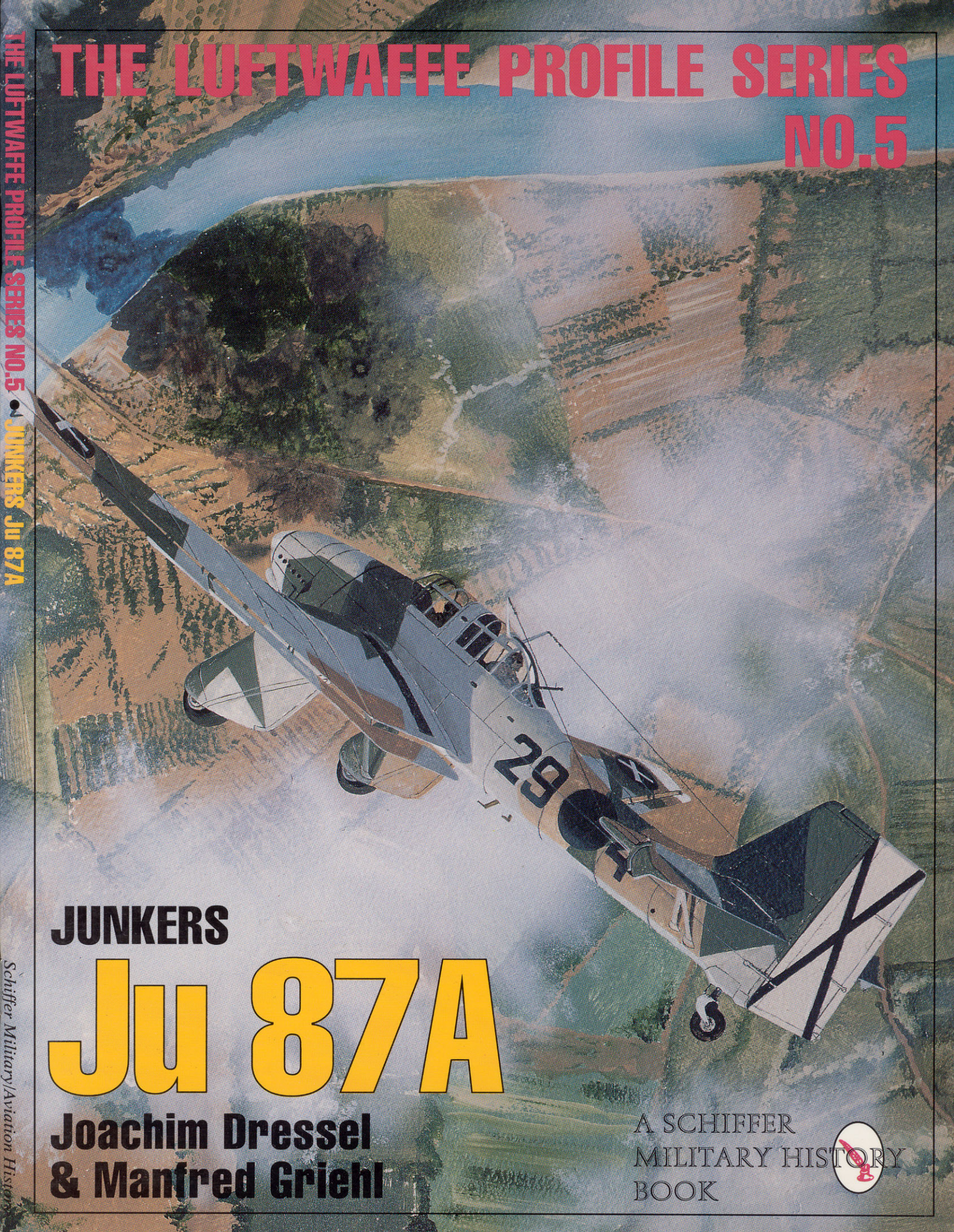
THE LUFTWAFFE PROFILE SERIES NO.5 • JUNKERS Ju 87A

THE LUFTWAFFE PROFILE SERIES NO.5



JUNKERS

Ju 87A

Joachim Dressel
& Manfred Griehl

A SCHIFFER MILITARY HISTORY BOOK

Schiffer Military/Aviation History

Translated from the German by David Johnston.

Printed in China.
ISBN: 0-88740-920-2

This book was originally published under the title,
Fleugzeug Profile Junkers Ju 87 A
We are interested in hearing from authors with book ideas on related topics.

Published by Schiffer Publishing Ltd.
77 Lower Valley Road
Atglen, PA 19310
Please write for a free catalog.
This book may be purchased from the publisher.
Please include $2.95 postage. Try your bookstore first.

Junkers Ju 87 A

Joachim Dressel & Manfred Griehl

In the autumn of 1933 a team led Dipl.-Ing. Hermann Pohlmann, himself a former World War One pilot, began work on the initial drawings for a modern, two-seat dive bomber. The results of these efforts and trials with the K 47 greatly influenced Pohlmann in the design of the future Ju 87. Like the earlier Junkers aircraft the new design had twin fins and rudders and a clean aerodynamic form. The most obvious external feature of the all-metal, low-wing Ju 87 was its wing. The latter was a two-spar, inverted gull structure whose lowest point was the two attachment points for the unbraced main undercarriage legs. As a "front-line aircraft" the Ju 87 was supposed to be as simple and robust as possible. Therefore the designers did not opt for a retractable undercarriage, eliminating a complicated and heavy retraction mechanism.

It was later found that wing construction was unsatisfactory, however. The spar flange (T section) did not extend to the outer area of the profile and was not attached to the outer skin. The outer skin on the upper surface wing had to bear extreme loads, the metal developed wrinkles and tended to form cracks as a result of vibration.

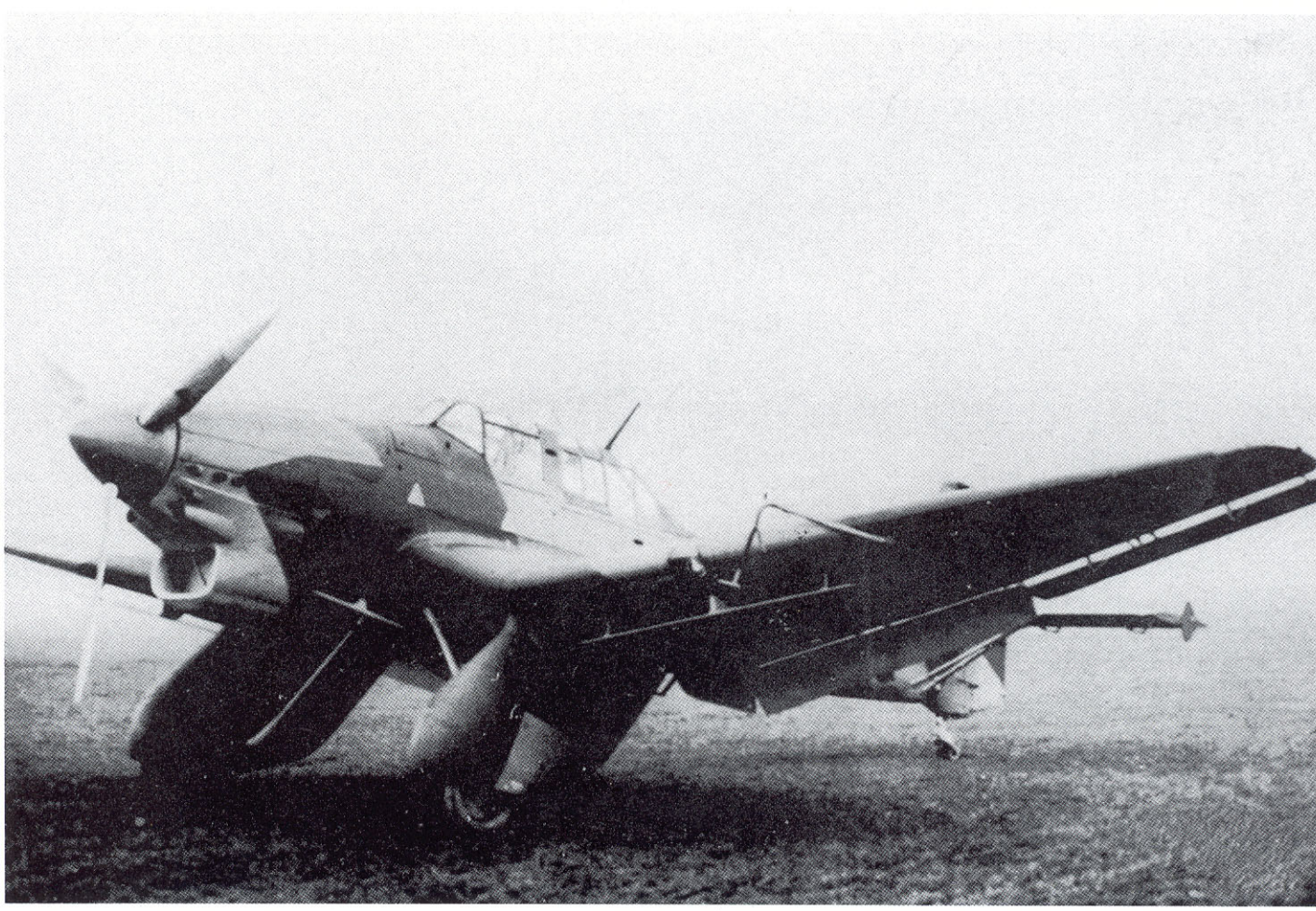
A full-scale mock-up was completed in September 1934 and was inspected by the RLM at the end of the year. Meanwhile construction of three prototypes had been under way since summer 1934.

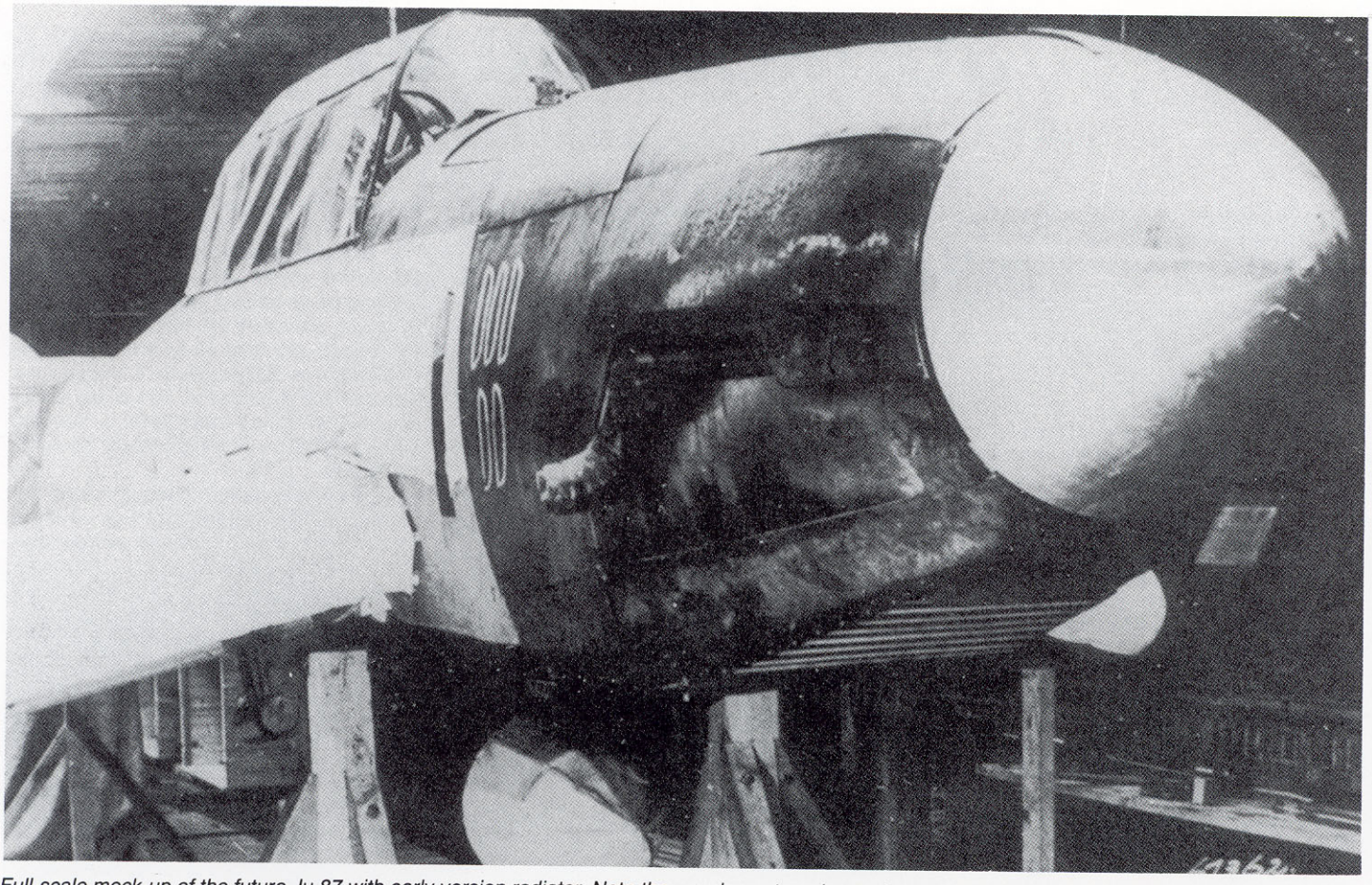
The first Ju 87 was completed in April 1935 and made its maiden flight on September 17 of the same year. This flight was generally satisfactory apart from some minor instability. In spite of its chunky appearance, the new dive bomber exhibited good handling qualities, in part due to the Junkers arrangement of landing flaps and ailerons. The sole major problem was the radiator, which was too small. As a result the 525 H.P. Rolls-Royce Kestrel V engine tended to overheat quickly. The prototype was subsequently fitted with a larger radiator.

Propulsion was provided by a two-blade wooden propeller. The V1 continued flying without further alterations until it crashed on January 24, 1936. Junkers chief test pilot Willy Neuenhofen and his observer Engineer Kreft lost their lives in the accident. The crash resulted from the aircraft losing its tail after developing flutter in a dive. Beginning with the V2, all subsequent Ju 87 aircraft were equipped with a conventional single fin and rudder.

Since the RLM rejected the building of the Kestrel engine under license by Heinkel for reasons of national prestige, a Jumo 210 Aa engine producing 610 H.P. was installed in the second prototype along with a Junkers-Hamilton three-blade propeller. Changes were also made to the radiator. The shape of the engine cowling was made flatter on account of the inverted-vee configuration of the Junkers engine.

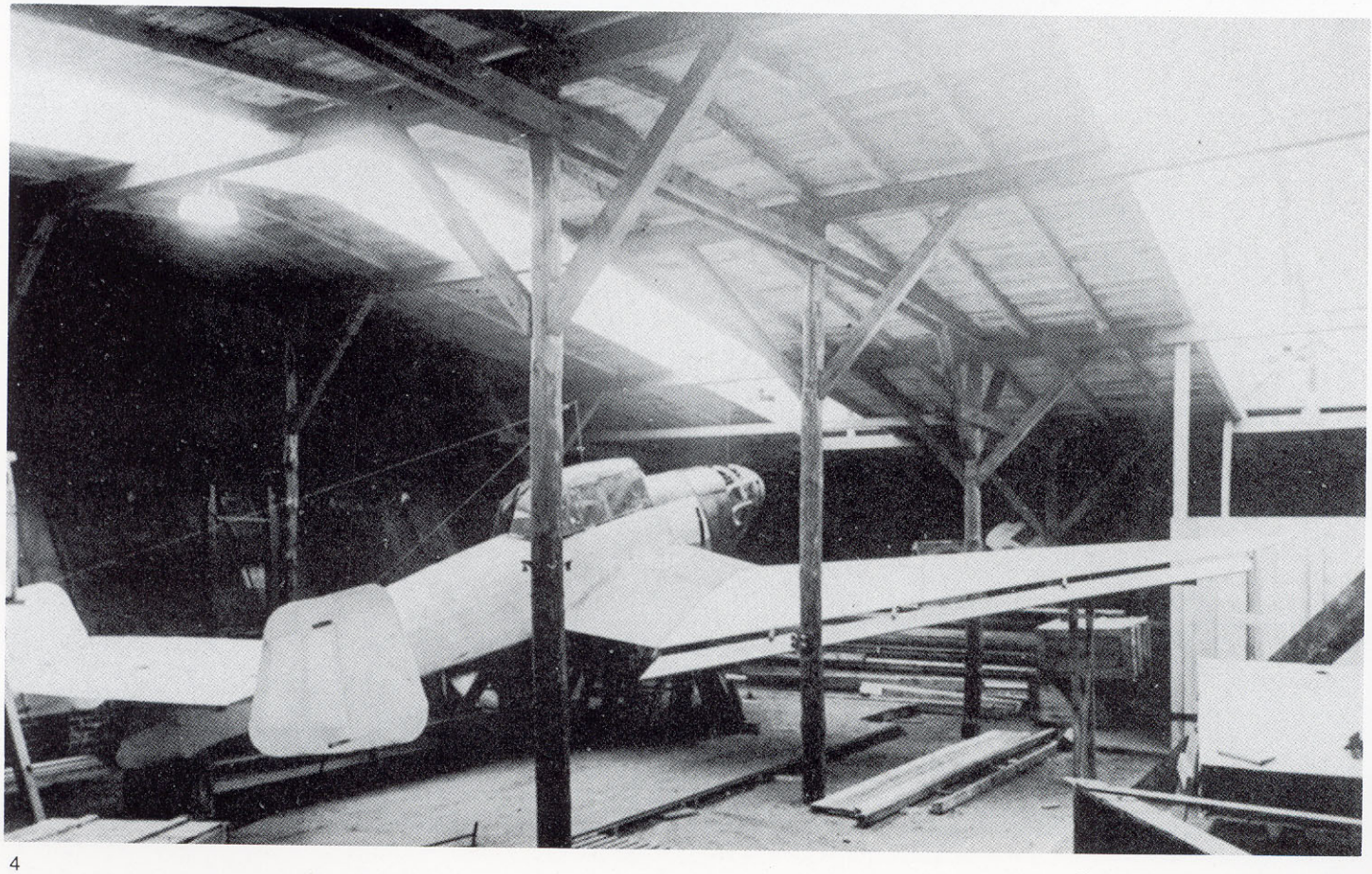
The liquid-cooled Jumo 210 was designed at the initiative of the Junkers Motorenwerk; the inverted-vee configuration was chosen for the twelve-cylinder engine after discussions with the aircraft manufacturer's project engineers. This promised to offer single-engined aircraft better visibility from the cockpit and also simplify engine maintenance. The piston displacement of 20 liters corresponded to one of the existing engine categories proposed by the State Ministry of Defense. In March 1931 Professor Mader began out a series of preliminary studies which were to lead to the Jumo 210, which within the company was initially called the L 10. These were car-





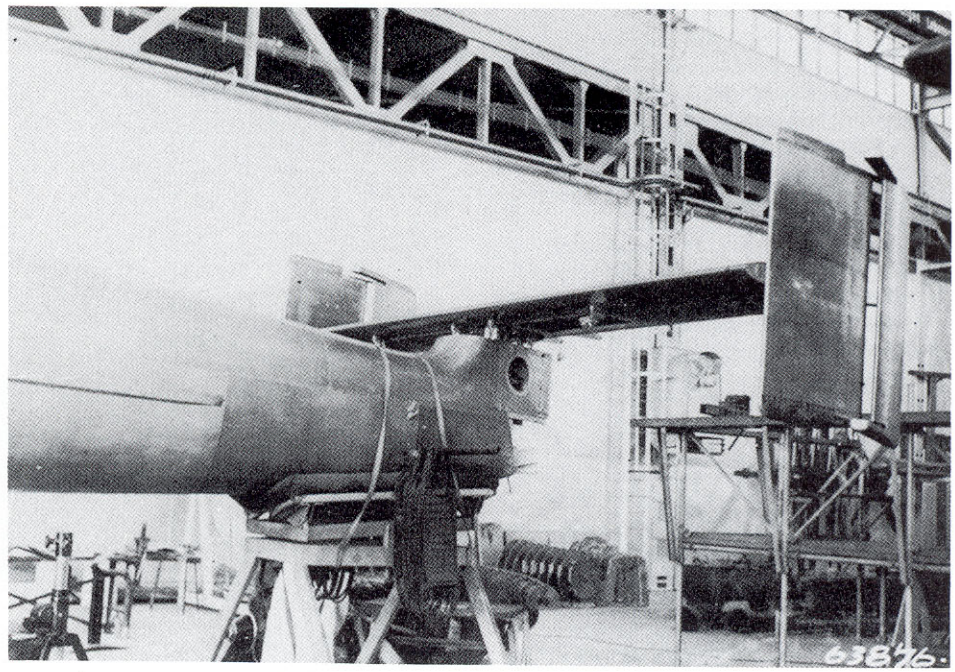
Full-scale mock-up of the future Ju 87 with early version radiator. Note the wooden external store beneath the fuselage.

rear view of the Stuka mock-up with twin fins and rudders.



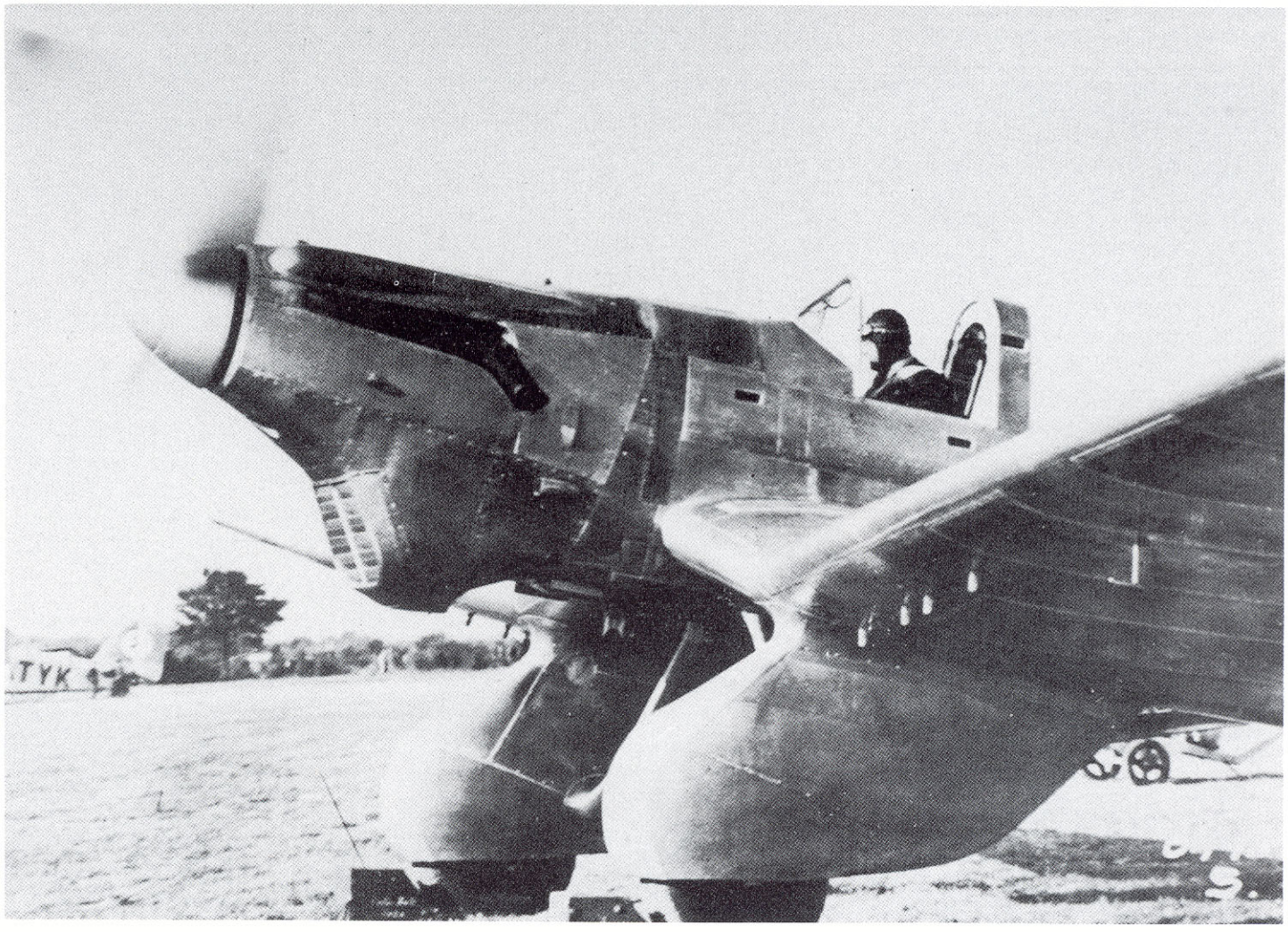
ried out under the code-name "multi-purpose engine" and very soon resulted in the selection of the inverted arrangement of the cylinders.

The first prototype began running on a test-stand on October 24, 1932, however it achieved only 450 H.P. instead of the required 600 H.P. Various modifications were made, including the adoption of two Type L 5 double carburetors, and in October 1935 a ten-hour engine run confirmed the desired output. Trials with the prototype engine concluded in March 1934 and on July 5 a Junkers W 33 test-bed took to the air powered by the new Jumo 210. The engine produced 680 H.P. The initial production variant, the Jumo 210 A with low-rated supercharger and carburetor, was installed in the Bf 109 and the Ju 87. This was followed in 1936 by the Jumo 210 D with a two-stage supercharger for the Bf 109 B and Ju 87 A-2 series. The Jumo 210 G, development of which began in 1935 under the direction of Dr. Licht, featured fuel injection with automatic pressure regulator. The G-series was the first production engine in the world to have direct fuel injection and automatic mixture regulation. The result was an increase in output to 730 H.P. A Bf 109 (D-IPLU) began flying with this engine in the summer of 1937. A total of about 6,500 Jumo 210 engines were built by Junkers from 1934 to 1938.



Final assembly of the tail unit with twin fins and rudders during construction of the prototype at Dessau in the summer of 1935.

The Ju 87 V1 during test run of the Rolls-Royce Kestrel V engine in early September 1935.

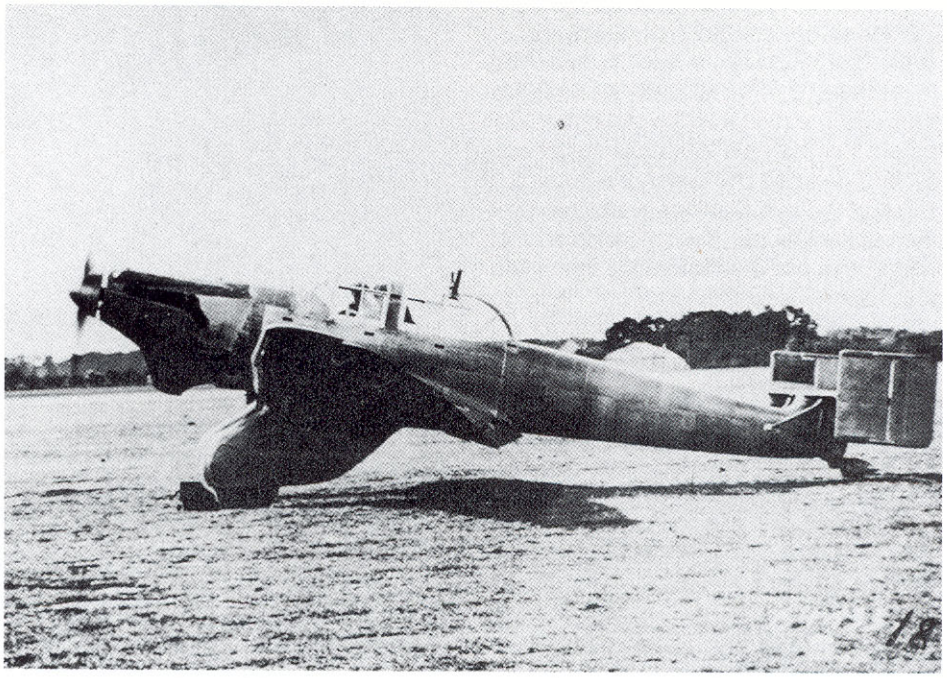


The Ju 87 V2 took off on its maiden flight on February 25, 1936 and was subsequently flown to Rechlin where testing began in March. The aircraft had been ready to fly at Junkers since November 1935, however following the crash of the V1 it was retrofitted with the central fin and rudder. The V3 began flight testing in the summer of the same year.

Several changes were introduced on the third prototype; the tail surfaces were enlarged, the wing improved and the engine cowling modified, resulting in a better forward view for the pilot.

Comparison flights between the Ju 87, He 118 and Ar 81 took place at the beginning of June 1936. This fly-off was the result of talks between the then head of the Technische Amt (C-Amt) (RLM Technical Office), Oberstleutnant Freiherr von Richthofen, brother of Manfred von Richthofen and later Luftwaffe Generalfeldmarschall and commander of the IVth Air Fleet, and Dipl.-Ing. Ernst Zindel, a designer who served with Junkers from 1920 until the end of the war, in his Dessau office. Von Richthofen informed Zindel confidentially that the Ju 87 stood little chance, because the Director General of Air Armaments, Ernst Udet, who was responsible for the final decision, had already decided in favor of the Arado biplane. In the unlikely event that the Ar 81 was eliminated he would have to fall back on one of the monoplanes, in which case the He 118, with its 60% more powerful 30-liter DB 600 C engine, would clearly enjoy the upper hand. In the end the Ju 87 with its 20-liter engine must be inferior in performance to the He 118, which was designed around the more powerful liquid-cooled 12-cylinder Daimler Benz DB 600. As a World War I fighter pilot who had flown Fokker D.VIIs and an aerobatic pilot on biplanes, Udet preferred the Arado biplane. In his opinion its smaller wingspan and supposedly greater maneuverability made it the only one of the three competitors suited to precise diving attacks.

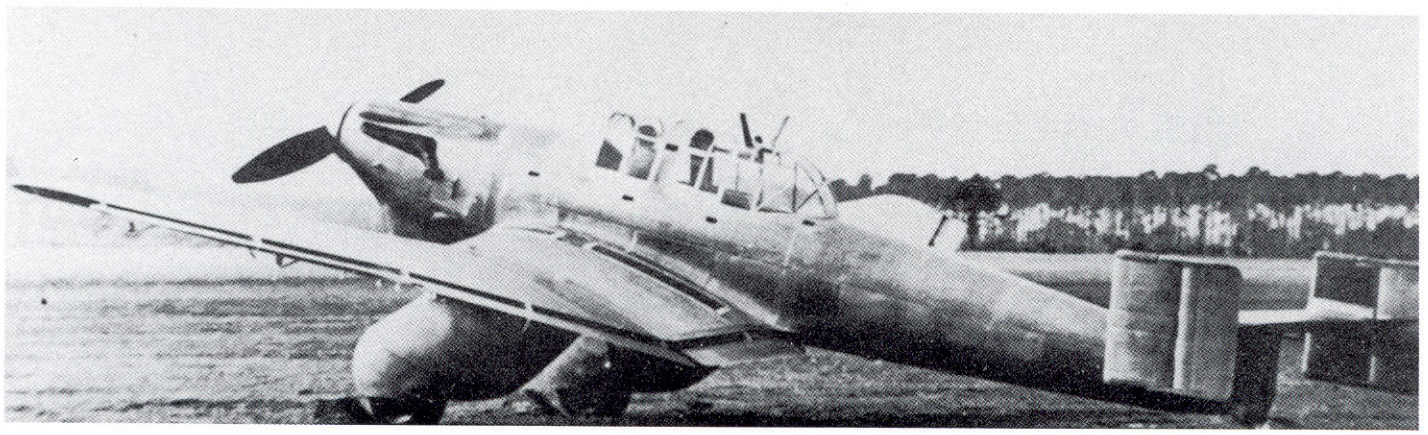
It was under this bad omen that designer Dipl.-Ing. Pohlmann, Dipl.-Ing. Hesselbach –

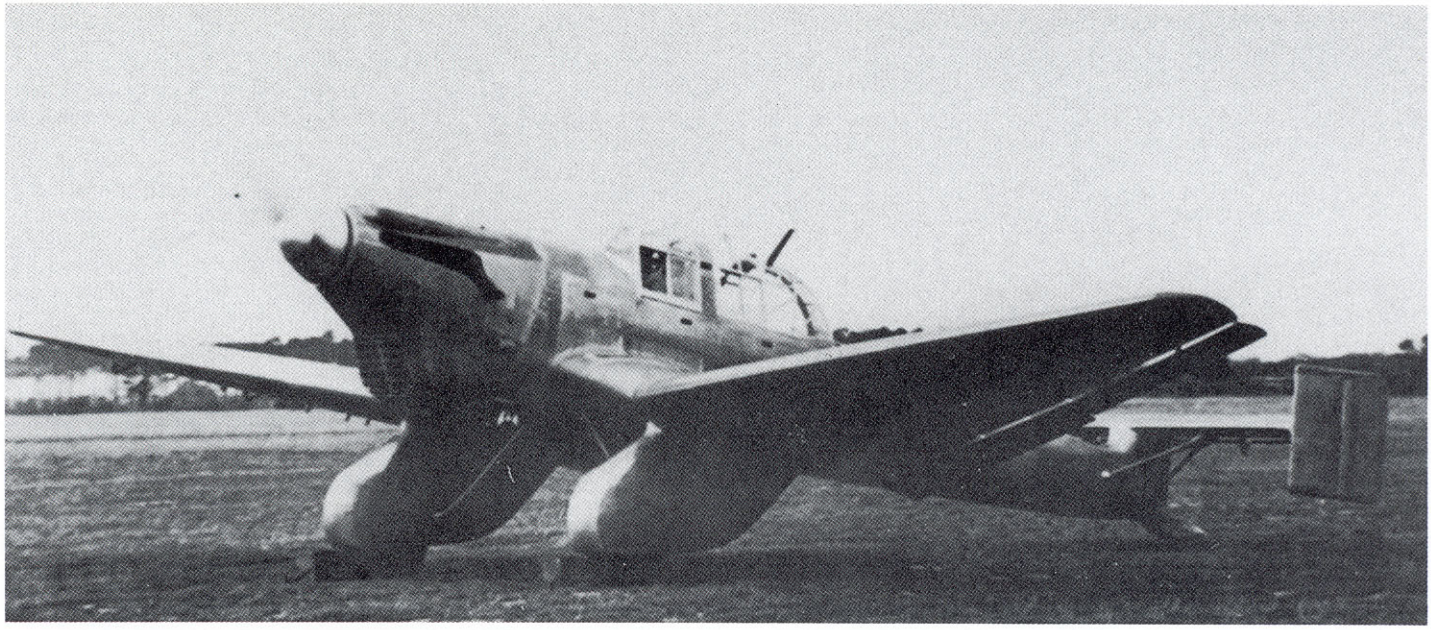


Side view of the still unarmed first prototype of the Ju 87 prior to its first flight on 17/09/1935.

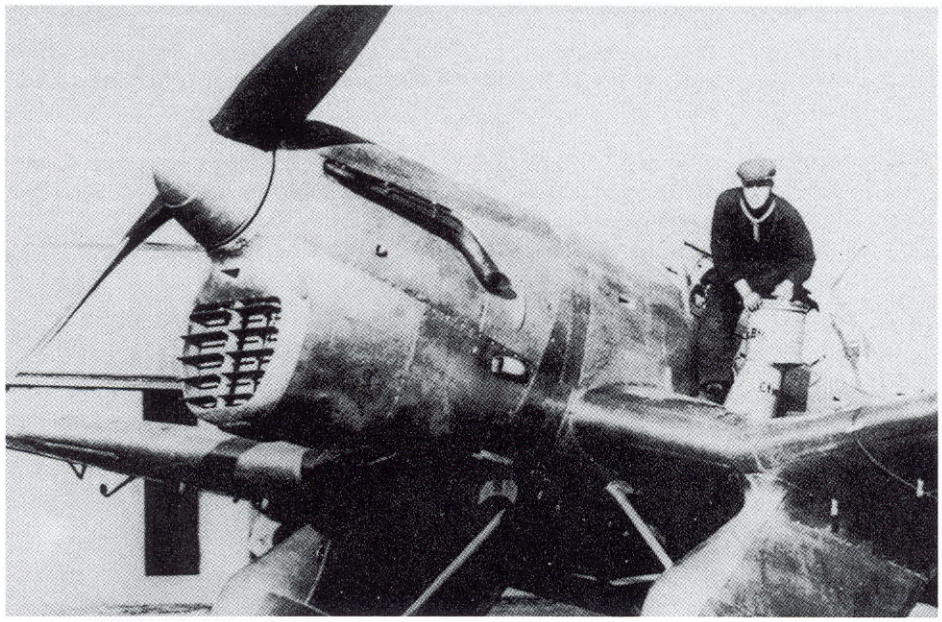
Engine	Jumo 210 A	Jumo 210 Da	Jumo 211 D	DB 600 C
Total Piston Displacement (l)	19.7	19.7	35.0	33.9
Bore x Stroke (mm)	124x136	124x136	150x165	150x160
Compression (OZ)	7.3 (87)	7.3 (87)	6.5 (87)	6.5 (87)
Supercharger	single-stage	two-stage	two-stage	single-stage
Propeller Reduction	0.57	0.57	0.65	0.65
Length (mm)	1478	1790	2173	1720
Width (mm)	686	1050	804	712
Height (mm)	960	1185	1053	1000
Dry Weight (kg)	—	442	660	560
Takeoff Power (H.P.)	610	680	1200	850
at Revolutions (rpm)	2700	2700	2400	2300
Boost Pressure (atm)	1.23	1.27	1.32	—
Climb and Combat Power (H.P.)	—	—	1100	910
at Revolutions (rpm)	—	—	2300	2400
maximum Boost Altitude	—	—	5200	400

Ground trials with the Ju 87 V1; the aircraft still has the early radiator, which proved to be too small.





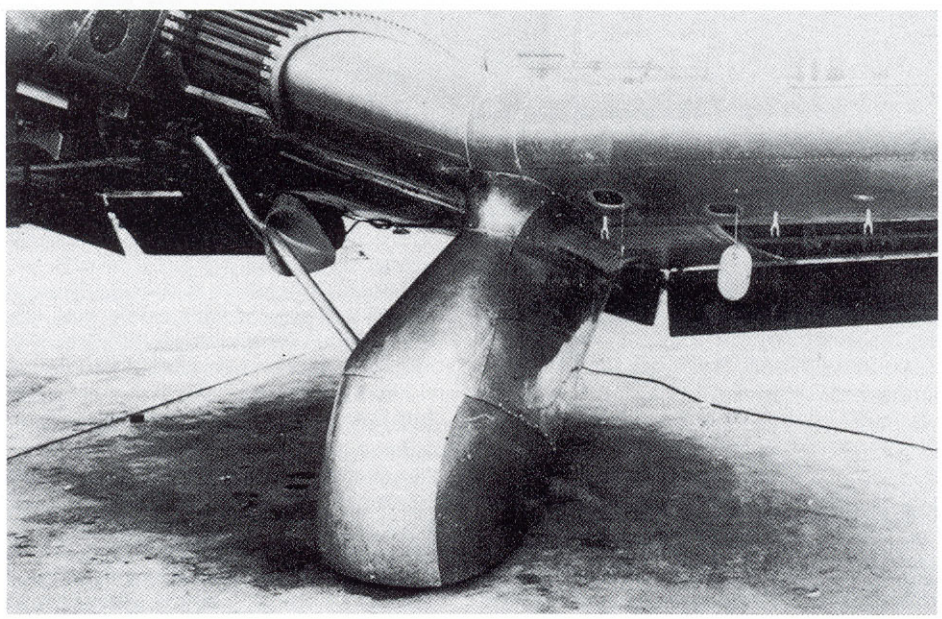
The Ju 87 V1, Werknummer 4921. The aircraft crashed on 21/01/9136.



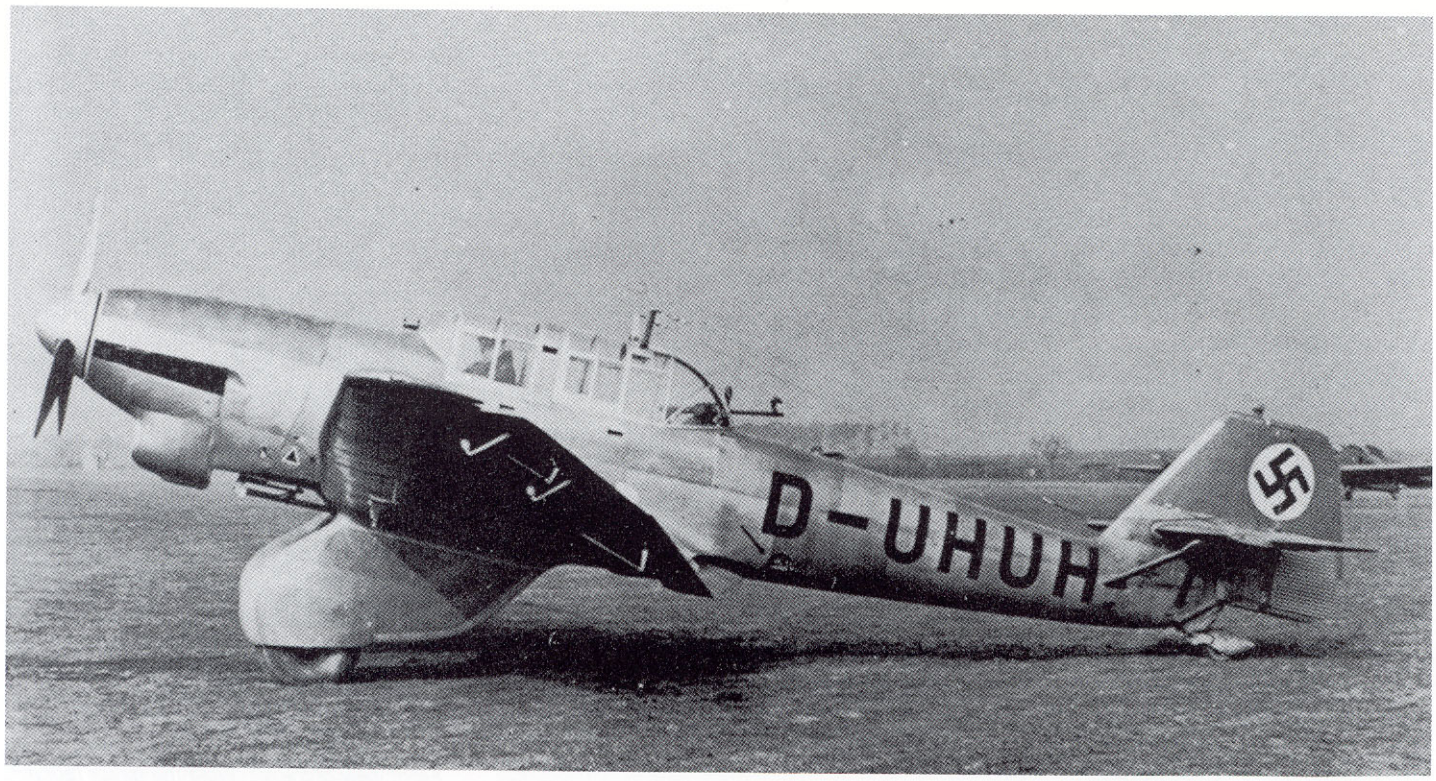
Front view of the V1. Note the larger radiator, installed after the original item proved inadequate.

the responsible test and demonstration pilot of the flight test group – and chief designer Ernst Zindel drove to Rechlin for the comparison flights. By the time they arrived Arado pilot von Schönebeck had already demonstrated the Ar 81; sure of victory, the latter was in conversation with Udet. There followed the comparison flight with the He 118 V3. The aircraft made only a gesture toward a dive-bombing approach from altitude, because without the necessary dive brakes it was hardly capable of such a maneuver (only later did the prototypes and the pre-production series receive a dive brake).

Dipl.-Ing. Hesselbach then demonstrated the Ju 87 V2 in a dive with extended dive brakes. According to statements by Zindel the approach appeared very good, but the pilot had several doubts. In the meantime the rumor that the decision had been made in favor of the Ar 81 continued to circulate. Zindel had to leave for Berlin because of a deadline, but Pohlmann and Hesselbach remained in Rechlin. Von Schönebeck now pressed Udet to take the Ar 81 up for a test flight. The flight was astonishingly brief; after landing Udet expressed his dissatisfaction with the handling characteristics of the biplane. Pohlmann and Hesselbach subsequently talked Udet into a flight in the Ju 87, after which he appeared very satisfied. However, the other side then raised the argument that the Ju 87 was underpowered. Udet was not ready to decide.

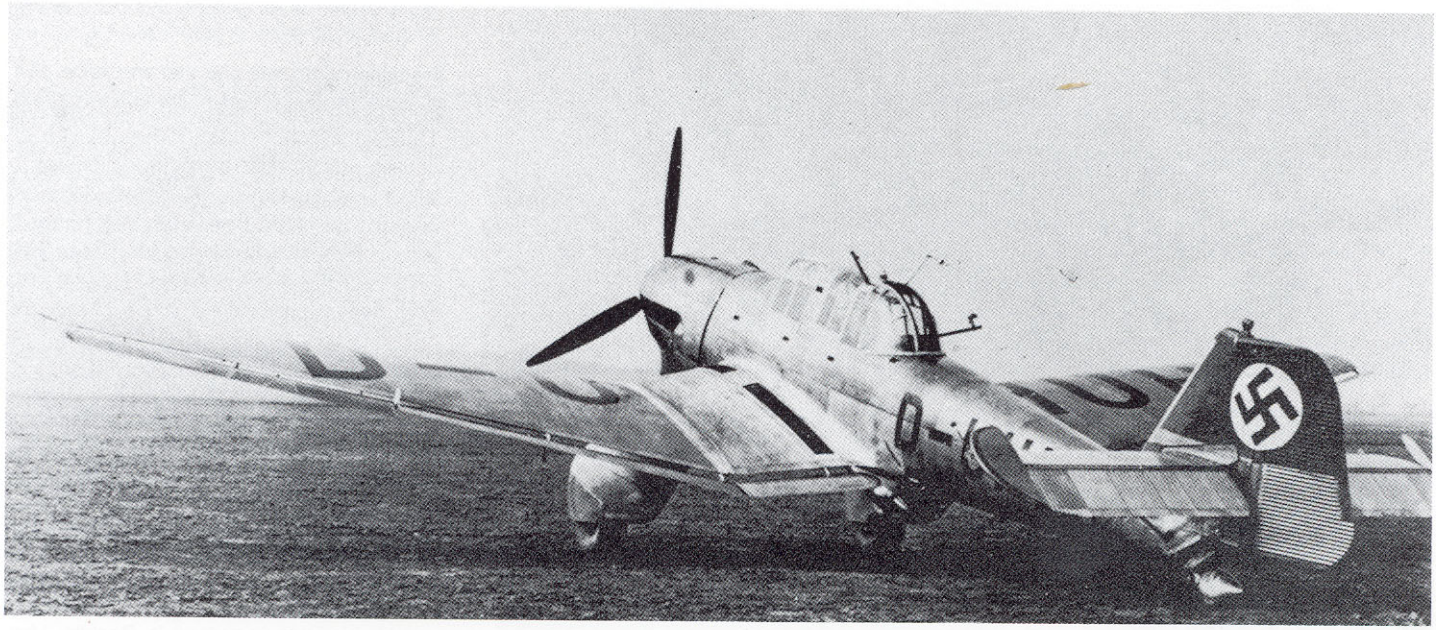


Undercarriage of the Ju 87 V1.



Modification of the tail unit resulted in a delay in the maiden flight of the Ju 87 V2, which was scheduled for November 1935.

The Ju 87 V2 (D-UHUH) was equipped according to the manufacturer's specification of 28/01/1936, which included a MG 15 machine-gun in the aft cockpit.



Udet went to Marienehe on July 27, 1936 (not on June 27 as is generally claimed) to test fly the He 118 V1. The American pilot Colonel Lindberg was visiting Ernst Heinkel that day and was thus not present. He did speak to Udet by telephone, however, and told him to pay attention to the propeller pitch and cautioned him that caution was still advised when flying the aircraft. Udet probably paid no attention to Heinkel's warning and overspeeded the engine, as a result of which the propeller flew away. The decision was now made in favor of the Ju 87 A. Heinkel subsequently exported several of the He 118s to Japan, but the type never went into production in Germany or Japan. The crash of the V1 was not the only reason for the type's demise. Intensive aerobatic testing with the V1 had resulted in the following verdict on July 14, 1936: "Airframe good, poor control qualities cancel out all other good qualities."

Development of the He 118 had begun simultaneously with that of the Ar 81 following the issuing of the RLM specification in April 1934. A mock-up was completed in February 1935. The maiden flight of the He 118 V1, which was powered by a Rolls-Royce Bussard engine, took place on February 14, 1936. The deadline for delivery of the second prototype was April 1936, the He 118 V3 the beginning of June the same year. Both aircraft were powered by the DB 600. In July 1936 the RLM requested the construction of the He 118 V4 as the prototype for a series with the Jumo 211 A. Following the negative results of the comparison flights the RLM canceled series production and authorized the machine with the DB 600/601 for export only. The only version built was the He 118 A-0, which was specified in

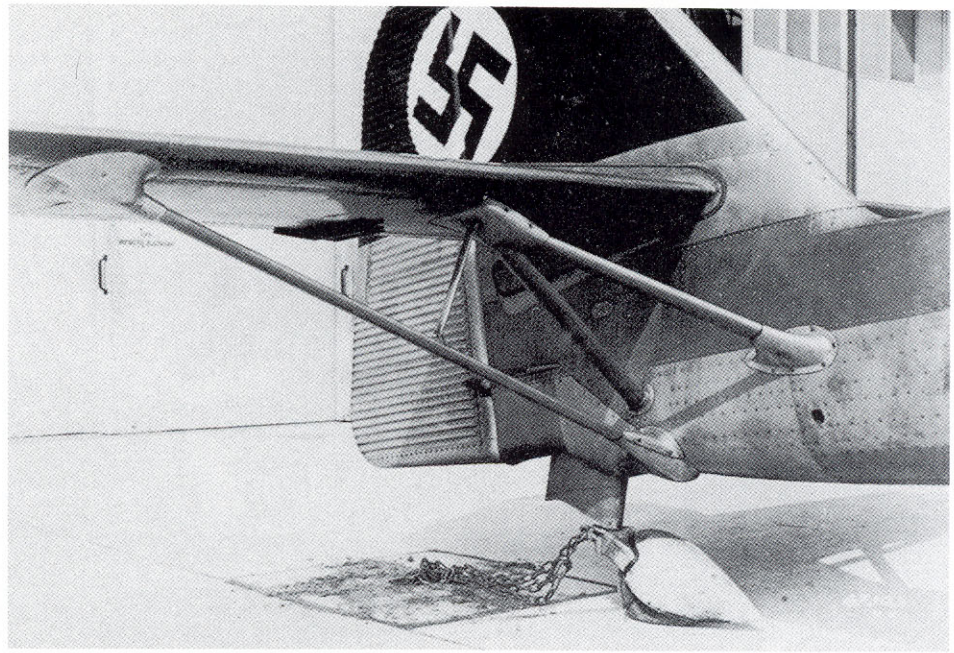
the procurement release of March 23, 1936.

Arado's previous positive experiences with the Ar 65 and Ar 68 single-seat fighters led chief designer Walter Blume to believe that only a biplane would be suitable for the dive-bomber mission. Development of the Ar 81, a biplane of metal construction with N-type struts and a faired, fixed undercarriage, began in April 1934. The aircraft's fuselage tapered sharply toward the tail. The Ar 81 V1 was powered by a Jumo 210 C in-line engine.

Construction of the mock-up was completed in December 1934 and the first flight was scheduled by the manufacturer for June 1936. By then the mock-up of the V2 was also complete. This prototype, for which the development contract was issued in December 1934, was to be powered by a Siemens-Bramo SAM 322 B radial engine (according to GL/C-Amt aircraft development program of 1/10/36). First flight of the Ar 81 V2 was planned for November 1936. Both prototypes had twin fins and rudders (the vertical stabilizer of the V1 was slightly vee-shaped), which tended to flutter in a dive. The aft fuselage of both prototypes was modified and the empennage attachment strengthened. Only the Ar 81 V1 and V2 had dive brakes. The revised horizontal stabilizer dispensed with the vee-shape. The Ar 81 V3, powered by a Jumo 210 C engine, had a central fin and rudder. This version, too, failed to convince the authorities and development was terminated after the third prototype. The planned pre-production series (A-0) thus did not come to fruition.

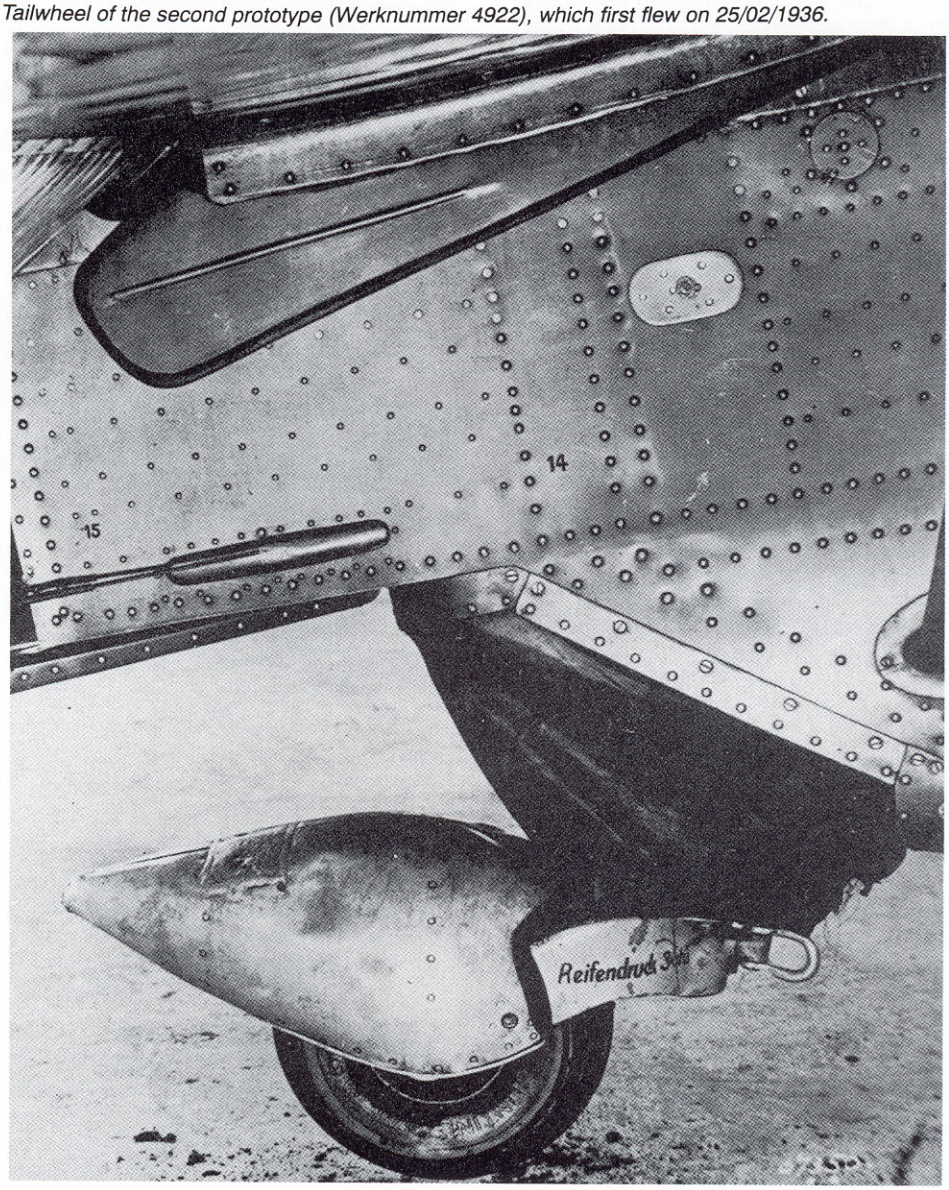
However, back to the development of the Ju 87 A. The Ju 87 V4 flew for the first time in November 1936 and represented the prototype for the future A-0 series. Junkers lowered the engine by approximately 0.25 meters in order to improve the pilot's forward view while taxying. The top line of the fuselage was lowered aft of the gunner's position and the aircraft had a single fin and rudder. In order to simplify production, the aircraft received a straight wing leading edge (previously the outer wings were swept back slightly) and the undercarriage fairings were lengthened. A dive-bombing sight (Sturzvisier, or Stuvi) was also added. Armament consisted of a flexible MG 15 for the radio operator and a fixed 7.92mm Rheinmetall-Borsig MG 17 in the starboard wing bend. The bomb cradle beneath the fuselage was intended for a maximum load of 250 kilograms. Carriage of a 500-kg external store was only possible without the radio operator. An automatic pull-out system was also installed; this aided the pilot in the high-G conditions encountered while pulling out of the dive. Following the manual release of the bombs, the system activated the control surfaces, dive brakes and trim tabs. In later versions an altimeter began the automatic release of bombs and the pull-out at approximately 500 meters.

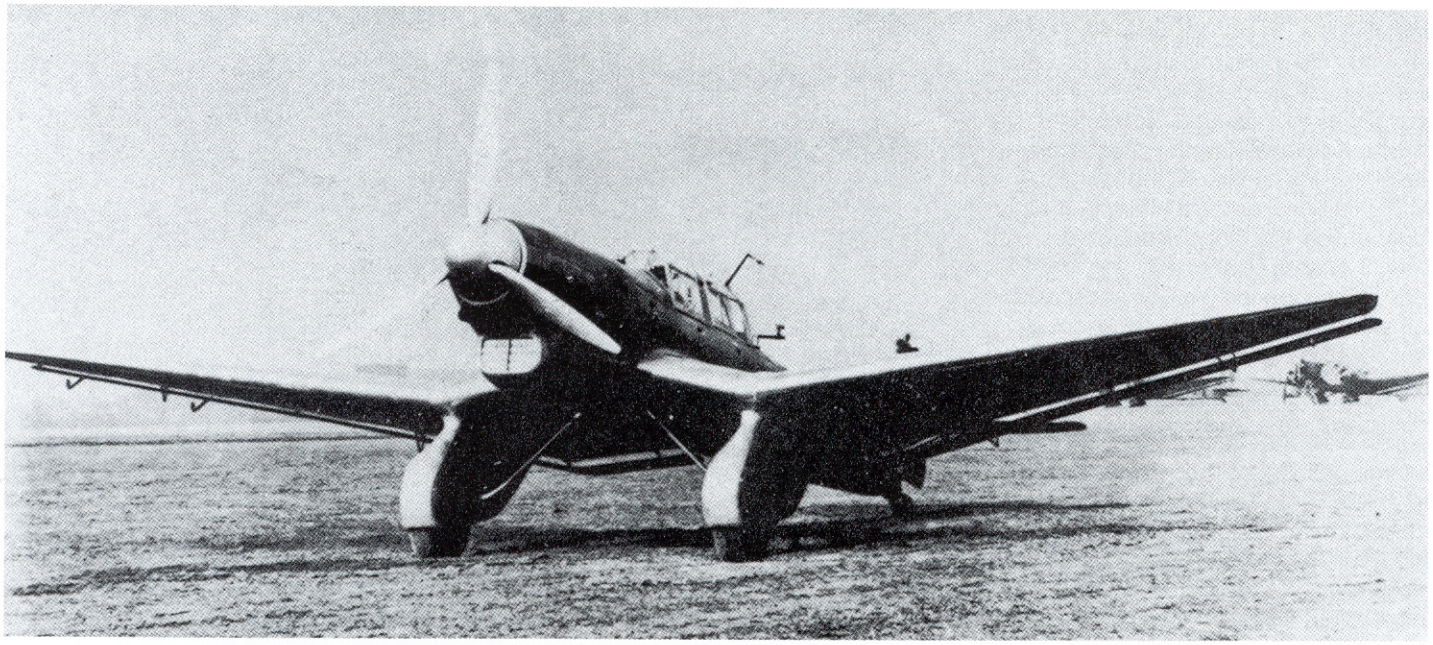
In early 1937 the Ju 87 V4 underwent extensive flight testing for measurement of the aircraft's performance, loading tests and bomb dropping. The inadequate power provided by the aircraft's engine continued to be a problem. Use of the heaviest external store (500 kg) was only possible if the radio operator was left on the ground. Consequently, somewhat



Close-up of the Ju 87 V2's centrally-mounted single fin and rudder. Dessau, early 1936.

Tailwheel of the second prototype (Werknummer 4922), which first flew on 25/02/1936.





Front view of the Ju 87 V2 during trials in March 1936.

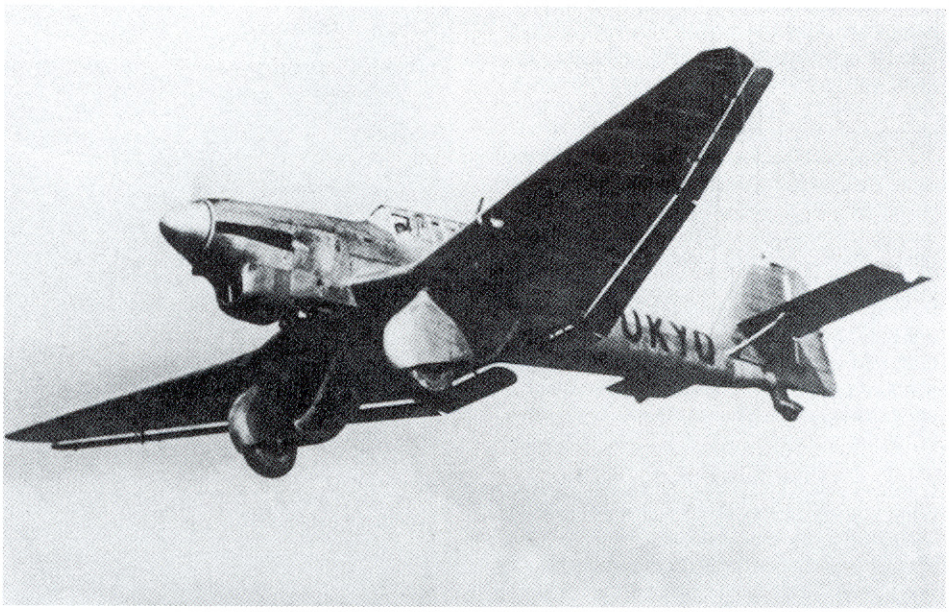
later the fourth prototype and the A-0 series were equipped with the 640 H.P. Jumo 210 Ca in place of the Jumo 210 Aa. A new oil cooler inlet was installed at the same time.

The Ju 87 V5 was basically similar to the fourth prototype but had a Jumo 210 Da engine in place of the Jumo 210 Aa. Construction began in November 1935 and the aircraft successfully made its first flight in August 1936. The aircraft served as the prototype for the A-1 series and carried out machine-gun trials, especially with the MG 17. Available sources do not clearly indicate that the Ju 87 V6 through V9 were prototypes of the A-series. According to Cescotti, the V6 and V7 began flying as test aircraft for the new Jumo 211 A engine in early 1938. Installation of the new engine resulted in numerous changes in the area of the fuselage.

In December 1938 4/Trägergruppe 186 was formed for operations from the German Navy carrier Graf Zeppelin then under construction. The Ju 87 A was planned as the carrier's first dive-bomber equipment. Trials with the Ju 87 V10 (D-IHFH) and V11 (D-ILGM), both converted as carrier aircraft, took place at the E-Stelle Travemünde. Also based there for tests with bombs and fuse experiments were Ju 87 A-1s Werknummer 5000 (D-IAGR) and 0013 (D-IEXC). Following the introduction of the more modern Ju 87 B, Junkers developed a carrier-based Stuka based on this later version, the Ju 87 C.

Production of eleven Zero-Series aircraft ordered by the RLM (procurement release on January 21, 1935) began sometime between August 1936 and early 1937. These aircraft incorporated all the changes introduced by the V4, as well as a contact altimeter, radio equipment and a window in the cockpit floor for better target identification.

The fuselage of the Ju 87 was a stressed-skin metal structure, forming a single component with the wing center-section. The radio-operator/gunner sat on a rotating stool under a plexiglass canopy. The trapezoid-shaped wing had a straight leading edge and was attached to the center-section with ball-head screws. The wing skin was flush-riveted from the leading edge to the forward spar; aft of the spar mushroom-head rivets were used, which required less work and produced negligible aerodynamic drag as a laminar flow was achieved over approximately only the first third of the wing surface. The centrally-mounted single tail unit had hand-operated trim tabs and an hydraulically-actuated tailplane trimmer.



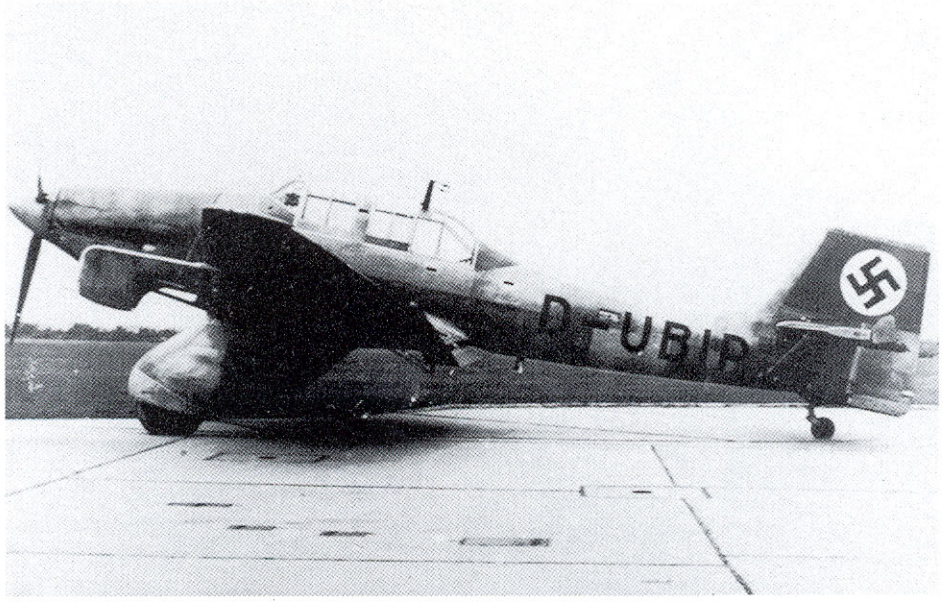
In-flight photo of the Ju 87 V3 (D-UKYQ, Werknummer 4923), which first flew on 27/03/1936. The aircraft was moved to the E-Stelle Rechlin in May.

Type	WerkNr.	Power Plant	Scheduled First Flight
Ar 81 V1	901	Jumo 210 C	June 1936
Ar 81 V2	902	SAM 322 B	September 1936
Ar 81 V3	903	Jumo 210 C	September 1936

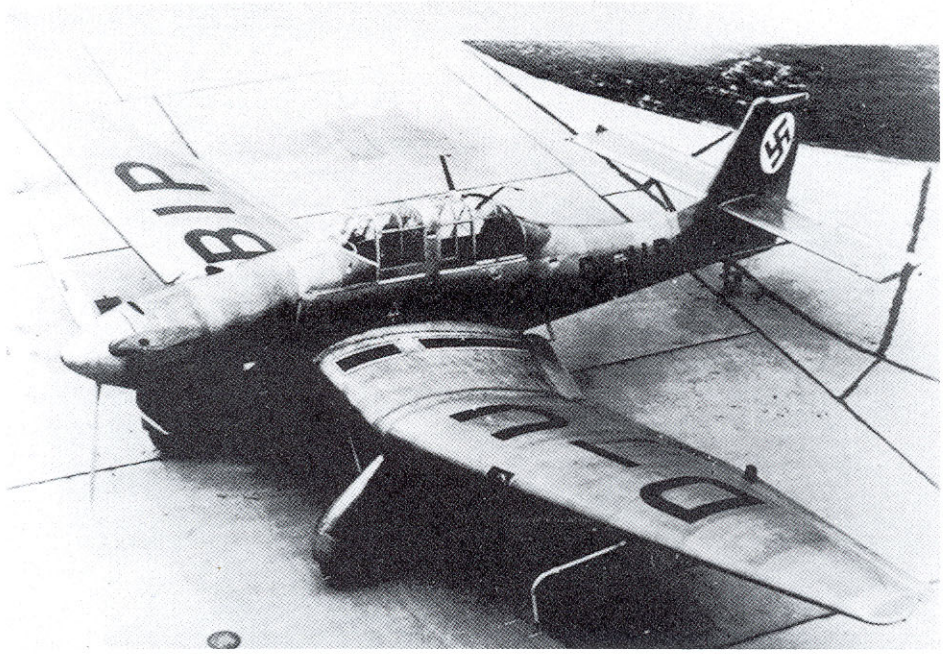
Leakproof wing tanks were located in the wing.

Following thorough inspections at the Junkers assembly plant in Dessau, the Ju 87 A-0 was handed over to I/StG 162 Immelmann for service trials. The first Ju 87 A-1, which was identical to the Zero-Series aircraft, was delivered to the Luftwaffe in the middle of the year.

At first the aircraft was built exclusively at Junker's Dessau plant. Soon, however, the company began seeking a manufacturer to construct the Ju 87 under license, for example Blohm & Voss or Henschel, but the RLM decided to bring Weser Flugzeugbau G.m.b.H. (WFG) into the program. An agreement between parties was reached after some negotiation and WFG was to remain the sole builder of the Ju 87, apart from Junkers, until the end of the war. The WFG construction program was included in the RLM's Delivery Plan 4 of November 1936. Production of the first 35 airframes was to begin in October 1937. Delivery Plan 7 (April 7, 1937) raised this figure to 70, with a monthly output of ten Ju 87 As. These numbers had to be revised at a later date. WFG received the jigs and initially also manufactured parts from Junkers. Production was up and running very quickly, however, and very soon the first components were manufactured in Bremen. Once Junkers had received the contract for large-scale production of the Ju 88, it increasingly transferred production of the Ju 87 to WFG.



Side view of the still unarmed Ju 87 V4 (D-UBIP, Werknummer 4924). This aircraft's tail unit was equivalent to that of the A-1 series.



The Ju 87 V4 was ready to fly on schedule in June 1936. The machine served as the prototype for the A-1 series.

Individual components were manufactured in a new branch plant located near Bremen. The tail unit was built in the Delmenhorst facility. The Karman Company of Osnabrück was also involved, producing the fuselage skin. The components were delivered by special ship to Lemwerder near Bremen where final assembly took place in Hall 210. The aircraft were ultimately rolled out and test flown there. Aircraft delivered by WFG were designated "Bremen Production" and marked with a letter "L." The first license-built Ju 87 made its maiden flight on February 26, 1938, after which it went to Junkers for testing. The second machine began flying on March 31, 1938.

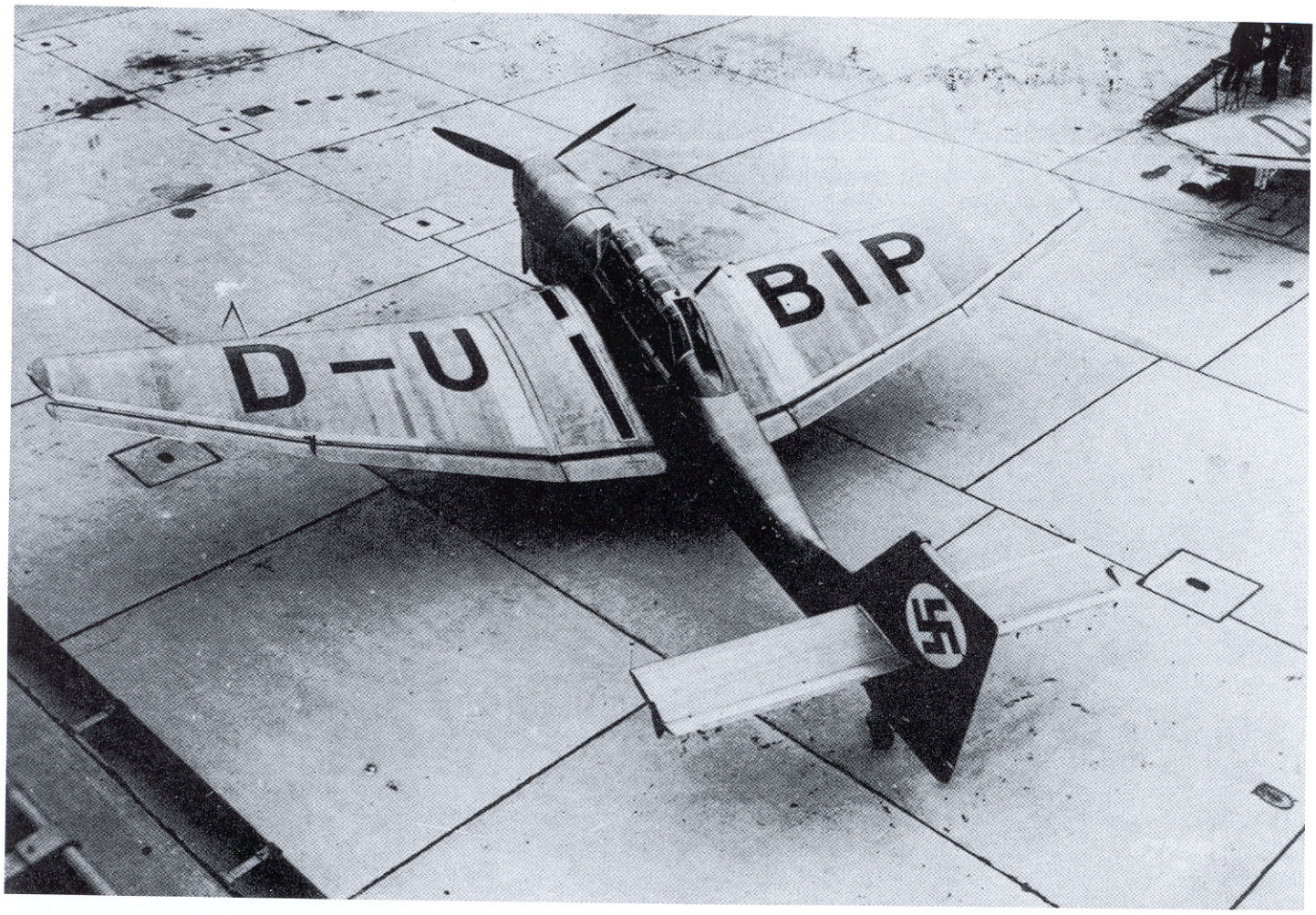
A total of 262 Ju 87 As were built by the end of 1938 – 192 aircraft in Dessau and the remaining 70 by Weserflug in Bremen.[1]

Dipl.-Ing. Beauvais test-flew a numbers of Ju 87 A aircraft at the E-Stelle between March and June 1937 (D-IFMP, D-IEUB, D-IDHD and D-IDYD). Beauvais carried out propeller pitch tests in November with D-IDFD. Flights in D-IFUB and D-IBNQ took place in April and June 1938. Test flights involving D-IMFV, equipped with an automatic pitch control mechanism by VDM, followed in August 1938. Ju 87 A D-IEAO arrived at Rechlin by February 14, 1938 at the latest (factory test flight). This machine was used for cold-start tests in February and March. He 118 D-OQYF was also at Rechlin for cold-start tests at that time. In the summer of that year D-IEAO was used for duration trials and calibration flights. The aircraft was again involved in cold-start experiments in the winter of 1939 and continued in duration trials until June 15, 1939, carrying out numerous calibration flights.

The first use of the new weapon in combat took place in February 1938 with Kampfgruppe K 88 of the Condor Legion in Spain. A pre-production (0-Series) aircraft joined J/88 in September 1936 and was followed by two Ju 87 As in January 1937.[2]

During the aircraft's period of operations in Spain crews were rotated regularly in order to provide the maximum number of pilots and observers with "live" combat experience.

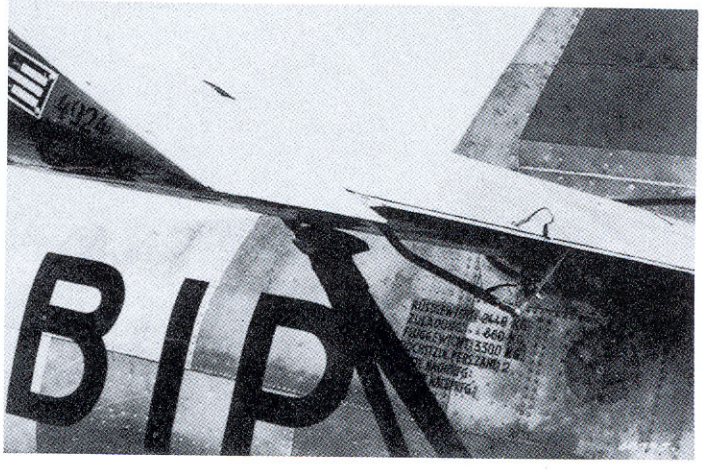
Responsibility for dive-bomber training was initially assigned to JG 132, which was formed at Döberitz on April 1, 1934; the unit was also involved in training fighter pilots. Due to the lack of a proper dive bomber the Geschwader at first used the He 50 and, from the beginning of 1936, the He 51. Based on initial experience, on March 28, 1935 the first



Close-up of the Ju 87 V4's tail unit. This aircraft corresponded to the manufacturer's specification of 18/11/1935 and flew for the first time at Dessau on 20/06/1935.

The Ju 87 V4 was fitted with the Junkers-designed dive brake in 1936, resulting in an interruption in the flight test program.

The Ju 87 V4 was ready to fly on schedule in June 1936. The machine served as the prototype for the A-1 series.



Stukagruppe, Fliegergruppe Schwerin (I/162), was formed from JG 132. Stab and I/162 were established at Schwerin, II/162 at Lübeck-Blankensee and earlier I/165 at Kitzingen.

Junkers began producing the Ju 87 A-2 in early 1938. The new variant differed from its predecessor mainly in the adoption of a somewhat more powerful Jumo 210 Da (690 H.P.) engine with two-stage supercharger, Junkers H-PA variable-pitch propeller and a revised rudder which was rounded at the top.

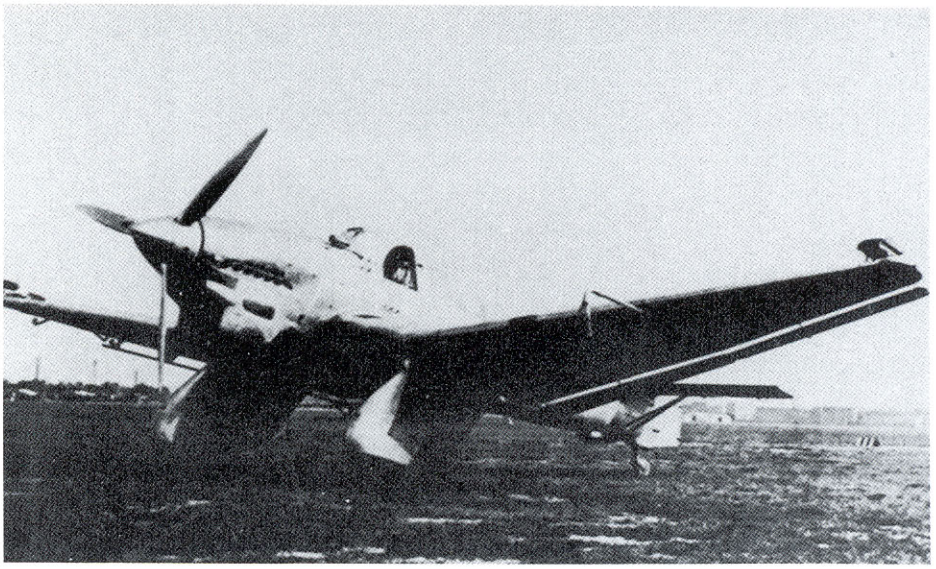
In the period June 3-9, 1939 Junkers factory pilot Harder flew Ju 87 A-2s with the Werknummern 0420, 0427, 0423, 0428 and 0429.

The armament of the Ju 87 A consisted of a fixed MG 17 installed in the right wing with a Junkers mount and 500 rounds of belt-fed ammunition. The Rheinmetall-Borsig MG 15 in the aft cockpit (B-Stand) was mounted on a Junkers slotted mount. Fourteen drums of ammunition, each with 75 rounds (1,050 rounds), were carried. The stores delivery system beneath the fuselage, an ETC 500/A (500 XI B lock) by Siemens, could accept a maximum bomb load of 500 kilograms. Also made by Siemens was the ETC 50 stores rack beneath each wing, which could carry a 50-kilo SC 50 bomb. A Revi C 12 C sight by Zeiss-Jena was available for aiming the fixed machine-gun. The dive-bombing sight was produced by Junkers itself.

Following the military success in Spain, where accurate bombing inflicted serious losses on the enemy, the RLM called for further development of the Ju 87.

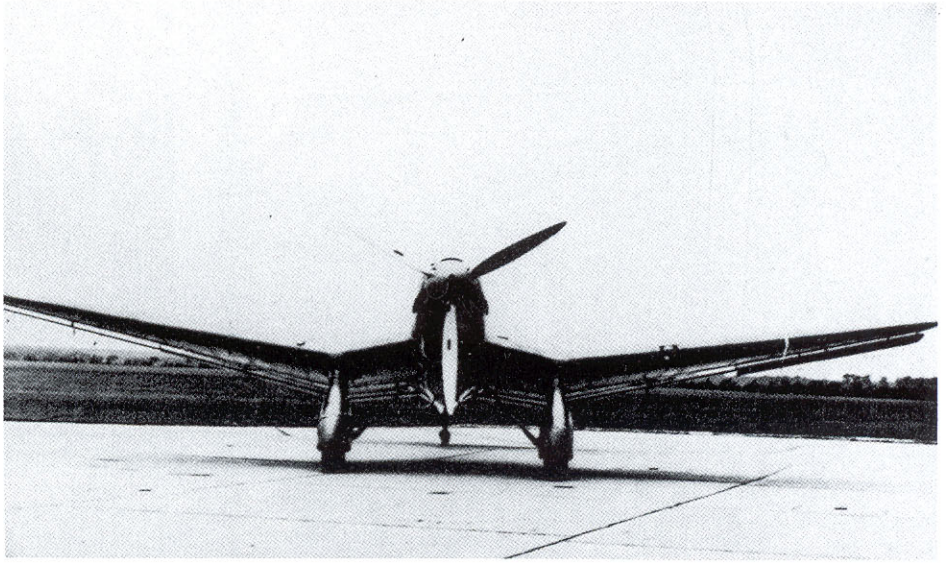
With the introduction of the more advanced Ju 87 B, the A-series was relegated to use as a training aircraft for new Stuka pilots and radio-operator/gunners; examples at training schools included: 5011, 5036, 5044, 5047, 5048, 5049, 5052, 5053, D-IDJU and D-IDFS at Wertheim; 5001, 5017, 5021, 5029, 5033, 5034, 5043, 5060 and 5065 at Otrokowitz, Bohemia; 5021, 5023, 5038, 5039, 5049, 5062, 5065 and 5069 at Graz auf Usedom.

According to flight logs, from summer 1938 until early 1939 2(See)/Lehrgeschwader 2 had on strength at least three Ju 87 A aircraft coded 6L+MOS, 6I+LOS and L2+L41. They were used for, among other things, dive-bombing instruction. At the same time the unit also had on strength: He 114s 6L+UOS and 6L+TOS, He 60s 6L+BOS and L2+B41, Do 18 6L+DOS, Ar 196 6L+Z41, and He 111s L2+041 and L2+P41.



The A-0 series was largely similar to the Ju 87 V5 (Werknummer 4955), which first flew on 14/08/1936.

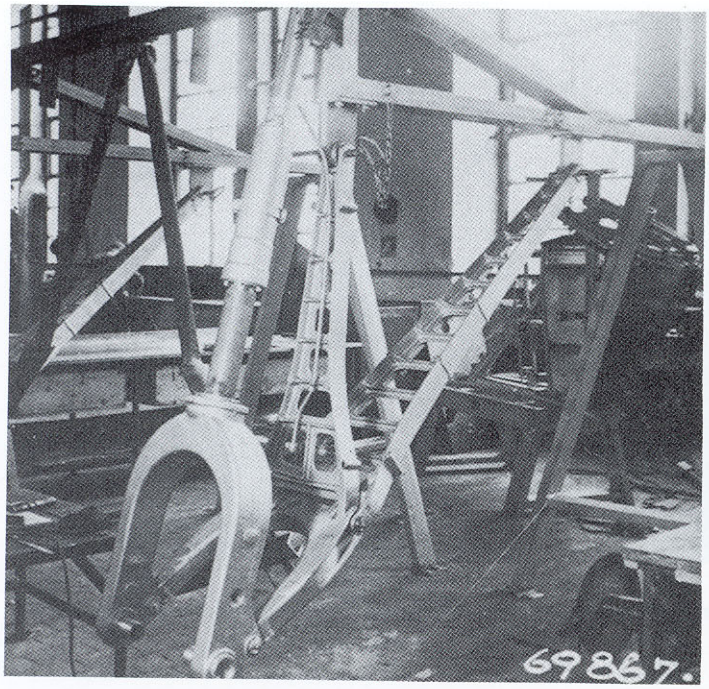
Front view of one of the two A-0 prototypes. The photo was taken soon before the aircraft was fitted with dive brakes.

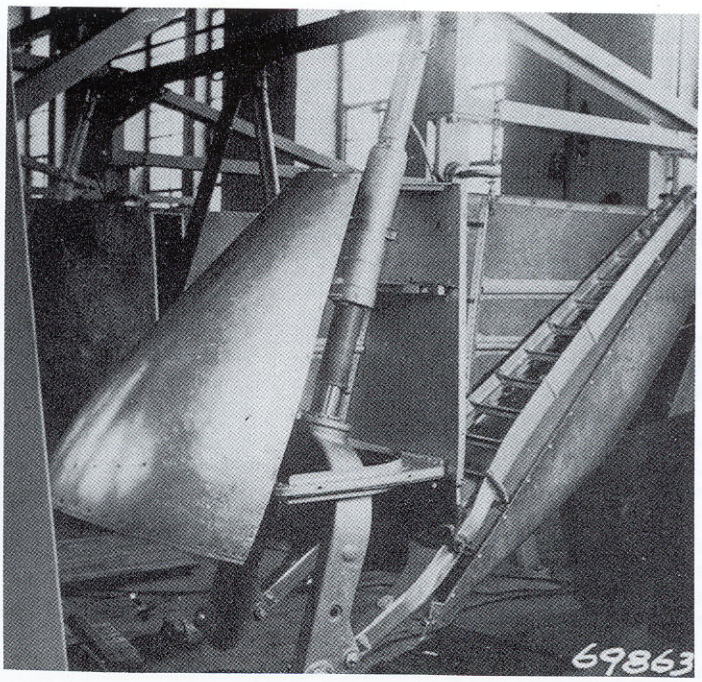


Footnote:

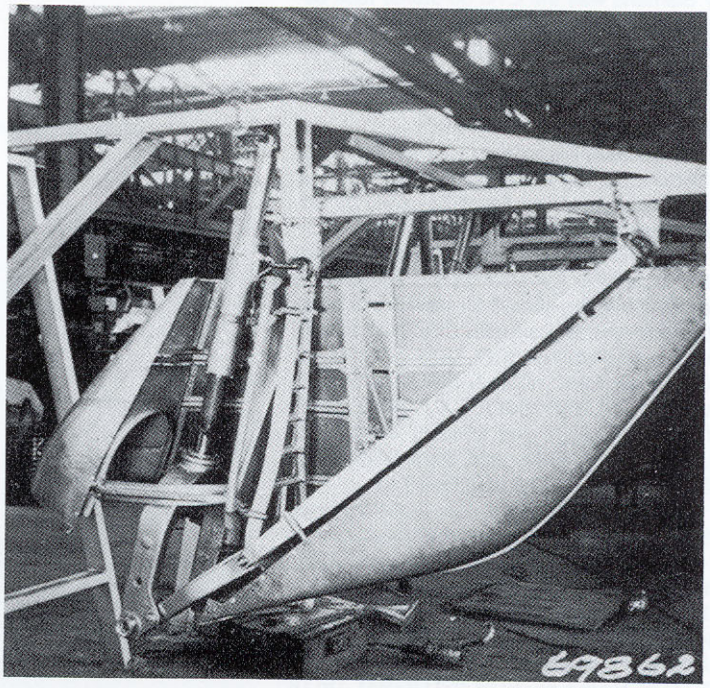
(1) R. Cescotti, Kampfflugzeuge und Aufklärer, Koblenz 1989

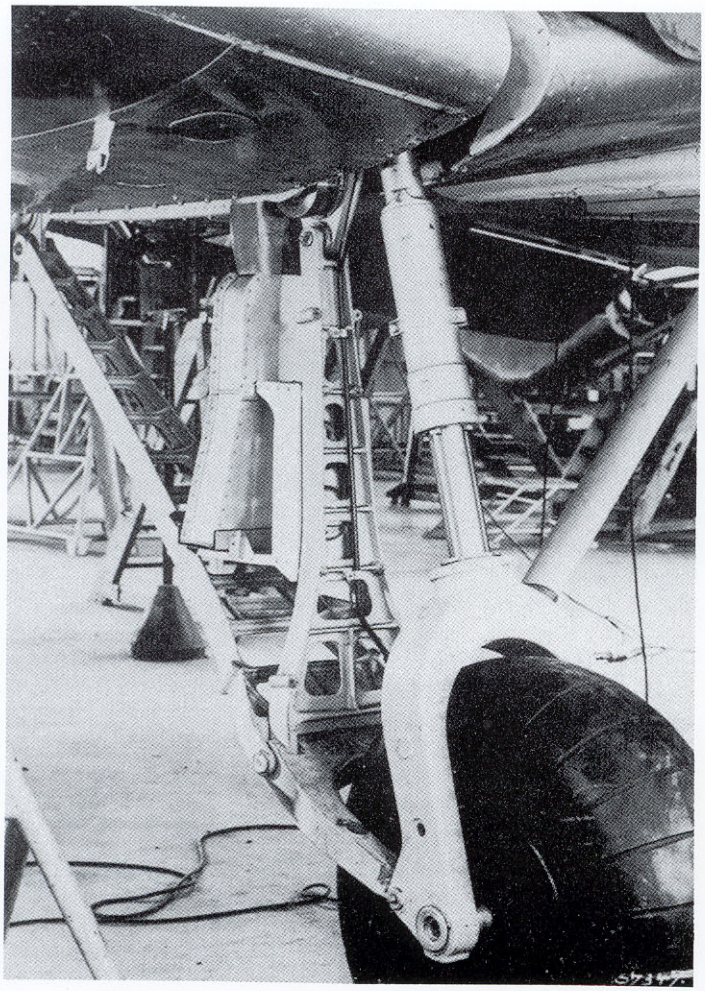
(2) K. Ries, Legion Condor, Mainz 1970

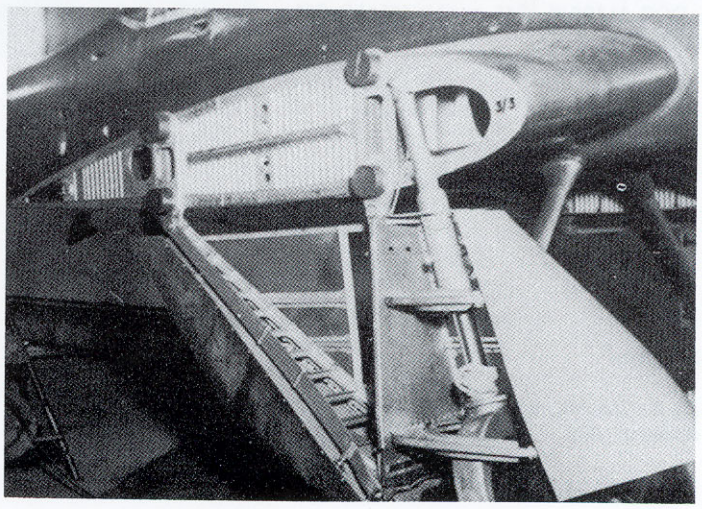


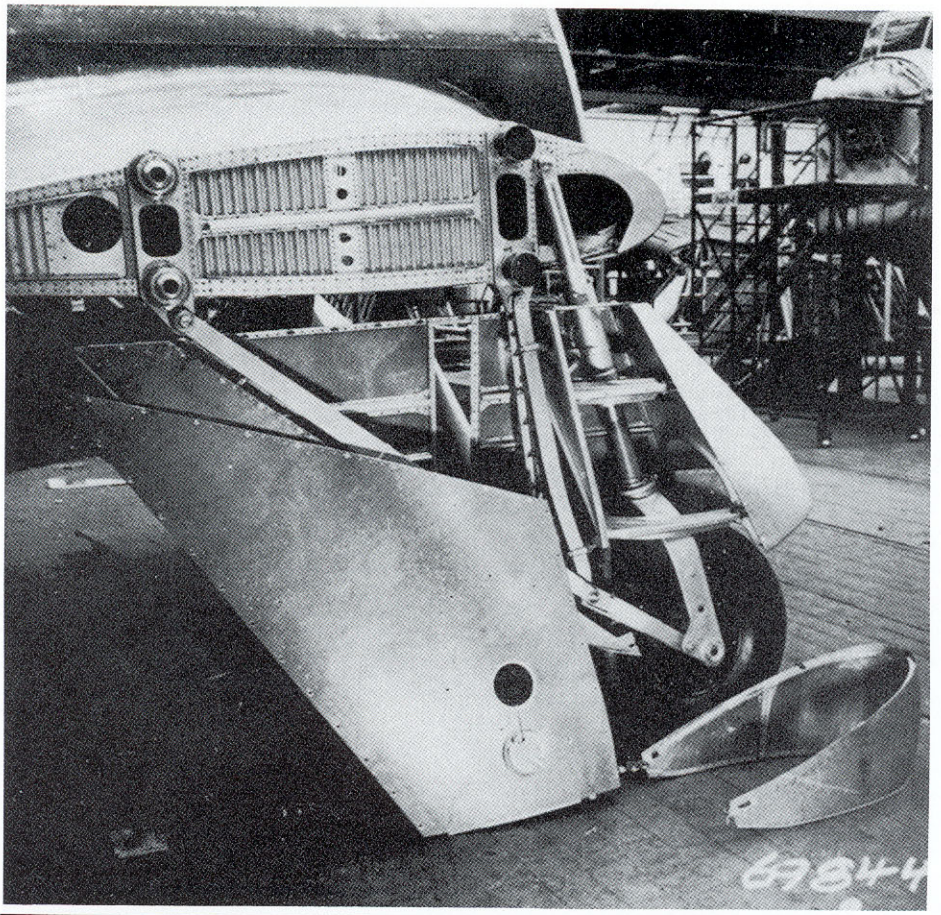


The robustly-designed main undercarriage of the first Ju 87. This series of photos was taken during final assembly of the prototype.





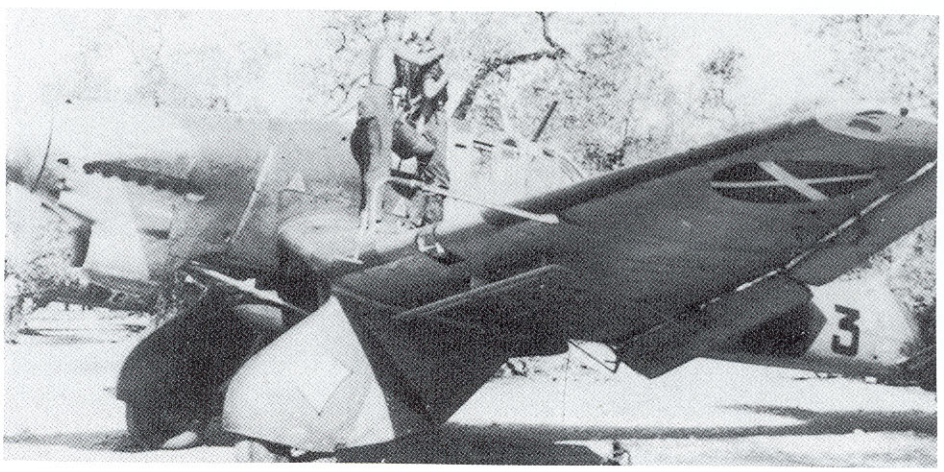




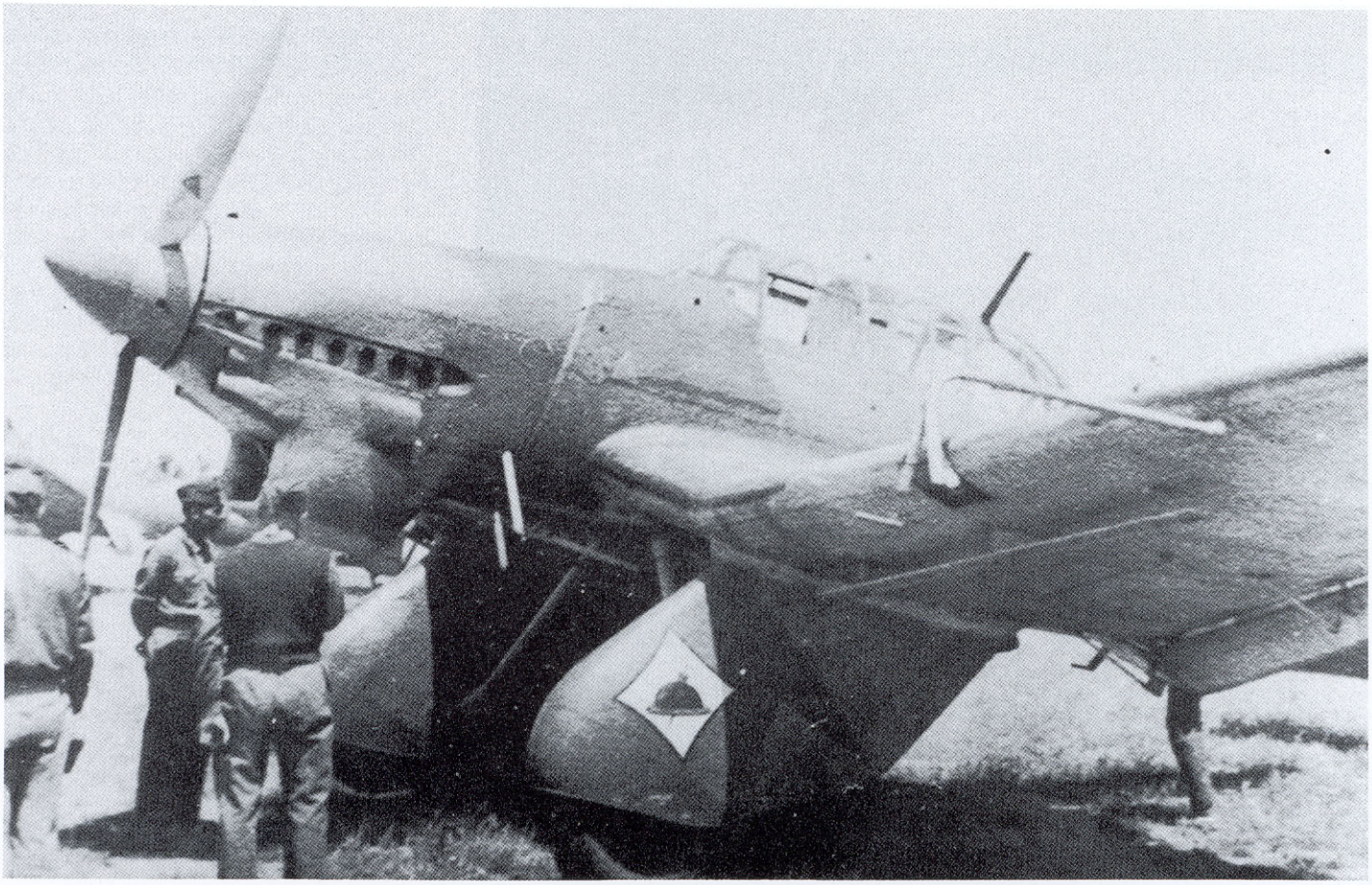
Another photo taken during construction of the prototype in early 1936 at Dessau.

Prototype and 0-Series Ju 87 A

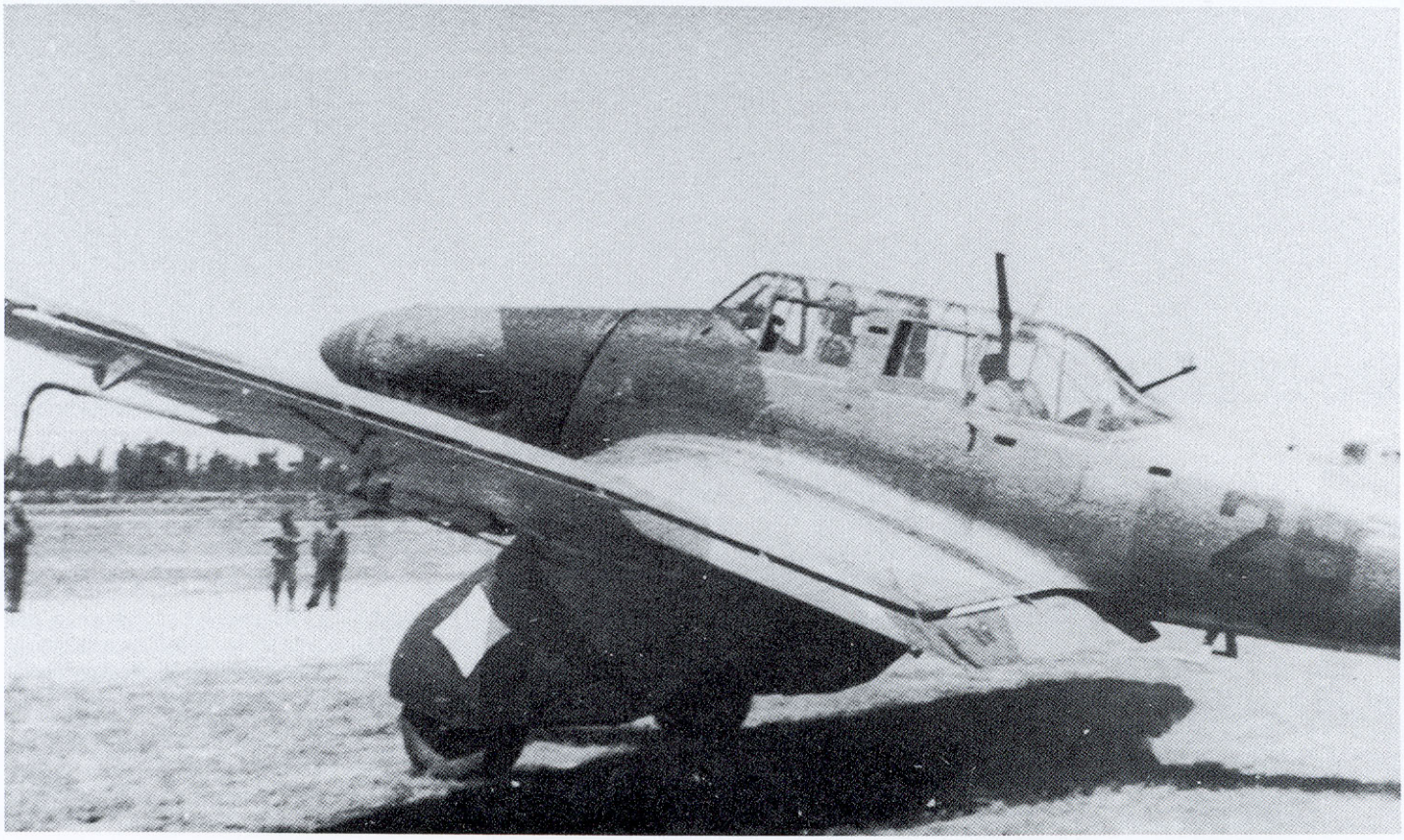
Type	First Flight	Werknummer	Code	Engine	Remarks
V1	17/09/36	—	—	RR Kestrel	crashed 21/01/36
V2	25/02/36	4922	D-UHUH	Jumo 210 Aa	at rechlin March-August 1936
V3	27/03/36	4923	D-UKYQ	Jumo 210 Aa	at Rechlin from May 1936
V4	20/06/36	4924	D-UBIP	Jumo 210 Aa	at Rechlin from September 1936
V5	14/08/36	4925	—	Jumo 210 Da	2nd half of 1936 at Rechlin as A-1
V6 to V9					prototypes for the Ju 87 B-Series (1)
V11	—	4929	D-ILGM	—	D-IHFH converted to carried aircraft converted to carrier aircraft
A-01 to A-11	August-early 1937	0001 to 0011	D-IEAA to D-IEAU	Jumo 210 Aa and Jumo 211 Ca	service trials



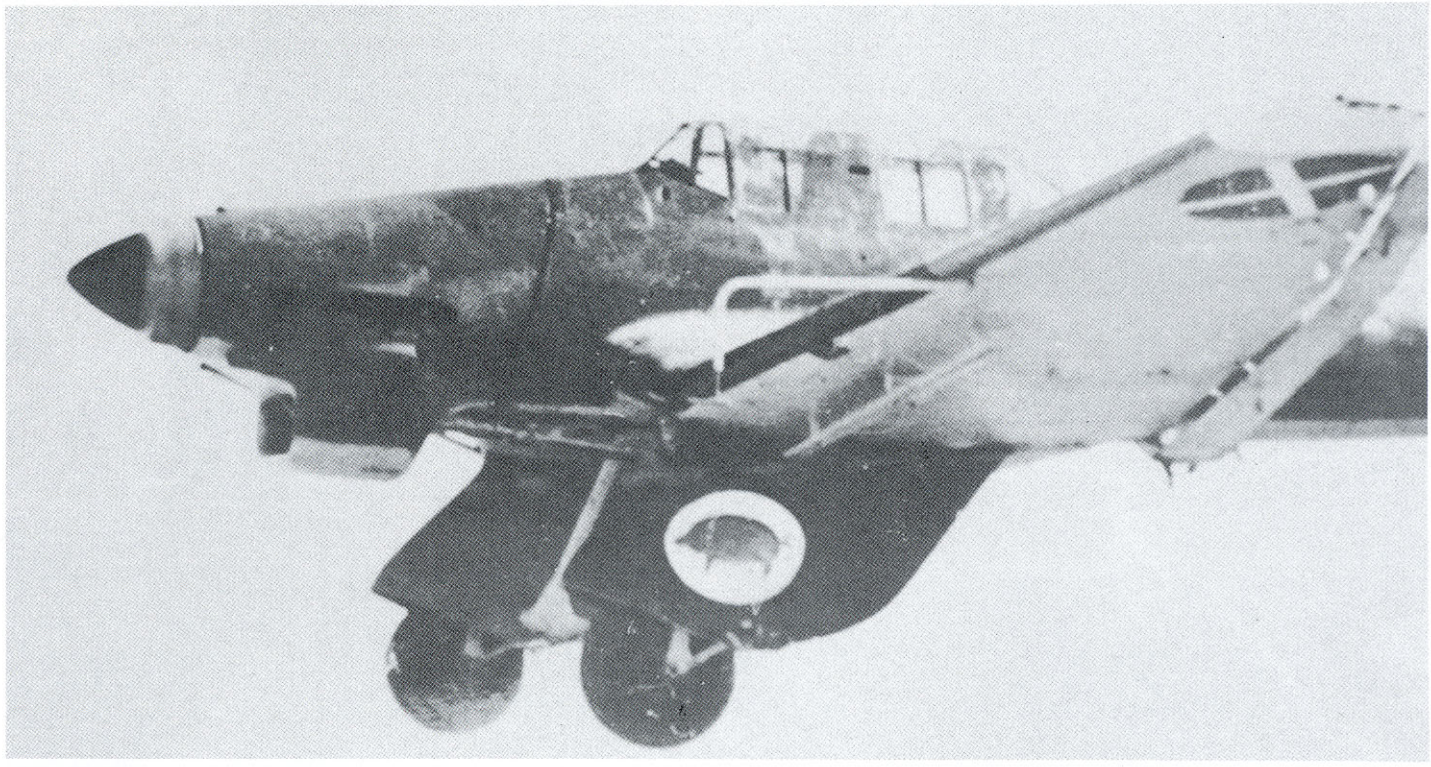
Aircraft 29.3 (in the background is 29.2) of the 5th Staffel of Gruppe J/88 shortly before an operational flight with external store in the under-fuselage bomb crutch.



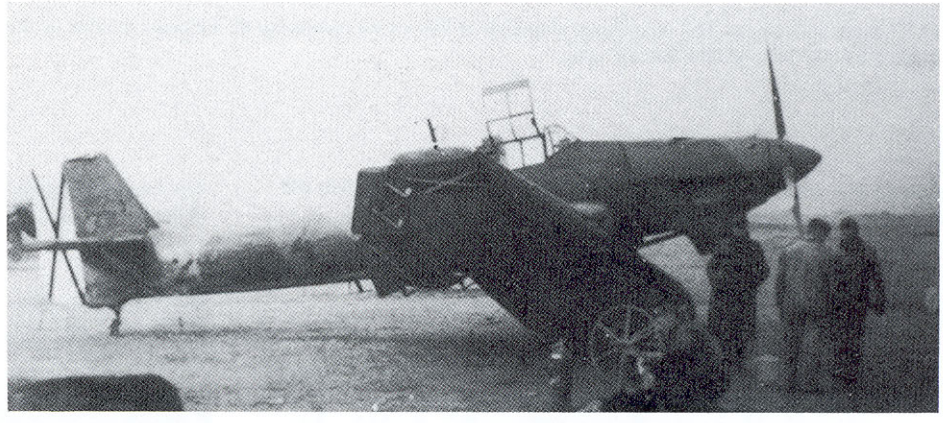
In 1938 three Ju 87 As were sent to J/88 in Spain, where they formed the 5th Staffel. These aircraft helped develop the dive bombing tactics later used by the Luftwaffe.



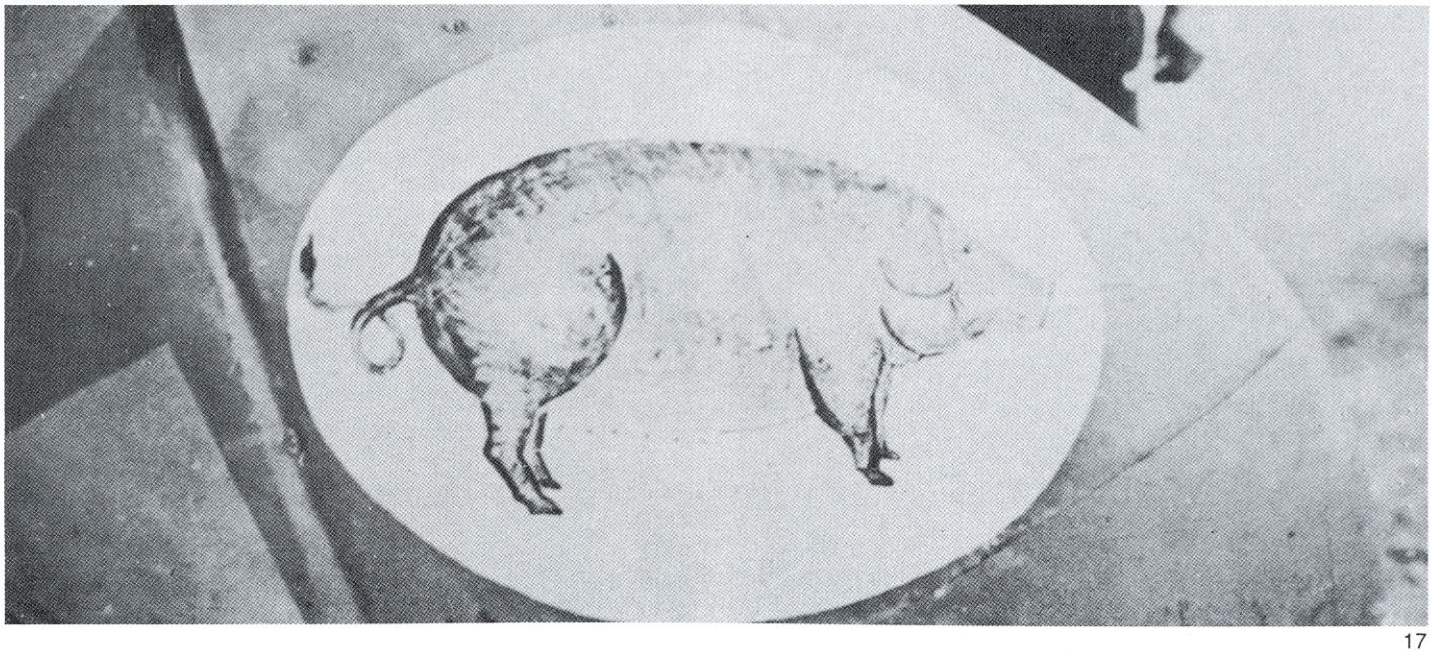
Side view of a Ju 87 A in Spain. The aircraft had to be flown as a single-seater when an SC 500 bomb was carried.

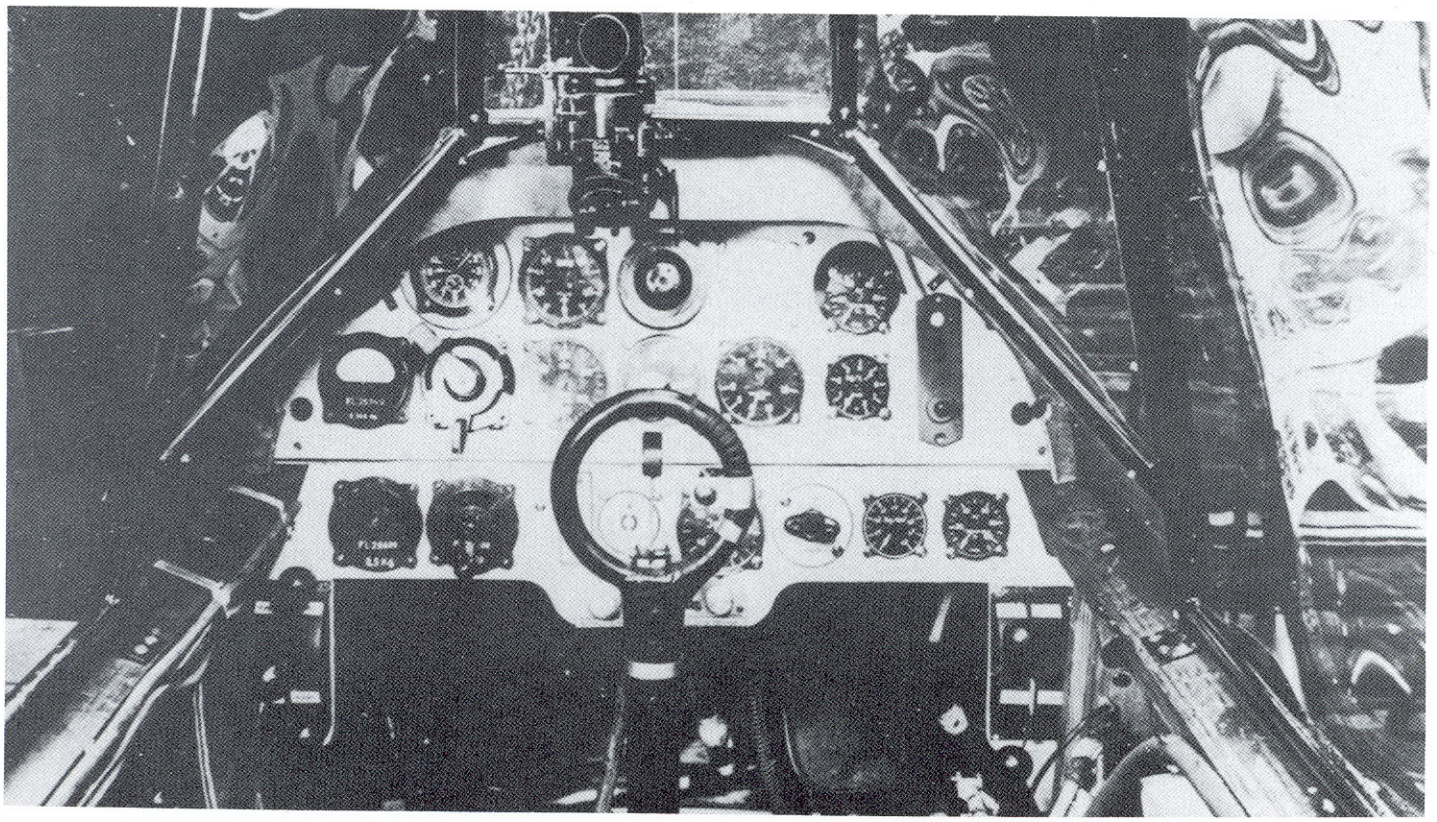


The insignia of the "Jolanthe Kette" was worn by the first Ju 87s sent to Spain; these were replaced by early Ju 87 Bs in October 1938.



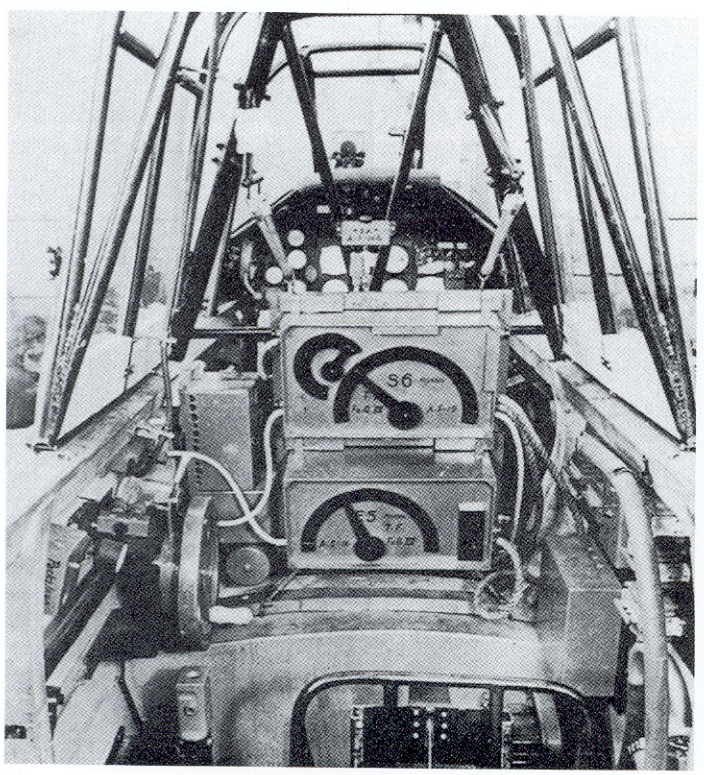
A Ju 87 A-1 of the Condor Legion photographed on an airfield near Barcelona between sorties.



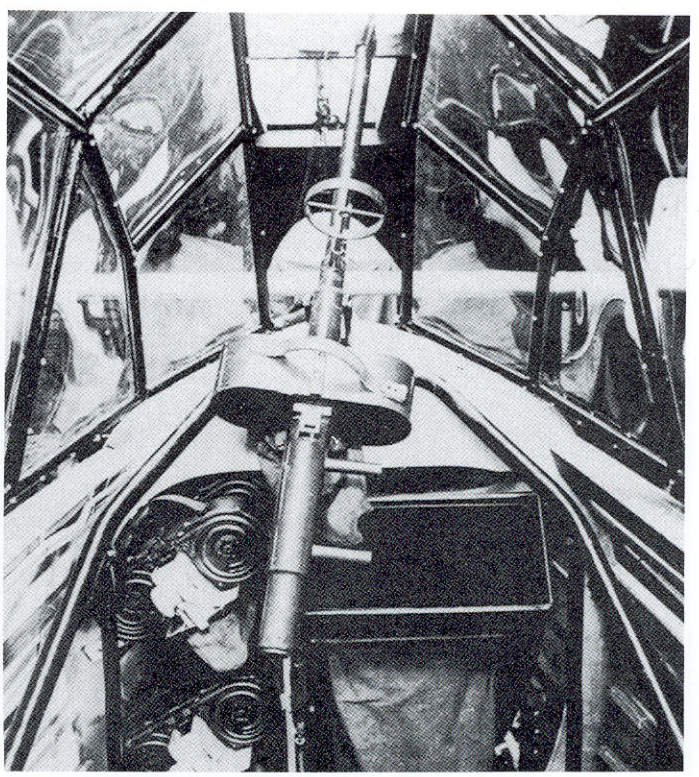


Ju 87 cockpit mock-up. The equipment was similar that of the eleven Ju 87 0-Series aircraft. Note the early style control column with "spade-handle" grip.

View of the two-seat cockpit of the Ju 87 mock-up. The radios are wooden boxes, while rope simulates electrical cables.

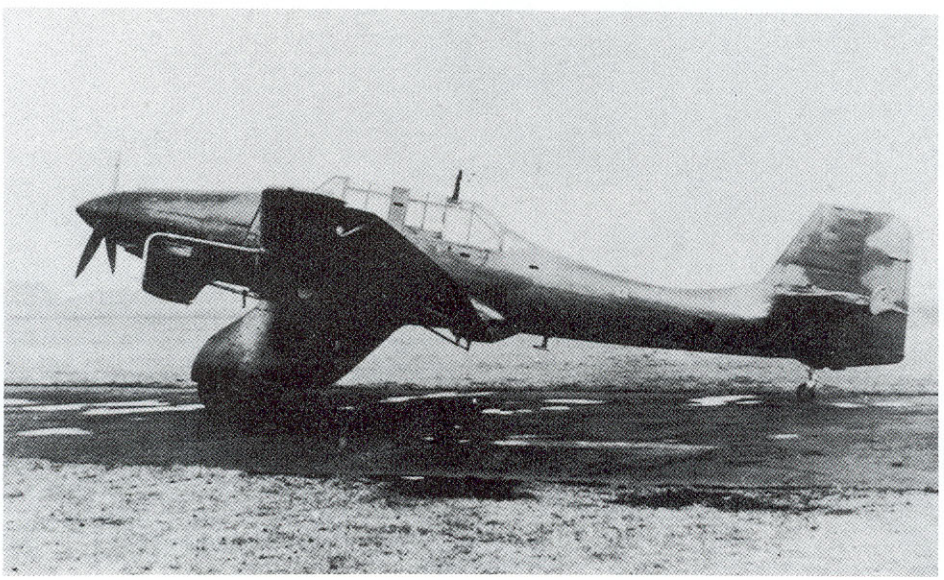


The rearward-firing machine-gun. The MG 15 installation corresponds to the manufacturer's specification of 22/06/1936.

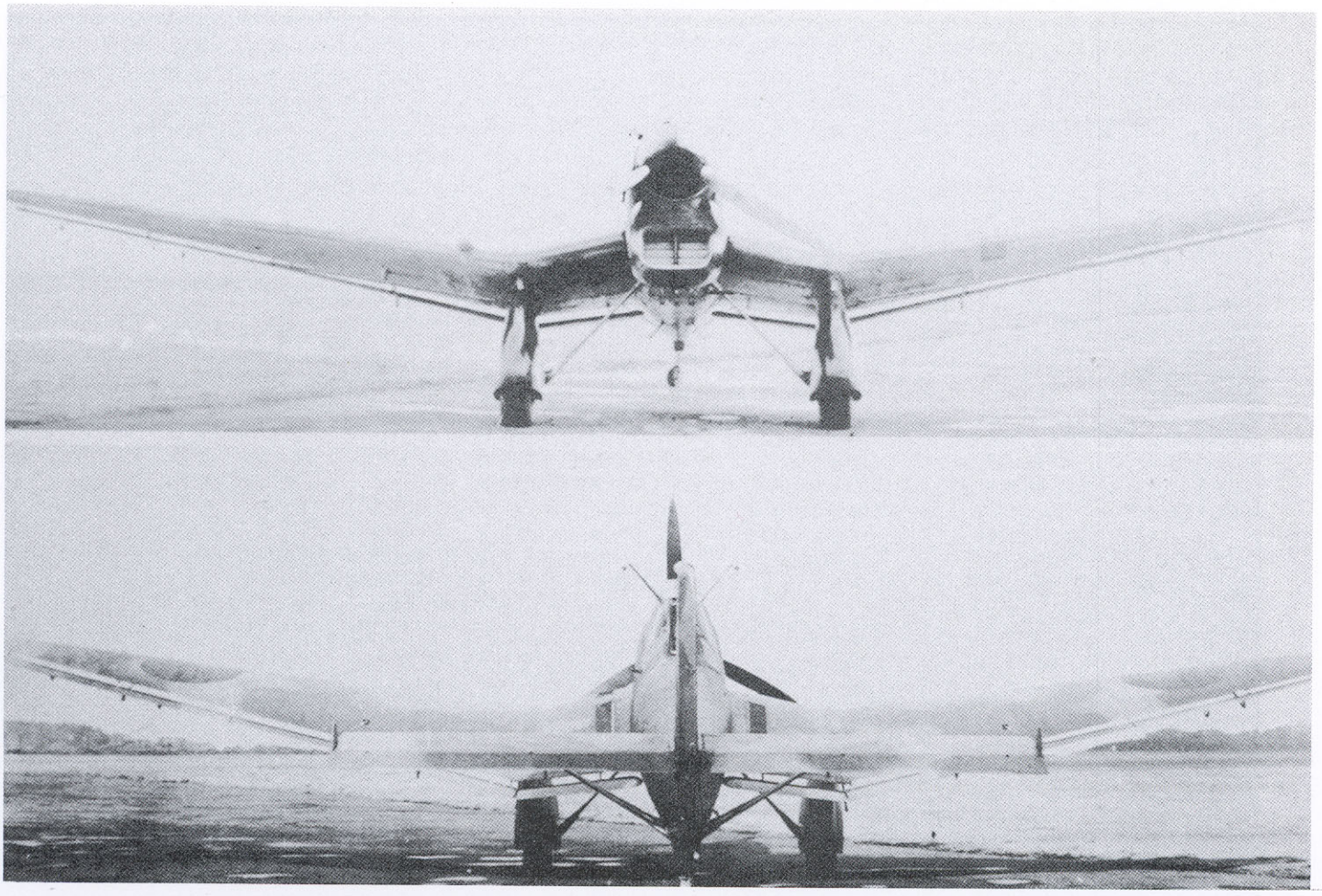


Luftwaffe Dive Bomber Units until the Outbreak of War

Geschwader	Date	Site of Formation	Fate/Remarks
I/StG 162	28/03/1935	Schwerin	formed from JG 132 as Fliegergruppe Schwerin, joined Lehrgeschwader in Greifswald and became IV(Stuka)/LG 1
	01/10/1936		
	15/03/1937		
IV(Stuka)/LG 1	15/03/1937		
		Schwerin	disbanded on 15/11/1936
Stab/StG 162	01/04/1936	Lübeck-Blankensee	renamed I/StG 167 on 01/05/1937
II/StG 162	01/04/1936	Kitzingen	became I/StG 77 in April 1939
I/StG 165	01/03/1936	Schweinfurt	became II/StG 77 in April 1939
Stab/StG 165	15/03/1937	Wertheim	became III/StG 51 in April 1939
II/StG 165/	15/03/1937		
	31/09/1937		
I/StG 167	01/05/1937	Lübeck-Blankensee	renamed I/StG 168
I/StG 168	01/04/1938	Graz/Usedom	renamed I/StG 76
III/StG 162	15/031937	Anklam	renamed I/StG 163
I/Stg 163	01/10/1937	Breslau-Strachwitz	taken over by I/StG 2
	01/04/1939		
II/StG 163	01/11/1938	Langensalza	formed from Fliegergruppe 50, renamed III/StG 2
I/StG 162 (New)	01/11/1938	Jever	new formation from Fliegergruppe 30, renamed StG 2 in April 1939
I/StG 160	01/11/1938	Insterburg	created from alert unit of Fliegergruppe 10 formed in Tutow in October 1938; renamed StG 1
4(Stuka)/186	01/10/1938	Kiel-Holtenau	later integrated into III/StG 1I/StG 1 01/06/1939
I/StG 1	01/06/1939	Insterburg	—
I/StG 2	01/04/1939	Cottbus	—
II/StG 2	01/04/1939	Stolp-Reitz	created by renaming I/StG 2 (New); took over I and II/StG 163
III/StG 2	01/04/1939	Langensalza	—
III/StG 51	01/04/1939	Wertheim	—
I/StG 76	01/05/1939	Graz-Thalerhof	—
I/StG 77	01/05/1939	Brieg	—
II/StG 77	01/05/1939	Breslau-Schöngarten	—
Stab/StG 77			

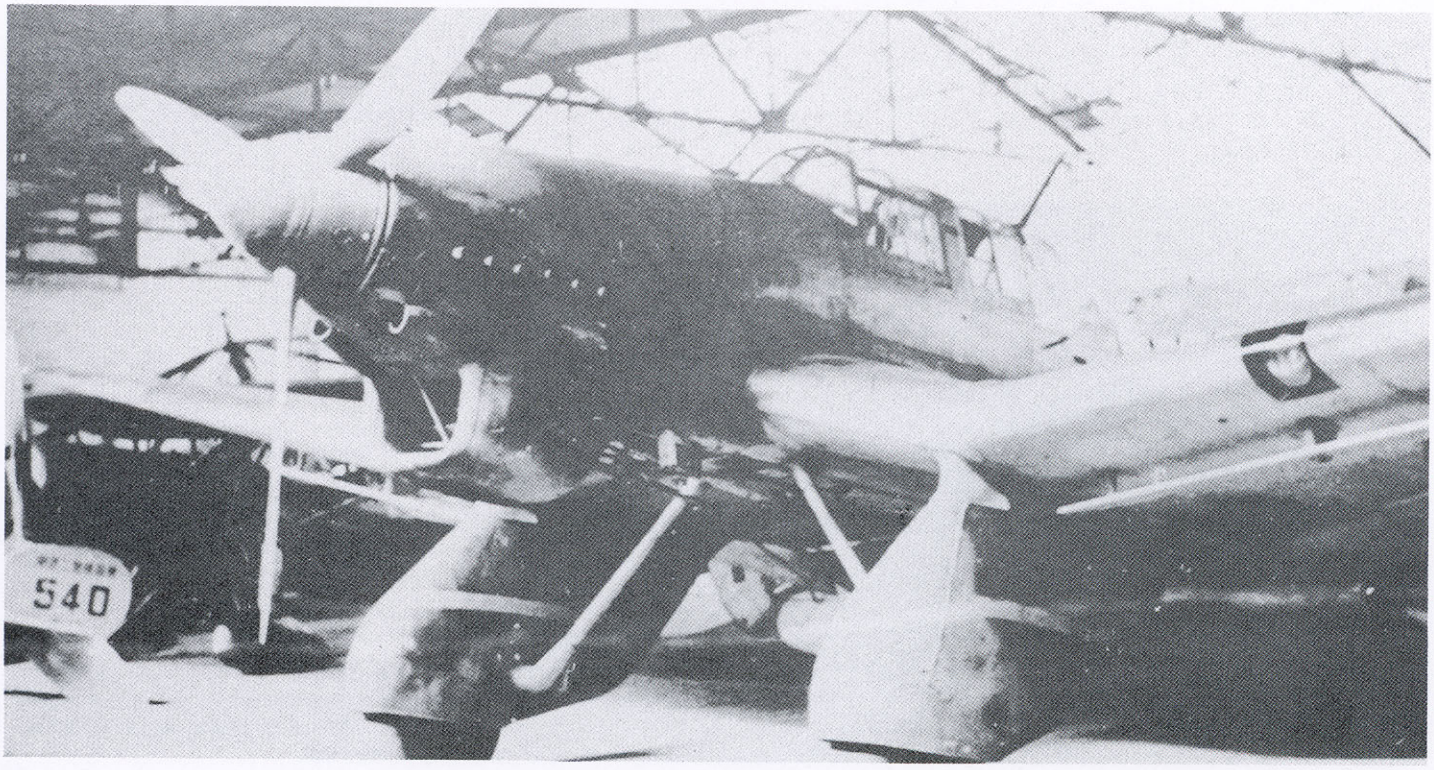


The first of eleven Zero-Series (pre-production) aircraft. It was supposed to be ready too fly in October 1936 and probably began flight testing in late 1936.

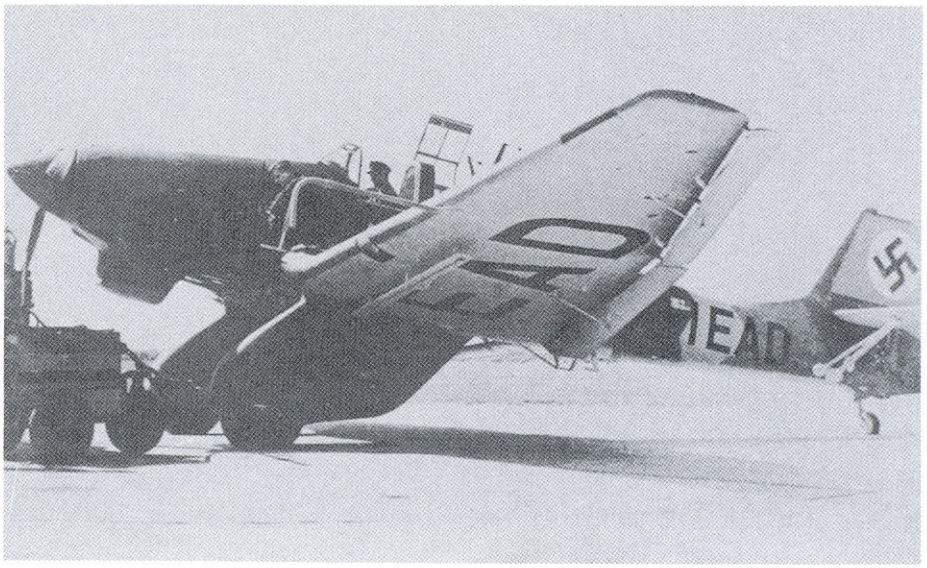


Front and rear views of the export version of the Ju 87 A which was demonstrated in Asia.

At least one early Ju 87 found its way to Asia where it influenced local dive bomber development.

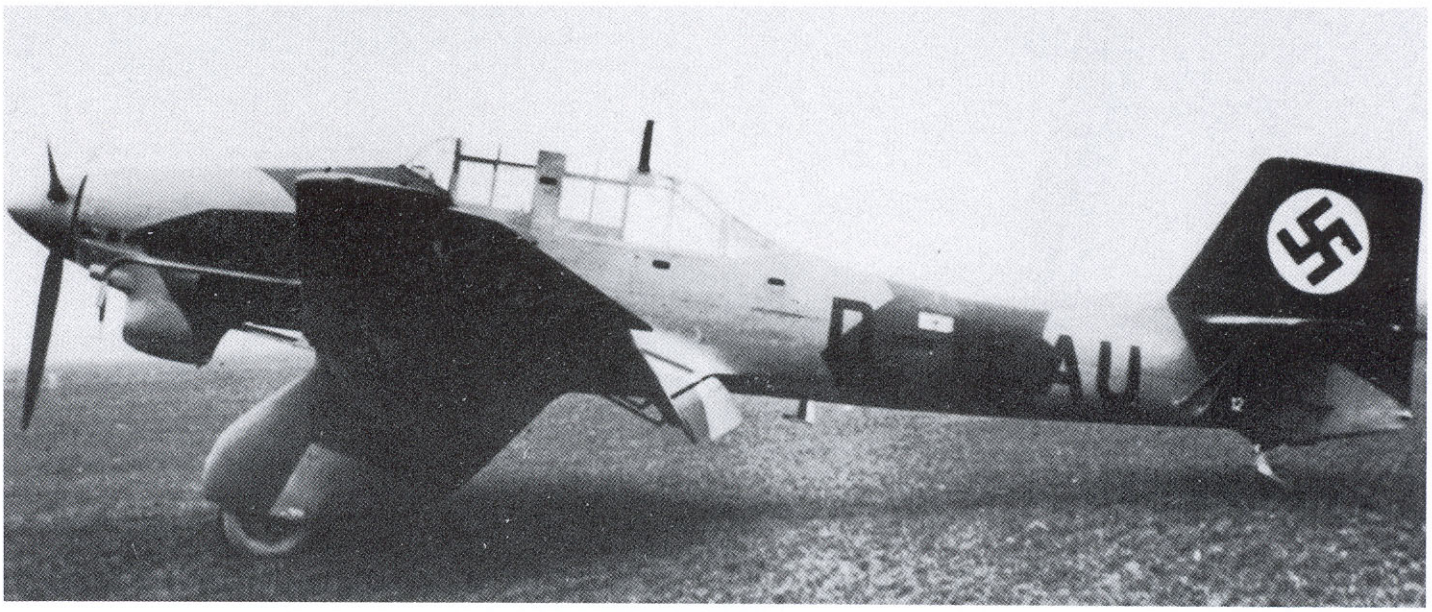


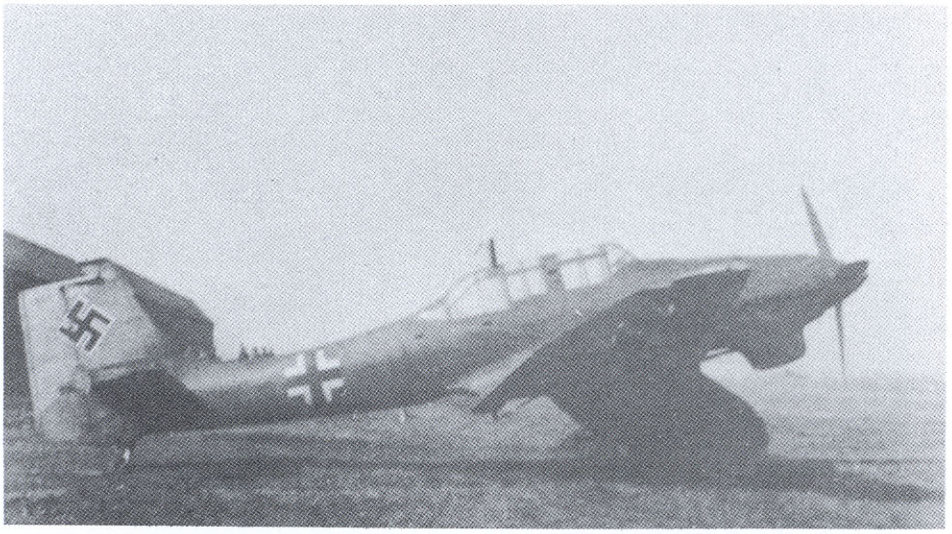
The tenth production aircraft during factory trials at Dessau. In the end only a single fixed machine-gun was installed, instead of two MG 17s with 500 rounds per gun as originally planned.



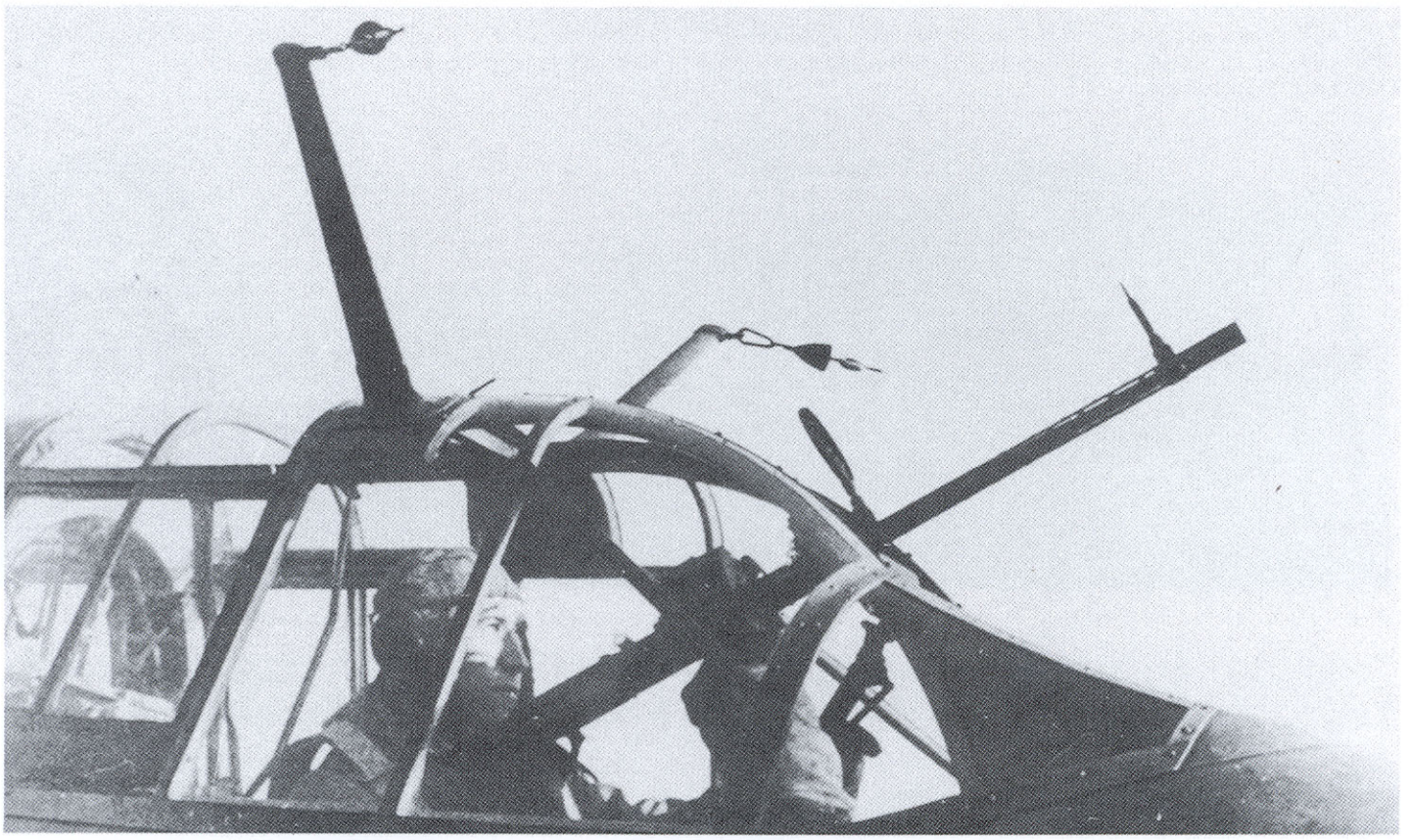
Center and Bottom:

Two photos of the twelfth production machine, which was armed with a single MG 17 in the starboard wing. The lower photo offers a good view of the rear cockpit gun position.

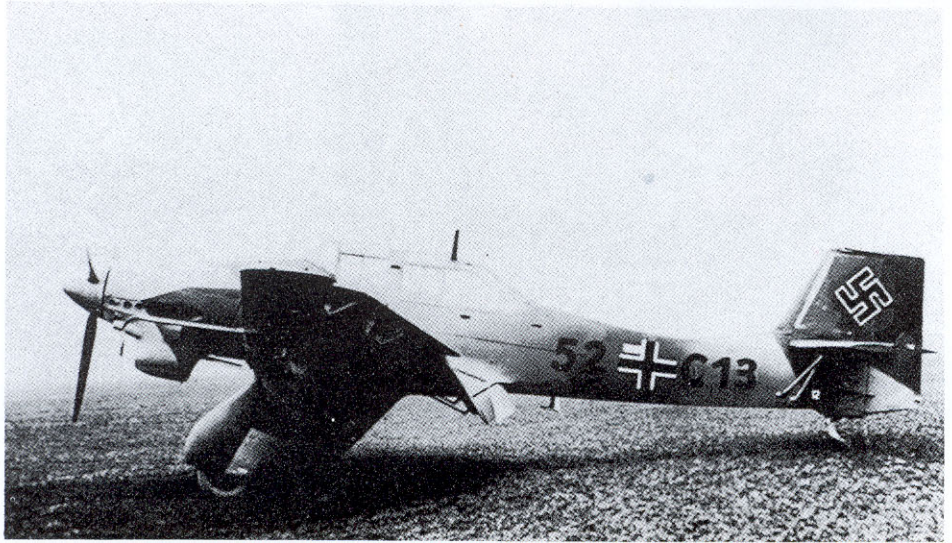




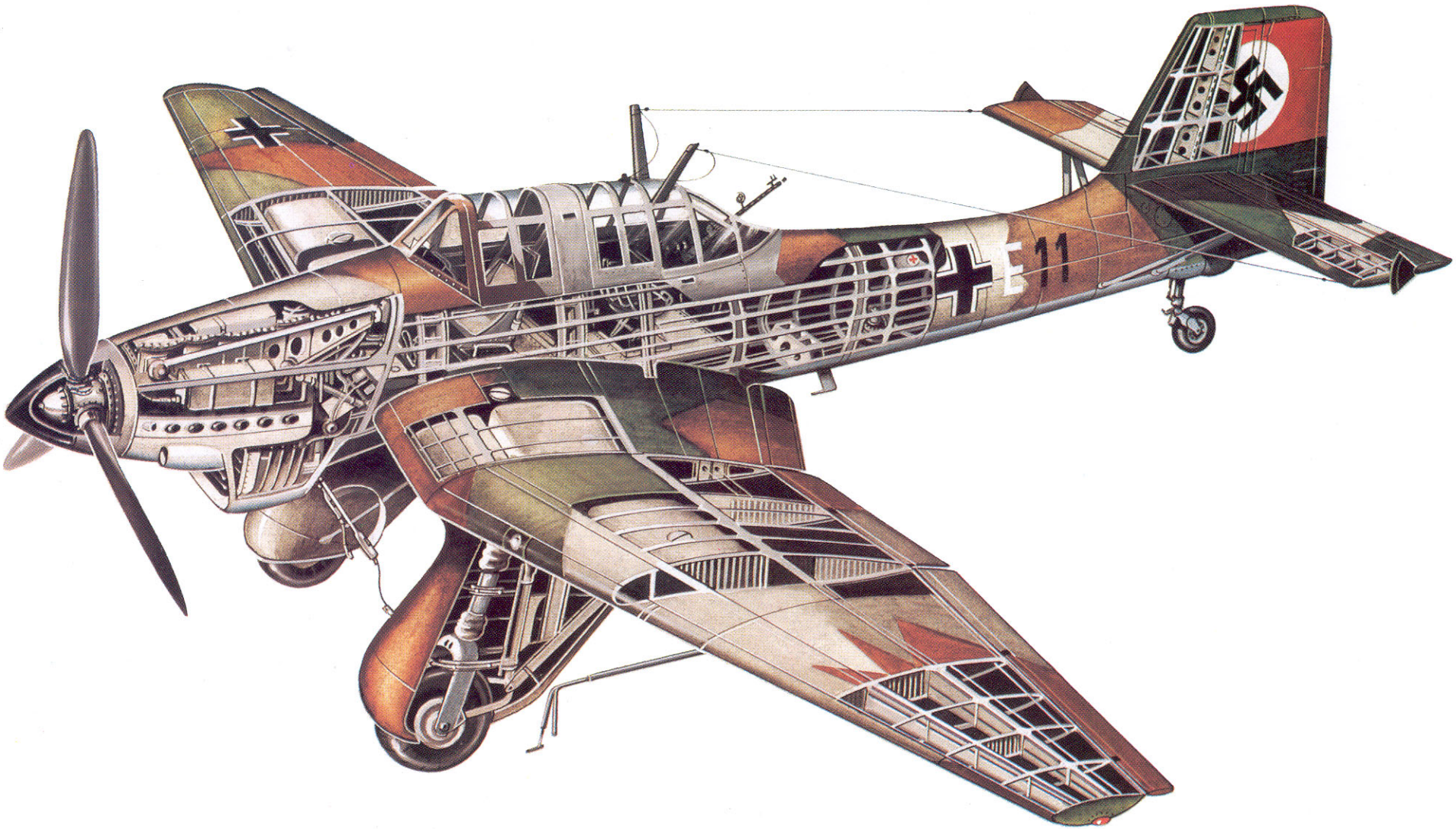
A Ju 87 A-1 during factory trials. The A-1 is distinguished by its angular rudder; the rudder of the A-2 version was rounded in shape at the top.

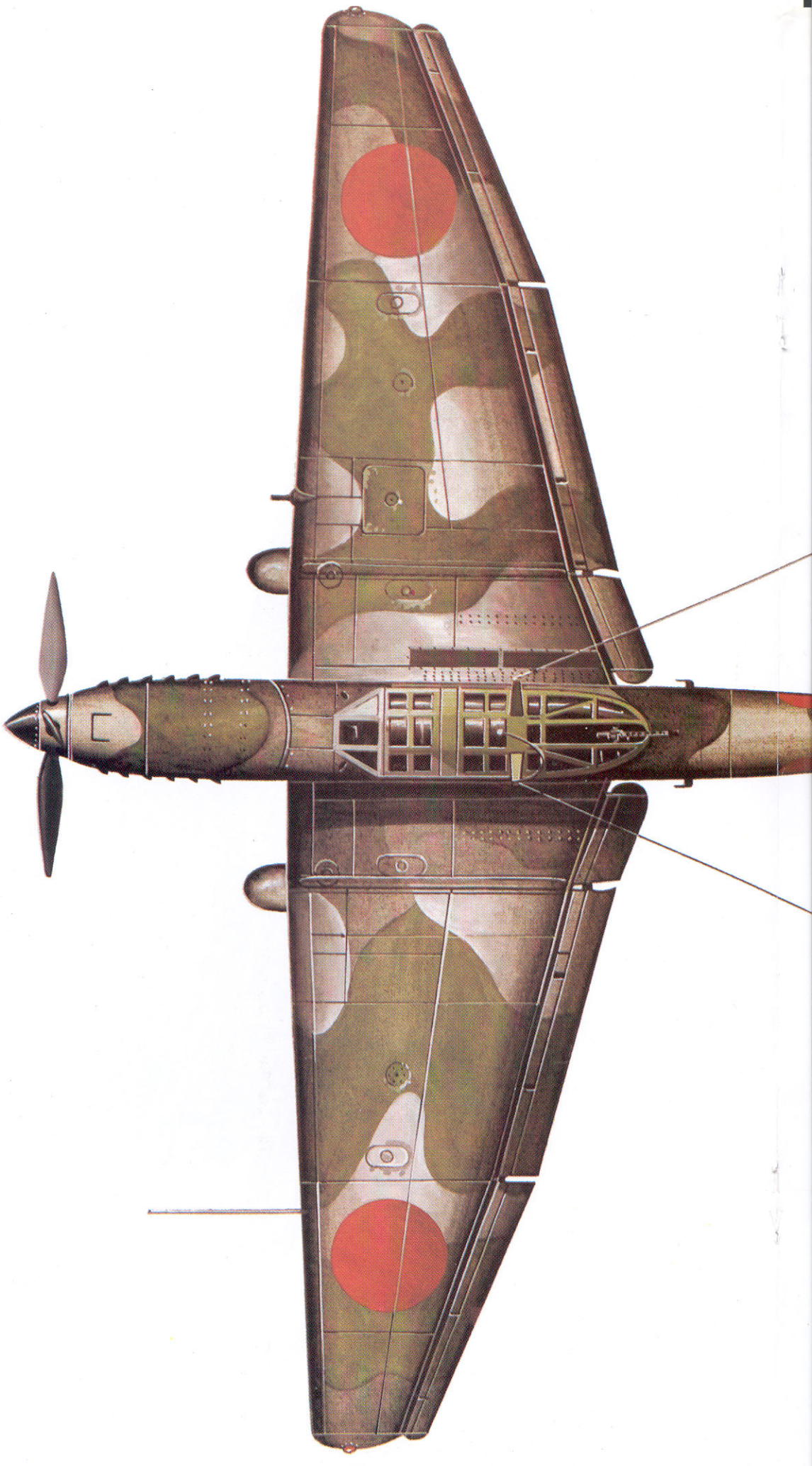


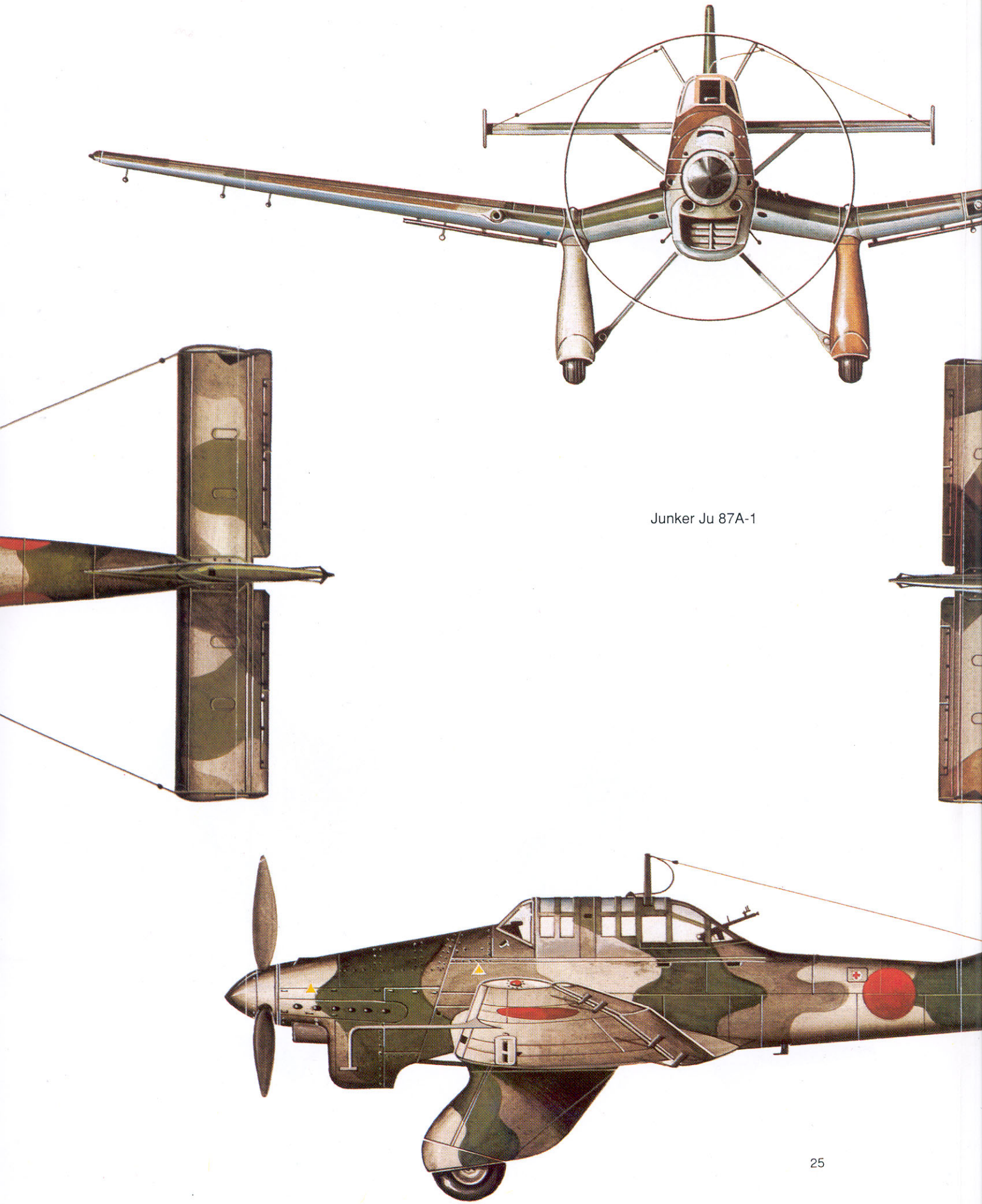
Close-up of the rear cockpit of a Ju 87 A-1 in service with the Stuka school at Schweinfurt.



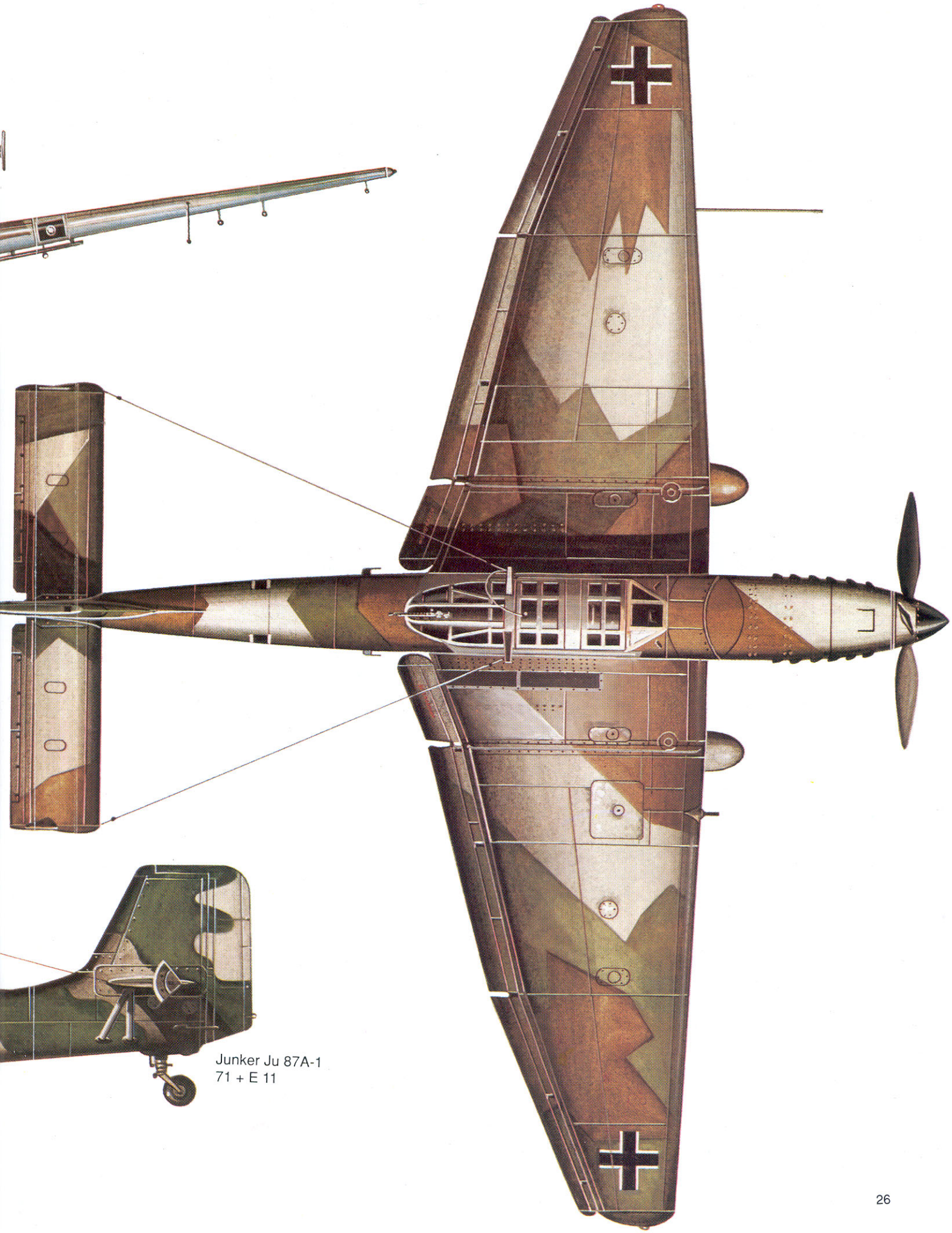
52+C13 belonged to the Ist Gruppe of StG (Sturzbomber-Geschwader) 162.



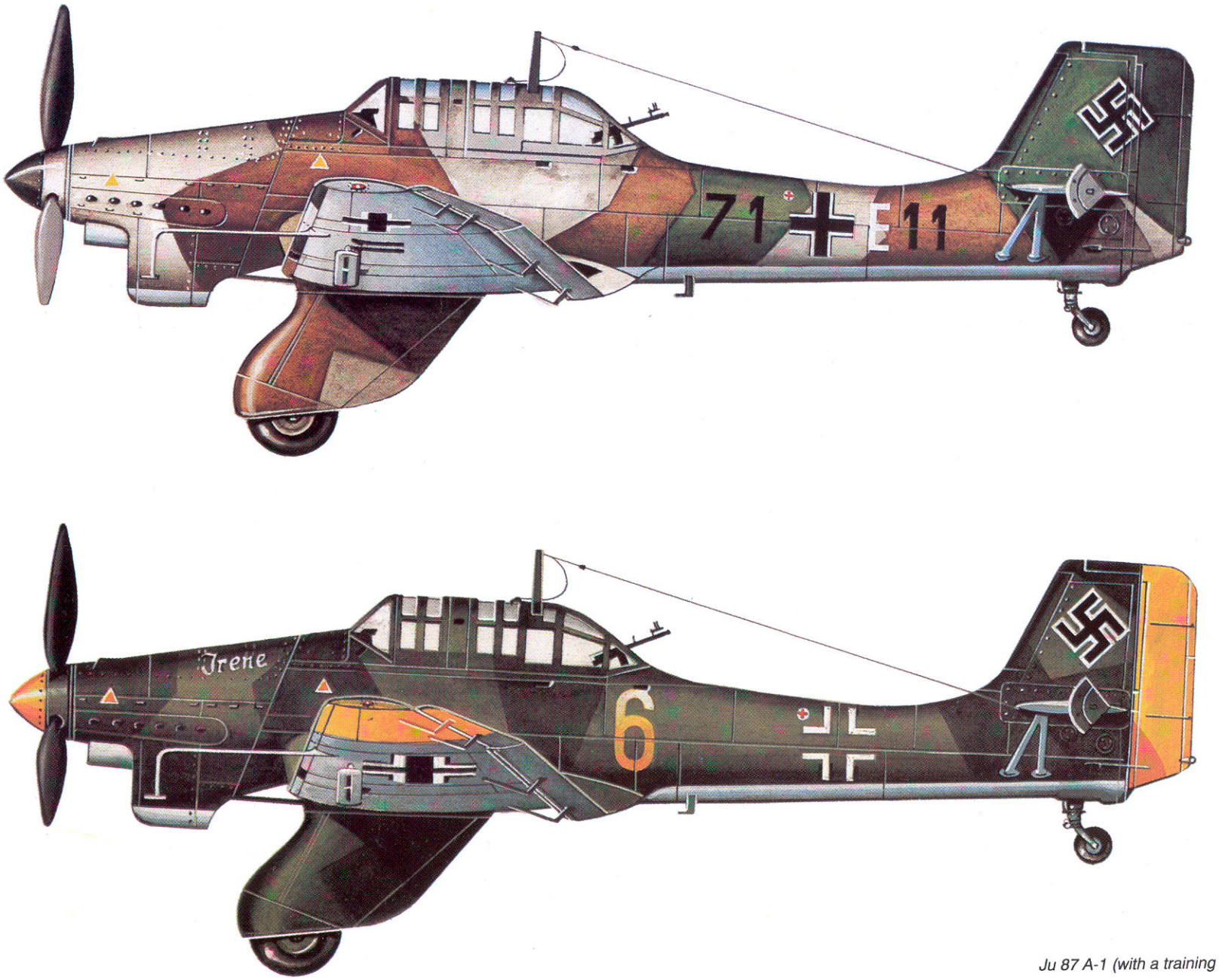




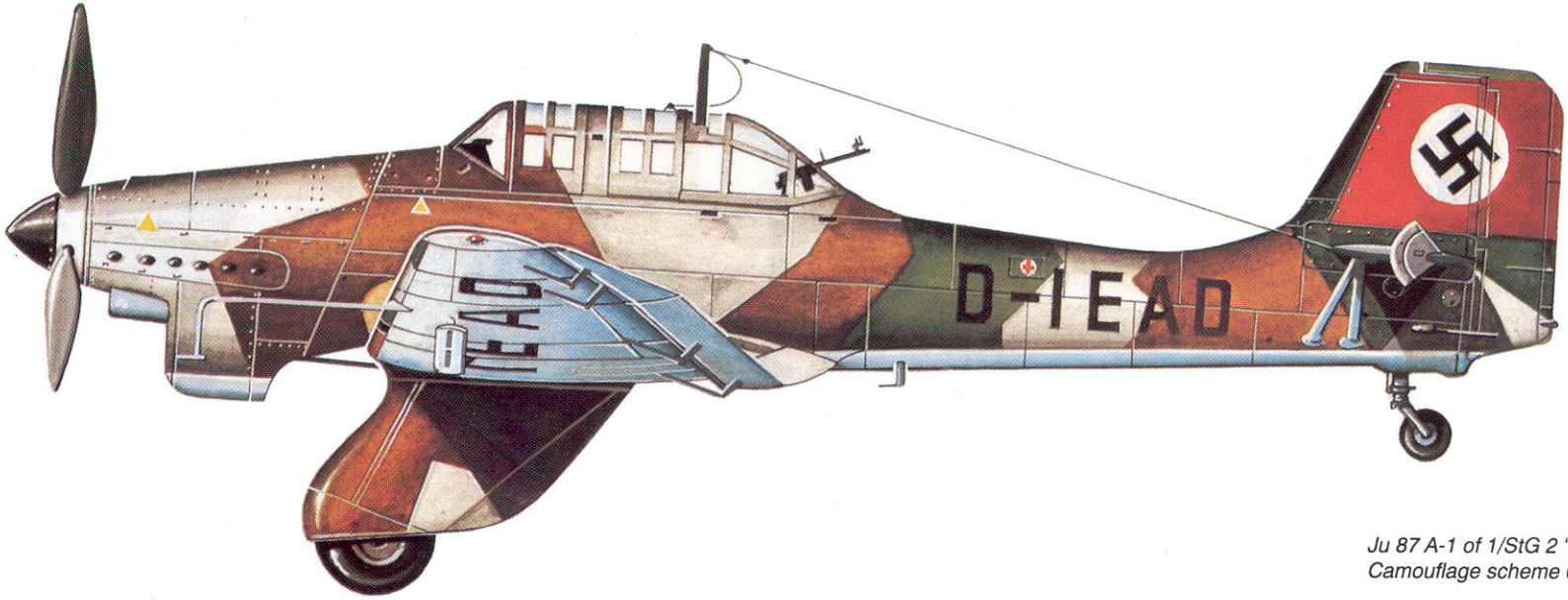
Junker Ju 87A-1



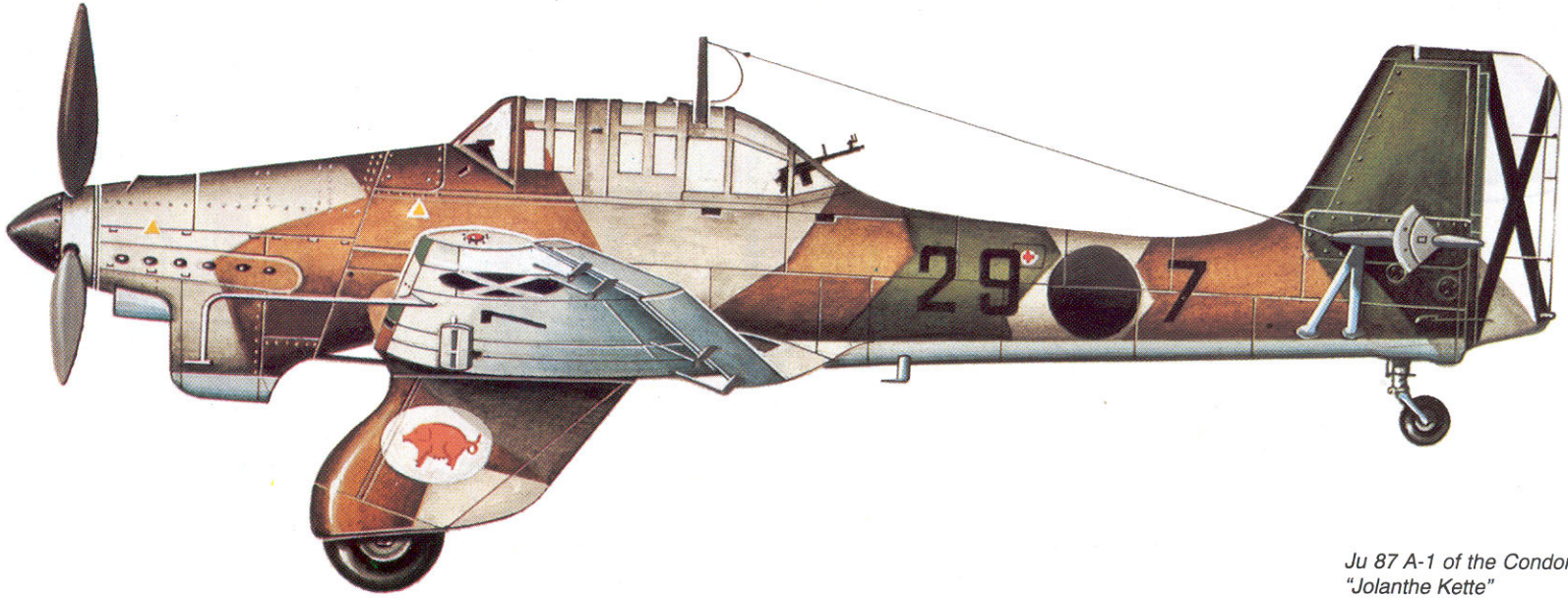
Junker Ju 87A-1
71 + E 11



Ju 87 A-1 (with a training unit 1939).

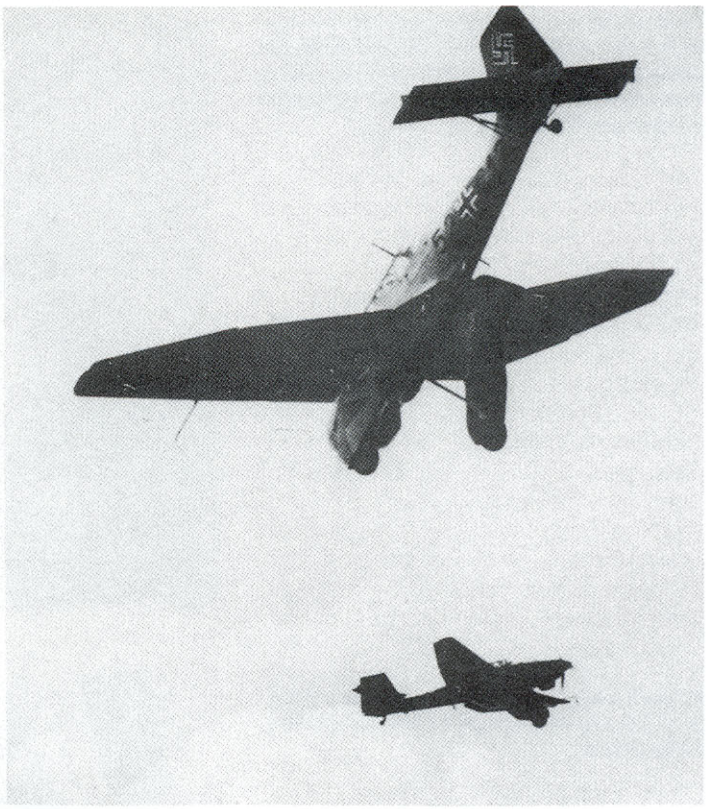


Ju 87 A-1 of 1/StG 2 "Immelmann"
Camouflage scheme 61/62/63/65



Ju 87 A-1 of the Condor Legion
"Jolanthe Kette"

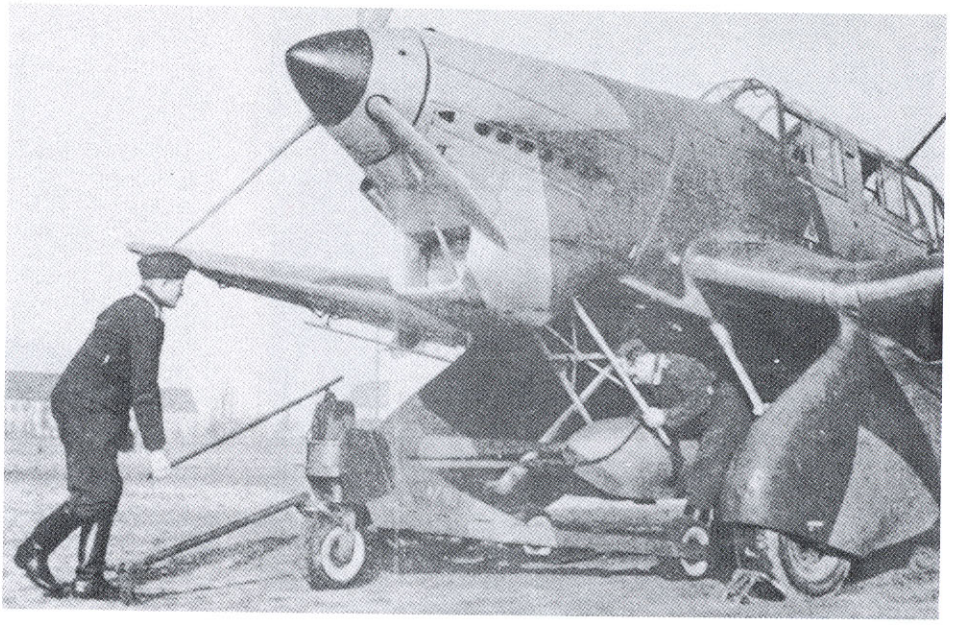
Pilot of a Ju 87 A-1. In the foreground is the reflector sight (Revi).



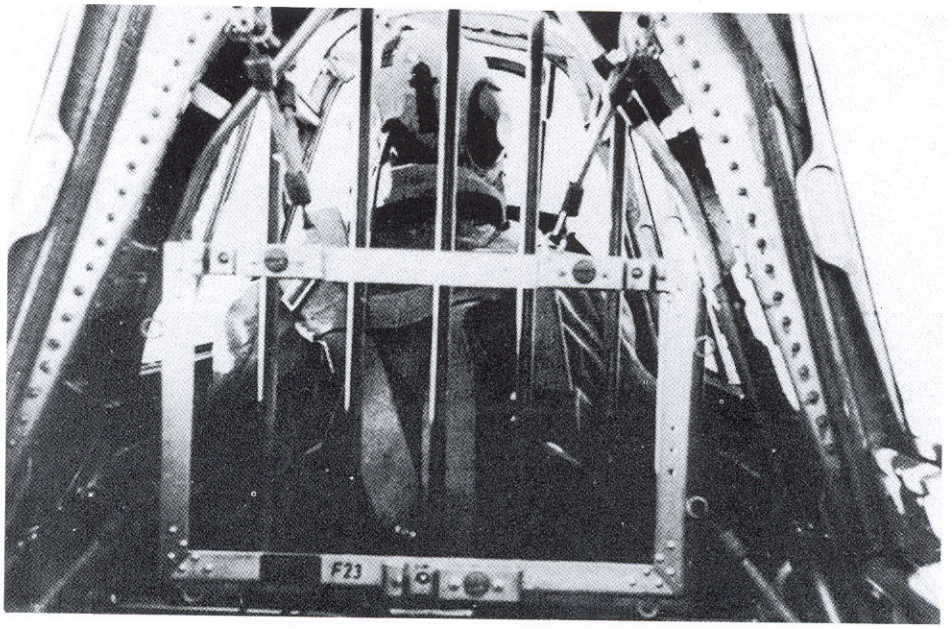
Aircraft of StG 162 during a training sortie.

An aircraft of the Schweinfurt Stuka School captured by the camera just as it releases its bomb. Fixed armament had to be reduced on account of the inadequate output of the Jumo 210 Aa; when carrying a full bomb load (500 kg) the aircraft had to be flown as a single-seater.

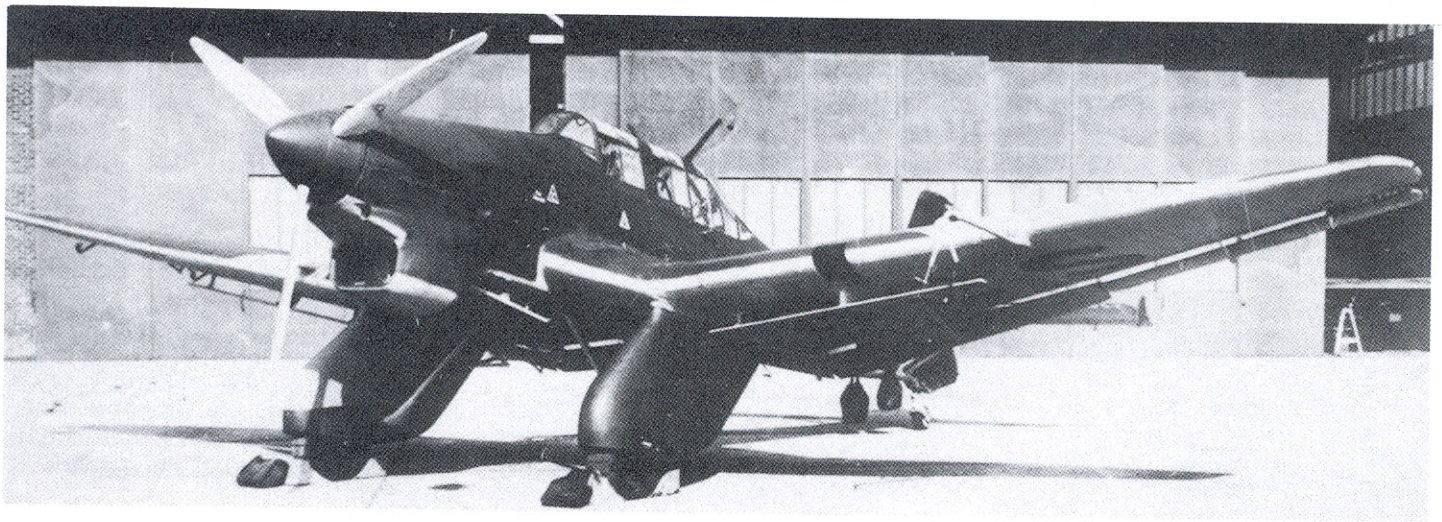
Ground crew practice loading a bomb onto the crutch of a Ju 87 A of 4/163 using a hydraulic bomb trolley; this device soon became a standard item of equipment with all Luftwaffe bomber and Stuka units.

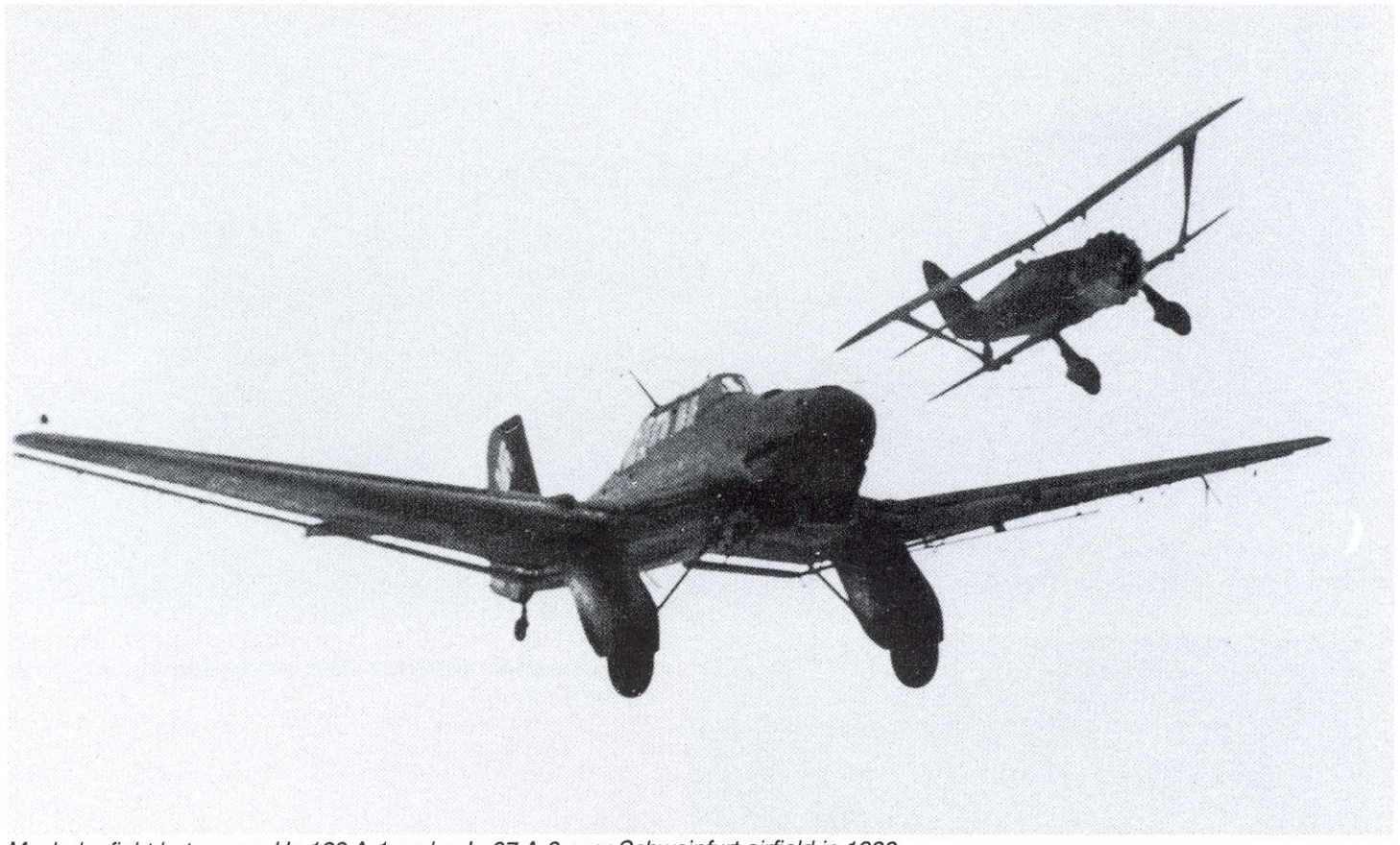


Forward view from the radio-operator's position. The aircraft belonged to the Schweinfurt Stuka School.



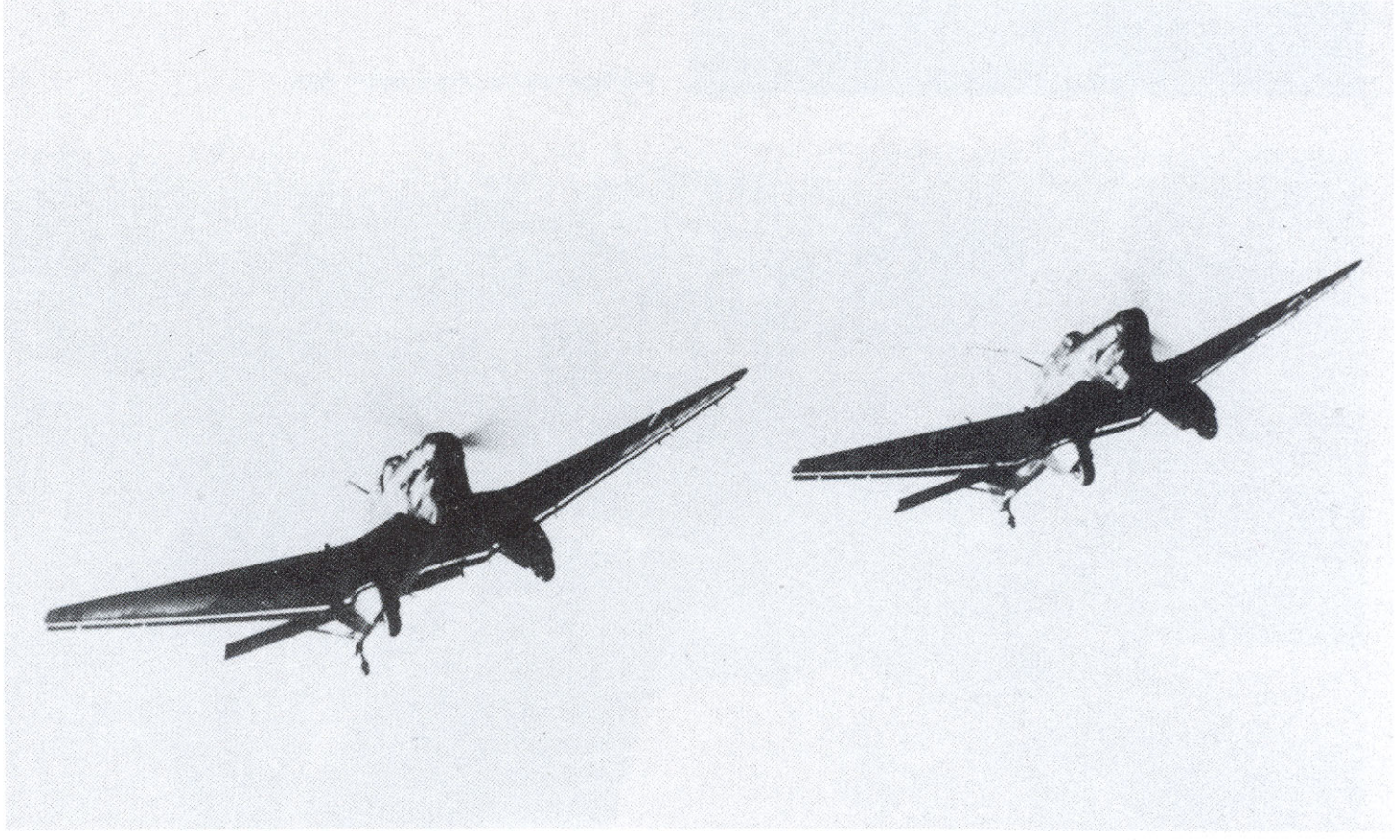
The first Ju 87 A-1 built by Weserflug in Bremen left the Lemwerder assembly line in October 1937.

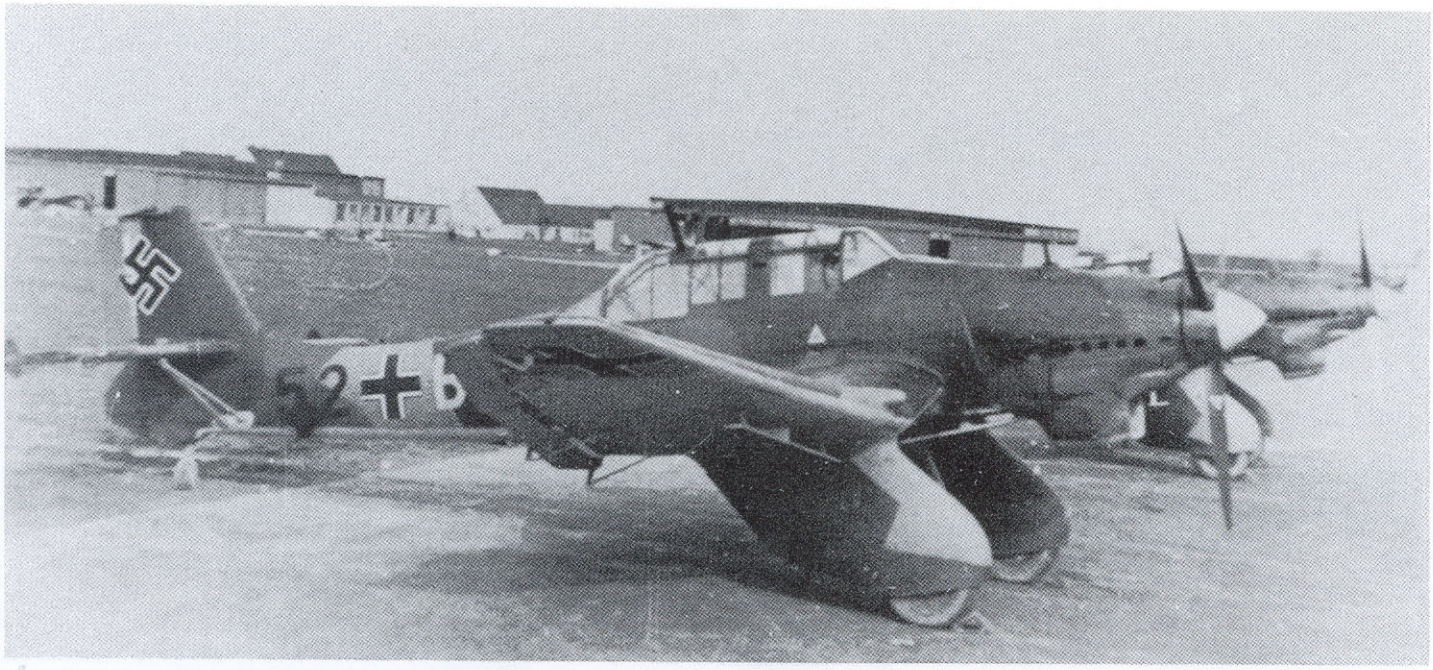


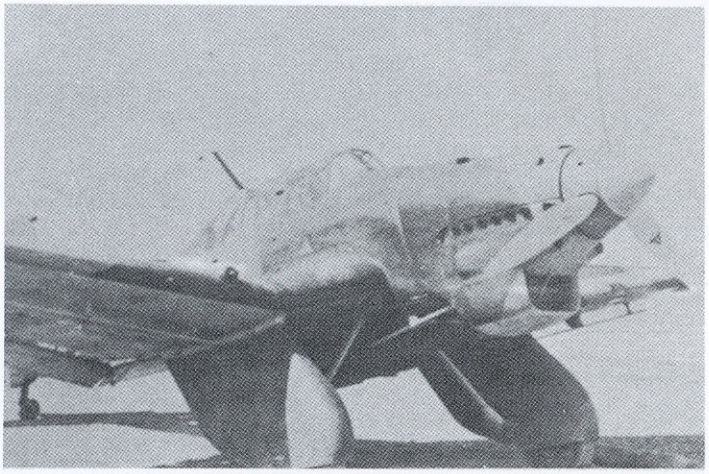


Mock dogfight between a Hs 123 A-1 and a Ju 87 A-2 over Schweinfurt airfield in 1938.

Two Ju 87s in the sky over Dessau during factory trials.



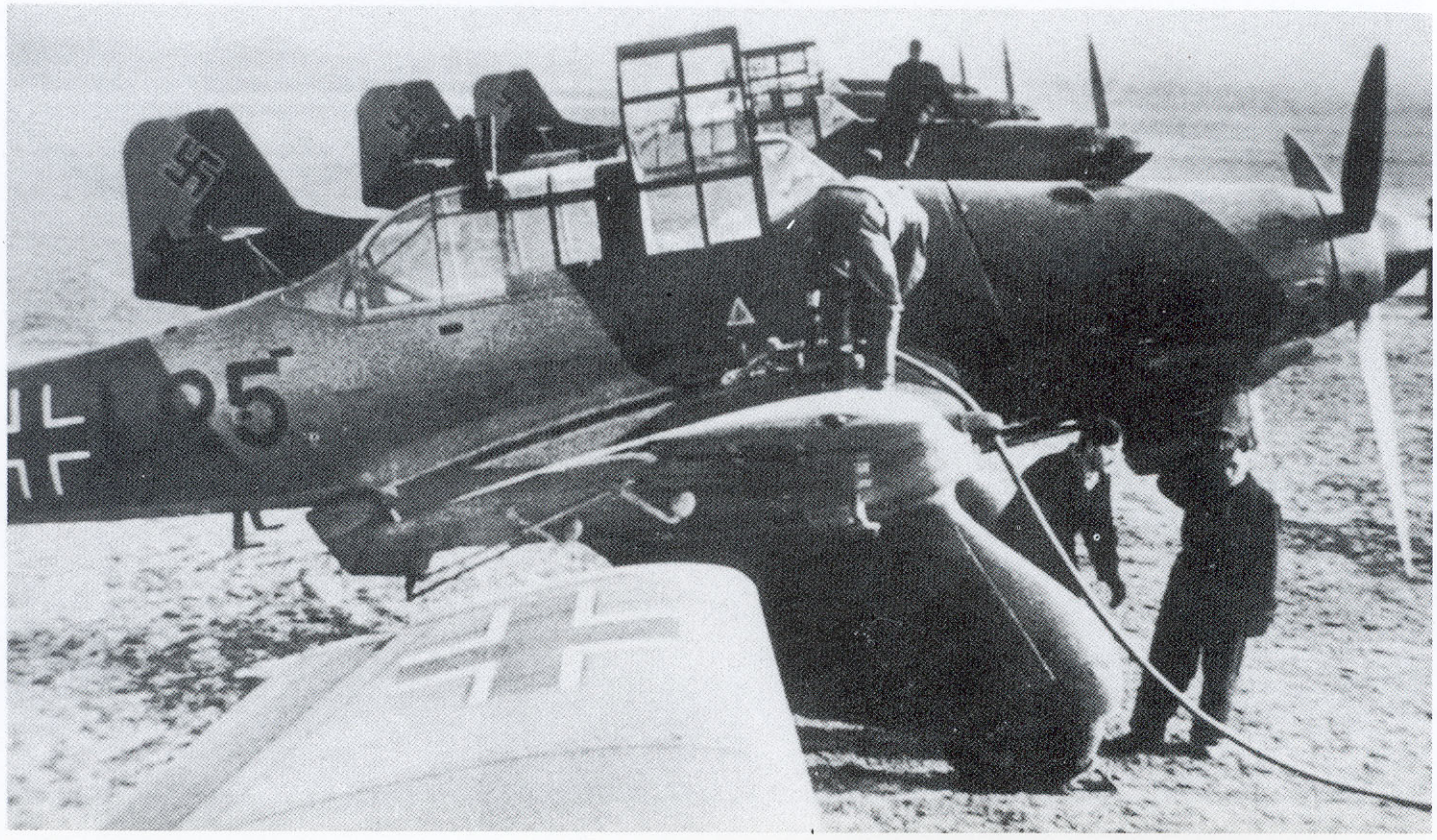


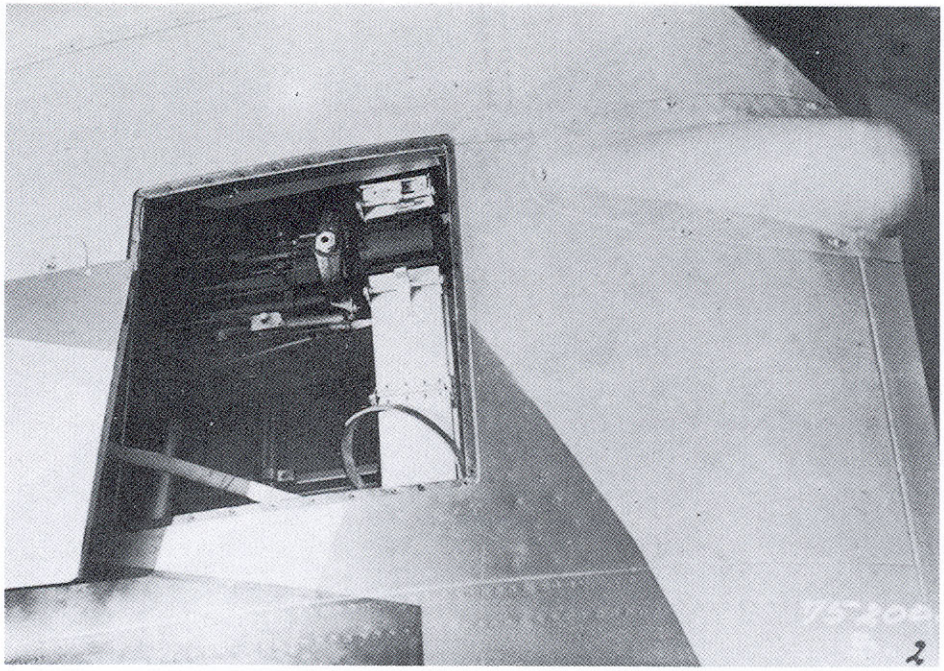


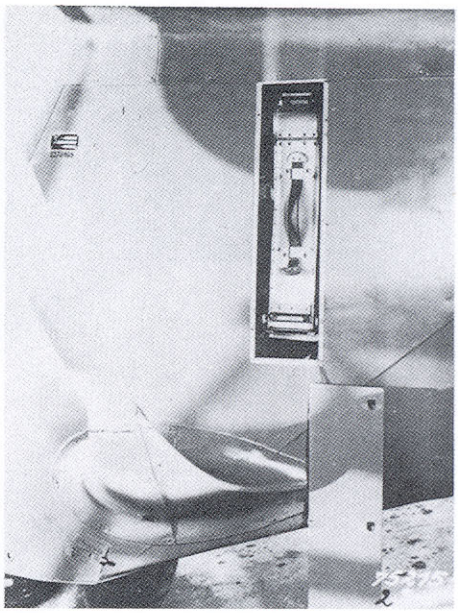
Another Ju 87 A-2 of StG 162 based at Stolp-Reitz. This unit later became II/StG 2.

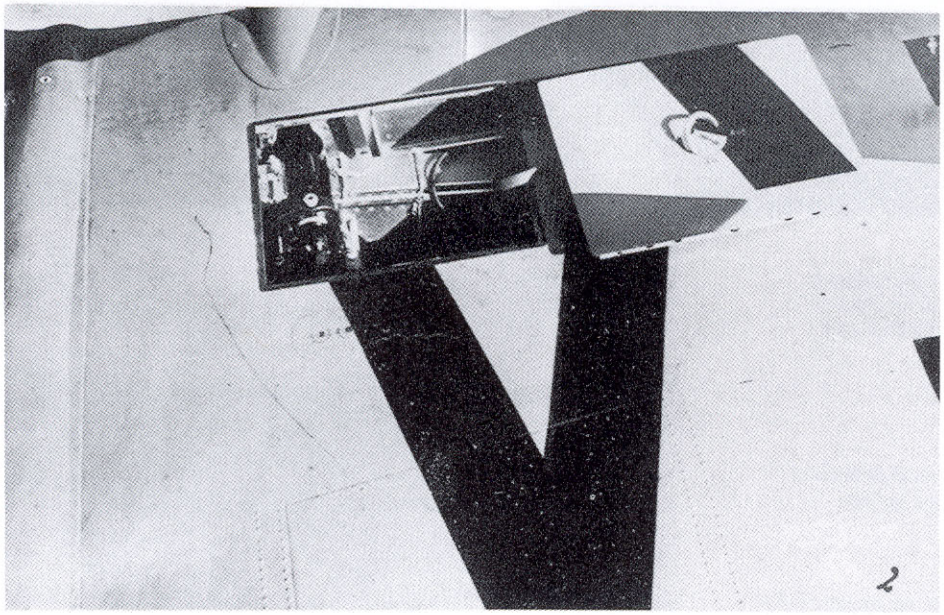
Weserflug built seven Ju 87 As by the end of 1937 and another 63 by August 1938. Note the MG 17 machine-gun in the starboard wing.

Maintenance on service aircraft in 1938.





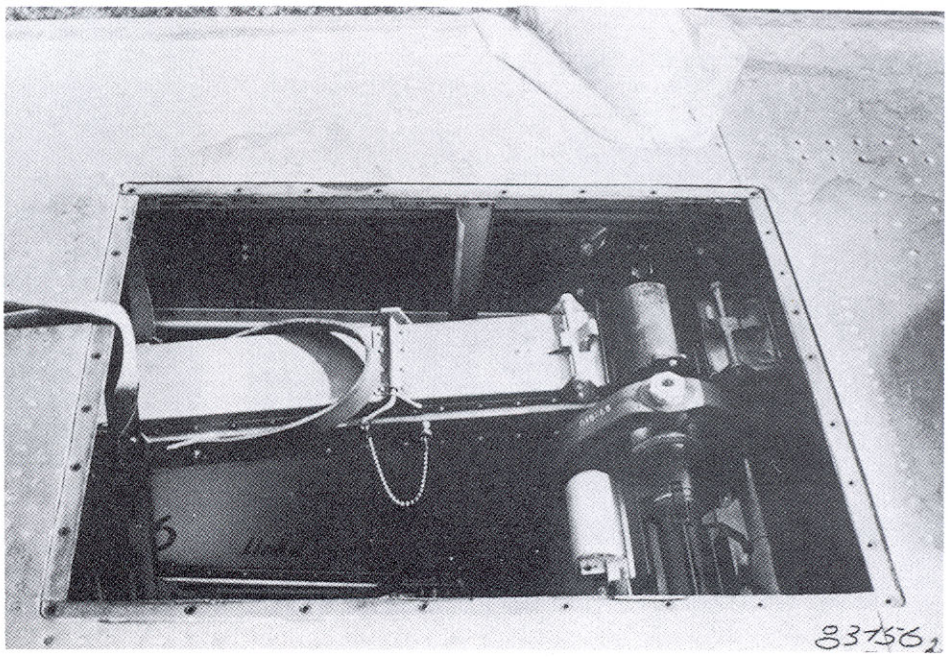


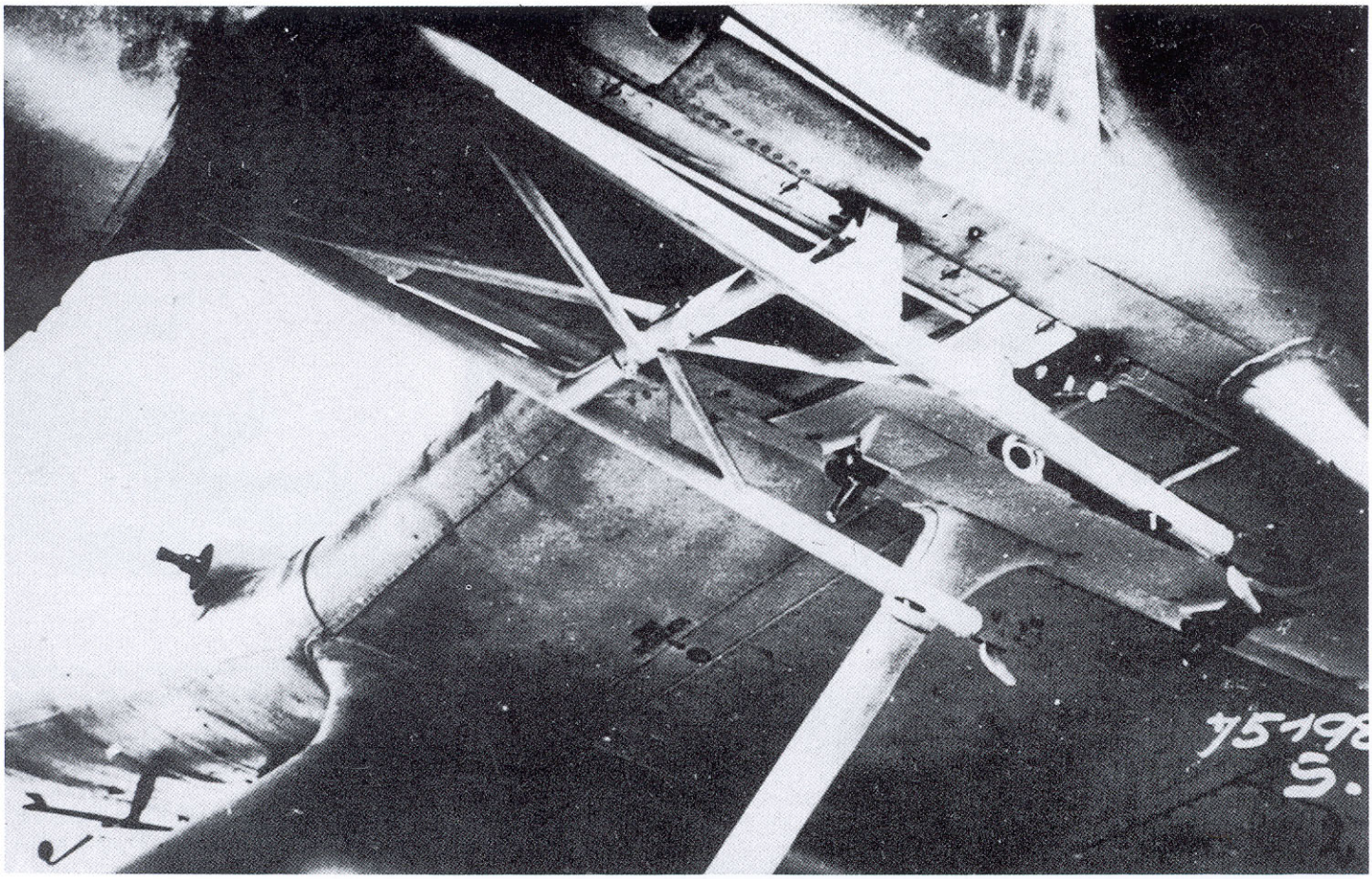


The ammunition box for the wing-mounted MG 17 was accommodated in the starboard main undercarriage fairing.

Top Left, Center and Bottom:

Close-up photos of the MG 17 installation in the starboard wing of the Ju 87 A-1/A-2, with a view of the ammunition feed.





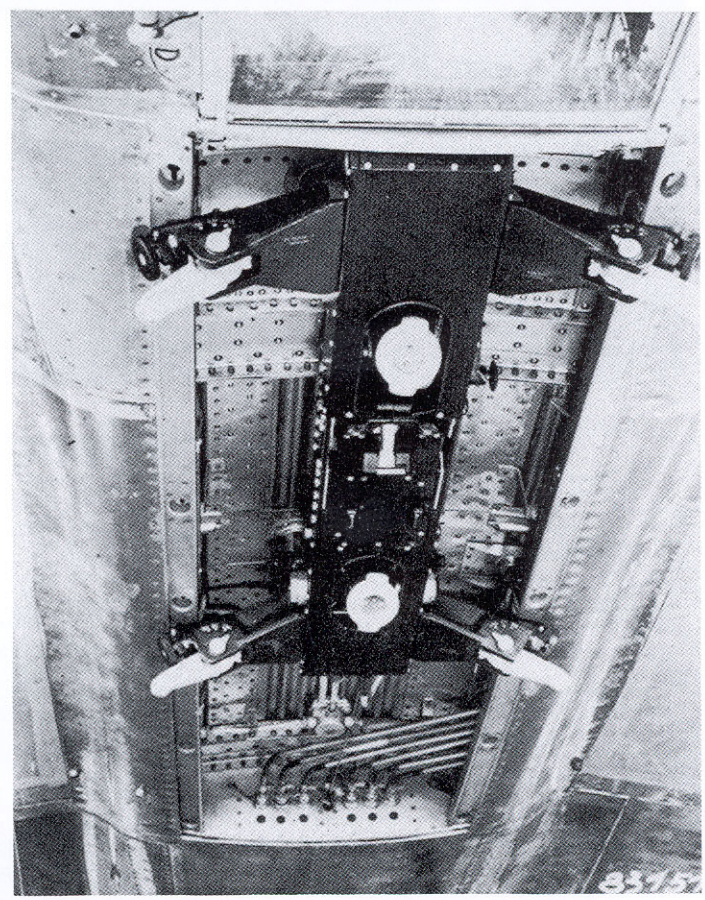
Early Ju 87s were equipped with the Siemens ETC 500/A stores rack which was designed for maximum loads of 500 kg. An excellent view of the bomb crutch which swung down and forward, allowing the bomb to clear the propeller.

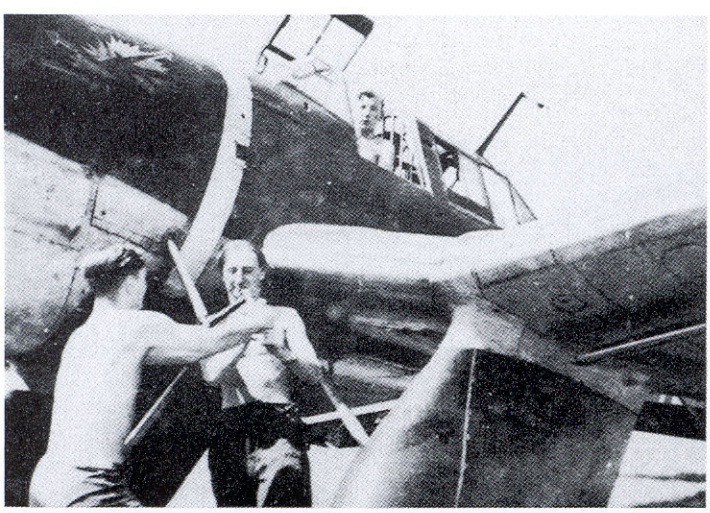
Bottom Left:

This Ju 87 of Luftnachrichtenschule (Luftwaffe Signals School) 5 at Erfurt-Bindersleben is being readied for an engine run-up.

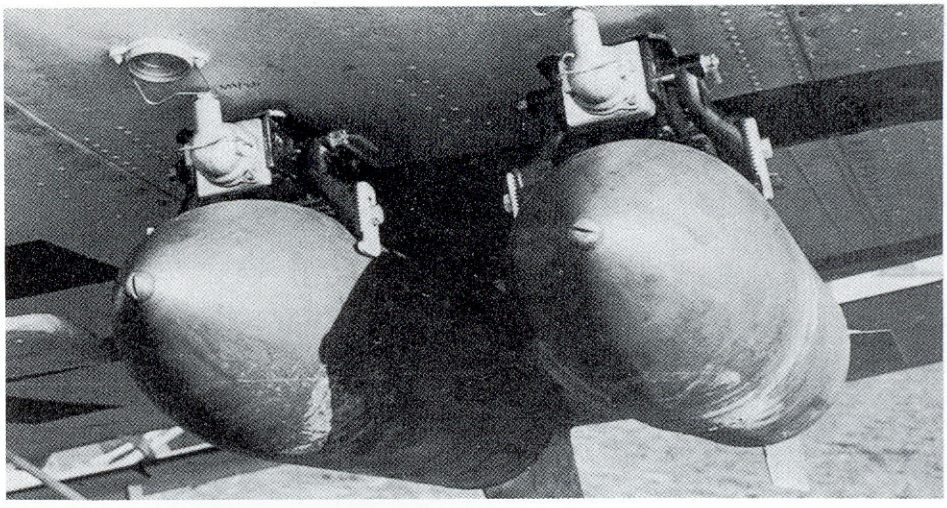
Bottom Right:

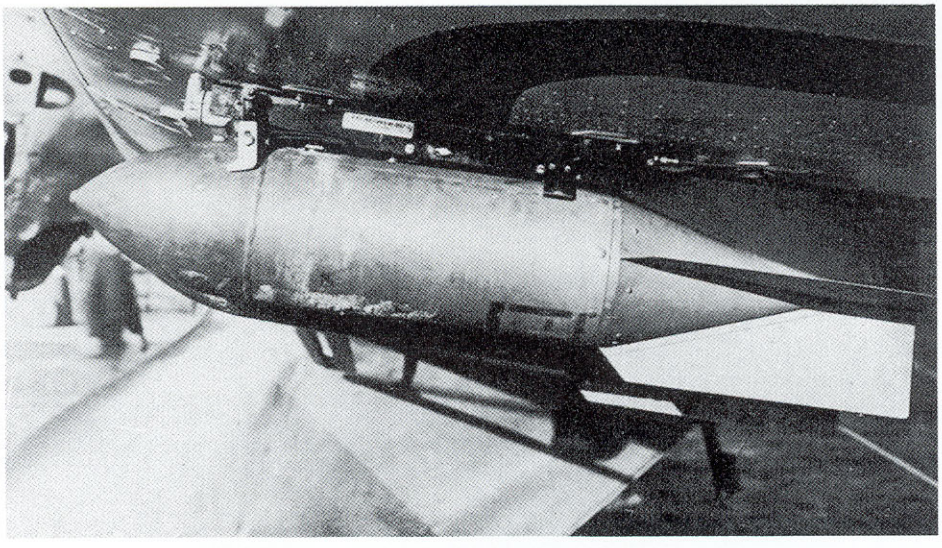
Close-up of the ETC 500/A. At the top of the photo is the window in the under side of the fuselage, which offered the pilot a better view of the target.



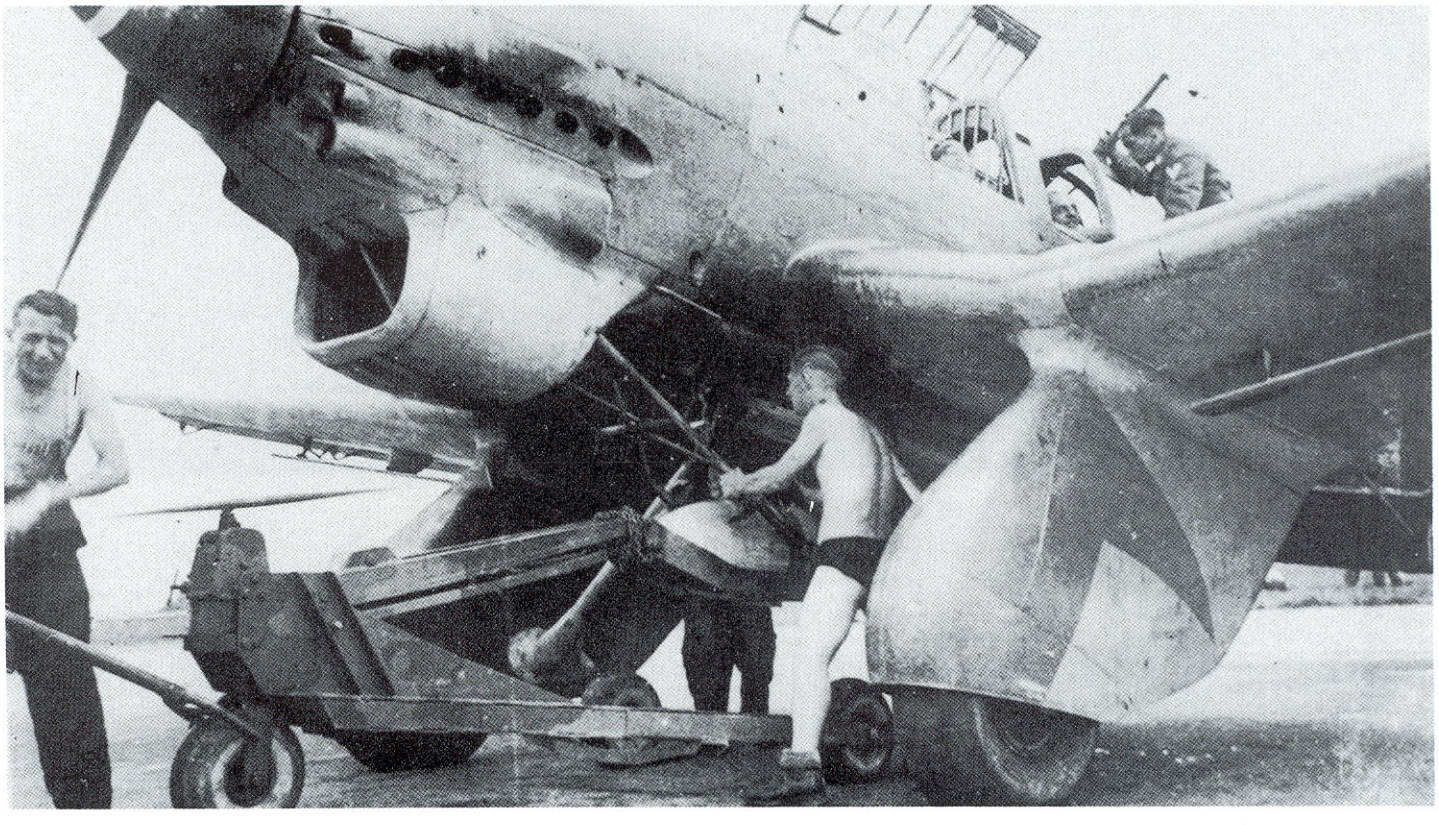


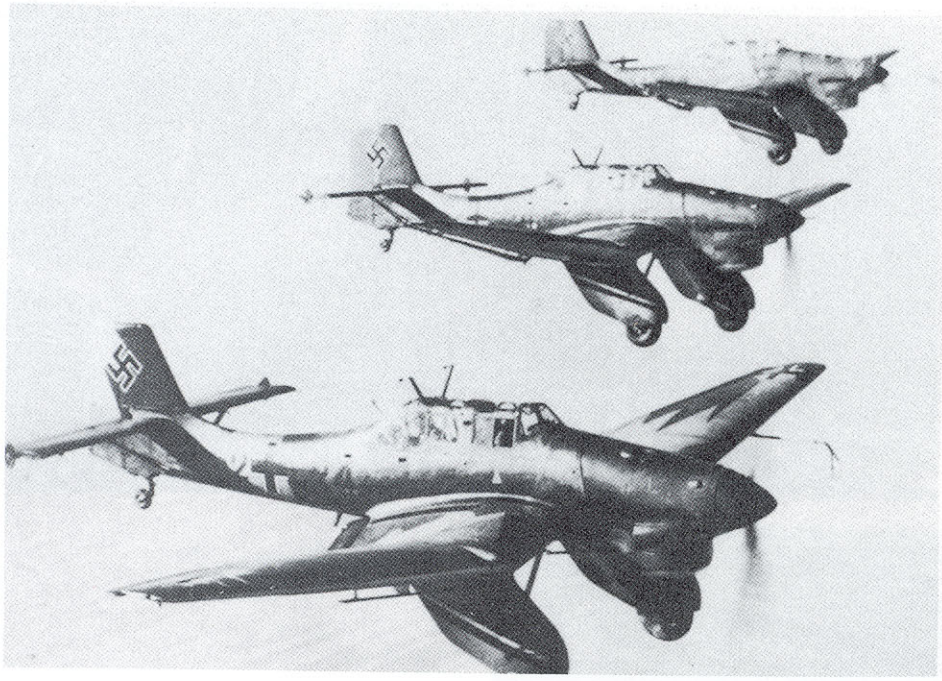
Two SC 50 bombs on ETC 50 racks mounted under the wing of a Ju 87 A.





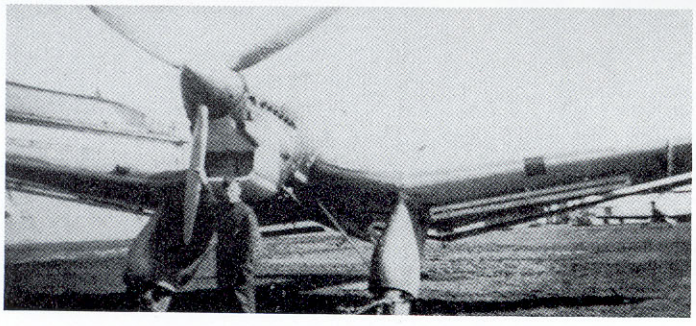
Loading a Ju 87 with a SC 500 bomb at the Insterburg Stuka School in East Prussia.





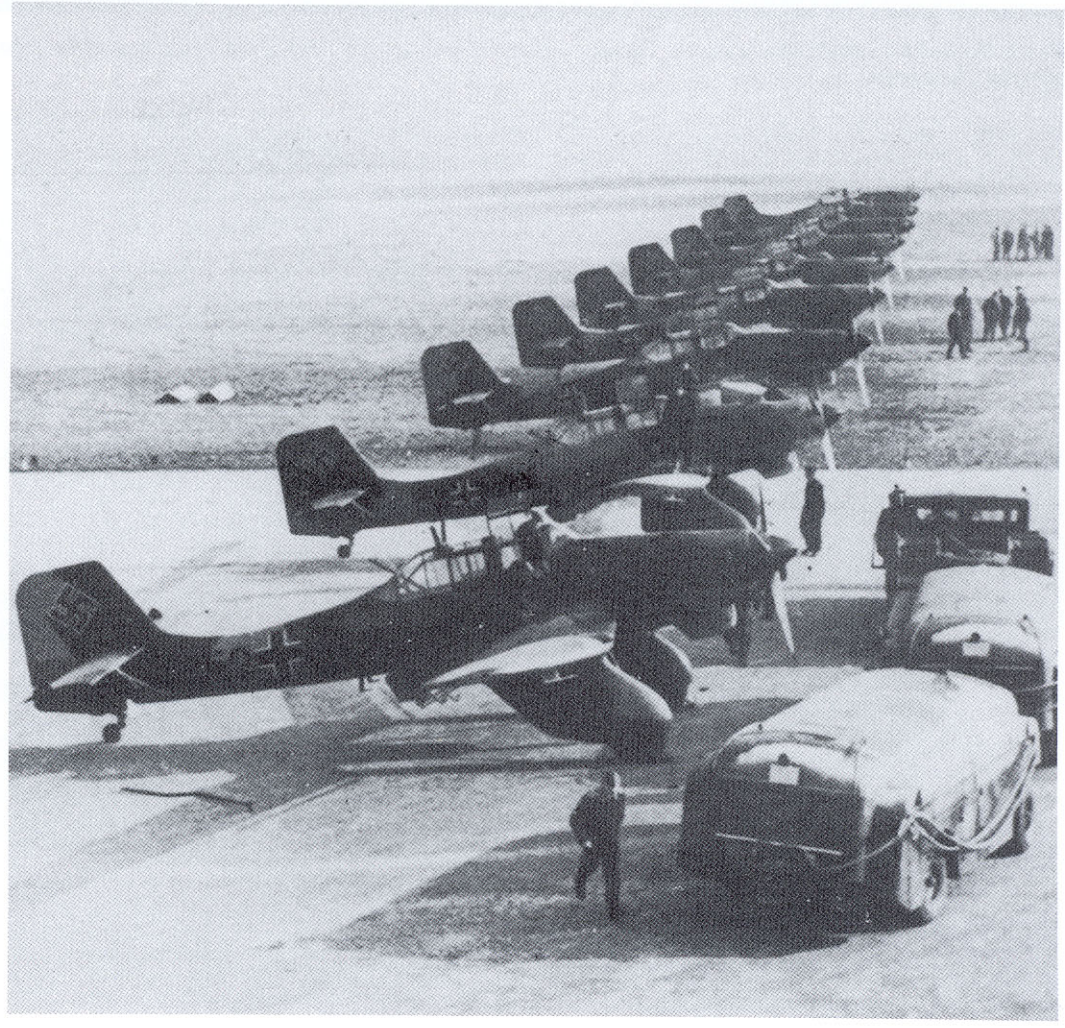
Three Ju 87 A-2 service aircraft in formation flight over Central Germany.

This ground collision between a Ju 87 A-2 and an unfortunate truck was the result of brake failure.



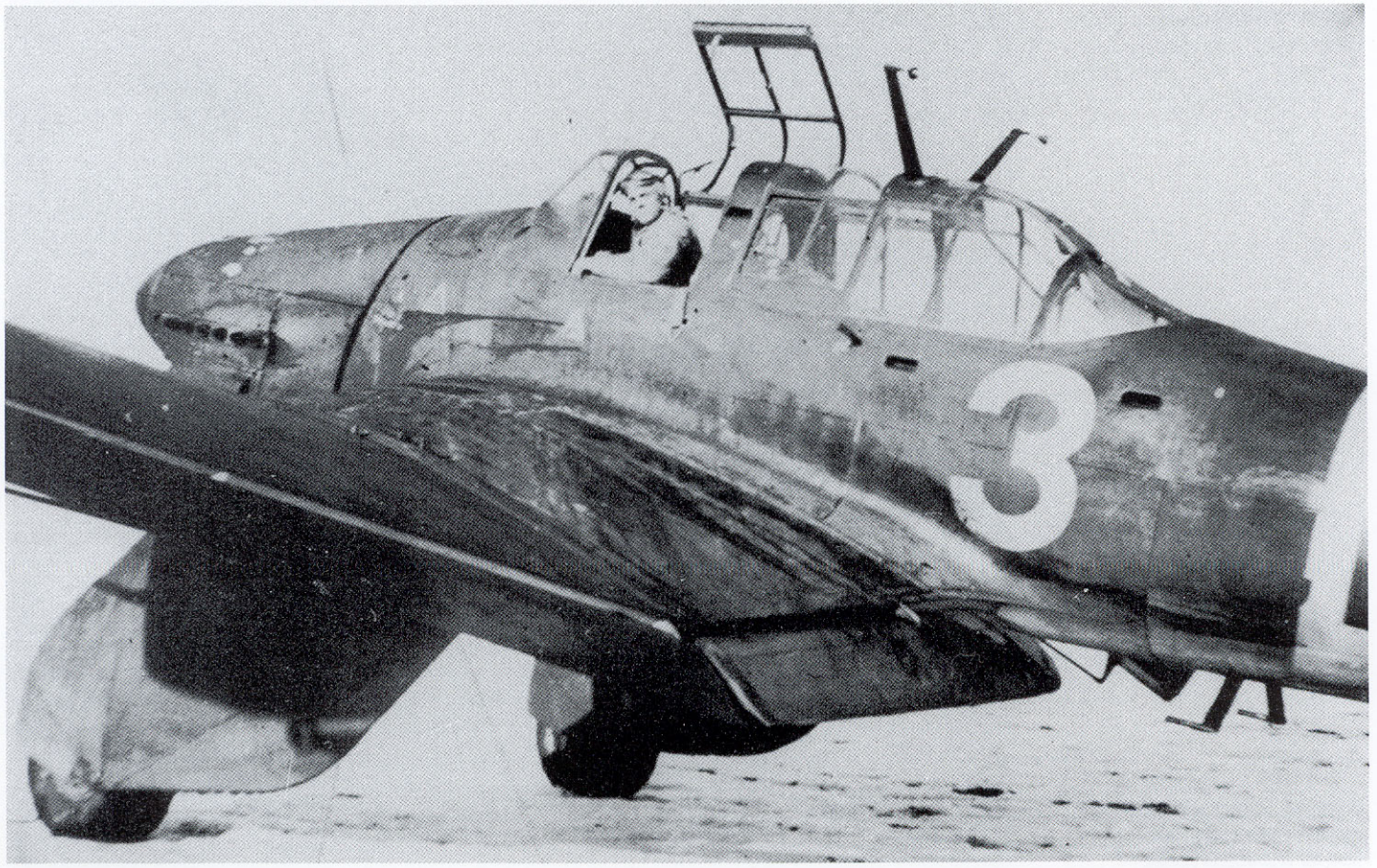
Visible in this photograph are both under-wing dive brakes of a Ju 87 A-2.

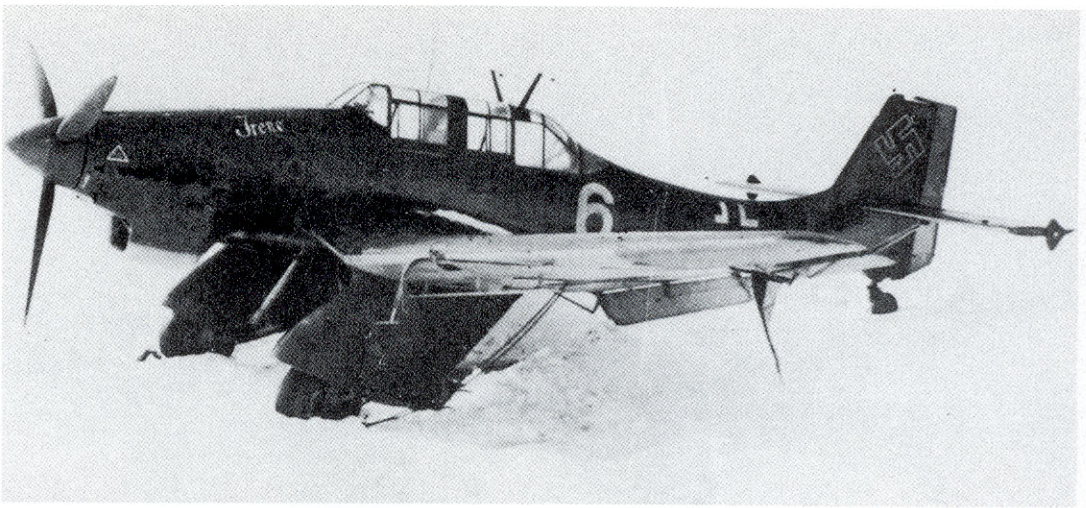
Briefing prior to a training mission. The photo was taken at the Schweinfurt Stuka School in early summer 1938.



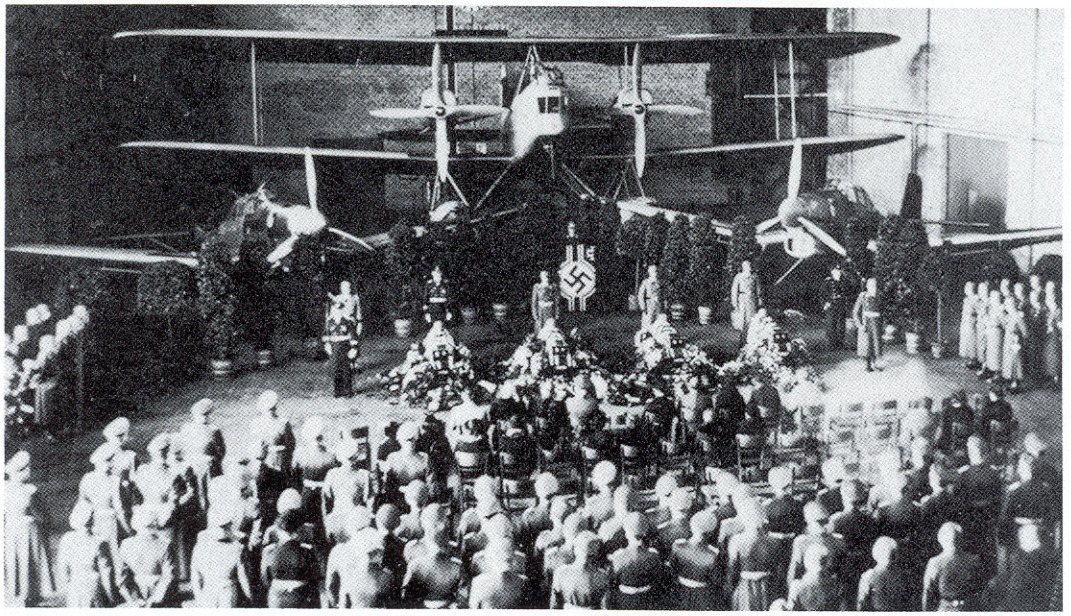
A Staffel of StG 165 being refuelled in preparation for a practice sortie.

Muddy Schweinfurt airfield after a storm. *Bottom: "Yellow 3" belonged to a Stuka preschool; one of the purposes of the school was to screen potential Stuka pilots.*



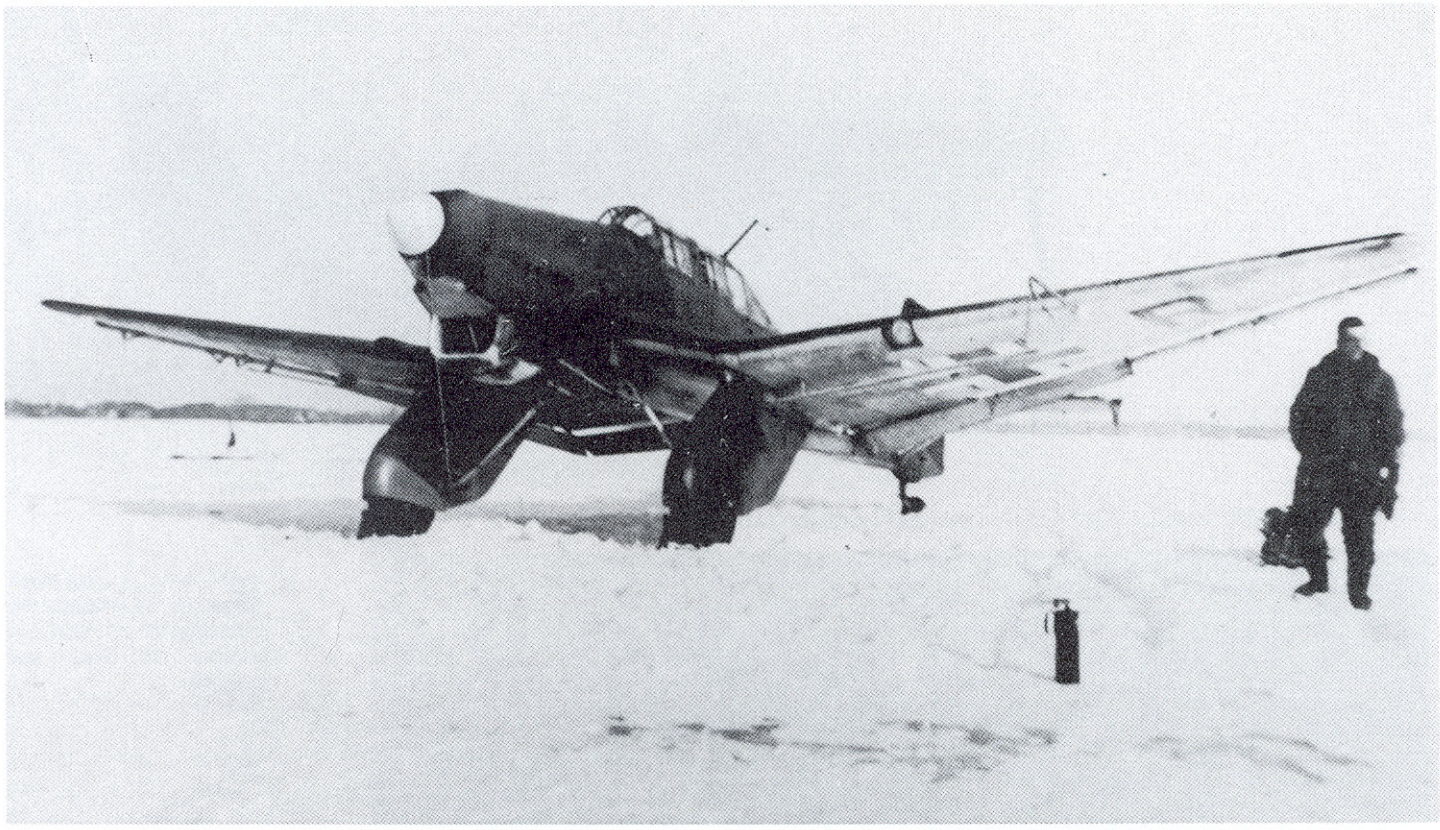


Werknummer 5040 "Irene", a Ju 87 A-2, also belonged to a Stuka preschool.



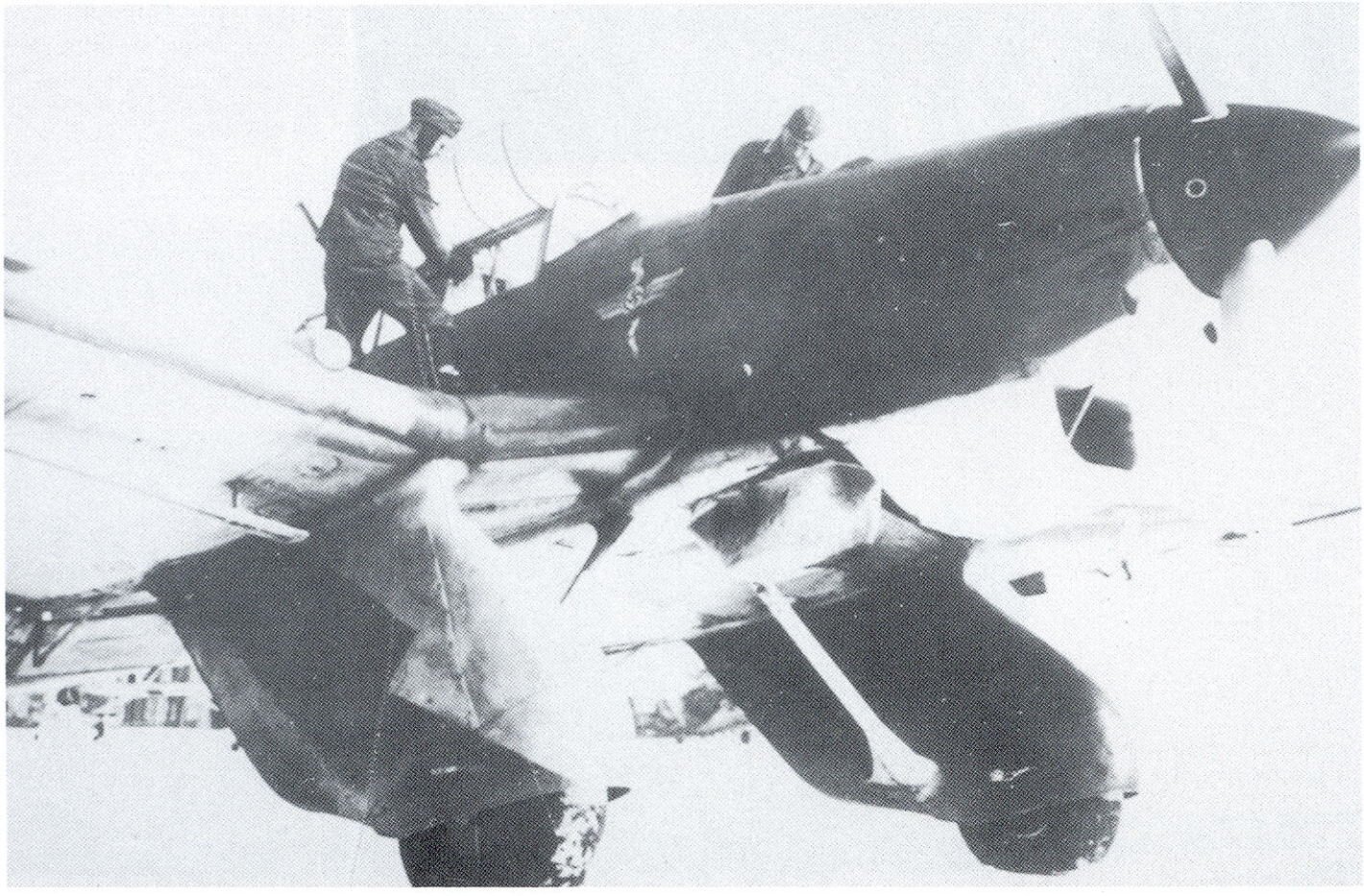
Two Ju 87 A-2s and a much larger He 59 provide the backdrop for a funeral ceremony at Graz auf Usedom.

This photo of two Ju 87 A-2s was taken at a dive bomber school.

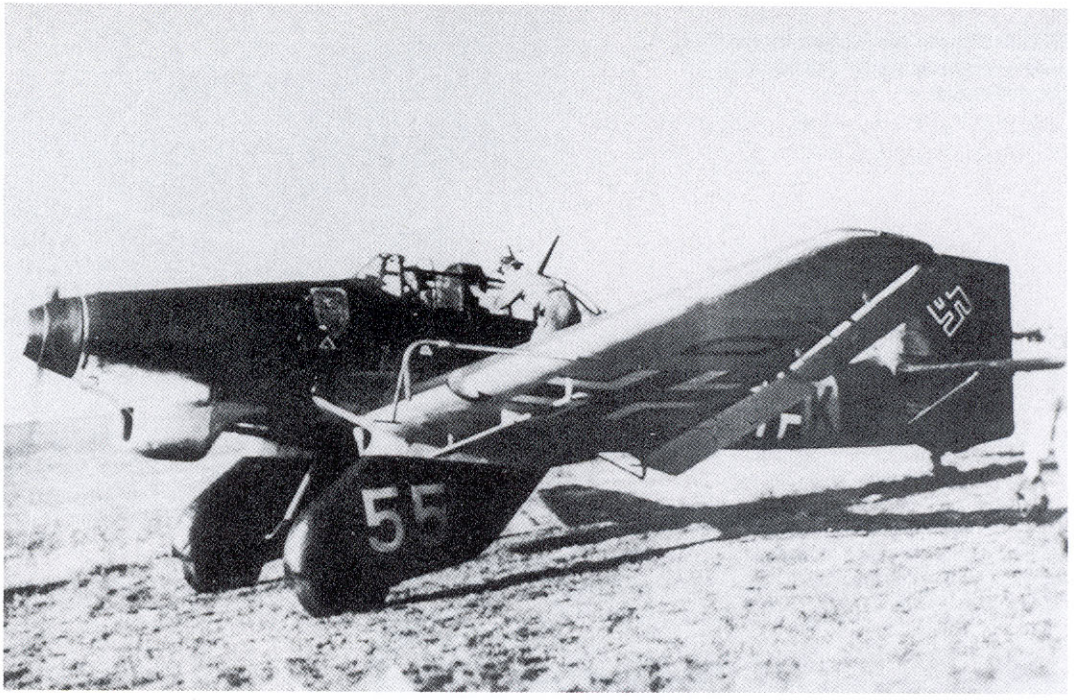


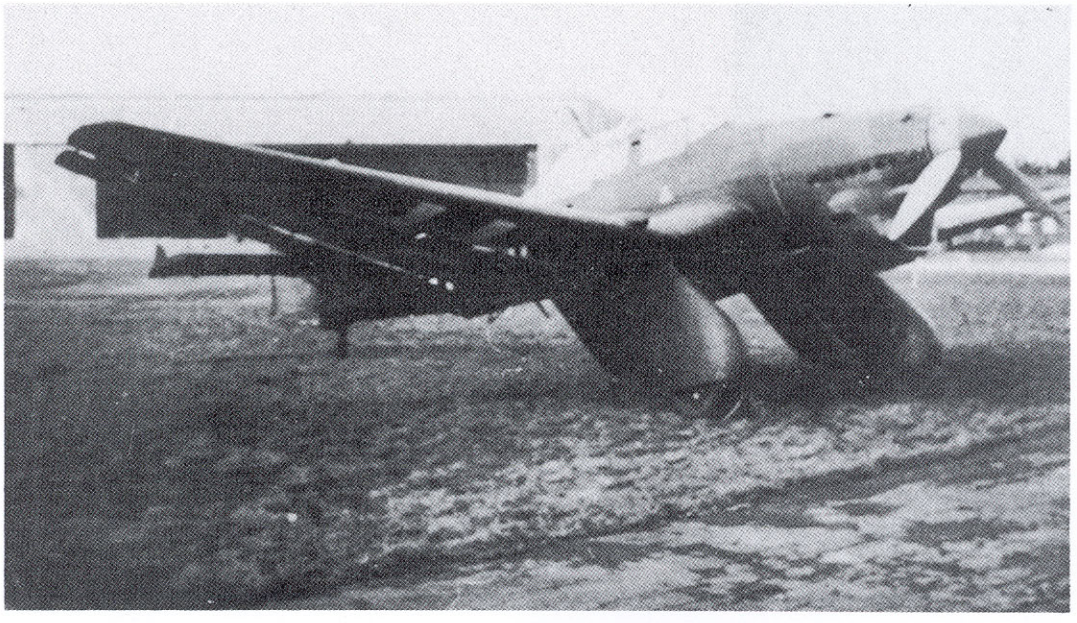
In the winter of 1938/39 flight operations had to continue in spite of snow-covered airfields, here a Ju 87 A-2.

This Ju 87 A belonged to the Luftwaffe's first-aid school. The aircraft's fixed machine-gun has been removed.



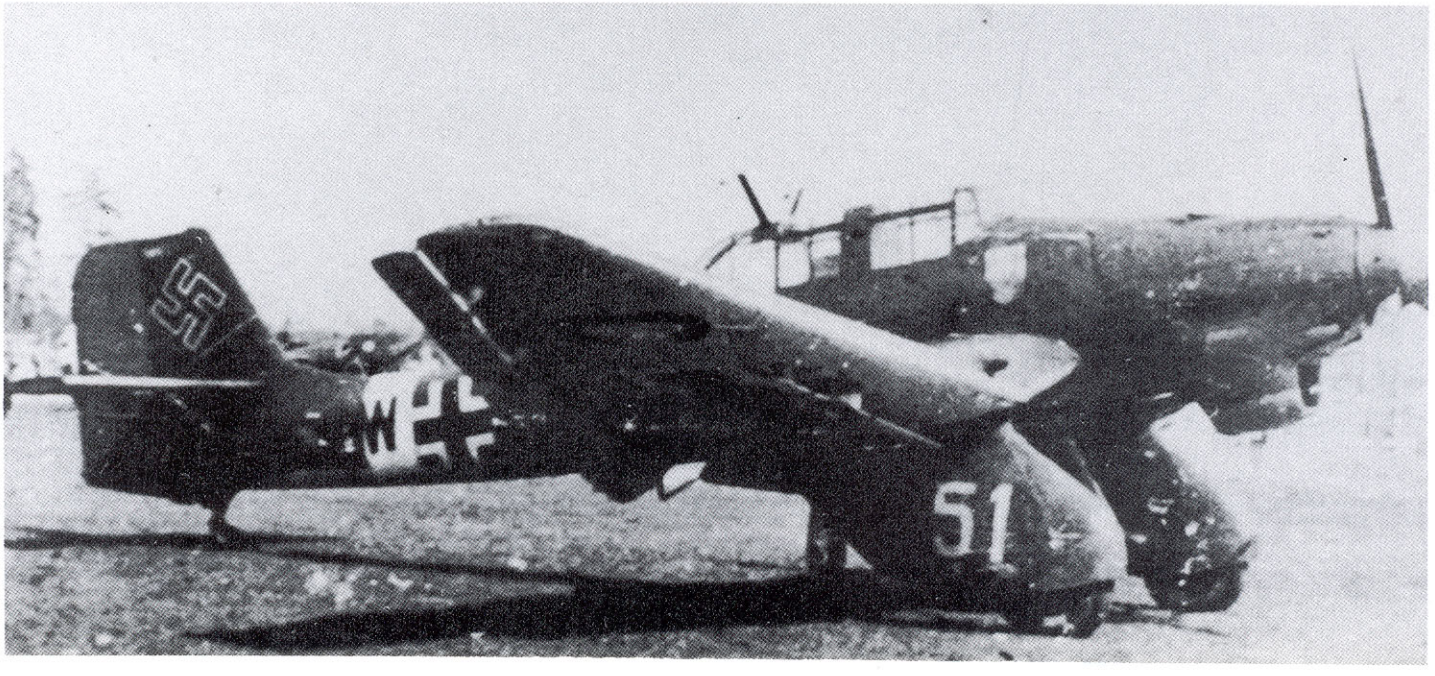
This Ju 87 A-2 bearing the number "55" belonged to a Staffel of Stukaschule 2 based in Foggia, Southern Italy.



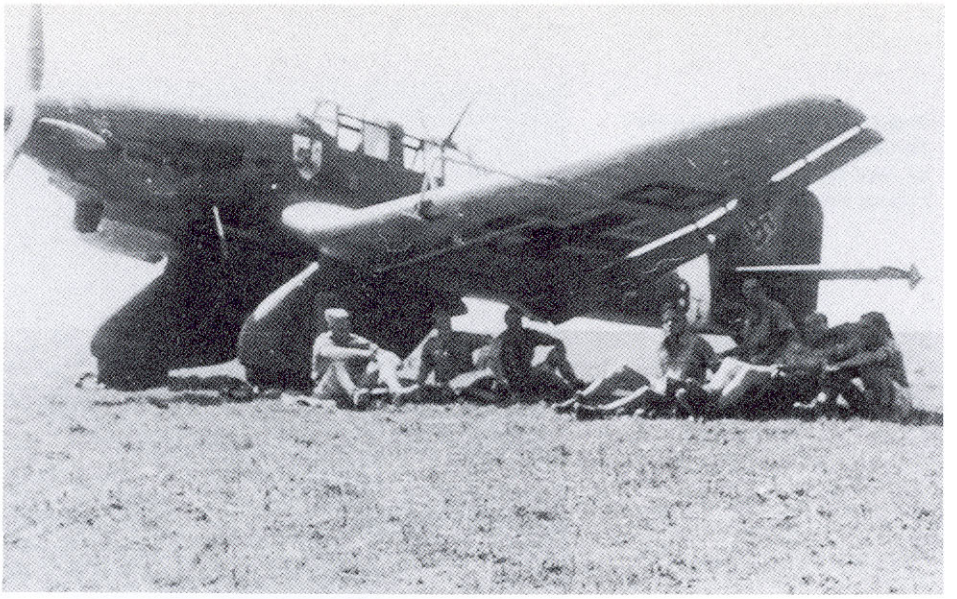


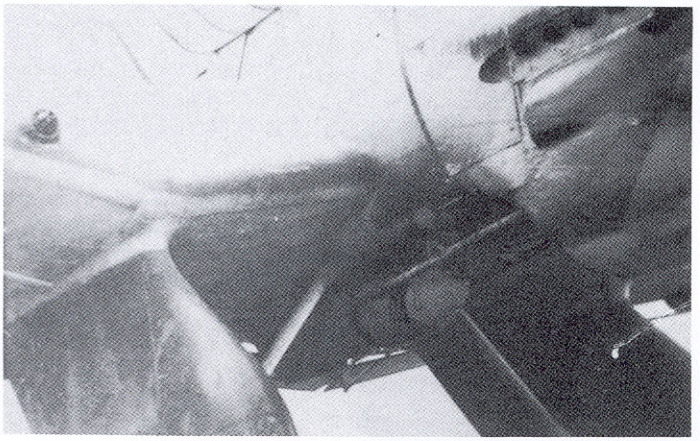
This photograph of a Ju 87 A was taken in 1940; note the oversized Balkenkreuze on the wing undersides.

Another aircraft (Ju 87 A-2) of Stukaschule 2 sits ready for the next training mission.



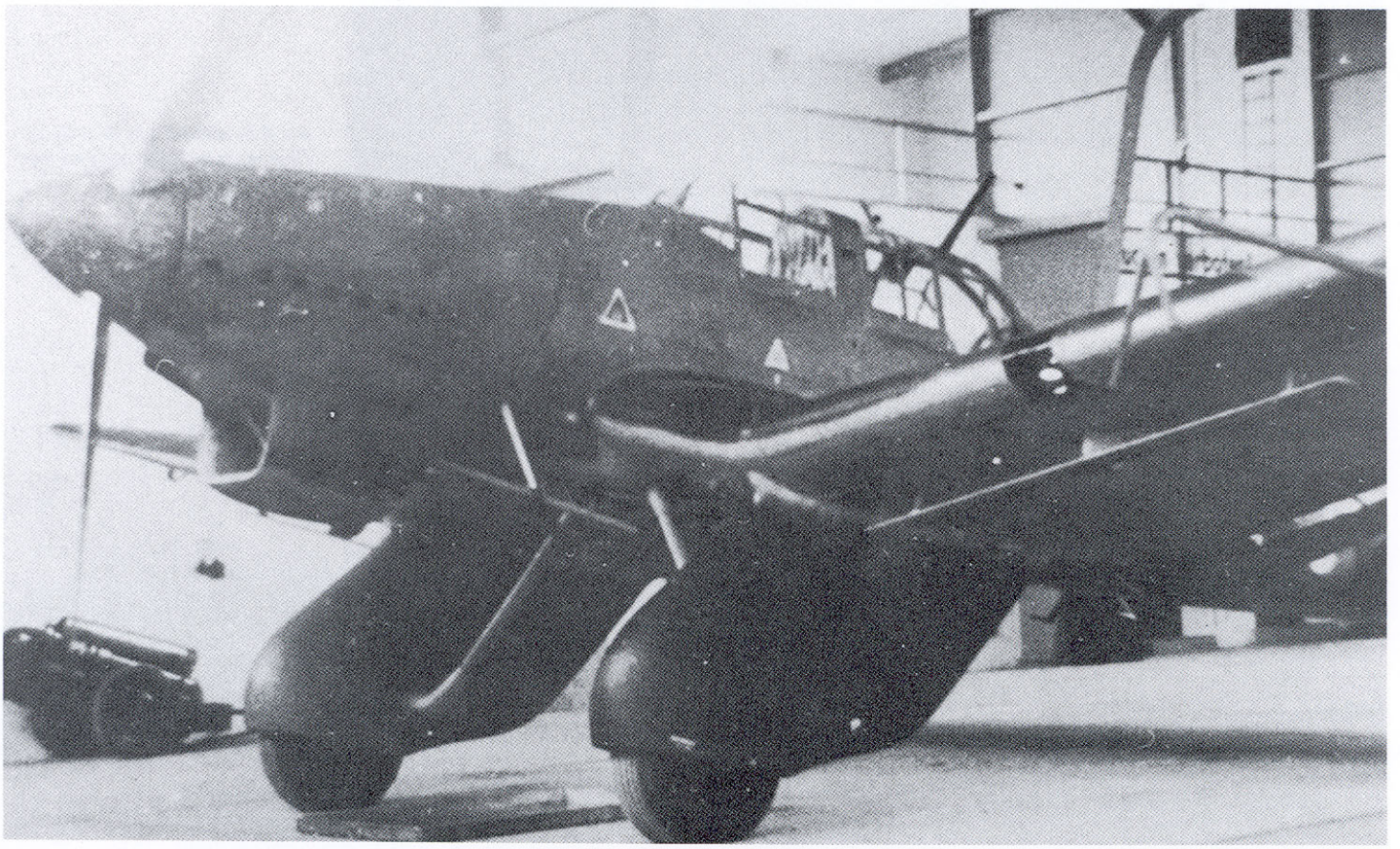
This Ju 87 A-2 of the Foggia Stuka School was a welcome source of shade for the ground crews.





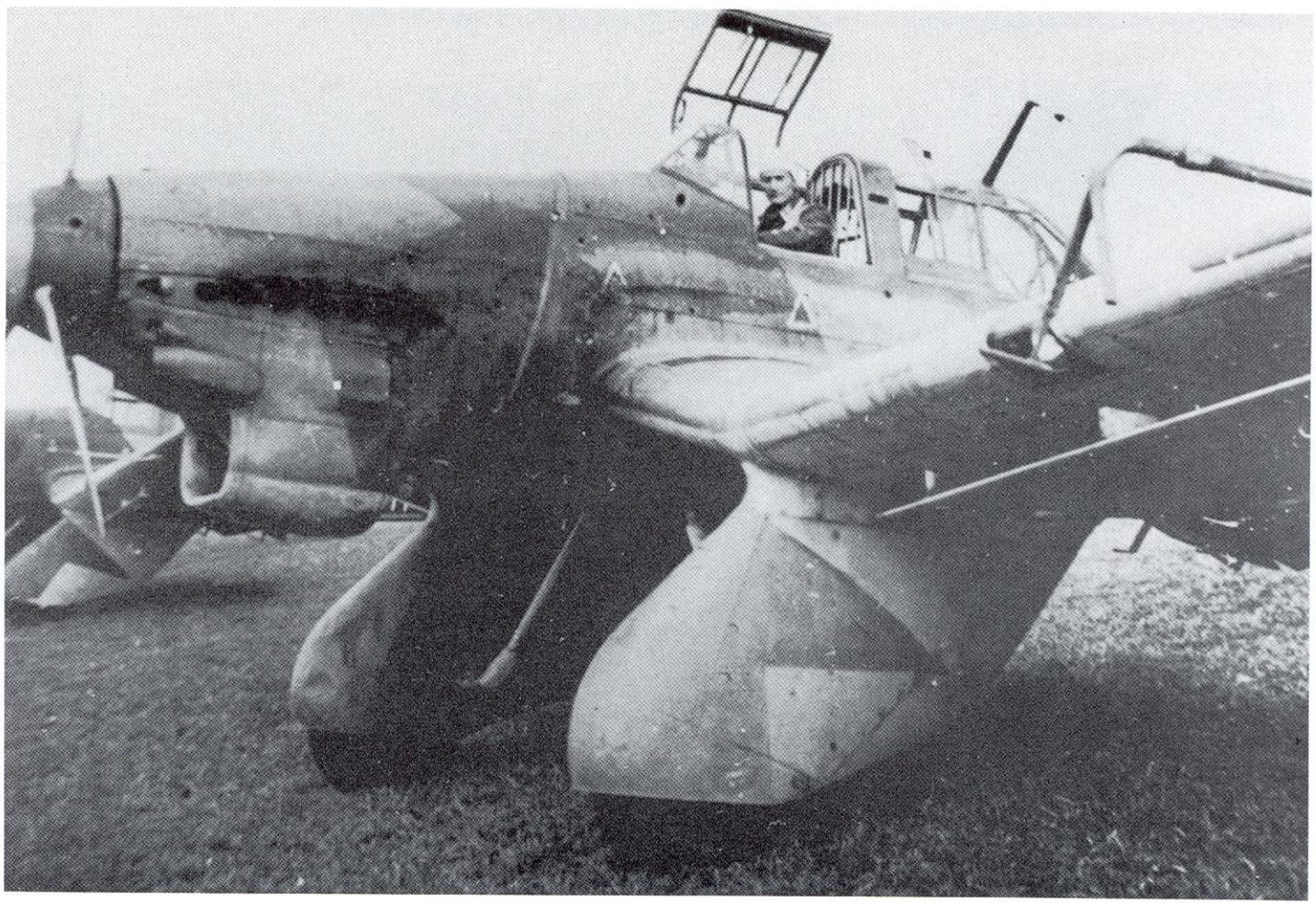
Ju 87 A with a 250-kilogram bomb on the crutch.

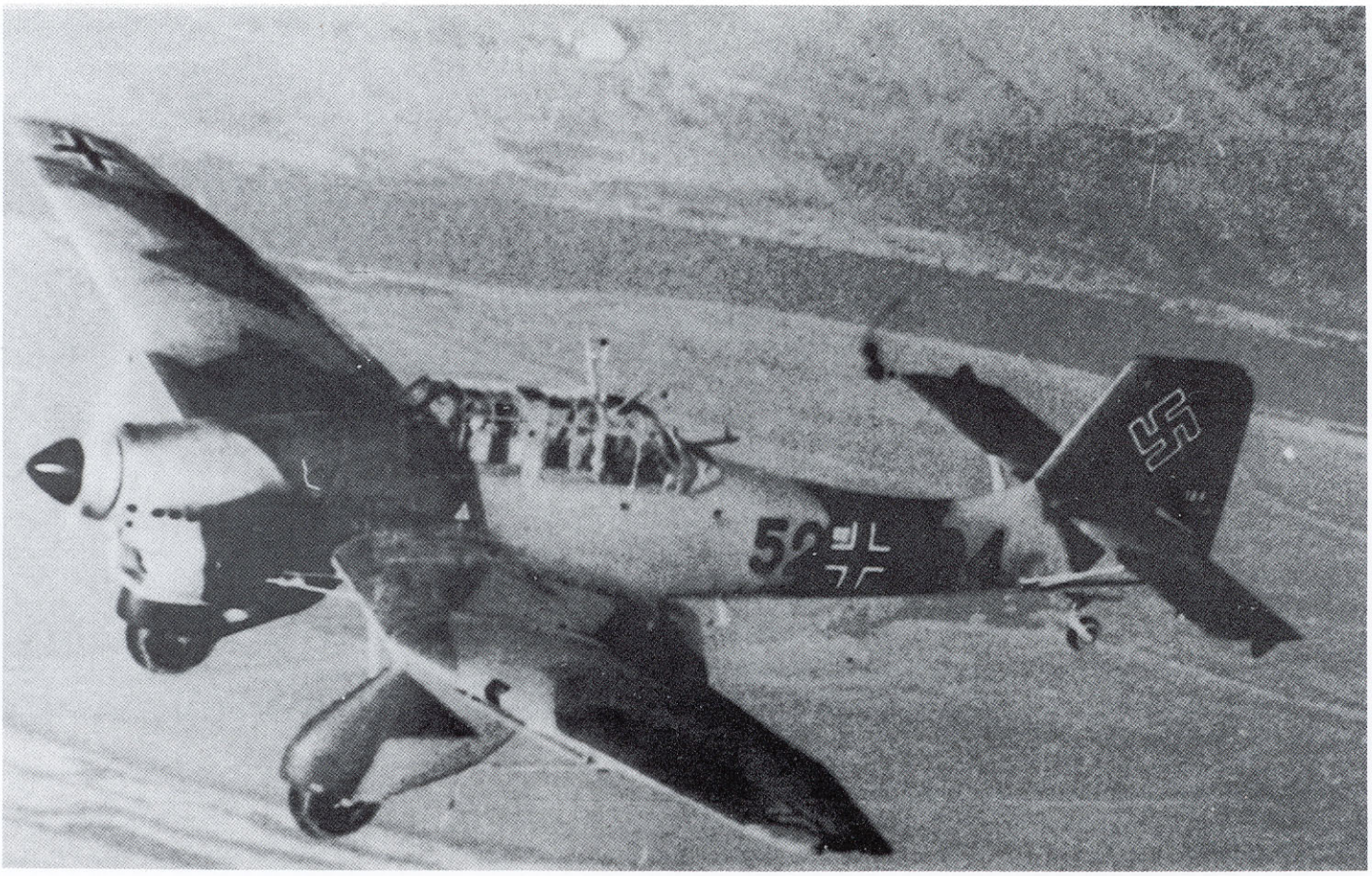
Visible in this view is the underwing dive brake, a Junkers patent.



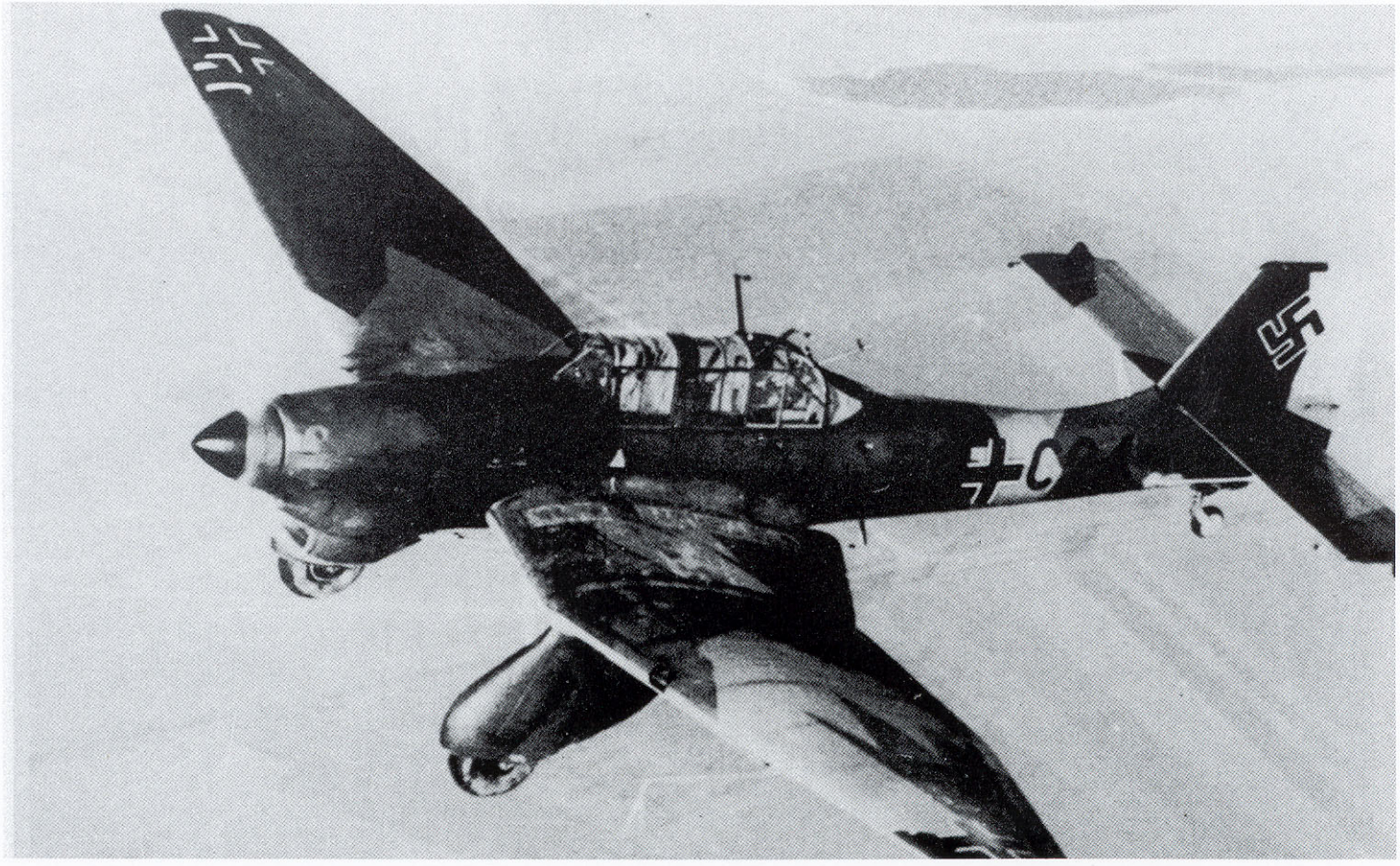
In-flight photo of a Ju 87 A-2 wearing the code CB+LW.

These two Ju 87 A dive-bombers in service with a Stuka school.



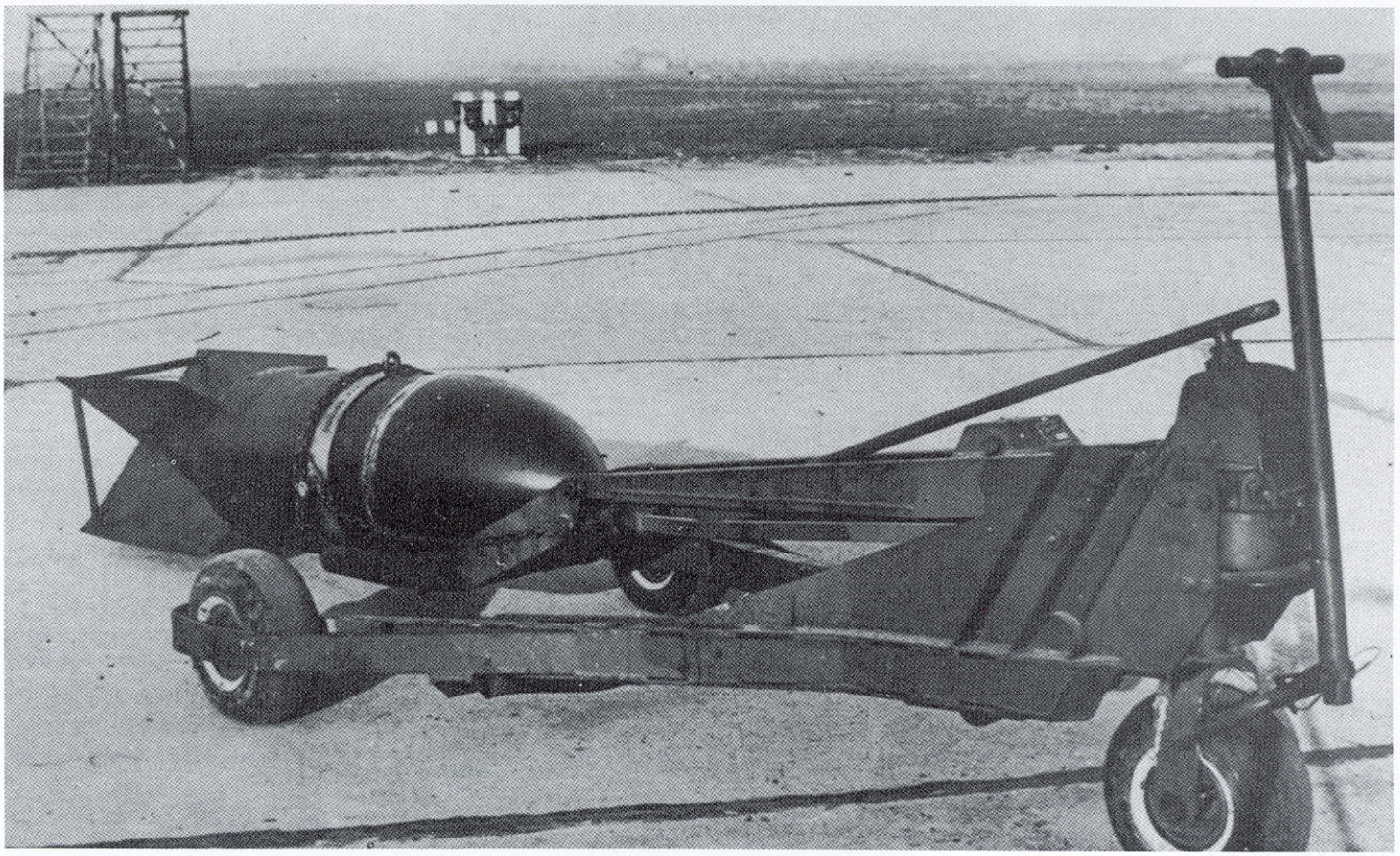


These two photos of Ju 87 A-2s illustrate well the variations in camouflage finishes worn by aircraft of the same unit.

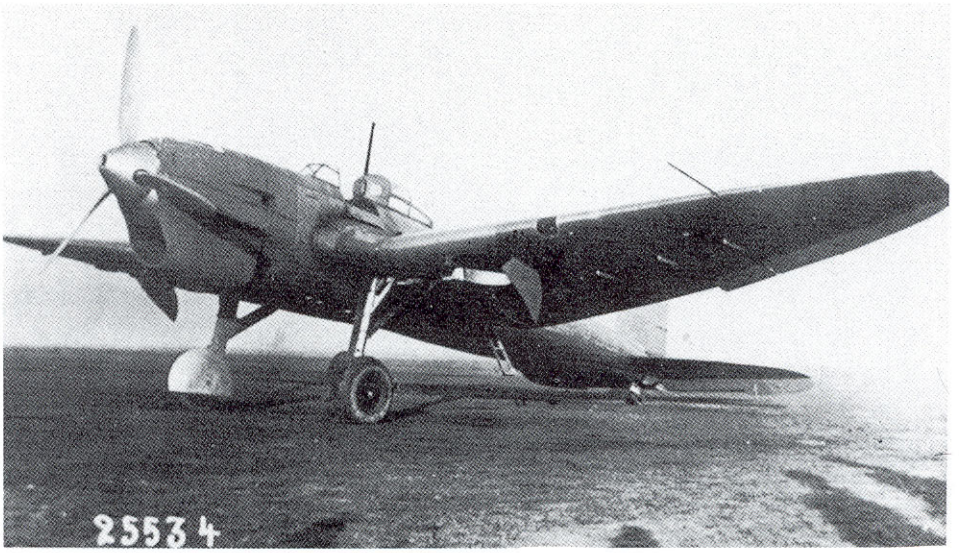


This photograph conveys well the hefty appearance of the Ju 87 A.

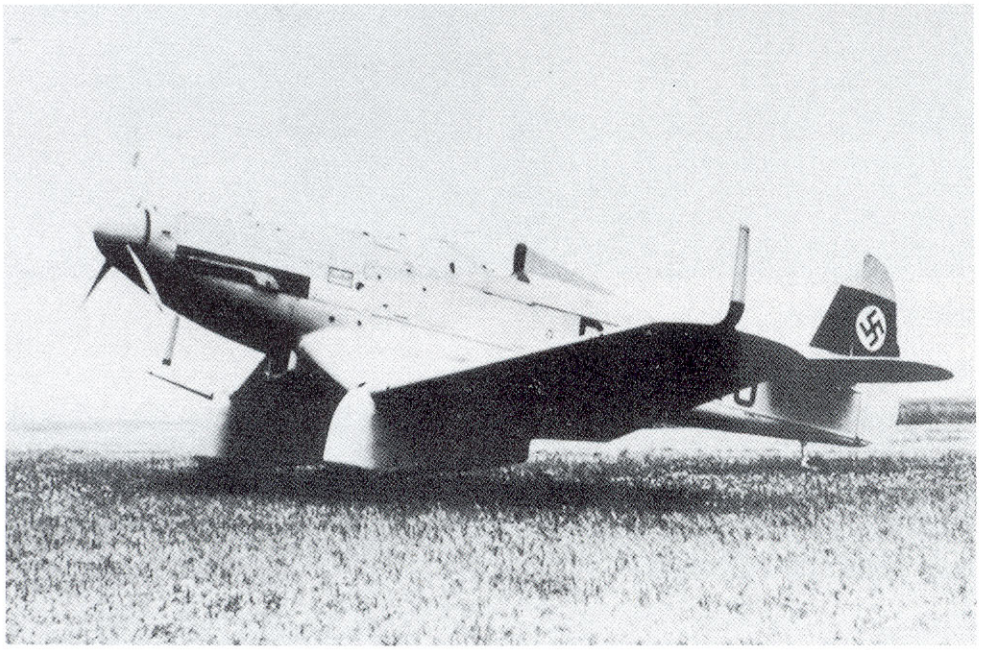
Hydraulic bomb trolley for all types of bomb up to the SC 500.



The Competitors



He 118



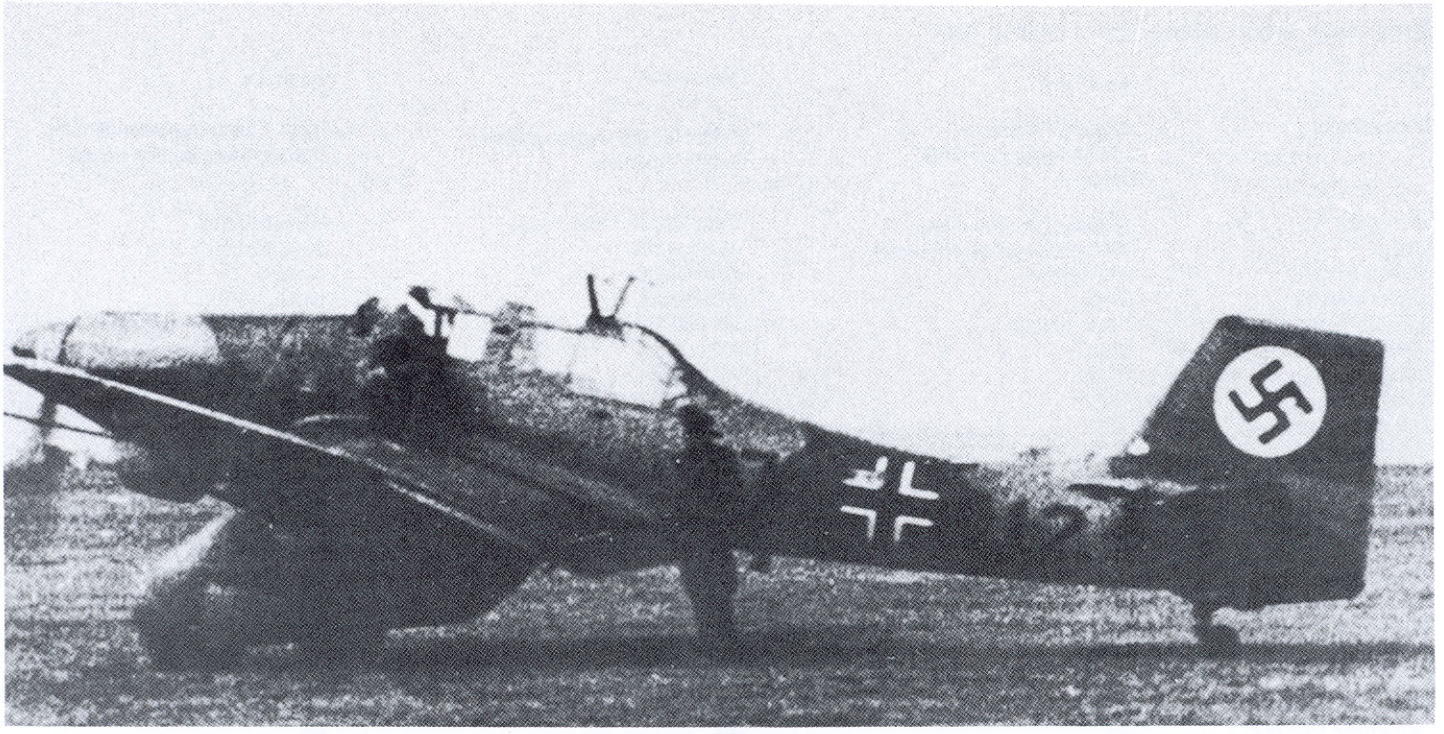
Blohm & Voss Ha 137

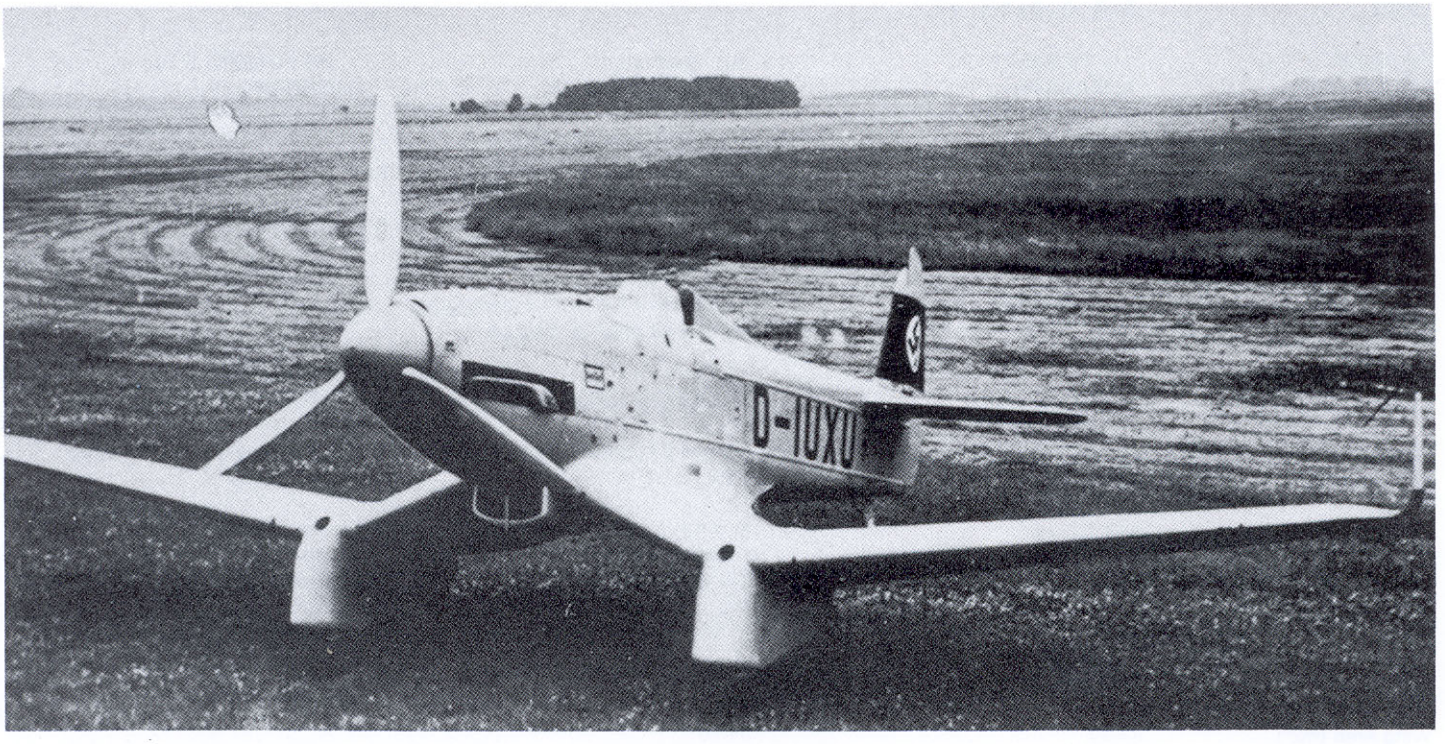
Arado Ar 81 V3.

Comparison of Dive Bomber Types (built in 1937)

Type	Ju 87 A-2	He 118 A-0	Ar 81 V1
Manufacturer	Junkers Flugzeug- und Motorenwerke AG, Dessau	Ernst Heinkel Flugzeugwerke GmbH, Rostock	Arado Flugzeugwerke GmbH, Brandenburg an der Havel
Designer	Dipl.-Ing. H. Pohlmann	Dipl.-Ing. W. Günter Ing.	Walter Rethel
Crew	pilot, radio-operator/gunner	pilot, gunner	pilot, gunner
Configuration	monoplane	monoplane	biplane
Undercarriage	fixed	retractable	fixed
Power Plant	Jumo 210 Da	DB 600 C	Jumo 210 C
Takeoff Power (H.P.)	680	850	600
Wingspan (m)	13.00	15.10	11.20
Length (m)	10.80	11.80	11.65
Height (m)	3.77	4.20	3.57
Wing Area (m2*)	30.00	37.70	35.60
Empty Weight (kg)	2273	2700	2070
Gross Weight (kg)	3324	4120	3198
Speed at sea level	(kph) 320	322	320
	312 at 4000 m	388 at 4000 m	345 at 4000 m
Diving Speed (kph)	550	594	–
Time to Climb (min)	8.0 to 2000 m	6.1 to 2000 m	–
Ceiling (m)	9430	8800	7700
Range (km)	9430	1050	790
Fuel (l)	480	500	–
Dive Brake	yes	yes	yes
Automatic Pull-out	yes	yes	no
Radio	FuG VII with intercom	–	–
Armament	one fixed MG 17 in starboard wing; one flexibly-mounted MG 15 in rear cockpit; 500 kg of bombs	two fixed MG 17 in wings; one MG 15 in rear cockpit and radio-operator/gunner possible; 500 kg of bombs;	two fixed MG 17 in fuselage; one flexibly-mounted MG 17 in rear cockpit; 250 kg of bombs
Production	262 ju 87 A from 1936 to the end of 1938	prototypes and pre-production series	three prototypes

Type	Ha 137 A-0	Aichi D1A2	Chance-Vought SB2U-1
Manufacturer	Blohm & Voss Flugzeugbau, Hamburg	Aichi Kokuki K.K. Funakata/Nagoya and Atsuta south of Nagoya	
Designer	Dr. Richard Vogt	Tokuhishiro Goake	Chance-Vought Corp., USA
Crew	pilot	pilot, radio-operator/gunner	pilot, radio-operator/gunner
Undercarriage	fixed	fixed	retractable
Configuration	monoplane	biplane	monoplane
First Flight	early 1936	autumn 1936	late 1937
Power Plant	BMW 132 A	Nakajima Hikari 1	Pratt & Whitney R-1535-96
Takeoff Power (H.P.)	590	730	825
Wingspan (m)	11.15	11.40	12.80
Length (m)	9.47	9.304tb	10.10
Height (m)	4.00	3.41	3.85
Wing Area (m2*)	23.50	34.70	–
Empty Weight (kg)	1815	1516	2300
Gross Weight	23504tb	2610	3200
Speed (kph)	330	310 at 3200 m	400
Time to Climb (min)	–	7.9 to 3000 m	–
Ceiling (m)	–	6980	8000
Range (km)	–	900	–
Dive Brake	–	yes	–
Automatic Pull-out	–	yes	–
Armament	two fixed MG 17 in fuselage; two fixed MG 17 in undercarriage fairings; 200 kg of bombs	two fixed 7.7mm Type 92 machine-guns in fuselage; one flexibly-mounted Type 92 machine-gun in aft cockpit; 310 kg of bombs	three 7.9mm machine-guns; 750 kg of bombs
Production	three prototypes and pre-production series	428 D1A2 built from 1936 to 1940	series production for the US Navy





Sources

Roderich Cescotti: Kampfflugzeuge und Aufklärer, Koblenz 1989
Joachim Dressel: Stuka!, Warbird Fotofax, London 1989
Brian Filley: Ju 87 Stuka in Action, Vol. 73, Texas 1986
Kyrill von Gersdorf: Flugmotoren und Strahltriebwerke, 2nd edition, Koblenz 1985
Manfred Griehl: Flugzeuge gegen Panzer, Sonderband 16, Friedberg 1990
Bruno Lange: Typenhandbuch der deutschen Luftfahrttechnik, Koblenz 1986
Karl Ries: Legion Condor, Mainz 1970
Peter C. Smith: Dive Bombers in action, London 1985
Ernst Zindel: Die Geschichte und Entwicklung des Junkers Flugzeugbaus von 1910 bis 1945, DLR-Report 79-01, Cologne 1979
Memorandum on the production of the Ju 87 by "Weser" Flugzeugbau GmbH, Bremen 1941
Aircraft Part List "J" Ju 87 A, Dessau 1938
Aircraft development program of 1/10/1936
Author's archive

THE LUFTWAFFE PROFILE SERIES NO.5 • JUNKERS Ju 87A

Schiffer Military/Aviation History

50000
9 780887 409202
ISBN: 0-88740-920-2