to the left in the aerial photo). Visible are both port and starboard wings in different stages of completion. Far in the back and slightly to the right there is a stand with wing spars ready for wing construction (taking place in the centre row). Completed wings are put on the stands above the main area of work. A bell-shaped structure to the right is in fact a semi-monocoque part of the P.11F fuselage. (Horia Stoica/Dan Antoniu collection)



Modernity split in two: cantilever low-wing monoplane, but of mixed construction (IAR-14, to the left) and all-metal, but strutbraced, high-wing fighter (P.11F, to the right). Experience gained with both types allowed IAR to design and produce IAR.80. At the time of the P.11 production completion Romania had a relatively sizable fighter force with 95 P.11F, 50 P.11B and 20 IAR.14 (although the latter used in the fighter-trainer role). None of its potential Balkan enemies could quite match it with Hungary having 84 Fiat Cr.32 on strength and Bulgaria using a total of 36 fighters (twelve of each: Heinkel He 51, Arado Ar 65 and PZL P.24). (Wojciech Sankowski collection) P11F were ready to defend the Romanian sky during the crises of 1940 (when the Soviet Union occupied Bessarabia in June and between July and September during the dispute with Hungary over Transylvania), invasion of Yugoslavia in April 1941 and finally took active part in Operation Barbarossa - performing mainly ground-attack missions. At the end of that year, they were withdrawn from the Eastern Front and transferred to Romanian air defence and training units.

Eventually, they were withdrawn from the front line service in September 1943 and the last units in schools ended their service in 1948.

In addition to one prototype built at the PZL factory (that had no Romanian number), 95 machines were produced in the IAR plant in Brașov (numbers 51-145) between 1936 and 1938. Unfortunately no P.11F fighter survives today.

P.11f or P.11F? PZL or I.A.R.?

There is no agreement in aviation literature with regards to the designation of this version, with both P.11f and P.11F being used. After analysing documents and aircraft photos it can be stated that in the huge majority of cases capital letters were used. This approach was also used on P.24E (sometimes designated P 24P), I.A.R.80 and retroactively on 'P 7P' and 'P 11C' taken over from Poland. Therefore in both the model and these publications 'P.11F' was used consistently. Situation is more complex in case of the manufacturer name with PZL, P.Z.L., IAR and I.A.R. being given even in official documents and instructions issued by the companies. To reflect that variety, but to avoid the excess of dots, PZL/IAR designation was adopted here.

Am onoare a raporta că azi ll.VI.1937 ora 18,45 avionul P.Z.L. No.11 F. No.65 pilotat de Lt.av. Rogescu Ion executând un sbor de antrenament La aterisare a capotat .

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 <u>Escadrila 43 V-toare:</u> avionul P.Z.
L.llF.Nr.81 căzut în liniile amice.-Avionul indisponibil. Pilotul Adjut.Stg.Gheorghe Dumitru internat spital.
<u>Escadrila 62 V-toare</u>:avionul P.Z.
L. Nr.12,lovit de A.C.A. inamic în rezezvorul de de ulei care s'a spart.-

Fragments of different Romanian documents showing the usage of capital letter F. Note the variety of naming and the fact that actually in none of them proper 'P.11F' is used. (Horia Stoica/Dan Antoniu collection)



On the tails capital letter F was also used consistently. In the left photo there are visible original factory markings with both IAR name (with dots) and logo (without dots). Post-overhaul airplane in the centre has the IAR logo, but the PZL name was used – in that case it was rather meant to point out not the producer, but the airplane type (as P.11F was most often simply described as 'P.Z.L.' or 'P.Z.L. 11F' in Romania). Note the very aesthetically pleasing IAR logo. (Tomasz Kopański and Horia Stoica/Dan Antoniu collections)

Features of P.11F

Although both P.11c and P.11F were developed from P.11/V and had many common changes incorporated, there were a number of significant differences between Romanian and the Polish version. Characteristic features of P.11F were:

- IAR 9K engine and its dedicated cowling
- Exhaust manifold behind the engine instead of in front of it
- Fuselage panels behind the engine with a single row of vents
- Propeller without spinner
- Armament consisting of 4x 7.92 mm FN Browning Modèle 1932 all aircraft by default had the wing-mounted guns and associated elongated chutes for spent links and cartridges
- Different shape of the gunsight and wing fairing in front of the windscreen
- No opening radio panel on the port side of the fuselage, behind the cockpit area
- Instrument panel of different set up and fitted with locally-produced instruments
- Fuselage antenna insulator only on the starboard side and further to the front of the airplane, just behind the cockpit
- No Venturi tube
- Different pitot tube
- At least on some of the machines an oil cooler with 30 ribs was installed
- Some smaller differences as pointed out in the Walkaround section

In later years of service further modifications were introduced:

- Installation of the radio set on some machines it is not known what type of radio was P.11F equipped with, but FuG VII seems to be a likely candidate (as used on Romanian Bf 109E and IAR.80/81). It cannot be excluded however that in some cases (especially in 1940) radios removed from ex-Polish P.11c were installed on a few aircraft. Note that as opposed to P.11c there was no additional fairing for the power generator drive shaft on the fuselage starboard side, above the machine gun recess
- Various versions of bomb racks were used for bombs or grenades
- Starboard machine gun access door got an additional opening, similar to the signal pistol cut-out on the fuselage port side
- In 1941, armoured seat was installed on an unknown number of P.11F



Exhaust behind the engine



Walkaround

As mentioned above, not a single P11F survived to this day. In order to present details of the airframe, original period photos will be used for areas specific to Romanian version and museum photos of P11c, where construction was identical between the two models. This section is dedicated to everyone wishing to add that little extra detail to already an excellent IBG model.

/ Powerplant



IAR 9K engine, license-produced Gnome-Rhône 9Krse engine. Rated at 600 HP it was a rough equivalent of Merkury V S2 powering the P.11c, giving P.11F similar performance. Note the wealth of details, with the 'I.A.R.' cast on the valve covers being well visible. (Horia Stoica/Dan Antoniu collection)



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Engine cowling, one of the most aesthetically pleasing elements of the P.11F. Initially it included a front screen behind the propeller (photo at left), but it is hard to find them in the post-1939 photos. Most likely engine cooling was insufficient with them on and they were ordered to be removed. Right photo shows the cowling already without the screen. Note the fasteners and the gun throughs. Zoom in to see delicate, barely visible rivets. (Tomasz Kopański and Horia Stoica/Dan Antoniu collections)



Two more photos of the cowled engine. Visible are additional details of the powerplant installation, panel lines on the cowling, fasteners on the port side and the exhaust manifold. Rectangular shape between fasteners (with 4 rivets) is an engine and cowling information plate overpainted in yellow, same as the entire cowling. (Horia Stoica/Dan Antoniu collection)



A propeller without spinner was a unique feature of the P.11F version. Note how the changing angle of attack causes the blade to look like it was bent forwards. Propeller hub has plenty of details and looks a bit Art Deco in its form, note the stamped lettering (unfortunately illegible) on its side. Right photo shows how the surface wore off as a result of usage – note the large number of scratches on the leading edge. (Tomasz Kopański and Michał Skawiński collections)



Left and centre - two more original photos of the propeller providing a good view at the metal leading edge protection consisting of the rectangular plates (apart from the top and bottom of the protection). At right – a nearly identical solution on the museum P.11c propeller. Centre photo shows the manufacturer decal in the middle of the blade. While it is generally accepted that P.11F originally used Szomański propellers, this decal does not fit the well-known logo of this company. If any of the Readers recognize it, author would be grateful for the contact. (Horia Stoica/Dan Antoniu collection, Michał Skawiński)

P.11F REDISCOVERED



This logo started to show up on P.11F propellers around 1941. Again, author was not able to establish the company that used it. Any hints would be highly appreciated. (Horia Stoica/Dan Antoniu collection)

/ Fuselage



Probably (soon to be?) a girlfriend of one of the pilots posing in the cockpit. This photo provides a good view on the port side of the fuselage. Note the airplane information plate under and slightly forward to the cockpit opening. Among other data it provided weights of the aircraft and was an equivalent of the stencil on P.11c rudder. Another difference compared to P.11c is also visible - lack of Viet 200 starter instruction plate directly under the windscreen (P.11F was not equipped with this type of starter). (Horia Stoica/Dan Antoniu collection)



Front of the port side of the fuselage. Visible is an additional panel between the strut mounts (not present on P.11c) and details of the lower areas, usually staying in the shade. The tubular vent under the bottom of the cockpit was not present on all machines and its function is not known. (Horia Stoica/Dan Antoniu collection)



Two photos of museum P.11c showing elements identical on P.11F. At left - cover of the fuel filler cap under the wing. At right – opening panels of the spent links and cartridges containers. (Michał Skawiński)



Similar view to the one presented earlier, but showing additional details. Note the access door behind the fuselage machine gun recess, two steps facilitating entering the cockpit, riveting of the fuselage and lack of opening panel above the rear, bottom step – one present on museum P.11c. (Horia Stoica/Dan Antoniu collection)



Machine gun access door on the port side of the fuselage. At left – museum P.11c. Right – P.11F. While they look extremely similar, P.11c had six locks in the top line, while P.11F only five. Note also slight differences in riveting. In the top right corner there is a signal pistol opening with the round clamp for holding it in place. (Michał Skawiński, Dénes Bernád collection)



One more close up photo showing well the P.11F-specific gunsight in front of the windscreen (with a round cover beneath it), overpainted information plate fixed in place by nine rivets and the fact that top panels of the fuselage were held by screws, some of which are missing! (Horia Stoica/Dan Antoniu collection)



Top, forward step facilitating entering the cockpit of P.11c. Romanian version had identical ones. Note the black rubber facing, the rivets and the way the step opens. (Michał Skawiński)



And two similar photos of bottom, rear one. The original photos quite often show the rubber facing well-worn and the natural aluminium visible in places. (Michał Skawiński)



Semi-monocoque aft section of the fuselage. Immediately behind the headrest there is an opening panel of a luggage compartment. First aid kit compartment was marked with a red cross on a white circle. Note the riveting. (Horia Stoica/Dan Antoniu collection)



Luggage and first aid compartments in the museum P.11c. P.11F had identical ones down to a single rivet. (Marek Możdżeń, Michał Skawiński)



Not a very sharp photo of P.11F, but showing well the two round inspection panels below the horizontal stabilizer. Further to the front there is a hole into which a rod was put in order to lift the tail of the airplane. (Horia Stoica/Dan Antoniu collection)



Close up of the museum P.11c round inspection panel. Again, exactly the same ones were on P.11F. Left – front one, right – rear one. (Michał Skawiński)



Front of the starboard side offering a wealth of details. Worth noting are the skin details with locks and rivets and the radiator with 30 ribs (as opposed to 24 ribs in P.11c), installed on at least some if not majority of P.11F produced. (Tomasz Kopański collection)



Further to the rear. This airplane had a round cover in place of the antenna insulator (compare with the photo below). Again, note the screws and not rivets were holding the panels around the cockpit in place. This significantly facilitated overhauls, as they could simply be unscrewed to allow a very good access to the truss sections of the fuselage. (Horia Stoica/Dan Antoniu collection)



Blurry, but an important view of the starboard side. Note the shape of fairing in front of the windscreen, just below the gunsight – this area differed from P.11c. (Horia Stoica/Dan Antoniu collection)



Starboard machine gun access door. Left – on a freshly-produced P.11F No. 70. Centre – museum P.11c. Again, the number of locks is different, with P.11F having only five of them in the top line. Riveting also slightly differed. Right - later in P.11F service (probably around 1939), there was an additional oval opening introduced, similar to the one on the port side. It is not known if it was also for signal pistol or any other purpose. (Tomasz Kopański collection, Michał Skawiński, Horia Stoica/Dan Antoniu collection)



Oxygen bottle access panel directly behind the machine gun access door. Left – on the P.11F No. 70. Right – museum P.11c. This time number of locks is the same, but riveting shows slight differences. (Tomasz Kopański collection, Michał Skawiński)



Rear starboard fuselage. Again, the photo of P.11F No. 70 at left provides a wealth of details. Clearly visible is the lack of the Venturi tube present on P.11c. There is a circular element just to the right of the bottom of number 0. Its purpose is not known. Further to the rear there is a hole with 'Ridică aici' (Lift here) stencil above it. Right – rear fuselage in P.11c, identical to P.11F. (Tomasz Kopański collection, Marek Możdżeń)



Bottom of the museum P.11c fuselage. The most prominent feature was the fuel tank that could be dropped in an emergency, a feature common for both P.11c and P.11F. Other elements of the fuselage underside were also largely similar between the two versions. (Michał Skawiński)



Close ups showing the fuselage fuel tank details. Note the belt running in the middle – releasing it caused the fuel tank to drop from the airplane. (Michał Skawiński)

/ Cockpit



External areas of the cockpit. Note the leather headrest and cockpit sides. Well visible are also rivets of the windscreen and handles at the sides of the cockpit. (Horia Stoica and Tomasz Kopański collections)



Similar view, but from the port side. Note the rear-view mirror and gunsight details. In the photos (and the next photo below) well visible is the fact that there was no sunscreen above the instrument panel. Cockpit interior was painted silver, at least initially. (Horia Stoica/Dan Antoniu collection)



There were no P.11F manuals available to the author, therefore the cockpit interior could only be reconstructed based on multiple external photos (one of them at left) and available information on Romanian instruments used in IAR.80 and IAR.37/38/39. The rectangular plate at the right side was put over the often removed Longines clock type 6036. Worth noting is the fact that P.24E instrument panel was very similar. (Horia Stoica/Dan Antoniu collection, IBG/Michał Skawiński)



Structure of P.11c fuselage from the airplane manual. P.11F was identical in the elements shown. Element marked with 1 was the forward truss section, it was the centrepiece of P.11 structure – wings, further fuselage elements, engine mount and landing gear were all attached to it. It held the droppable fuel tank inside. Very good design of this element provided P.11 with a well-known structural strength. Truss section marked with 2 was the cockpit area – note the pilot's seat, control stick, ammo boxes and spent links and cartridges containers. Section number 3 was the semi-monocoque rear of the fuselage. (Muzeum Lotnictwa Polskiego)



Truss section of the cockpit area. Fuselage machine guns mounts consisted of elements number 45 and 46. The word 'Przód' (Front) clarifies the orientation. (Muzeum Lotnictwa Polskiego)



Two more photos from the P.11c manual showing the cockpit floor. Note the control stick (3/28), rudder pedals (30), signal pistol cartridge rack (34), ammunition boxes (32) and finally flooring itself (33). It is reasonably safe to assume these elements were identical in P.11F. (Muzeum Lotnictwa Polskiego)



Photo at left proves that P.11F had Romanian harness, at least later in the service. As opposed to the Polish one it did not go over the seat, below the headrest, but rather went through the bottom of the backrest in the seat. Drawing at right shows the details of the type of harness that was continued through P.24E and into IAR.80. (Horia Stoica/Dan Antoniu collection, Radu Brînzan)



At left, drawing of the P.24E seat. Note the diagonal cut outs in the bottom of the backrest, through which harness was passing to the attachment points in the back of the seat bottom – P.11F must have had similar or identical ones. Above them a leather backrest lining is visible, typical also for P.11c (although not fitted to the museum example). Mechanism shown allowed for the regulation of seat height (handle) and adjusting the elevator trim (wheel). Photo in the centre shows the seat in the museum P.11c viewed from the front – note the missing lining on the backrest (allowing to view the perforations) and the lack of the diagonal harness pass-throughs typical for Romanian version (on Polish machines harness was passing below the headrest, as shown in the photo). Right – P.11c seat viewed from the top. Seat cushion is not original. Viet starter (visible to the left of the seat) was not installed in P.11F. (Radu Brînzan collection, Michał Skawiński)



Some of the P.11F were equipped with armoured seat before or during the Barbarossa campaign. Original seat and headrest were removed and most likely entirely new, armoured seat with integrated headrest was installed. (Dénes Bernád collection)

/ Wings



A good view on the complex, but elegant shape of Puławski's gull wing as used in P.11F. All the elements visible in this view were identical with the P.11c wing. Note the surface details (rivets, access panels) and the fact that panels directly in front of the cockpit and first one to each side were not covered with corrugated skin, but the smooth one. (Horia Stoica/Dan Antoniu collection)



Close up on the port wing surface. Left photo – machine gun bay covers (top) and area aft of it. Skin repair is visible at the bottom (cuts in the corrugations and additional small rivets) – it was not present on the factory-fresh airplane. Photo at right – neighbouring area, closer to the fuselage. Apart from the corrugated surface there is a smooth skin visible to the right (mentioned in the description of the photo above). Of special interest are the details of the corrugated skin panels, each of them had an approximate width of 28 cm. The joints running along the wing chord were smooth, with a single line of rivets. (Michał Skawiński)



J Starboard wing of P.11F. Note the 'chessboard' of panels, covers visible in the photos above, positioning of aileron actuator and two lifting hooks near the cockade. Again, all aspects (apart from the fairing immediately in front of the windscreen) were identical with P.11c. (Horia Stoica/Dan Antoniu collection)



Starboard wing of museum P.11c. Note the surface details and that the wingtip was covered with smooth skin. These photos show well how the light reflects from corrugated surfaces as opposed to smooth ones. Compare the effect with the IBG model wing. (Michał Skawiński)



A highly-detailed view on the original P.11F wing. Corrugated skin panels on the undersurfaces were joined in a different way than on the uppersurfaces due to the requirements of production technology. This resulted in slightly protruding combs running along the cord of the wing. Note the riveting details and that both wingtip and leading edge were covered with smooth skin. (Tomasz Kopański collection)



Additional view at the combs on the wing undersurfaces. Note, that they started only behind the smooth leading edge. (Horia Stoica/Dan Antoniu collection)



🥖 Skin details on the museum P.11c. Note the combs, smooth vs. corrugated skin division and rivets. (Michał Skawiński)



At left - opening panel on the leading edge of the starboard wing giving access to the cables leading to the pitot tube. Centre photo – pitot tube as fitted to P.11F. Note that it slightly differed in details from the one in P.11c. Right – similar panel placed symmetrically on the port wing with the hinges visible. (Michał Skawiński, Tomasz Kopański collection)



At left – another opening panel in the leading edge of the starboard wing, this time giving access to the inner cover of the machine gun barrel – note the hinges. While in P.11c these were not symmetrical on both wings, in P.11F they actually were. Right photo – spent link and cartridges chute. When wing armament was installed, so were the additional elongated chutes in the form of long pipes - see section on the armament. Small sheets of metal under the screws are most likely not original. (Michał Skawiński)



Double panel on the leading edge of the port wing was a cover of the gravity fuel tank. There was no equivalent double panel on the starboard wing. Photo at right – inspection panels at the bottom of the wing. (Michał Skawiński)



Ailerons were identical on P.11c and P.11F. The hinge area was covered with smooth skin, while the rest with corrugated. Same as for the rest of the wing, combs were only on the undersurfaces. Note the actuators and the trim tabs on both ailerons. (Michał Skawiński, Horia Stoica/Dan Antoniu collection)



🥖 Two photos showing ailerons on the museum P.11c. Note the areas of smooth skin and the combs (Michał Skawiński)



Underwing struts were one of the recognizable features of Puławski's fighters (left – P.11F, right – museum P.11c). Struts had a streamlined cross-section with the front one having the row of hollow rivets running along the centreline. (Tomasz Kopański collection, Michał Skawiński)



Photo of the strut from P.11c manual. The heavily riveted endings were hidden under streamlined covers. (Muzeum Lotnictwa Polskiego)



Streamlined covers of the struts. Left – rear one. Right – front one, note the hollow rivets running along the centreline of the strut. (Michał Skawiński)

/ Empennage



Three photos of P.11F tails. Top – No.70, bottom – No.57. Skin structure of the horizontal tail was similar to that of the wings with corrugated panels of the 28cm width with flat joins on the uppersurfaces and combs at the bottom. Leading edge and the tip were covered with smooth skin. Vertical tail was a bit different, with only three panels of corrugated skin joined using combs on both sides. Leading edge, top and bottom of both the fin and the rudder were all covered with smooth skin. P.11c and P.11F shared identical empennage – probably the most aesthetically pleasing of all PZL fighter tails. (Dénes Bernád, Tomasz Kopański and Horia Stoica/Dan Antoniu collections)



Vertical tail of the museum P.11c. Note the corrugated vs. smooth skin areas, trim tab not adjustable in flight and details of the riveting, including prominent rivets on the leading edge. (Michał Skawiński)



Rear of the fuselage and bottom of the rudder (covered with smooth skin). Note the actuator in the centre, strut mount in the bottom and the Bowden cable for controlling the elevator trim tab at the top. (Michał Skawiński)



Horizontal tail of the P.11c was identical to the one on the P.11F and was rich in detail. Inspection panels on the elevator facilitated servicing of the trim tab Bowden cable. Note that corrugated skin on the horizontal stabilizer reached all the way to the fin, while on the elevator the inner part was smooth (as was the hinge area and the trim tab). The visual effect of light reflection off the different types of skin is the same as discussed in the wing section. (Michał Skawiński)



Trim tab actuators. This is how the Bowden cable (26) was attached to the levers (25) that changed the position of the trim tab (22). (Muzeum Lotnictwa Polskiego)



Photo at left - horizontal tail viewed from the bottom. Note the six combs and the strut supporting the stabilizer. Same as on the uppersurfaces, the inner skin panel of the horizontal stabilizer was corrugated, while on the elevator it was smooth. Note the rivets, especially visible on the leading edge skin. Right – a bit retouched, but important photo from P.11c instructions. Note how streamlined the strut was (identical can be seen on P.11F No.70). Visible are also the details of the strut attachment (12), Bowden cable (26) and the bottom trim tab actuator. (Michał Skawiński, Muzeum Lotnictwa Polskiego)



Two more photos of the horizontal stabilizer. Note the smooth skin on the tip, hinge details and the fact that the strut has a more rounded cross-section than in the instructions photo above. The reason for this difference is not certain, but all photos of *P*.11F known to the author show the more streamlined version, as seen in the *P*.11c instructions. (Michał Skawiński)

/ Landing gear



The best position to present legs is lying on the back! This ground-looped P.11F No. 128 shows very well both the V-shaped legs of the main undercarriage and the tail skid. No shock absorbers are visible, as they were hidden in the fuselage as a measure to reduce drag. (Horia Stoica/Dan Antoniu collection)



Left – forward truss section of P.11c fuselage to which the main undercarriage (visible at the bottom) was attached. This element was almost certainly identical in P.11F. Right photo – V-shaped legs. Streamlined in cross-section, they had a row of rivets on the trailing edge. (Muzeum Lotnictwa Polskiego, Michał Skawiński)



Another photo of a ground-looped P.11F No.128 shows the angle of the undercarriage legs without load (in flight). When on the ground, the track width was slightly larger. (Horia Stoica/Dan Antoniu collection)



Left – another photo of the front truss section from P.11c instructions. Metal rod (4), flat in cross-section apart from the attachment points, together with the undercarriage leg (2) and a steel diagonal lever leading to the fuselage centreline (3) created a triangle providing structural strength to the undercarriage. The load was transferred from the undercarriage through the steel tendons (9) to the vertically placed shock absorbers (10). Each of them worked independently and so did the undercarriage legs. At right – two photos of the attachment points of metal rods (marked as 4 in the left photo) to the steel diagonal lever (3) as can be seen in the fuselage bottom, immediately in front of the fuel tank. Top photo shows the view from the front, while the bottom one - from the back. Note how the metal rods cross-section changed near the attachment point. (Muzeum Lotnictwa Polskiego, Michał Skawiński)



Photo of the wheel from P.11c instructions provides a view on how the undercarriage legs (2) and metal rods (4) were attached to the wheel hub. The same can be seen in the close up of the P.11F No.70 photo (centre). Note the lettering on the Dunlop tyre inner face. Photo at right shows how this area looked in service. Note the accumulated dirt and oil stains, especially on the undercarriage legs. Wheel chocks are also well visible. (Muzeum Lotnictwa Polskiego, Tomasz Kopański, Horia Stoica/Dan Antoniu collections)



Details of the wheel hub. Even more interesting are the tyres. At left, there is a photo of the factory-fresh airplane No.70. Writing on the tyre says: DUNLOP AERO - STANDARD 750 x 150. Already in 1937 Romania started importing tyres of the Polish company Stomil that were also used on P.11F. A wheel with this tyre is visible at right (photo is dated 1941). Note the fragments of the POLSKA OPONA LOTNICZA STOMIL 750 x 150 that can just be made out on the tyre. (Tomasz Kopański, Horia Stoica/Dan Antoniu collections)



Tailskid of P.11F No. 70 at left. Centre and right – photos of the same element in P.11c instructions (with leather covers on and removed). Tailskid was identical between the two versions. (Tomasz Kopański collection, Muzeum Lotnictwa Polskiego)



Two photos of museum P.11c confirming the details shown in the instructions. Note that in the photo at right the tailskid is mounted on the additional single-wheel trolley. (Marek Możdżeń, Michał Skawiński)



In the winter, wheels could be changed to skis. Romanian P.11F used locally-produced SET skis, but this is yet another story. (Horia Stoica/Dan Antoniu collection)

/ Armament





7.92 mm FN Browning Modèle 1932 was the main armament of P.11F with two synchronized ones installed in the fuselage at each side of the cockpit and firing through the propeller arc and further two unsynchronized ones in the wings. Photo above shows the 7.5 mm version (externally identical) with additional cut outs to show internal structure. At left – drawings of the proper 7.92 mm version as installed in P.11F. (Jean-Francois Legendre collection, Radu Brînzan)



Left – machine gun recess in the museum P.11c. While the machine gun was different, the overall look of the well was similar (probably apart from the aluminium sheet put over the barrel, which does not quite seem to be representative for either P.11c or P.11F). At right – opened machine gun access door on P.11F. Note the light interior colour, which is almost certainly silver. (Michał Skawiński, Horia Stoica/Dan Antoniu collection)





Two photos of the machine gun mounts. Above – as seen on a P.11F wreck, proving that main components were identical with P.11c (at left), of course apart from machine guns themselves. Visible are: gun trigger (2), control column (3), spent links chute (7), ammunition box (8), spent cartridges container (9) and spent links container (10). At the opposite side of the machine gun there was an element similar to 7, delivering ammunition from box 8. (Tomasz Kopański collection, Muzeum Lotnictwa Polskiego)



Elongated chutes protected rear struts and wing undersurfaces from being hit by spent links and cartridges. As in case of other elements of the construction, the chutes had the streamlined cross-section. Photo at left shows the newly-produced machine that does not yet have the armament installed - it was done only after the machine was taken over by the Romanian Air Force. (Horia Stoica and Tomasz Kopański collections)



Further photos of wing machine guns and their covers. Note how big the opening in the wing was compared to the barrel itself. Protruding elements to the outside of the machine gun bays were the wing lifting hooks attached directly to the spars. (Horia Stoica/ Dan Antoniu collection)







P.11F left the factory without any bomb racks installed, having instead a blanking plate (photo at left). First bomb racks were installed most likely already in 1938, these were of the IAR-Barbieri system for 12,5 kg PuW bombs (right). (Tomasz Kopański and Horia Stoica/Dan Antoniu collections)







The second type seen in the photos from 1940 and later years was probably a smallbomb (grenade?) dispenser installed inside the wing with a sliding cover. Top left, port wing with the cover closed. Top right – with the cover open (slid to the back). Left – starboard wing with what looks to be the same or similar installation. (Horia Stoica and Michał Skawiński collections)



K 28 gun camera was an additional equipment of P.11F used during exercises, although photos showing it are actually quite scare. Top right photo shows it installed in its regular place - the rear port strut. Photo top left illustrates it attached to the Potez XXV (photo is actually upside down to show it in position it was installed on P.11F). Directly above – components of K 28 gun camera. (Michał Skawiński collection, Muzeum Lotnictwa Polskiego)

/ Radio



A photo with a highly increased contrast to bring out the antenna wires. Single wire was attached to the mast on top of the fin, but after a short distance split into three – one leading to the antenna insulator on the starboard side of the fuselage and two leading to the masts on each wing. (Horia Stoica/Dan Antoniu collection)



Well-known photo, again with significantly increased contrast. Note the distance from the tail at which the single wire splits into three. The thicker sections near the tail and wings were most likely springs protecting the wire from breaking in case of excessive tension. It can also be noticed that the wires are not entirely straight, but are slightly sagging. (Horia Stoica/Dan Antoniu collection)



Ceramic antenna insulator on the starboard fuselage side, just behind the cockpit of a freshly produced P.11F. At right, similar insulator used in Germany – they were not identical, with Romanian one having what looks like a more rectangular base, but the components were probably the same or similar. Durchführungsbolzen was the antenna connection bolt and screw, Porzellanisolierkörper – ceramic insulator, Schaumgummiring – rubber foam ring, Gummibeilegscheibe – rubber pressure ring and Ferrozellscheibe – metal ring. (Dénes Bernád, Tomasz Kopański and Radu Brînzan collections)



Left and centre – P.11F tail antenna mast without and with the wire attached. Note how the latter splits at a short distance from the tail. Right – museum P.11c mast seems to be longer and have a slightly different ending, but of interest is the spring element preventing the wire from breaking – a similar (but different in details?) solution was applied to P.11F. (Horia Stoica/ Dan Antoniu collection, Michał Skawiński)



Left - wing antenna mast on a freshly-produced P.11F No.70, proving that the machines were produced ready to accept the radio. Centre – mast on a crashed P.11F viewed from the side. It does not look to be identical to the museum P.11c masts, the latter being more bulky at the base and longer. Right – as the radios were not mounted for at least three years after production, masts were removed from a number of P.11F. (Dénes Bernád and Horia Stoica/Dan Antoniu collections)

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