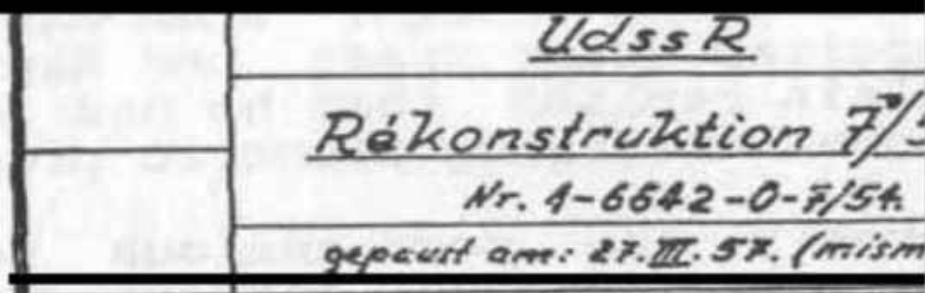


SECRET NAZI AIRCRAFT

1939 -1945 Luftwaffe's Advanced Aircraft
Projects

DAVID CROCKER



SECRET NAZI AIRCRAFT



Heinkel He 162 "Volksjä

Last Chance for the Luftwaffe

1939 -1945 Luftwaffe's Advanced Aircraft Projects

Second Edition

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This book is a compilation of surviving technical data and engineering information on the aircraft projects that were ongoing in Germany between the years 1939 and 1945. A short section of background material is also given at the beginning of each chapter, to help readers appreciate the environment and culture that existed in these research organizations in those times. This background material was found in Wikipedia, the free encyclopedia. A basic knowledge of aircraft terminology is perquisite to reading this work.

The projects were selected for their advanced technological content and their unorthodox approach to aircraft design. To the reader many of these programs may have a familiar look and that is not too surprising; since they were to be the inspiration and source of engineering data, for most aeronautical research work, that was to take place in the world throughout the later part of the century. Aeronautical development that took place in the West and also in the Eastern bloc had their beginnings in Germany during WW2. This trend was to continue for at least three decades following the end of hostilities in Europe. Familiar war-birds such as the Sabre Jet and the MIG 15 are direct descendants of projects which started at Messerschmitt and Focke-Wulf.

Who can deny the resemblance of those fighters that emerged in 1950's to the Ta 153 and the ME P 1101 of the 1940's. The so called groundbreaking supersonic Bell X series of aircraft flown by legendary test pilot Chuck Yeager in the 1950's had their beginnings in the high-speed research programs of the Nazi regime (8-346 supersonic research aircraft).

The material in this volume includes more engineering data than our earlier book. One of my engineering professors once said, that unless one could quantify a fact with a number, it was of little value. Following this thought, this work contains as much engineering data as could be found and is assigned to each project and aircraft design appearing here.

The project material in this book has been arranged so that the manufacturers are listed in alphabetical order, making it more convenient for the reader to follow the development work that was proceeding in the company's advance design offices ("Skunk-Works").

The material found in this compilation could also form a valuable source of information for flight simulator games, aero modelers both 1/72nd and giant scale RC Jets. Jet

propelled models or for that matter, any aircraft model could be scaled up from the dimensions and engineering data found in these pages. Imagine the prospects of a scale ME 1101, a TA 183 or even an RC model of the Focke-Wulf ATHODYD (ramjet) fighter performing at some local jet rally.

ADVANCED PROJECTS

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This chapter deals with advanced projects that were ongoing in Nazi occupied Europe in 1944, requiring testing and evaluation at the Luftwaffe's testing establishments. There was a special commission formed with expert members of the Luftwaffe and industry who were chosen to direct and set priorities for the various projects.

AIRCRAFT TEST AND DEVELOPMENT PLAN 1945

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(Emergency Fighter Program)

Reports of surviving documents give a feeling of conditions which existed within the aircraft community just before the final collapse. A document datelined Berlin December 22nd, 1944 sheds some light on the situation; specifically the ideas and the problems which confronted German designers. The paper by Technischen Luftrüstung (TLR) [Technical Air Armament] was addressed to the Chief of Technical Air Equipment and was issued by the Chief Commissioner for Aircraft Development.

The following is a list of the individual special commissions and their chiefs that were active in Germany in the latter days of the Second World War.

The commission for:

Day fighters was headed up by Willi Messerschmitt;

Night fighters was led by Kurt Tank;

Bombers was led by Heinrich Hertel;*

Airframe construction was headed by Otto Bock; and

Power units was headed by Schilo.

**Heinrich Hertel (13 November 1901 – 1982) was a German [aeronautical engineer](#).*

After graduating as an [engineer](#) from [Munich Technical College](#), he joined the [Junkers](#) company in 1926. In 1932, he was recruited by [Ernst Heinkel](#) and two years later was made the Technical Director of the [Heinkel](#) company where he oversaw many projects including the [Heinkel He 100](#) and [He 111](#).

In May 1939 he returned to the Board of Directors at Junkers where he was closely connected with the development of the [Junkers Ju 288](#) and [Ju 248](#). In February 1945, he also worked on a project of the [Dornier Do 635](#), one of the twin boom fighter aircraft developed from [Dornier Do 335](#) but the project was cancelled in 1945.

After [World War II](#), Hertel worked in France before returning to Germany in 1950 to teach [aeronautics](#) in Berlin. From 1959 until his retirement in 1977 he worked as a technical consultant for [Focke-Wulf](#) in [Bremen](#).

Single engine fighters.

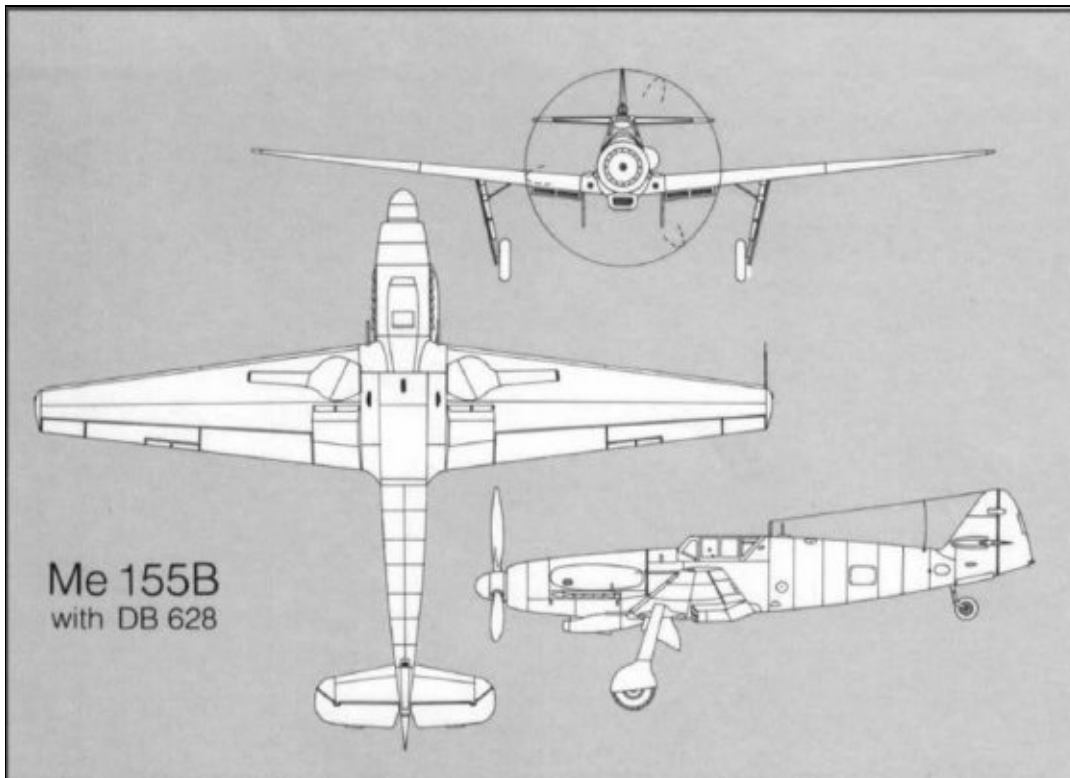
It was decided not to develop the BF 109 with the DB 605 L engine in view of the better performance of the TA 152 and because of Daimler-Benz's commitments in respect of the DB 603 and its turbojet research program.

The proposal the new engine to be installed in the BF 109 was to be dropped and the termination of 109 production was also ordered. However for some unmentioned reason, instructions were given to proceed with the ongoing aerodynamic improvements of the BF 109. The F.W. 190 was also to be improved aerodynamically, but further modifications would in principle not be carried out.

The program for the TA 152 was to continue until the completion of the series, and the development of the DB 155 high altitude fighters for operation up to 52,500 ft. was considered imperative, although at the time of the meeting only a small experimental series had been ordered.



TA 152



Me 155B with DB 628 Engine

Target defense aircraft.

The importance of Target Defense was emphasized and consideration was narrowed down to the 8-248, a development of the ME 163; the Heinkel-Julia; the Bachem Natter; and the ME 262 interceptor with supplementary rocket propulsion. It was decided by the commission that since these developments were in an advanced state that it was not expedient to abandon any of them. A proposal by the special commission for Jet Aircraft and Special Aircraft to curtail or reject the 8-263 in favor of the He 162 was adopted on the grounds that further development and serious production of the 263 should be based on of the work already undertaken in connection with the 163 aircraft. The four types of target defense aircraft already mentioned, were to be developed with the following priority: (1) ME 262 with supplementary rocket propulsion; (2) He (code name) Julia; (3) 8-263; (4) Bachem Natter.

The development of the new Walter rocket engine 109 0.708, using nitric acid, was to proceed on a high priority basis, as this unit was needed for the last three aircraft named for development.

Multi engine aircraft.

Mention was made of the building of four prototypes of the 8-635 (dubbed F.T. 35) and it was suggested that a small experimental series of 10 to 20 aircraft should be built.

At the time of the meeting work was continuing on the He 211 with a wooden covered wing. The first test of the wings had already taken shape and the aircraft was nearly ready

for flight trials, though not with long-range reconnaissance equipment installed. The Heinkel firm had been requested to take over the technical direction of the whole project.

The He 211 is a low wing long-range reconnaissance aircraft with a wing of the extremely high aspect ratio (this aircraft was later resurrected to be a 20 passenger transport in the late 1950's).

The DO 335 was to be further developed.

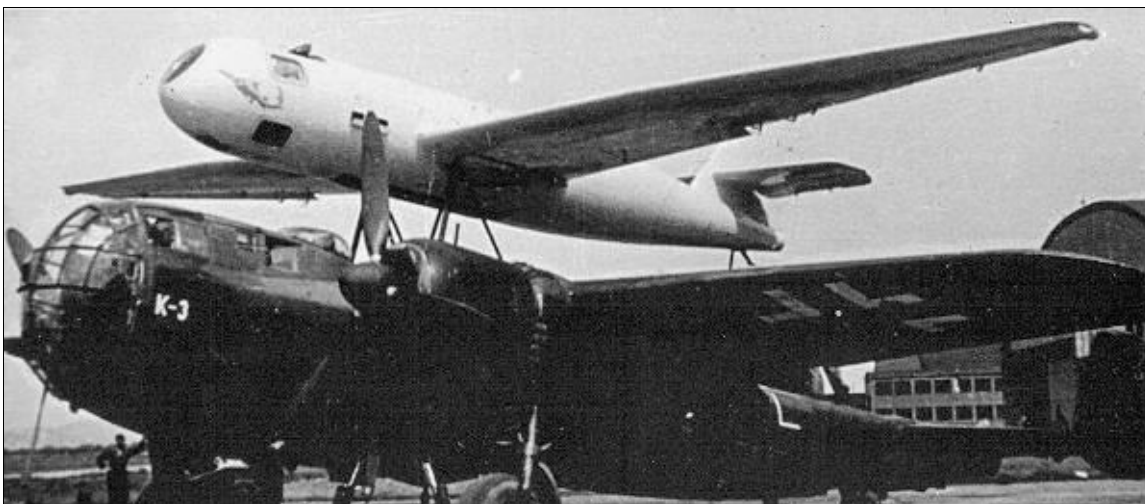
The He 219 was only to be developed as authorized by the night fighter commission.

Flying wings.

The H 0229 was to be developed in conjunction with the Gotha, and three prototypes of the Horten VII were to be completed.

Research aircraft.

Emphasis was placed on the ramjet propulsion system of the Lippisch P13 and the DFS 228 rocket propelled reconnaissance aircraft described by the Germans as a glider with rocket unit for altitudes in excess of 65,000 ft. It was stated that the best employment of these types would be decided when the tests were in hand. Many points were to be clarified; for example, bailing out from great altitude's. Ten prototypes would be completed.



DFS 228 Rocket Propelled Reconnaissance Aircraft.

Three samples of the 8-332 rocket propelled glider were ordered. This was a pure research aircraft for profile measurements at high Reynolds numbers which could not be obtained in the wind tunnel.

Work on the 1068 piloted flying model with rocket propulsion was to continue as planned (note this appears to have been a flying scale model of the He 343).

No firm had been designated to build the 8-346 research aircraft. Later Siebel was entrusted with this task. The aircraft was to be used for collecting aerodynamic data of the sonic and supersonic flight regimes, which at that time was a new and uncharted area of the flight envelope.

Miscellaneous jet propelled aircraft.

The Junkers EF 126 project, was mentioned at the meeting as a heavy fighter with one or two Argus impulse Duct Units. Its future depended on the Junkers production capability.

It was clear from the minutes of the last meeting that the development of the JU 287 multi jet high-speed Bomber hung in the balance.

Gliders.

The future of the KA 4 30 assault and freight glider was to be subject of discussions on quantity of production. 5 examples of a Kranich glider with prone pilot, would be completed by the Schneider concern.

The He 162 S, and training variation of the 162 Fighter, was mentioned under the heading gliders and is followed by a reference to the RE 5, also described as a glider for ME 162 pilot training. The 162 S was to be developed by Heinkel in conjunction with S F K. The ME 162 pilot trainer project was to be replaced by the Fi 103 produced by Segelflug-Reichenberg.

Fieseler Fi 103 Reichenberg Pilot Trainer Aircraft.



The Fieseler FI 103 pilot trainer must have been a strange aircraft to fly. It was up piloted version of the infamous buzz-bomb that was used extensively in the battle of Britain. The pilots must have had a sense that they were flying in a bomb.

Miscellaneous developments.

Wing section thickening was a promising means of carrying additional fuel economically. By deepening the section over part of the wing, resulted in considerable savings: reduced drag numbers, decreased manufacturing time, less of the now precious aluminum material used; as compared to utilizing standard drop tanks.

Development of this technique was to be pursued on a high priority basis for the BF 109 and the F.W. 190 fighter aircraft.

Single seat fighters. Speeches were made by representatives of various firms to the commission. Messerschmitt discussed rocket engine and turbo jet fighters. On the subject of turbojet fighters he said that there was complete and unequivocal agreement that in the competition there were only four aircraft worthy of mention. Mr. Messerschmitt went on to say that since it was not clear whether the turbojet fighter was adequate for all operational tasks envisaged by the Luftwaffe, because of its special characteristics, further development of fighters with reciprocating engines could not be discontinued. It was accordingly concluded that development of the TA 152 should precede in order to match the performance of the new generation enemy fighters.

Bad weather and night fighters

Kurt Tank the talented aircraft designer at Focke-Wulf reported that it was agreed, that the operational qualities of contemporary German bad weather fighters were not satisfactory. Moreover the problem of designing aircraft for day fighting with night vision had not been solved. German night fighters in current use and propose for the near future were far from adequate for dealing with enemy aircraft such as the Mosquito which was primarily constructed of wood and was not easily detected by radar. Night fighter developments of the AR 234 and the ME 03354 were only makeshift solutions and did not satisfy the operational objectives of the Luftwaffe in the areas of endurance and adequacy of navigation systems.

Tank concluded that it was necessary to develop as a matter of the greatest urgency a super fighter with an endurance of five to eight hours and a crew of three with satisfactory provisions for night navigation. Tank mentioned a development of the DO 335 modification which added a turbojet engine to this airframe.



Small aircraft:

Junkers proposed a very cheap and simple single seat aircraft with an Argus power unit that was intended for ground attack operations. This aircraft has the designation EF 126. This aircraft having a range of 280 to 310 mi. and an endurance of 40 to 50 minutes was considered to be completely inadequate, so that the realization of the project was considered as impractical. However no one objected to further development of this very interesting and economical aircraft for experimental purposes, but there was no intention of committing the design to high quantity production.

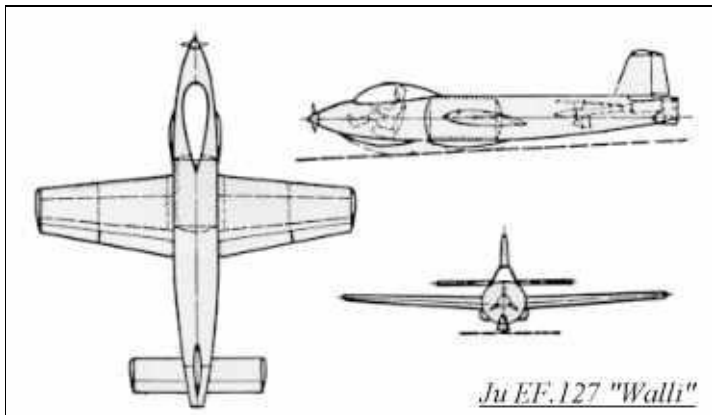
Target defended interceptors.

Reference was made to the inadequate endurance of the Me 163 B and it was further stated that the He Julia and the Bachem Natter rocket planes did not hold much promise either. It was concluded that the development of the ME 263 should be continued on a priority basis. Tests of the ME 262 with supplementary rocket propulsion should be resumed as good results with this aircraft might render all other target defense interceptors obsolete for this role.

The results of the ballot meant that the Julia was to be discontinued because of its inadequate performance. Any resumption of future development of this type would be dependent upon testing results of with the ME163, 263 and 262 aircraft. As well as the "walli" codename for the Junkers Project EF 127.

Hertel told the commission that the Julia project was opposed to on technical and tactical grounds, the completion of planned development was agreed to, because the initial flight tests for them seem to have taken place and showed some promise. Preparations for serious production, however, were to be discontinued.

Reference was made to the planned proposal by Willie Messerschmitt to attach an additional rocket unit with special external tanks to existing fighters with internal combustion engines and those with turbojet units in order to enhance their combat performance.



Engines for future aircraft:

Speaking on the subject Schilo said that additional improvements to the DB 603 and Jumo 0213 engines were under development. He also mentioned that the Heinkel-Hirth He-S11 engine and the BMW 109-003R turbo jet engine were coming online. He referred to Tandem and other combinations of the DB 603 and Jumo 0213 were being considered.

Aircraft actually on test at Rechlin* February 1945 Germany's Edwards).

** The airport was once part of the [Third Reich](#) era's [Luftwaffe](#) main testing ground, or Erprobungsstelle for new aircraft designs, the heart of which was actually centred on two large turf areas some 4.5 km (2.5 mi) due north (at [53°20'48.11"N 12°44'23.25"E](#)) of the 21st century era paved-runway airport facility. The core airfield of the Luftwaffe facility took the form of a typical pre-World War II [aerodrome](#), with no clearly defined "runways", being bounded by a roughly hexagonal-layout perimeter road that still exists today, defining an area approximately 1,700 meters (5,700 ft) across within it of about 234.3 hectares, or 578.9 acres, which today is the site of the annual [Fusion music festival](#). The Rechlin data sheets on Luftwaffe and captured [Allied](#) aircraft are considered by many aviation historians to be among the most reliable sources for aircraft performance data from the [World War II](#) era. Its role was taken over after 1945 by the Bundeswehr military aviation installation at [Manching](#), within [West German](#) borders, since Rechlin was well inside the borders of [East Germany](#) for 45 years.*

The list of projects is given in a third document headed "Notes Emergency Testing Programs".

The ME 262 production aircraft were being subjected to performance checks and final test of the Jumo 004 jet unit installation. Experiments were also in progress with parachute arresting brakes, drop tanks and new fight instruments. The AR 234 B was undergoing

performance tests and the AR 234 C was doing its total type certification trials. Prototype trials were in progress on the TA 152 H and the TA 152 C while the F.W. 190 was undergoing performance testing with certain aerodynamic improvements incorporated by the Focke-Wulf organization.



Heinkel He 162 “Volksjäger”- Last chance for the Luftwaffe

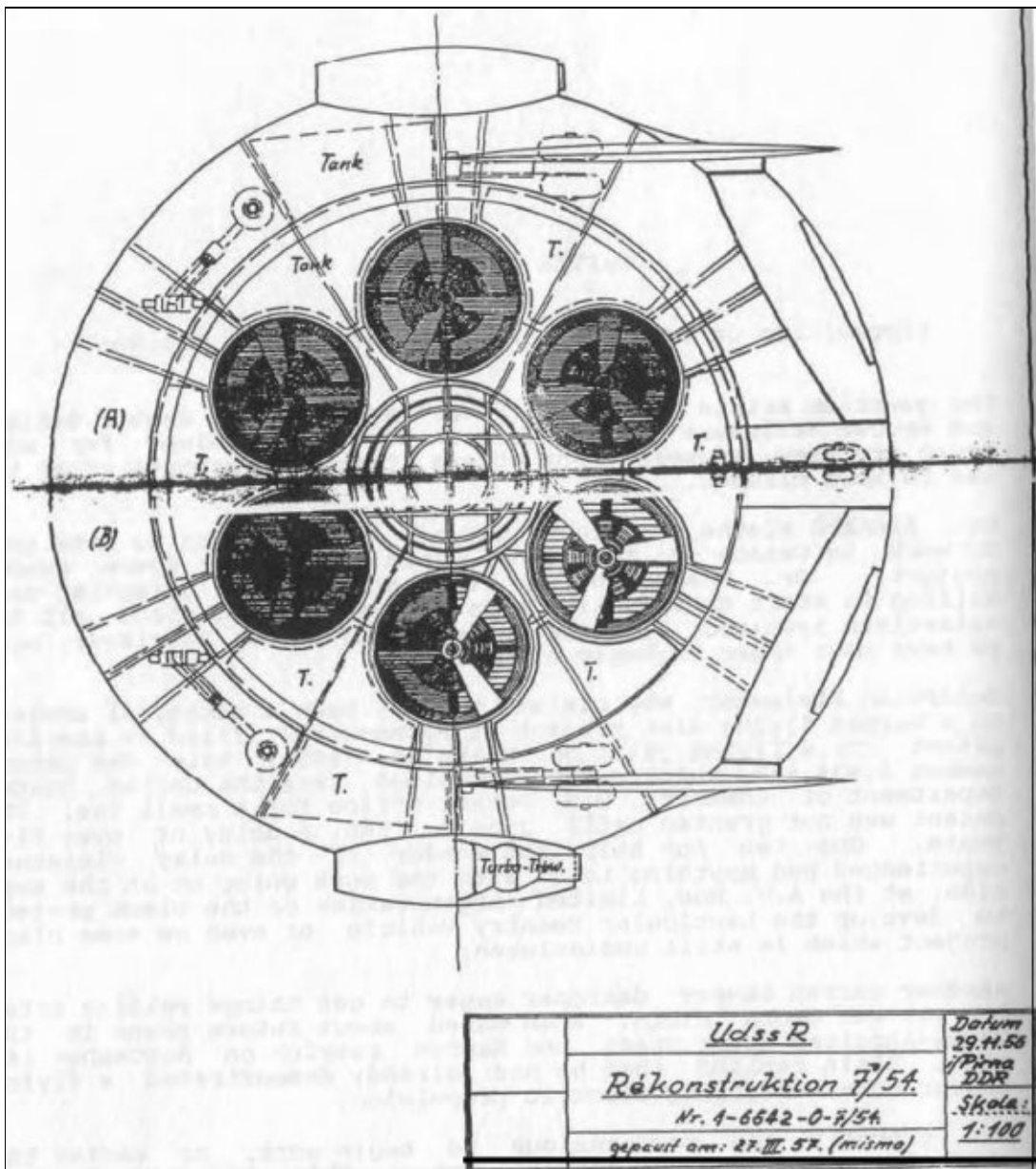
The He 162 was doing its prototype trials and the DO 335 was finishing engine tests. Some work on free spinning of undercarriage wheels was also in progress. Finally, prototype trials of the JU 308 with Jumo 213 E engines were also ongoing.



Junkers EF 126



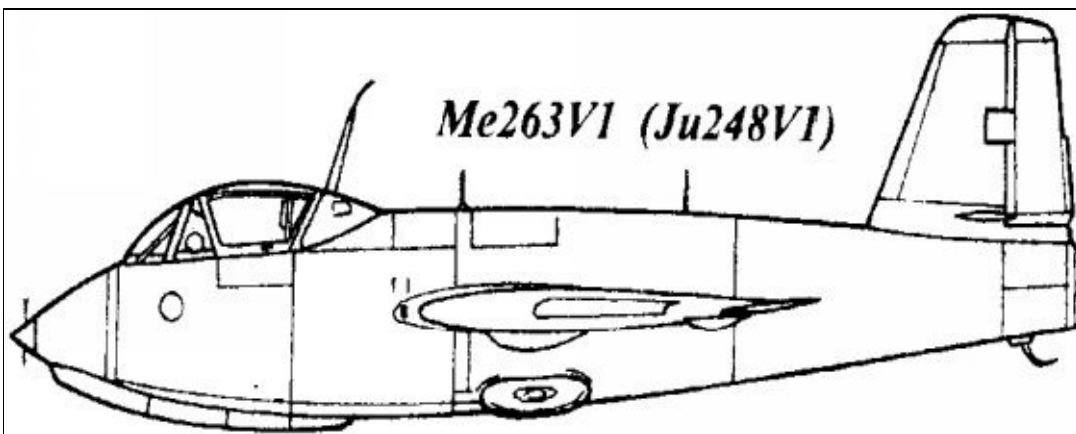
Argus Power Unit



Argus Power System

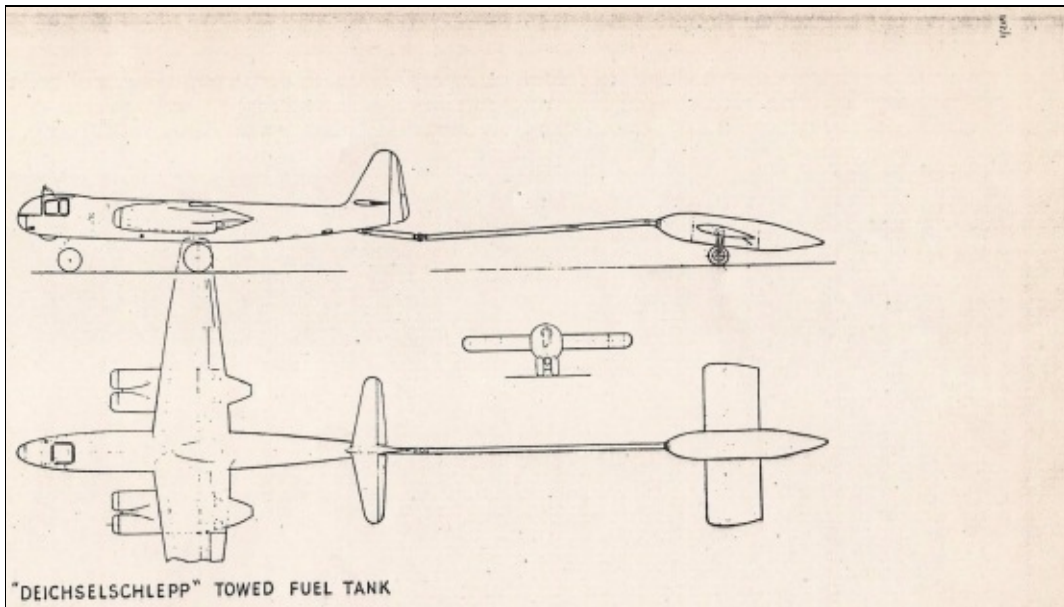


Daimler-Benz 603



Me 263 V1

Long Range Fuel Tanks.



MESSERSCHMIDT TOWED fuel tank - Drawing x 1.

In 1944 both the major rival aircraft design bureaus of Messerschmitt and Focke-Wulf were working on schemes for towing auxiliary fuel tanks behind its aircraft by means of a semi rigid tube. The experiments were carried out at the investigation branch of the German air ministry at the beginning of 1945 and the two firms agreed to pool their data.

It was agreed by the Commission that the fuel tanks were required for the F.W. 190, the TA 152, ME 262, AR 34, DO 635, and the TA 655 aircraft, in order to substantially increase the range of these aircraft so, tanks of 1000 to 3,000 liters were proposed.

The flying wing type of tank was to receive preference for performance reasons, but it was realized that many design difficulties would have to be overcome with this type of tank since strength and rigidity would be impaired by the extraction of the fuel through the connecting tube.

Finally it was decided to hand the problem over to the D.F.S. who were to find a solution. The two firms were to provide the engineers and technicians to support the development testing for these tanks.

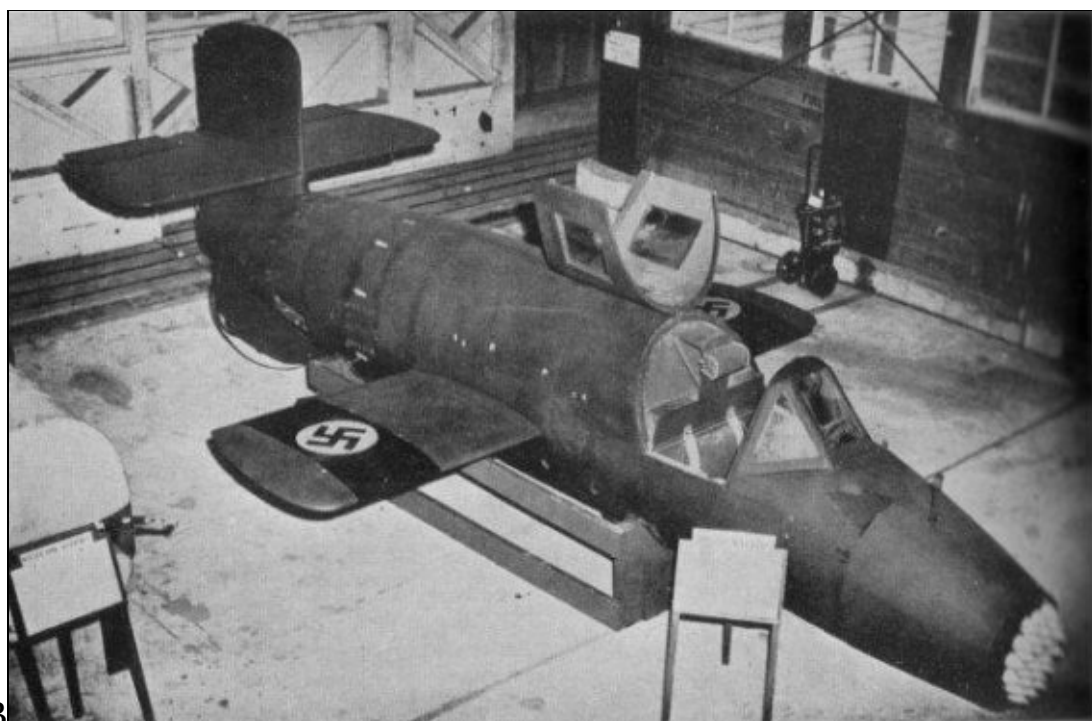


Looking at the picture above one does not have to spend too much time to determine that towing with the Do 635 presented special challenges.

For the experimental testing, it was decided that each aircraft would have to be fitted with a second seat facing rearwards to accommodate an observer, who was required to watch the behavior of the tank in flight. The DO 635 presented special difficulties, for not only was the aircraft not available for towing; special towing arms were necessary because of that aircraft's unique configuration. An He 111 bomber was finally used as a substitute for the DO 635.

Various flights were carried out with both, the all wing type of tank and a conventional fuselage with tail type, the towing aircraft were He 111's, He 177, JU 87 and AR 234. They were investigating the possibilities of a tank of 4,000 liters capacity for towing by the AR 234 C but, it was uncertain whether this combination would be practical.

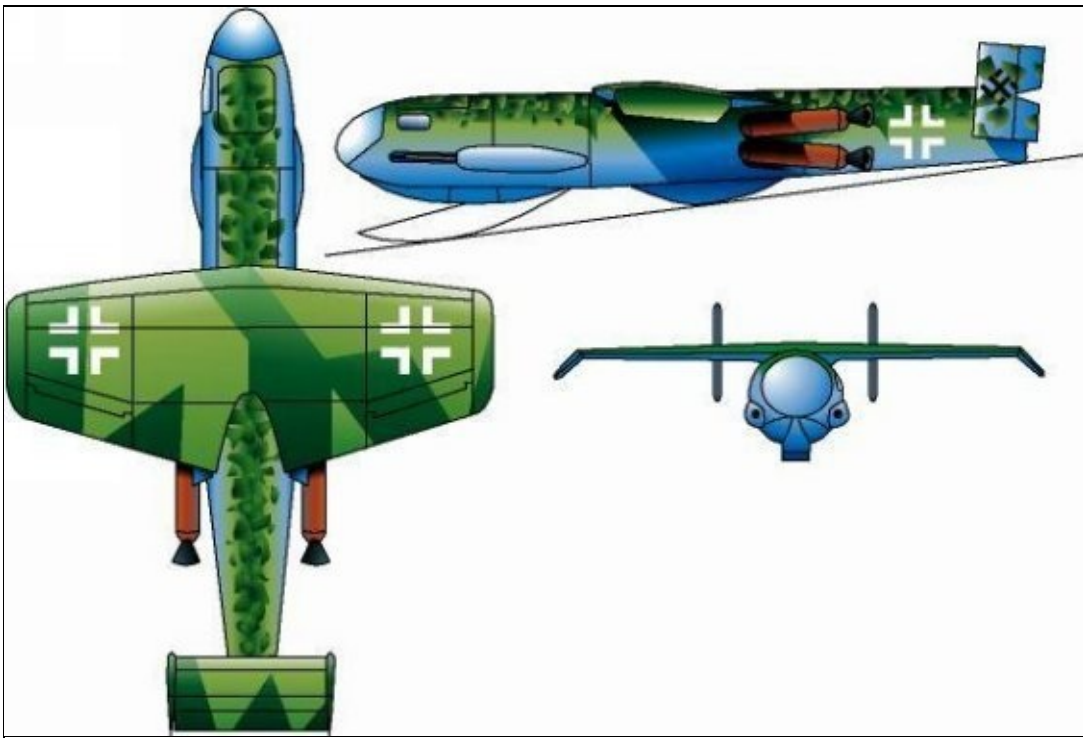
Details of the towed tank are: wingspan 18 ft.; cord 6 ft.; length of tank 17.75 ft.; Capacity 3,000 l or 660 gal.



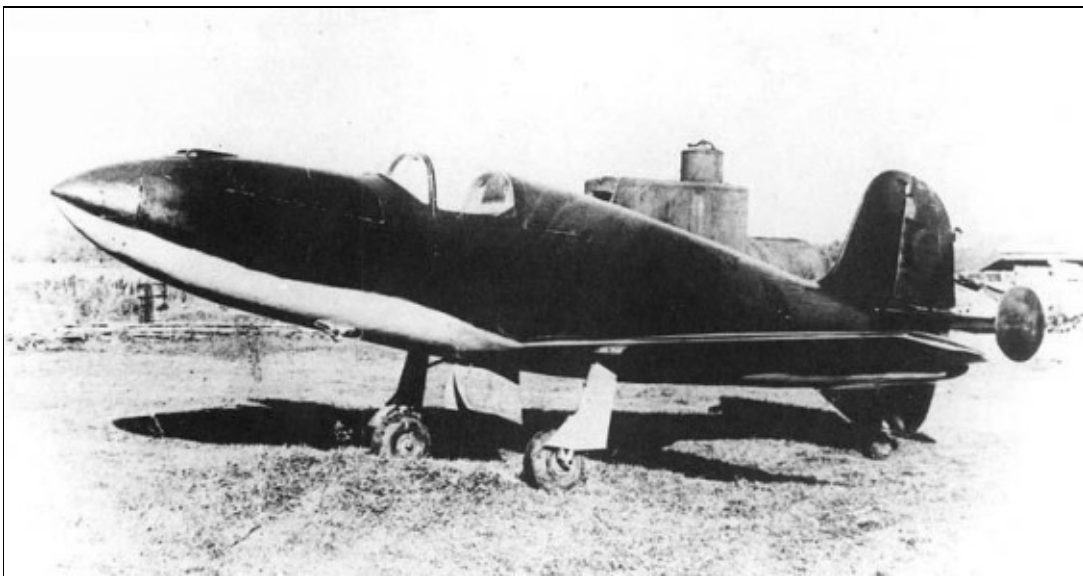
ARADO AR 234 B

Bachem Ba 349 "Natter Viper"

Rocket Plane



Heinkel P1077(Julia)



Was the Heinkel Julia is a copy of the Russian rocket plane which is pictured above? The evidence supporting this hypotheses is presented here but it is difficult to interpret since it's a Google translation an original article which is written in Russian.

In Russia on 9 June 1941 the chief designer VF Bolhovitinov sent to the National Commissioner Aviation industry (NKAP) a formal request for approval of the project rocket fighter-interceptors under ozunakom BI (BI). The proposal was accepted in its entirety, with the NKAP issued a new deadline for the project documentation of only 35 days, instead of three months as was suggested in the study.

The A.Ya.Bereznyaka and AMIsaeva designed aircraft with a rocket engine thrust of 1400

kg / s. The fuel system installation caused a delay in the implementation of the project. Instead of using the turbo-compressor, it was decided that the fuel in the tank is kept at a pressure of 145-148 ATM. The reservoir is expected to deliver 115 liters of compressed liquid fuels. This variant of the engine D-1A has become the main direction of development, and the project was identified with the label “bi”. As for the construction of the aircraft, it was self-supporting, with flat trapezoidal low-mounted wings. The plane was a wooden structure.

The request for a high-speed interceptor, had opposing requirements, including a request for minimum landing speed, as well as a low stalling speed. This issue is solved by developing special konstruktorkim flaps and other aerodynamic features. Parts of the problem was solved only after making the first prototype, “on the fly” so to speak.

ARADO

[Return](#)

Company's History:

With its parent company, it ceased operations following the [First World War](#), when restrictions on German aviation were created by the [Treaty of Versailles](#). In 1921, the factory was purchased by [Heinrich Lübbe](#), who is said to have assisted [Anthony Fokker](#) in the creation of the pioneering Stangensteuerung [synchronization gears](#) system during 1914-15, and re-commenced aircraft construction for export, opening a subsidiary, [Ikarus](#), in [Yugoslavia](#). [Walter Rethel](#), previously of [Kondor](#) and [Fokker](#), was appointed head designer.

In 1925, the company joined the Arado Handelsgesellschaft (“Arado trading firm”) that was founded by the industrialist Hugo Stinnes Junior for covering up illegal trade with military equipment. When in 1933 the new [Nazi](#) government came to power in Germany, Stinnes emigrated and Lübbe took control over the company. Just prior to this, [Walter Blume](#), formerly of [Albatros](#) replaced Rethel.

Arado achieved early prominence as a supplier to the [Luftwaffe](#) with the [Arado Ar 66](#), which became one of the standard Luftwaffe [trainers](#) right into World War II. The firm also produced some of the Luftwaffe's first [fighter aircraft](#), the [Ar 65](#) and [Ar 68](#). In 1936, the RLM ([Reichsluftfahrtministerium](#) – “Reich Aviation Ministry”) insisted that, as a show of loyalty, Lübbe should join the Nazi party. When he refused, he was arrested and forced to sell the company to the state. It was renamed to the more specific (and accurate) **Arado Flugzeugwerke GmbH**, and was placed under the direction of [Erich Serno](#), and [Felix Wagenführ](#), himself a former [IdFlieg](#) officer in World War I.

When Germany invaded Poland, instigating World War II, two more Arado products rose to prominence, the [Ar 96](#), which became the [Luftwaffe](#)'s most used trainer, and the [Ar 196](#) a [reconnaissance seaplane](#) that became standard equipment on all larger German

warships. Unfortunately for Arado, most of their other designs were passed over in favour of stronger products from their competitors, such as Germany's only [heavy bomber](#) fielded during the war, the [Heinkel He 177](#), for which Arado was the primary subcontractor. Perhaps Arado's most celebrated aircraft of the war was the [Ar 234](#), the first [jet-powered bomber](#). Too late to have any real effect on the outcome of the conflict, it was nevertheless a sign of things to come.

Until their liberation in April 1945 by the Soviet army, 1,012 slave laborers from Freiburg, a sub-camp of the [Flossenbürg concentration camp](#), worked at the Arado factory, beginning with the first trainload of 249 prisoners arriving in August 1944. The prisoners were mostly Polish Jewish women and girls sent to Freiburg from [Auschwitz](#).

Arado also licence-built various versions of, and components for the [Focke Wulf Fw 190](#).

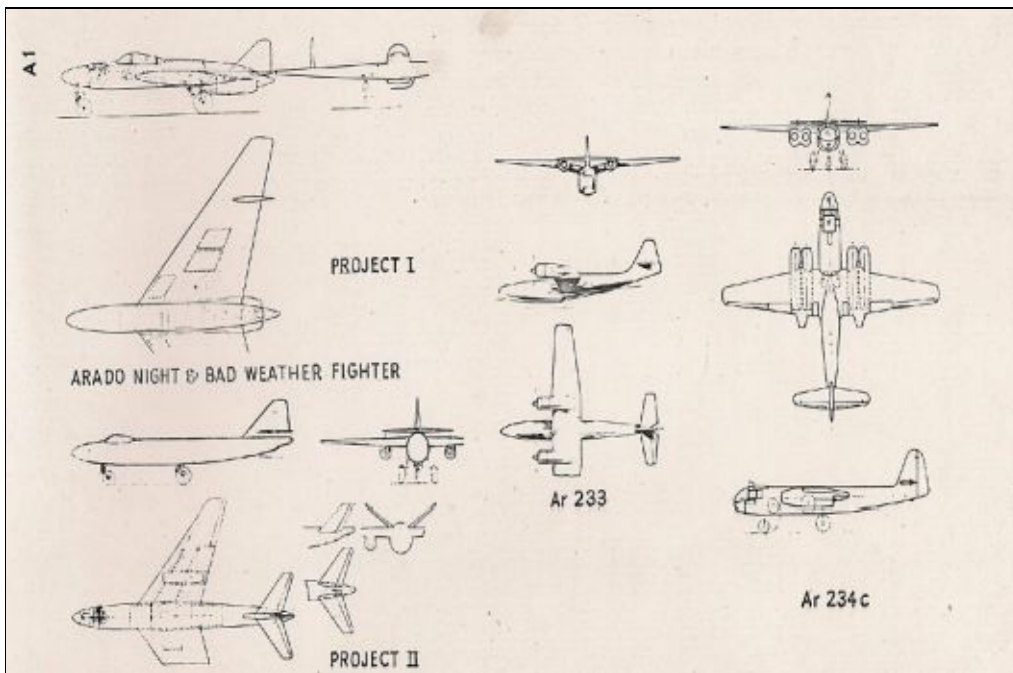
In 1945, the company was liquidated and broken up.

The Ar 96 continued to be produced in Czechoslovakia by [Zlin](#) for many years after the war as the C.2B.



ARADO AR234C

This is a high Speed Jet Bomber with a maximum speed of 555 miles per hour at 20,000 feet and a maximum takeoff weight of 22,300 pounds. This aircraft could be powered by either 4 BMW 003 turbo jet engines or 2 Jumo 004's.



ARADO PROJECT 1/ NIGHT AND BAD WEATHER FIGHTER

This low wing monoplane has a swept back wing of a large root chord. The design has a long narrow fuselage housing the fixed, forward armament, radar and the nose wheel of the tricycle undercarriage. In addition to the crew of three there is a pressurized cabin and two self-sealing fuel tanks. There are also six wing tanks in addition to those within the fuselage. The two He S 011 turbojets are built into the bottom of the rear fuselage and have a combined flat air intake. About one-third of the half span from each wing tip is a vertical fin and rudder. The ailerons also act as elevators and split flaps are fitted on the intersection of each wing main panel. Armament consists of two MG 213 E/30 fixed forward firing with 200 rounds per gun; two MK 108 oblique upward firing with 100 rounds per gun and two in MG 213 E/30 rear-ward firing 200 rounds per gun. Two 500 kg bombs may be carried. Specifications: wingspan 60.3 ft.; overall length 42.5 ft.; sweep-back angle at one-quarter chord = 35 degrees; wing area = 806 square feet; empty weight = 17,000 lbs.; normal flying weight = 27,700 lbs.; maximum speed at 29,500 ft. = 503 m.p.h.; endurance at full thrust = one hour and 42 minutes.



Artist Impression of the Arado AR Project #1 Night Fighter

ARADO PROJECT 2/ NIGHT AND BAD WEATHER FIGHTER.

The Arado night and bad weather fighter project number 2. Drawing A1 is a shoulder wing monoplane with sweptback. The wing, tail plane and wide fin of this project is a more conventional design than is the case with project #1. The two piece wing, which houses part of the fuel supply, is made of composite construction and carries the 2 He S 011 turbojet units, which are mounted in under-slung nacelles which project neither forward of the wing's leading edge, nor aft of the its trailing edge. The fuselage is of a rounded section and contains a pressurized cabin for a crew of three, additional tank-age, retractable tricycle undercarriage, armament, a radio and radar compartment, are also included. A parachute brake is fitted in the rear of the fuselage and catapult seats are provided for the crew members. Armament, radio, and radar equipment is the same as that installed in the Arado number 1 project. Except that in this case 3 * 500 kg bombs can be carried. A variant of the project incorporating a "V" tail also existed.

Specifications are: wingspan = 49.2 ft.; wing area = 538 square feet; sweep - back angle at the $\frac{1}{4}$ chord line = 35 degrees; aircraft weight empty = 17,490 lb.; normal flying weight = 28,200 lb.; overload starting weight = 29,060 lb; normal fuel capacity = 1050 gal; maximum fuel capacity = 1605 gal; max speed at sea level = 438 mph; max speed at 23,000 ft. = 481 mph; endurance at 32,800 ft. and full power = 1 hr. 42 min.; endurance at 32,800 and cruising power = 2 hr. 12 min.; service ceiling = 37,400 ft.

ARADO AR 234

There was a scheme to use the AR 234 to tow a single Fi 103 flying bomb. A second scheme entails carrying the Fi 103 on a cradle on the back of an AR 234 C. For the launching, of the bomb is raised on its mounting cradle by a series of hydraulically

operated arms to a level that is high enough to clear the structure of the parent aircraft.



Fi 103 Flying Bomb (Buzz-Bomb)

AR 234 with sweptback wings

It appears that there was a proposal to construct a version of the AR 234 aircraft with the sweptback wings similar in design to that of the AR 560 (Refer to drawing A2).

AR 340 - This is a low-wing monoplane, with twin booms, twin empennage and rudders.

The under-slung engines are located in the long nacelles which project well beyond the leading and trailing edges of the wing. The aircraft carries a crew of two.

Version 1- Specifications: engines are DB 601's; empty weight = 11,450 lbs.; flying weight = 17,600 lbs.; fuel load = 455 gal..

Version 2- Specifications: powered by two DB 601 engines this version can carry two 500 kg bombs or one 1,000 kg bomb externally; armament consists of two MG 17 and 2 MG 16 forward firing; empty weight = 11,009 lbs.; flying weight = 18,050 lbs.; fuel load = 205 gal.

Version 5 and version 6- Are designed for a high altitude reconnaissance, with a pressure cabin and remotely controlled dorsal and ventral gun turrets, each with 2 MG 81.

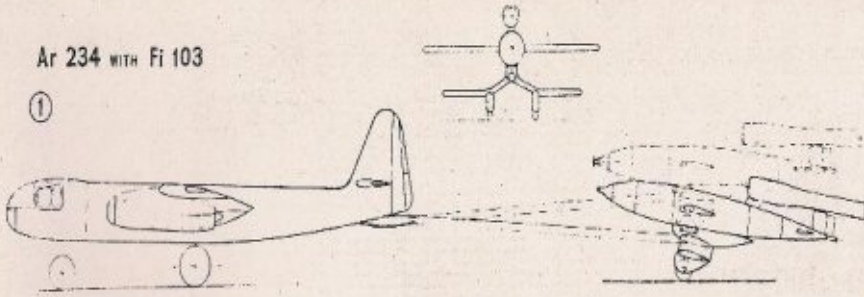
Specifications: armament consists of two MG 17; the engines are two DB 601 E; empty weight = 13,640 lbs.; flying weight = 20,800 lbs.; fuel including drop tanks = 587 gal..

Version 7 and version 8- These versions are similar to version 5 and version 6 but powered is by two DB 605A engines. Additional armament in version 8 consists of one MG 151/20 mounted under the fuselage. Version 10- Is a night fighter. The engines are two DB 601-2 or 2 Jumo 213 E engines. The forward armament is increased to four in MG 151/20, while the turrets have two MG 131.

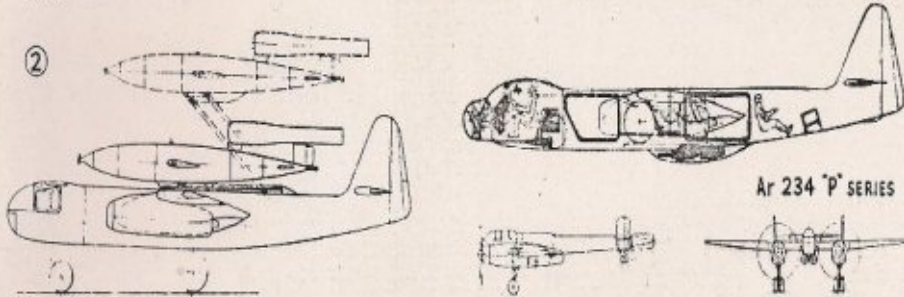
A2

Ar 234 WITH Fi 103

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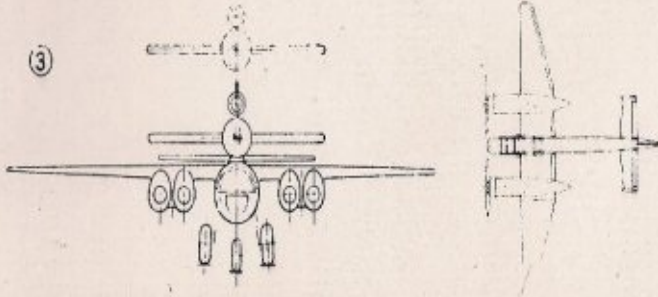


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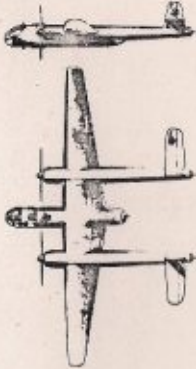


Ar 234 "P" SERIES

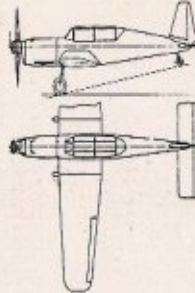
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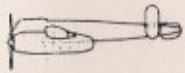
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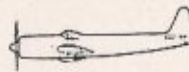
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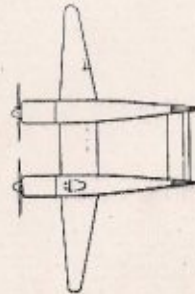
Ar 396

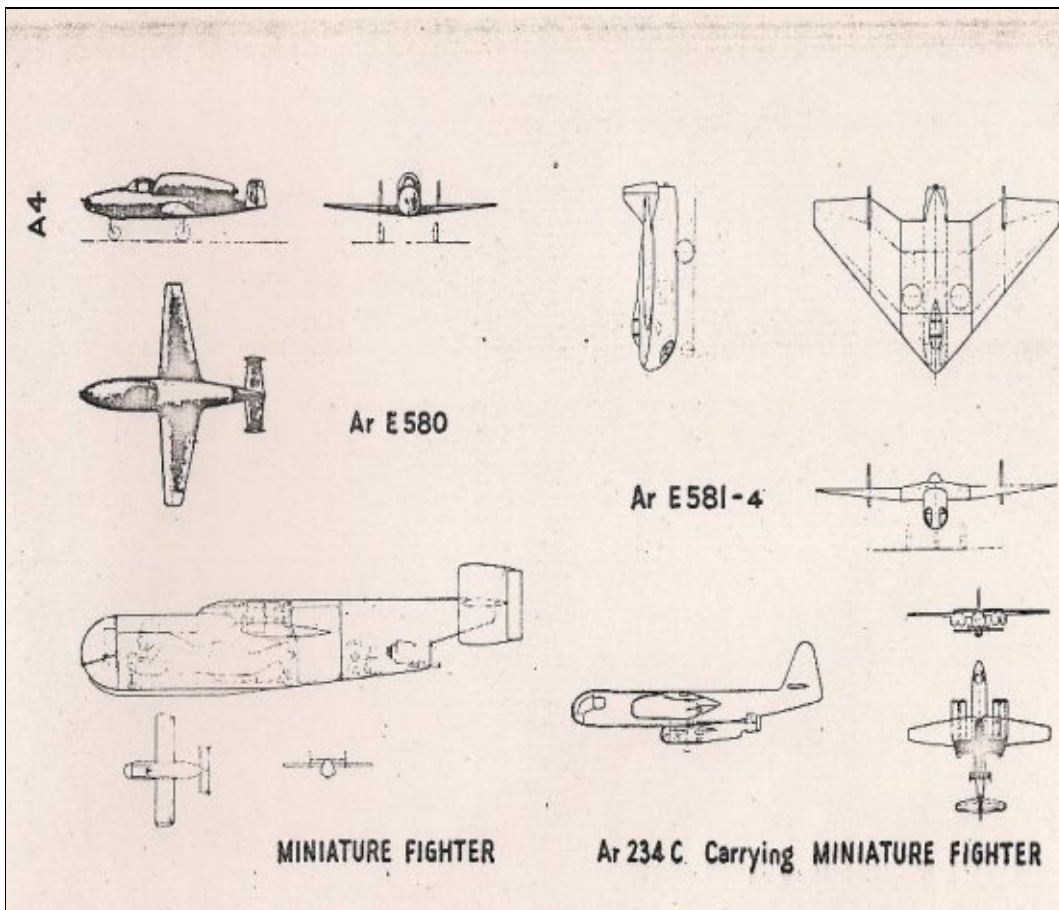


Ar 440



Arado E 530





The above sketches shows the variety of ideas that were in the works at ARADO during the period 1942 - 1945

BLOHM AND VOSS

[Return](#)

Company's History:

It was founded on April 5, 1877, by [Hermann Blohm](#) and [Ernst Voss](#) as a general partnership. A shipyard was built on the island of [Kuhwerder](#), near the Free and [Hanseatic City of Hamburg](#), covering 15,000 m² with 250 m of water frontage and three building berths, two suitable for ships of up to 100 metres length. The company's logo is a simple dark blue rectangle with rounded corners bearing the white letters "Blohm+Voss". Until 1955 the company name was shown with the [ampersand](#).

The company has continued to build ships and other large machines for 125 years. Despite being almost completely demolished after the end of [World War II](#), it now builds warships both for the [Deutsche Marine](#) and for export (see [MEKO](#)), as well as oil drilling equipment and ships for numerous commercial customers.

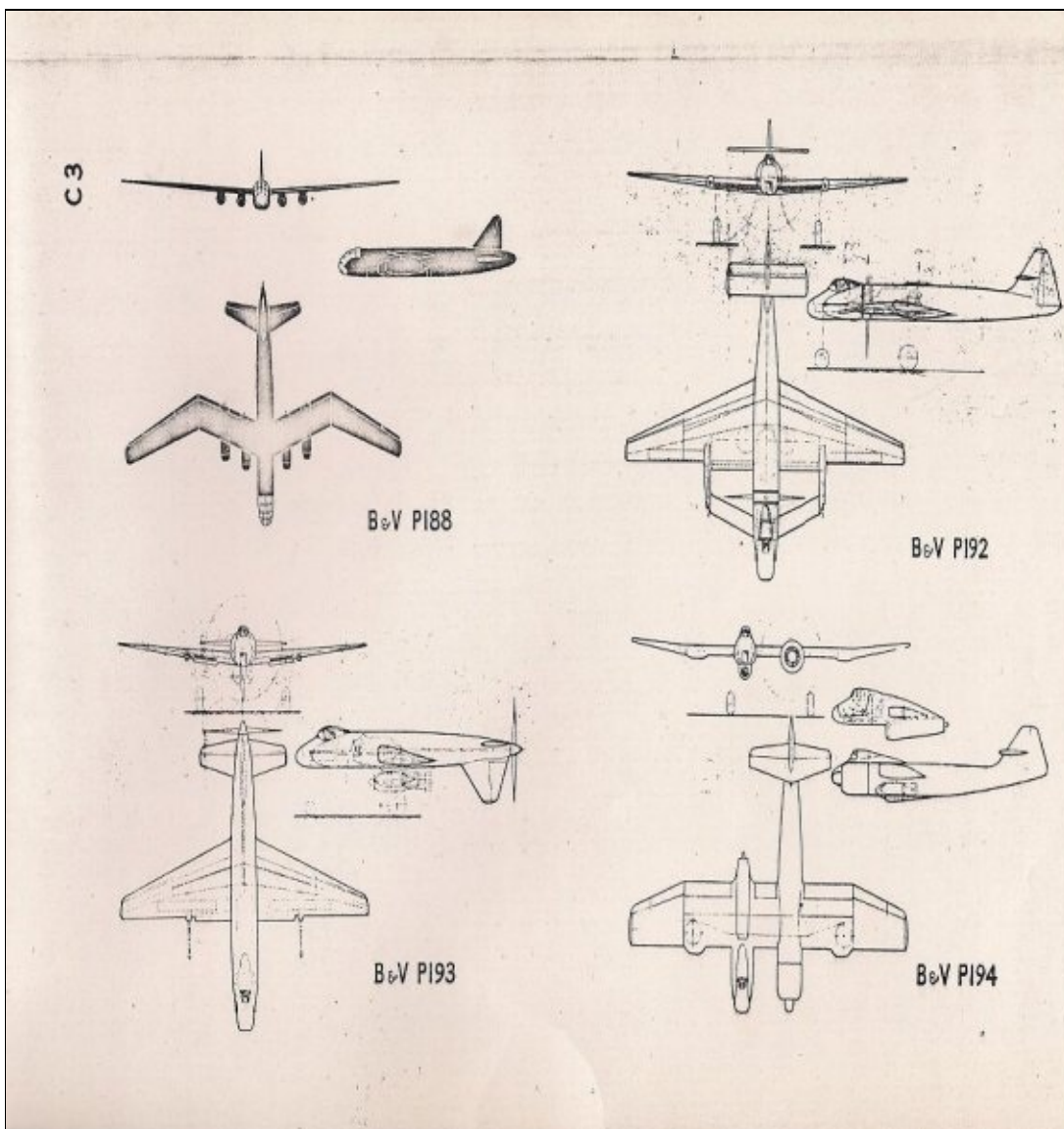
The company is, along with [Howaldtswerke](#) at [Kiel](#) and [Nordseewerke](#) at [Emden](#), a subsidiary of [ThyssenKrupp Marine Systems](#).

History during the Third Reich[[edit](#)]

With the rise of the [Nazi Party](#) to power in 1933, Germany's rearmament in violation of

the [Versailles Treaty](#) was begun. This began a sudden change in fortune for the company, run then by brothers [Rudolf](#) and [Walther Blohm](#), which was taken out of a deep crisis. Until then specialising in shipbuilding, the company began to design and build [aircraft](#) for the German state airline, pre-war [Deutsche Luft Hansa](#) and the [Luftwaffe](#). The aeronautical section of the company was named [Hamburger Flugzeugbau](#), therefore the first planes it produced had the code “Ha”, but in September 1937 the aviation subsidiary was renamed Abteilung Flugzeugbau der Schiffswerft Blohm & Voss, [later replaced by “BV”](#).^[3] Particularly noteworthy were the large [flying boats](#) the company produced, especially the largest aircraft designed, built and flown by any of the [Axis forces](#), the [Bv 238](#), and its ingenious approaches to aircraft building that even featured asymmetric designs.

From July 1944 to April 1945 the company used inmates of its own concentration subcamp at its shipyard in [Hamburg-Steinwerder](#), a subcamp of [Neuengamme concentration camp](#).^[4] A memorial stands on the site of the camp and the company continues to pay an undisclosed amount to the [Fund for Compensation of Forced Laborers](#).^[5]





B&V P188 Shown below dropping a Fritz X

There is no other aircraft design in the world that is more unorthodox in its designs than the Blohm and Voss Company. Their designs are usually far from what is considered normal practice.

Their use of asymmetrical designs are world renowned and totally unique to this organization. The asymmetrical designs range from the single engine utility aircraft BV P194 to the pivot wing fighter design (BV P 202). The Utility design was proved to be perfectly viable, but was rejected by the design review board. The same cannot be said for the swing wing P 202, where it remained a paper design until the concept was produced and tested in the United States in the 1980's.

There is also the peculiar dive bomber/ground attack aircraft (BV P 192), where the engine and propeller are mounted in the fuselage and located just behind the cockpit. This design is especially suited for the intended role, in that it gives the pilot a clear unobstructed view of his target.

The Blohm and Voss BV P1 88 four engine jet heavy bomber with its strange cranked wing design is particularly interesting and unique in its own right. This type of wing design affords the aircraft with a swept wing but because of the double break the wings center of lift is concentrated during all flight regimes. If this design was allowed to go ahead Germany's bomber capability would have been greatly improved over the condition where they had to rely upon medium bombers such as the HE 111 and the Junkers JU 88 until the time defeat in 1945.

PROJECTS:-

The most outstanding feature of the P188 aircraft is the peculiar plan form of its wing. From the root to approximately midpoint along each main plane, the structure is swept

back at 20 degrees and from midpoint to the tip it is swept forward at 20 degrees, giving a cranked appearance when viewed in the plan view. The wings have a consistent dihedral angle of 3 degrees at the root to the tip and the wing tip incidence can be adjusted through 12 degrees. Four turbojet units are mounted in wings, under-slung from the inner sections with the intakes protruding well forward of the leading edges. There are four versions of this aircraft, designated P 18 8.01, P 18 8.02, P 18 8.03, and P 18 8.04. The main differences are the arrangement of the jet units, and the disposition of the vertical tail surfaces, and the cockpit enclosure arrangement.

P 188.01. Turbojet units in equally spaced in single nacelles. Having a single fin and rudder. Air brakes fitted in the tail. No Armament.

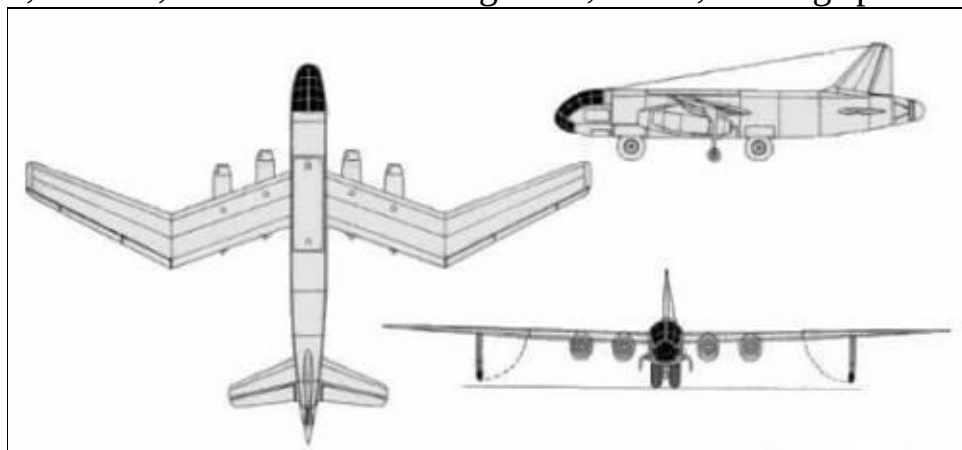
P 188.02 single and jet unit nacelles. Twin fins and rudders. Superimposed "snake-head" cockpit canopy. Armament fitted.

P 188. 03. Jet units in twin nacelles under inner wing. Single fin and rudder. No Armament.

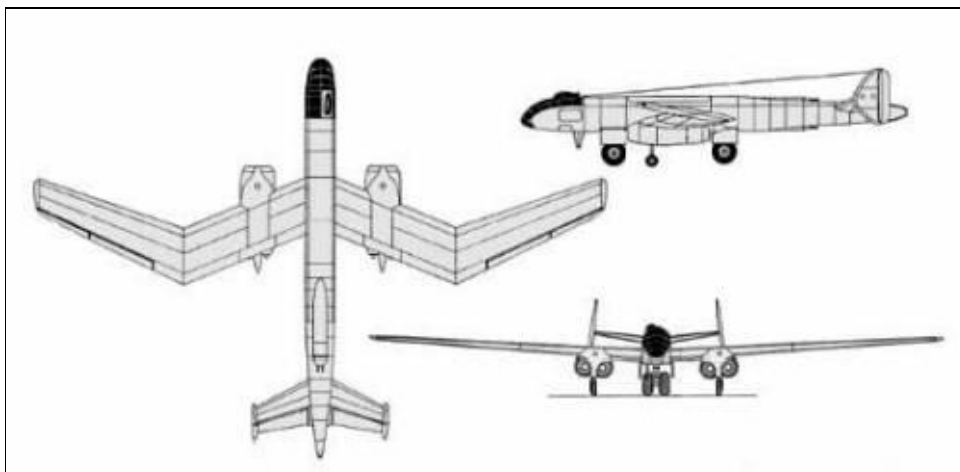
P 188. 04. Jet units in twin nacelles. Twin fins and rudders with a dihedral tail plane. The Armament of the 188.0 to consist of two MG 151 fixed forward firing, 2 MG 145 fixed astern firing and 2 MG 131 movable in the tail.

The bomb load can be 8* 250 kg., 4 * 500 kg., 2 * 1,000 kg., 1 * 1800 or 2005 kilograms, or one * "Fritz X".

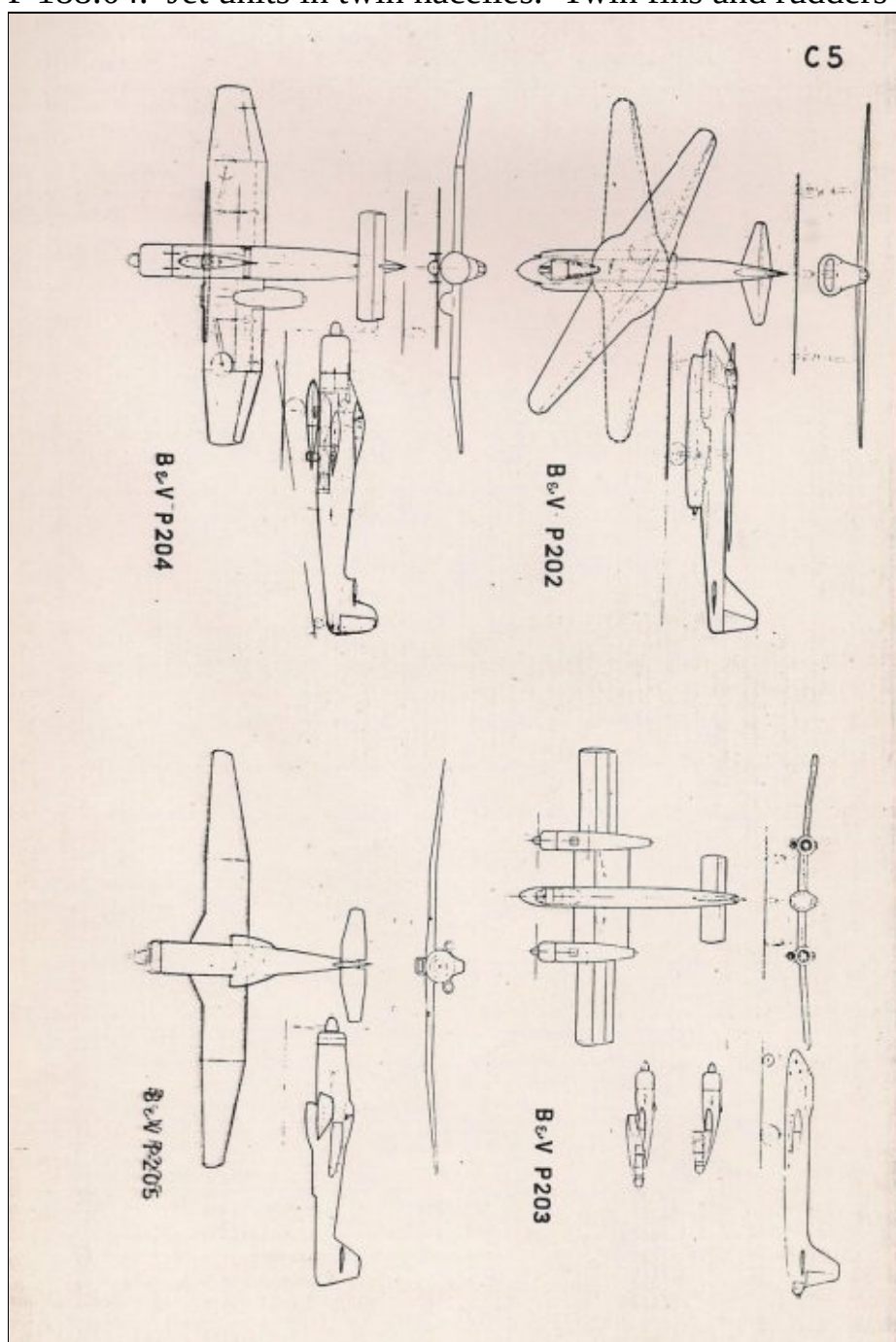
Specifications are: aircrew = 2; wingspan = 78.5 ft.; Length = 57.5 ft.; wing area = 645 square feet; aspect ratio = 12.15; Maximum flying weight 53,700 lbs.; when unloading = 83.3 lbs. per square foot; fuel = 17,600 lbs.; power plants 4 * Jumo 004 C; maximum speed 435 m.p.h.; maximum speed at 19,700 ft. 415 m.p.h.; rate of climb at maximum weight and sea level 1,720 ft. per minute; service ceiling 28,500 ft. absolute ceiling of 29,500 ft.; range at maximum weight and 100% thrust at sea level 485 mi.; takeoff thrust 6,600 lbs.; takeoff distance on grass 3,000 ft.; landing speed 106 m.p.h..



P 188.01. Turbojet units in equally spaced in single nacelles. Single fin and rudder. Air brakes fitted in the tail.



P 188.04. Jet units in twin nacelles. Twin fins and rudders with dihedral tail-plane.



The Blohm and Voss P 192 dive bomber and ground attack aircraft. Drawing C 3. In this

most unusual design the nose containing the pilot's cockpit is entirely separate from the main fuselage, being carried by two inclined booms which in turn are anchored to tubular projections from the wing leading edge. These projections serve a secondary purpose; as fairings for the two MK 103 guns (70 rounds per gun). The wing has a straight leading edge apart from the step inboard of the projections where the radiators are housed. There is pronounced taper on the trailing edge. The wingspan this 42.6 ft. and the wing area 273 square feet. The DB 603 engine is such a close fit in this slim cowl that it has been necessary to provide a slight blister at the top to clear the ancillary fuel supply system. The propeller blades are carried by a large revolving ring which also serves as a fairing between, the nose and the main fuselage sections.



Blohm and Voss P 192 dive bomber.

The Blohm and Voss P202 fighter is shown in Drawing C5.

Perhaps the most unusual for all of the Blohm and VOSS projects is the BV P 202 twin-jet high wing fighter. This is characterized by a high wing, which can apparently be swung in flight about a vertical axis to give the effect of variable sweep back without alteration of the center of lift. In actual fact, one wing is swept forward and the other sweptback. When the wing is displaced from its central position the velocity of the airflow normal to the

leading edge is progressively reduced in relation to the forward speed of the aircraft. Since it is the velocity of normal flow, which determines the onset of compressibility (shock Wave) effect at high speed. It is actually possible in this way to obtain an increase in airspeed for a given thrust. It is difficult to visualize the possible effects of this peculiar arrangement upon the flying characteristics, but presumably the designers thought that no insurmountable problems would arise.

The maximum displacement of the wing is 35 degrees. For takeoff and landing the wing is in its normal position (90 degrees to the airflow), in deed it is only in this position that the flaps and the main undercarriage can be operated. The two jet units were probably BMW 003 E's. They are mounted in close proximity to one another in the lower portion of the fuselage and share a common intake duct which is located in the nose. The tail arrangement is of a conventional type, with a vertical fin and rudder and a horizontal stabilizer and elevator. Armament consists of one MK 103 and two MK 151's. Specifications: wing span = 39.4 ft. max wing sweep = 32.84 degrees, wing area = 215 square feet. Because of the high wing, the main landing gear struts are very long.



The Blohm and Voss P202 fighter Drawing C5.

Blohm and VOSS P 207 pusher fighter. Drawing C6

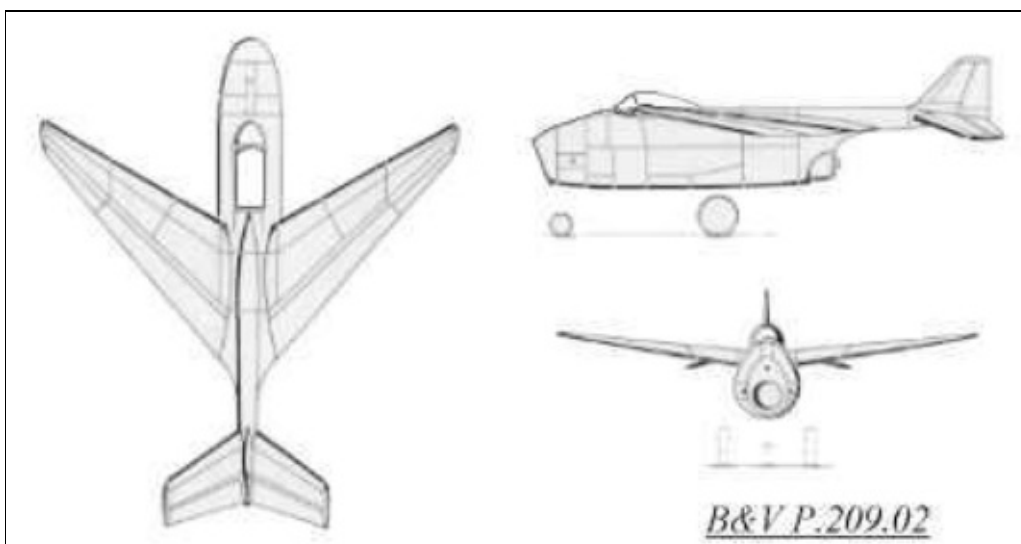
There are two versions of this single seat reciprocating engine fighter. The P 207.02 has an A/S 413 engine in the fuselage behind the cockpit driving a pusher propeller through a long shaft. The parallel chord variable incidence wing has a span of 39.4 ft. and an area of 260 square feet. The empennage comprises of a parallel chord tail plane sat fairly high and a vertical fin and rudder, also of parallel cord, extending both above and below the fuselage. The lower portion of the fin is carried down sufficiently far enough to provide protection for the propeller when taking off and landing. The engine intake is well

forward under the cockpit giving a peculiar nose profile when it is viewed in the side elevation. Armament consists of two MK 103 and 2 MG 151/26 in the nose. The main wheels of the tricycle undercarriage retract inward into the lower portion of the fuselage, and the nose wheel retracts forward and upward.

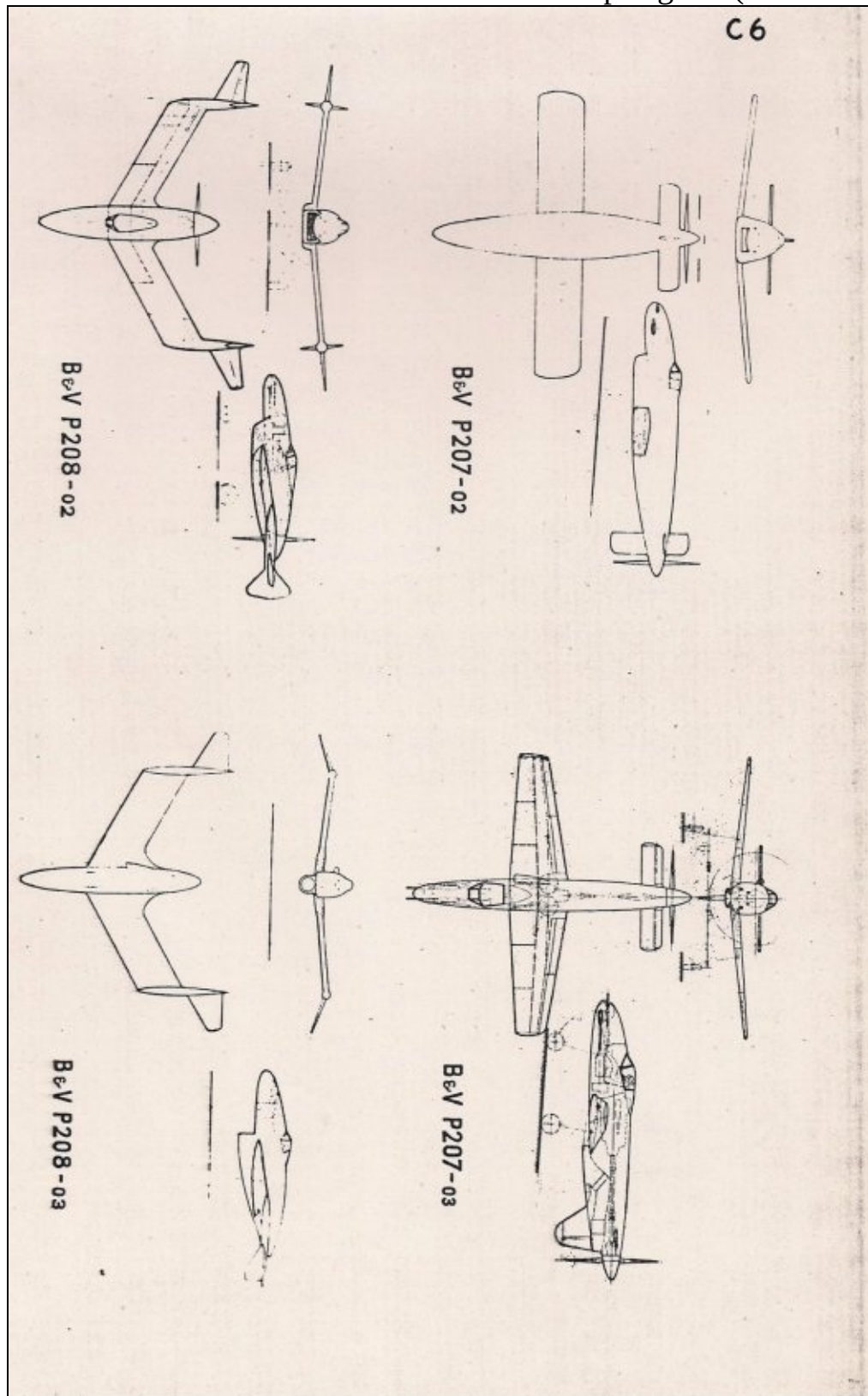
On the P 207.03 the wing is 32.8 feet in span and has moderate taper. The variable incidences feature has been retained. The upper fin and rudder has been eliminated and the lower portion is enlarged. The engine is in this case a Daimler-Benz 603 E MG, and is mounted in the same position as in the P 207.02 but the radiator has been moved back and buried inside the fuselage. The intake being approximately level with the wing's trailing edge.



Model of the BV P 207 Pusher Fighter Shown in Drawing C 3



Artist's Impression of Blohm and Voss P 209 Forward Swept fighter (Details shown in



Drawing C6).

DAIMLER BENZ

[Return](#)

Company's wartime History:

Although Daimler-Benz is best known for its Mercedes-Benz automobile brand, during

World War II it also created a notable series of aircraft, tank, and submarine engines. Daimler also produced parts for German arms, most notably barrels for the Mauser rifle. During World War II Daimler-Benz employed slave labour. The slaves “toiled eighteen hours a day; cowering under the lash, sleeping six to a dog kennel eight feet square, starving or freezing to death at the whim of their guards.”^[1]

PROJECTS

Daimler-Benz Bomber tug modified to carry up to six self-destructing flying bombs. AUGW 273,500 pounds and tug is powered with up to six turboprop units. The flying bombs were powered by a single turbo jet unit and the pilot was carried in a jettison-able capsule attached to the underside of the aircraft. Maximum speed of the bomb was 665



mph.

Artist Concept

Daimler-Benz air-launched bomber project drawings T2.

A high-speed jet propelled bomber is carried under the belly of a very large tug aircraft and air launcher. The tug has a wide 82 ft. track, fixed undercarriage which has six wheels in total. With 3 tires and wheels placed in line one after the other within fairings on each side of the bomber. The tug has a parallel long cord center section whereas the outer panels are tapered at the leading edge. The span is 177 ft. the aspect ratio 6 and the wing area is 15,170 square feet. The tug is powered by either four, five, or six turbojet propeller units which each develop 4,000 equivalent shaft horsepower at sea level. The all-up weight of the tug is: 101,000 lbs, in the case of the four engine craft; for the five engine craft 114,800 lbs.; and for the six engine aircraft 118,600 lbs. The all up weight: of the four engine tug + Bomber 259,500 lbs.; 266,000 lbs. for the five engine; for the six engine bomber 273,300 lbs.. The bomber has a sharply swept back wing with the span of 76 ft. The wing area is 1560 square feet and the aspect ratio is 3.7. The crafts propulsion is provided by two very large turbojet units each developing 16,500 lbs. of static thrust at sea

level. The bomber's payload was 6,600 lbs. of bombs and 3,920 lbs. of fuel and the bomber had a launching weight of 158,500 lbs. corresponding to a wing loading of 101.5



lbs. per square foot.

Daimler Benz Model F Flying Bomb.

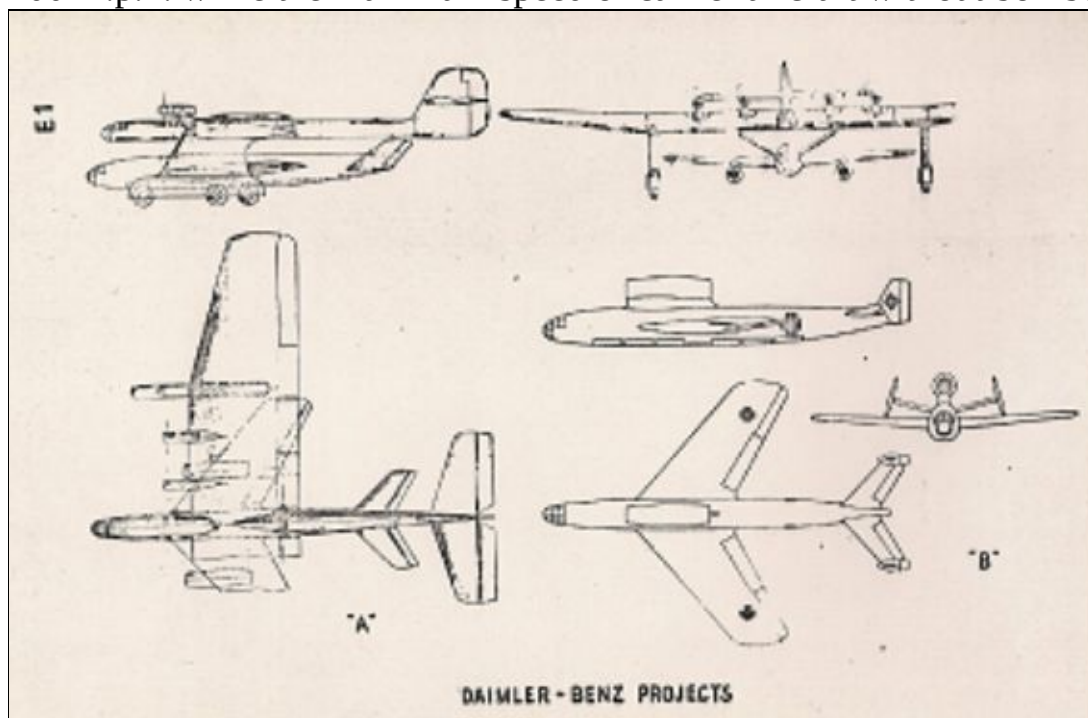
Another air-launched bomber project is comprised of the combination of tug with reciprocating engines and a single tall tail setup, to allow space for the bomber. The tug has a very slender fuselage. There is pronounced anhedral angle over the center section to accommodate the bomber without interference and provide adequate ground clearance. Outboard of the six wheel undercarriage, the wings have moderate dihedral angle. The span of the carrier is 177 ft. and the wing is of parallel chord over the center section with tapers on both leading and trailing edges of the outboard panels. There are six Daimler-Benz 603 engines four of the engines are spaced along the leading edge and drive tractor propellers and the remaining two are mounted at the trailing edge and drive pusher propellers. The pusher engines and the outboard tractor engines are disposed in tandem in line with the undercarriage wheel group. The fixed fairing undercarriage has three wheels arranged in line, one ahead of the other. From the undercarriage twin booms extend back to carry the tail plane which is placed fairly high.

The Bomber which is carried beneath the tug is of the mid wing design with pronounced sweptback on the main and tail planes. The span is approximately 72 ft.. There is a single large jet unit mounted high above the fuselage with a pronounced dihedral angle to the tail plane. The front view of the aircraft is reminiscent of the 8162. The large jet unit is probably the Daimler-Benz jet engine, project which was to develop about 28,500 lbs. static thrust at sea level. The anhedral center section of the wing provides clearance for the jet unit when the bomber is in the carry position. The Bomber has a normal flying weight of 154,000 lbs. although in the special circumstances this can be increased to 165,000 pounds. The maximum bomb load is 66,000 lbs. and the normal maximum fuel + bombs is 107,200 lbs. In the overload condition however 135,000 lbs. of fuel can be

carried. The maximum radius of operation without bombs is 5,770 mi. and with 66,000 bombs 620 mi..

An alternative to the single bomber the tug can carry up to six self-destroying aircraft or flying bombs. These bombs have a span of 29 ft. 5 in. and are powered by a single turbo-jet propulsion unit mounted on top of the fuselage at the rear and the pilot sits beneath it in a pod which can be jettisoned at the appropriate time. The all-up weight of the bomb is 22,650 lbs. with the 6,600 lb warhead and 1,800 lbs. of fuel. The wing loading is 102 lbs. per square foot and the maximum speed is 665 m.p.h.

The Daimler-Benz project P 100/003 follows on the same general lines as those already described, the latter is however powered by Four Daimler-Benz 603 E engines equipped with two stage supercharger producing 1,820 horsepower each at takeoff and the wing of the bomber which has two turbojet units is constructed of wood. Maximum flying weight is 138,000 lbs. and the landing weight is 44,000 lbs.; wing area of 1180 square feet wing loading at takeoff 112 lbs. per square foot; operating height to target 23,000 ft.; maximum speed to target is 570 m.p.h.. Maximum endurance is 6.2 hours. Carrier aircraft maximum weight with bomber mounted is 194,000 lbs. and landing weight is 59,400 lbs.. Wing area is 5400 square feet and the combined aircraft wing loading is 29.3 lbs. per square foot. The wing loading carrier aircraft alone is 11 lbs. per square foot and the initial launch-speed of bomber aircraft is 200 m.p.h. while the maximum speed of carrier aircraft without bomber is 167 m.p.h.





Where the Daimler Benz Jäger differed from most aircraft was its unusual propeller placement. The Daimler Benz DB 609 development began in September 1942, and it was to be an in-line, 16 cylinder injection-type aircraft engine.

FOCKE-ACHGELIS

[Return](#)

Company's History:

Henrich Focke was ousted in 1936 from the [Focke-Wulf](#) company, which he had cofounded in 1924, due to shareholder pressure. The ostensible reason for his ouster was that he was considered “politically unreliable” by the Nazi regime. There is reason to believe, however, that Focke’s removal was to allow Focke-Wulf’s manufacturing capacity to be used to produce [Bf 109](#) aircraft. The company was taken over by [AEG](#), but soon after this the Air Ministry, which had been impressed by the [Focke-Wulf Fw 61](#) helicopter, suggested that Focke establish a new company dedicated to helicopter development and issued him with a requirement for an improved design capable of carrying a 700 kg (1,500 lb) payload.

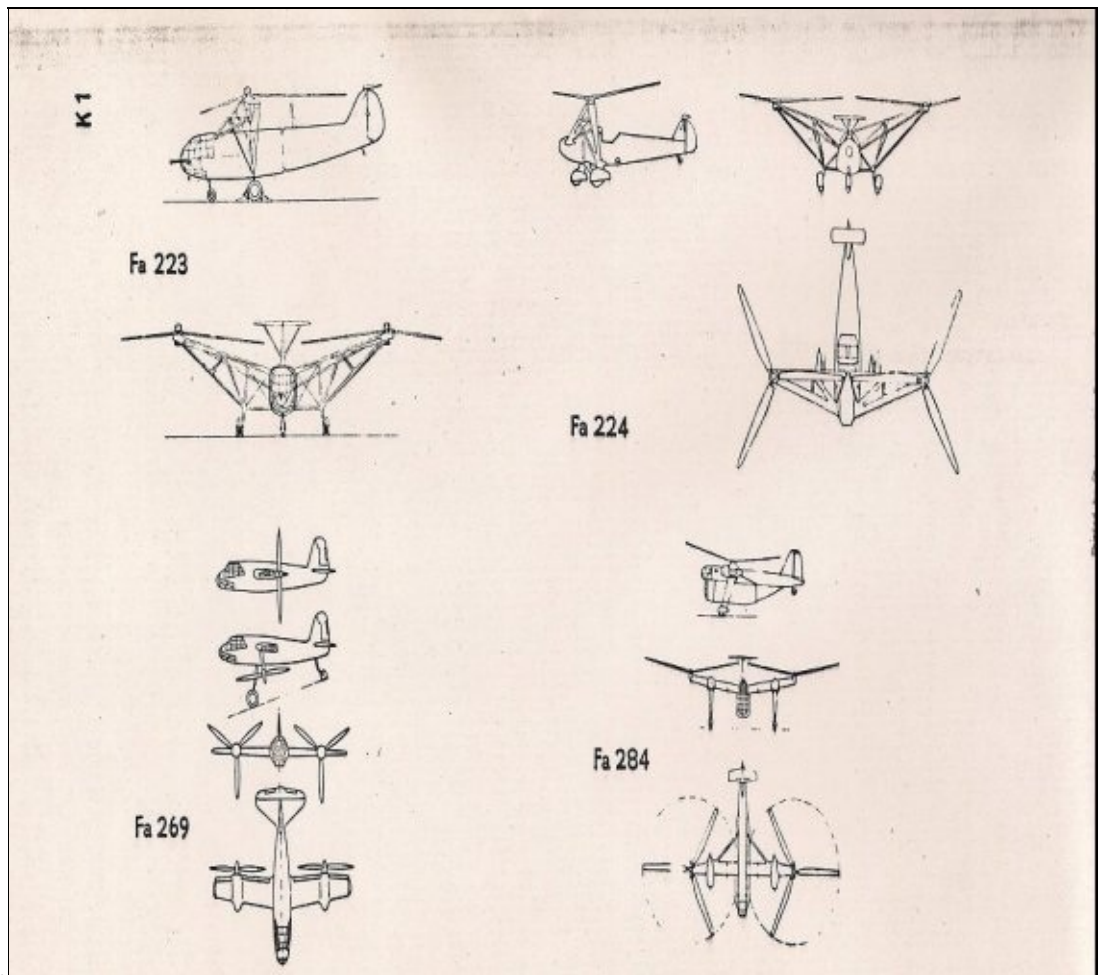
Focke established the Focke-Achgelis company on 27 April 1937 in partnership with pilot Gerd Achgelis, and began development work at [Delmenhorst](#) in 1938.



Artist impression of Focke FA 269

HELICOPTER PROJECTS

FOCKE FA 269 is a twin engine 32 foot wing span and 29 foot in length, it takes off as a helicopter and transitions into level flight, by swinging the propeller/rotor arc through 80 degrees. The aircraft becomes a pusher type in level flight unlike the example shown in

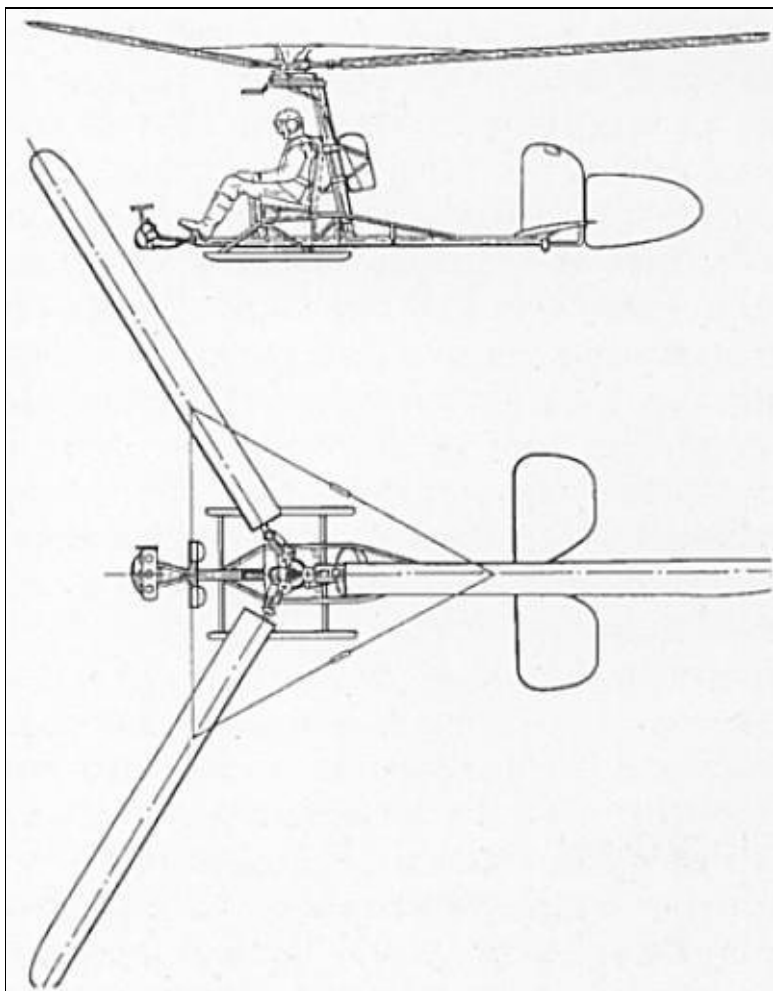


the picture above.

FOCKE ACHGELIES HELICOPTER PROJECTS

The Fa 330 was the original design of the observation kite for use on submarines. They were used to provide a high platform for looking out for enemy ships over the horizon, later known as the Fa 330 auto-gyro (Kite). The device did not have an engine but, was towed aloft by a tow cable attached between the auto-gyro and a tow vehicle; usually a submarine, where the cable could be paid out or reeled in for retrieval.





Fa 330 AUTO-GYRO (KITE)

The Fa 223 helicopter has twin but, not overlapping 3 blade rotors and is powered by a BMW 323 radial engine located in the fuselage. The two rotors are supported by a heavy boom structure, and the blades are inclined upwards from the horizontal; there by approximating a dihedral angle of the two disc planes. The pitch angle of the blades can be altered by hydraulic actuators. Engine power is transmitted to the rotor by means of a hydraulically powered clutch. In the event of a sudden power failure, pitch is decrease automatically to the auto rotation angle and the craft can be flown back to earth as an auto-gyro. The only Fa 223 difficulty experienced, was due to the extreme vibrations which were caused by the rotors revolving out of phase with one-another.

To pilot's seats are arranged in the cockpit and in the adjoining cabin space; three or four passengers, or a cargo load can be accommodated. Transport of cargo is also achieved by lashing it under the fuselage. In this way, the taking on, or sitting down of cargo can be accomplished without landing and could be a affected in the most difficult type of terrain.

The first test flights were made in 1940 and all but three of the Fa 223 that were built between 1942 and 1944 were destroyed by Allied bombing raids. This helicopter was intended for use as a transport; and as a substitute for U Boats, in the mine laying and torpedo attack roles. It was however considered unsuitable for the latter role.

Specifications: length = 40 ft.; maximum speed at sea level 124 m.p.h.; span including rotors = 80 ft.; maximum takeoff weight = 9,460 lbs.; diameter of rotors = 39.1 ft.; range = 200 mi. at 86 m.p.h.; height of the rotors from the ground = 14.75 feet; endurance = 2

hours and 20 minutes; fuel internal = 910 gal.; dispensable load = 1,000 pounds; fuel = 66 gal.; all up weight = 9,940 lbs.; time to climb to 6,050 ft. = 14.1 minutes; critical climb rate = 1,260 ft. per minute.

Fa 224 Helicopter

A training and sports helicopter with a three blade rotor carried on an open truss-work of struts. It is powered by an unspecified engine mounted in the fuselage. The occupants sit side by side in the open cockpit. In addition to a tricycle undercarriage a tail wheel is fitted. The tail plane is mounted on top of the fin.

The distance between rotor axis was 29.5 ft.; diameter of the rotors = 26.5 ft.; noted all up weight = 2,926 lbs.; fuel for two hours of cruising = 176 lbs.; maximum speed = 100 m.p.h.; maximum backward speed = 12.5 m.p.h.; rate of climb at sea level = 300 ft. per minute; maximum rate of climb = 790 ft. per minute. These helicopters are all shown in Drawing K1.

FOCKE WULF

[Return](#)

Company's History: [\[edit\]](#)

The company was founded in [Bremen](#) on 24 October 1923 as Bremer Flugzeugbau AG by Prof. [Henrich Focke](#),^[2] Georg Wulf^[3] and Dr. rer. pol. Werner Naumann^[4] Almost immediately, they renamed the company Focke-Wulf Flugzeugbau AG (later Focke-Wulf Flugzeugbau GmbH).^[5]

Focke-Wulf merged, under [government](#) pressure, with [Albatros-Flugzeugwerke](#) of [Berlin](#) in 1931. Albatros-Flugzeugwerke engineer and test pilot [Kurt Tank](#) became head of the technical department and started work on the [Fw 44](#) Stieglitz (Goldfinch).

Dr [Ludwig Roselius](#) became Chairman in 1925 and handed over to his brother Friedrich in early 1933. In 1938 Roselius' HAG combine increased its shareholding to 46% and [C. Lorenz AG](#) secured 28%. The company was reconstituted as Focke-Wulf Flugzeugbau GmbH and no longer had to publish its accounts. A substantial capital injection occurred at this time.^[6]

In August 1933 Hans Holle and Rudolf Schubert were given power of attorney over the Berlin branch of Focke-Wulf. Then in October 1933, Focke-Wulf Flugzeugbau A.G. Albatros Berlin was officially registered with the Department of Trade.^[7]

Dr Roselius always remained the driving force of Focke-Wulf. He and his closest collaborator, [Barbara Goette](#), often met with technical director Professor Kurt Tank. When Roselius died in May 1943, Heinrich Puvogel continued handling the financial affairs of Focke-Wulf as chief of Seehandel A.G.^[8]

[Hanna Reitsch](#) demonstrated the [Focke-Wulf Fw 61](#), the first fully controllable [helicopter](#) (as opposed to [autogyro](#)), in [Berlin](#) in 1938.^[9] The four-engined [Fw 200](#) airliner flew

nonstop between [Berlin](#) and [New York City](#) on August 10, 1938, making the journey in 24 hours and 56 minutes. It was the first aircraft to fly that route without stopping. The return trip on August 13, 1938 took 19 hours and 47 minutes. These flights are commemorated with a plaque in the [Böttcherstraße](#) street of [Bremen](#).

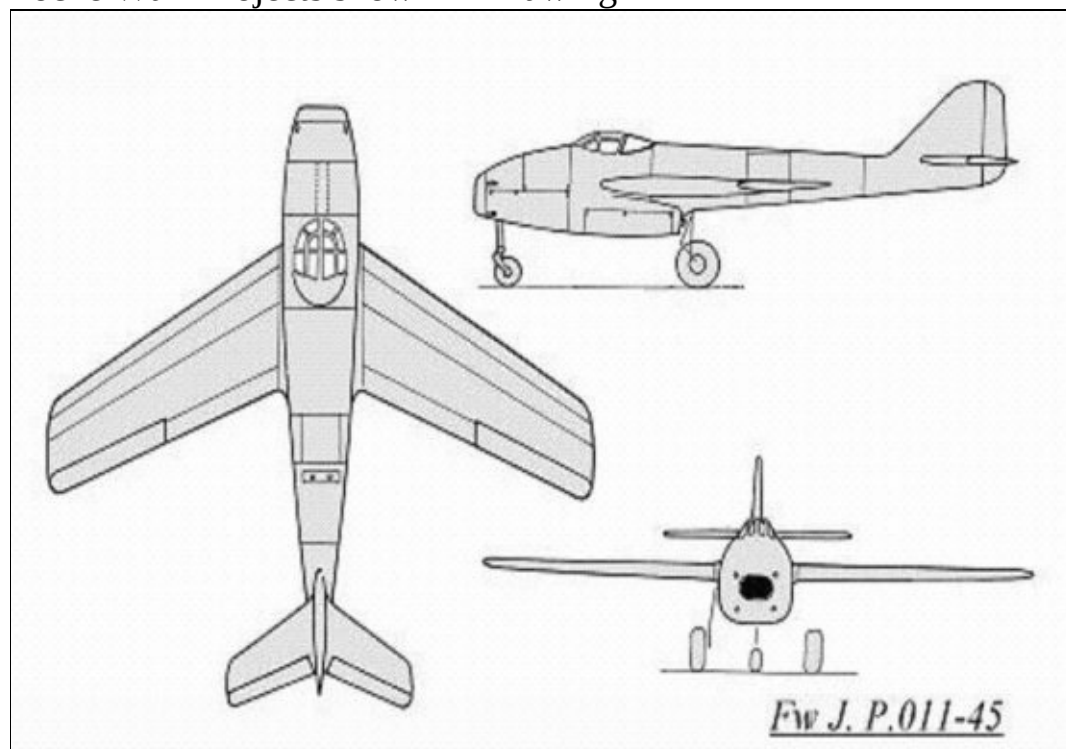
The [Fw 190](#) Würger (butcher-bird), designed from 1938 on, and produced in quantity from early 1941–1945, was a mainstay single-seat fighter for the [Luftwaffe](#) during [World War II](#).

Repeated [bombing of Bremen in World War II](#) resulted in the mass-production plants being moved to eastern Germany and [Poland](#), with [AGO Flugzeugwerke](#) of [Oschersleben](#) as a major subcontractor for the Fw 190. Those plants used many foreign and [forced labourers](#), and from 1944 also [prisoners of war](#). Focke-Wulf's 100-acre (0.40 km²) plant at [Marienburg](#) produced approximately half of all Fw 190s and was bombed by the Eighth Air Force on October 9, 1943.^[10]

Many Focke-Wulf workers, including [Kurt Tank](#), worked at the [Instituto Aerotécnico](#) in [Córdoba, Argentina](#) between 1947 and 1955. Focke-Wulf began to make [gliders](#) in 1951, and in 1955, motorised planes. Focke-Wulf, [Weserflug](#) and [Hamburger Flugzeugbau](#) joined forces in 1961 to form the [Entwicklungsring Nord](#) (ERNO) to develop rockets.

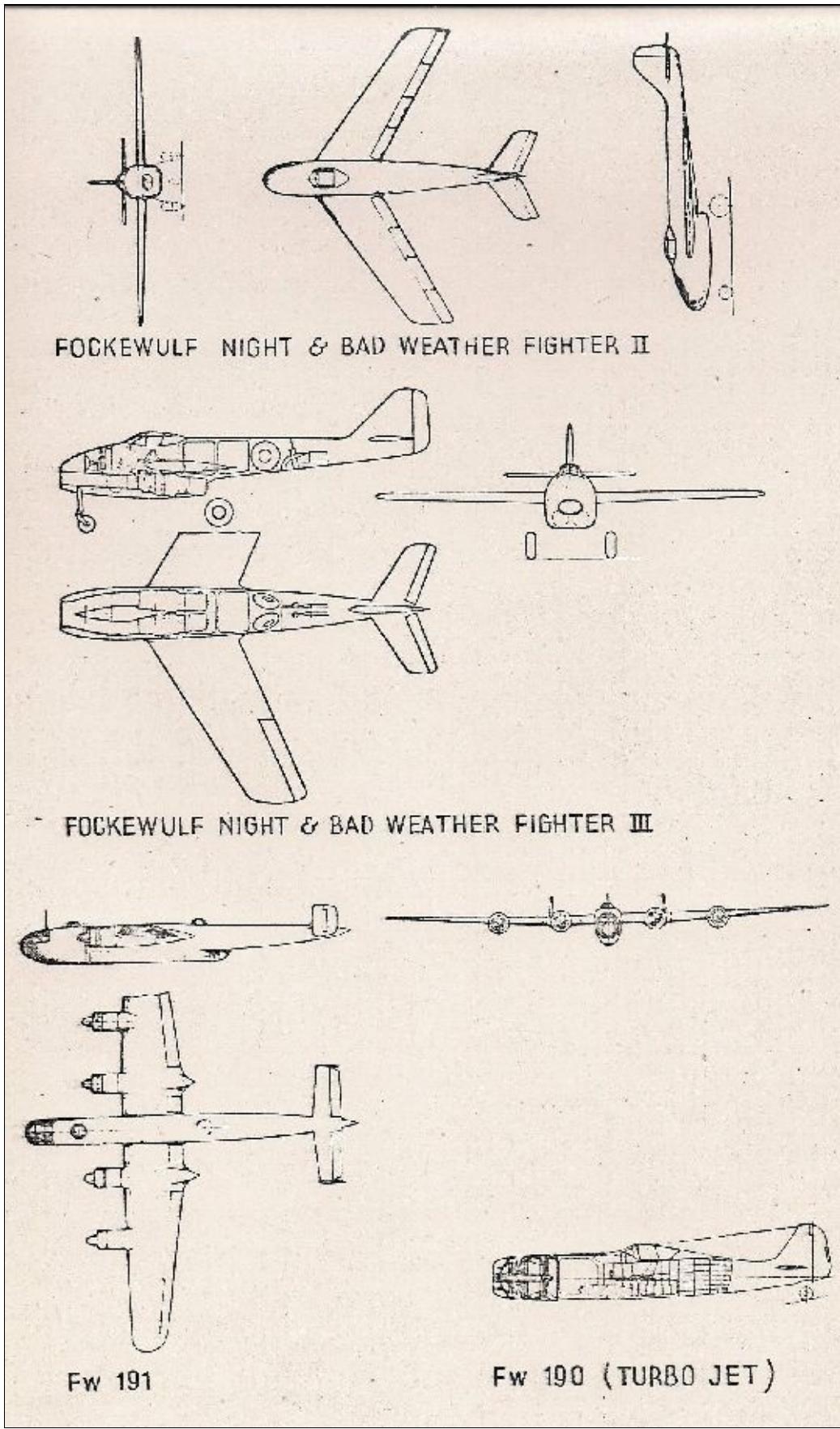
[ITT Corporation](#), which had acquired a 25% stake in the company prior to the war, won \$27 million in compensation in the 1960s for the damage that was inflicted on its share of the Focke-Wulf plant by WWII Allied bombing.^[11] Focke-Wulf formally merged with [Weserflug](#) in 1964, becoming [Vereinigte Flugtechnische Werke](#) (VFW), which after several further mergers is now part of [European Aeronautic Defence and Space Company N.V.](#) ([EADS](#)).

Focke Wulf Projects shown in Drawing L4



FW Night and Bad weather Fighter II- Drawing L 4.

The FW night and bad weather fighter project II design is a conventional monoplane with conventional tail. This designed has a sharply swept back, single spar wing with normal flaps and ailerons. The forward fuselage is rather bulbous, accounting for the side by side position of the 2 Hes 011 turbojets and their intake pipes. Above the jet units is a pressurized cabin for a crew of three, with catapult seats, and behind this is a space for self-sealing fuel tanks. The tricycle undercarriage retracts rearward into the sides of the fuselage. Armament is comprised of four MK 108 fixed, forward firing (120 rounds per gun); two MK 108, oblique firing (with 100 rounds per gun). Specifications: wing span 51.8 ft.; wing area 538 square feet; empty weight 16,540 lbs.; normal flying weight 27,280 lbs.; maximum speed at sea level 570 m.p.h.; maximum speed at 23,000 ft. is 565 m.p.h.; maximum endurance 2 hours and 45 minutes; service ceiling 42,600 feet.



Drawing L 4

FW Night and Bad weather Fighter Project III is shown Drawing L4. The FW project III night and bad weather fighter project is a mid-wing monoplane with conventional tail. This design has a sharply swept back, single spar wing with normal flaps and ailerons. The forward fuselage is again bulbous in proportions, accounting for the side by side

position of the 2 He S 011 turbojets and their intake pipes. Above the deck units is a pressurized cabin for a crew of three, with catapult seats, and behind this is a space for to its self-sealing fuel tanks. The tricycle undercarriage retracts rearward into the sides of the fuselage.

Specifications are: armament is four MK 108 fixed, forward firing 120 rounds per gun; two MK 108, oblique firing with 100 rounds per gun;

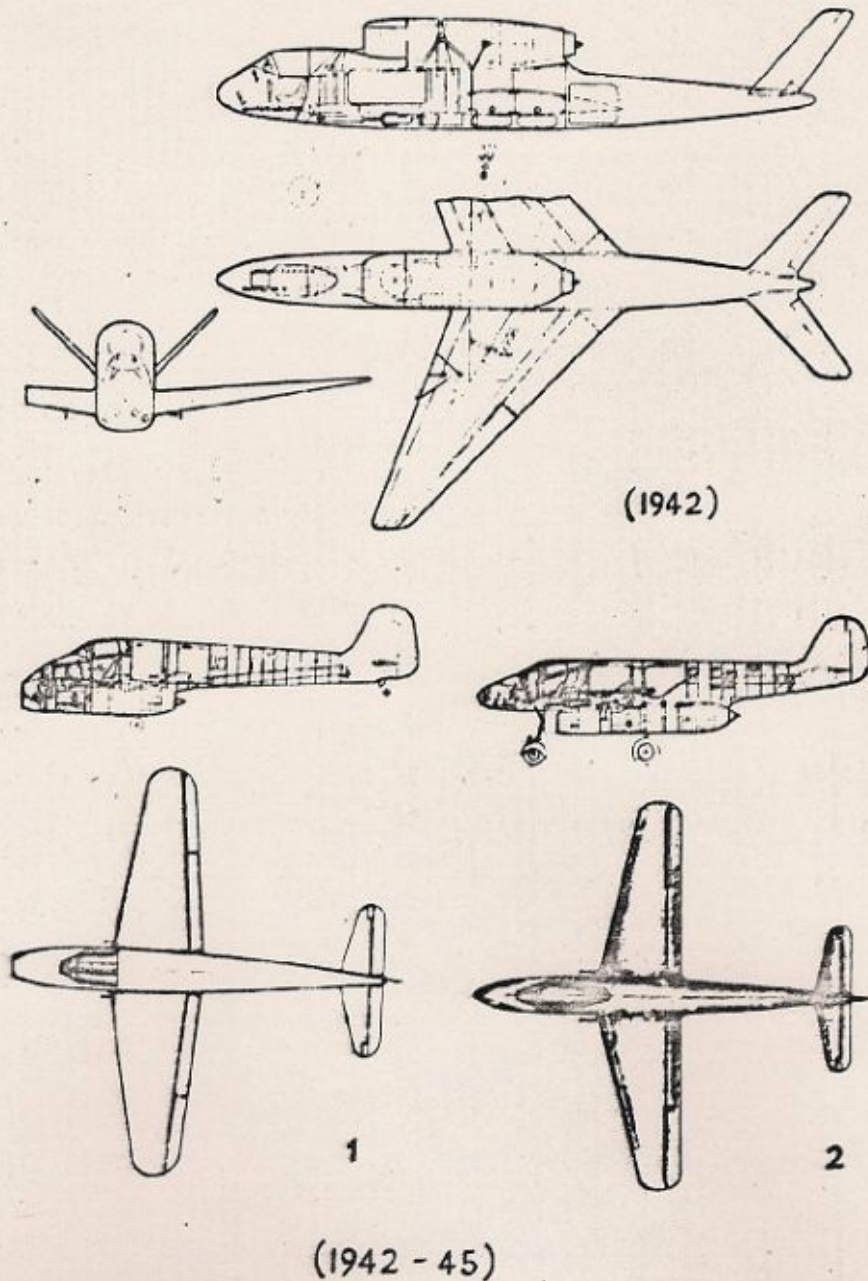
Wingspan = 51.8 ft.; wing area = 538 square feet; empty weight 16,540 lbs.; normal flying weight 27,280 pounds;

maximum speed at sea level 570 m.p.h.; maximum speed at 23,000 ft. 565 m.p.h.; maximum endurance 2 hours and 45 minutes; and

service ceiling is 42,600 ft.

Focke Wulf Single Seat Fighter Projects

FOCKE WULF SINGLE JET FIGHTERS



FW single jet fighter projects 1942 to 1945 drawings L1, L2, and L3 Commencing in March 1943 Kurt Tank designed a series of single jet fighters. The first of these added a Jumo 004 jet unit slung beneath the nose. The undercarriage is of orthodox type (tail-dragger) and the main plane and tail surfaces are very similar to those of the well-known FW 190. The cockpit is located forward of the wing's leading edge, affording good visibility for combat situations. The next few projects still has an under the fuselage engine location, but is placed farther back, and a tricycle undercarriage is fitted, which was to be the trend from this point on. There is a fairly pronounced taper on the leading edges and the trailing edges are straight.

In November 1943 a different solution was sought, by placing the jet unit in another

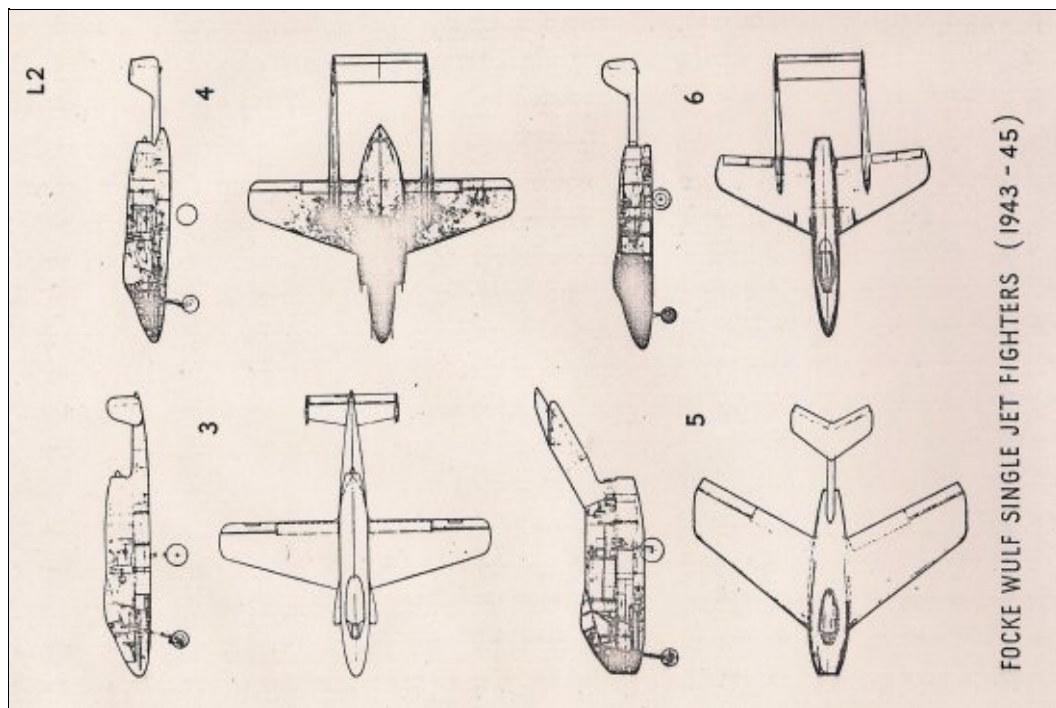
location: instead of placing it below the fuselage, it is now mounted behind the cockpit. This arrangement required a new placement for the engine air intake, the solution was to introduce protruding intakes (scoops) on each side of the nose. In order to avoid interference with the jet stream, twin fins and rudders are employed.

A little later a twin boom interceptor fighter was designed, still with the turbojet unit above the fuselage. Two bi fuel rocket motors are mounted side by side beneath the jet tailpipe. The tail plane is placed above the twin fins and rudders, to provide the space necessary for the rockets.

At the beginning of 1944 a design was prepared very similar to that, ultimately adopted for the TA 183, except that the wing is of considerably wider chord. A bi-fuel rocket is mounted above the tailpipe of the He S 011 turbo jet unit.

The next design is of the twin boom type with high tail plane and a very long nose. The He S 011 jet unit is mounted in the rear of the fuselage with a Walter 509 rocket motor slung under the tail pipe.

FOCKE WULF SINGLE JET FIGHTER PROJECT OF 1942



Drawings L1 L2 L3

L4

Although this project was drawn up in 1942 it is of interest because of the swept forward wing and the probability of being one of the first single jet fighter projects in the world. Three versions were foreseen, the first to have been swept forward wings with either the Jumo 004 or the BMW 003E turbo jet units. The third has no sweep back and BMW 003 jet unit. The unit is mounted on top of the fuselage forward of the center section. The main wing is swept forward at 30 degrees and tail surfaces are swept up forming an angle of 45 degrees to the horizontal. The tail surfaces are also swept back and there are no true vertical surfaces. A tricycle undercarriage is fitted and 187 gallons of fuel is carried in two fuselage tanks. The armament consists of two MK 151 (300 rounds per gun) and two MK 108 (200 rounds per gun) firing forward. Wingspan 27 feet, length 34.4 ft., wing area 150

square feet, maximum flying weight 6,600 lbs., wing loading 43.7 lbs. per square foot, landing weight 4,400 lbs., aspect ratio 4.8, maximum speed at sea level 520 m.p.h., at 13,200 ft. 578 m.p.h.. rate of climb at sea level 4250 ft. per minute, at 32,800 ft. 1570 ft. per minute, service ceiling 44,500 ft..



FW ATHODYD FIGHTER shown in Drawing L3

This single seat fighter has a long pointed nose and sharply swept back low wing and tail plane is swept back at both leading and trailing edges and carries the 2 rocket units its extremities of the horizontal tail. The cockpit is midway along the fuselage and the canopy blends in with a large vertical fin a Walter by fuel rocket is mounted in the tail end of the fuselage. The narrow track of only 2.6 feet required that the wheels retract vertically into the fuselage and the nose wheel retract rearward and upwards.

Armament consists of two MK 103 E (60 r.p.g.) in the nose. Behind the cockpit there is a 20 mm armor bulkhead protecting the forward fuel tank of 306 gallons capacity. After the cockpit there are 3 additional fuel tanks. One of these contains 211 gallons of gasoline fuel while the other two provide 36 gallons of hydrazine hydrate and 86 gallons of hydrogen peroxide for the starter rocket motor.

Each athodyd unit is 8.8 ft. long and 4.4 ft. in diameter and develops a maximum of 10,850 horsepower. At sea level and 2270 horsepower at 36,000 ft.. The Walter starting rocket gives the thrust of 6,600 lbs.. For takeoff and acceleration the rocket is operated for a period of 33 seconds. This leaves sufficient fuel for a further acceleration in case it is necessary to make another circuit. After a faulty landing approach.

Specifications are:

wingspan = 26.2 ft.;

overall length = 38.9 ft.;

wing area = 204 square feet;

all up weight with 5,500 lbs. of fuel = 11,880 lbs.;

time from standing start to beginning of steep climb at 3,000 ft. = 2 minutes; time of climb from 3000 to 36,000 ft. = 2 minutes 18 seconds;

maximum speed at sea level = 682 m.p.h.;

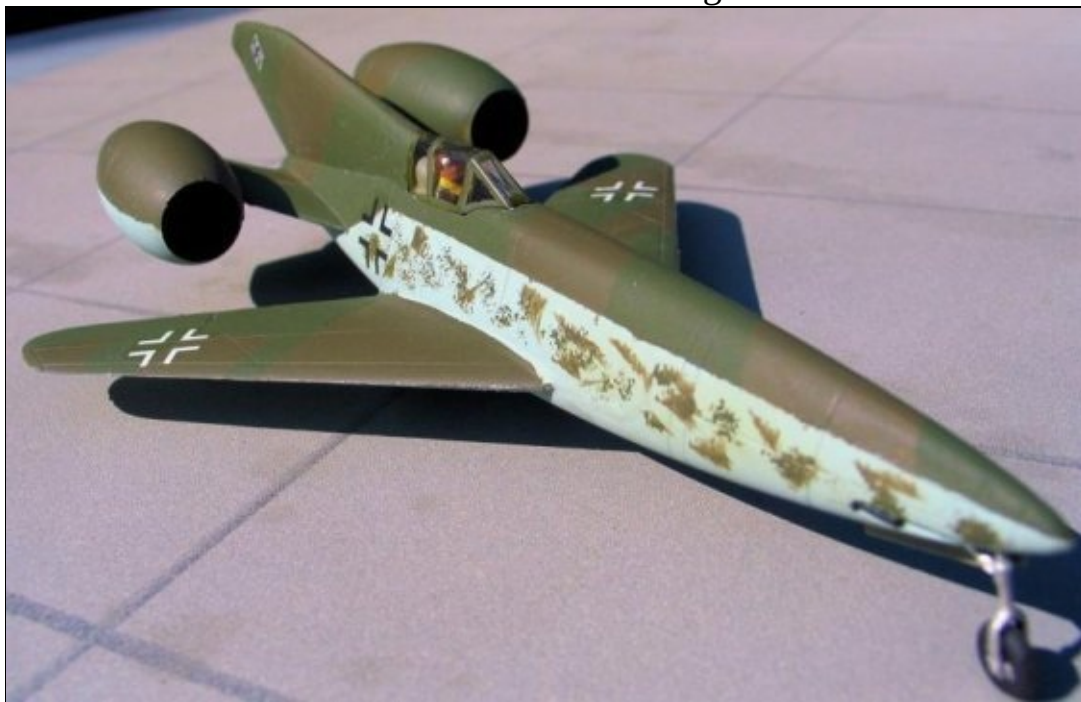
maximum speed at 36,000 ft. = 592 m.p.h.;

range at sea levels = 143 mi. at 36,000 ft. = 435 mi.;

endurance at sea level = 13 minutes and

endurance at 36,000 ft. is 43 minutes.

FW ATHODYD FIGHTER shown in Drawing L3



FW Fighter project of 1943

Wingspan 27 feet, the main wing is swept forward at 30 degrees and the twin tail planes are inclined at 45 degrees. Maximum speed at 13,000 feet 578 mph.



World's First Jet Fighter

FW Single Jet Project "5" 1943 - 1945 (TA 183)



Focke Wulf Fighter Research Projects wire guided air to air missile

The TA 183 single jet fighter Drawing L5

This was submitted for the single jet fighter competition and was selected as TA-183 was about to go into production when the war in Europe changed course.

it was designed for the HeS 011 jet unit but in the first production series this engine was not available in sufficient quantities and the decision was made to go with the Jumo 004.

It was compact fighter of mid wing design. The main plane is swept back at 40 degrees, at that quarter chord line. The fuselage is rather deep to accommodate the turbojet unit which is mounted in the lower rear portion with a straight intake extending to the nose. The pilot's cockpit is placed above the intake and well forward. Fin also fulfills the function of a tail boom and the horizontal surface has a very sharp swept also and is mounted at top of the fin (similar to the Russian MIG15).

Armament comprising two MK 108's with the optional addition of two MK 108's or two MK 103's, are mounted in the nose at the sides of the intake. The main wheels retract forwards and upwards into the fuselage and the nose wheel retracts rearwards and is stowed nearly flat in the space between the air intake. Throughout the design considerable attention has been paid to the type of construction for example the wing is of wood construction with a steel box spar and a single sheet of plywood forming the covering for that portion of the wing in front of this spar.

Fuel tanks are incorporated in the wings as part of the structure. The Wing area = 242

square feet, wingspan = 32.8 ft., aspect ratio = 4.43, maximum flying weight with 525 gal. of fuel = 11,200 lbs., wing loading at maximum flying weight = 46.4 lbs. per square foot, maximum speed with the HE S 011 engine at sea level = 543 m.p.h., at 23,000 ft. = 597 m.p.h., at 39,500 ft. = 574 m.p.h.. Rate of climb at sea level = 4,770 ft. per minute, at 20,000 ft. = 3,200 ft. per minute, service ceiling = 47,200 ft., range at 23,000 ft. with 315 gallons of fuel = 615 mi.. Range at 55% thrust = 810 mi. at 23,000 ft. = 1300 and the endurance @ full thrust one hour and six minutes, 55% thrust two hours and 55 minutes. Bomb load = 1500 kg.. There are provisions for the installation of a bi fuel rocket motor to give improved climb performance when the aircraft is to be employed in the interceptor role.

An alternative design submitted in the competition was a Focke Wulf project with the same cockpit set farther back, permitting improved streamlining of the nose. The wing is very similar to that of the TA 183 but has 35 degrees instead of 40 degrees sweep-back. Span of 31.2 ft., and a wing area of 215 sq. ft.. The layout, however is more conventional, the sweep back tail plane is placed below of the fin and rudder. Although this version had not been selected for production it was estimated that the performance would be slightly better than that of the TA 183 with the maximum speed of 595 m.p.h..

FW Rotating Wing Fighter features vertical takeoff. The pilot controls the pitch angle of the three rotating wings and the thrust of the wing tip engines to maintain a maximum tip velocity of 670 feet per minute (455 mph). Flying weight is 11,500 pounds, Length 30 feet, diameter 35 feet, maximum speed at sea level is 630 mph, rate of climb at sea level is 24,300 feet per minute Rotational power is provided by three Walter rocket motors located at the wing (vane) tips.



FW Rotating Wing Fighter- Drawing L3

This aircraft is unusual where the normal wing is replaced by three rotating wings or vanes. Each of these wings has a ramjet-rocket unit mounted at each tip. The pitch of the

angle of the vanes can be adjusted by the pilot. The maximum peripheral speed at the tip of these vanes is limited to 670 ft. per second or 515 m.p.h. (which is normally used only for climb). It will be appreciated that with such an arrangement the airspeed of the vein tips may be considerably greater than that of the fuselage; in this way efficient operation of the athodyd engines can be achieved when the aircraft speed is still relatively low. One of the main drawbacks of this form of propulsion is thereby overcome. The higher the forward speed of the fuselage the slower the rotation of the wings and the smaller the differences between the athodyd speed and the fuselage speed. For takeoff the aircraft stands vertically on its tail in which the wheels are housed and the initial rotation is imparted to the wing assembly by three auxiliary Walter rockets motors which are embedded in the athodyd units. Soon as the peripheral speed is high enough to operate to athodyds efficiently and the rocket motors are shut down when the main athodyds are started up. During this start-up stage the vanes are in neutral pitch. When there is sufficient thrust the pitch is increased enough to lift off and accelerate the aircraft vertically. The total thrust (lift) is equal to the combined effect due to the rotation of the vanes (wings) and partly due to the components of the athodyd thrust parallel to the fuselage axis. At this stage the craft transitions from vertical to level flight by gradually increasing the pitch of the wings until they are at an angle approaching 0 degrees to the airflow. After leveling out, the pitch is at or near a maximum and the speed of the rotation is correspondingly reduced in order to maintain a constant Mach number of 0.9 at the wingtips. At the maximum design speed of the aircraft the wings rotate at 220 rpm.

The following advantages are claimed by the project leaders:

- 1 high efficiency and low fuel consumption;
- 2 high ceiling;
- 3 no runway required for takeoff or landing;
- 4 low weight;
- 5 simplicity;
- 6 any combustible solid, liquid or gas which can be vaporized may be used as a fuel.

Specifications:

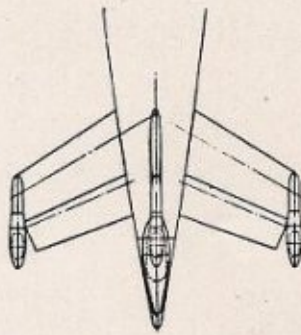
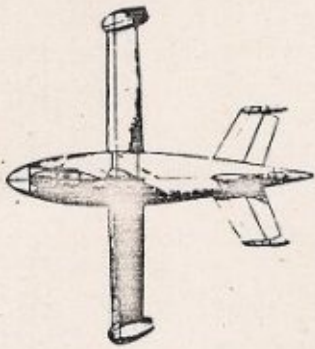
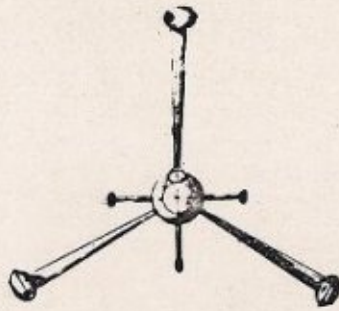
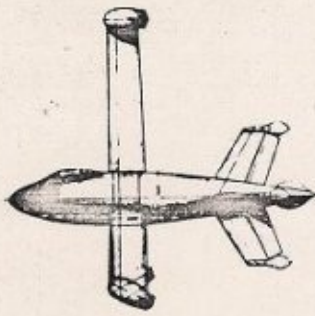
Flying weight = 11400 lbs.; length = 30 ft.; diameter = 35.4 ft.; power three Walter rockets each of 660 lbs. thrust; fuel 3,300 lbs.;

armament to MK 103 (100 r.p.g.), 2 MK 151 (50 r.p.g.);

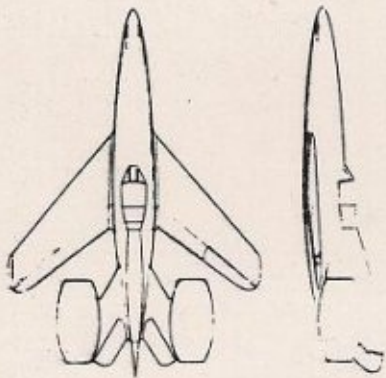
speed at sea level = 620 m.p.h. at 46,000 ft. = 520 m.p.h.;

rate of climb at sea level 24,600 ft. per minute, at 49,000 ft. 400 ft. per minute; climb to 3,280 ft. 8.2 seconds, climb to 49,000 ft. = 11.5 minutes; range at sea level = 400 mi. range at 46,000 ft. = 1500 mi. and

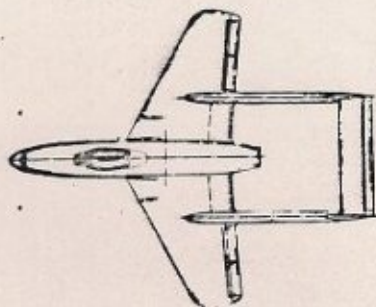
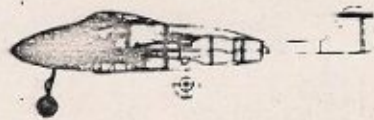
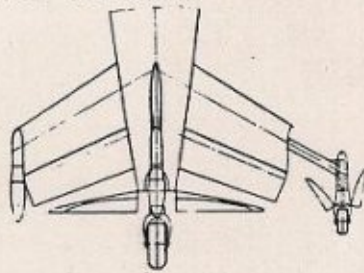
endurance at sea level is 0.7 hours at 46,000 ft. 3.4 hours.



FOCKE-WULF ROTATING WING FIGHTER



FOCKE-WULF ATHODYD FIGHTER



FOCKE-WULF SINGLE JET FIGHTER (1943-45)



Focke Wulf ATHODYD Fighter

Artist Concept

Focke Wulf Athodyd (Ram Jet) Fighter has a wing span of 26 feet, maximum speed at sea level 682 mph, climb rate at sea level 31,500 feet per minute, and all up weight 11,800 pounds.

GOTHA

[Return](#)

Company's History:

In 1921 the company purchased [Automobilwerk Eisenach](#), thereby entering automobile production and, with the [Dixi 3/15 DA-1](#) playing an important part in expanding the German auto-market to buyers who hitherto would have been motorized, if at all, only as motor-cyclists. However, the company encountered a cash crisis in 1928 and the Dixi branded auto-business was sold to [BMW](#): the Dixi 3/15 DA-1 was rebadged in 1928 as the [BMW 3/15 DA-2](#), the name by which today the little car is better remembered.

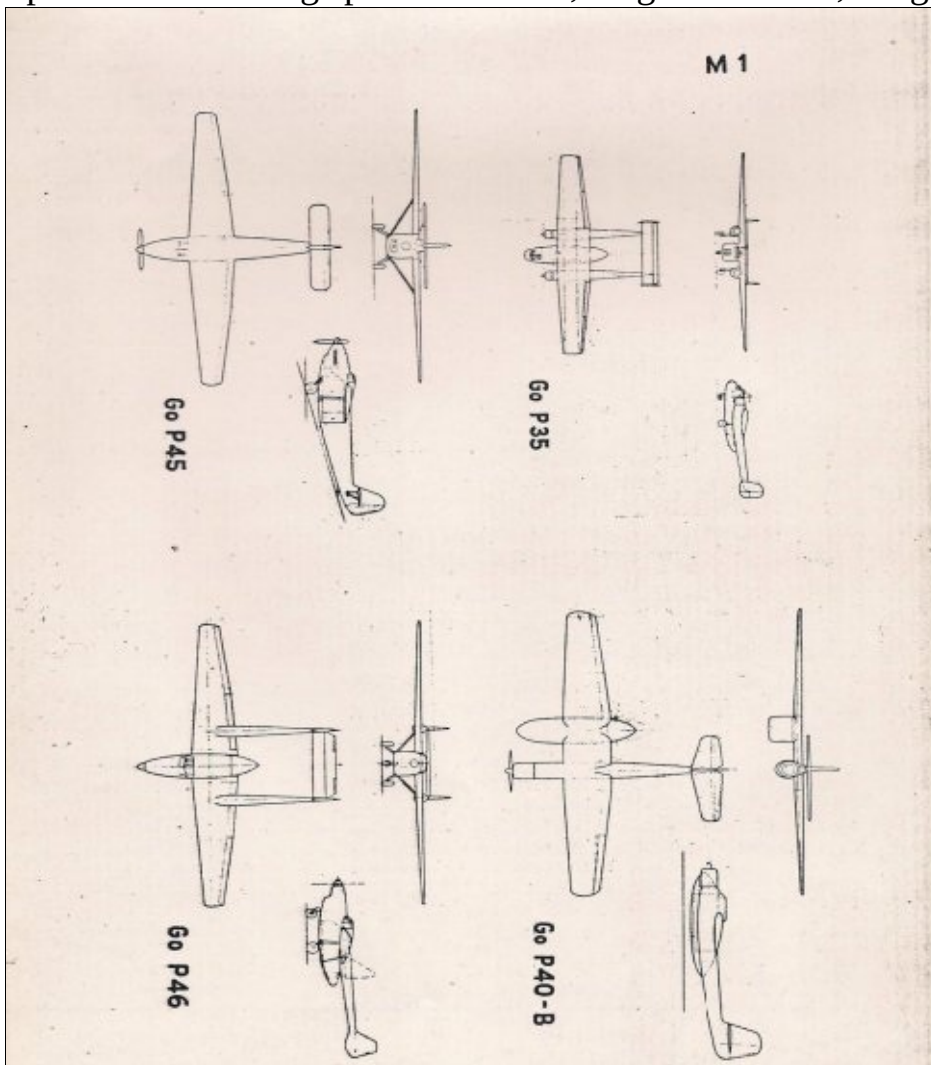
In 1924 the [Cyklon Maschinenfabrik](#), a manufacturer that had concentrated on motor-bikes and cycle cars came, through a rather indirect route of company purchases and sales, to be merged into the larger Gothaer Waggonfabrik business. This gave Cyklon access to the viable sales and distribution network of Dixi and aspirations to become a serious auto-producer. Between 1927 and 1929 the company produced the Cyklon 9/40 which at the time was the most inexpensive six cylinder powered car sold in Germany. The conservative looking car featured a modern all-steel body produced by Germany's leading producer of steel car bodies, [Ambi-Budd](#)'s Berlin based business.^[1] It was, in fact, the first all-steel standard car body produced by Ambi-Budd in Berlin and, incongruously to some modern readers, was shared with the [Adler Standard 6](#), a more powerful and more highly priced six cylinder car from one of Germany's mainstream auto-makers of the 1930s. The sale by Gothaer Waggonfabrik of the cash-strapped Dixi business to BMW meant an end to Cyklon's access to a sales network, and highlighted the lack of cash for running the auto-business which rapidly fizzled out after 1928, although Cyklon was not formally wound up till 1931.^[2]

Gotha's main contribution to the new [Luftwaffe](#) was the [Gotha Go 145 trainer](#), of which

1,182 were built. The firm also produced the [Gotha Go 242 assault glider](#) and licence-built [Messerschmitt Bf 110](#). Perhaps the most famous Gotha product of [World War II](#), however, was an aircraft that never entered service, the [Horten Ho 229](#). This was an exotic [jet-powered, flying wing fighter aircraft](#) designed by the [Horten brothers](#), who lacked the facilities to mass-produce it. Two prototypes flew, the second (powered) version lost in an accident on its third flight. the third prototype- built to a modified design - was almost complete and four more were in various stages of manufacture before the end of the war.

RESEARCH PROJECTS- Drawing M1

The GOTHA P 35-01 TRANSPORT is a twin boom transport, apparently developed from the Go 244 which it resembles in appearance, power is supplied by a pair of Bramo 323 engines and the tricycle undercarriage is fixed. Armament is 1 * MG 15 front and rear. Specifications: wing span = 106.5 ft.; length = 67.2 ft.; freight capacity = 1330 cubic feet.



GOTHA P 40 - B TRANSPORT

The Gotha P 40 B Transport is an asymmetrical high Wing monoplane, powered by an unspecified radial engine. The freight container, which appears to be detachable, is carried under the starboard wing. No undercarriage is shown in the sketch. Dimensions are approximate only as give in the following specifications: wingspan = 82 ft.; length =

56 ft.; freight capacity = 540 cubic feet.

GOTHA P 45 - 01 TRANSPORT

The Gotha P 45 - 01 transport is a high wing monoplane of conventional configuration, with its strut braced wing and tailplane. A single in-line engine is shown, also the non-retractable main wheels and base tail skid.

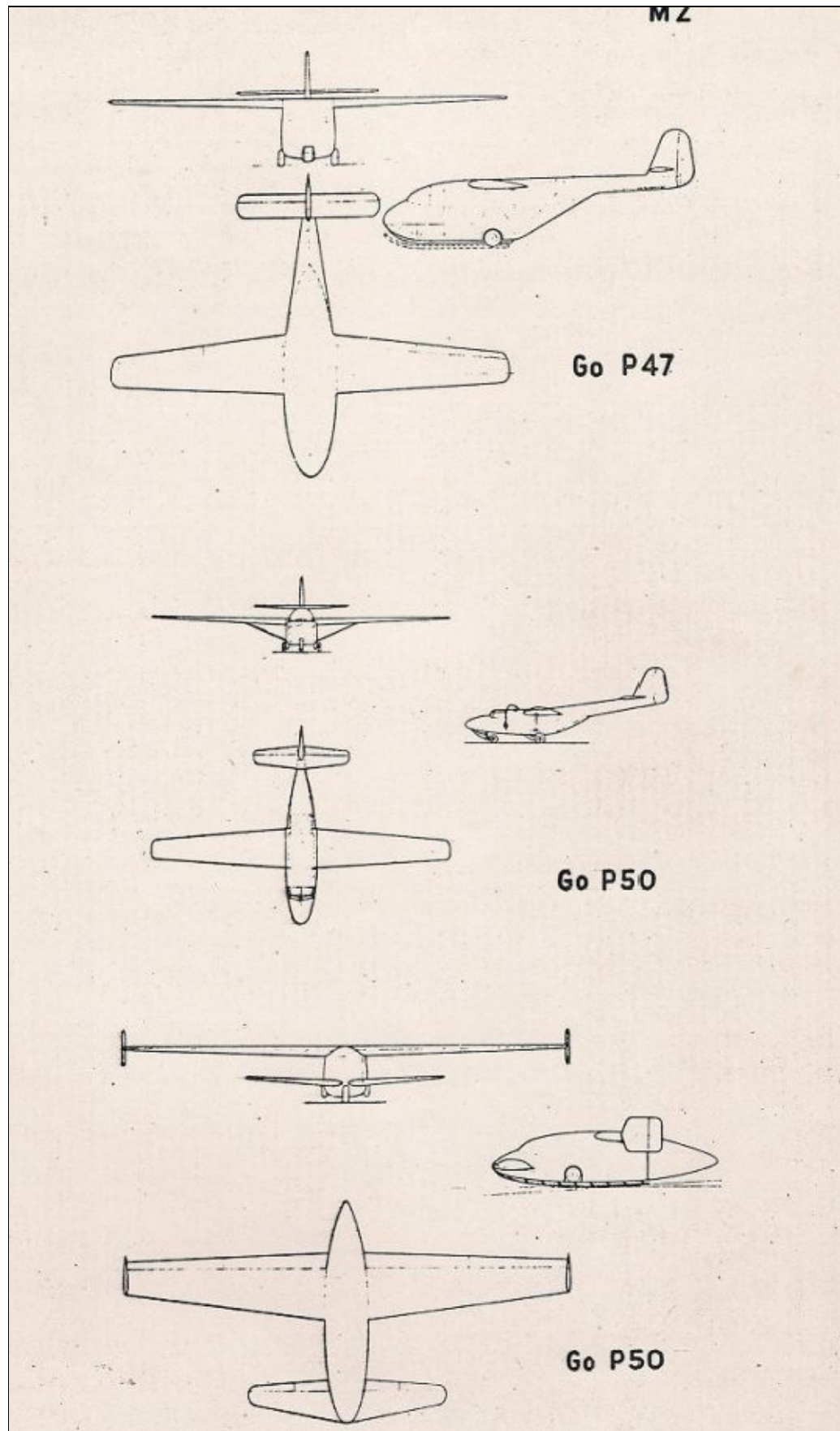
Specifications: wingspan = 78 ft.; length = 50.5 ft.; maximum freight capacity = 407 cubic feet.

GOTHA P 46 TRANSPORT

A twin boom monoplane with a strut braced high wing, powered by two Jumo 211 F engines, and having a fixed tricycle undercarriage. To facilitate the loading the rear section of the nacelle is hinged at the top. Specifications: wingspan = 80.4 ft.; length = 50.8 ft..

GOTHA P 47 TRANSPORT GLIDER shown in Drawing M2.

The Glider is of similar appearance to the more conventional version of the P 50, this glider has a large square section fuselage. The undercarriage consists of two main wheels and a retractable tail skid. Specifications: wingspan = 88 ft.; length = 68.5 ft.; freight capacity = 1600 cubic feet.



GOTHA P 50 TRANSPORT GLIDER is shown in Drawing M2.

There are two versions of this glider, which will carry 12 troops, 1 Volkswagen jeep and a 37 mm antitank gun or a howitzer. One design shows a conventional high wing monoplane, which has a strut braced main plane and a fixed tricycle undercarriage.

Specifications: wing span = 65.6 ft.; length = 44.6 ft.; freight capacity = 368 cubic feet.

The alternative design shows a tail first monoplane with fins and rudders on the wing tips. The detachable wheels are provided for takeoff, and a skid is provided for landing.

Specifications: wingspan for main wings = 73.5 ft. for front airfoil = 32.8 ft.; aspect ratio main wing = 8.2 and front airfoil = 6.7; Wing area = 660 square feet and for the front airfoil = 107 square feet; length = 37.4 ft.; freight capacity = 515 cubic feet.

GOTHA P 52 FIGHTER is shown in Drawing M2.

This was an interim project based on the Horten 9 and the Horten 229.

GOTHA P 43 FIGHTER is shown in Drawing M2.

Another interim project based on the Go P 49 and the Horten 229.

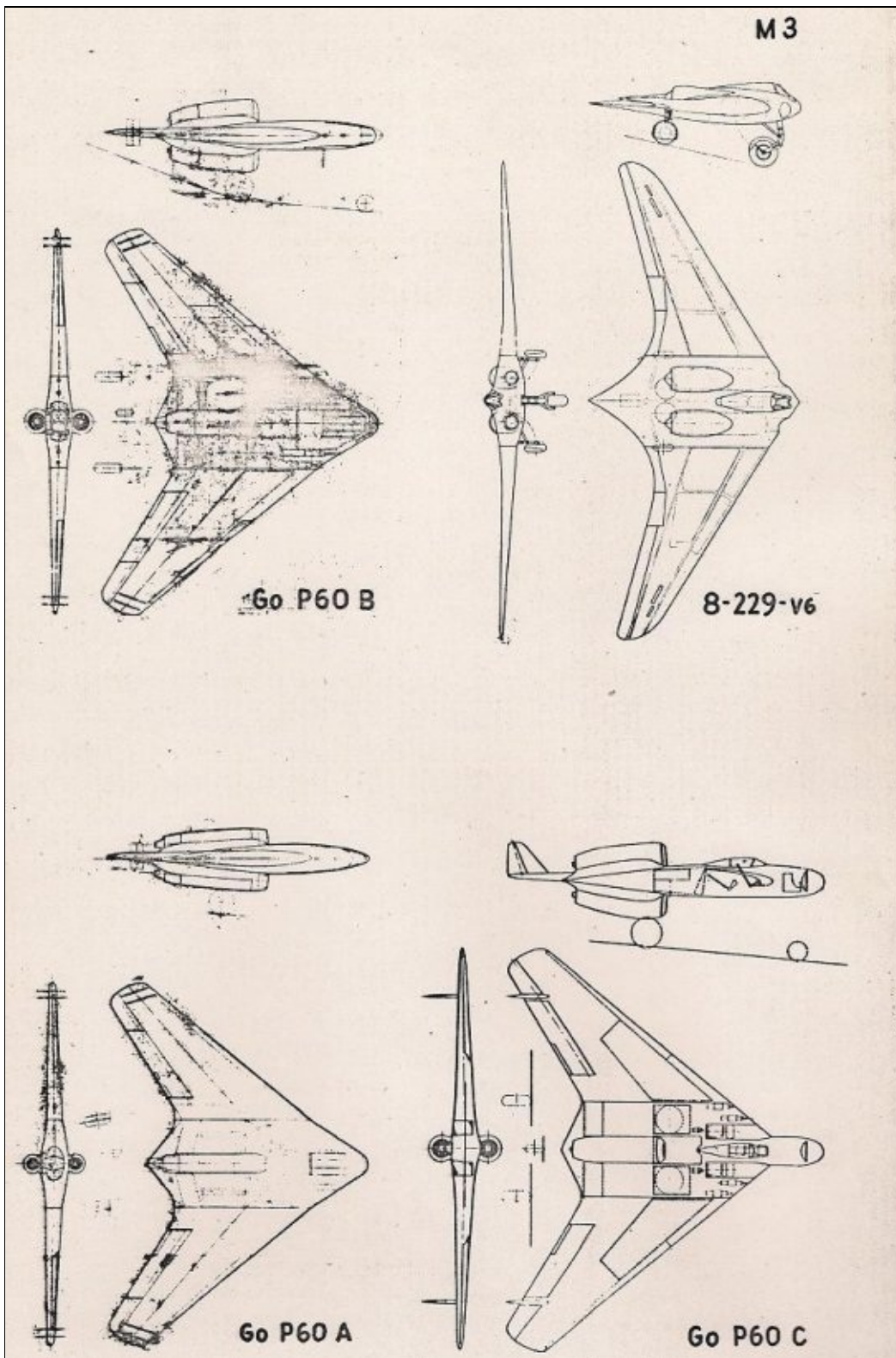
GOTHA P 58 GLIDER TANKER is shown in Drawing M2.

A reference has been discovered to a glider tanker project by Gotha designated Go P 58.

GOTHA P 60 TWIN JET FIGHTER is shown in Drawing M3.

This was the first of the P 60 series of twin jet fighter projects and was designed by Gotha to supersede the Horten 229 jet propelled flying wing. The two BMW 003 turbojet units are mounted to the rear of the center section, one above and one below. The pilot and observer lie prone and this arrangement has permitted a configuration rarely seen in aircraft design, since there is no projecting canopy to increase the frontal area of the fuselage.

To provide space for the crew the nose wheel is offset. The main wheels are in the middle portion of the center section which also houses the main fuel tanks. Armament comprises of 4 * MK 108's mounted two on each side of the cockpit. In addition to the turbojet units, the fuselage houses a 4,400 lb. trust Walter rocket motor. These axillary rocket motors were installed in some cases for rapid takeoff and climb. The wing has one degree of dihedral and 45 degrees of sweep-back at the quarter chord line.



Special landing flaps are fitted primarily to improve the stalling characteristics. For directional control narrow chord airfoils are mounted near the wingtips at a predetermined angle of attack and are pivoted so that when not in use they can be withdrawn completely into the wing. The elevons are split and at high speeds only the outer sections are used, whereas at low speeds the inner servo tab operates the surfaces.

GOTHA 345 GLIDER

This Glider is a high wing monoplane with a wing of fairly high aspect ratio, having a slightly swept back leading edge, and a swept forward trailing edge, resulting in a plan

form of fairly pronounced taper. There is a high single fin and rudder.

In order to facilitate the loading: the nose section, including the pilots cockpit, is hinged to swing upwards. There are two loading arrangements: in the first case, the nose wheel is raised; with a hinged portion, allowing the fuselage floor to be brought down to ground level, with the assistance of light jack. The second case the nose wheel remains under the fuselage and only the nose portion hinges upwards.

wingspan = 67 ft.; length = 41 ft.; length of nose = 12 ft. 5 1/2 inches; Root chord = 10 ft. 2 in.; maximum width of compartment = 6 ft. 8 in.; maximum fuselage length = 8 ft. 3 in..

8-229 V6 DEVELOPMENT OF HORTEN IX is shown in Drawing M3.

The Horten 9 flying wing twin jet fighter is described in the Horten chapter of this book. Development of the aircraft was transferred to Gotha and given the designation 8-229. The V-6 prototype is powered by two Jumo 004 turbojet units and the center section is rather different from that of the Horten 9, having been thickened by the addition of a shallow bulge on the underside. The jet unit intakes are straight instead of having up-swept as is the case on the Horten 9.

Estimated dimensions and performance figures are as follows:

wing area = 504 square feet; wingspan = 40 ft. 8 and a half inches; all up weight normal = 16,390 lbs.; overload condition 18,800 lbs.; tank each 475 gal.; maximum speed 569 m.p.h. at 23,000 ft.; rate of climb at sea level = 2,750 ft. per minute; endurance = 2 hours and 17 minutes at 39,600 ft.; range = 990 mi. at 39,500 ft..

GOTHA P 60 B TWIN JET FIGHTER is shown in Drawing M3.

The P 60 B was an enlarged version of the 60 A with 2 H e S 011 turbo jet units. Specifications: wing area = 588 square feet; wingspan = 44 ft. 4 in.; all up weight = 22,000 lbs.; fuel tank-age 915 gal.; maximum speed = 500 m.p.h. at 16,500 ft.; rate of climb at sea level = 3140 ft. per minute; endurance = 3 hours 6 minutes at 39,500 ft.; endurance = three hours and six minutes and 39,500 ft.;

With an additional rocket motor the all up weight is increased to 24,200 lbs. with 630 gallons of turbo jet fuel and 3,950 pounds of rocket fuel. The rate of climb at sea level when using the rocket motor and the turbojet is 9,850 ft. per minute. Using the rocket motor to climb from sea level to an altitude of 30,000 ft. is reached in two minutes, when the rocket motor is withheld until at 10,000 ft. the total time to climb to 39,500 ft. is 5.8 minutes, and if the use of the rocket is delayed until the aircraft has reached 20,000 ft. a ceiling of 48,500 ft. can be attained in 9.5 minutes.

GOTHA P 60 C NIGHT AND BAD WEATHER is shown in Drawing M3.

The P 60 C is a bad weather and night fighter version of the P 60 B. It was necessary to enlarge center section to house the radar and to allow the crew of three to sit upright. The

extended nose necessitated the addition of two vertical tail surfaces. Armament was 4 * M K 108 fixed forward firing 120 rounds per gun and 2 * MK 108 oblique upward firing 100 rounds per gun. Performance approximated to be the same as that of the P 60 B.

HEINKEL

[Return](#)

Company's History:

Following the successful career of [Ernst Heinkel](#) as the chief designer for the [Hansa-Brandenburg](#) aviation firm in World War I, Herr Heinkel's own firm was established at [Warnemünde](#) in 1922, after the restrictions on German aviation imposed by the [Treaty of Versailles](#) were relaxed. The company's first great success was the design of the [Heinkel He 70](#) Blitz high-speed [mail plane](#) and airliner for [Deutsche Luft Hansa](#) in 1932, which broke a number of air speed records for its class. It was followed by the two-engine [Heinkel He 111](#) Doppel-Blitz, which became a mainstay of the Luftwaffe during World War II as a bomber. Heinkel's most important designers at this point were the twin [Günter brothers](#), Siegfried and Walter, and [Heinrich Hertel](#). The firm's headquarters was in [Rostock](#) later known as Heinkel-Nord (Heinkel-North), possessing a factory airfield in the Schmarl neighborhood of the city (then known as "Marienehe") with an additional Heinkel-Süd facility in [Schwechat](#), Austria, after the [Anschluss](#) in 1938.



Ruins of the Heinkel headquarters in Rostock

The Heinkel company is most closely associated with aircraft used by the Luftwaffe during World War II. This began with the adaptation of the He 70 and, in particular, the He 111, to be used as bombers. Heinkel also provided the Luftwaffe's only operational [heavy bomber](#), the [Heinkel He 177](#), although this was never deployed in significant numbers. The German [Luftwaffe](#) equipped both of these bombers with the Z-Gerät, Y-Gerät, and Knickebein, developed by [Johannes Plendl](#), and thus they were among the first aircraft to feature advanced night navigation devices, common in all commercial airplanes today.

Heinkel was less successful in selling fighter designs — before the war, the [Heinkel He 112](#) had been rejected in favour of the [Messerschmitt Bf 109](#), and Heinkel's attempt to top Messerschmitt's design with the [Heinkel He 100](#) failed due to political interference within the [Reichsluftfahrtministerium](#) (RLM — Reich Aviation Ministry). The company also provided the Luftwaffe with an outstanding night fighter, the [Heinkel He 219](#), which also

suffered from politics and was produced only in limited numbers. By contrast, the only [heavy bomber](#) to enter service with the Luftwaffe during the war years – the [Heinkel He 177 Greif](#) – turned out to be one of the most troublesome German wartime aircraft designs, plagued with numerous [engine fires](#) from its general airframe design being mis-tasks to be built to be able to perform moderate-angle [dive bombing](#) attacks from the moment of its approval by the [RLM](#) in early November 1937.

From 1941 until the end of the war, the company was merged with engine manufacturer [Hirth](#) to form Heinkel-Hirth, giving the company the capability of manufacturing its own powerplants.



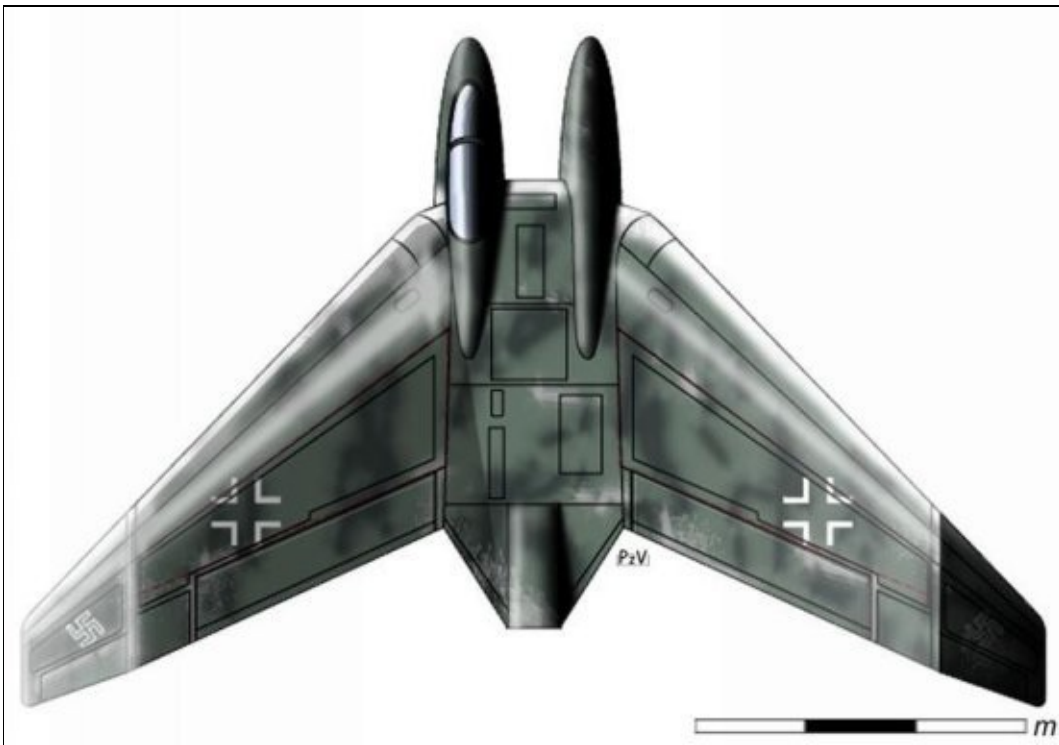
Production of the Heinkel He 111 in 1939

The Heinkel name was also behind pioneering work in [jet engine](#) and [rocket](#) development. In 1939, flown by [Erich Warsitz](#),^[1] the [Heinkel He 176](#) and [Heinkel He 178](#) became the first aircraft to fly under liquid-fuel rocket and [turbojet](#) power respectively, and Heinkel was the first to develop a jet fighter to prototype stage, the [Heinkel He 280](#). This latter aircraft never reached production however, since the RLM wanted Heinkel to concentrate on bomber production and instead promoted the development of the rival [Messerschmitt Me 262](#). Very late in the war, a Heinkel jet fighter finally took to the air as the [Heinkel He 162](#), but it had barely entered service at the time of Germany's surrender.

Following the war, Heinkel was prohibited from manufacturing aircraft and instead built [bicycles](#), [motor scooters](#) (see below), and the [Heinkel microcar](#). The company eventually returned to aircraft in the mid-1950s, licence building [F-104 Starfighters](#) for the West German Luftwaffe. In 1965, the company was absorbed by [Vereinigte Flugtechnische Werke](#) (VFW), which was in turn absorbed by [Messerschmitt-Bölkow-Blohm](#) in 1980 and later became part of [EADS](#).

RESEARCH PROJECTS

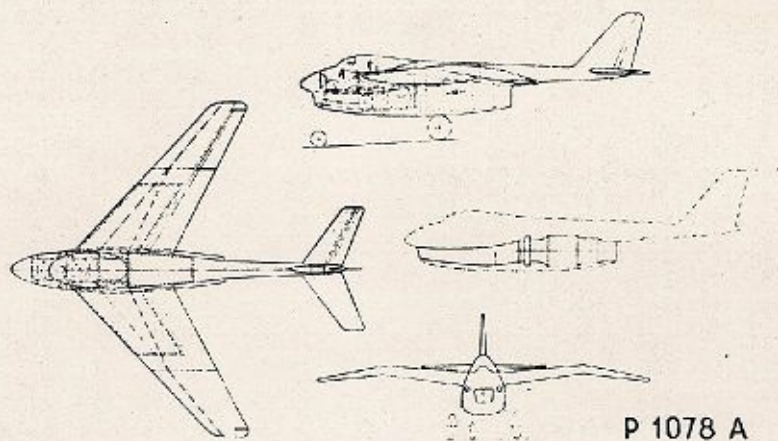
Heinkel Fighter Projects



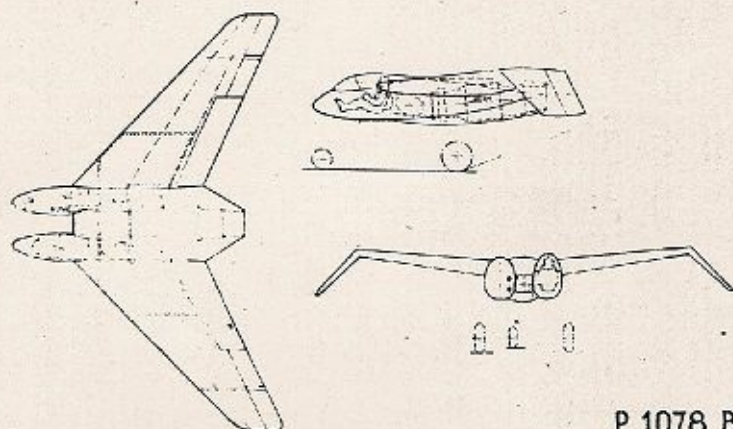
Heinkel He 1078 B Single jet Fighter

HEINKEL

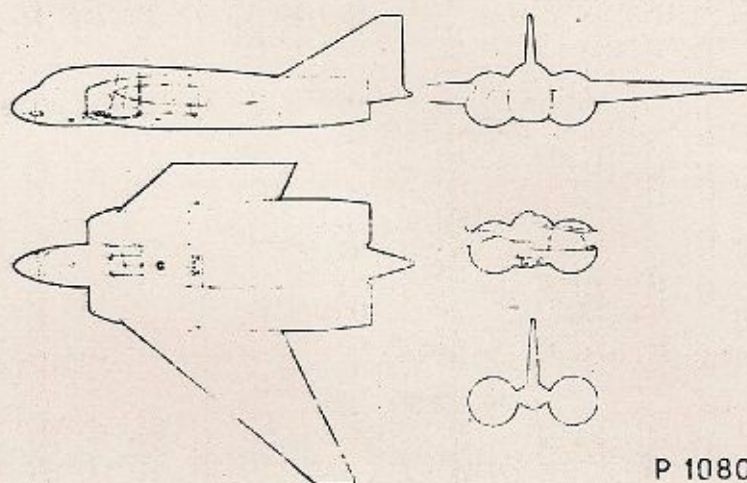
N 4



P 1078 A



P 1078 B



P 1080

Heinkel He 162 (people's fighter) with BMW 003 engine.

BMW 003 jet unit can be modified to increase thrust for periods up to 30 seconds, the following performance have been attained. The full thrust figures for 30 seconds periods at increased rating.

Specifications: thrust at sea level = 2,020 lbs.; thrust at 36,000 ft. and 500 mi. an hour = 730 lbs.; maximum speed at sea level = 552 m.p.h.; maximum speed at 36,000 ft. = 562 m.p.h.; full thrust endurance at sea level = 28 minutes; full thrust endurance at 20,000 ft. =

46 minutes; rate of climb at sea level = 5,220 ft. per minute; rate of climb at 20,000 ft. 3100 feet per minute.

Heinkel He 162 with Jumo 004 engine

With a Jumo 004 B4 turbine unit developing 2,200 lbs. of static thrust at sea level and 690 lbs. at 500 m.p.h. at 36,000 ft. the He 162 has the following estimated performance data:

All up weight = 6,220 lbs. with 125 gal. of fuel; all up weight = 6,850 lbs. with 227 gal. of fuel; maximum speed at sea level = 549 m.p.h.; maximum speed at 20,000 ft. = 551 m.p.h.; Endurance at full thrust at sea level = 13 minutes with Normal fuel load, = 35 minutes; with maximum fuel load endurance at 36,000 ft. = 40 minutes at normal fuel loading, or 77 minutes with maximum fuel loading; maximum range = 335 mi. at 41,000 ft. with normal fuel load, or 670 mi. at 39,000 ft. with maximum fuel load; time of climb to 20,000 ft. = 5.3 minutes with normal fuel load, or 6 minutes with maximum fuel load; service ceiling at maximum weight = 41,300 ft..

He 162 with HE S 011 engine and a swept back wing, as shown in Drawing in N1: a version of the H E 162 was planned with the following specifications: a swept back wing of 26.2 ft. wingspan and powered by an HE S 011 turbojet unit mounted above the fuselage in place of the BMW 003; the fuel tank-age is 314 gallons but no performance estimates could be found for this particular configuration.



Heinkel He 162 “Volksjäger“ [People’s Fighter]

Heinkel He 219 B, C, D and E models:

The He 219 B differed from the well-known series in that it has Jumo 222 engines and increase span, also it had strengthened undercarriage. The B1 subtype was a three seat heavy fighter with 2 Jumo 222 A/B3 engines, and has the following characteristics: wingspan = 70.8 ft.; wing area = 538 square feet; all up weight = 32,500 lbs.; range (economical) with 836 gal. of fuel = 1,585 mi..



The He 219 C is the development of the B. The fuselage is lengthened and by 11.8 in. and there is a MG 131 gun in the tail. A night fighter version with the Jumo 213 engines, He 219 D-1, has a mean weight of 29,800 lbs. with N.W. 50 it attains 410 mi. an hour per hour at 31,000 ft. Armament is 4 * MG 130 1/20, 300 R.P.G. plus 2 * M K 108 upward firing 100 R.P.G.

The He 219 E is similar to the C except there are changes in its mixed construction. The engines are DB 603 E engines.



The four-engined Heinkel He 277B-5 bomber in flight.

He 277 long-range bomber: a projected bomber developed program based on the He 177,

and powered with either four Jumo 222 or four BMW 501E engines.

Specifications and performance data with 4 Jumo 222 engines:

wing area = 1830 square feet for the long Span version, or 1430 square feet for the short span version; wing loading = 74.1 lbs. per square foot for the long span versions, or 64.7 lbs. per square foot short span version; flying weight = 136,300 lbs. long span version, or 121,000 lbs. for short span version; maximum speed = 342 m.p.h., long Span version, 333 m.p.h. for short span model; takeoff distance = 1200 to 1,750 yards.



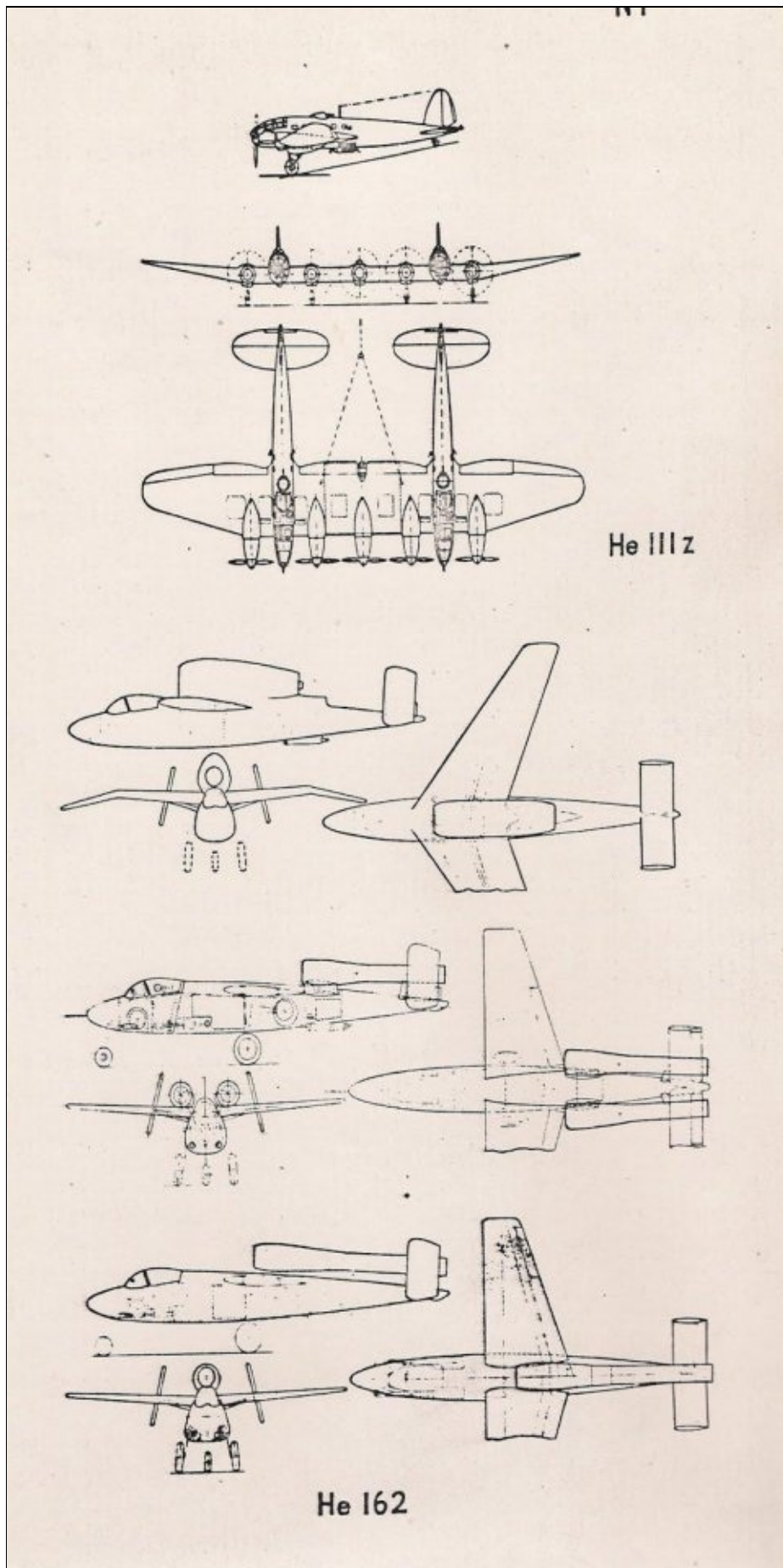
Artist impression of Heinkel He 177

He 277 long-range bomber cont.

Long span version, or 1100 to 1,640 yards short span version; fuel = 8,400 gal. Long span version, 5,200 gal. Short span version;

performance data with six BMW 801 E engines: wings area = 1830 square feet, long span

version; wing loading equal 74.5 lbs. per square foot long span version, 64.5 lbs. per square foot short span version; flying weight = 136,300 lbs. or short span version, 92,200 lbs. short span version; maximum speed = 342 m.p.h., long span version, 326 m.p.h.; short span version cruising speed = 217 m.p.h., long span version, 199 m.p.h. short span version; Take-off distance = 1150 to 1,690 yards, or short span version, 985 to 1,480 yards short span version; fuel = 6,400 gallons for the long span version, 3,400 gallons for the



short span version.

He 111 Z glider tug and at bomber.

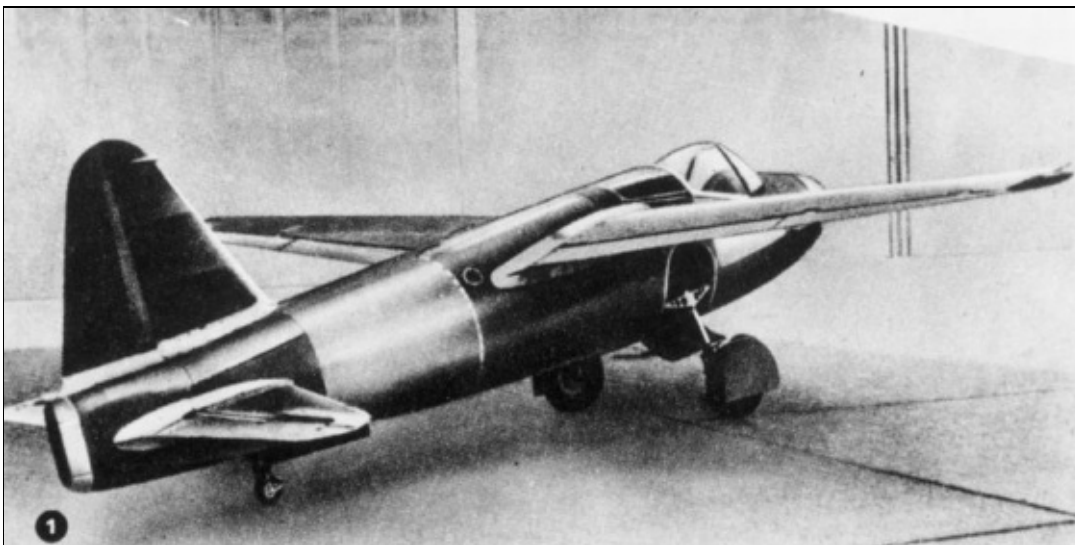
The existence of this aircraft has been known for some time. The craft is made from two Heinkel 111 aircraft that are joined by a special center section constant chord wing Panel,

which includes an additional engine mounted at its midpoint. It was not possible to find figures for both weights and performance, from official German accounts. These figures relate to the first prototype which accommodates a crew of eight and is powered by five 211 F engines. Specifications: wingspan = 115.5 ft.; wing area = 1592 square feet; extra fuel in drop tanks = 2 * 264 gallons; maximum speed 295 m.p.h. at 48,400 lbs. and 19,500 ft.; maximum weight as a glider tug = 48,400 lbs. with 965 gal. of fuel; maximum overload weight = 66,000 lbs. to be increased eventually to 72,600 lbs.; range with a maximum bomb load is equal to 680 miles at 195 m.p.h.; range with maximum fuel =



2,670 mi.

Heinkel 111Z Glider Tug/Bomber

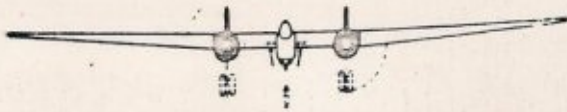
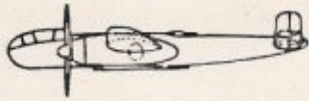


Heinkel He 178 Single jet Fighter Drawing N2

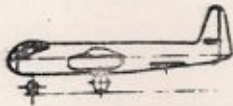
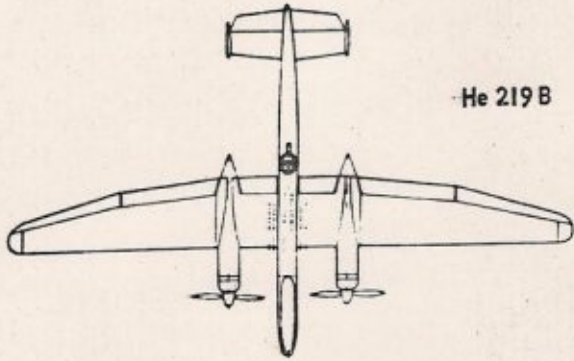
N2



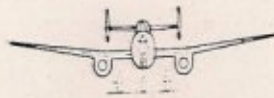
He 178



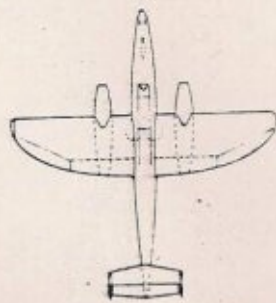
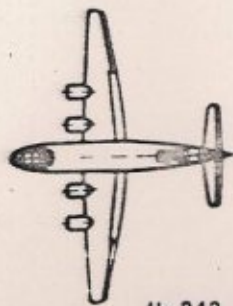
He 219 B



He 343



He 280



He 343 for each multi-purpose aircraft is shown in Drawing N2.

The He 343 is a high-speed 4 engine jet multi-purpose aircraft developed from the AR 234, to which it bears a fairly close superficial resemblance. The shoulder Wing is not swept back as on most of the later the German designs and the four jet units are spaced along the wing, not mounted in pairs. The projected work for this design were to be extensive. Five versions of this aircraft were planned, two of which were heavy fighters, one slated to be high-speed bomber, and two others versions reconnaissance craft. The high-speed bomber has four Jumo 004 C turbojet units, whereas the heavy fighter and reconnaissance versions may have either been equipped with four Jumo 004 C's or four HE S 011's.

The following is a listing of the specifications:

Wingspan = 59 ft.; overall length = 54 ft. 2 in.; wing area = 455 square feet



; aspect ratio = 7.5; crew members = 2; all up weight = 37,200 to 40,700 lbs.; Fuel tank-age 1,438 gal. for the heavy fighter and high-speed bomber; maximum speed = 518 m.p.h. at 20,000 ft. with Jumo 004 C's and 565 m.p.h. at sea level with HE S 011's; Armament = four * MK 103 + 2 * MK 151 for the heavy fighter; for the high-speed bomber there were 2 * MG 151 rearward firing; bomb-load = 4,000 lbs..

Heinkel P 1054 TRANSPORT:

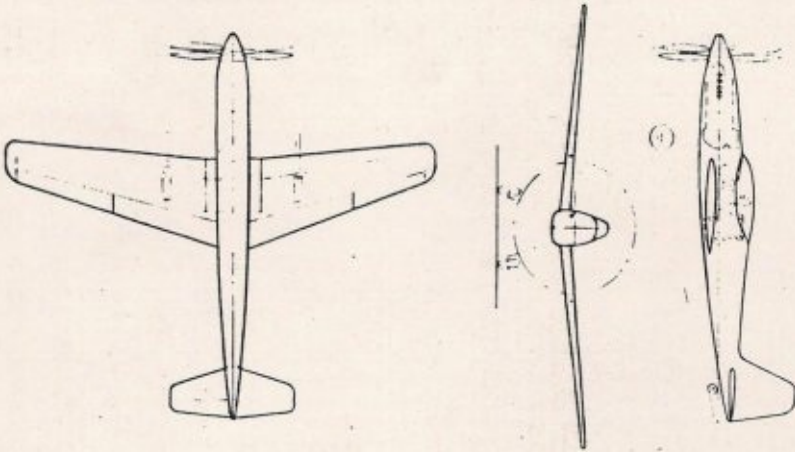
Tactical transport aircraft with four reciprocating engines.

Heinkel P 1063 E single seat bomber:

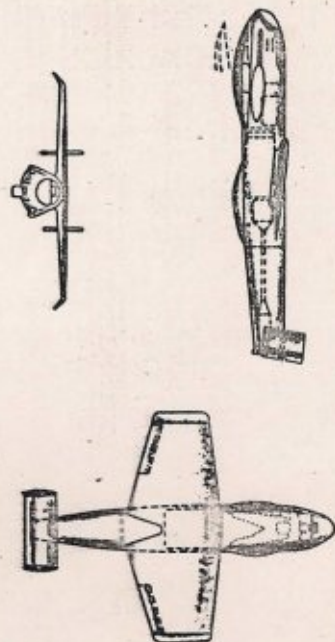
Single seat high-speed bomber with two turbojet units.

N 3

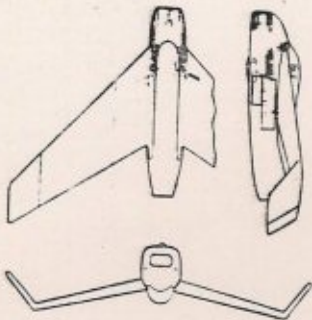
HEINKEL P 1076



HEINKEL P 1077



HEINKEL P 1078



Heinkel P 1054 long-range bomber:

Long-range bomber with six reciprocating engines.

Heinkel P 1063 multi-purpose aircraft:

Multi-purpose with 3 seats, 2 reciprocating engines.

Heinkel P 1066 multi-purpose aircraft:

Multi-purpose two seat with two reciprocating engines.

Heinkel P 1068:

This was the prototype design for the HT 343.

Heinkel P 1069 fighter:

Fighter with turbo jet unit.

Heinkel P 1070 flying wing:

Flying wing with two or four turbojets.

Heinkel P E 1071 fighter

Asymmetric fighter with two reciprocating engines.

Heinkel P 1072 long-range bomber:

Long-range bomber before reciprocating engines.

Heinkel P 1073:

This was the project designated as the He 162.

Heinkel P 1074 fighter.

Twin-engine fighter with pusher propellers.

Heinkel P 1075 reconnaissance aircraft.

A four engine twin fuselage development of the He 03354 long-range reconnaissance probably generally similar to the 635 which was handed over to Junkers for development.

Heinkel P 1076.

This aircraft is a single seat fighter with a DB 603 N engine in the nose driving contra rotating propellers. The wing which has a span of 86.1 ft. has the leading edge swept slightly forward. This arrangement has evidently been adopted for convenience in design and not for aerodynamic reasons. There are two guns; probably MG 103's in the wings located just outside the propeller arc.



Drawing N5

Heinkel P 1079 Night Fighter.

This twin-jet sleek night fighter has the wing which is swept back at 35 degrees at the quarter chord line and drooping at a small anhedral angle. The jet unit is either two times HE S 011 or two * Jumo 004, are mounted in the wing root close to the fuselage, giving a peculiar frontal appearance to this unusual aircraft. Retraction of the main wheels is forwards and upwards into the fuselage and the nose wheel retracts rearwards and is stored flat. The crew sit back to back in a cabin in the nose. Four MK 108 guns are mounted in staggered pairs low down on each side of the cabin. There are three fuel tanks located in the fuselage and one in each wing, located outboard of the jet unit.

A drawing of this aircraft shows a span of 39.4 ft. and a wing area of 323 square feet. Whereas in a specification sheet the span is recorded at 45.9 ft. and the Wing area at 430 square feet. The following weights and performance figures relate to the latter condition.

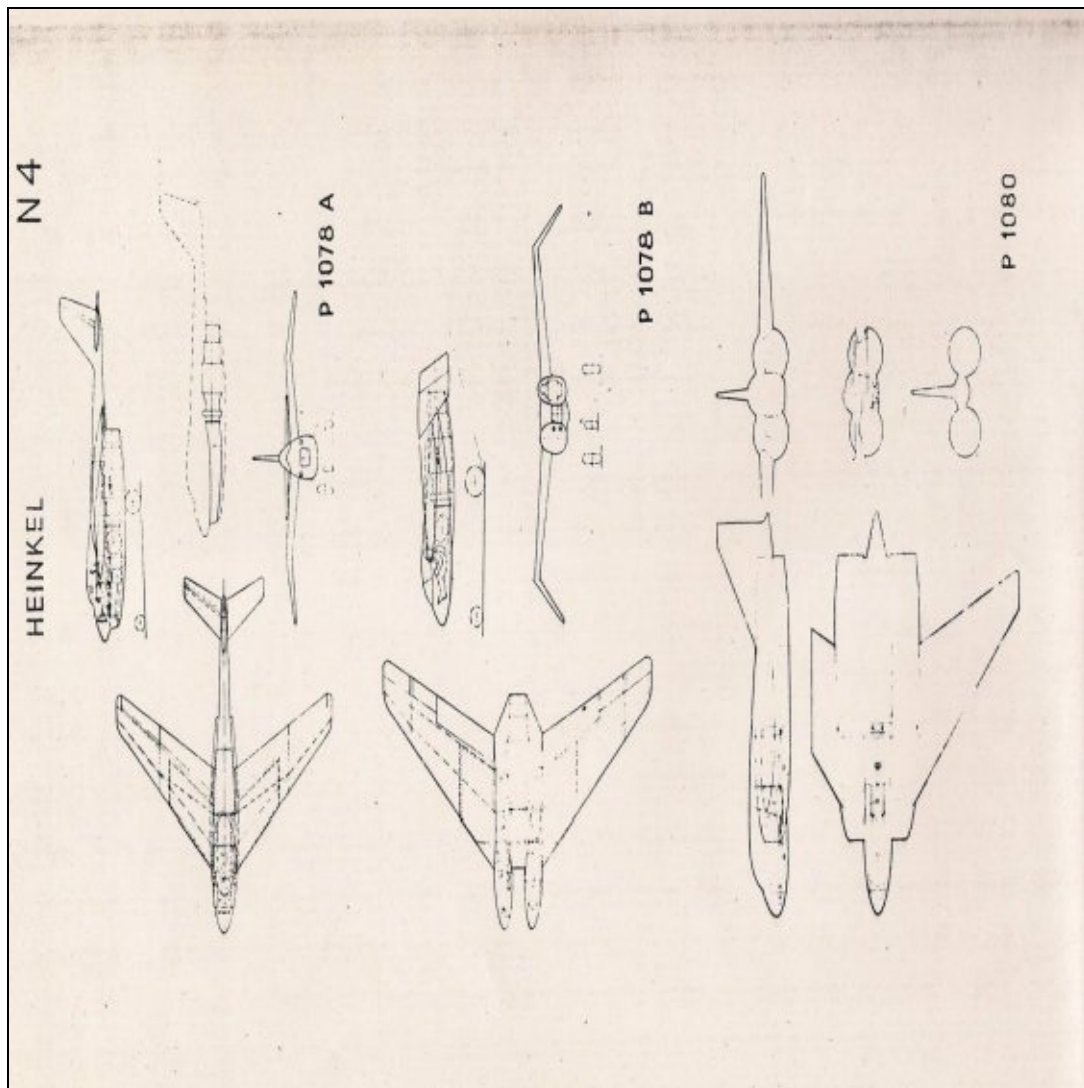
All up weight for the HE S 0011 version is = 24,210 lbs. and with the Jumo 004 the weight is 22,100 lbs.; Armament for the HE S 011 aircraft is 4 * MK 106 and for the Jumo powered aircraft 3 * M K 108; fuel tank-age for the HE S 011 aircraft is 950 gal. and 785 gal. for the Jumo powered aircraft; maximum speed at sea level for the HE S powered aircraft is 512 m.p.h. and for the Jumo powered aircraft it is 485 m.p.h.. The maximum speed at 26,000 ft. for the HE S powered aircraft is 555 m.p.h. and 490 m.p.h. for the Jumo powered aircraft. The rate of climb at sea level for the HE S 011 powered aircraft is 3570 feet per minute and 2,740 ft. per minute for the Jumo power aircraft. The rate of climb at 20,000 ft. for the HE S 011 powered aircraft is 2,200 ft. per minute and for the

Jumo power aircraft it is 1,180 ft. per minute. The service ceiling for the HE S 011 powered aircraft is 42,300 ft. whereas for the Jumo powered aircraft the figure is 38,000 ft.. Endurance at 20,000 ft. at the normal weight for the HE S 011 powered aircraft is one hour and 27 minutes or, one hour and 12 minutes for the Jumo powered aircraft. Maximum range at 36,000 ft. is 1,680 mi. for the HE S powered aircraft whereas there are no figures available for the Jumo powered aircraft.



There are also other versions of the aircraft designated 1079 B. These are both tailless designs. One follows fairly closely to the aircraft already described, but the rear portion of the fuselage and the tails have been eliminated and a single fin and rudder substituted. The nose has also been shortened and modified to provide staggered seating for the crew. This versions of the 1079 approximates more closely to that of a true flying wing design. The vertical fin has been eliminated and the gull wings now have a pronounced anhedral angle at the outer panels. The jet units are more widely based and the main wheels are stowed flat between them, one retracting upwards and forwards and the other upwards and

rearwards



Heinkel P 1080 ATHODYD propelled fighter.

This is the latest of the Heinkel projects on which information has been received. It is a single seat fighter with a ramjet unit at each wing root. The wing has a swept back, wingspan is 29.2 ft. and the wing the area is 218 square feet. There is a single fin and rudder but no tail plane. A drawing of the ramjet units appeared to be of the Sacnger type with an overall length of 16.4 ft. and a diameter of 3.8 ft.



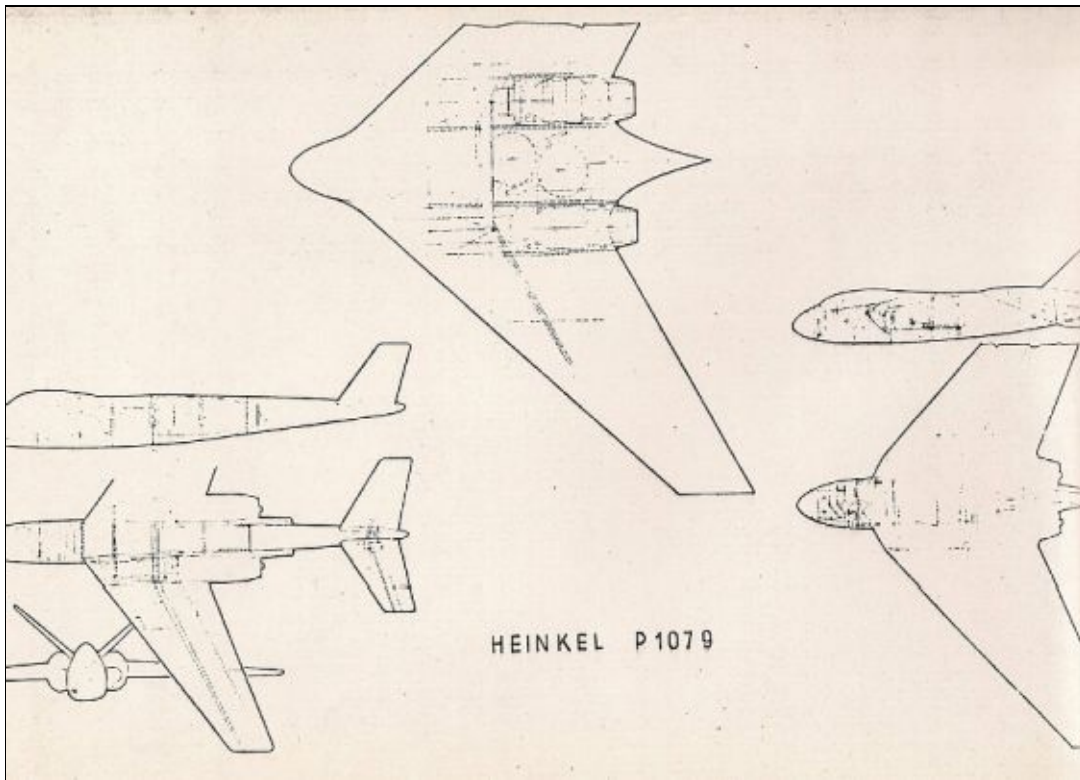
Heinkel He P1080 ATHODYD (RAM-JET) Propelled Fighter

HEINKEL P1078B- This single engine HE S 011 turboJet engine, the right hand projection contains the armament (2 MK 108 guns) and the left hand projection houses the pilot. The aircraft has a 40 degree swept back wing with no vertical surfaces except for the anhedral wing tips with separate control surfaces, providing pitch and yaw inputs. Specifications: WS 30 feet; and all up weight 8600 pounds.



HEINKEL P1078B

HEINKEL BOMBER RESEARCH PROJECTS



HEINKEL 1079 B- Powered by twin either JUMO 004's or HE S 011 turbo jet units.
Specifications: WS 40 feet; AUGW 22,000 pounds; maximum speed at 20,000 feet is 490
mph; endurance at 20,000 feet is 1.2 hours.



Heinkel P1078A

HORTEN

Company History:

Walter Horten (born 13 November 1913; died 9 December 1998 in [Baden-Baden, Germany](#)) and Reimar Horten (born 12 March 1915; died 14 August 1993 in [Villa General Belgrano, Argentina](#)), sometimes credited as the Horten Brothers, were [German](#) aircraft pilots and enthusiasts. Although they had little, if any, formal training in aeronautics or related fields, the Hortens designed some of the most advanced aircraft of the 1940s, including the world's first jet-powered [flying wing](#), the [Horten Ho 229](#).

Between the [World Wars](#), the [Treaty of Versailles](#) limited the construction of German military airplanes. In response, German military flying became semi-clandestine, taking the form of civil “clubs” where students trained on gliders under the supervision of decommissioned [World War I](#) veterans. As teenagers, the Horten brothers became involved in such flying clubs.

This back-to-the-basics education, and an admiration of German avant-aircraft designer [Alexander Lippisch](#), led the Hortens away from the dominant design trends of the 1920s and 1930s, and toward experimenting with alternative airframes — building models and then filling their parent's house with full-sized wooden sailplanes. The first Horten glider flew in 1933, by which time both brothers were members of the [Hitler Youth](#).^[1]



[Horten Ho IV](#) flying wing sailplane recumbent glider at the [Deutsches Museum](#)

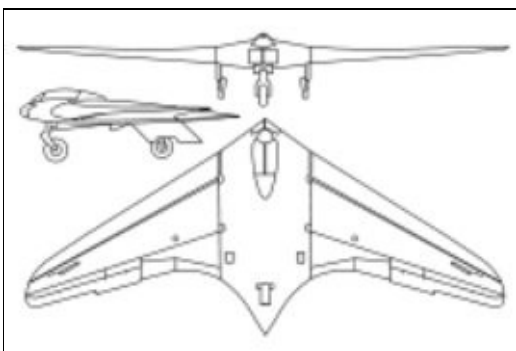
The Hortens' glider designs were extremely simple and aerodynamic, generally consisting of a huge, tailless albatross-wing with a tiny cocoon of a fuselage, in which the pilot lay prone. The great advantage of the Horten designs was the extremely low [parasitic drag](#) of their airframes. They were "slick" and scalable to high speeds.

[During World War II](#)

By 1939, with [Adolf Hitler](#) in power and the Treaty of Versailles no longer in effect, Walter and Reimar had entered the [Luftwaffe](#) as pilots. (A third brother, Wolfram, was killed flying a bomber over [Dunkirk](#).) They were also called upon as design consultants, though Germany's aeronautical community tended to regard the Hortens not as part of the cultural elite. However, both were members of the [Nazi party](#).^[2]

Walter participated in the Battle of Britain, secretly flying as the wingman for [Adolf Galland](#), and shot down seven British aircraft.^[3]

In 1937, the Hortens began using motorized airplanes, with the debut of the twin-engined [pusher-prop](#) airplane H.VII (an earlier glider had a mule engine). The Luftwaffe, however, did not actually use many of the Hortens' designs until 1942, but gave enthusiastic support to a twin-[turbojet](#)-powered [fighter](#)/bomber design, designated under wartime protocols as the [Horten H.IX](#).^[4] For their completion of the Ho 229 prototypes, the Horten brothers were awarded 500,000 Reichmarks.^[3]



The [Horten Ho 229](#), the world's first jet-powered flying wing

Securing the allocation of turbojets was difficult in wartime Germany, as other projects carried higher priority due to their rank in the overall war effort. Although the turbojet-

equipped Ho IX V2 nearly reached a then-astonishing 500 mph in trials, the project was soon given over to the theretofore low-tech aircraft company, [Gothaer Waggonfabrik](#), as the Horten Ho 229 (subsequently often erroneously called Gotha Go 229). The Ho 229 was captured by the U.S. Army at the end of World War 2, in which the completed but unflown V3 third prototype aircraft is presently housed at the [Smithsonian Institution](#) in Washington D.C.^[2]

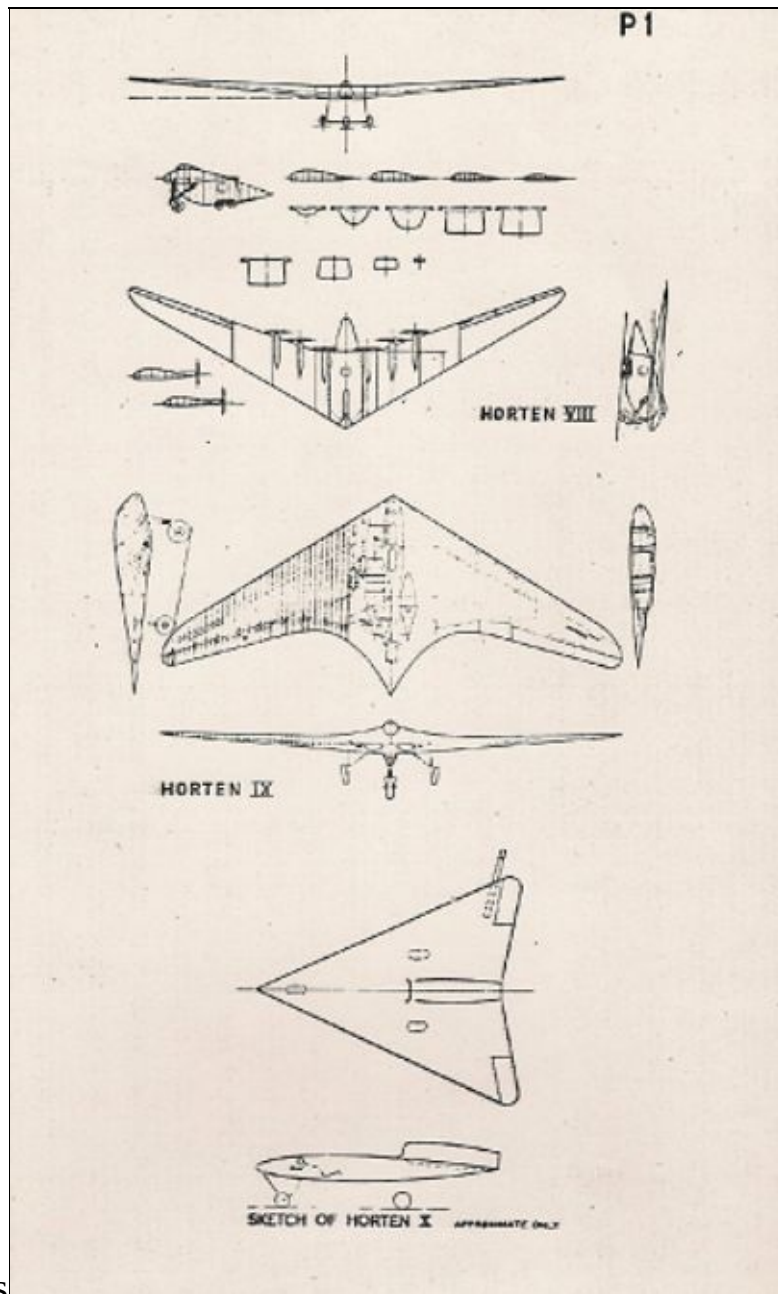
The Ho 229 was a fighter jet with great potential, but arrived too late to see service. Among other advanced Horten designs of the 1940s was the supersonic delta-wing H.X, designed as a hybrid turbojet/rocket fighter with a top speed of Mach 1.4, but tested only in glider form (as the [Horten H.XIII](#)). Its revolutionary stealth design included a special carbon layer that was able to reduce the radar range detection.^[5] The Horten brothers also worked on the [Horten H.XVIII](#), an intercontinental bomber that was part of the [Amerika Bomber](#) project.

Post World War II

As the war ended, Reimar Horten emigrated to [Argentina](#) after failed negotiations with the United Kingdom and China,^[6] where he continued designing and building gliders, one experimental supersonic delta-wing aircraft and one twin-engined flying wing transport called the "[Naranjero](#)" for its intended use of carrying oranges for export. It was unsuccessful commercially. Walter remained in Germany after the war and became an officer in the post-war German Air Force. Reimar died on his ranch in Argentina in 1994, while Walter died in Germany in 1998.

In the late 1940s, the personnel of [Project Sign](#), the [U.S. Air Force](#)'s [flying saucer](#) investigation, seriously considered the possibility that UFOs might have been secret aircraft manufactured by the [U.S.S.R.](#) based on the Hortens' designs.^[7]

RESEARCH PROJECTS



Horten Flying Wing Projects

Horten IX Flying Wing Twin Jet Fighter

Maximum speed at sea level is 590 mph and service ceiling 52,000 feet. Only 3 prototypes were built and one crashed after only 3 hours of testing due to pilot error.



The Horten IX twin engine fighter shown on Drawing P1

This is a single seat fighter bomber with twin-jet units developed from the Horten V and VI. Four prototypes were commenced and designated as prototypes. The first prototype was fitted with twin 003 E jet engines. The airframe was completed but the jet units were not installed. It was converted to a glider and flown extensively. The second was completed with 2 Jumo 0004 units and crashed after only two hours of flying due to pilot error. The third was under construction as prototype series and the fourth as a production variation. Plans for a night fighter with an extended nose did not get beyond the prototype stage.

In shape the Horten IX is a pure wing of increased chord at the center section to give sufficient thickness to house the pilot and jet units. The center section is built up from steel tubing and the wing tips are of aluminum metal. The structure comprises of 1 main and one auxiliary spar, with plywood covering. All the fuel tanks are housed in the wings. A retractable undercarriage and a caster nose wheel is fitted. Elevon controls and drag rudders are fitted also, a spoiler and landing flaps. Jet intakes are spaced out in the center section one on either side of the cockpit.

The hot engine exhaust over the upper surface is prevented from doing damage to the wing by: using metal plates fitted to the wing surface and introducing cold air which is bled from the lower surface of the wings and introduced between the hot object and the wing surface.

Specifications: Wingspan 52.5 ft.; wing area 206 square feet; wing loading 33.15 square feet; weight including armor and bombs 18,700 lbs. all up weight excluding armor and bombs 16,500 lbs.; takeoff run at 16,500 lbs. = 550 yards; takeoff speed was 95 m.p.h.; speed at two-thirds throttle = 400 to 430 m.p.h.; maximum speed at sea level = 590 m.p.h.; estimated maximum ceiling 52,000 ft.; and rate of climb at sea level = 4,300 ft. per

minute.

JUNKERS

[Return](#)

Company's History:

The history of Junkers aircraft production begins with the [Junkers J 1](#) mid-wing [monoplane](#) (not to be confused with the later, all-metal sesquiplane ground attack aircraft [J.I](#) which had a factory designation J4). Research for this aircraft began in 1914 and was interrupted by the start of the First World War. The prototype aircraft, named the Blechesel (Tin Donkey), was completed in very late 1915 after the outbreak of the war. This aircraft is significant in that it was the first flyable aircraft to utilize an all-metal "total structural" design. Contemporary aircraft were built around wooden frames constructed in a rib-and-stringer fashion, reinforced with wires, and covered with a stretched fabric. The J 1 was a semi-monocoque design, using steel ribs and sheeting that formed both the stringers and the skin. At the time aluminium was still fairly expensive and the desirable, newest light duralumin alloy could not be worked in sheet form without damaging flaking occurring, so the J 1 was made of sheet electrical steel. It was quite heavy as a result, which translated into poor climb and maneuverability, yet its clean monoplane layout, which even featured a ventral "belly" radiator installation for its Mercedes D.II inline-six cylinder engine, had very low drag, and the J1 was one of the fastest planes of its day, reaching speeds of 170 km/h, with only a 120 hp engine for power.

The Nazi party came to power in Germany in 1933, and all German aviation development was shifted away from long-range civil aircraft types. Hugo Junkers himself was forced to transfer all his patents to the Nazis, who doubted that Junkers would comply with their plans. Shortly after, his holdings were expropriated and he was placed under house arrest. The company that had pioneered commercial aviation development for at least a decade was relegated to relatively small one- and two-engined military design competitions issued by the Reichsluftfahrtministerium (RLM) the "Reich Aviation Ministry". Two exceptions to this were the legendary Ju 52 and the Ju 90.

Ju 52 development had started in 1928 as a single-engined commercial transport and evolved, initially to a two-engined, later into the classic "trimotor" design for which the Tante Ju became world famous. The Ju 52 was a bona fide commercial success, with over 400 airplanes delivered to various airlines around the world prior to the outbreak of World War II, including the countries of: Finland, Sweden, Argentina, Brazil, Uruguay, Ecuador, Peru, Mexico, South Africa, Denmark, Norway, Italy, UK, Belgium, Hungary, Estonia, Greece, Spain, and of course, Germany. As a consequence of its rugged design, Spain and France resumed Ju 52 production after cessation of the Second World War.

With the introduction of the Junkers Ju 86 bomber of 1934, Junkers abandoned the corrugated sheeting of his earlier designs. The basic layout was used in the four-engine Junkers Ju 89 heavy bomber, but this program ended with the death of Walther Wever, and his Ural bomber program along with him. Junkers then adapted the Ju 89 to passenger use, introducing the Junkers Ju 90, one of the first planes specifically designed for scheduled trans-Atlantic flights to the US. Developed in 1937, the aircraft suffered

multiple setbacks with crashes of prototypes in 1937 and 1938. Further refinements enabled certification in 1939 and spurred South African Airways to make an initial order for two aircraft fitted with US-built Pratt & Whitney engines. Just as the aircraft was being readied for its first commercial flights, World War II began. With the outbreak of hostilities, all models were requisitioned by the Luftwaffe for military air-transport roles, and later, long-range maritime patrol.

World War II[edit]

Military aircraft production was begun by the company in the 1930s and eventually monopolized all its resources. Perhaps the most notable design was the Junkers Ju 87 Stukadive bomber, one of the Luftwaffe's most effective aerial weapons (at least in the early war period) and continually used for bombing attacks as an integral part of the Blitzkriegstrategy. The Stuka was used both for precision tactical bombing and the strafing of enemy positions, acting as a sort of "airborne artillery" that was able to keep up with the fast-moving tanks and attack defended points long before traditional artillery could be brought into range. Later in the war it was fitted with a large cannon and employed in a "tank busting" role against Soviet armour. It gained much notoriety for its use at both Dunkirk and later Stalingrad, where it caused enormous destruction under Field Marshal Wolfram von Richthofen's VIII Air Corps.

Perhaps even more successful was the [Junkers Ju 88](#), the primary [light bomber](#) of the German forces. It was used in practically every role imaginable; level bomber, shallow-angle dive bomber, [night fighter](#), and [bomber destroyer](#), as well as in anti-shipping raids. A variety of improved versions were also produced over the course of the war, including the [Ju 188](#) and [Ju 388](#) which included numerous features for better performance, but never replaced the Ju 88 outright. A much more formidable aircraft was also planned, the [Junkers Ju 288](#), but the required [high-power engines](#) never worked and the effort was eventually abandoned.

A total of 4,845 [Ju 52s](#) were produced before and during the war. The wide availability of Ju 52s enabled their immediate utilization for the German war effort as a transport aircraft for delivering men and supplies. They were additionally used, with minor modification, to carry out bombing raids. Prior to World War II, the Ju 52 was utilized in the [Spanish Civil War](#), where it took part in the [Condor Legion](#)'s destructive raids on [Durango](#) and [Guernica](#) in 1937 which illustrated to the world—for the first time—the destructive potential and horror of strategic bombing. Unfortunately for its pilots and military passengers, by the outbreak of World War II, the Ju 52 was a thoroughly obsolete military design and unlike many other famous [Luftwaffe](#) aircraft, the Tante Ju was cumbersome, slow, and therefore vulnerable to attack. This resulted in many losses, namely at [Crete](#) and [Stalingrad](#).

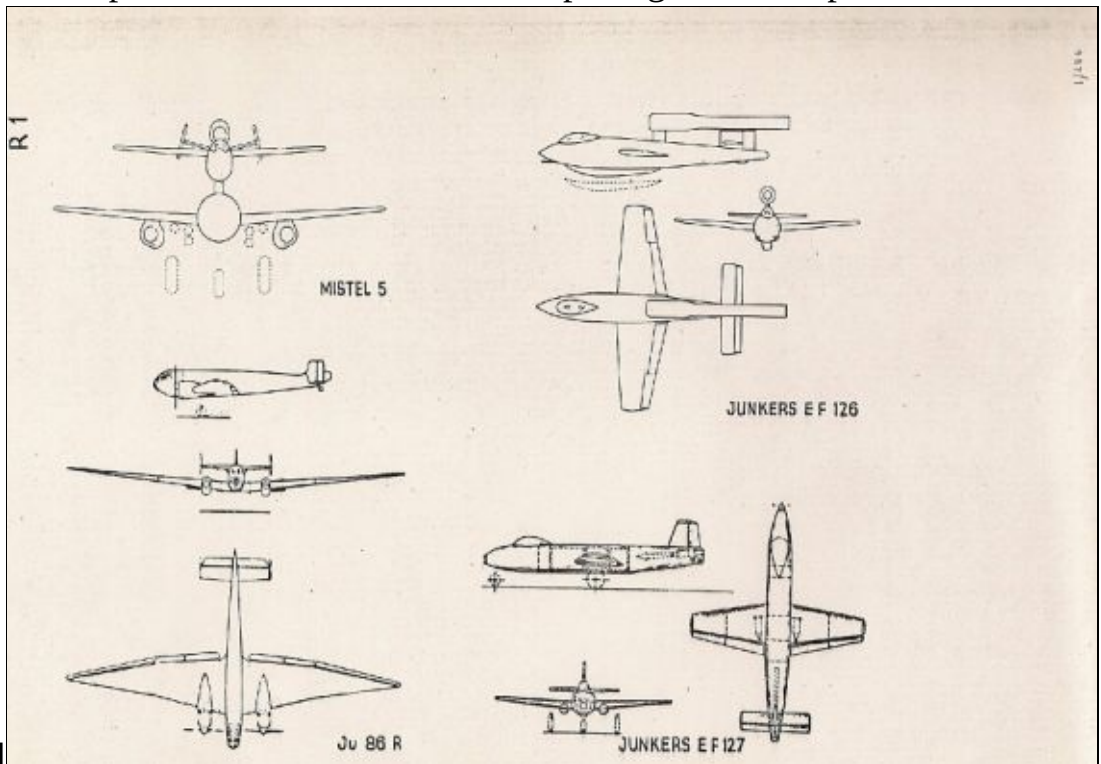
Post World War II[edit]

The Junkers company survived the [Second World War](#) and was reconstituted as Junkers GmbH and eventually merged into the [MBB](#) consortium (via joint venture Flugzeug-Union-Sued between [Heinkel](#) and [Messerschmitt](#) in 1958).^[4] [Messerschmitt](#) ended the joint venture in 1965 by acquiring control of JFM AG and absorbed within [Messerschmitt](#) in 1967.^[4] Within [West Germany](#), Junkers GmbH was engaged in research on the future of

aerospace transportation during the fifties and early-1960s. During this period, Junkers employed the famous Austrian engineer and space travel theorist, [Eugen Sänger](#), who in 1961 completed work for the design of an advanced orbital spacecraft at Junkers. Junkers GmbH was absorbed within [MBB](#) and the Junkers name disappeared in 1969.^[5]

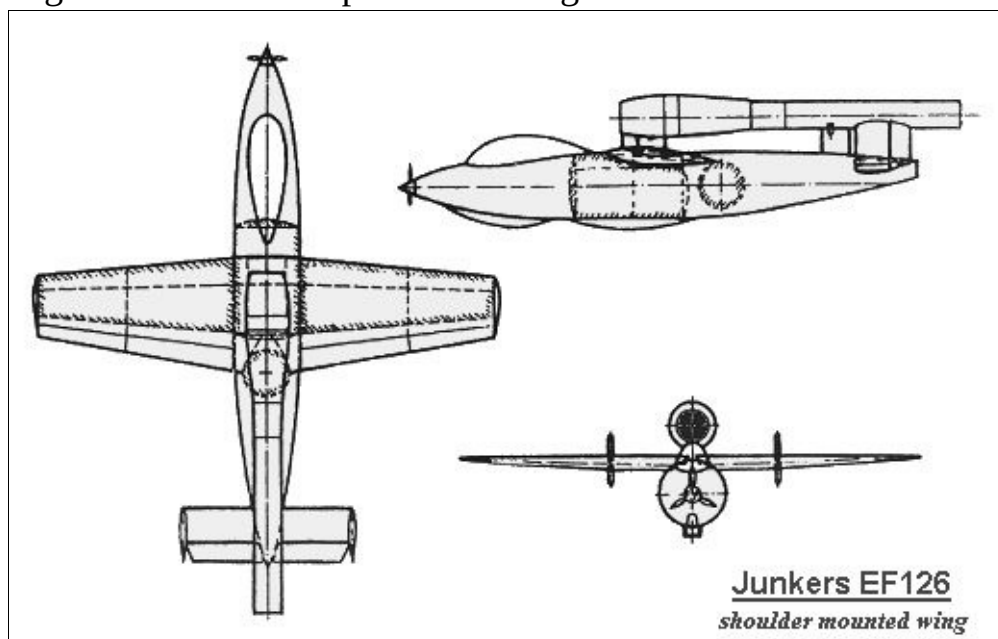
PROJECTS

JUNKERS EF 126 GROUND ATTACK/INTERCEPTOR Specifications: propulsion by a single Argus pulse jet unit with a thrust of 1,100 pounds; takeoff by winch or rocket motors; armament 2 MG 151/20 or 2x 250 bomb containers; wing span 29.8 feet; wing area 95.8 square feet; aspect ratio 4.5; maximum all up weight is 6160 pounds; maximum



speed at sea level

The team at Junkers developed the Junkers E F 126 A as a sleek shoulder wing with the engine mounted on top of the fuselage.



Junkers Composite 1CR FT (Mistel 5)

The upper component of this, as it aircraft is the He 162 single jet fighter. The lower component is a tender aircraft, designated 8-268, it carries the warhead and is a twin jet, constructed with a monoplane wing of wooden construction with vertical fins and rudders. Powered with two BMW 003 jet units. A jettison-able tricycle undercarriage is fitted for takeoff.

Three alternative warheads were envisaged for the 8-268, the first consisting of a single 2,000 kg bomb cradled in the lower forward part of the fuselage; the second was a steel encased warhead of 3,500 kg, mounted near the center of gravity and the third, a steel encase solid warhead of the same weight mounted in a similar position.

It was also foreseen that the lower component could also be used as a separate aircraft with conventional controls and a pilot.

The specifications are: wing span = 37.7 ft.; wing area = 237 square feet; power is comprise of 2 BMW 003 turbo jet units.

The Mistel 5 Composite combined specifications: wing area 357 square feet; engines three BMW 003; weight equipped 13,255 lbs.; fuel load = 1,449 lbs.; total flying weight = 29,920 lbs.; maximum speed at sea level 484 m.p.h.; cruising speed at 36,100 ft. = 496 m.p.h.; rate of climb at sea level 3,150 ft. per minute; rate of climb at 19,700 ft. = 1,675 ft. per minute; take-off with rocket assist is 1,530 yards.



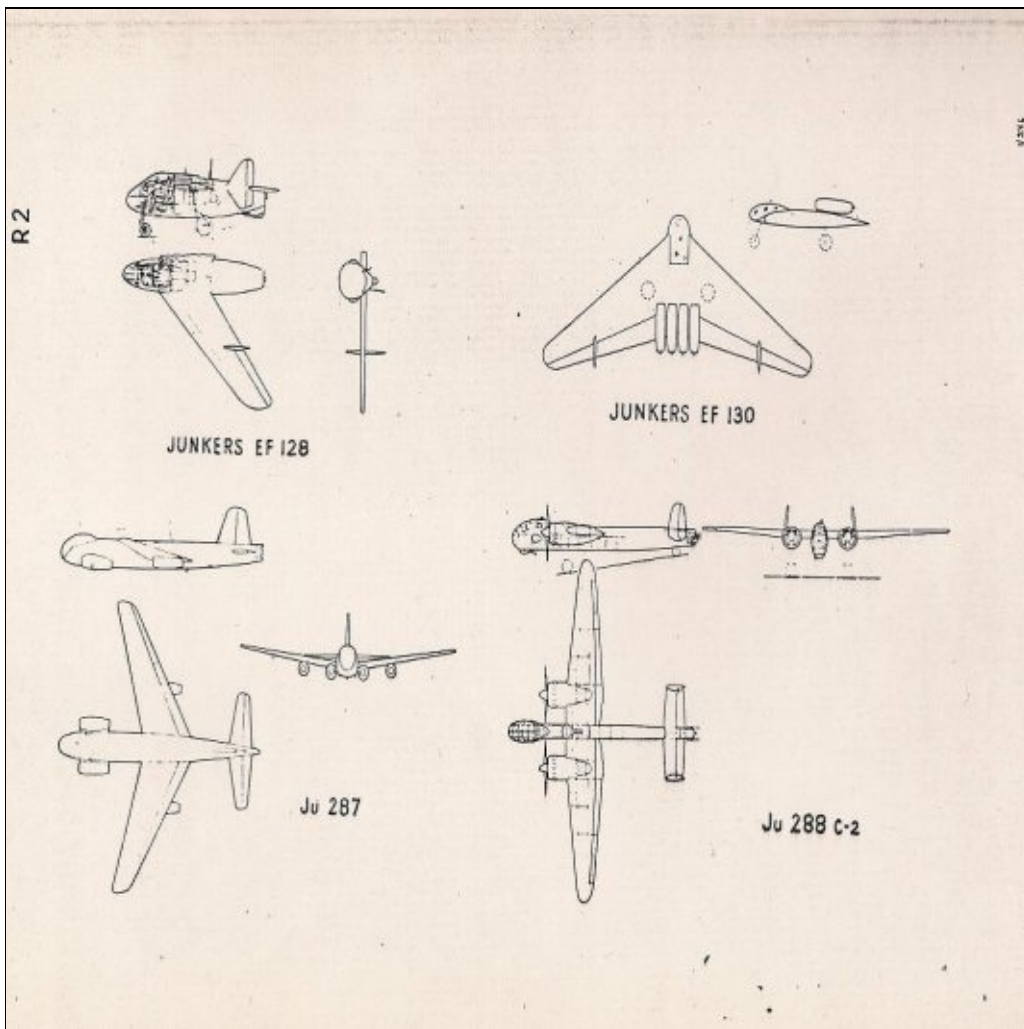


Artist impression of Junkers Mistel 5 at moment of separation



JUNKERS EF-128 This aircraft is a single jet fighter of all wood construction. Wing span was 30 feet and the maximum all up weight was 10,800 pounds this aircraft was designed to reach a maximum speed of 590 mph at 20,000 feet, for armament it carried 4 MK 108 guns with 100 rounds per gun.

A variation of the E.F. 128 was planned as a night fighter. The aircraft was of the flying wing type, this project was the stabilizing fins and rudders mounted on the trailing edge of the wing approximately midway between the wingtips and to the fuselage. Landing flaps are fitted inboard of the stabilizers with ailerons located outboard. The wing is constructed of wood and a fuselage is made of light metal.



Junkers 128 Drawing R2

The E F 128 is a single jet fighter project of tailless design with a shoulder wing. The lateral controls surfaces are mounted above and below the wing just inboard of the ailerons. A pressure cabin and a catapult seats are fitted, aft of which are the fuel tanks and the He S 011 turbojet unit. In addition to the fuselage fuel tanks, there are wing tanks feeding in all, a total capacity of 477 gal.. The inlet for the jet unit are on each side of the fuselage under the wing. Good results were obtained in the wind tunnel with the first completed model. A mock-up of the fuselage with an He S 011 engine was built. This was to be mounted above the fuselage of a JU 88 for testing.

Armament comprises of 4 MK 108 guns with 100 R.P.G. or 4 MG 151. Wing span = 30.2 ft.; speed at sea level = 445 m.p.h.; wing area = 237 square feet; speed at 19,700 ft. = 590 m.p.h.; aspect ratio = 3.82; maximum range = 1120 mi.; all up weight = 10,780 lbs..

JUNKERS JU 130 Four Engine Jet Bomber Drawing R2

The aircraft is of the flying wing type, this project has stabilizing fins and rudders mounted on the trailing edge of the wing at approximately midway between the wingtips and a fuselage. Junkers type flaps are fitted inboard of the stabilizers with ailerons outboard. The wing is made of wood and the fuselage is made of metal. The power plant is comprised of 4 HE S 011 turbo jet units installed centrally. Several different designs were submitted for the E P project and it was the subject of considerable controversy,

particularly in the positioning of the four jet units. A retractable tricycle undercarriage is fitted. Fuel tanks are located in the wings at the center section. Specifications: wing span = 78.8 ft.; aspect ratio = 4.8; wing area = 1290 square feet; approximate weight 77,000 to 84,000 lbs.; maximum speed 620 m.p.h.; Range = 3,700 mi..

JU 187 Dive Bomber Drawing R2

this aircraft was intended to replace the JU 87. Powered by 1 Jumo 213 engine, it resembles superficially the Russian IL2 ground attack. The project was abandoned due to the success of the fighter-bombers.



JU 252 Transport

The JU 252 was developed from the JU 52 which it was intended to eventually replace. This 3 engine monoplane carries a crew of three in a pressurized cabin. The hydraulically operated loading ramp can be used to jettison cargo in flight. Between 1941 and 1942 15 aircraft were built, but though the performance was satisfactory and there was a definite need for such an aircraft, production ceased due to the shortage of aluminum for this new all metal design.

Specifications for the JU 252: engines 3 Jumo 211 F; wingspan 112 ft.; wing area 1309 square feet; aspect ratio 9.55; normal weight 42,200 pounds; overload weight 44,800 lbs.; fuel 1,060 gal.; range 2,480 mi. at 208 m.p.h. with a load of 12,000 lbs. and 1,560 gal. of fuel; speed at operational weight 260 m.p.h. at 18,800 ft.; maximum emergency speed = 273 m.p.h. at 19,100 ft.; landing speed = 75 mph; service ceiling = 20,700 ft. at 44,000 lbs.; rate of climb at sea level 740 ft. per minute; take-off run 776 - 1,200 yards; armament 3 twin MG 81.



Artist impression of JU 287 Long Range Bomber Drawing R2

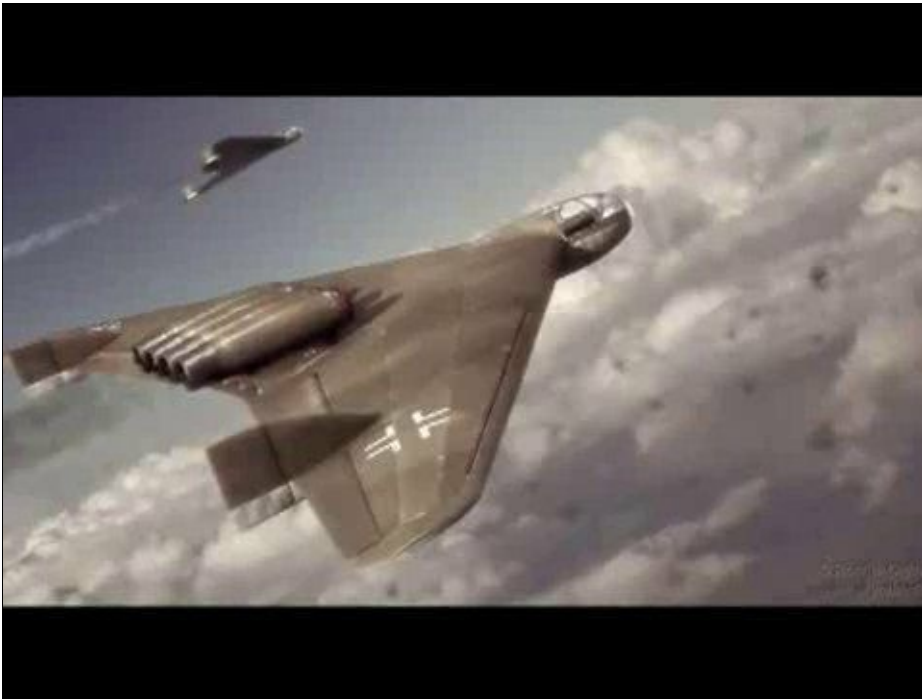
Work on this aircraft was commenced in the summer of 1943, it was supposed to be the first German long-range bomber. Had the original program been put into effect about 8 hundred aircraft would have been completed by the end of April 1945, at the time of the final collapse,

2 prototypes had been built and one had been flown, using a fixed undercarriage and four Jumo 004 turbojet units, two mounted under the wing and two attach to the sides of forward fuselage. For initial production it was intended that the four power plants would be the more powerful He S 011 units. Other power combinations envisaged where six BMW 003 mounted in under Wing cluster of three engines each side.

The wing is swept forward at 20 degrees and is attached at approximately the center point of the fuselage, giving the aircraft an exceptionally long nose. The main plane also has a dihedral angle. The tail unit is of conventional design with a single fin and rudder. The power plants are under-slung at points under each wing. A tricycle undercarriage is employed and the installation of a pressure cabin was foreseen.

Specifications: wingspan = 63.5 ft.; length = 64 ft.; wing area = 630 square feet; aspect ratio = 6.5; power plants four He S 011 A-0; crew = 4; maximum flying weight = 68,005 lbs.; fuel weight = 33,000 lbs.; bomb load = 8,800 lb.; maximum speed at 23,000 ft. = 550 m.p.h.; cruising speed = 500 m.p.h.; optional range = 2,760 mi.; service ceiling with bombs was 35,000 ft.; take-off distance = 7,550 ft. with 6 jet assist units each of 2640 lbs. thrust; rate of climb at sea level 1,500 ft. per minute; landing speed = 106 mph.

It was very fortunate for the Allies that the development of the Junkers JU 287 long-range bomber was postponed, because if the original plans were to go forward as planned the outcome of the war could have been very different. There were no Allied aircraft interceptors that were fast enough to catch this bomber as for instance, it were to be deployed against the British Isles.



JUNKERS EF-130 FOUR ENGINE JET BOMBER

Specifications: wing span 78.8 feet; wing area 1290 square feet; aspect ratio 4.8; power plants 4 He S 011 turbo jet units; maximum gross weight 84,000 pounds; maximum speed 620 mph; range 3,400 miles; Linden flaps fitted between the fins and ailerons outboard of the fins; wood is the principal material used in the wing's construction.



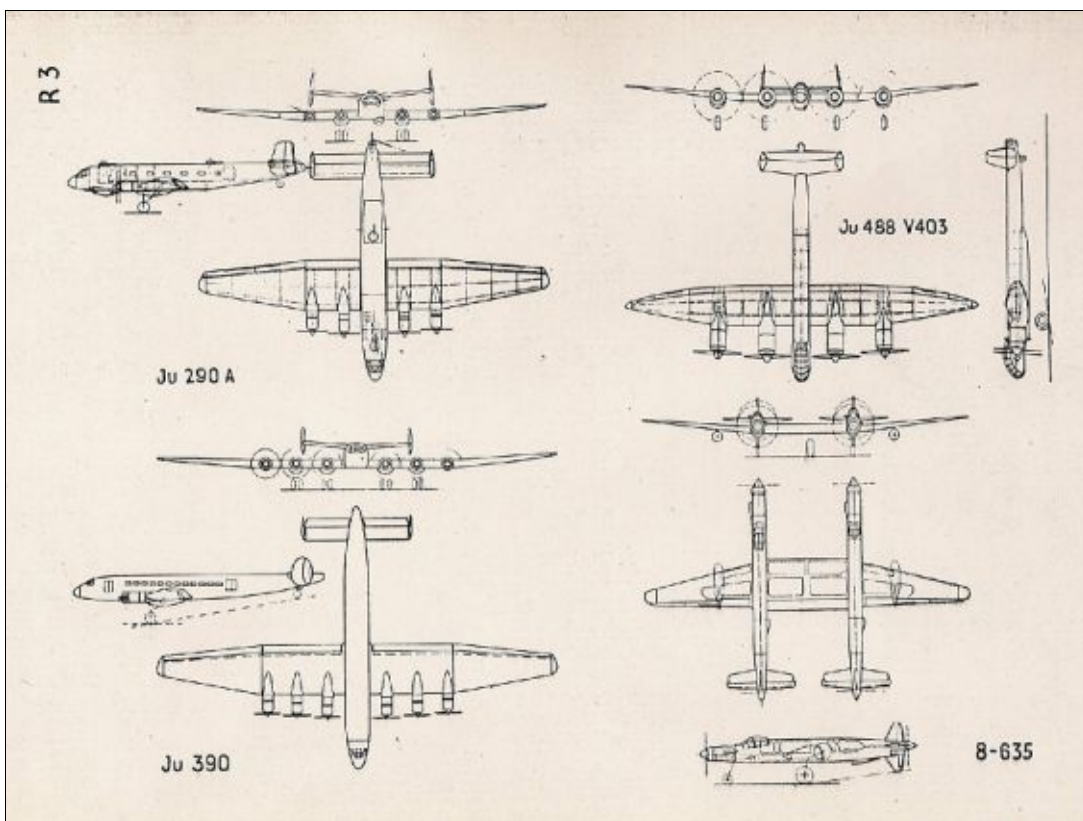
JUNKERS 390 LONG RANGE HEAVY BOMBER is a 6 engine development of the JU 290 with a wingspan of 169 feet and a maximum weight of 161,000 pounds. The range is 4900 miles at an altitude of 6500 feet at 205 miles per hour.

JU 390 6 engine Heavy Bomber: shown in Drawing R3

The JU 390 is a six engine development of the JU 290 with increase speed and overall Length. It was first flown in 1943. The following data applies to the civil version of this

aircraft: wingspan = 169 ft.; wing area 272 square feet; engines six BMW 801 E; all up weight with 22,000 lbs. of useful payload = 161,000 lbs.; all-up weight with 48 passengers 4,400 lbs. of freight and 6,000 gal. of fuel = 148,000 lbs.; maximum speed and minimum weight at 18,700 ft.; range at 205 m.p.h. and 6,500 ft. = 4,970 mi.; rate of climb at sea level at 161,000 pounds = 690 ft. per minute; a long-range reconnaissance and long-range bomber version of the 390 where at one time projected but never materialized.

Long range heavy bombers are one of the military assets that were lacking in the Nazi aircraft arsenal during the Second World War. Had this aircraft been developed to its full potential prior to 1943, even the North American continent would have been threatened with bombing raids by this type of aircraft. Hostilities on the Eastern front against Russia had occupied most the Germany's military might during the years prior to 1944. Had it not been for the steady pressure from the Soviet forces Germany in 1942 could possibly have had the ability to develop a formidable long-range bomber fleet.





JU 8-635



JUNKERS JU 187 designed as a copy of the Russian IL2 using the Jumo 213 engine, this project was abandoned because of the success of the fighter bombers.

The unorthodox location of the vertical fin and rudder on the JU 187 afforded the rear gunner and non-obscured view of attacking aircraft from above and behind.

LIPPISCH FIGHTER PROJECTS

[Return](#)

History:

Alexander Martin Lippisch (November 2, 1894 – February 11, 1976) was a [German](#) pioneer of [aerodynamics](#). He made important contributions to the understanding of [flying wings](#), [delta wings](#) and the [ground effect](#). His most famous design is the [Messerschmitt Me 163](#) rocket-powered interceptor.

Lippisch was born in [Munich, Kingdom of Bavaria](#). He later recalled that his interest in aviation stemmed from a demonstration conducted by [Orville Wright](#), over [Tempelhof Field](#) in [Berlin](#), in September 1909.^[1] Nonetheless, he planned to follow his father's footsteps into art school. The outbreak of [World War I](#) intervened. During his service with the German Army from 1915–1918, Lippisch had the chance to fly as an aerial photographer and mapper.

Following the war, Lippisch worked with the [Zeppelin Company](#), and it was at this time that he first became interested in tail-less aircraft. In 1921 his first such design would reach production in as the [Lippisch-Espenlaub E-2](#) glider, built by [Gottlob Espenlaub](#). This was the beginning of a research programme that would result in some fifty designs throughout the 1920s and 1930s. Lippisch's growing reputation saw him appointed the director of the [Rhön-Rossitten Gesellschaft](#) (RRG), a glider research group.

Lippisch's work led to a series of tail-less designs numbered Storch I – Storch IX (Stork I-IX) between 1927 and 1933 (these were not related to the successful [Fieseler Fi 156 Storch](#) STOL aircraft of World War II). These designs attracted little interest from the government and private industry. Nonetheless, it was during this time that Lippisch's [Ente](#) (Duck) became the first aircraft to fly under [rocket](#) power.

Experience with the Storch series led Lippisch to concentrate increasingly on [delta-winged](#) designs. The Delta I was the world's first^[2] tailless delta wing aircraft to actually fly (in 1931^{[3][4]}). This interest resulted in five aircraft, numbered Delta I – Delta V, which were built between 1931 and 1939.^[4] In 1933, RGG had been reorganised into the [Deutsche Forschungsanstalt für Segelflug](#) (German Institute for Sailplane Flight, DFS) and the Delta IV and Delta V were designated as the [DFS 39](#) and [DFS 40](#) respectively.

War projects[[edit](#)]

In early 1939, the Reichsluftfahrtministerium ([RLM](#), Reich Aviation Ministry) transferred Lippisch and his team to work at the [Messerschmitt](#) factory, in order to design a high-speed [fighter aircraft](#) around the rocket engines^[3] then under development by [Hellmuth Walter](#). The team quickly adapted their most recent design, the [DFS 194](#), to rocket power, the first example successfully flying in early 1940. This was the direct ancestor of what would become the [Messerschmitt Me 163](#) Komet.

Although technically novel, the Komet did not prove to be a successful weapon, and friction between Lippisch and Messerschmitt was frequent. In 1943, Lippisch transferred to Vienna's Aeronautical Research Institute (Luftfahrtforschungsanstalt Wien, LFW), to

concentrate on the problems of high-speed flight.^[3] That same year, he was awarded a doctoral degree in engineering by the [University of Heidelberg](#).

[Wind tunnel](#) research in 1939 had suggested that the delta wing was a good choice for [supersonic](#) flight, and Lippisch set to work designing a supersonic, [ramjet](#)-powered fighter, the [Lippisch P.13a](#) ([wartime test footage](#)). By the time the war ended, however, the project had only advanced as far as a development glider, the [DM-1](#).

Post war in the United States[[edit](#)]

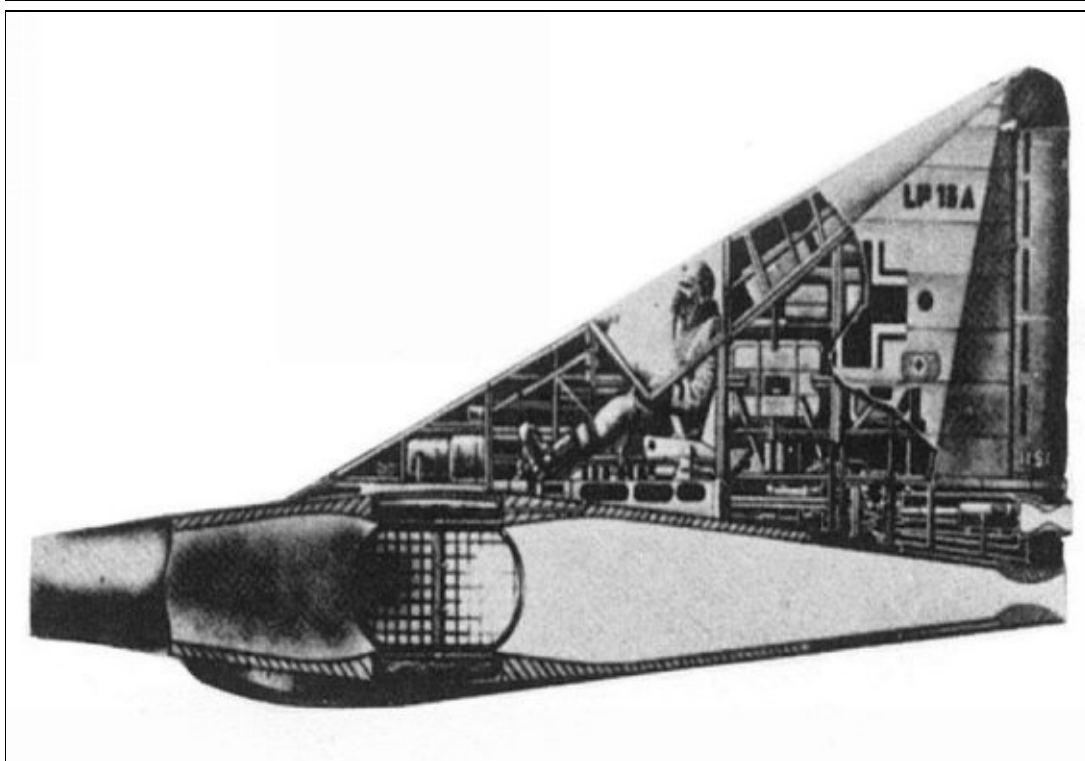
Like many German scientists, Lippisch was taken to the [United States](#) after the war under [Operation Paperclip](#). Advances in [jet engine design](#) were making Lippisch's ideas more practical, and [Convair](#) became interested in a hybrid ([mixed power](#)) jet/rocket design which they proposed as the F-92. In order to gain experience with the delta wing handling at high speeds, they first built a test aircraft, the 7002, which became the first jet-powered delta-wing aircraft to fly on June 9, 1948.^[5] Although the U.S. Air Force lost interest in the F-92, the next test model 7003 was designated the [XF-92A](#). This led Convair to proposing delta wing for most of their projects through the 1950s and into the 1960s, including the [F-102 Delta Dagger](#), [F-106 Delta Dart](#) and [B-58 Hustler](#).

Ground Effect[[edit](#)]

From 1950–1964, Lippisch worked for the [Collins Radio Company](#) in [Cedar Rapids, Iowa](#), which had an aeronautical division.^[3] It was during this time that his interest shifted toward [ground effect craft](#). The results were an unconventional [VTOL](#) aircraft (an [aerodyne](#)) and an aerofoil boat research seaplane [X-112](#), flown in 1963. However, Lippisch contracted [cancer](#), and resigned from Collins.

When he recovered in 1966, he formed his own research company, [Lippisch Research Corporation](#), and attracted the interest of the West German government. Prototypes for both the aerodyne and the ground-effect craft [RFB X-113](#) (1970) then [RFB X-114](#) (1977) were built, but no further development was undertaken. The [Kiekhäfer Mercury](#) company was also interested in his ground-effect craft and successfully tested one of his designs as the [Aeroskimmer](#), but also eventually lost interest.

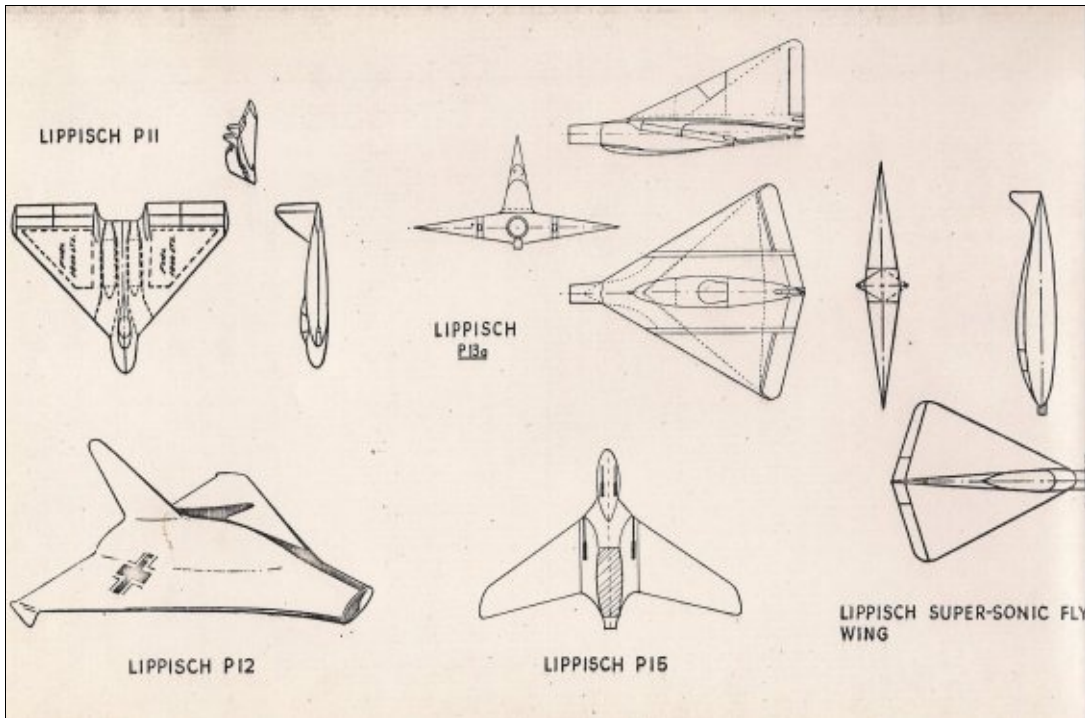
Lippisch died in [Cedar Rapids](#) on February 11, 1976.^[3]



LIPPISCH P 13 Fighter-This flying wing has a short nose with unusual accommodation for the pilot, who is perched on top of the engine, with the cockpit built into the large vertical fin. The leading edge of the wing is swept back at a rather more than 45 degrees. The trailing edge is straight, giving the wing its delta shaped plan form. There is a fairly large vertical fin and rudder.

The P 11 is powered by two turbojet propulsion units are mounted side by side in the center section with intakes in the leading edge and adjacent to the nose. There is a large fuel tank in each of the main wing members. Specifications are as follows: wing span = 35

ft. 5 in.; wing area = 538 square feet; aspect ratio = 2.3; overall length = 23 ft.; propulsion units 2 Jumo 004; fuel tank-age = 720 gal.; all up weight = 16,000 lbs.; undercarriage is a tricycle gear; armament two MK 1 03's; maximum speed 645 m.p.h. at 39,500 ft.; cruising speed = 528 m.p.h.; range = 1860 miles.



LIPPISCH P 13- Drawing page S1 above.

The P 13 is a usual flying wing design with a built in ramjet using liquid fuel. There is a large intake protruding forward of the delta shaped wing. The pilot is seated in an upright position above the combustion chamber and the cockpit canopy blending with the high single vertical fin. The undercarriage is comprises of a single controlled wheel with stabilization from tipping over offered by retractable struts located at the wing tips. The wing area is approximately 130 square feet and the aspect ratio = 1.35.

The company in the dying days of the war were working on plans to build a coal powered P 13. The idea was to use powdered coal as the fuel and use the heat of RAM air for the ignition source. This system had been tested and found to be a very practical one though it was never used it air tests.

At the end of hostilities in 1945 the glider version of the P 13 had not been completely finished. When the American forces took control of the Lippisch design team the design personnel were taken into custody and ordered to finish the glider prototype. This prototype was then shipped to the United States and was used by NASA as the pattern to use for development aircraft in the 1950s and onward. Testing on these aircraft proved to be very positive and the principles behind the design were shown to be sound.

Company's History:

Messerschmitt AG (German pronunciation: [*ˈmɛsɛʃmɪt*]) was a famous [German aircraft manufacturing corporation \(AG\)](#) named after its chief designer [Willy Messerschmitt](#) and known primarily for its [World War II fighter aircraft](#), in particular the [Bf 109](#) and [Me 262](#). The company survived in the post-war era, undergoing a number of mergers and changing its name from Messerschmitt to [Messerschmitt-Bölkow-Blohm](#) before being bought by [Deutsche Aerospace](#) (DASA, now part of [EADS](#)) in 1989.

In February 1916, the south German engineering company [MAN AG](#), and several banks purchased the unprofitable aircraft builder, [Otto-Flugzeugwerke](#), starting a new company Bayerische Flugzeugwerke AG. The articles of association were drawn up on February 19 and 20, and completed on March 2, 1916. Details of the company were recorded in the Commercial Register with an equity capital of RM 1,000,000 on March 7, 1916. 36% of the capital was provided by the Bank für Handel und Industrie, Berlin, 30% by MAN AG and 34% by Hermann Bachstein, Berlin. The first Chairman of the Board of Management was Peter Eberwein, who had previously been employed at [Albatros Flugzeugwerke](#).

Due to the need for immediate aircraft production for the ongoing war, there was no time for development work and BFW manufactured aircraft under licence from [Albatros Flugzeugwerke](#). Within a month of being set up, the company was able to supply aircraft to the war ministries of [Prussia](#) and [Bavaria](#). However, major quality problems were encountered at the start. The German air crews frequently complained about the serious defects that appeared in the first machines from BFW. The same thing had happened with the aircraft from the predecessor company run by Gustav Otto. It was only organizational changes and more intensive supervision of the assembly line that succeeded in resolving these problems by the end of 1916. BFW then started turning out over 200 aircraft a month, with their workforce growing to 3,000 and becoming one of the largest aircraft manufacturers in Bavaria.

The end of the war hit BFW hard, since military demand for aircraft collapsed. The company's management were forced to look for new products with which to maintain their position in the market. Since WWI aircraft were largely built from wood to keep their weight down, BFW was equipped with the very latest joinery plant. What is more, the company still held stocks of materials sufficient for about 200 aircraft, and worth 4.7 million reichsmarks. It therefore seemed a good idea to use both the machinery and the materials for the production of furniture and fitted kitchens. In addition, from 1921 onwards, the company manufactured motorcycles of its own design under the names of [Flink](#) and [Helios](#).

In the autumn of 1921, Austrian financier [Camillo Castiglioni](#) first announced his interest in purchasing BFW. While most of the shareholders accepted his offer, MAN AG initially held on to its shareholding in BFW, but Castiglioni wanted to acquire all the shares. He was supported in this by BMW's Managing Director Franz Josef Popp who, in a letter to the chairman of MAN, described BFW as a "dead factory, which possesses no plant worth mentioning, and consists very largely of dilapidated and unsuitable wooden sheds situated in a town that is extremely unfavorable for industrial activities and whose status continues to give little cause for enthusiasm". Apparently Popp was still in close contact with

Castiglioni and was perhaps even privy to the latter's plans for merging BMW with BFW. It was probably in the spring of 1922 that Castiglioni and Popp persuaded MAN to give up its shares in BFW, so that now the company belonged exclusively to Castiglioni. Then, in May of the same year, when the Italian-born investor was able to acquire BMW's engine business from [Knorr-Bremse AG](#), nothing more stood in the way of a merger between the aircraft company BFW and the engine builders BMW.

Reestablishment[[edit](#)]

Bayerische Flugzeugwerke (BFW) (Bavarian Aircraft Works) was reformed in 1926, in [Augsburg, Bavaria](#), when [Udet-Flugzeugbau GmbH](#) was changed into a joint-stock company. In the early stages, BMW AG held a stake in this company and was represented by [Josef Popp](#), who held a place on the Supervisory Board.^[1]

[Willy Messerschmitt](#) joined the company in 1927 as chief designer and engineer and formed a design team.

One of the first designs, the [Messerschmitt M20](#), was a near-catastrophe for the designer and the company. Many of the prototypes crashed, one of them killing Hans Hackmack, a close friend of [Erhard Milch](#), the head of [Deutsche Luft Hansa](#) and the German civil aviation authorities. Milch was upset by the lack of response from Messerschmitt and this led to a lifelong hatred towards him. Milch eventually cancelled all contracts with Messerschmitt and forced BFW into bankruptcy in 1931. However, the German re-armament programs and Messerschmitt's friendship with [Hugo Junkers](#) prevented a stagnation of the careers of him and BFW, which was started again in 1933. Milch still prevented Messerschmitt's takeover of the BFW until 1938, hence the designation "Bf" of early Messerschmitt designs.

Messerschmitt promoted a concept he called "light weight construction" in which many typically separate load-bearing parts were merged into a single reinforced firewall, thereby saving weight and improving performance. The first true test of the concept was in the [Bf 108](#) Taifun sports-plane, which would soon be setting all sorts of records. Based on this performance the company was invited to submit a design for the [Luftwaffe](#)'s 1935 fighter contest, winning it with the [Bf 109](#), based on the same construction methods.

From this point on Messerschmitt became a favorite of the [Nazi](#) party, as much for his designs as his political abilities and the factory location in southern Germany away from the "clumping" of aviation firms on the northern coast. BFW was reconstituted as "Messerschmitt AG" on July 11, 1938, with Willy Messerschmitt as chairman and managing director. The renaming of BFW resulted in the company's [RLM](#) designation prefix changing from "Bf" to "Me" for all newer designs that were accepted by the RLM after the acquisition date. Existing types, such as the Bf 109 and 110, retained their earlier designation in official documents, although sometimes the newer designations were used as well, most often by subcontractors, such as Erla Maschinenwerk of [Leipzig](#).^{[[citation needed](#)]} In practise, all BFW/Messerschmitt aircraft from the Bf 108 four-seat touring monoplane, to the Bf 163 light observation aircraft (not the same plane as the later Me 163 rocket fighter) were prefixed "Bf", all later types with "Me".

World War II[[edit](#)]

During the war Messerschmitt became a major design supplier, their [Bf 109](#) and [Bf 110](#)

forming the vast majority of fighter strength for the first half of the war. Several other designs were also ordered, including the enormous [Me 321](#) Gigant transport glider, and its six-engined follow on, the [Me 323](#). However for the second half of the war, Messerschmitt turned almost entirely to [jet](#)-powered designs, producing the world's first operational jet fighter, the [Me 262](#) Schwalbe ("Swallow"). They also produced the [DFS](#)-designed [Me 163](#) Komet, the first [rocket](#)-powered design to enter service. Messerschmitt relied heavily on slave labour to produce much of the parts needed for these planes during the second half of World War II; these parts were assembled in an enormous underground tunnel system in [Sankt Georgen an der Gusen, Austria](#). Slave labour was provided by inmates of the brutal [KZ Gusen](#) I and Gusen II camps, and by inmates from nearby [Mauthausen](#) concentration camp, all located near the St. Gorgen quarries. 40,000 inmates from Spain, Italy, Poland, Slovenia, France, Russia, Hungarian Jews and twenty other nationalities were murdered during the production of these planes at [KZ Gusen](#). Messerschmitt officials maintained barracks at the concentration camp to oversee the work being done by the inmates. Messerschmitt, and its executive [Willy Messerschmitt](#) also occupied the famed [Villa Tugendhat](#) in [Brno, Czech Republic](#), designed by [Mies van der Rohe](#) and [Lilly Reich](#) in the 1920s; the Messerschmitt aircraft factory office and the [Gestapo](#) occupied the property during the war.

Messerschmitt had its share of poor designs as well; the [Me 210](#), designed as a follow-on to the 110, was a disaster that almost led to the forced dissolution of the company. The design problems were eventually addressed in the [Me 410](#) Hornisse, but only small numbers were built before all attention turned to the 262. Late in the war, Messerschmitt also worked on a heavy [Amerikabomber](#) design, the [Me 264](#), which flew in prototype form but was too late to see combat.

Post-war[[edit](#)]

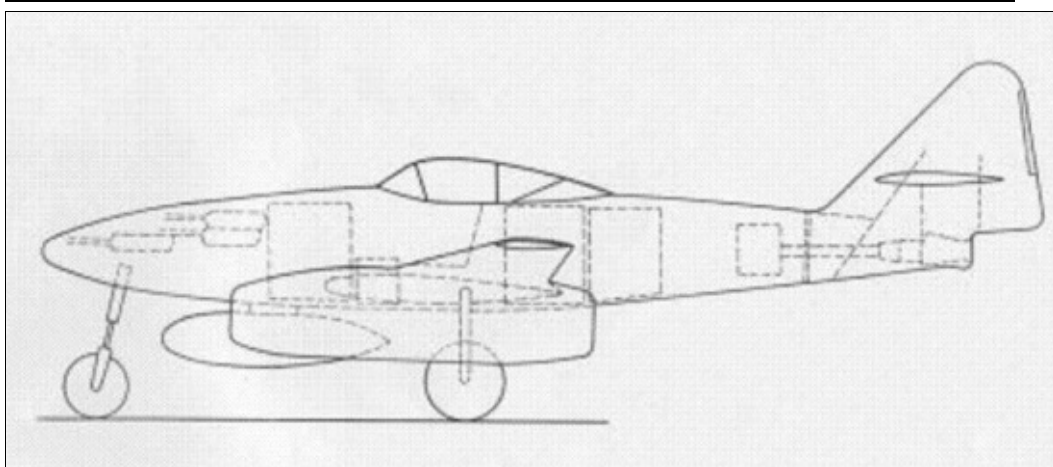
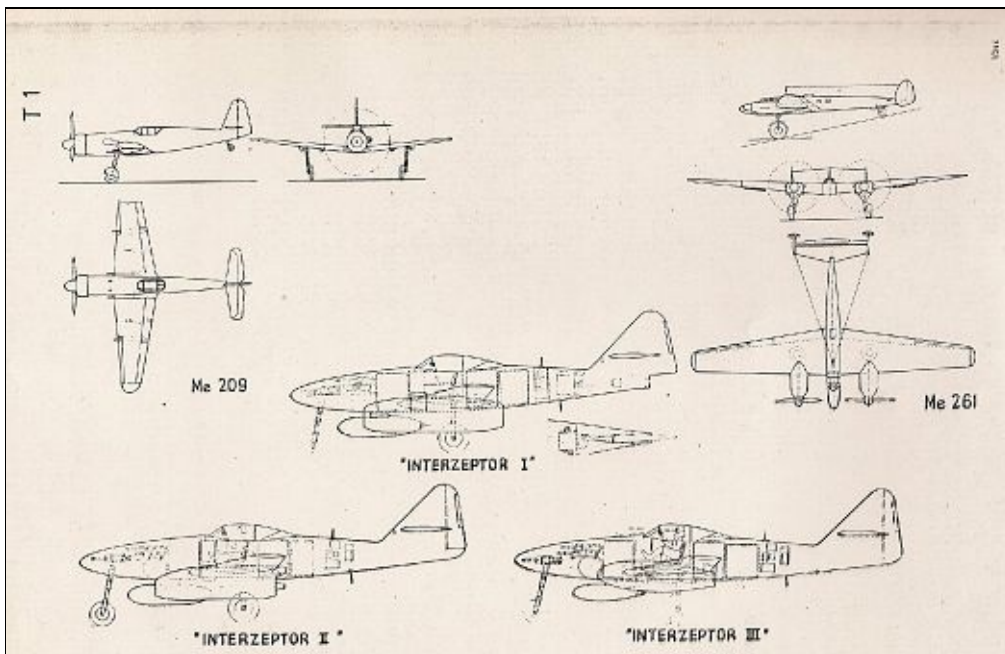
After [World War II](#), the company was not allowed to produce aircraft. One alternative the company came up with was the three-wheeled [motorcycle/bubble car](#) or Kabinenroller (cabinscooter) [KR175](#) / [KR200](#), designed by an aircraft engineer, [Fritz Fend](#).^{[[citation needed](#)]}

The cars were actually made by Fend's own company in the Messerschmitt works at Regensburg, and [Willy Messerschmitt](#) had very little to do with the vehicles other than ruling that they carried his name. Production of the KR200 ceased in 1964.^{[[citation needed](#)]}

The Messerschmitt factory also produced prefabricated houses, which were designed as "self-building-kits" mainly based on an alloy frame work.^{[[citation needed](#)]}

Return to aviation[[edit](#)]

On 6 June 1968, Messerschmitt AG merged with the small civil engineering and civil aviation firm [Bölkow](#), becoming Messerschmitt-Bölkow. The following May, the firm acquired [Hamburger Flugzeugbau](#) (HFB), the aviation division of [Blohm + Voss](#). The company then changed its name to [Messerschmitt-Bölkow-Blohm](#) (MBB). In 1989 MBB was taken over by [Deutsche Aerospace AG](#) (DASA), which was renamed [Daimler-Benz Aerospace](#) in 1995. The former DASA now operates as "EADS Germany".^[2]



Messerschmitt ME 262 and interceptor 1- shown in drawing T1

This was to be a fast interceptor fighter differing from the other X model in the following respects. One rocket unit is installed in the rear of the fuselage, the rocket unit is similar to that used on the ME 163. The 750 fuel tank is to be replaced by one of 600 liters, the hydrazine tank of 5 l liters capacity containing a shut off valve. The forward tanks of 900 liters contains 365 liters of jet assist in the jettison-able tank and is carried under the fuselage for additional short takeoff. The additional 3 wheel dolly is attached to each double axle for takeoff and these wheels are jettisoned after takeoff. Fuel in the forward tanks is distributed in the following manner. With 250 liters forward of cockpit 900 liters behind and 625 liters in the rear tank. An auxiliary tank carries another 305 liters. Specifications: wingspan 41.5 ft.; length 38.8 ft.; height 9.2 ft.; wing area 223 square feet; power plants two Jumo 004 C turbojets and one by fuel rocket motor; maximum flying weight = 17,600 lbs.; landing weight 11,400 lbs.; climb to 38,400 ft. with turbojets and rocket units 4.5 minutes; endurance at 38,400 ft. with turbojets only 42 minutes at 52,500 ft.; endurance with rocket 5.7 minutes; speed with turbojets at 38,400 ft. = 500 m.p.h. at 91 percent thrust; speed at 40,000 ft. = 545 m.p.h. at a hundred percent thrust; range including climb to 32,400 ft. 462 mi.; takeoff distance is 2000 ft.; landing speed 114 m.p.h.; and armament is 6 MK 108 machine guns.



Artist Impression of ME 262 and interceptor 1



Artist Impression of ME 209

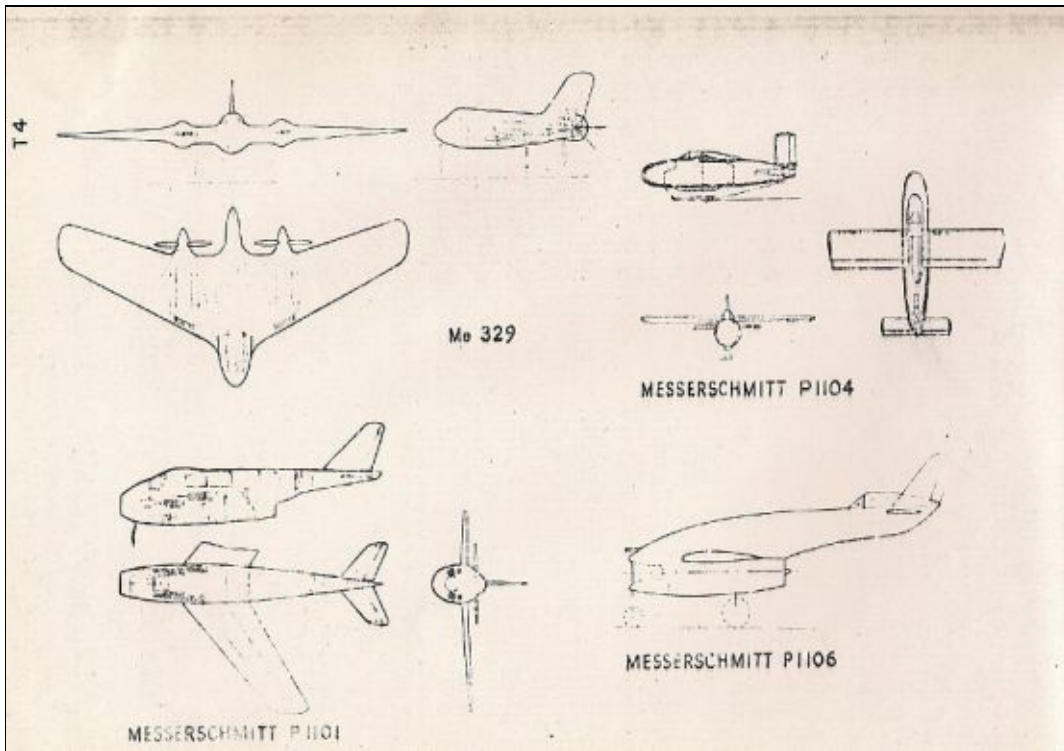
ME 209 is the updated development of the BF 109, powered by the DB 603 engine, this

aircraft featured an annular radiator clustered around the propeller shaft and a wide stance landing gear. Maximum speed at 20,000 feet is 415 mph

The ME 209 fighter is shown on drawing the page T1, it is a modernized version of the BF 109 adapted to house the larger Daimler-Benz 603 engine. The main difference as compared to the BF 109 is the Daimler-Benz 603 engine with an annular radiator clustered around the propeller shaft, a wide track inboard retracting undercarriage replacing the notorious narrow track of the 109. Other differences are: enlarged wing panels, lengthened fuselage forward of the wing by approximately 11 in. to the offset the change in center of gravity due to the heavier 603 engine. Typical armament is one 30 mm cannon firing through the propeller hub; 2- 20 mm in the engine cowling over the engine; 2-20 mm in the wings fairings all synchronized for firing through the propeller arc. Specifications: takeoff weight 9,000 lbs.; landing weight 7,800 lbs.; service ceiling 38,000 ft.; maximum speed at sea level 343 m.p.h.; maximum speed at 20,000 ft. 415 m.p.h.; maximum speed at 30,000 ft. 390 m.p.h.



Artist Impression of ME 209



ME 329 Twin Engine Bomber with a wingspan of 56 feet and length of 25 feet with a top speed of 465 mph. Powered by two DB 603 engines turning pusher propeller.

Messerschmitt P 1101 single jet fighter shown in Drawing T4.

Jet engines at the time in Germany were so scarce and difficult to produce, so the ME P1101 was launched to try to match the performance of the ME 262 which of course used two of these units. The Messerschmitt advanced design office was given the problem of developing a fighter with approximately the same endurance and range using a single jet unit.

Several projects were considered, the first was the P 1101. It was designed as a result of the personnel wishes of Professor Messerschmitt. The purpose of the project was for the collecting of experimental data on high-speed flight and to prove what design of the wing that best suited this type of aircraft. A two meter span model was constructed and tested in the wind tunnel at Baring. Although the prototype had been completed, it was blown up before the arrival of the allied troops. This aircraft was powered by a single Jumo 004 mounted on the center line, which was to be replaced by the more powerful He S 011 engine. The wing has steel spars with wooden ribs and skin. It is set with a swept back at 40 degrees. There are leading edge slats and main plane camber changing capability by the use of landing flaps. The pressure cabin is located well forward in the upper part of the fuselage followed by the fuel tanks. The undercarriage retracts into the fuselage and a tail cone houses the test equipment. Underneath the nose is the central intake leading to that turbojet unit at the rear. The armament is arranged on each side of the cockpit and comprises of two or four MK 106 guns with a hundred rounds per gun. The tricycle

undercarriage retracts into the fuselage.

Specifications are: wingspan = 27.7 ft.; rate of climb at sea level 73 ft. per second; wing area 170 square feet; ceiling 46,000 ft.; aspect ratio 4.29; speed at sea level = 549 m.p.h.; speed at 23,000 ft. = 600 m.p.h.; landing speed = 107 m.p.h.; landing weight = 7097



pounds; and takeoff run = 787 yards.

ME P 1101

The ME P 1106 single jet fighter is shown in drawing T4.

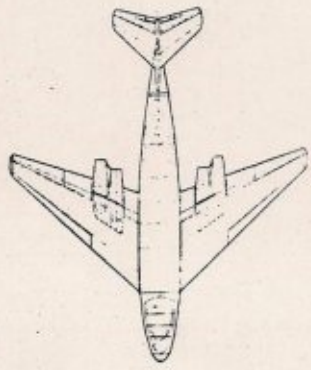
This project was intended as an improvement on the ME P1101, it has a similar outline except that the pilot sits at the tail end of the fuselage behind the fuel tank. The former pilot's position is taken up by two MK 108's and the tricycle undercarriage. The design resulted in bad visibility for the pilot and as the performance over the ME P1101 was not improved upon, the project was abandoned.



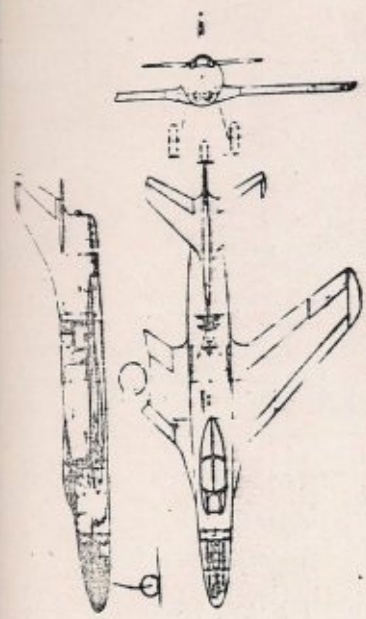
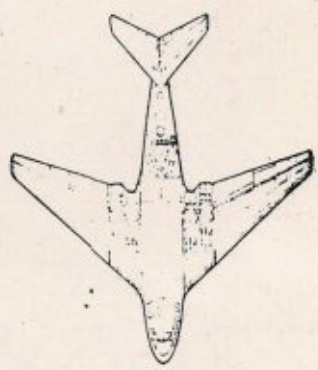
This strange design was abandoned once it was shown that the forward visibility of the pilot was unacceptable and the performance was not significantly improved over the more conventional design.



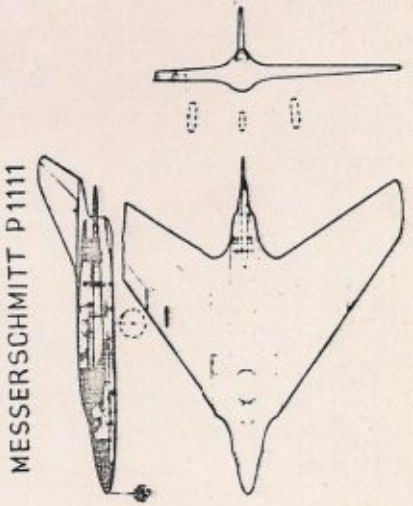
MESSERSCHMITT P1107/I



MESSERSCHMITT P1107/II



MESSERSCHMITT P1110



MESSERSCHMITT P1111



Artist Impression of MESSERSCHMITT P 1110 SINGLE FIGHTER

This P 1110 aircraft is probably one of the first to incorporate active boundary layer control to assure good airflow to the engine. Active boundary layer control was not used in fighter aircraft design until it was used in the 1970s when it was incorporated in the design of the wing of the US Navy's Phantom II aircraft. The simplified principal is used the engine compressor stage to remove a turbulent boundary layer by sucking it away and replacing it with a more efficient laminar flow boundary layer.

This project is common with the ME P 1111 and P 1110, seeking an optimum condition with respect to the location of the jet unit and accommodation space arrangement in order to attain the best performance. Great effort was made to achieve the minimum possible fuselage cross section. In the P 1110 boundary layer suction is used to maintain adequate air flow to the jet unit. Except for the undercarriage housing the wing is the same has found in the P 1101. The addition of three M K 100 guns is housed in the nose directly forward of the pressure cabin which is contained entirely within the fuselage cross section. Two additional MK 108's can be fitted as optional equipment. Behind the cabin is the main self-sealing fuel tank holding 265 gallons. Followed by the He S 011 turbojet unit in the extreme tail of the aircraft. In addition, 44 gallons of fuel is contained in a tank located underneath the jet unit. The air intakes are far back along the sides of the fuselage

above the wing and just forward of the leading edge fillets. Initially the tail plane and rudder were constructed of wood with 40 degree sweep-back was proposed, but it was planned later to substitute a v-tail.

Specifications are: wing span 27.07 ft.; rate of climb 4,330 ft. per minute; wing area 170 square feet; maximum speed at sea level 560 m.p.h.; speed at 23,000 ft. 601 m.p.h.; aspect ratio 4.29; dispensable weight 3,255 lbs.; all up weight 9,459 lbs.; landing speed 110.5 m.p.h.; landing weight 7,965 lbs.; takeoff run 864 yards; Service ceiling 46,000 ft.



MESSERSCHMITT P 1111 Single JET FIGHTER shown in Drawing T5.

The P 1111 is characterized by the orientation of the tail plane, although this sweep back angle of the fin and rudder are identical. The deep chord swept back wing houses the fuel load, which consist of 330 gallons. The ailerons served also as elevators (elevons) and lateral stability is provided by a large vertical fin and rudder. Armament consists of two MK 108, 100 rounds per gun mounted in each wing. The jets air intakes are located at the roots of the wing at the leading edge, and are connected with the jet by slightly curved ducts passing on either side of the cockpit and in front of the He S 011 turbojet unit there is space for radio and special equipment.

Specifications: wing span = 30.05 ft.; rate of climb at sea level = 4,660 ft. per minute; wing area = 301 square feet; speed at sea level = 519 m.p.h.; aspect ratio = 3; speed at 23,000 ft. = 618 m.p.h.; dispensable load = 3,400 lbs. all up weight = 9,441 lbs.; landing speed = 96 m.p.h.; landing weight = 7,677 lbs.; take-off run = 658 yards; service ceiling = 46,000 ft.

MESSERSCHMITT P 1112 Single JET FIGHTER shown in Drawing T5.

The P 1112 was designed to correct some of the faults which became apparent after a study of the P 1111, the wing area was reduced to 236.5 square feet, since it was felt that the wing loading could be increased. The pilot's cockpit is situated at the extreme front of the aircraft and two * MK 108 guns are fitted in the wing. The remainder of the design closely resembles the P 1111. Performance calculations were never completed for this project.

MESSERSCHMITT P1116 Single JET FIGHTER - Drawing T5

This project is similar in outline to the P 1101 except that the pilot sits at the tail end of the fuselage, behind the fuel tank. Performance was not improved and is designed resulted in very bad visibility for the pilot consequently the project was dropped.



MESSERSCHMITT 109Z

The BF 109 Z was designed in response to a Luftwaffe request for proposals for a long range interceptor/bomber to fill a role similar to that of the British DE Havilland Mosquito.

The aircraft is essentially two BF 109F airframes joined together by means of a new wing center section much in the same way as was used to create the F 82 twin Mustang was configured. Only one BF 109 Z was ever built and it was never flown. It was damaged while stored in a hanger during an Allied bombing raid in 1943. The project was permanently abandoned in 1944 and very little in the detail information remains today about this curious aircraft.

This project comprises of two BF 109 fuselages joining by a common center section, giving a total Wing area of 250 square feet a Jumo 13 a or b engine is installed in each fuselage and the aircraft is normally intended to carry 1 * 1000 or 1 * 500 kg bomb. No Drawing is available but the wing area indicates that the fuselage center-lines are about 12.5 ft. apart. The all up weight with a thousand KG Bomb is 16,050 to 16,200 lbs.

Specifications are: speed at climb and combat rating at sea level = 366 m.p.h.; speed at 26,000 ft. = 456 m.p.h.; rate of climb at sea level = 3,900 ft. per minute; rate of climb at

23,000 ft. = 2,130 ft. per minute; range @ maximum continuous power 1,050 mi. at 418 m.p.h.; Take-off run = 380 yards; landing speed = 99 m.p.h.



ME 329 Twin Engine Bomber with a wingspan of 56 feet and length of 25 feet with a top speed of 465 mph. Powered by two DB 603 engines turning pusher propeller.



ME 262 “AUFKLARER 1a” Specifications: wing span 41.5 feet; wing area 224 square feet; power plants 2 JUMO 004 C engines; maximum flying weight 14,500 pounds; maximum speed at 20,000 feet 575 mph; endurance at 20,000 feet 1.93 hours.



ME 262 “AUFKLARER 1a” Attacks a formation of Allied heavy bombers over Germany.



ME 264 AMERICA Steam Powered Long Range Bomber with steam turbines.

The steam powered ME 264 was a very ambitious program that was commissioned in the dark days of the war when Germany was running short of fuel supplies. At that time Nazi leaders were obsessed by the need for a way to avenge the Allied air raids that were devastating the German war machine. Very few steam powered aircraft have been developed and gone on to fly successfully, but this project looks like it could have had some success if it was pursued to its conclusion.

In August 1944 the firm of Oscar Maschinen G.m.b.H. founded by professor Lescel was commissioned to carry out the design and development of a steam turbine power unit for aircraft propulsion.

The design authority called for a system capable of producing 6000 H.P. at 6000 rpm, with a weight to power ratio of 0.7 kg per horsepower and a fuel consumption of 190 grams per horsepower per hour.

A ME 264 airframe was to have been placed at the disposal of the firm, but it was destroyed in an air raid. Two forms of propeller were envisaged, one with 17.5 feet diameter and revolving at 400 to 500 rpm and one of 16.5 feet in diameter revolving at 600 rpm.

The whole system consisting of four boilers, (capillary tube boilers of a special design) boiler feed water pumps and auxiliary turbine, mini-turbine, combustion air draught fan, condenser, controls and ancillaries.

At the time of the German collapse many components of the system had been produced, including the turbine blades, and ancillaries such as the combustion air draught fan and condenser pump were ready for use. A start had been made with the assembly of the auxiliary turbine and one boiler had been manufactured in its entirety.

The first system was designed to use 65% solid fuel (pulverized coal) and 35% liquid fuel (petroleum) but it was intended to use liquid fuel only when it became available in quantity.

The advantages claimed for the steam turbine system are:

1. Constant power at varying height;
2. Capacity for 100% overloading even for long periods;
3. Full steam output attained in 5-10 seconds;

4. The system is not sensitive to low temperatures;
5. Long life and simple servicing;
6. Simple and rapid control;
7. The system lends itself to incorporation in an airframe, since it can be broken down into separate components. The four main boilers are 3 feet in diameter and four feet high. The main turbine is 2 feet in diameter and 6 feet in length.

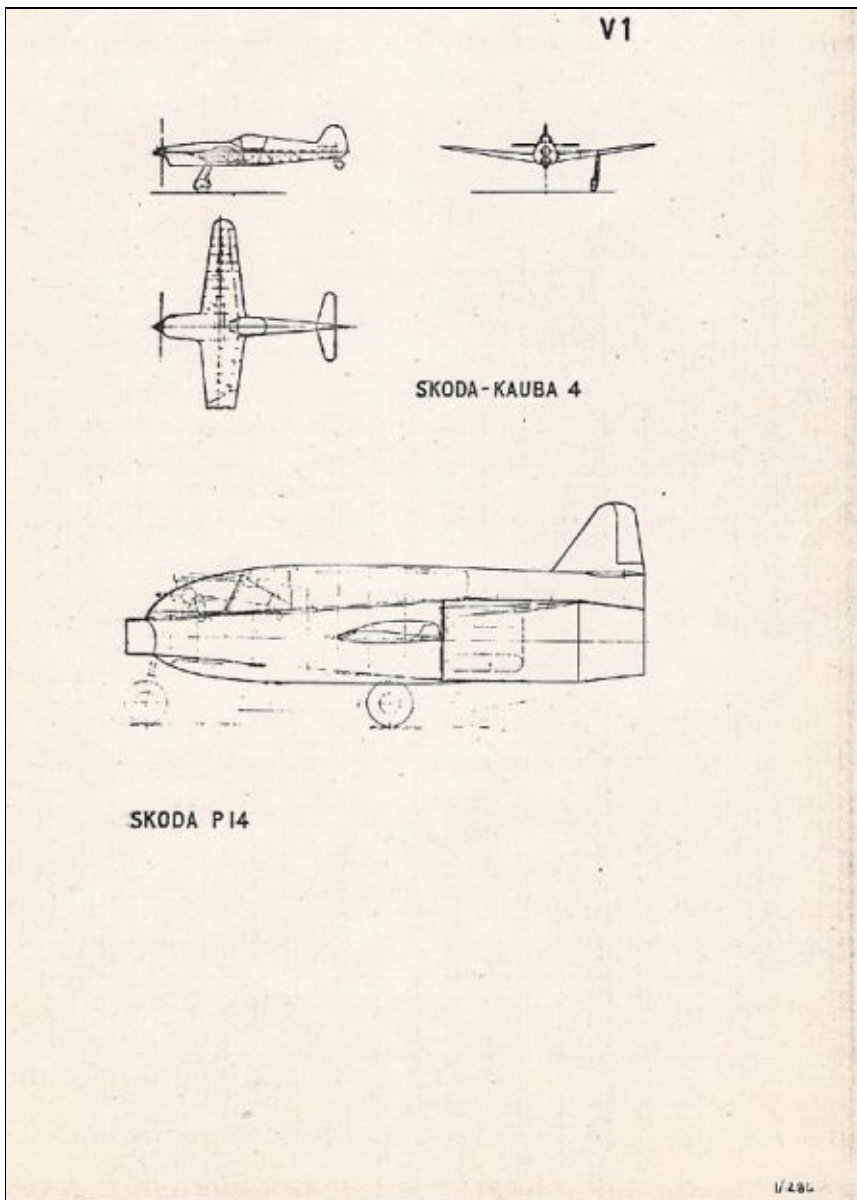


SKODA

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PROJECTS

SKODA FIGHTER PROJECTS



S K O D A Kaura 4 Trainer

Skoda Kaura 4 trainer is shown in Drawing V1.

This small low Wing monoplane was designed as a fighter trainer aircraft. In general appearance and with the wheels down, it is very similar to a scaled down Focke Wulf 190. The engine is probably an Argus AU 10 C-3.

Specifications:

Wingspan = 25 ft.; Wing area = 98 square feet; aspect ratio = 6.34; maximum flying weight without Bombs = 2,156 lbs.; wing loading = 22 lbs. per square foot; maximum power = 240 horsepower at 2000 r.p.m.; maximum speed at sea level = 240 m.p.h.; rate of climb = 2,000 feet per minute; landing speed = 70 m.p.h.; range at 195 m.p.h. = 580 mi.; endurance = 2.9 hours; service ceiling = 23,200 ft.; rate of climb to service ceiling = 26.7 minutes and special equipment = 1 MK 17.

Skoda P 14 ramjet (Athodyd) propelled fighter - Drawing V1.

This fighter, in which the pilot lies prone in the nose, is characterized by a very large diameter fuselage in comparison to its wing size. This large diameter is necessary because of the dimensions of the ramjet unit which powers the craft. It has an overall length of no less than 31 ft. 0.2 in. and a maximum diameter of 4 ft. 11 inches. This wide section is located fairly far back from the intake and is the reason that the fuselage is not tapered towards the tail, but rather has an unnatural stubby shape.

The intake is carried forward slightly beyond the nose and there is a long, gradually tapering diffuser portion leading to the parallel combustion chamber. The wing is not swept back and there is a conventional horizontal and vertical tail plane. A three wheel bogey is used for takeoff and there is a retractable skid for landing.

The armament comprises of a single MK 103 mounted above the pilot and in the upper portion of the fuselage just behind the cockpit there is a single large fuel tank containing 297 gallons of jet fuel. Alternatively there is a tank-age configuration where pulverized coal could be used as the prime fuel, when petroleum based fuel was not available.

Specifications: wingspan = 25.9 ft.; wing area = 134 square feet; aspect ratio = 5; fuel capacity = 297 gallons or, 54 gal. plus 1,870 lbs. of pulverized coal; all up weight = 6,270 lbs. to a maximum of 6,800 lbs.; maximum thrust at sea level = 9,680 lbs. at 630 m.p.h. which is = to 16,200 T H P; maximum speed at sea level 620 m.p.h.; maximum speed at 33,000 ft. = 545 m.p.h.; maximum endurance at sea level 28 minutes at 240 m.p.h.; maximum durance at 49,000 ft. = 42 minutes at 420 m.p.h.



SKODA P14 Miniature Athodyd (Ramjet) Fighter Specifications: WS 26 feet; weight 6820 pounds; endurance at 33,000 feet is 42 minutes; maximum speed at 33,000 feet is 545 mph; Service ceiling 60,000 feet, Time to climb to 20,000 feet 1.7 minute; time to reach 49,000 feet is 6.3 minutes.

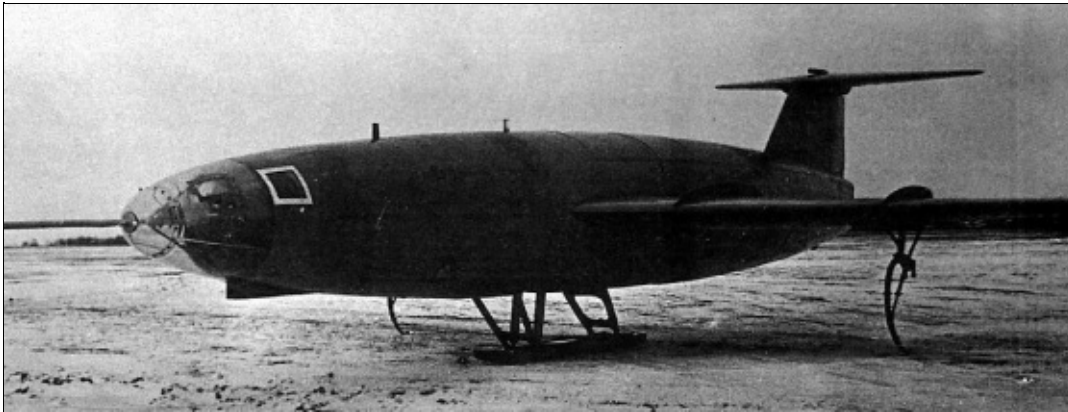
The Skoda P 14 ramjet powered emergency fighter was authorized by the Luftwaffe. It was designed by Skoda industries in occupied product towards the end of the war and was part of the third Reich defense effort against the devastating allied bombing raids. Yet another case of too little too late.

TRANS/SUPERSONIC RESEARCH PROJECTS

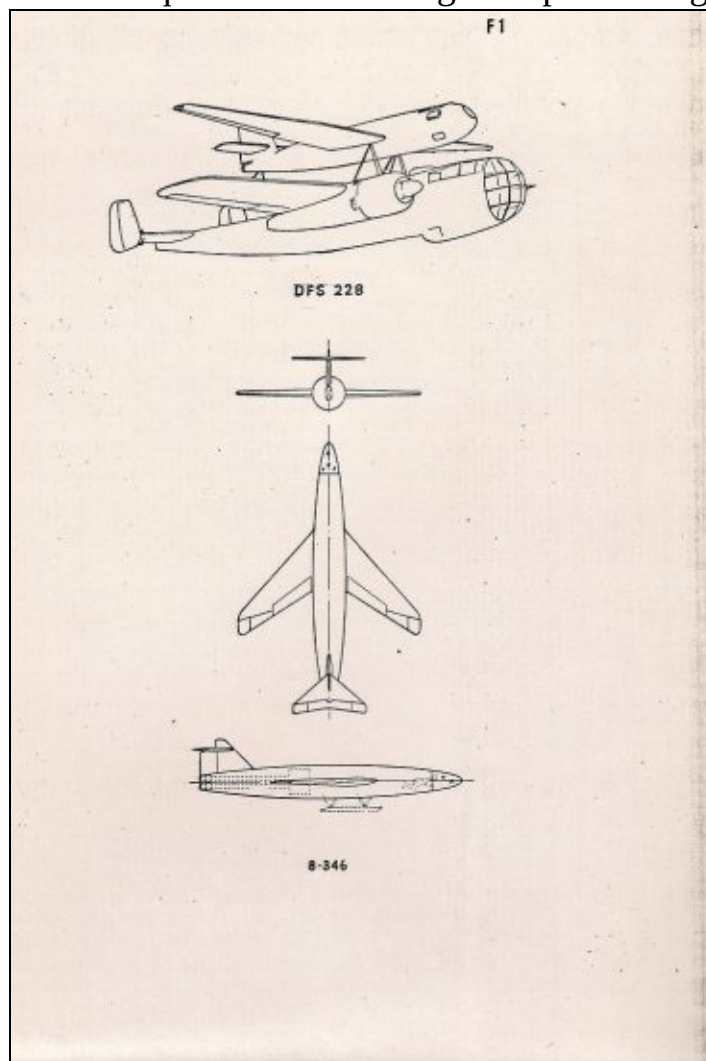
[Return](#)

The 8-346 supersonic research aircraft PF 1 designed by D F S for speeds above 1000 m.p.h. This aircraft was to be built by Sibel. The aluminum semi monocoque fuselage is of circular cross section and the pilot lies prone in nose. Behind him is a pressurized compartment for measuring and recording equipment and the tanks for T-S T O F F and C-S T O F F.* The bi fuel rocket motors are mounted one above the other at the rear of the fuel supply. The all metal wing has a 45 degree sweep-back at the one-quarter chord line and the airfoil is of symmetrical shape. Each aileron is divided into two parts, the outer portion having no air dynamic balance and are made with a deep chord to insure effective operation at high Mach numbers. Outer and inner ailerons can be moved independently or simultaneously. The nose, incorporating a pressure cabin is connected by a system of explosive bolts to the main fuselage and can be blown off in an emergency. Allowing the pilot and recording equipment the opportunity to escape. The nose section is braked by a

parachute which is deployed after separation. At the appropriate time the pilot can be leased from the cabin by means of an ejection catapult and then descend with his own parachute. It is intended that the 8-346 should be carried by a parent aircraft to 33,000 ft., from which height it would climb under its own power to 66,000 ft., where it would attain a speed of 1250 m.p.h.



Wingspan = 29 ft. 6 in., wing area = 215 square feet and wing sweep back angle = 45



degrees at the quarter chord line.

The DFS 228 Pictured Above Was a High Altitude Reconnaissance Aircraft

* Ref Wikipedia T-Stoff (80% concentrated hydrogen peroxide / 20% oxyquinoline) was the oxidizer part of a bipropellant rocket fuel combination used in Germany during World War II. It is a stabilized [high test peroxide](#). One of its uses was to be combined, as the oxidizer, with C-Stoff (methanol-hydrazine mixture) as the fuel, in the Messerschmitt Me

163 and Messerschmitt Me 263, at a ratio of three parts C-Stoff fuel to one part T-stoff oxidizer. Because the two substances were so visibly similar, a complex testing system was developed to make sure that each propellant was put into the correct tanks of the Messerschmitt Me 163. This was because T-Stoff and C-stoff are hypergolic propellants: they spontaneously ignite when mixed. Even slight contamination between the T-Stoff oxidizer and the C-Stoff fuel was likely to cause an explosion.

T-Stoff was used to drive the turbopump in the German [V2](#) rocket; ammonia-stabilized [hydrogen peroxide](#) was decomposed into hot steam and oxygen by adding Z-Stoff (aqueous solution of various permanganates). The turbopump was used to transport fuel and oxidizer liquids to the rocket engine of the V2.^[1]

- Hydrogen peroxide (H₂O₂) HTP of ~95% concentration by weight
- Stabilisers: phosphoric acid, sodium phosphate, 8-oxyquinoline^[2]

Because of its extreme oxidizing potential, T-stoff was a very dangerous chemical to handle, so special rubberized suits were required when working with it, as it would react with most cloth or other combustible material and cause it to spontaneously combust.

ZEPPELIN

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Company's History:

The name Zeppelin goes far back in German's aeronautical enterprises from the First World War with its most famous creation airships, to its lesser known exploits during the Second World War and The Third Reich.

Count [Ferdinand von Zeppelin](#)'s serious interest in airship development dates from 1884, when he was inspired by a recent lecture given by [Heinrich von Stephan](#) on the subject of "World Postal Services and Air Travel" to outline the basic principle of his later craft in a diary entry dated 25 March 1874.^[8] This describes a large rigidly-framed outer [envelope](#) containing several separate gasbags.^[9] He had previously encountered [Union Army](#) balloons in 1863, during the [American Civil War](#), where he was a military observer.^[10]

Count Zeppelin began to seriously pursue his project after his early retirement from the military in 1890 at the age of 52. Convinced of the potential importance of aircraft designs, he started working on various designs in 1891, and had completed detailed designs by 1893^[2] These were reviewed by an official committee in 1894,^[2] and were the subject of a patent granted on 31 August 1895,^[11] with Theodor Kober producing the technical plans.^[3]

The name and origin of the Zeppelin Group reach back to the early 20th century, when Ferdinand Count Zeppelin broke through an historic barrier with the construction of his first airship. His invention transformed humankind's dream of flight into reality, enabling people to forget the boundaries of their countries. In 1908 Count Zeppelin founded Luftschiffbau Zeppelin GmbH – the airship construction company – in Friedrichshafen and gave the entire company to the newly-founded Zeppelin Foundation. This ownership structure exists to the present day.

The success of airship technology transcended far beyond the boundaries of Germany and Europe. Count Zeppelin's original airship company was also the rootstock of other enterprises which are globally active today, among them Maybach-Motorenbau (now MTU and Tognum AG respectively), Dornier, and ZF Friedrichshafen AG, which like the Zeppelin Group is owned by the Zeppelin Foundation.

The accident of the airship "Hindenburg" in Lakehurst in 1937 and the outbreak of World War II brought the airship era to an abrupt end. After the war, the forced liquidation on January 1, 1947, by the Allied military government brought the definite end for airship construction. There would be no reprieve for another nine years; meanwhile, the breakup of the Zeppelin Group left our company without production or products. Yet the Zeppelin people remained true to their founder's legacy. The vision, courage to innovate and the steadfast will to succeed would once again become the driving forces to make a new start possible.

Two new enterprises, Metallwerk Friedrichshafen GmbH and Fahrzeug Instandsetzung GmbH, Friedrichshafen, started with fresh ventures, including production of lightweight construction and silos for the chemical industry, vehicle maintenance and antenna systems for Germany's emerging radio network. The roots for the Trading Division were laid down in 1954, when Zeppelin secured rights for selling and servicing Caterpillar construction machines and engines in the Federal Republic of Germany. In 1961, the activities of the trading and industry sectors were merged into Zeppelin Metallwerke GmbH, which is the present ZEPPELIN GmbH. This far-reaching decision created the structures which are still in place to this day. Our company's registered office is still in Friedrichshafen, and the headquarters have for 40 years been in Garching, near Munich.

PROJECTS

ZEPPELIN Z.SO 523 TRANSPORT Drawing - W1

The Z. SO 523 project is a high wing transport monoplane powered by six Gnome Road 18 radial engines and based on the design of the ME 323 although it is of much greater size. It was to be developed jointly by Zeppelin and the French firm of Sud-Quest.

Even by today's standards this aircraft is considered to be massive. It was to be capable of carrying light armored tanks, military trucks, field guns and fully equipped combat troops. The aircraft was to be developed and built in occupied France but because of the liberation of France by the Allies in 1944 the project was terminated.

The fuselage is composed of a framework of four steel longerons with a skin covering of sheet metal. Access to the freight compartment is from the front through 2 clam-shell doors which open sideways and from the rear, it is accessed through a lowering ramp,

much in the same way as do modern transport aircraft. The undercarriage consists of an arrangement of eight main wheels and a tail skid. The 2 * 4 wheel trains are covered in on each side of the fuselage and are retractable into their fairings. The main plane comprises of a hollow center section of constant cord, carrying the 6 engine nacelles.

Oil tanks are located in the leading edge and six main fuel tanks are located behind the main wing spars. The two outer wing panels are trapezoidal in shape with rounded tips. Twin fins and rudders are fitted unlike the ME 323 which has a single vertical tail. The normal flight crew consists of four. The aircraft is capable of carrying 100 fully equipped troops.

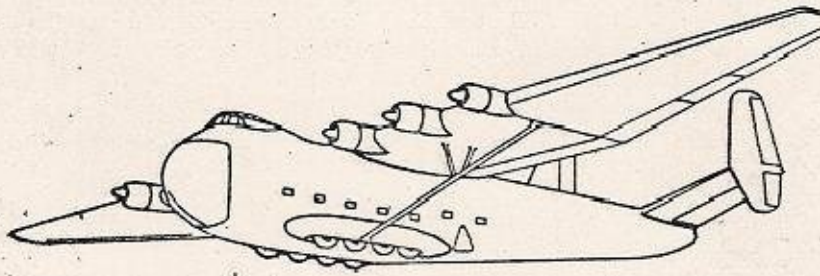
Specifications are:

wingspan = 229.6 ft.; wing area 4925 square feet; length 127.9 ft.; aspect ratio 10.7; maximum all up weight = 209,000 lbs.; wing loading 38 lbs. per square foot; maximum speed at sea level = 192 m.p.h.; maximum continuous speed at sea level 182 m.p.h.; cruising speed at sea level 163 m.p.h.; freight compartment full area of floor is 6749 square feet; maximum length of the floor = 59 ft.; maximum width of cargo compartment = 12.1 ft.; maximum height = 11.5 ft. loading space 7920 cubic feet; normal takeoff run 1,640 ft.; landing speed 80.6 mi. per hour; rate of climb 432 ft. per minute; take-off run 2,179 ft.; range = 1,054 mi. at 193 mph.

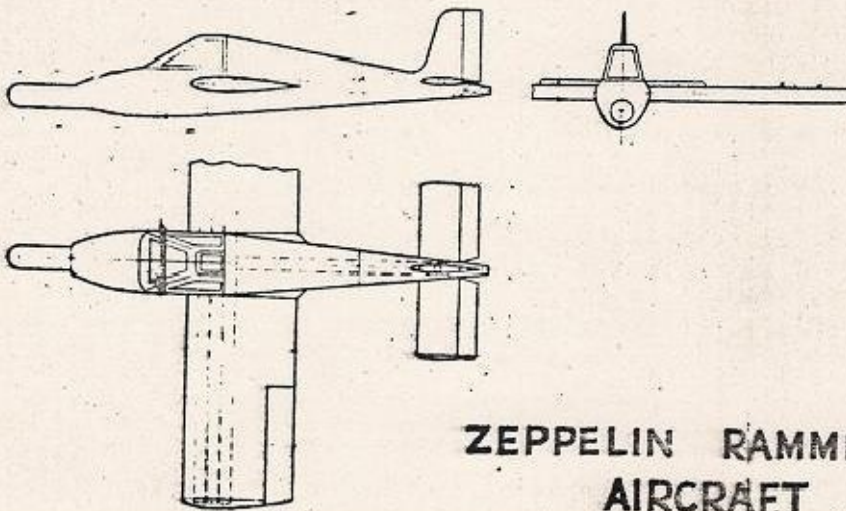


ME 323 shown-The Z. SO 523 was similar only larger and had twin tails unlike the ME 323 which had only a single vertical tail.

W1



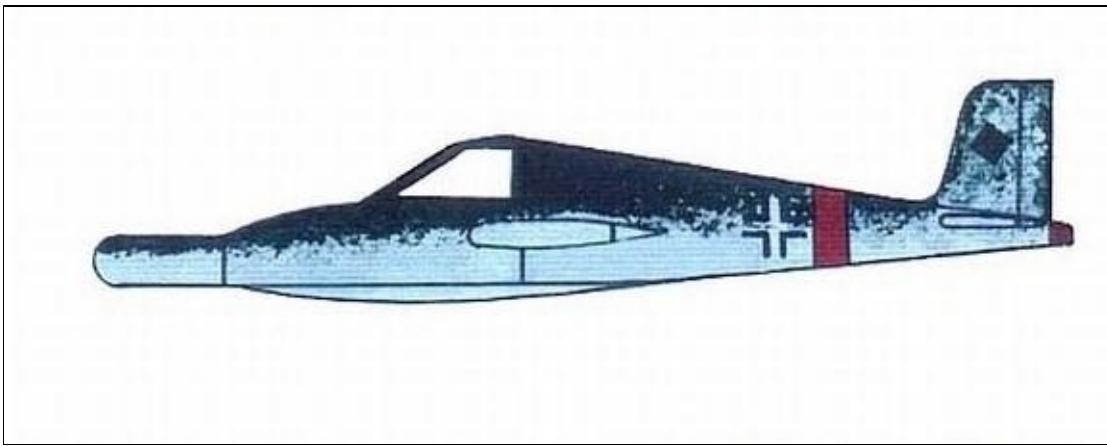
Z 50523



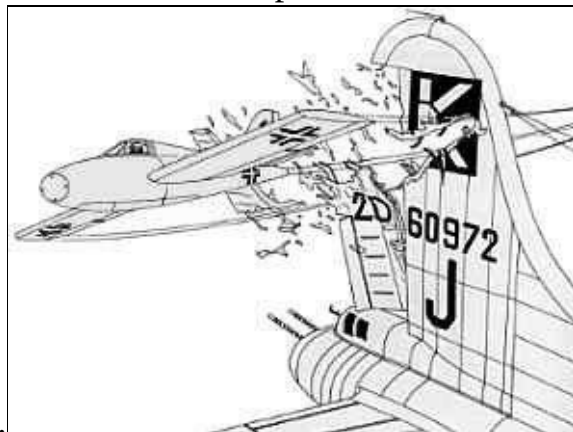
ZEPPELIN RAMMING
AIRCRAFT

ZEPPELIN ROCKET PROPELLED RAMMING AIRCRAFT

Drawing W1 shows a small rocket propelled aircraft apparently intended for ramming into enemy aircraft with the hope of destroying them and hopefully, itself surviving the collision. The overall length is 16 ft. and the span of the constant chord wing is 16.4 ft.. The approximate wing area is 130 square feet. There are three large tubular spars in the forward portion of the wing and the solid fuel rocket motor, which extends along the aft fuselage appears to be welded permanently, at its forward end to the wing's rear spar. The



rocket engine, which terminates in a narrow venturi which is 5.4 inches in diameter by 9 ft. in length. The pilot's cockpit is completely armor plated: the thickness of the plating varies from 28 mm in the nose, to 20 mm at the rear. Bulletproof glass being also lavishly employed, the thickness of the windscreen is 40 mm and that of the side and top panels is 18 mm. A container of 14 R.P. (rockets) can be fitted to the nose. The arrangement is rather similar to that of used with the Natter aircraft. There is a retractable skid for landing. It is presumed that the aircraft is carried or towed to the required altitude, and the rocket motor is used to gain sufficient speed and altitude to put the aircraft into position for an attack on an enemy



bomber formation.

The aircraft itself, is of very rugged construction with a maximum protection for the pilot. Presumably the idea was to attack the enemy bomber by ramming it at a flimsy but critical location such as the vertical fin as pictured above.

Conclusion:

Although it is true that many of these projects never survived to see the light of day, as full grown aircraft weapon systems; they never the less did have an influence on the future of aviation development. Some projects did not get beyond the paper project stage, before they were obliterated by the allied bombing campaigns.

It is no wonder that the German aircraft industry was so prolific through the war years: the designers had the greatest of all incentives to spur on their creativity. The Fuhrer himself had decreed that those engaged in "The Emergency Fighter Aircraft Program", would not be subject to be drafted for military service. The draft in 1944 was effectively a death

sentence. There was a big incentive in having your company chosen to build the next generation of air superiority fighter, because it meant that you then had a real possibility of coming through the war alive.

About the Author

[Return](#)

Bio

Worked as an Aircraft Structures Engineer for over forty years (1960 to 2003). Specialized in structural design, stress analysis, metal fatigue, aircraft fatigue monitoring system design, fracture mechanics and aircraft structural integrity programs. Currently retired with an ongoing interest in aviation.