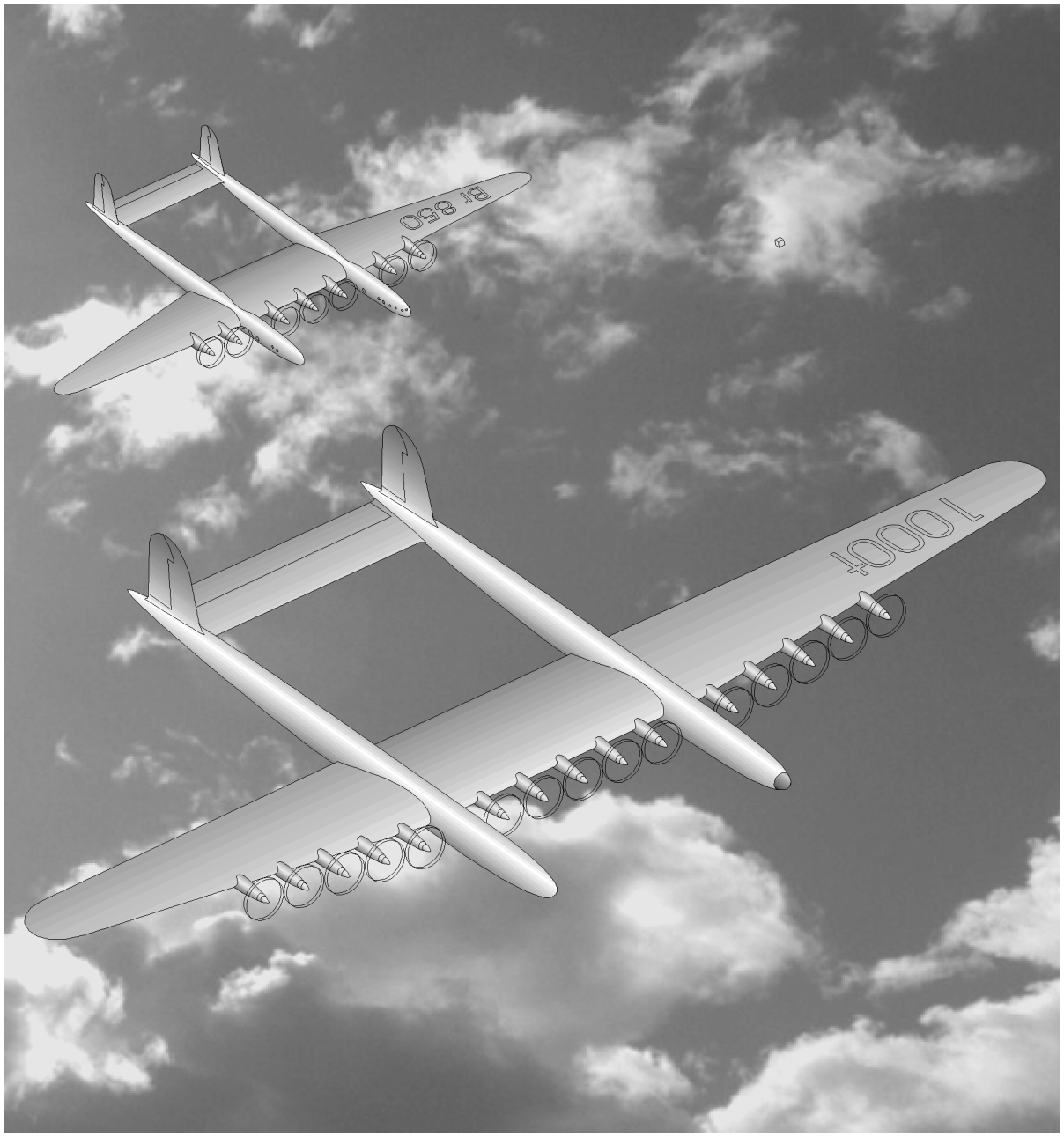
The **Bréguet Br 850**, mentioned about its twin-hull derivative, is rather difficult to classify. This model had a big passenger compartment in the central part of the thick wing, reminding the Burnelli principle – however, the inhabited booms were big enough to be fuselages. The power would have come from 28 engines, grouped 4 by 4 (as on the B-2000B), but a version with 6 very large engines came after: Br 851. For the land version, the landing gears' fragility was an issue, the plane weighing 230 tons (500,000 lb, three times more than a Douglas XB-19, larger plane of that time, and almost five times more than a Gigant or Superfortress).

Bigger derivatives of the Br 850 were also mentioned, without saying clearly if they were contemporary (probably, according to motorization) or after 1945. To drive their fifteen sets of propellers, they used engines grouped 4 by 4 (500t Transport, or Br 500), and even 8 by 8 (**Bréguet Transport 1000t**)... Carrying nearly 750 people, this monster with 120 engines would have been twice bigger than the colossal Hughes H-4, and would still be unrealizable today, perhaps. This can be understood in an invaded country, where engineers forced to work for their enemy may choose to design aberrant projects, impossible to build and fly.



As with the doubled twin-fuselages, we finish here with gliders. The first model was presented with for only designation: **SSSR-123**, with no name of a design bureau. Presented in the contemporary press, and not confirmed thereafter, it could be a lure from intelligence services, or a distant derivative of the old Gribovskiy G-3.

Other strange case: the **DFS 332** – its twin-fuselage layout was intended to keep the median axis for a portion of interchangeable wing to test. This principle was used again, somehow, on the recent SSAKTB SL-2P, twin-fuselage glider twinning Let Blaniks. The DFS 332 project had surprisingly short wings for a glider; though the goal was not at all harmonious gliding, but huge speeds diving vertically (with no propeller airflow vortex on the wing to test)... With new rocket engines, a motorized version was considered then.

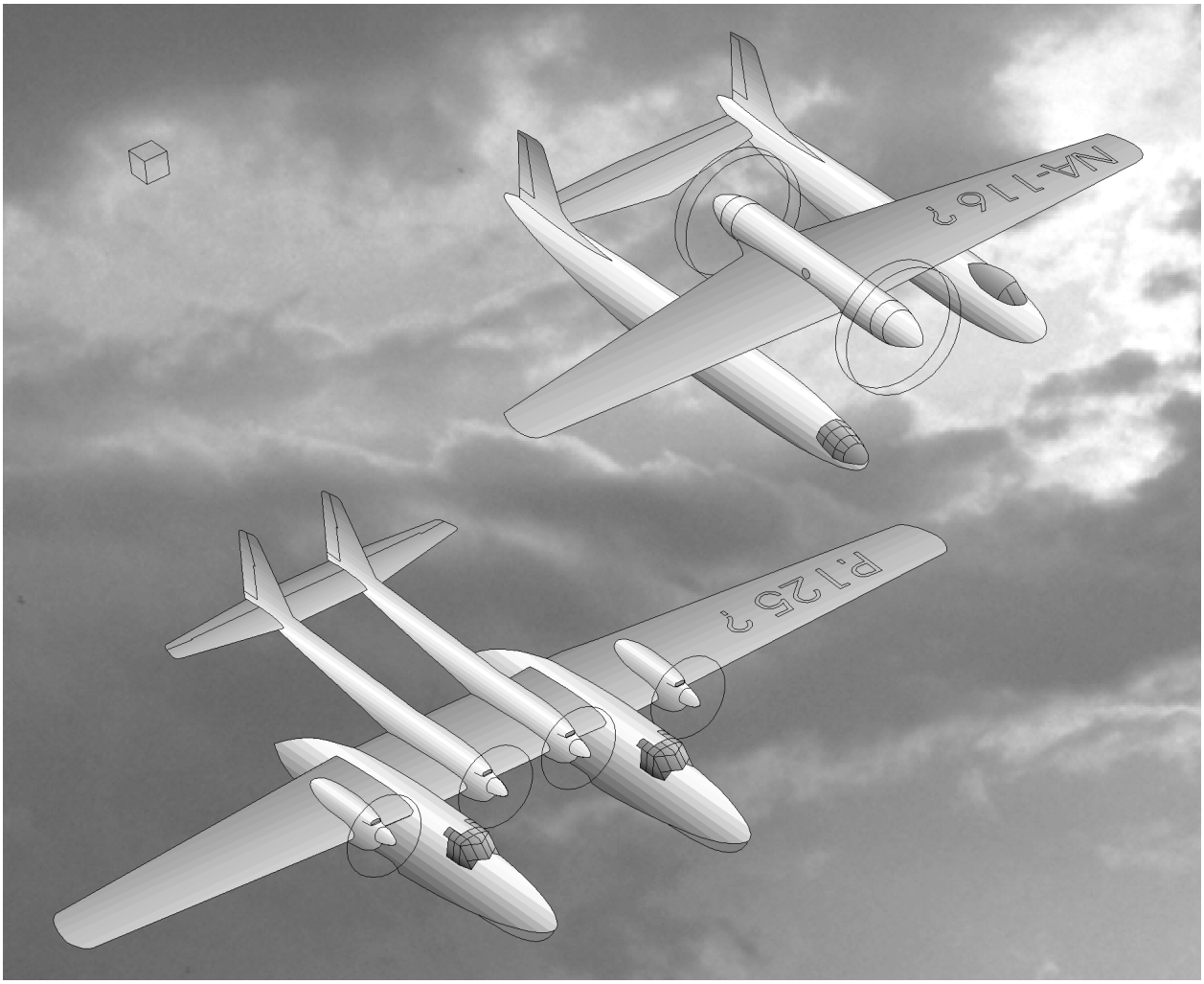
Chapter 3 : Booms beside pod

After exotic layouts, here is the main subject: models having a central pod and two lateral booms. Before the famous classical ones, a few incongruous items should be presented. Those would deny the traditional rule "twin-boom with pod" = "twin-boom with cockpit/load on the central line".

The first counterexample is the case of “twin-pod” models. Among late derivatives of the famous Bv 138, a twin-hull model could have kept independent booms, contrary to the twin-fuselage P.123 page 25. By using elements of the asymmetrical model P.111 (presented page 79), it was simple to create a twin-hull four-engined seaplane without specific parts (**Blohm und Voss P.125**?). On our provisional drawing, note the median axis free of any pod.

Another abnormality: models whose central nacelle holds the motorization and possible loads but whose crew is located laterally, on the booms. It seemed possible that the twin-boom four-**engined North American NA-116** was considered in this form, among others – mixing the Blohm und Voss P.163 formula (2 lateral cockpits and a tractor double-engine) and the Douglas XB-42 formula (2 canopies and a pusher double-engine)...

Except such special cases, the twin-boom-with-pod family is rather uniform. To classify it, we chose an explanatory guideline, detailing the various justifications of the twin-boom layout.

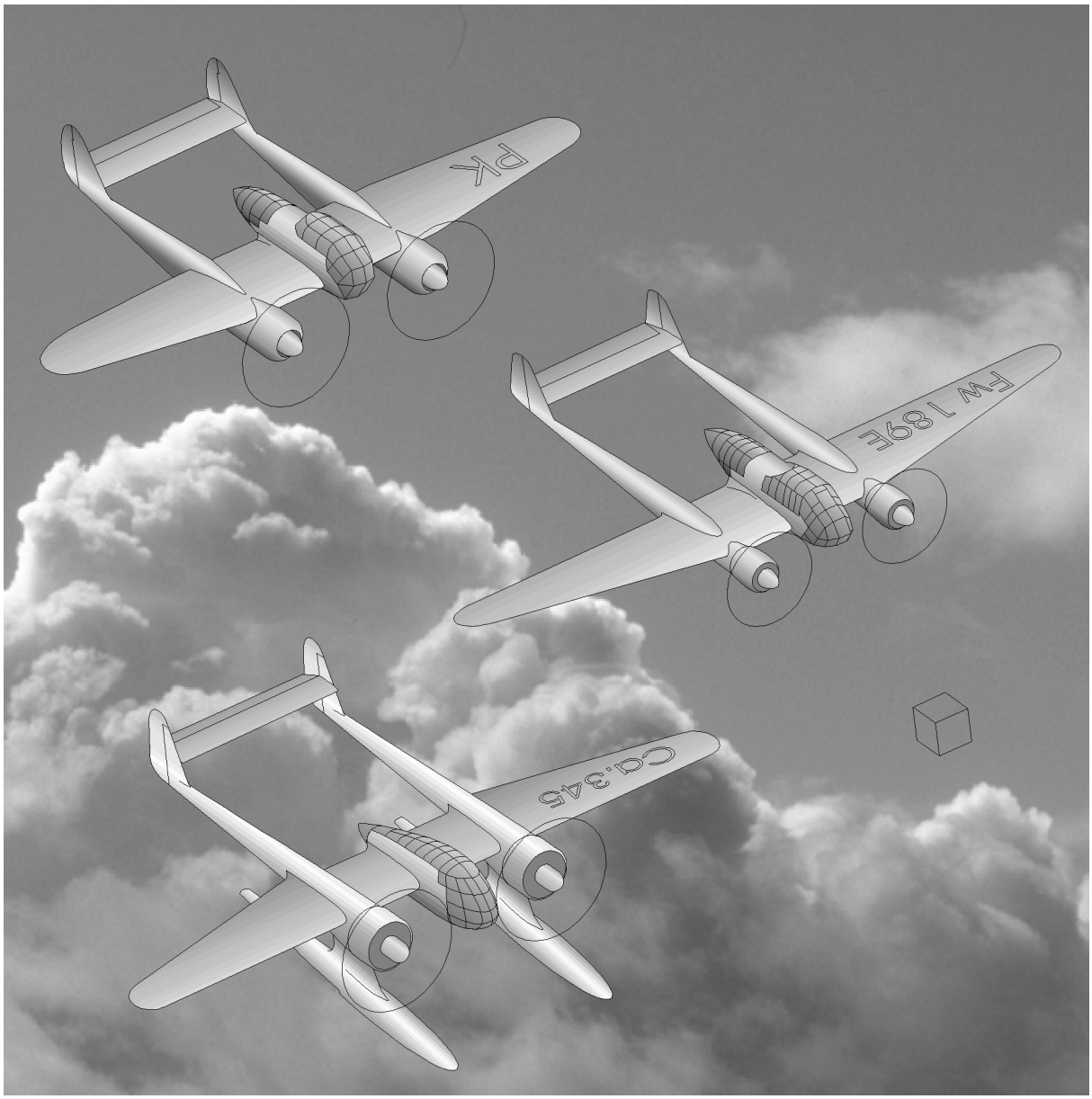


3.1 – Pod with rear view

The first advantage of the twin-boom design with pod lies in the panoramic view available to an occupant located at the back. Of course, a tail-less flying wing (Moskalyev Sigma), or a plane with tandem wing (Delanne 10), present this characteristic at a still higher degree, but these formulas with abnormal centering were not yet trusted. Concerning planes with a traditional fuselage, only the largest (B-25 etc.) could receive a rear cockpit, behind the tail, without unbalance. The Fokker G.1 and Fw 189 Uhu, known as "1940 airplanes", are the most famous examples of twin-boomers with rear post; their design appeared however far before 1939. For the period which interests us, there was just a project of modified Uhu: **Focke-Wulf Fw 189 E**, whose radial engines changed the silhouette notably.

The project **Sukhoi RK** (Razvechik-Korektirofshchik), dates also of that time. Mayby inspired by the Fw 189, this three-seater had the same aspect of a flying verandah, with imperfect aerodynamics. The booms were better adapted to radial engines than on the Focke-Wulf. The project leaded to a bigger version after 1945: the four-seater Su 12, still using the name RK.

The **Caproni Ca.345** was a seaplane. The version Ca.345 bis differed by its in-line engines, with better aerodynamics.



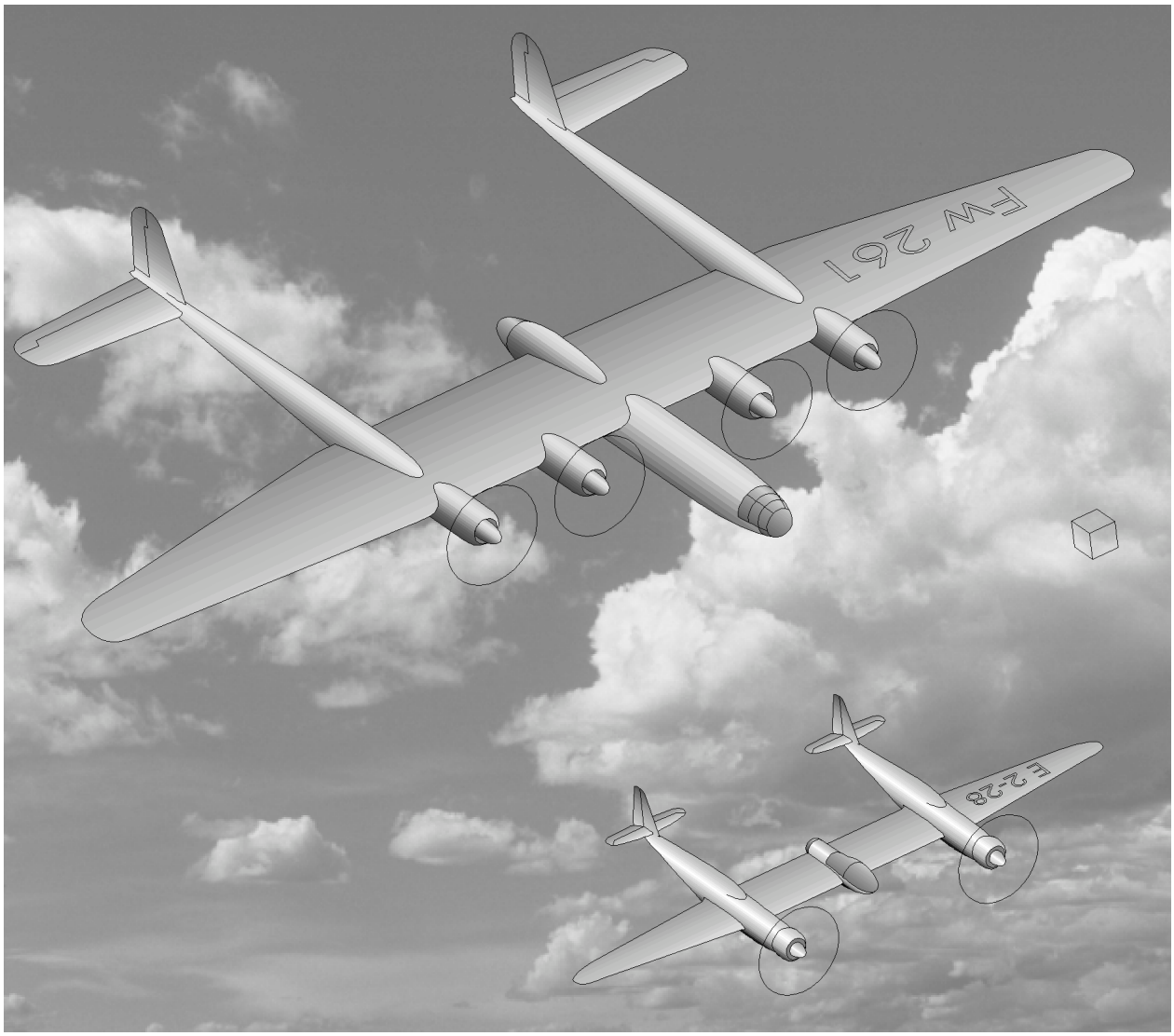
If visibility in the rear sector is regarded as a key point, it is not enough to have much glazed areas, it would also be necessary to remove the tailplane mask. Using two separate tails, the view-point is better, while fragility is worse. The optimum is having external tailplanes only, outside booms. The **Arado Ar 340**, development of the project Arado E 500 before 1939, was the best example. A version known as Arado E 340 was mentioned, differing only by the span. In spite of its designation, the Arado 340 had no relation with the Arado 240 and 440.

The **Arado E 555-9** was a tailed derivative of a genuine flying wing (E 555-7). Power was brought by three jets: two lateral above, one central below (so much low: able to avoid a central rear tailplane, thus it was not the main reason for a twin-boom layout – rear view was the reason).

To improve further the rear view, it is also judicious to have booms as lateral as possible, as showns on the Focke-Wulf project illustrated below – usually, on a twin-boom four-engined plane (such as the Argosy), the interior engines are linked to the tail. The name of this model is sometimes indicated as P.0310.225, or **Focke-Wulf Fw 261**, more convenient but more improbable, the figure 261 having been given to a contemporary Messerschmitt project.

The disadvantage of such distant booms is an increase of torsional stress produced on the wing, which could revive old fears related to the twin-boom configuration – let us recall that precursory aerodynamicists had forecast dislocation in flight, systematic, for such airplanes, and it is only with the Burnellis that the safety-related racism against twin-booms was cooled down: on these flat planes, a high share of the total weight was invested in the structure surrounding the passengers, forming an indestructible box; though, dislocated booms brought death in the history of twin-boomers; the most famous accidents concerned the Kalinine K-7 under test and a Sea-Vixen in airshow. Nowadays, the Fw 261 could be very solid, with composite materials directed in a precise direction, optimized to resist the mechanical constraints; considering that the forward swept wing was rehabilitated this way with the X-29 program, the external booms layout could similarly prove itself viable. The Rutan Antares (or Scaled Ares) has been a modern update for the separate tails layout.

Using very distant booms could also allow symmetrical tails (minimizing torsion effects) with a perfect rear view,. This layout is illustrated by the projects **Messerschmitt E 2-28** to 2-32. These models would have associated two fuselages of Me 209-II to a new central pod – reminding the old Fokker M9.



Without separating tails, therefore without weakening the structure, the rear view can be improved by raising the tailplane. The simplest solution consists in employing a high wing, directly raising booms and tail above the nacelle. The three-engined seaplane Bv 138C could illustrate this, but it largely exceeded the status of project, and its aspect is identical to the initial versions, designed before 1939. However, the bigger version P.110 or the four-engined **Blohm und Voss P.124** and P.122 were not built. Another illustration of the same family, the **P.61** was rather old, probably dated 1939. It completed the Bv 138 family, started with a twin-engine. The P.61 motorization may have been similar to the Latécoère 480's – some designers had gone much further in the free multiplication of the propellers, tractor and pusher, on the wing of twin-boomers: five propellers on the Republic Super Clipper and Caproni 59, six on the Martin XB-16, seven on the Kalinine K-7, up to ten on the Adlershof R...

In the same class, high wing and rear post, was the glider Maeda Ku 1-I. Even if it is remained almost unknown, it was more than a project, though a published plan did not correspond to the photographs of the built models, and could depict an intermediate project between the Ku 1-I and its successors, associating the specific twin-boom formula of the initial model to the specific faired canopy of the posterior versions. The name of this drawing is unknown, but professor Sato was probably the designer – thus our hypothetical designation **Sato Kutei-Butai**.

The use of a high wing is a problem for landing gears: long and fragile from the wing or narrow and unstable from the pod. The low or median-low wing were thus preferred most often, but to keep the rear view acceptable, it was necessary to raise up at least the tailplane ("double-T-tail", "Π-tail", "stool-tail"), while prolonging the pod far behind. This is illustrated by the project **Sud-Ouest SO-1070**, twin-engine preceding the later triplex-boom Nationale-Centre NC-1070.

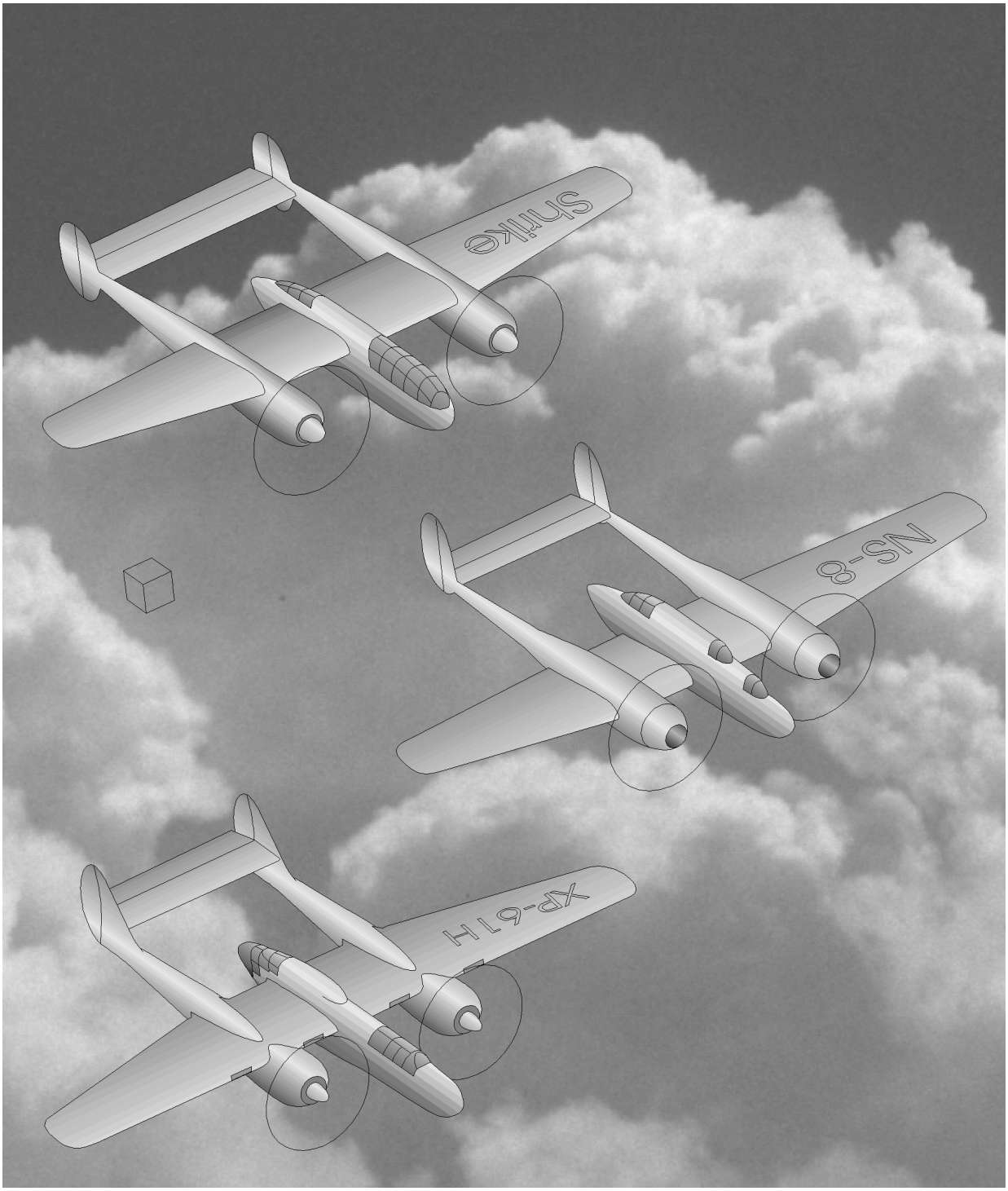
As regards not-conventional tail, the **Bestetti-Nardi BN-3** and **BN-4 Saettante** used the tailplane-on-pylons formula seen on the Saetta (page 8).

Still to have a free back, another way is possible if a narrow cone is enough: replacing the horizontal tailplane by a V or reversed-V plane (cf SAAB RX-2 page 8). With such oblique stabilizers, there is no need anymore of fins and rudders, that may be removed, for a butterfly-tail – many butterfly twin-boomers have been built after 1945; among the strangest, the Fouga Gemini had a W-tail and the Freewing Tilt-Body had a \ /-tail. For the period studied here, the V-tailplane for good view backwards is illustrated by the **Flying Whale** and a **Martin "twin-engine"** whose precise name remains unknown. They may have been secret old projects which were revealed to the public lately. The Whale, with its lateral front posts remains the famous Bell Airacuda – while it derives in fact from the old Martin XB-16 twin-boomer.

The standard layout, simpler and more solid, offered a worse point of view rearwards. The most orthodox, looking like the old design Fokker G.I (or of its glazed nose derivative T.VI), were the **Weserflug P.2137** and the initial version, twin-boom, of the **Caproni Ca.325 bis**.

Going back to classics, we have of course the XP-61/P-61 family. The preliminary draft designs, **Northrop NS-8**, may be presented through one of the many considered shapes. Even before, the very source may have been the **DDMDAL Shrike**, from the Design Development Material Division Aircraft Laboratory of Wright Field (or from Northrop, according to one author). The ornithological nickname "Shrike" reminds several Curtiss planes, and the preliminary draft of the Vultee XP-54, but it seems there was no relation at all, just homonymy.

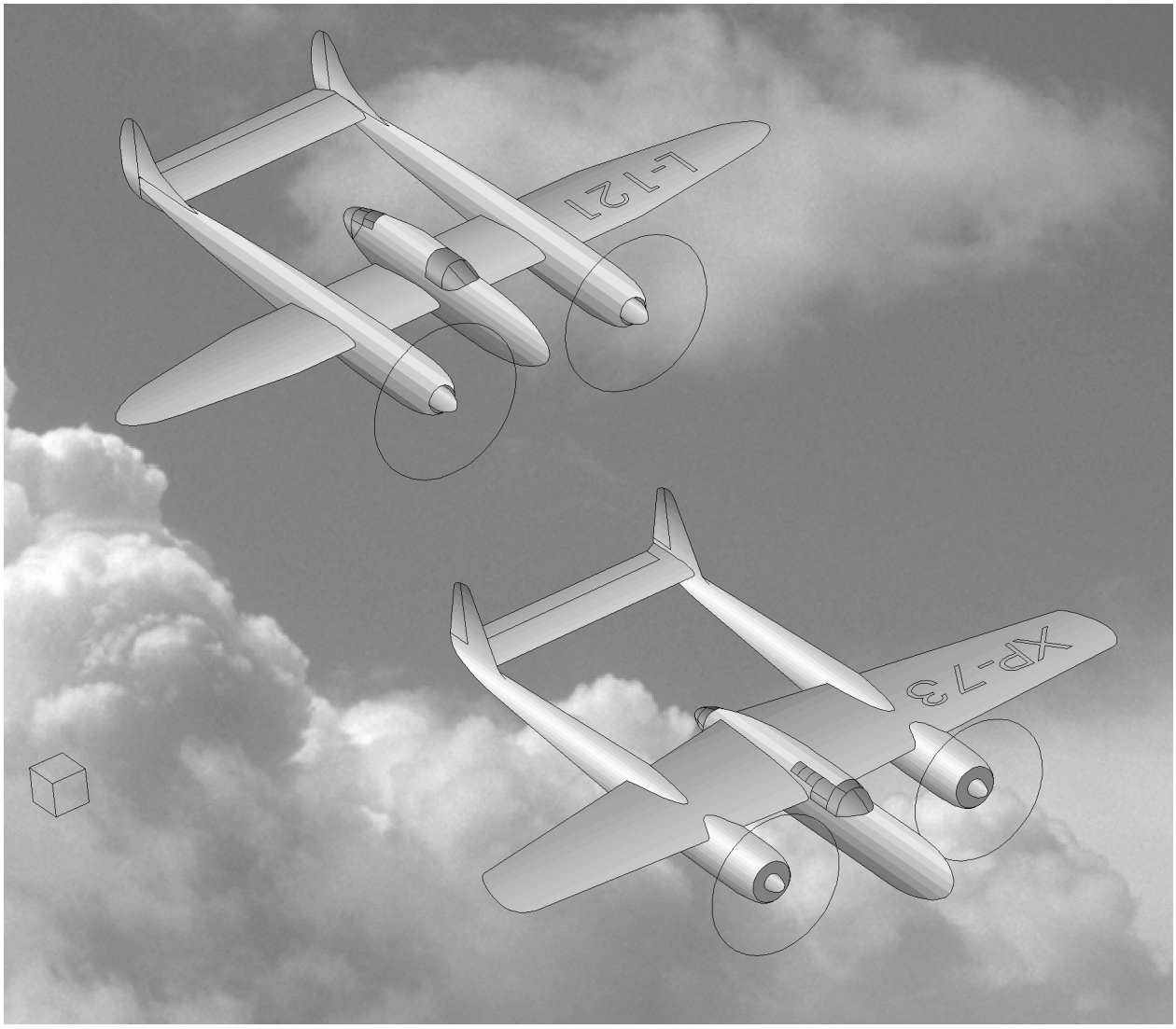
Concerning the P-61 later versions, one of the rare unknown ones was the model H (**Northrop XP-61H Black Widow**), with the highest front post removed and with a bulbous dorsal tank.



The Hughes D-2 and Lockheed XP-58 Chain Lightning were twin-engined airplanes like the P-61.

The Hughes model, secret, does not have a clear history, some books saying it was designed before 1939. It seems that a multitude of projects followed one another, progressively improved. After a first twin-boom project of twin-engine had been presented by Hughes, a second (X-608) was proposed in parallel with the future XP-38 Lightning (Hughes accusing Lockheed for plagiarism), then a third project was born, and led to the D-2 Design (or DX-2, XA-37, etc). Illustrated below is the night version **Hughes XP-73**, which did not have the glazed nose of the photographed prototype.

Opposite, we could present the XP-58 with a glazed nose, unusual on this model, but which was considered. The history of this XP-58 is very long too: Models 20-24, 20-59 and 20-86 were mentioned, maybe 86 distinct versions (or even more…) have been designed. The initial project, **Lockheed L-121**, included completely different models, with an almost-standard P-38 (or P-49) single-seater, a far-bigger two-seater, etc. The final L-134 used even four engines, as two double ones. Meanwhile, one design had booms prolonged behind the fins, one had radial engines and no more the boom-radiators which characterized the Lightnings. For the latter, the silhouette was different with standard engines (2 large rows of 9 cylinders) or thin ones such as illustrated here (6 rows of 7 cylinders).



The **AGA XLRG-1** and **XCG-9** gliders' main feature was three separated cabins, reminding the old Anatra Anadva – among old ones, the Caproni Ca.51 had been even further, with a fourth pod on the horizontal stabilizer, and a fifth one under the centre of gravity... The XLRG and CG-9 had three observation posts frontward (as on the Bell Airacuda) and a rear post thanks to the twin-boom layout. On the LRG-1 sea-glider, the booms/fuselages were hulls, and it was wise to fill these structures that would have been empty, classically.

The **Battle Glider** was another freak, derived from the XCG-9, perhaps by the Laister-Kauffman firm. Mother-ship glider nicknamed "Reverse-Mistel", and maybe inspired by the old Zveno, it was aimed to drop (and welcome back) two fast single-seat P-39 Airacobra... It could have been an imaginative dream simply intended for public display of futuristic almost-unbelievable projects – it was indeed necessary to present an intense activity of aeronautical invention, justifying hope and support, without revealing to spys the principal source of progress: jet engines.