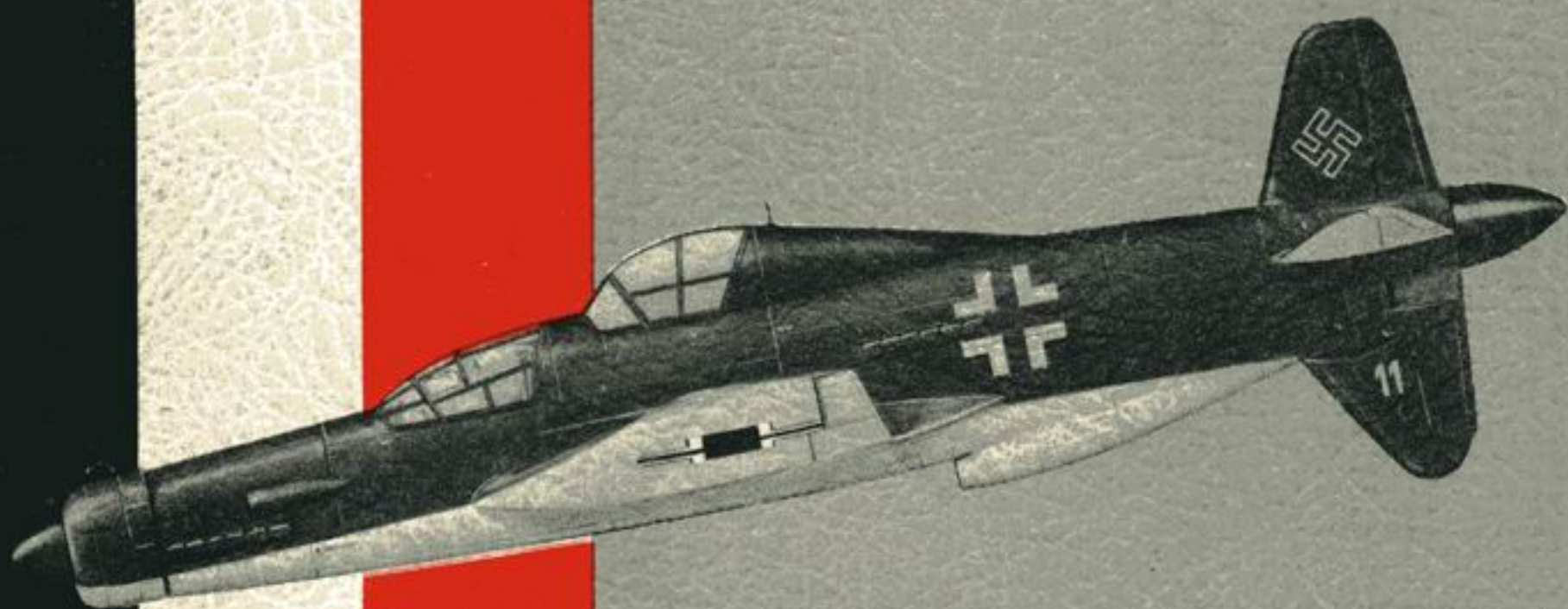


Dornier



Do 335



PFEIL



\$3.

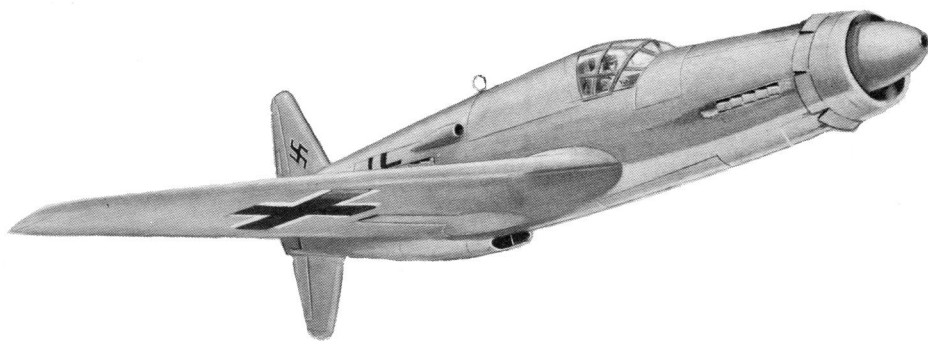
Dornier Do 335

by

Heinz J. Nowarra

Edward T. Maloney, Curator of The Air Museum

Scale Drawings by Uwe Feist



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Dornier Do-335 "Pfeil"

By Edward T. Maloney
Curator The Air Museum
Ontario, California

During World War II the German aircraft industry developed many outstanding military aircraft. In this stable of modern and unique aircraft was the most unconventional piston engine design to come out of the war. The Dornier Do-335 "Arrow" (Pfeil) featured a unique push-pull engine combination.

In 1942 the Technical Office of the German Air Ministry issued a request for a high speed bomber of twin engine design. Such an aircraft was already at hand—the Heinkel He-219—but Ernest Heinkel was in disfavor by the German Air Ministry (R.L.M.) and his design was rebuffed. The design request was sent only to Junkers, Arado, and Dornier. All three firms undertook the project, but only the initial Dornier P-231 design was accepted.

In 1937 Claude Dornier took out patent rights on a push-pull engine aircraft. In 1940 he gave an order to Ulrich Hutter, a well known glider designer, to build an aircraft with an engine in front and another engine mounted on the aft fuselage driving a pusher propeller. This tandem engine design was to be used as a prototype design aircraft for future push-pull aircraft. Hutter drew experience from the Dornier Do-17 "Flying Pencil" for fuselage design and from the Dornier "Wal" flying boats.



Dr. Claude Dornier, the genius behind the Do 335 design, patented the first push-pull design in 1937.

Dornier (in hat) and his Chief Test Pilot Fath.



Hutter's final design became known as the Göppingen Gö-9. It had a Hirth HM-60R engine of 80 h.p. buried in the fuselage under the wings, with an extended drive shaft to the propeller mounted in the rear. Dornier had had considerable experience with shaft driven engines in the Do-18 and Do-26 Flying Boats. These aircraft had proven very reliable over the Atlantic Ocean and North Sea air routes prior to World War II. Weight and speed tests were very encouraging, and this design led to the experimental Dornier Do P-231 project.

In early 1942 the war was going well for Germany. The R.L.M.—Air Ministry felt no urgent or current interest in the Dornier project. The officials disliked new revolutionary designs. However, in 1943 following German defeats in North Africa and Russia, the Luftwaffe urgently requested an aircraft which would be superior to Allied types of aircraft. The order was finally given to build this unique design. But in spite of this fact, construction of the first prototype, the Do-335 V-1 took only nine months. Two years of valuable flight testing experience was already lost. Everyone who knew the events in Germany at that time viewed the situation with great alarm for the sands of time were slipping away for this outstanding aircraft and, like so many other German aircraft developments, Dornier "Arrow" would come too late.

The outline of the prototype Do-335 V-1 was generally similar to all future Do-335 design models. However, the oil cooler inlet on the Do-335 V-1 model was mounted just below and aft of the front engine cowl. It was a single seat fighter of tremendous size. It carried the code letters CP+UT on the sides of the fuselage and under the wing. It did not carry armament and only limited ground to air radio equipment. The leading characteristic in identifying the Do-335 V-1 on the ground was by the large circular wheel cover plates on the main landing gear.

The first test flights of the Do-335 V-1 were very successful, and after the phase I test flights were completed at the Dornier factory in Oberpfaffenhofen Bavaria, the aircraft was transferred to the Luftwaffe Test Center at Rechlin.

A short time later Do-335 V-2 and V-3 left the factory. These two prototype models incorporated a new oil cooler ring mounted in the front engine cowl. The new location of the oil cooler improved engine oil cooling efficiency.

The Luftwaffe pilots who test-flew the Do-335 at Rechlin test center all praised the handling qualities of this outstanding design.

The only accident during the entire Dornier Do-335 testing program was caused by an engine failure. No structural trouble was experi-

enced whatsoever. One day the factory test pilot Mosbacher was flying the Do-335 V-2 prototype when the rear engine became overheated and caught fire. The resultant crash and loss of the aircraft required a modification to the Do-335 V-3.

The Do-335 V-4 was the prototype model of the first two-place design Do-435. This project, which was initiated in 1943, was a much stronger and simplified version of the original Do-335. The fuselage was almost straight from front to rear except for the streamlined canopy. This aircraft was to be equipped with two Jumo 222's of 2500 h.p. each. This engine was never built in quantity.

The next experimental Do-335 V-5 prototype served as a test bed for guns and armament. It was equipped with one engine-mounted 30 m.m. MK-103 cannon and two MG-151/15 fitted above the engine. These two MG-151/15 were of 15 m.m. caliber. They had a special long barrel which made for a higher muzzle velocity. The 30 m.m. MK-103 cannon also had a barrel of increased length. This armament system proved very successful.

The final Dornier test programs were completed with the Do-335 V-6, V-7, and V-9. The Do-335 V-7 was sent to Junkers in Dessau to serve as a test bed for the Jumo 213A and 213E engine, which eventually was also to have been fitted to the Do-335. It was destroyed at the Junkers factory outside Dessau during an air raid. The Do-335 V-9 version was delivered to Rechlin during the summer of 1944. It was the basic model for pre-production plans of the Do-335 A-O.

The Do-335 V-8 was sent to Daimler-Benz for testing the Daimler-Benz DB-603 E and L engines.

After the Do-335 V-9 was completed, ten Do-335 A-O were manufactured using the prototype V-9 as the basic model. It was one of these Do-335 A-O aircraft that the French Ace Pierre Closterman mentions in his book as having seen. All ten Do-335 A-O's were completed and delivered between August-October 1944.

The Do-335 was officially designated "Kampfflugzeug" (literally meaning combat plane, but actually meaning—in official use—bomber). In November 1944 an order was issued by the R.L.M. cancelling all bomber construction work. However, the officials recognized the real value of the Do-335 design and no cancelling order was issued for it. Goering ordered production at the Heinkel plant in Oranienburg. Finally, orders were issued to speed up Do-335 production and development, but up until 1943 no priority could be obtained for this aircraft.

When the Do-335 V-10 two seat night fighter was completed more production orders were

issued. The Do-335 V-10 would serve as the prototype model of the projected Do-335 A-6 night fighter series. It proved out very well in all tests in spite of a second cockpit for the radar operator, and the large radar antennae, which were installed in the wing leading edge. The R.L.M. had placed great confidence in the Do-335 A-6 Night Fighter as the aircraft to stop the nightly Mosquito attacks. The R.L.M. decided that the Heinkel plant at Vienna-Schwechat was now to produce the Do-335 under license. The other Heinkel plant that had been ordered to produce Do-335 aircraft at Oranienburg was at the time already in danger from mass bomb raids. But the Heinkel plants were overloaded with work from the He-162 and He-219 programs so that no large scale production could begin. Heinkel was also involved in developing a new large wing for the high altitude version of the Do-335.

Two experimental Do-335 training aircraft were built to train pilots on this unconventional aircraft. In external appearance they resembled the Do-335 V-10. Two experimental models were built, the Do-335 V-11 and V-12. These were to serve as prototypes for the Do-335 A10 series. The Do-335 A-10 trainer was derived from the Do-335 A-0, while the second trainer version, the Do-335 V-12, was derived from the Do-335 A-1.

The Do-335 A-4 was an unarmed, high speed, photo-recon aircraft similar to the Do-

335 A-0. No more than two or three of these aircraft were completed.

Two further prototypes were built at the Dornier Works in Oberpfaffenhofen. The Do-335 V-13 served as the prototype model for the Do-335 B-1 series. The Do-335 V-14 served as prototype model for the Do-335 B-2 series. The Do-335 V-14 had the heaviest armament of all Do-335 aircraft—one engine mounted 30 m.m. MK-103 cannon and two MG-151/20 in the cowl and an additional two MK-103 cannons in the wing leading edges.

All Do-335, except the A-4 and B-1, could also be used as fighter bombers. They each had a bomb bay and they could carry one 500 Kg. bomb or two 250 Kg. bombs. A Revi C-12D gunsight was installed.

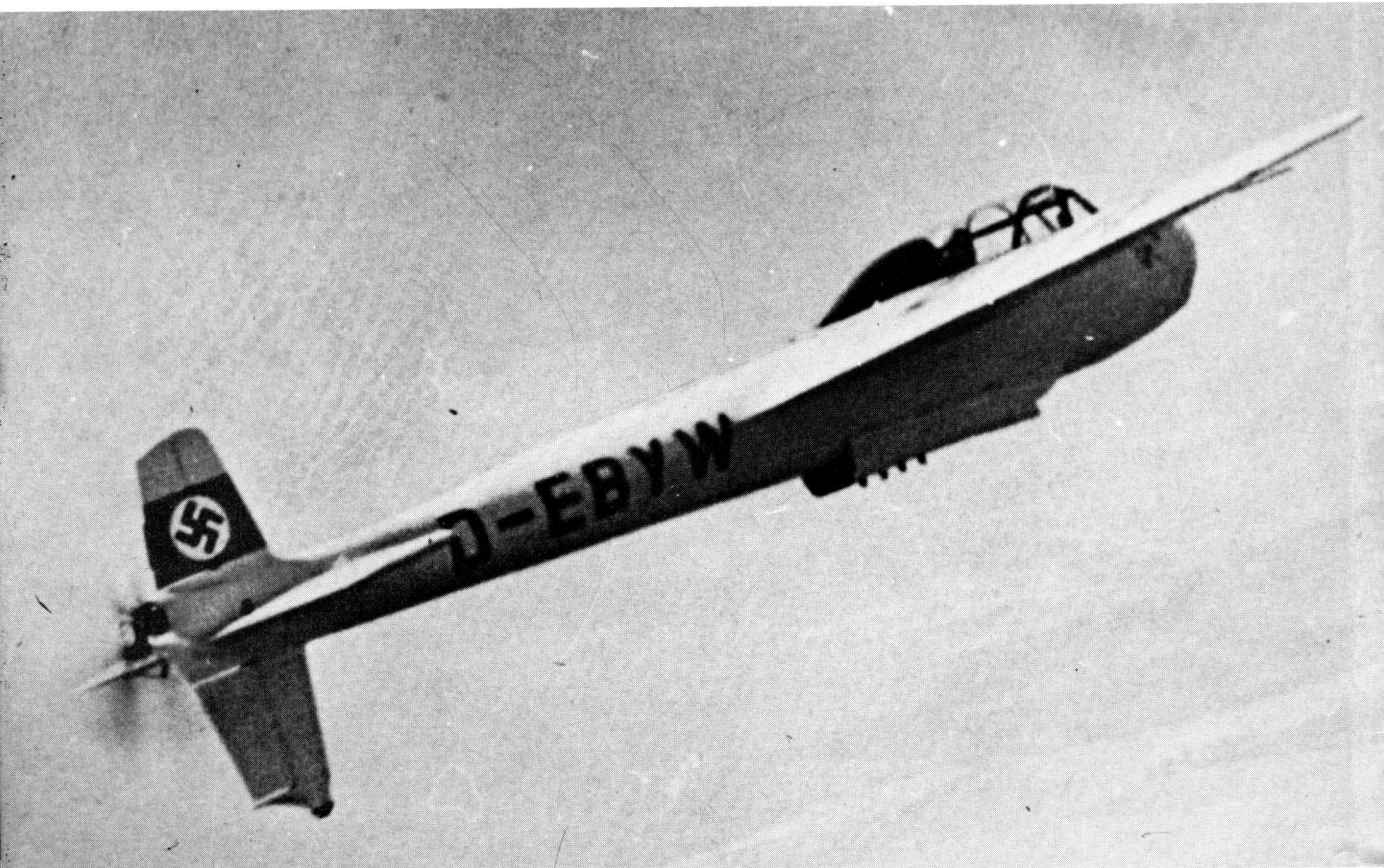
In the event the pilot was forced to make an emergency exit by bailing out, the vertical tail surfaces and rear propeller were jettisonable.

Due to critical delays in materials, Allied bombings and initial project delays, only ten pre-production Do-335 A-0 aircraft and eleven Do-335 A-1's were completed in addition to the fourteen prototype models Do-335 V-1 — V-14 and a small number of trainers. Altogether only thirty-eight Do-335's were completed for the Luftwaffe.

With a maximum speed of 417 m.p.h. at 26,000 feet with full military equipment, the Do-335 was one of the fastest propeller-driven fighters of the Second World War.

Acknowledgement:

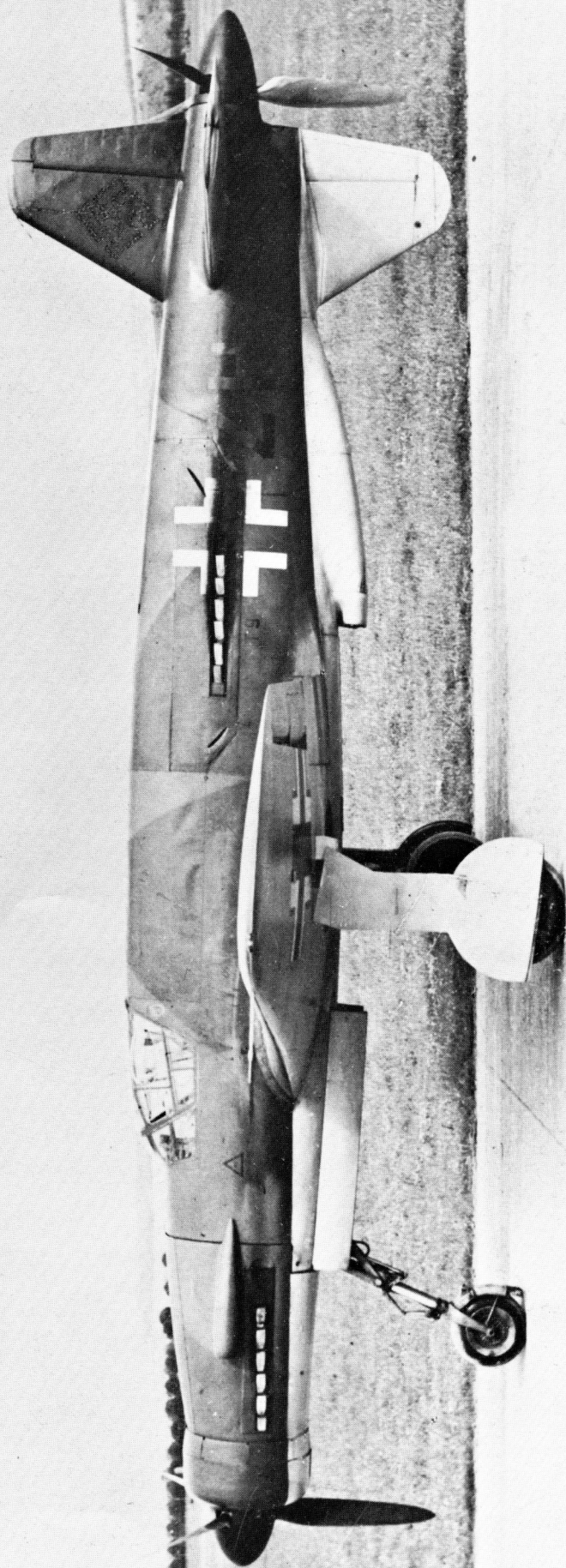
We wish to thank Mr. Edgar Deigan of **Air Books** for his pictorial assistance in this volume.



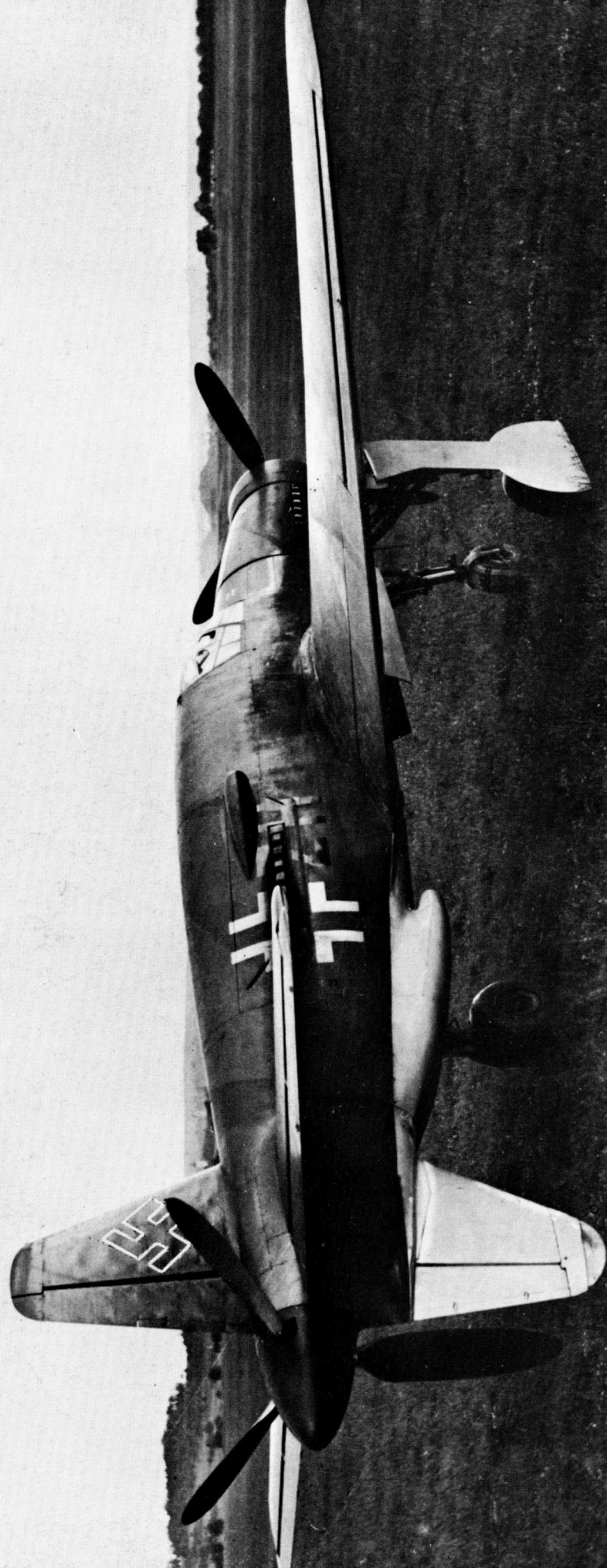
The Göppingen Gö 9 successfully proved that this unique pusher-propeller design could be flown safely and without difficulty.

The first flight trials with the tail-propeller installation were carried on with the Göppingen Gö 9.





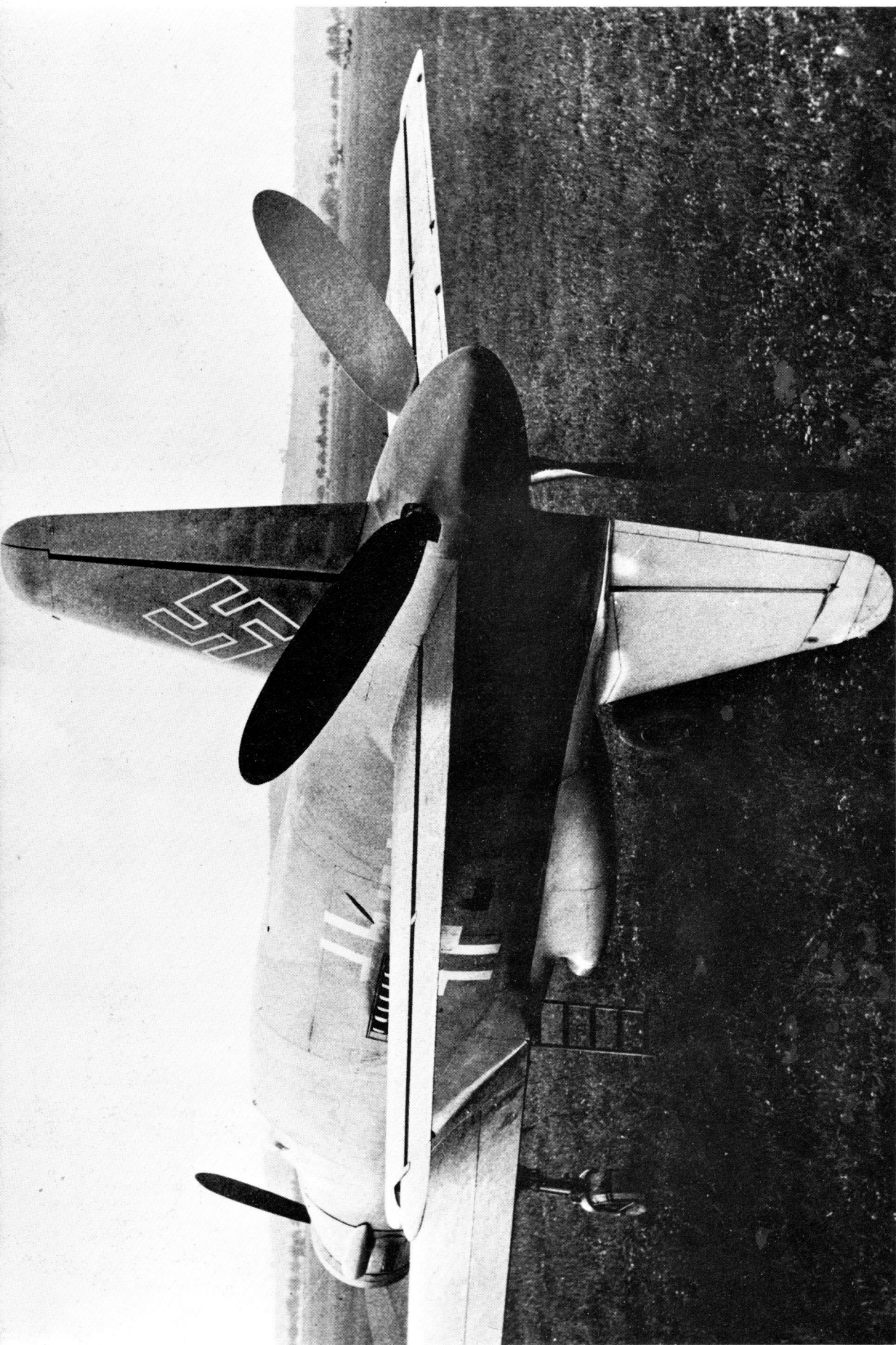
Dornier DO 335 V-3 (CP + ZH) This rare view clearly shows the changed nose design from the original Do 335 V-1. The oil cooler was included in the front ring cowl. A large airplane by any standard, the Do 335 weighs more than 18,000 lbs. with standard armament.



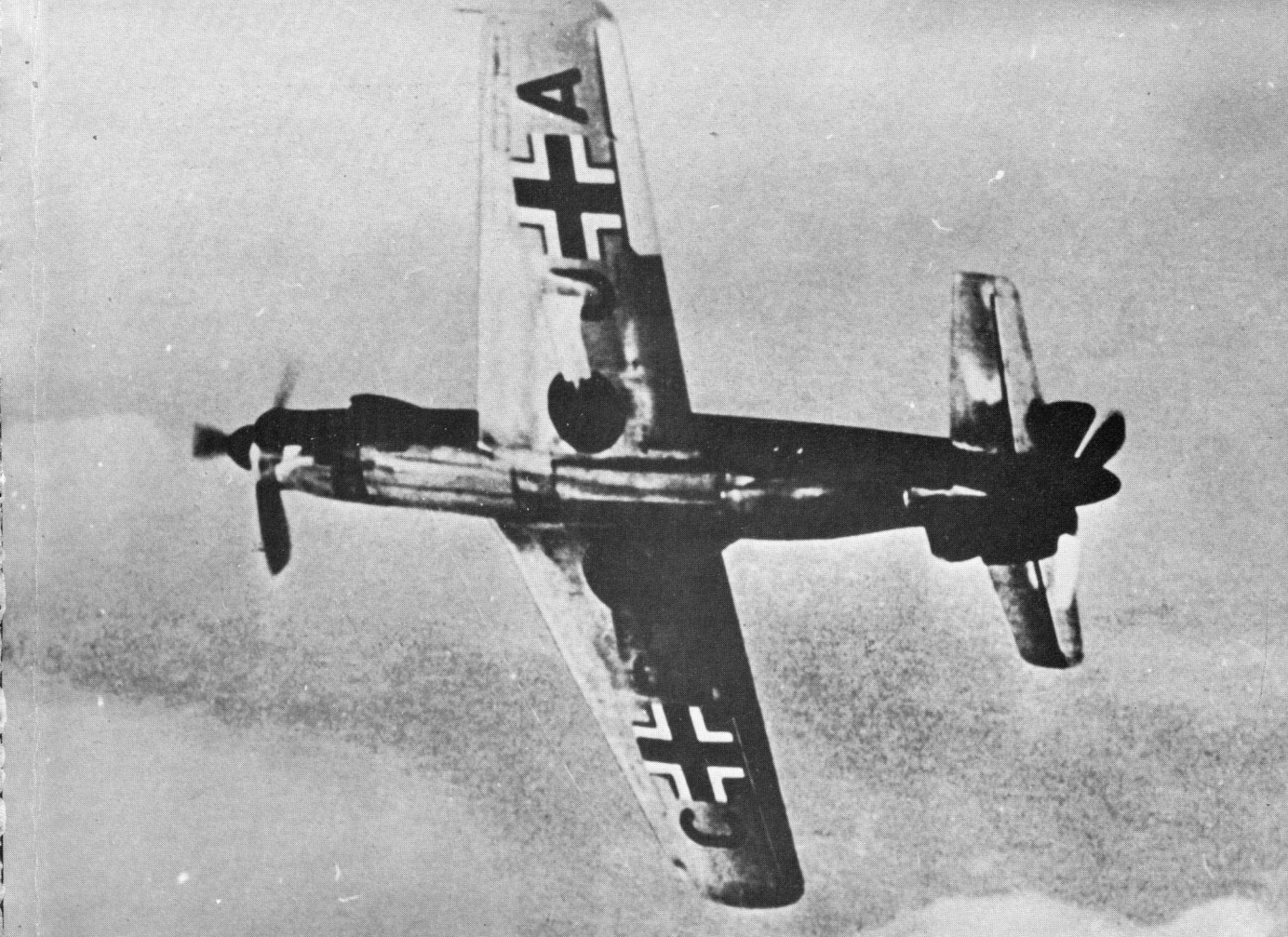
Dornier Do 335 V-3 at the factory. This prototype did not carry full radio equipment or armament. The Do 335 design qualified as an all purpose aircraft—day fighter, night fighter, recon aircraft and fighter bomber.



Full front view of Dornier Do 335 V-3 gives an impression that this design is a single engine fighter. Note the wide tract tri-cycle landing gear. Its amazing performance surprised many Luftwaffe pilots in spite of the oddity of its design.

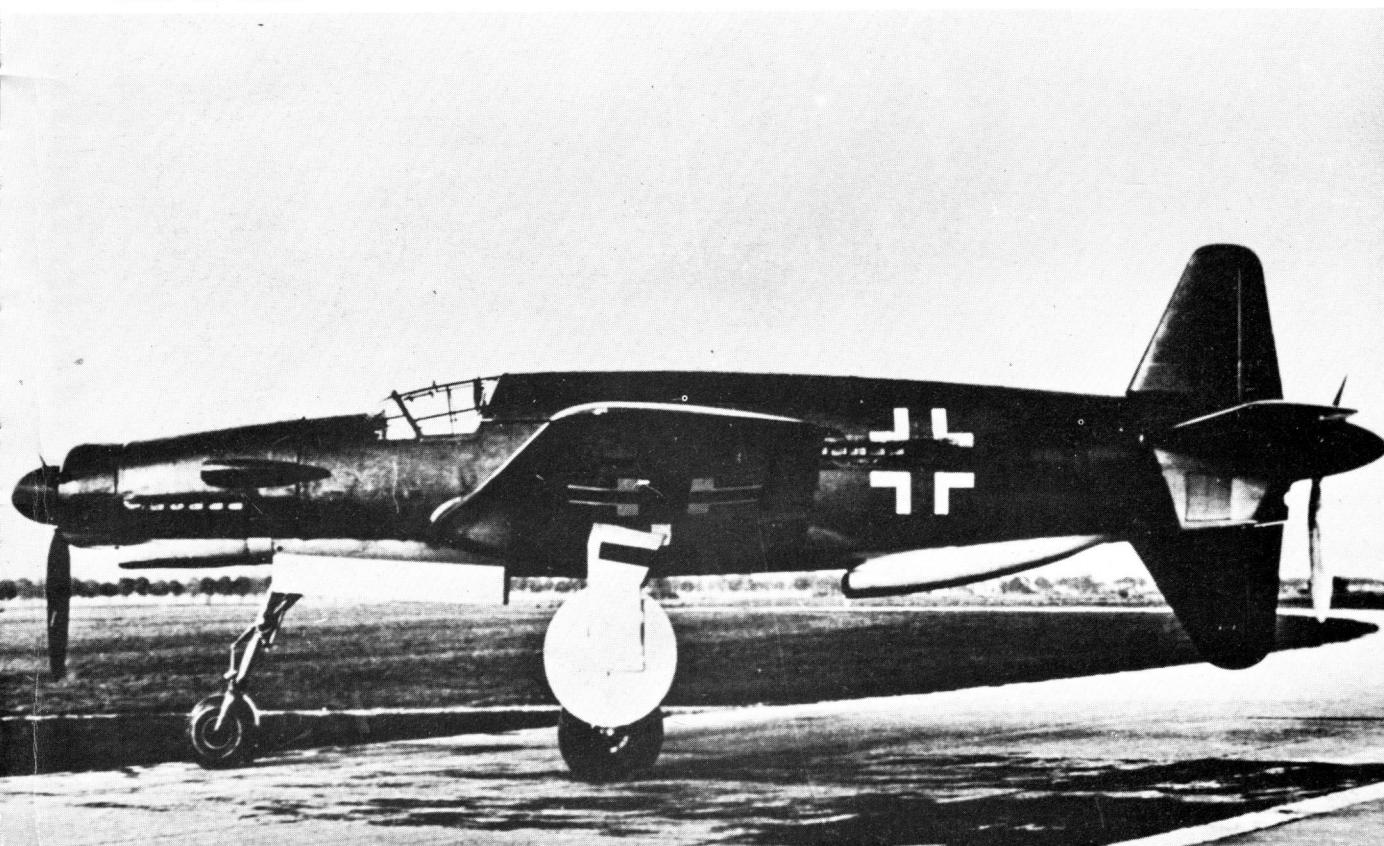


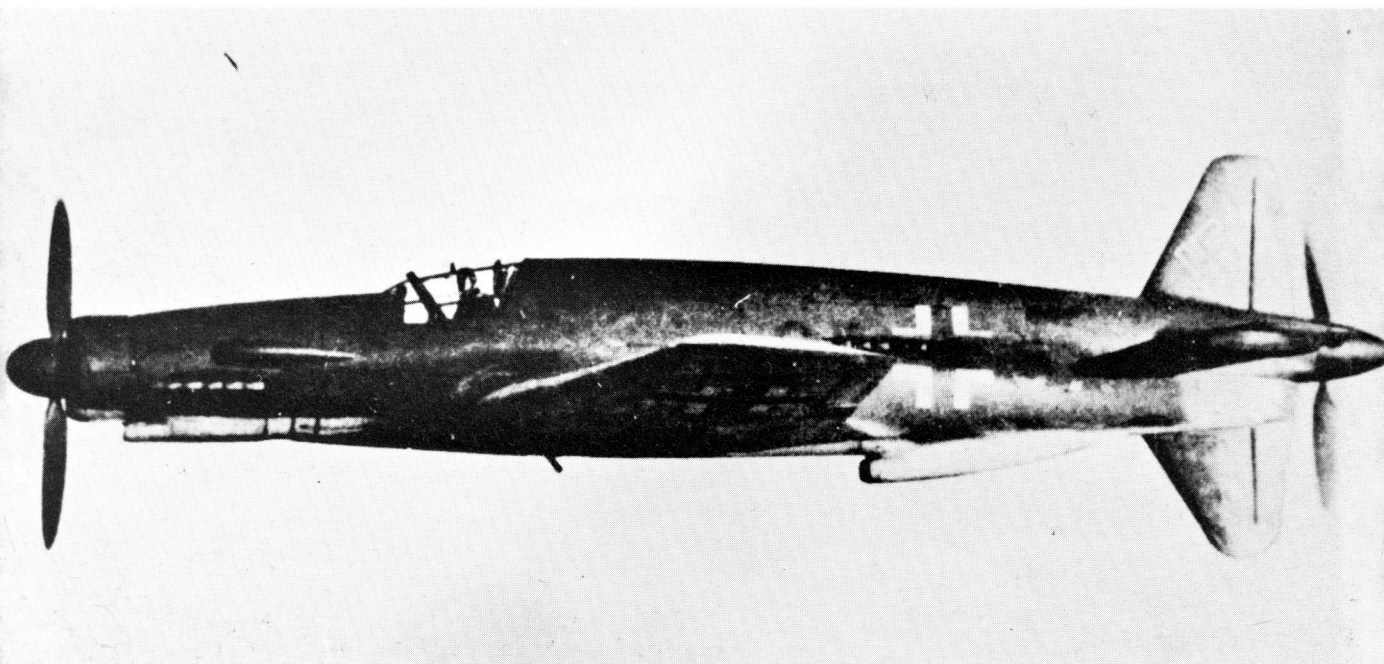
Unusual view of Dornier Do 335 clearly shows the marked recognition feature of the cruciform tail. Rear engine was amidship in the fuselage driving a pusher propeller via an extension shaft.



Dornier Do 335 V-1 (CP + UA), prototype of the series, made its first flight in the autumn of 1943. This flight view shows the V-1's distinguishing oil cooler under the nose.

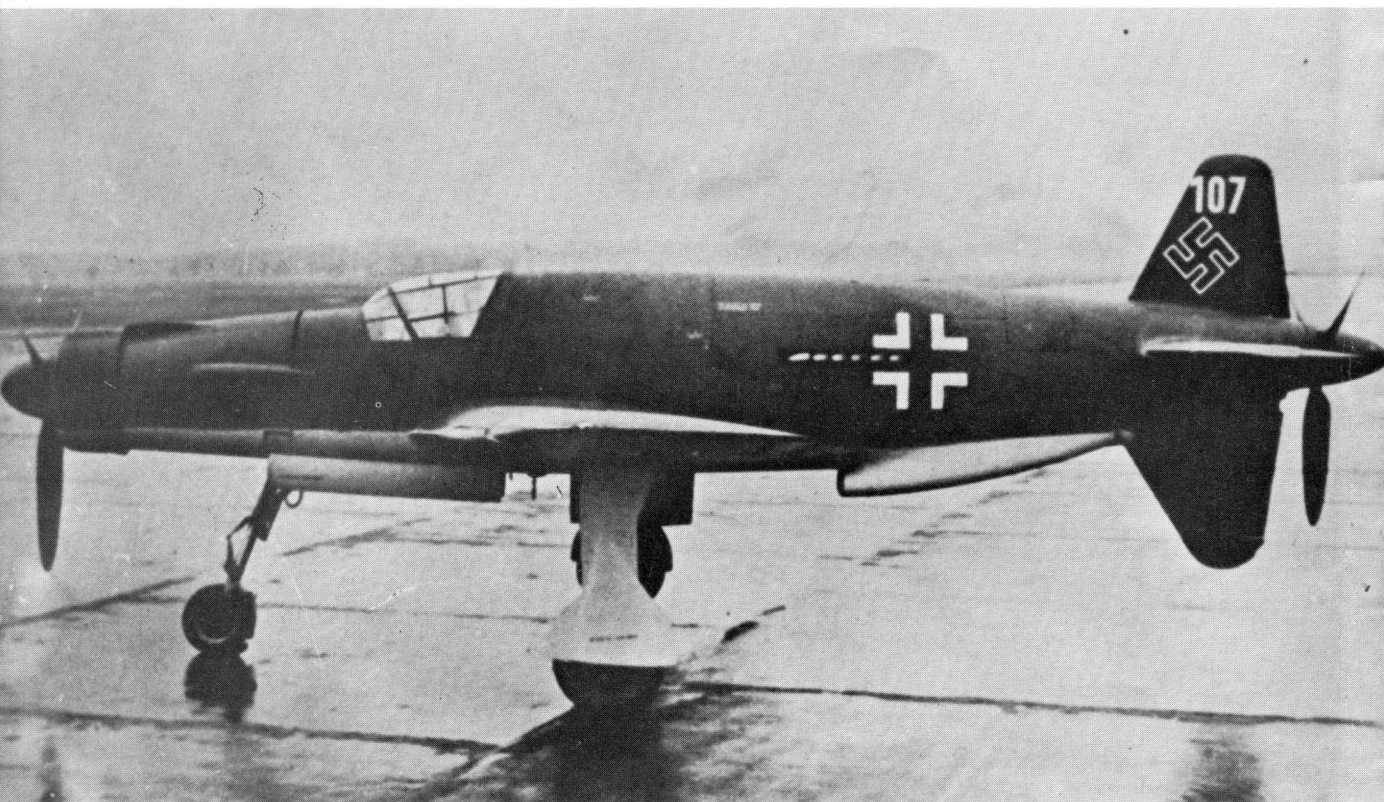
Nine months after receiving the initial order from the German Air Ministry, the Do 335 V-1 was ready for its first maiden flight. Note large circular landing gear doors and oil cooler under the nose.

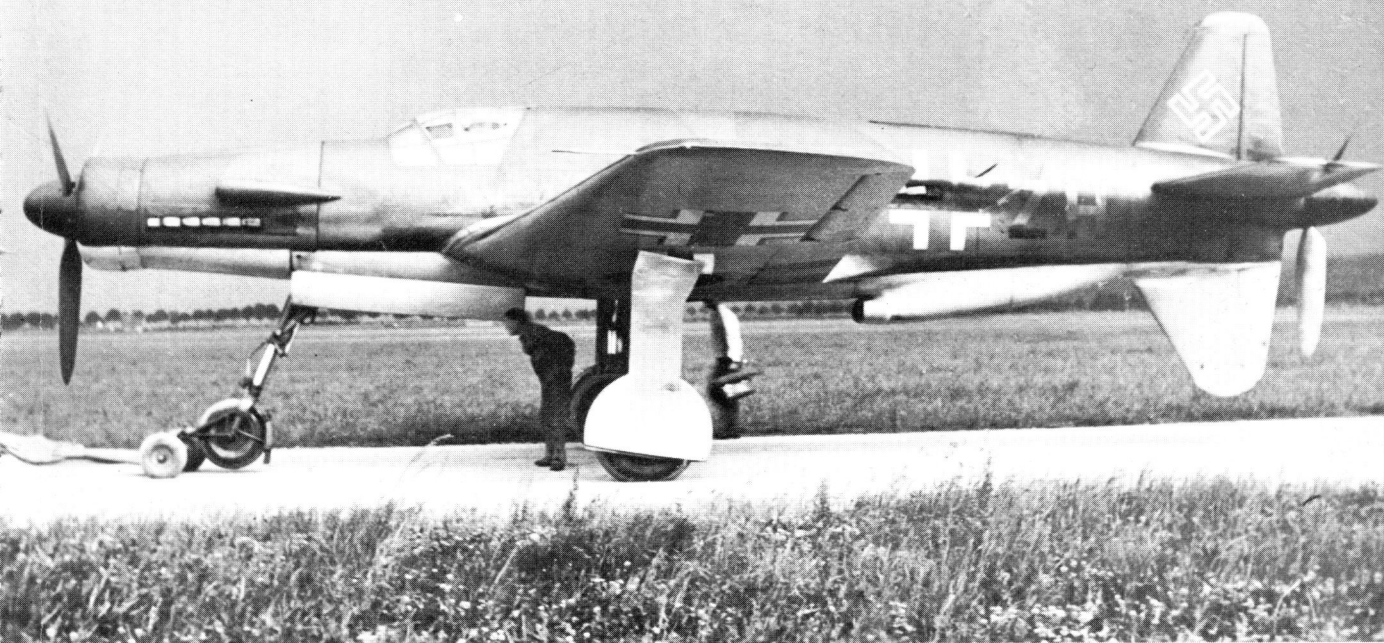




Outline shape of the Do 335 V-1 was almost identical with the final DO 335 A-1 design except for the oil cooler installation. Operating on one engine, it could move along at 350 m.p.h. and with both engines turning it could do 425 m.p.h. One interesting fact is that the greatest single engine speed was attained with the pusher engine turning and the front propeller feathered.

Dornier DO 335 A-1 Werk Number 107 at the factory at Oberpfaffenhofen Germany. This production model was later taken over by American troops and it was closely examined by Allied intelligence.





DO 335 V-3, having just completed a successful test flight at the factory, is being prepared to be towed to the hangar for maintenance. Note special tow-bar dolly by nose wheel. The DO 335 V-3 was unarmed as were the V-1 and V-2 prototypes.

Dornier Do 335 V-2 on the factory airfield. This model was later destroyed when the rear engine caught fire during initial flight test trials at the factory.



Energieversorgung (Ha):

Ha 1 Druckvorratsbehälter

Ha 2 Filter

Ha 3 Außenbordschluß (Saugseite)

Ha 8 Drucksäule 18 l/min

Ha 9 Drucksäule 12 l/min

Ha 10 Rückschlagentlüftungsventil zu Ha 8

Ha 15 Rückschlagentlüftungsventil zu Ha 9

Ha 16 Außenbordschluß (Druckseite)

Ha 17 Drossel am Druckmesser

Ha 18 Druckmesser 0-160 atü

Ha 19 Überdruckventil 100 atü

Ha 20 Überdruckventil 30 atü

Fahrwerkbetätigung (Hb):

Hb 1 Magnetschalter

Hb 2 Steuersylinder der Fahrwerks-

Hb 3 Steuersylinder (verriegelt)

Hb 4 Steuersylinder (eingefahren)

Hb 5 34-Arbeitszylinder 80 #

Hb 6 70-Arbeitszylinder 50 #

Hb 7 F-Arbeitszylinder 70 #

Hb 8 54-Arbeitszylinder 80 #

Hb 9 50-Arbeitszylinder 50 #

Hb 10 Durchlauf-Wechselventil

Hb 20 Steuersylinder der Bugfahrge-
verriegelung (ausgefahren)

Landeklappenbetätigung (Hc):

Hc 1 Magnetschalter

Hc 2 Rückdrasselventil

Hc 3 Mengenvervielfacher mit

Abschaltregler (Ausfahrseite)

Hc 4 Doppelschloß

Hc 5 Doppelschloß

Hc 6 SE-Arbeitszylinder 60 #

Hc 7 SE-Arbeitszylinder 60 #

Hc 8 Wagenvervielfacher mit

Abschaltregler (Einfahrseite)

Hc 9 Rückdrasselventil

Steuerungsumschaltung (Hd):

Hd 10 Magnetschalter

Hd 11 35-Arbeitszylinder 32 #

Preßluft-Notbetätigung (Hn):

Hn 1 Preßluftflasche

Hn 2 Preßluftflasche

Hn 3 Preßluftflasche

Hn 4 Druckmesser 0-160 atü

Hn 5 Rückschlagventil

Hn 6 Außenbordschluß

Hn 7 Preßluftschalter, Bombenklappen

Hn 8 Preßluftschalter, Steuerungsumschaltung

Hn 9 Preßluftschalter, Landeklappen

Hn 10 Druckminderer (auf 50 atü)

Hn 11 Preßluftschalter, Fahrwerk

Hn 12 F-Arbeitszylinder 25 # zur

mechanischen Fahrwerkentriegelung

Hn 13 Wechselventil (Fahrwerkbetätigung)

Hn 14 Wechselventil (Fahrwerkbetätigung)

Hn 16 Wechselventil (Landeklappenbetätigung)

Hn 17 Wechselventil (Steuerungsumschaltung)

Hn 18 Wechselventil (Bombenklappenbetätigung)

Hn 19 Preßluftflasche

Kühlerklappenbetätigung (Hd):

Hd 1 Temperaturregler Gr-80

Hd 2 Temperaturregler Gr-80

Hd 3 Temperaturregler Gr-80

Hd 4 Temperaturregler Gr-80

Hd 5 Temperaturregler Gr-80

Hd 6 Temperaturregler Gr-80

Hd 7 Temperaturregler Gr-80

Hd 8 Temperaturregler Gr-80

Hd 9 Temperaturregler Gr-80

Hd 10 Temperaturregler Gr-80

Hd 11 Temperaturregler Gr-80

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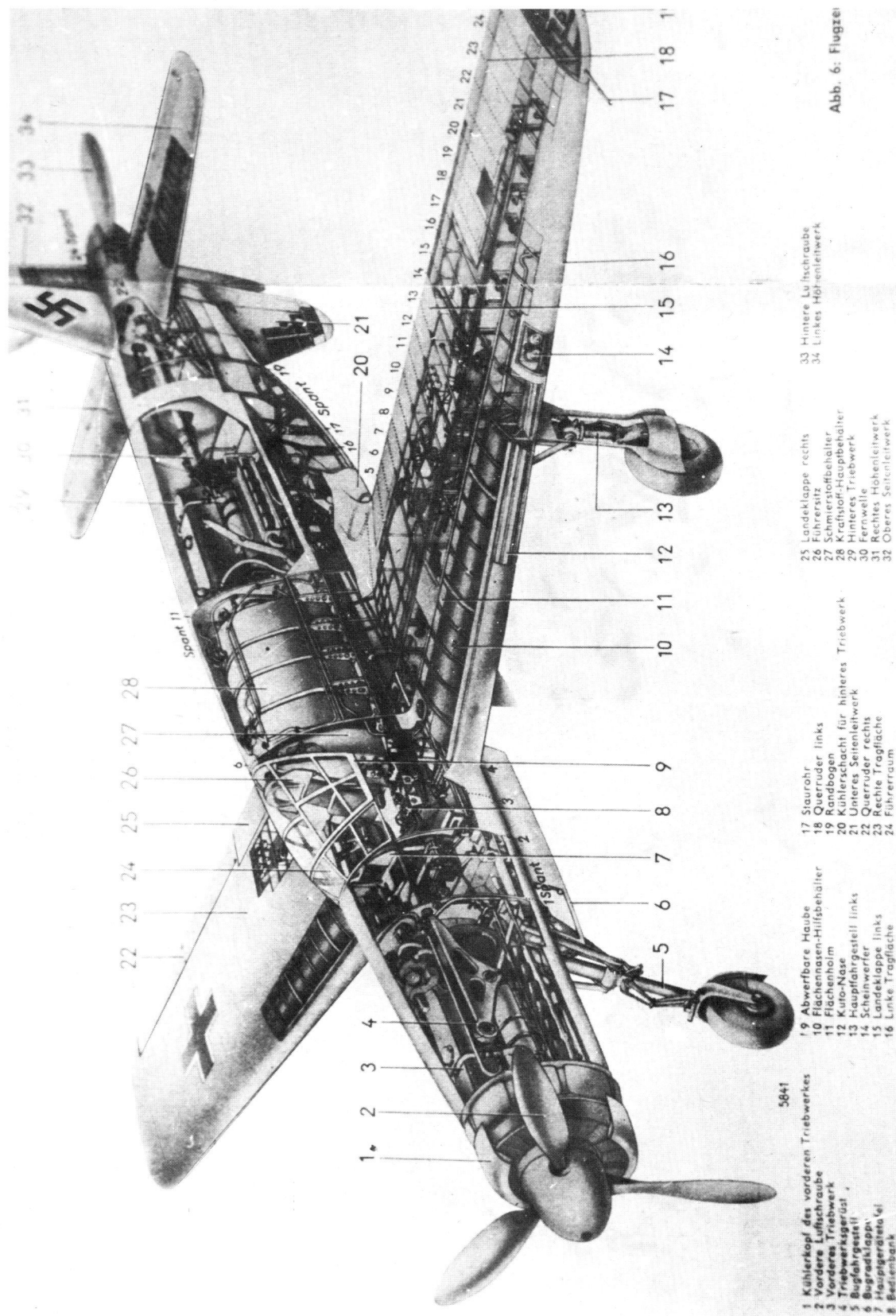
Hd 16 Temperaturregler Gr-80

Hd 17 Temperaturregler Gr-80

Hd 18 Temperaturregler Gr-80

Hd 19 Temperaturregler Gr-80

Hd 20 Temperaturregler Gr-80



5841

- 1 Kühlerkopf des vorderen Triebwerkes
- 2 Vordere Luftschraube
- 3 Vorderes Triebwerk
- 4 Triebwerksgestell
- 5 Bugfahrgerüst
- 6 Bugradklappe
- 7 Hauptgerüst links
- 8 Bedienbank

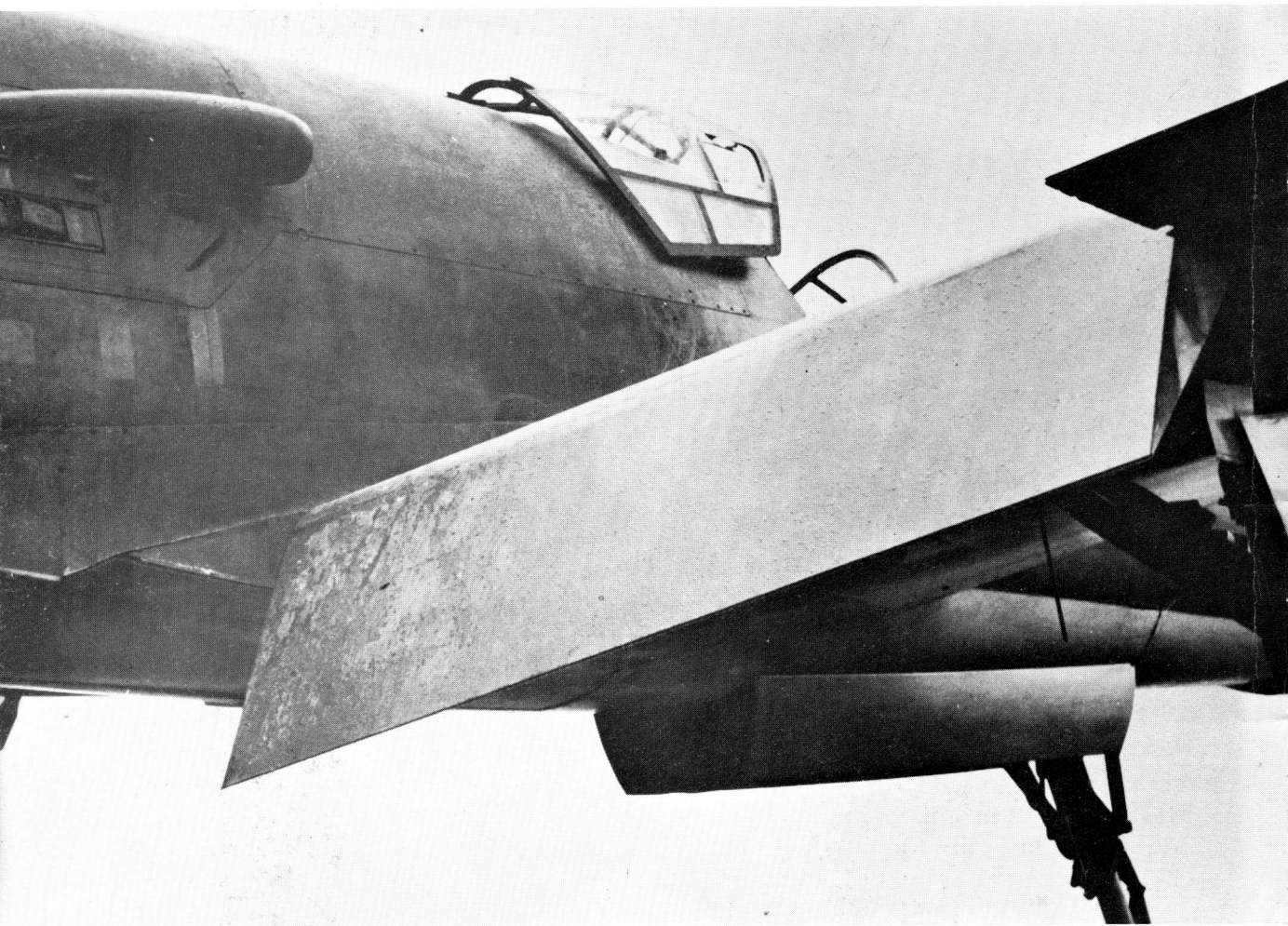
- 19 Abwerfbare Haube
- 10 Flächennasen-Hilfsbehälter
- 11 Kabinenholz
- 12 Kabinenholz
- 13 Hauptfahrgerüst links
- 14 Scheinwerfer
- 15 Landeklappen links
- 16 Linke Tragfläche

- 17 Stützrohr
- 18 Querruder links
- 19 Rumpfbogen
- 20 Kabinenschacht für hinteres Triebwerk
- 21 Unteres Seitenleitwerk
- 22 Querruder rechts
- 23 Rechte Tragfläche
- 24 Führerraum

- 25 Landeklappen rechts
- 26 Führersitz
- 27 Kraftstoffbehälter
- 28 Kraftstoffbehälter
- 29 Hinteres Triebwerk
- 30 Fernwelle
- 31 Rechtes Höhenleitwerk
- 32 Oberes Seitenleitwerk

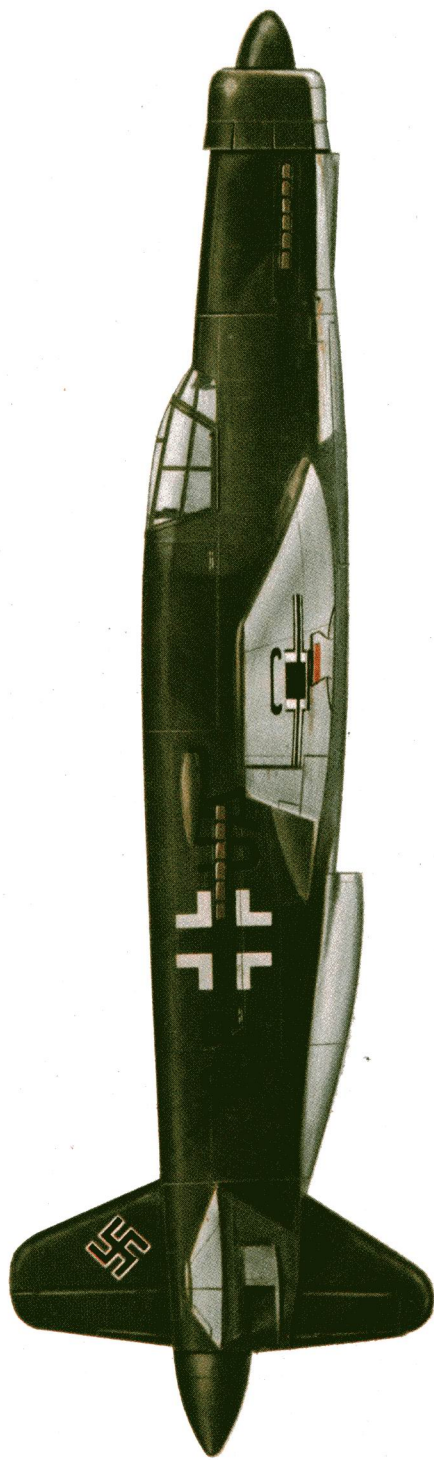
Abb. 6. Flugzei

Cutaway drawing of a typical Dornier Do 335 showing the front and rear engine installations, fuel cells, cockpit layout, and interior details.

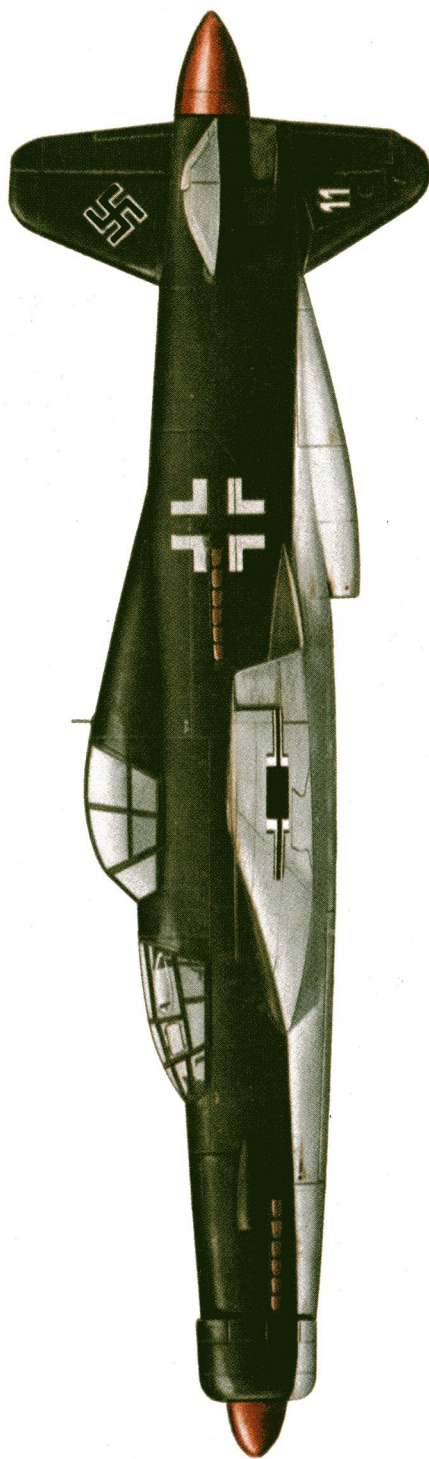


Do 335 A-1 close-up view showing removed cockpit canopy atop fuselage and hydraulic wing flap in lower position. Engine air scoop is mounted amidship of fuselage.

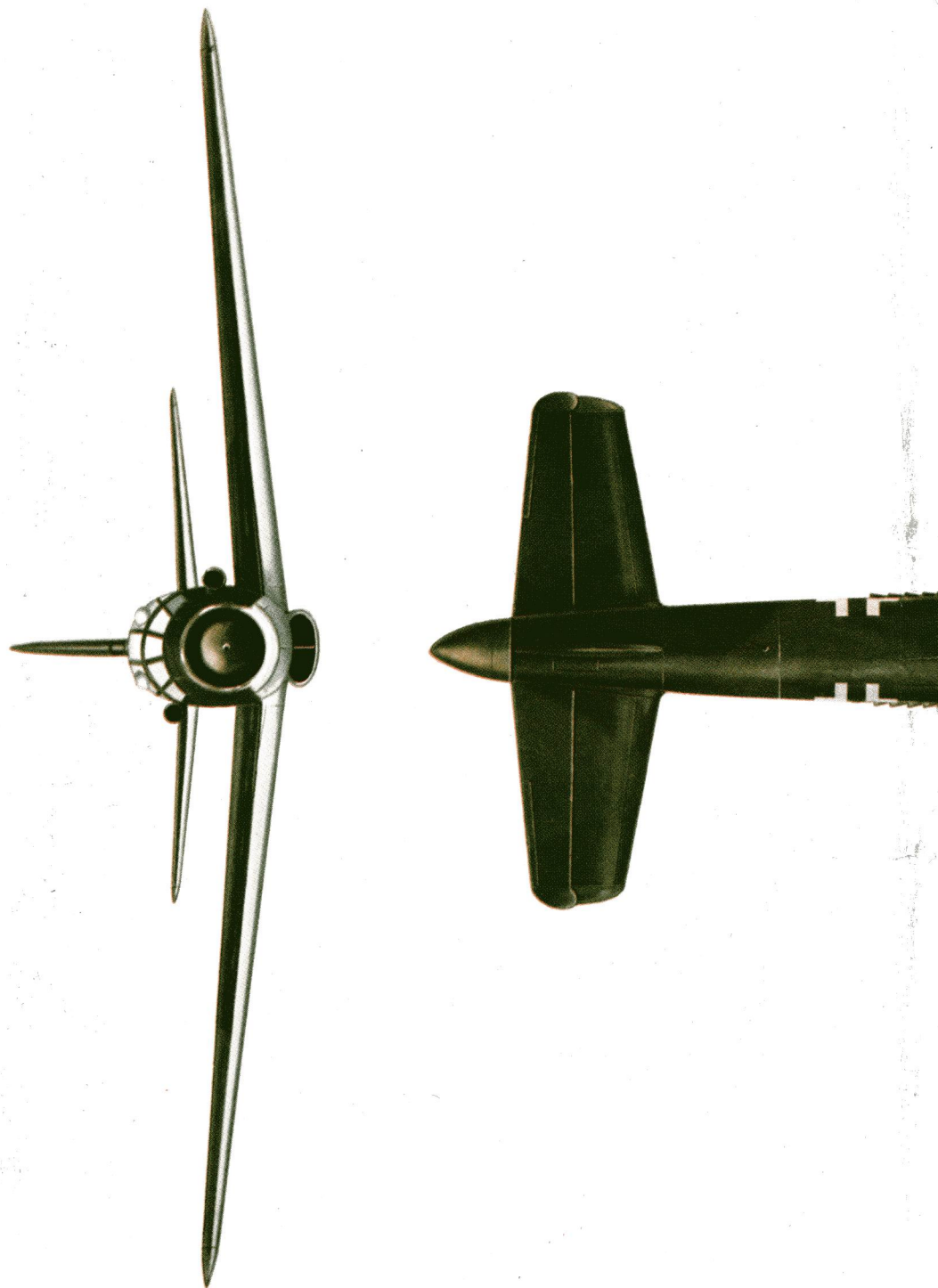
DORNIER DO 335 V1 "PFEIL"

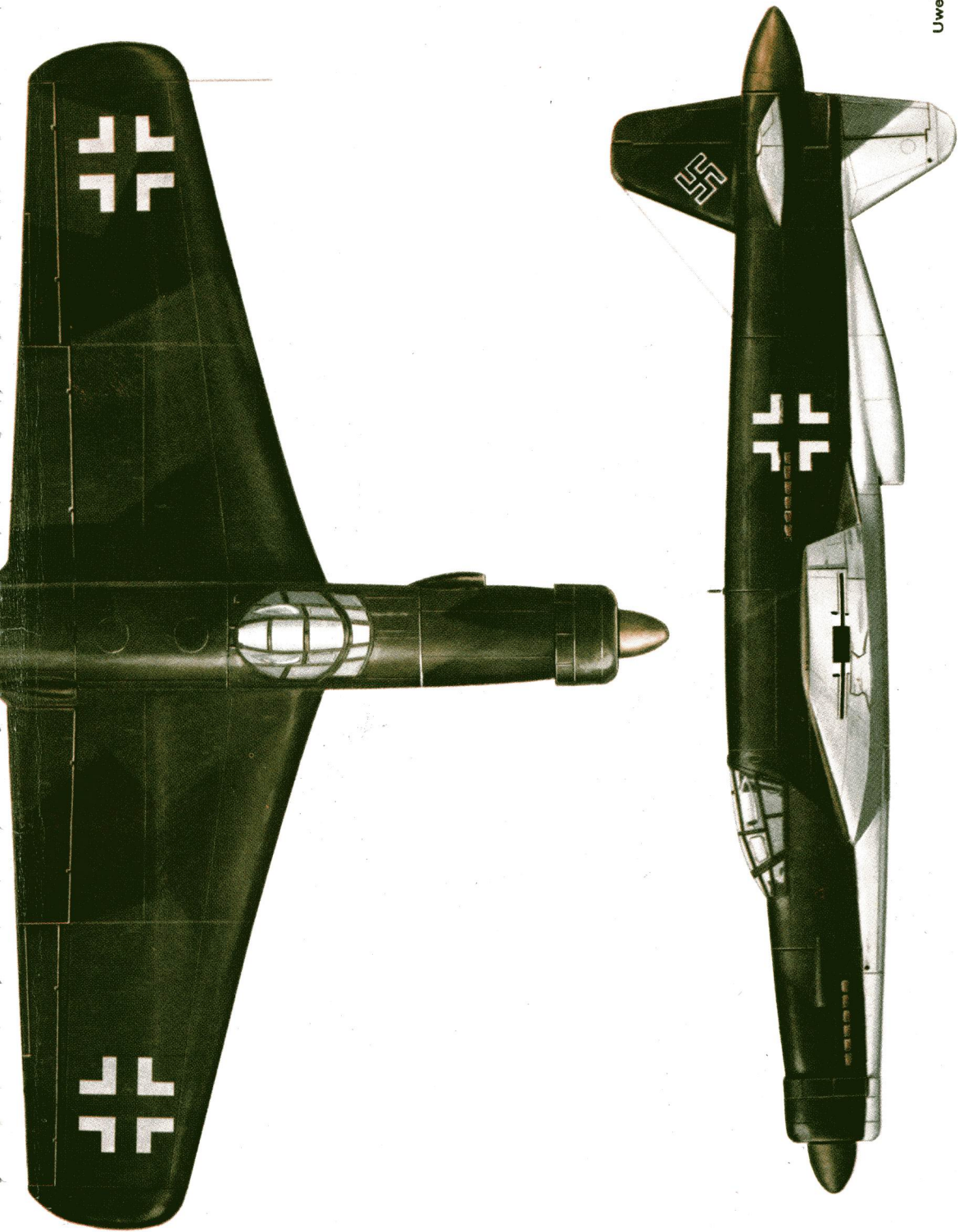


DORNIER DO 335 V10



DORNIER DO 335 A-O

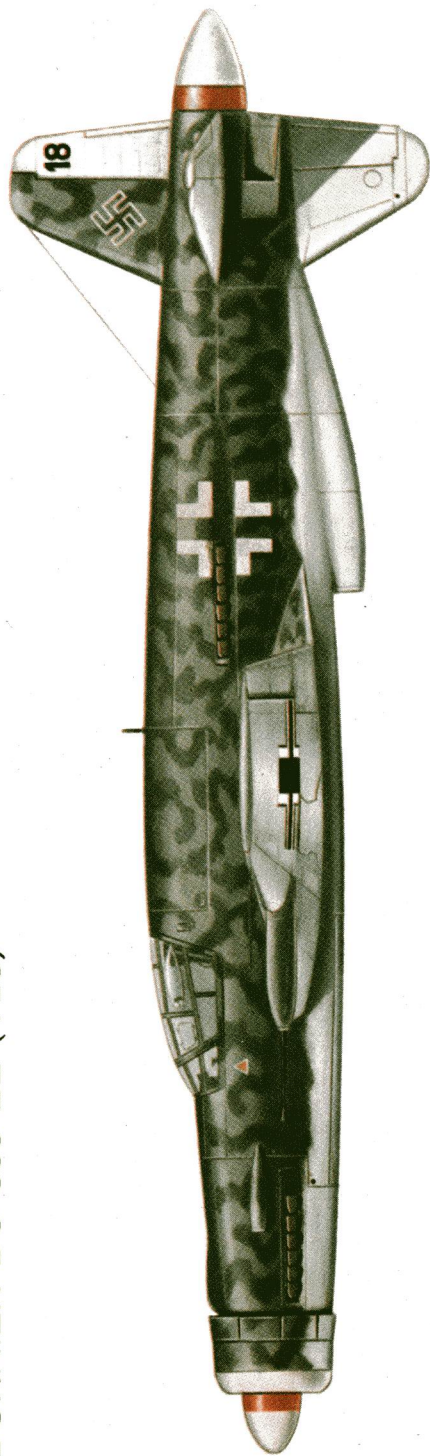




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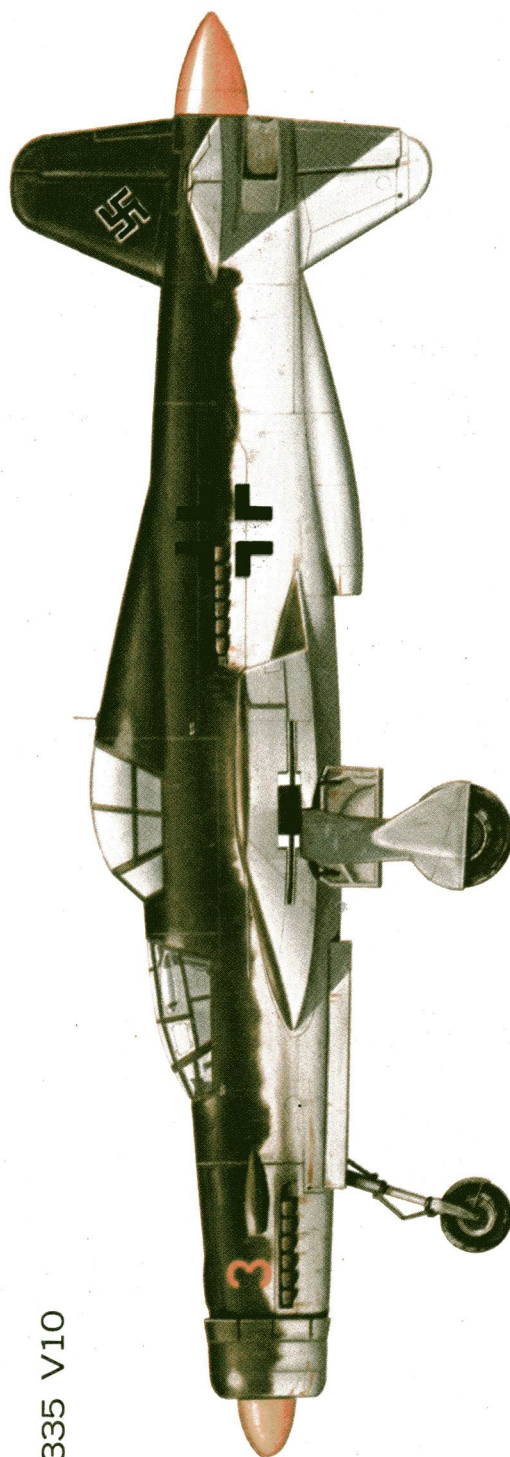
Uwe Feist

DORNIER DO 335 B2 (V13)



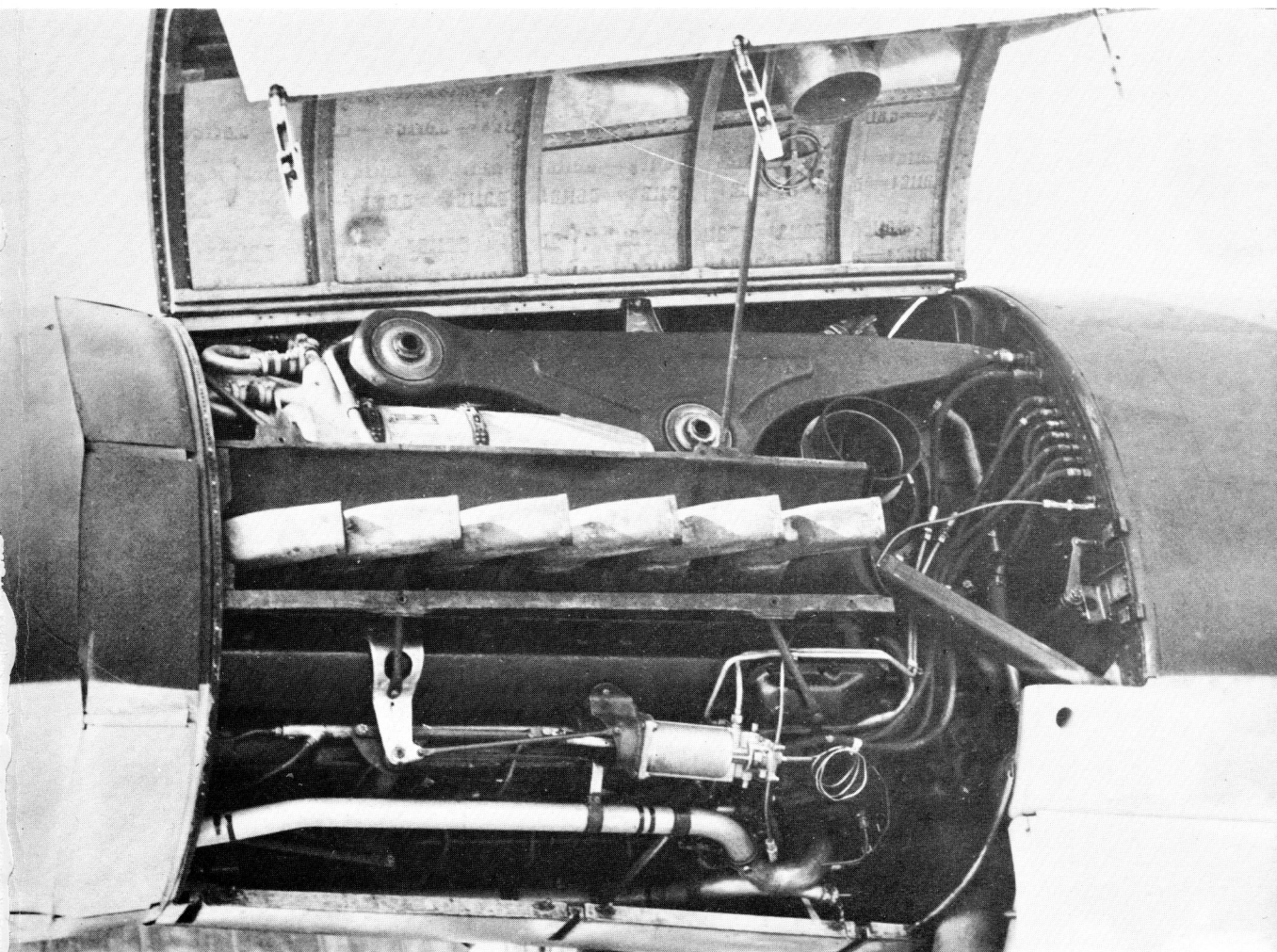
The Dornier Do 335 V-13 served as the prototype for the Do 335 B-1 series intended specifically for the heavy day-fighter role.

DORNIER DO 335 V10

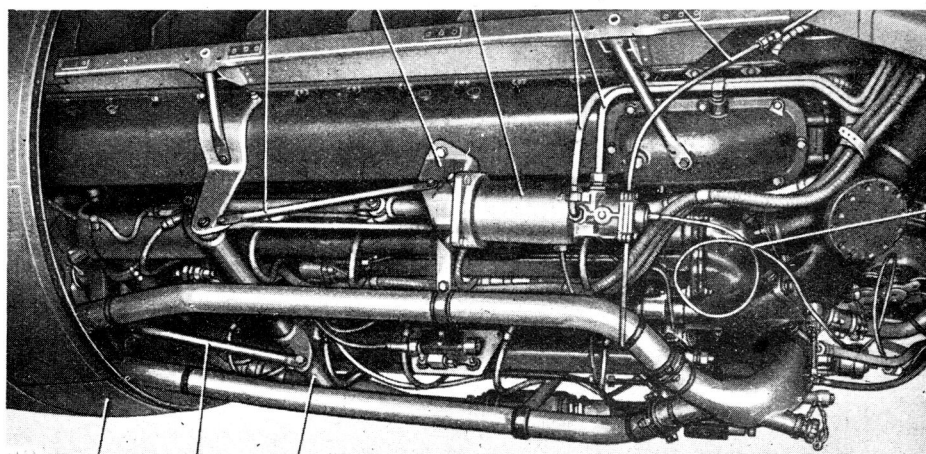


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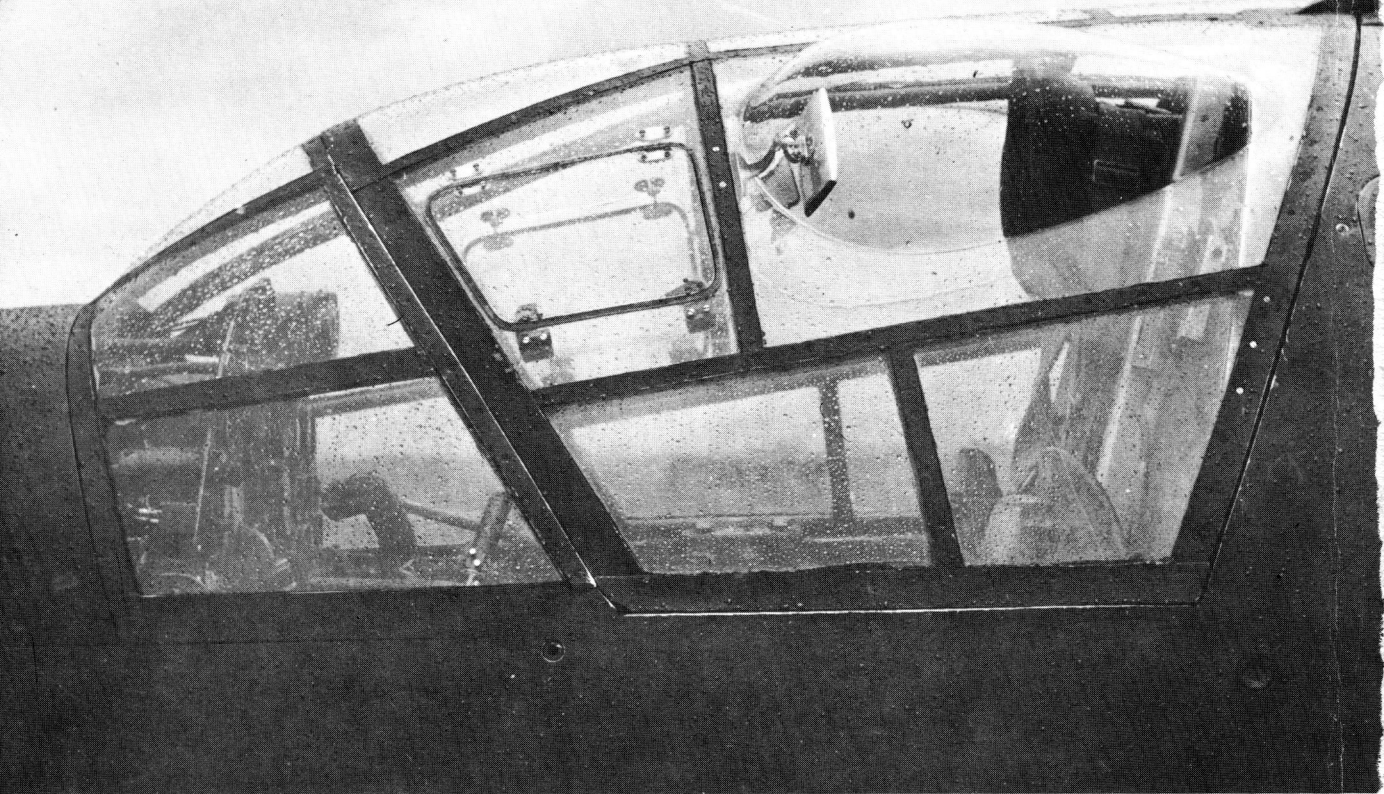
Uwe Feist



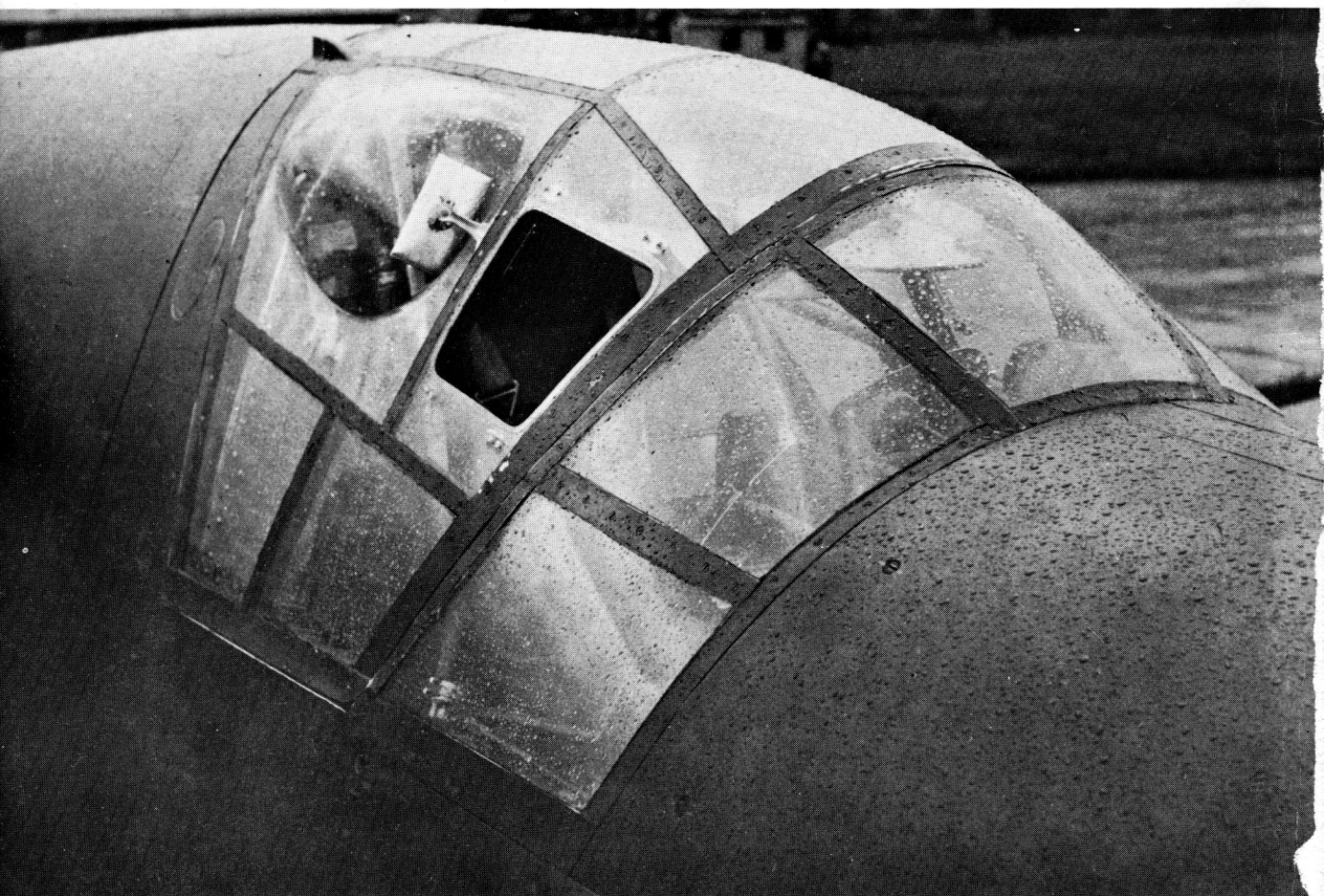
Rare interior view of Do 335A Daimler Benz 603 G engine of 1900 h.p. Note how front cowling hinges at top and is held in place by only three quick release latches. Engine mount was of simple, light weight design.



Interior view of Daimler Benz DB 603 G engine with lower cowling removed. Center actuator operated cowl flaps at rear of engine.

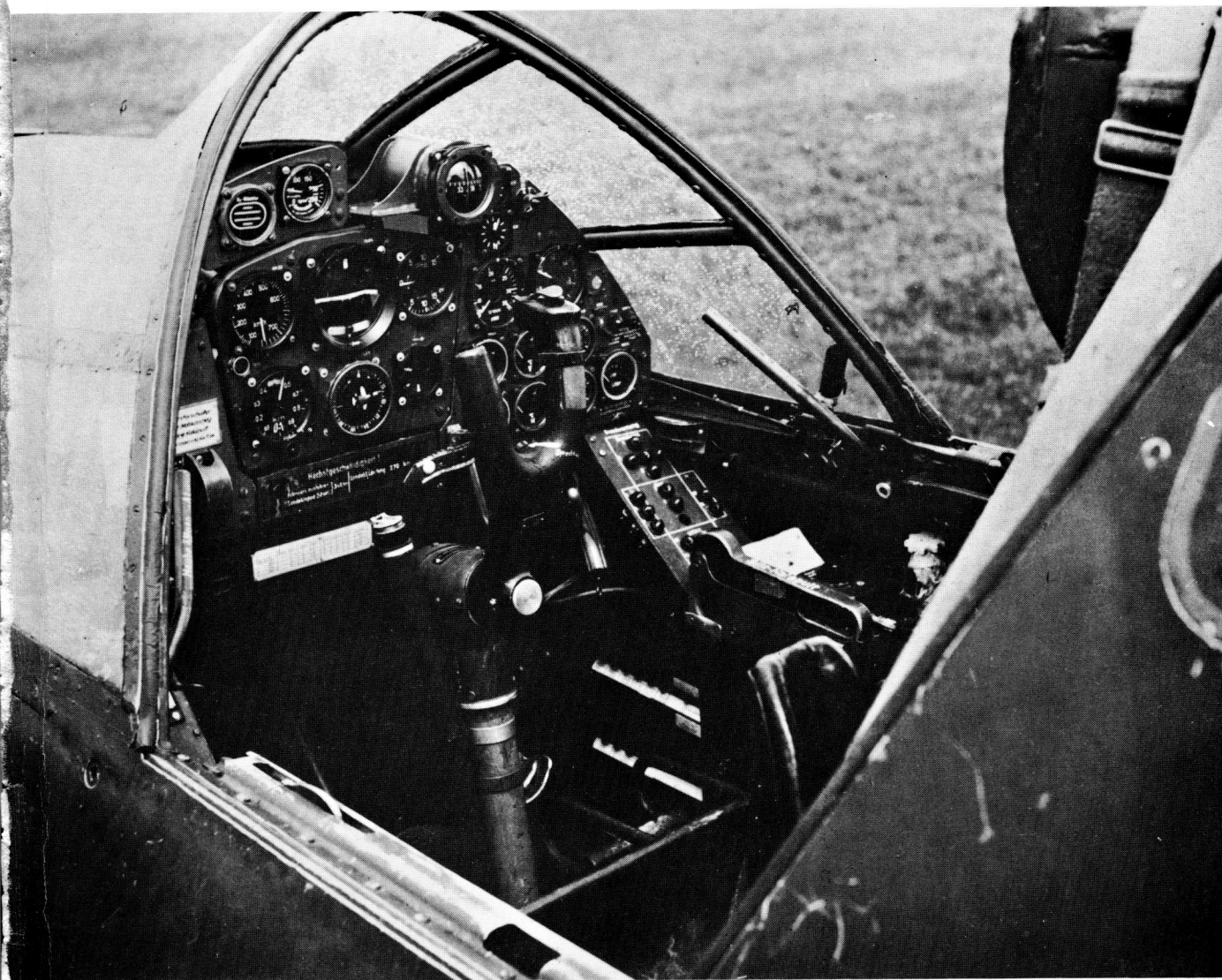


Do 335 A-1 pilots cockpit and canopy close up. The pilot had very poor rear visibility and therefore special blisters were made in the canopy glass to house rear view mirrors.



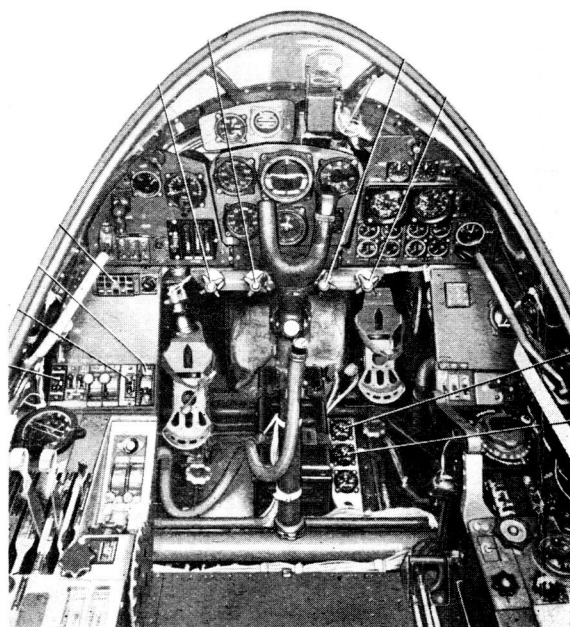
Do 335 A front cockpit canopy hinged up and back. Front windshield was made up of fixed segmental glass panels.

COCKPIT INTERIOR OF THE DO 335 A-1

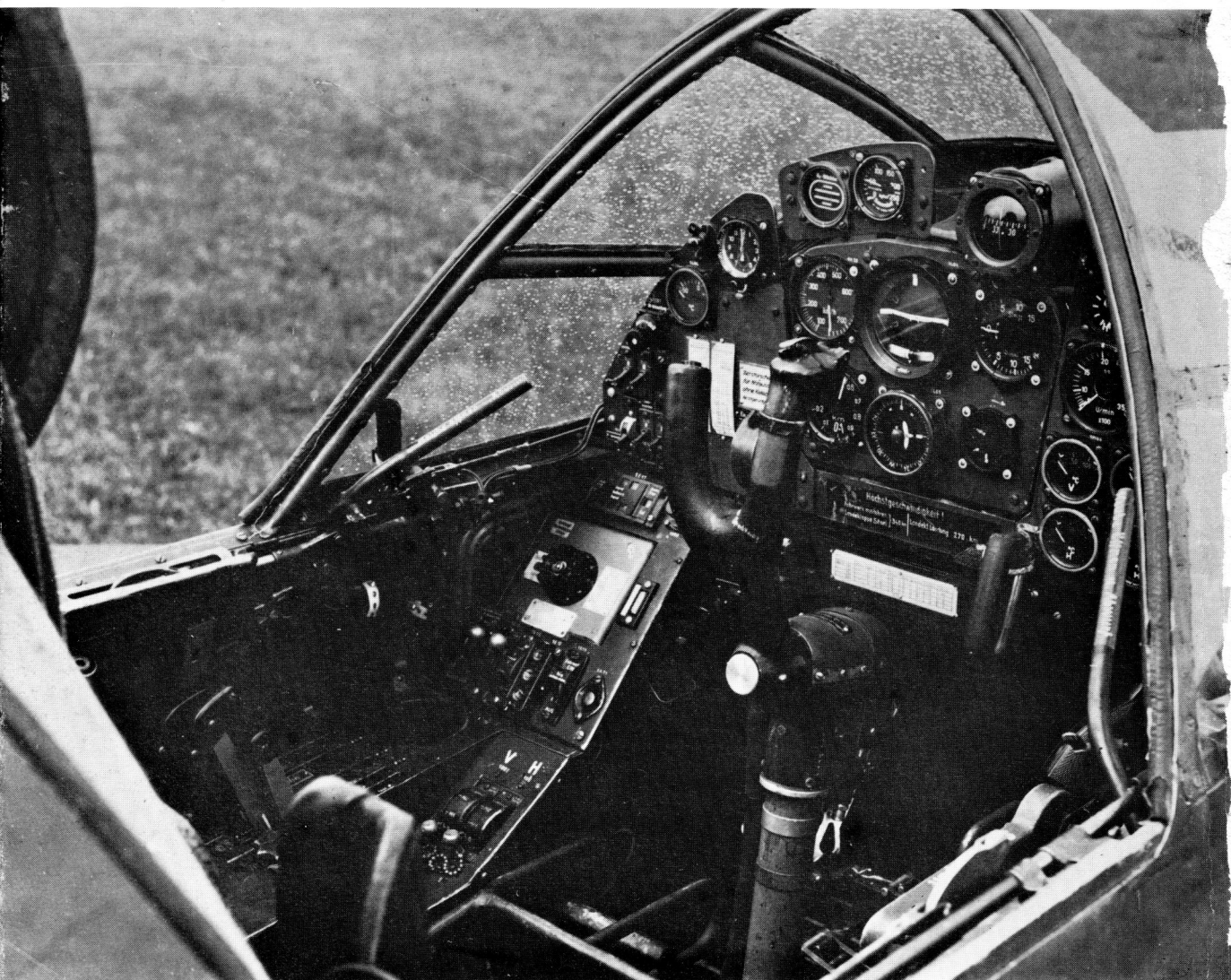


Detail closeup of Do 335 A-1 instrument panel as viewed from left wing. Flight instruments are grouped in the center and pilot compass at top. Pilot stick was U-shaped with cannon and machine gun triggers on left handle. No gun sight was fitted, so it is doubtful that this model carried armament.

Full interior view of Do 335 cockpit, engine throttles are on left console. Compass has been shifted to left to make room for Revi gunsight, top center.



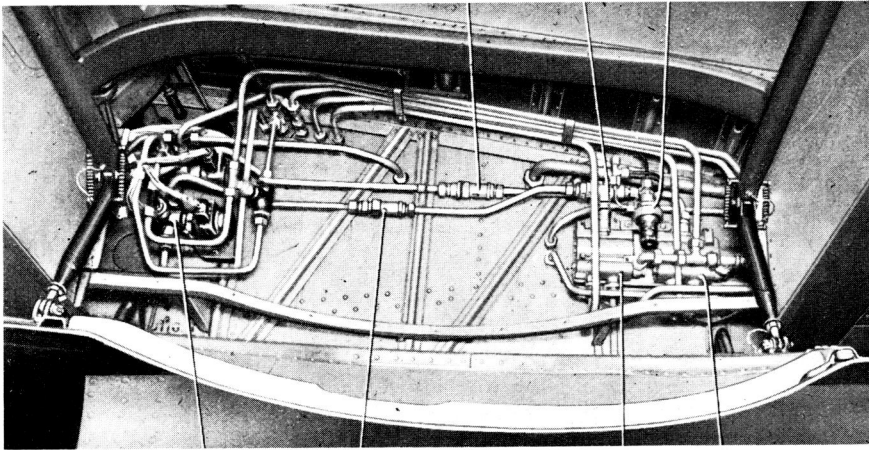
Interior view of cockpit instrument panel showing left console, pilot control column, and windshield defroster.



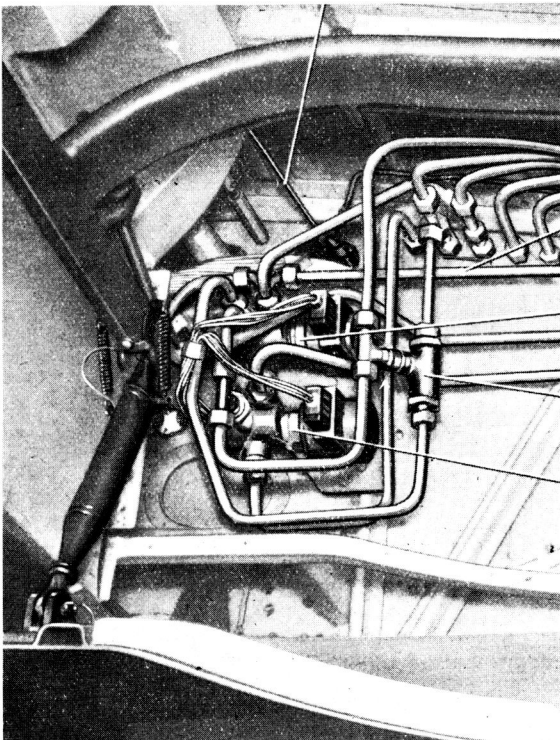


Do 335A close-up of pilot seat and head rest. Electrical circuit breakers are just above right side console. Cockpit was spacious and comfortable.

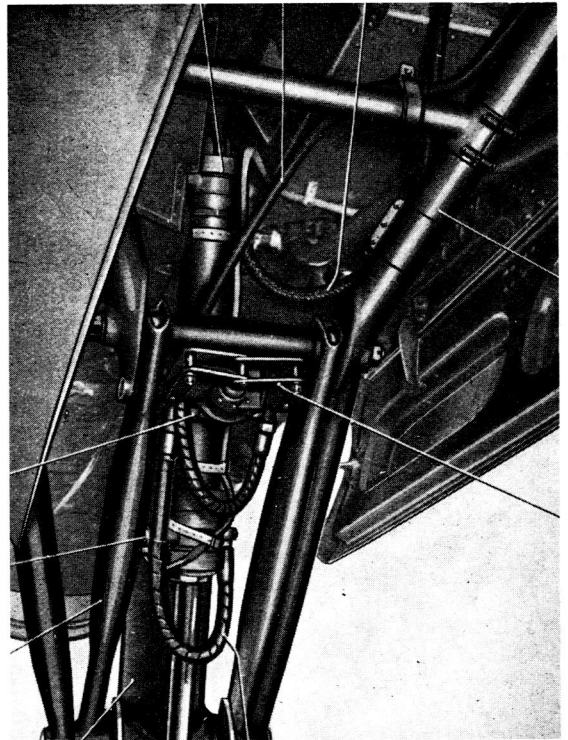
LANDING GEAR OF THE DO 335 A-1



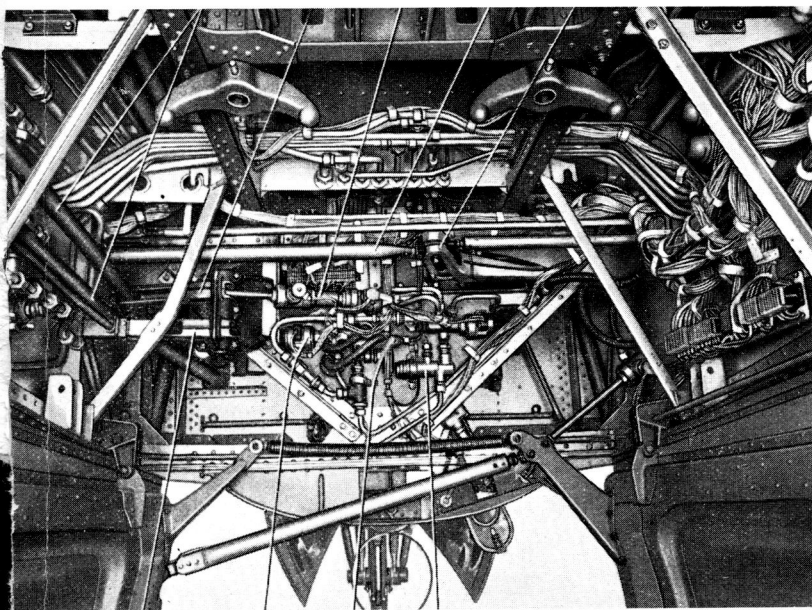
Do 335 main landing gear wheel well showing hydraulic actuators, check valves, and lines.



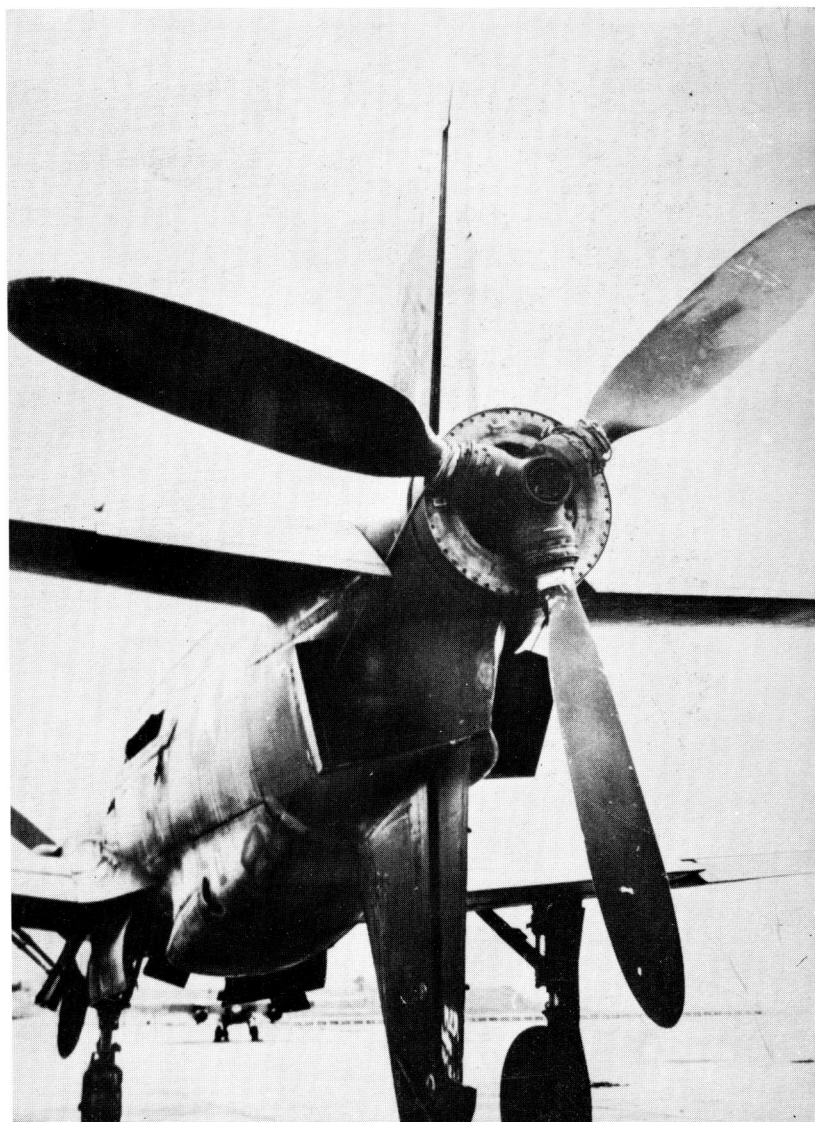
Interior view of Do 335A main landing gear wheel well. Landing gear door and actuators were hydraulically actuated.



Interior view of Do 335 nose landing gear which retracted rearward into wheel well in front lower fuselage.



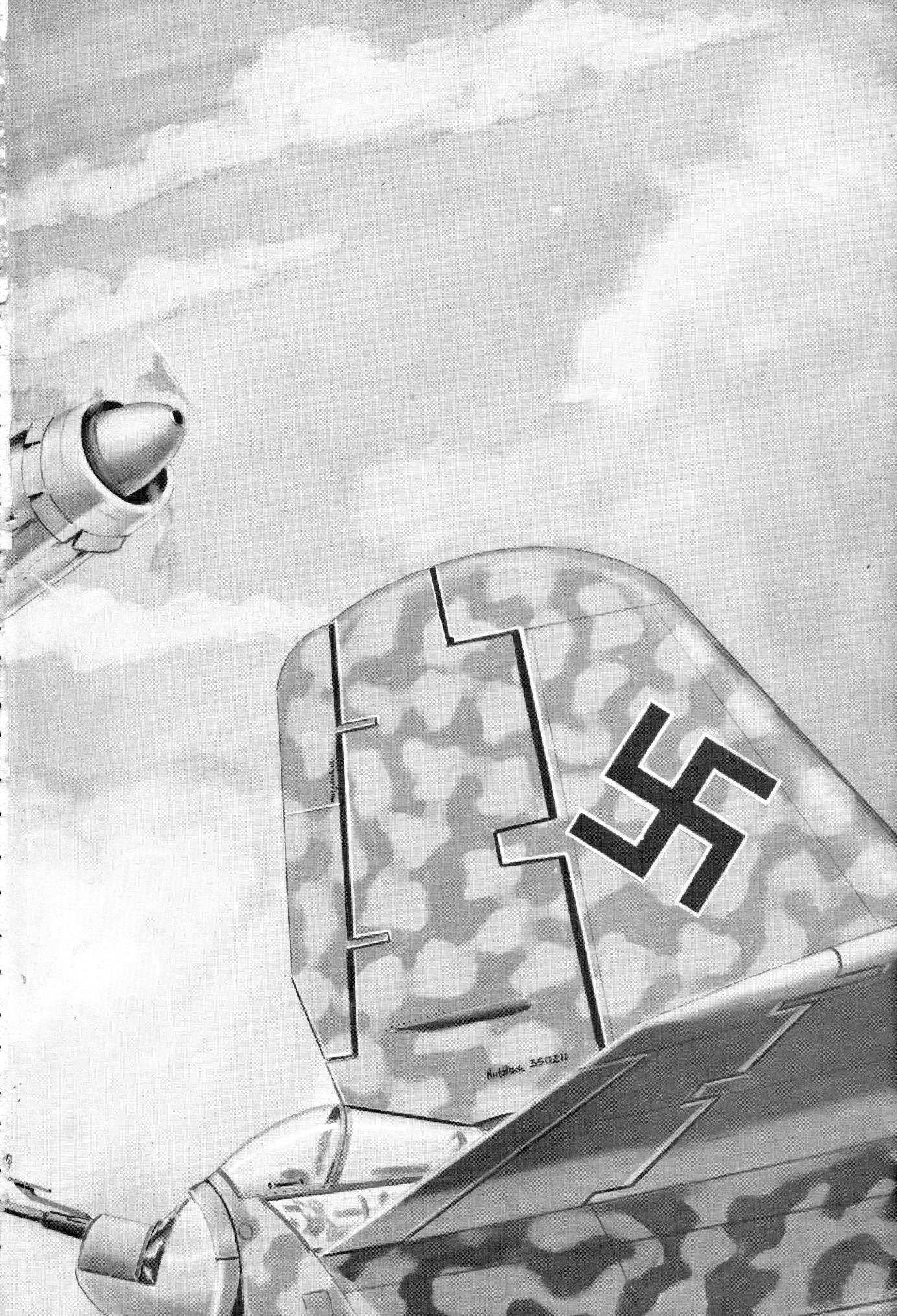
Rare interior view of Do 335A bomb bay. Bomb bay doors opened hydraulically. Hydraulics were located on left and forward bulkheads, the electrical bundles and circuit junctions were located on right side.

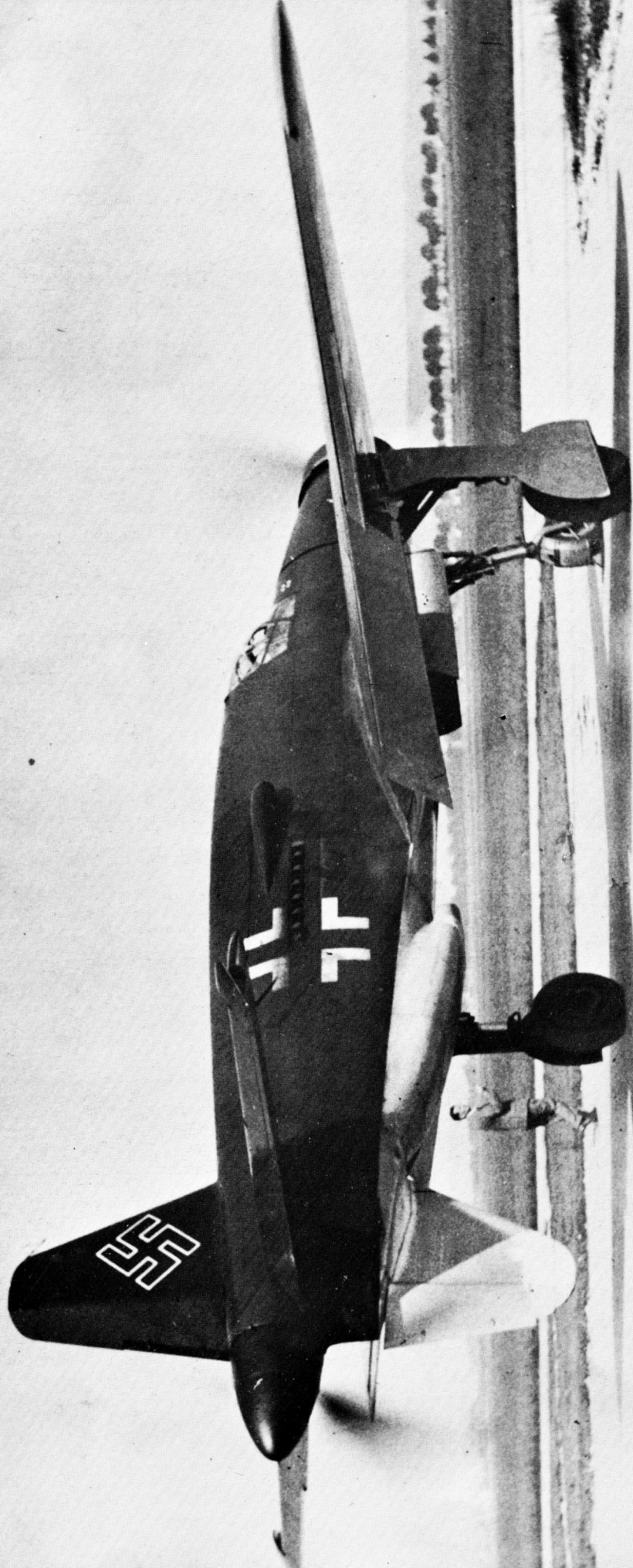


Do 335 with rear spinner removed from VDM propeller. Engine exhaust outlets are in the open position.



The Dornier DO 335 A-1 is simulating an attack on a bomber, in this case a friendly one, the Heinkel HE 177 A-5. This plane will be the subject in a future volume of the Aero Series.







Close-up view of Do 335 V-3 (CP + ZH) shows exact details of the unique cruciform tail. Rear Daimler Benz DB 603 engine drove V.D.M. propeller at rear via 10 foot extension shaft.

Previous page

Do 335 A-1 taxiing out on the ramp for its maiden flight. When Allied fighter pilots first viewed the Do 335 in flight they rubbed their eyes in disbelief and wondered if they had seen a "Buck Rogers" space plane.



2
Dornier 335 A-1, one of eleven production models built. This one was captured at factory by American Army troops when the war ended in April 1945.



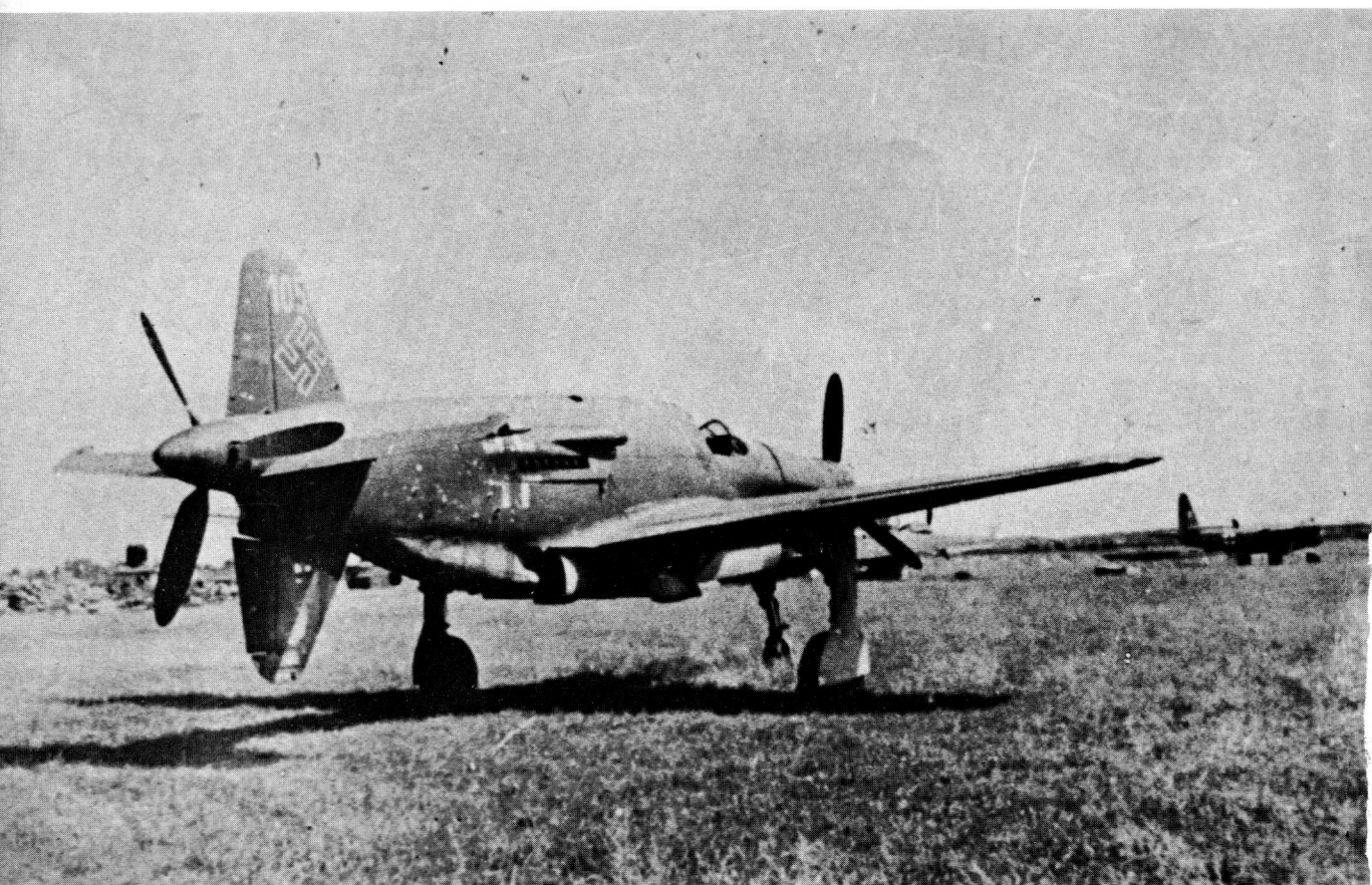
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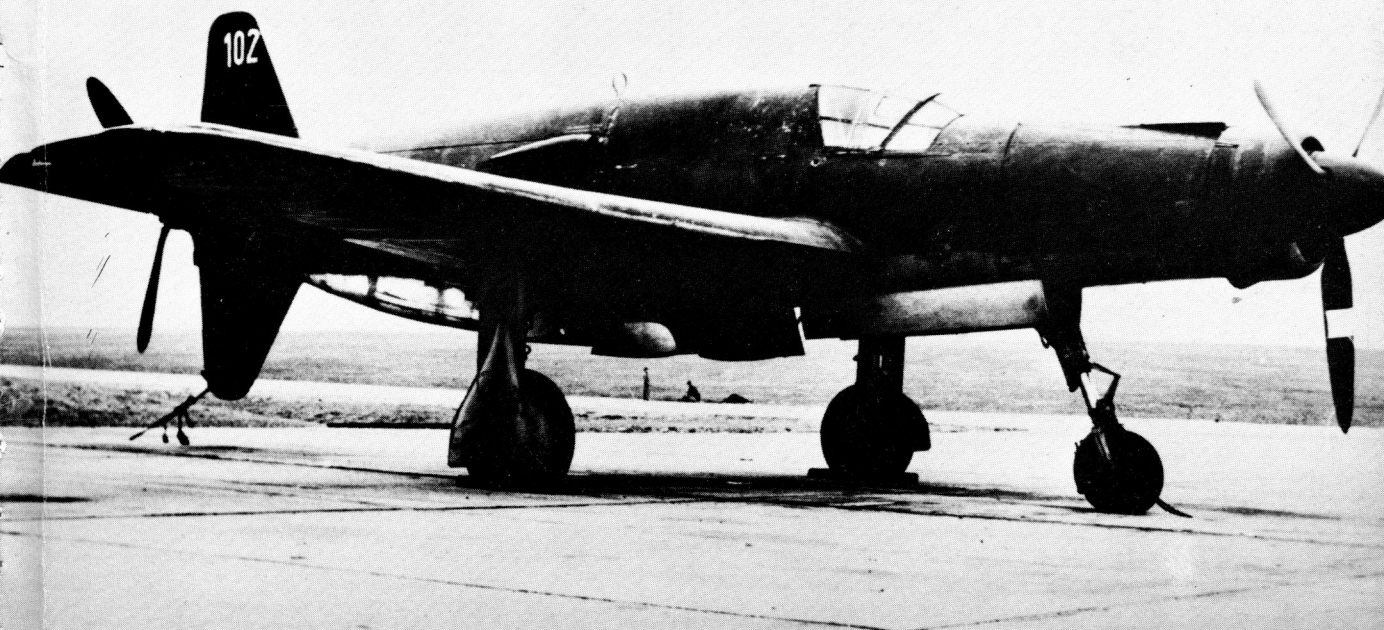
Dornier Do 335 A-O Werk Number 102 was returned to United States for examination and inspection. The above photograph was taken at the U.S. Navy's Patuxent River Test Center in Maryland in 1947.



The Dornier Do 335 V-9 was delivered to the Luftwaffe flight test center at Rechlin for flight test trials during the summer of 1944. Rechlin test pilots acclaimed the Do 335's performance.

That was the end! A lonely Do 335 stands on a German airfield April 1945. This is the fifth production model of the Dornier Do 335 A-1 Werk Number 105. In the background is an Arado 234 jet bomber.

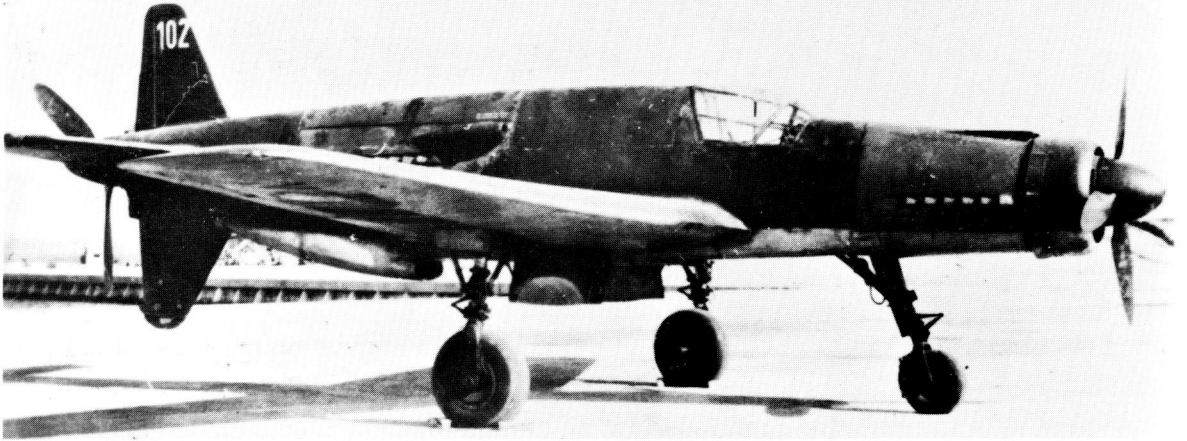




The second production aircraft of the Dornier Do 335 A-O series was brought to the United States for inspection following the war.

Do 335 A-1 Werk Number 102 during its stay at the U.S. Navy test center at Patuxent River, Maryland.

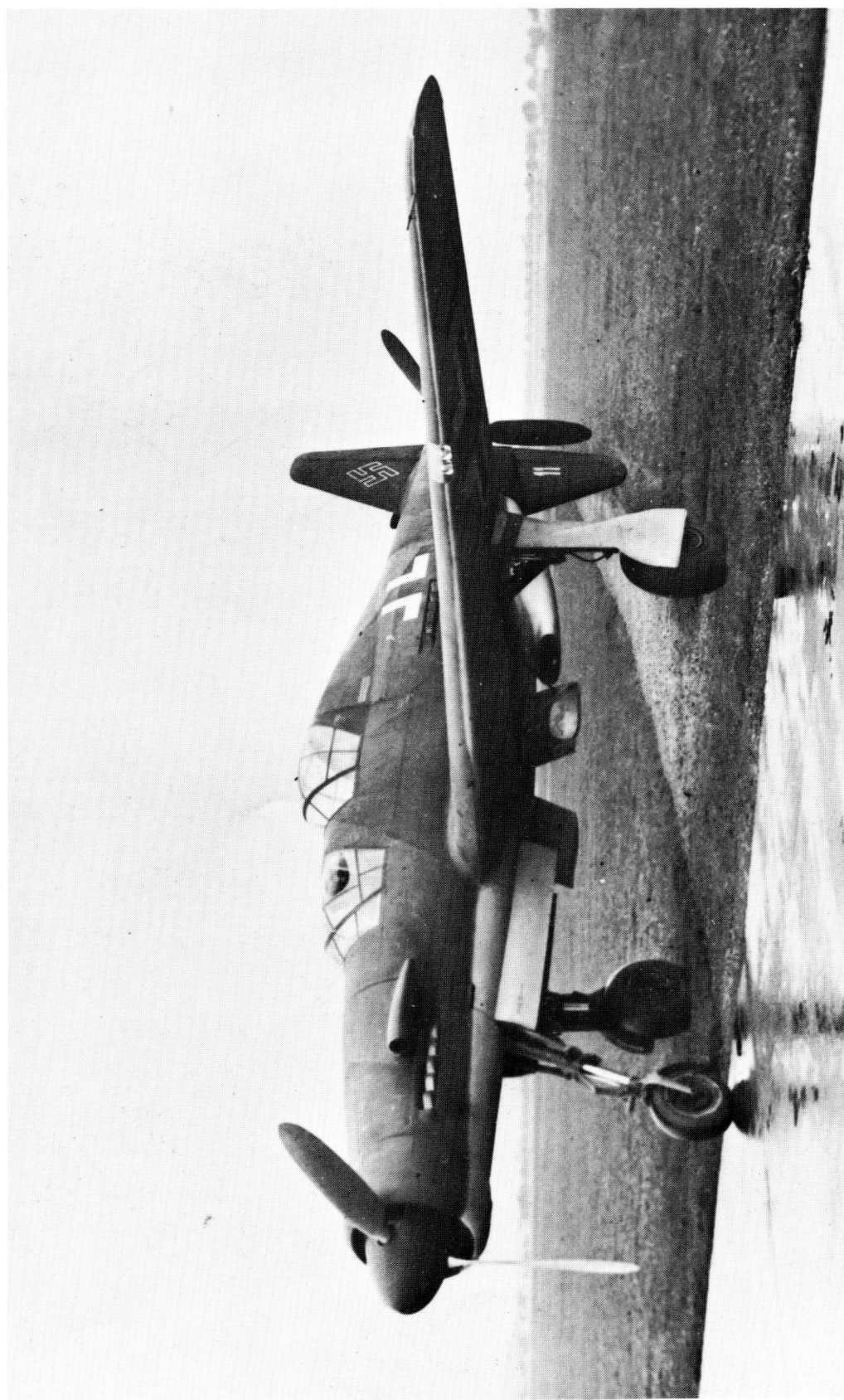




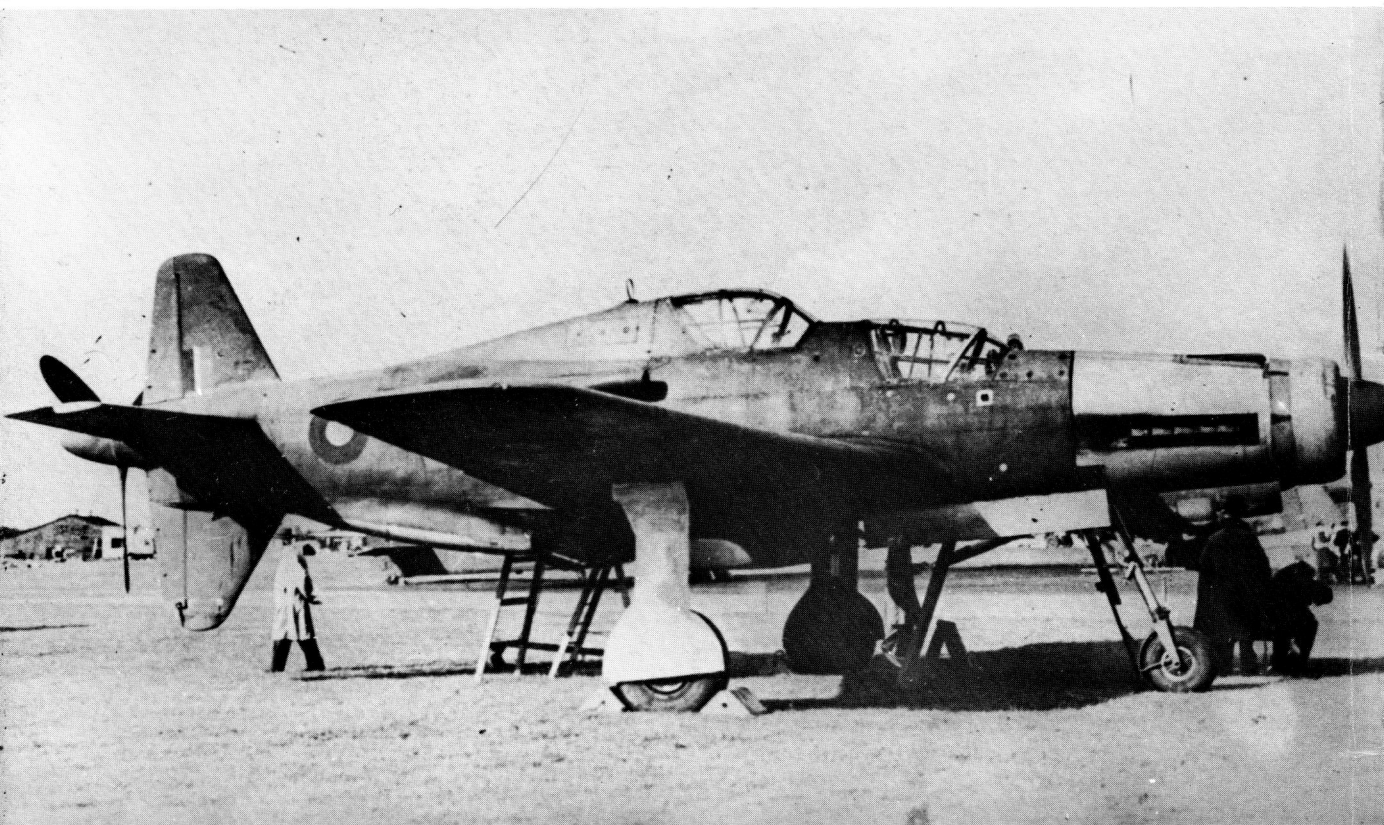
After the U.S. Navy intelligence men had studied the Do 335 A-1 it was placed in an inactive area. In 1947 it was given to the National Air Museum where it is held in storage.

The Do 335 A-1 had a wing loading of 41 lbs. per square foot. Later high altitude models had a wing loading of 35 lbs. per square foot.

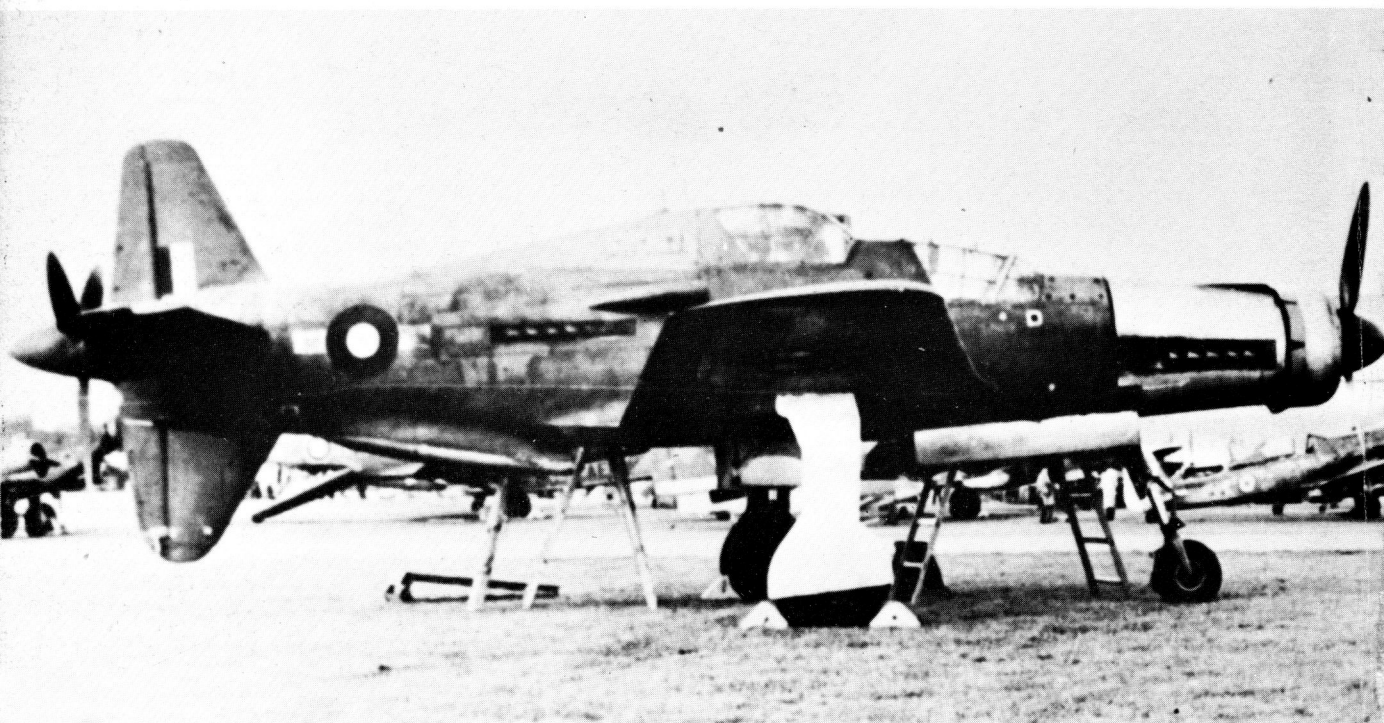


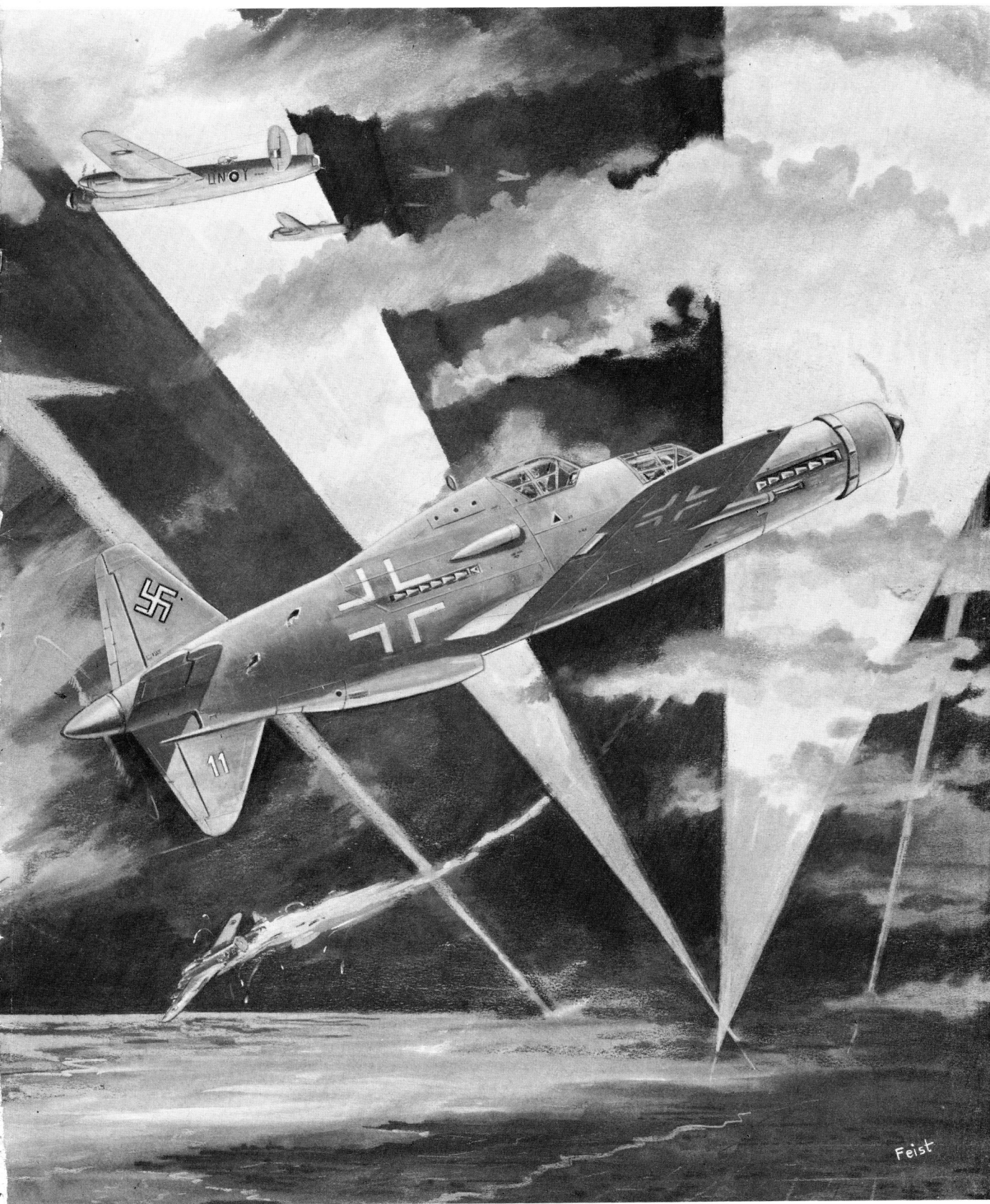


The Do 335 V-11 (CP + UL) served as the prototype two seater, trainer for the series. The second cockpit was for the pilot instructor.



Dornier Do 335A-10 two seat piggy back conversion trainer. This one was captured by American forces in Germany and given to the British. The aircraft above was on display at the Royal Air Force Captured Enemy Aircraft and Equipment display at Farnborough in April 1946.





Artist's impression of a Dornier DO 335 A-6 Night Fighter intercepting British Bombers during a raid over the Reich.



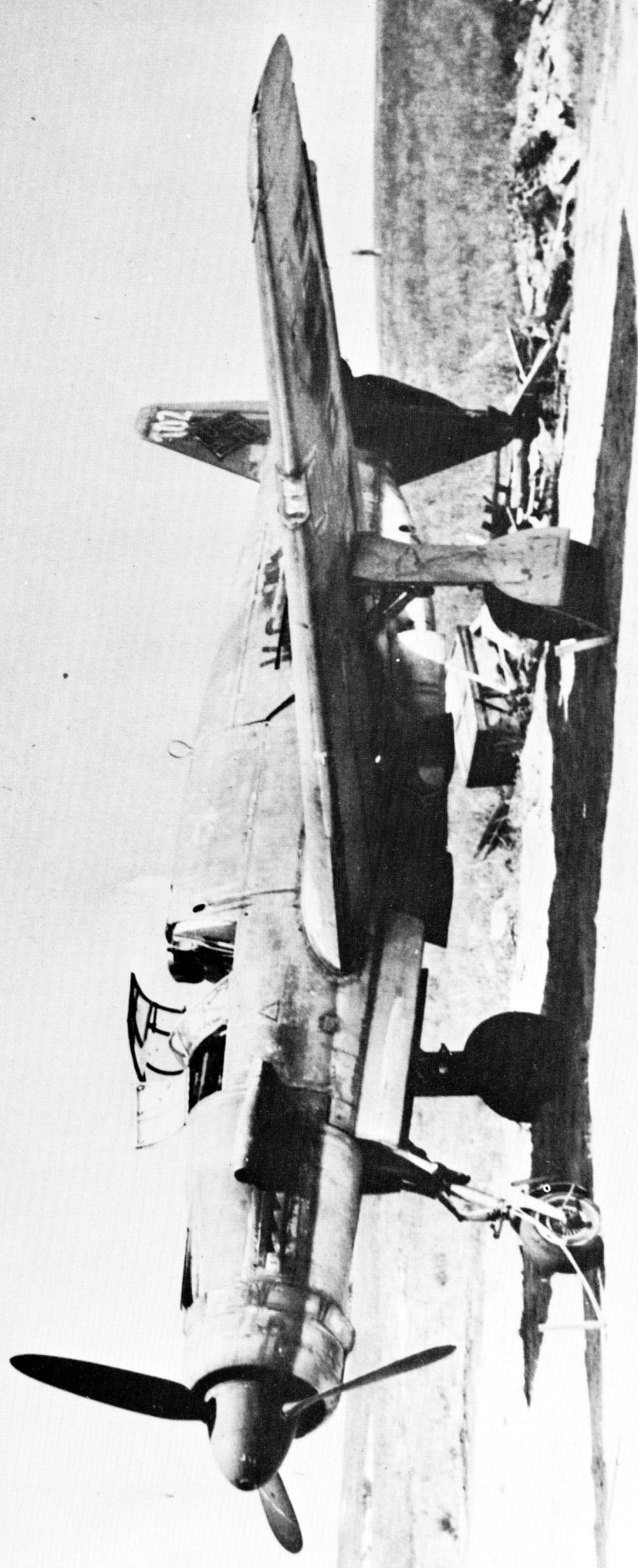
Dornier factory engineers and mechanics pose in front of the 12th production Do 335 A-12 series. It was later modified and became the second prototype of the Do 335 A-10 series.

The following three pages

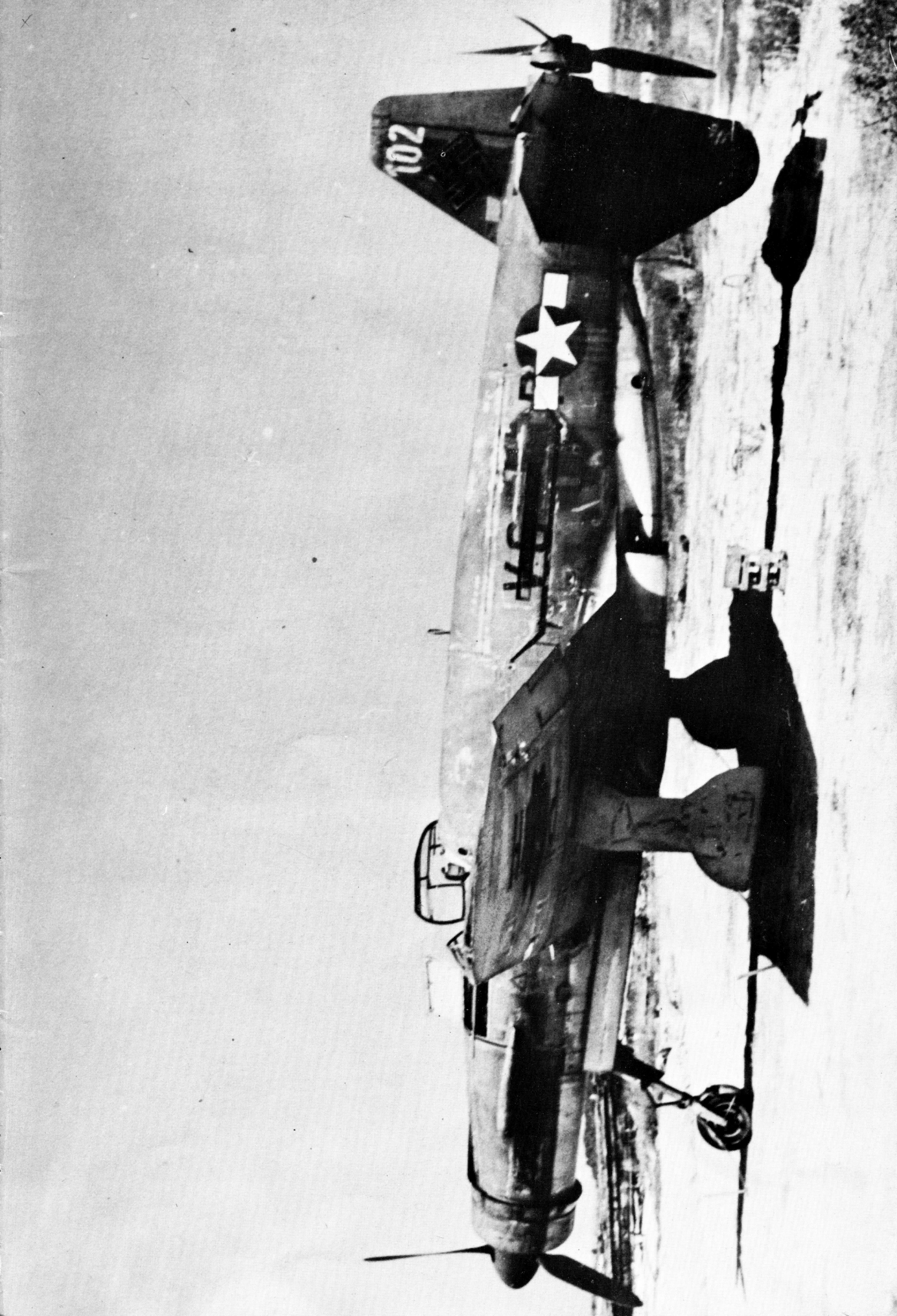
The Do 335 A-1 full up fighter installation included one 30 m.m. MK. 108 cannon firing through the propeller hub, two 20 m.m. MG 151 machine guns, one on each side of the nose cowl within the propeller arc.

The pilot of the Do 335 A-1 was well protected in the air with a bullet-resistant glass windshield and cockpit enclosure, and an armored bulkhead between the cockpit and main fuel tank in rear.

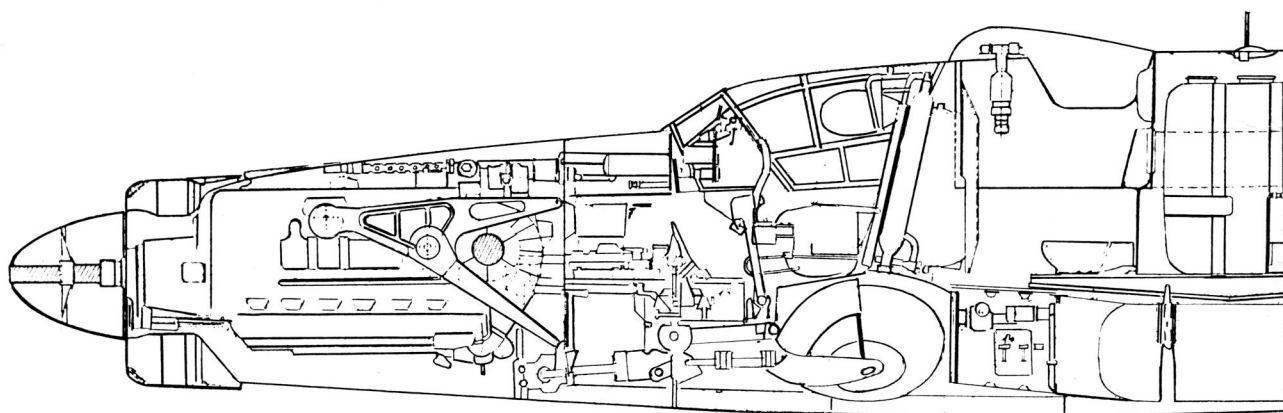
The Do 335 A-1 Werk Number 102 (VG + PH) at U.S. Navy's Patuxent River Test Center. The rear propeller was jettisonable to enable the pilot to bail out safely.

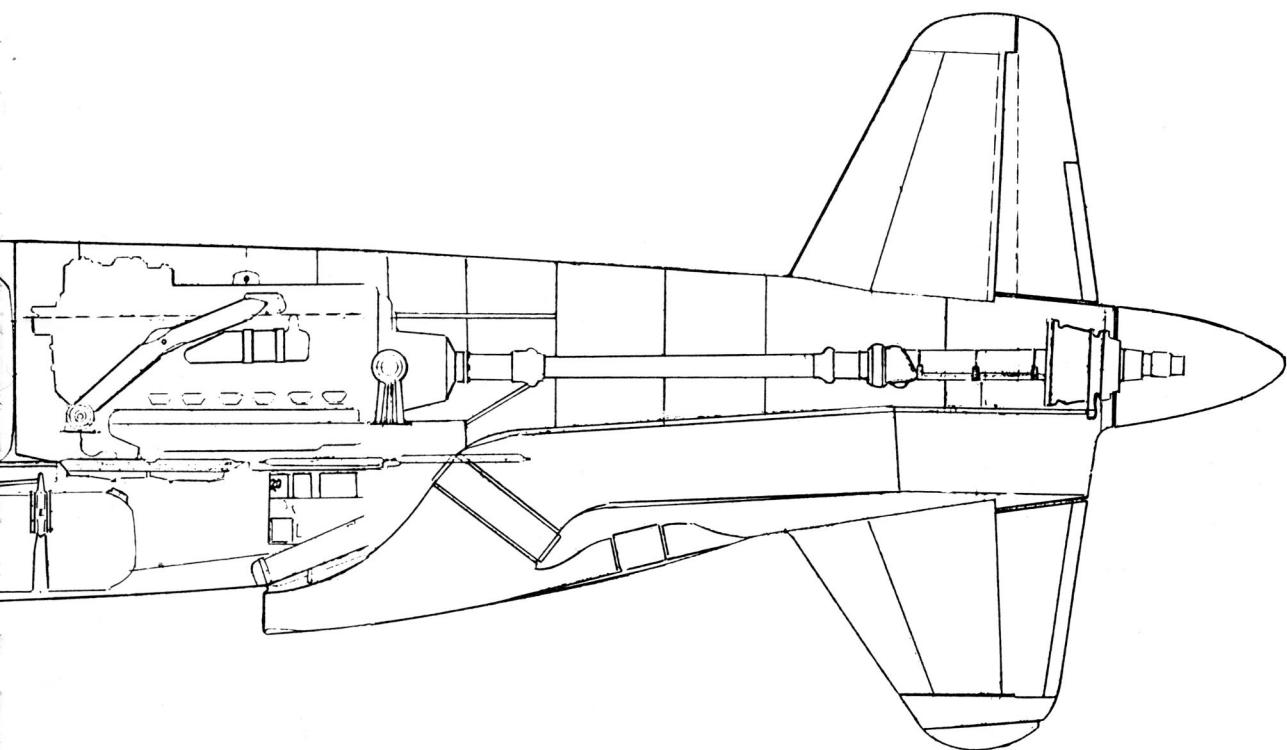


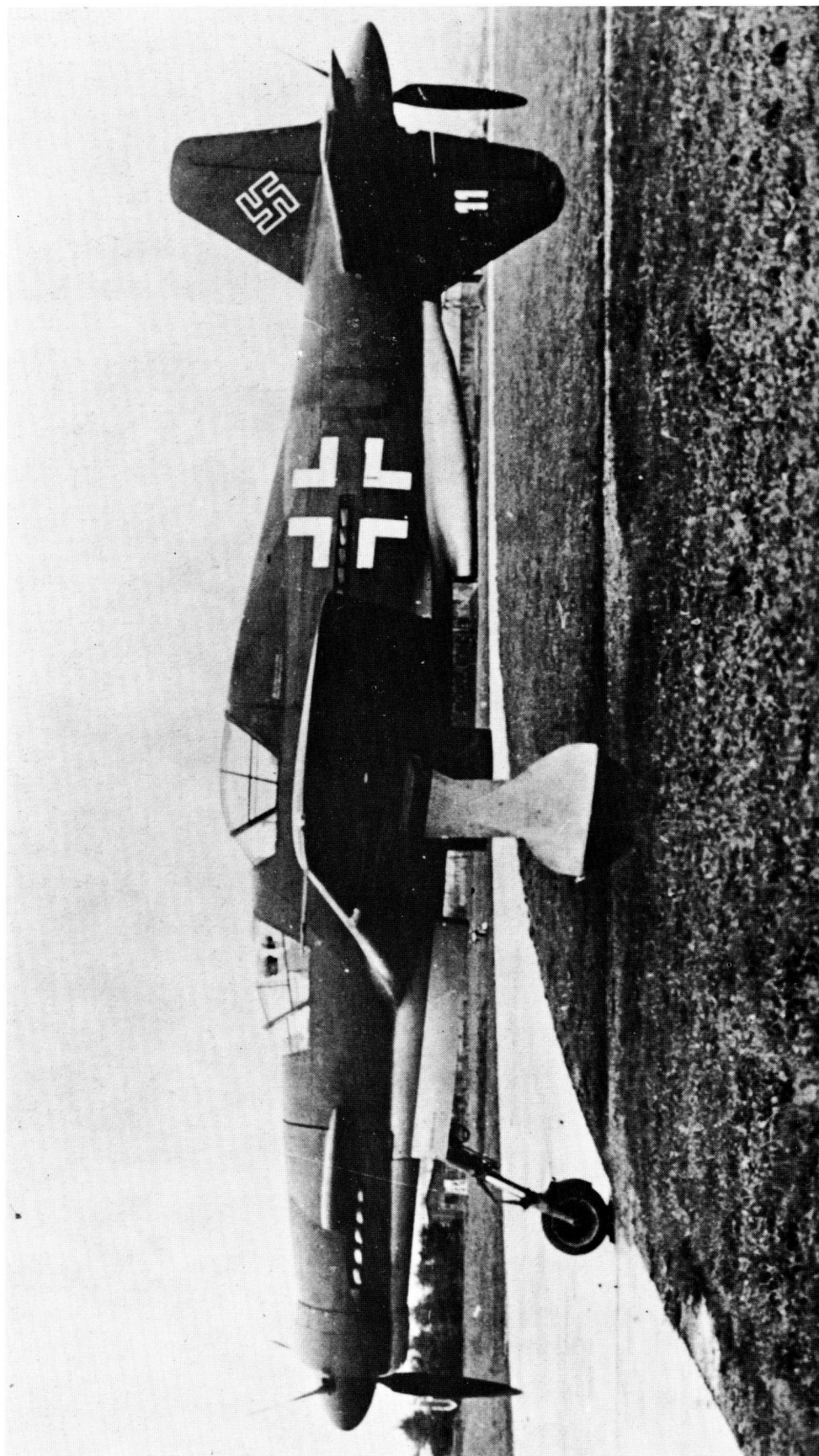




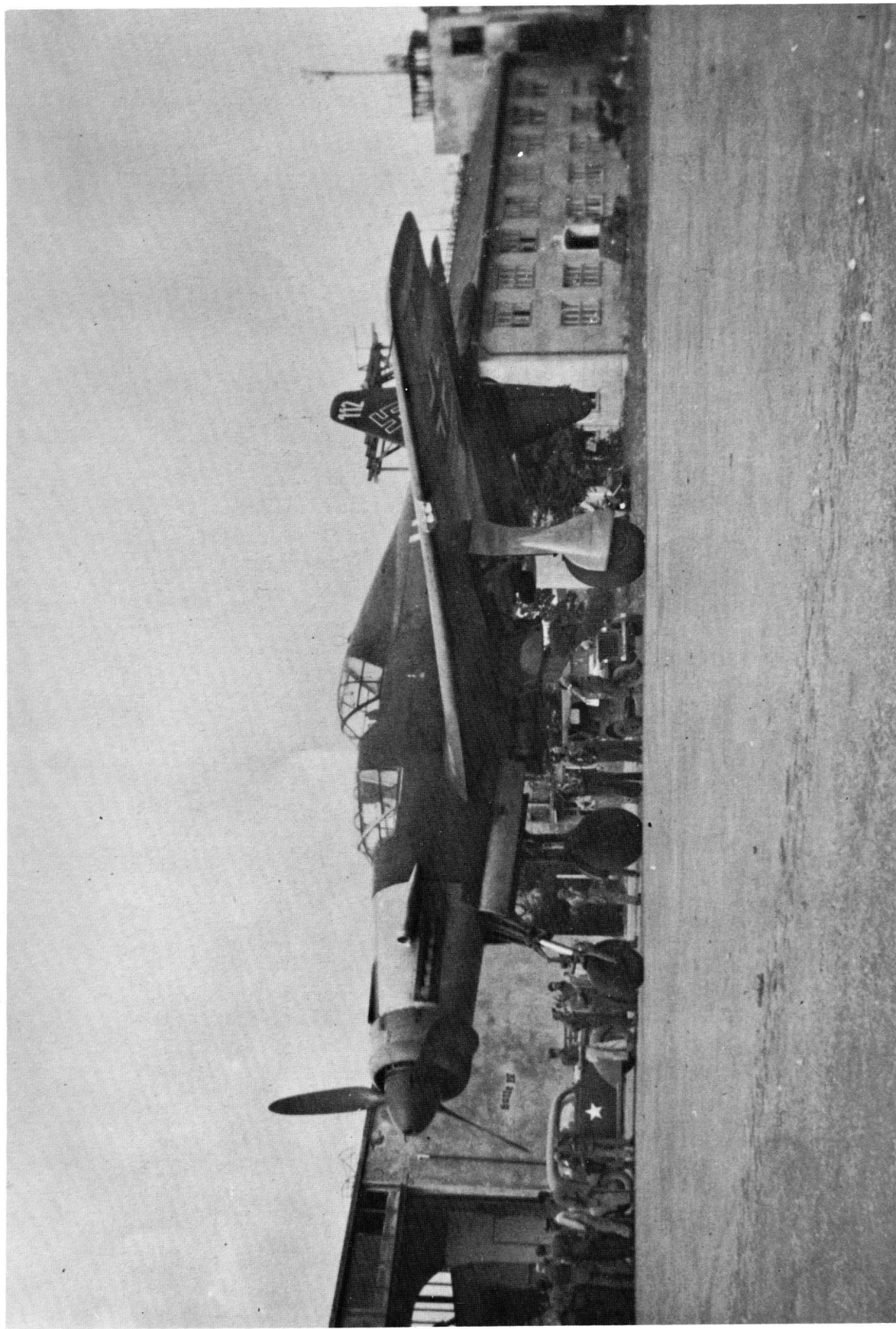
Cutaway drawing of the Dornier DO 335 A-1



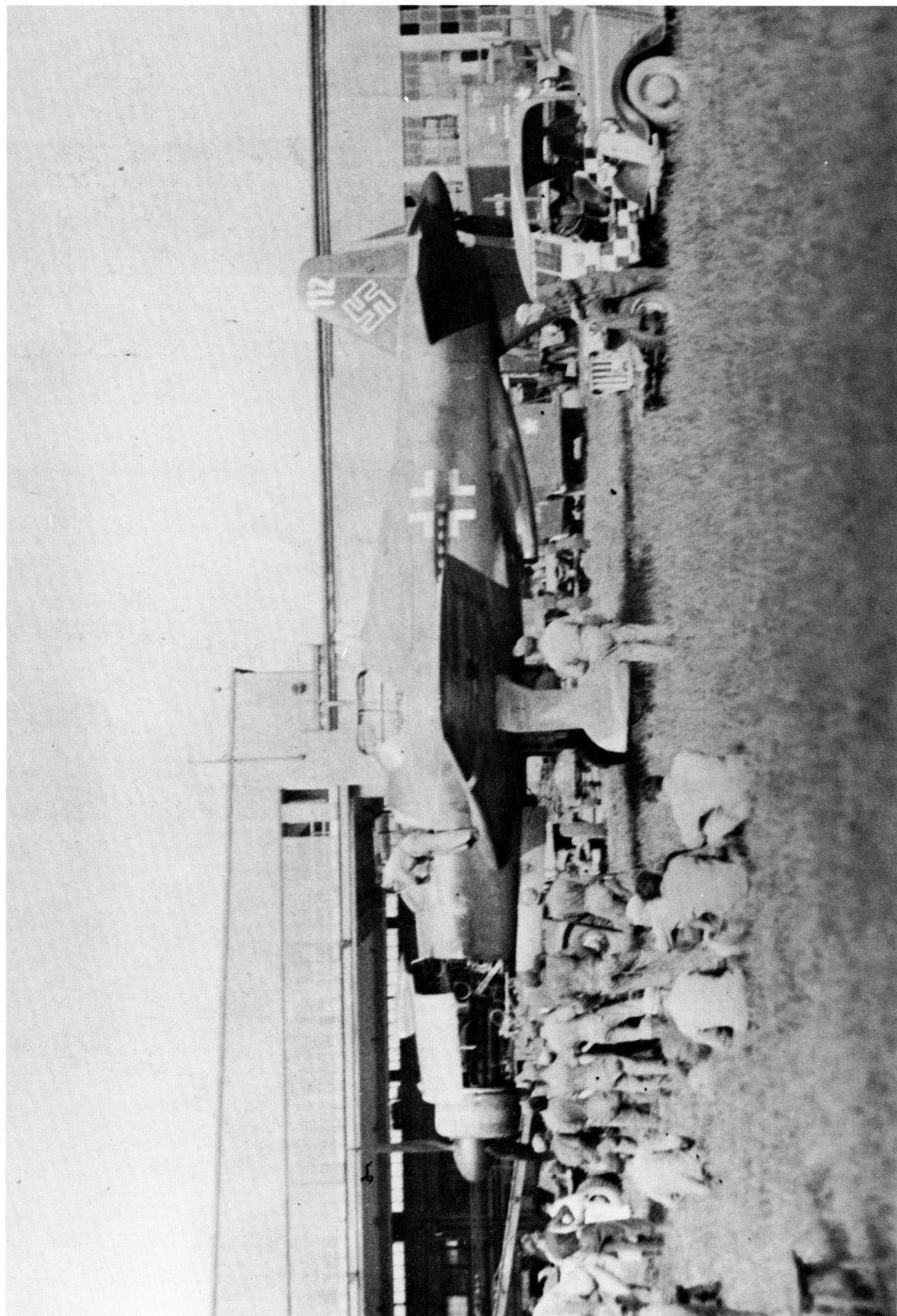




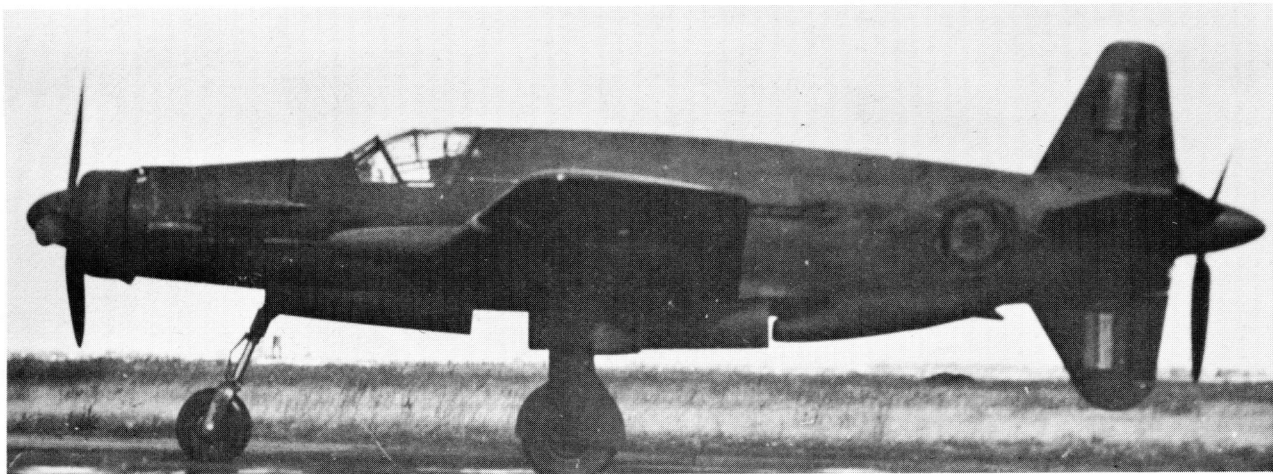
Dornier Do 335 V-11 two seat trainer version inspired the night flight version to repulse De Havilland Mosquito raids on the Reich.



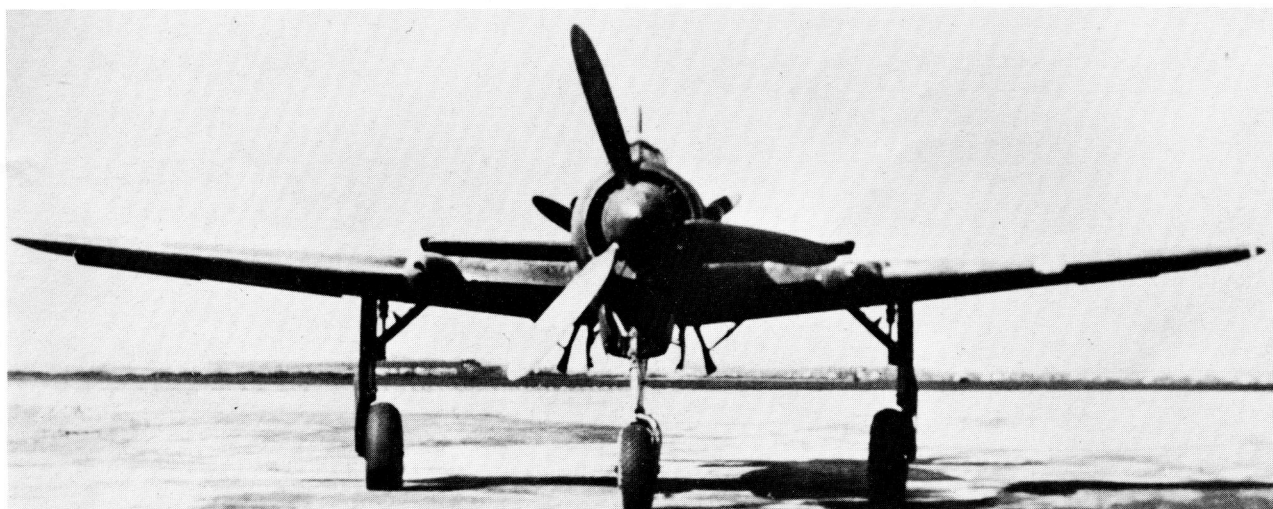
The Dornier Do 335 A-12 as discovered by American Army troops—a big aircraft by any standard. Note how high the aircraft sits off the ground.



U.S. Army Air Force mechanics inspect new Do 335 A-12 on former German airfield April 1945. It was the first time Air Force personnel had had a chance to inspect the Do 335 A close up.



The Dornier Do 335 V-13 served as the prototype for the Do 335 B-1 series intended specifically for the heavy day-fighter role. It was taken to France in 1945 for flight tests. It was the only Dornier model captured with wing armament.



Dornier Do 335 V-13 mounted one MG 20 m.m. cannon in each wing. Heavy firepower from its cannon could have created havoc with Allied bomber formations.



Do 335 V-13 at a French Air Force base south of Paris was test-flown for several months following the war.



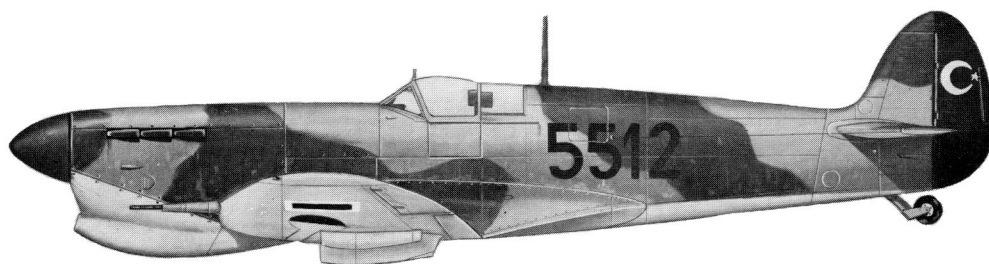
Rare aerial photograph of nine Do 335's in various stages of completion at the Dornier factory May 1945.

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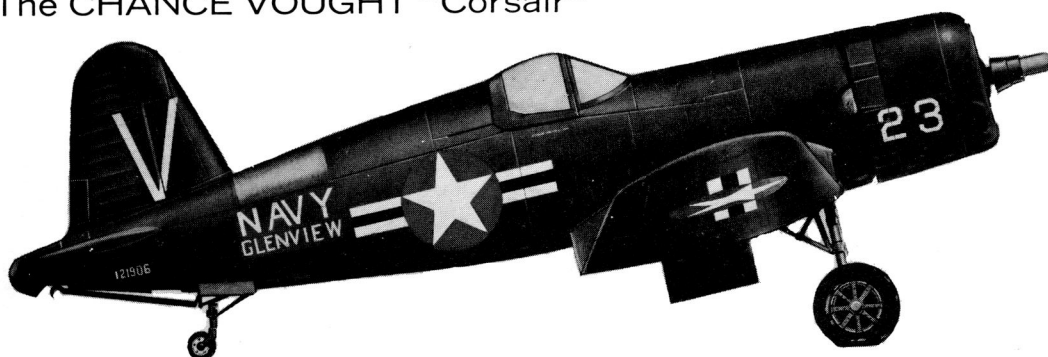
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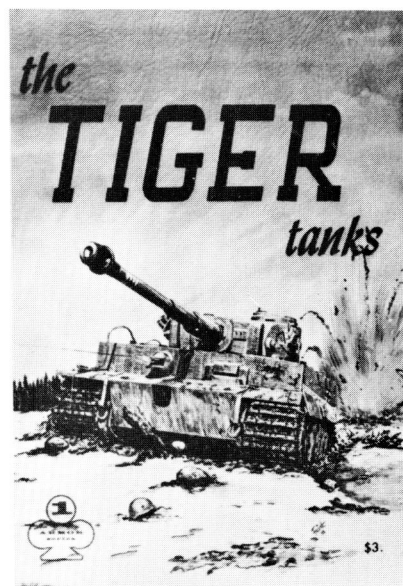
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