

Dornier Do 335 Pfeil



Le Dornier Do 335 Pfeil en français, « flèche » est un avion de chasse construit par l'Allemagne nazie à la fin de la Seconde Guerre mondiale. Il avait des performances de vitesse particulièrement élevées pour un avion propulsé par des moteurs à pistons classiques. Le Dornier Do 335 fut conçu à l'origine pour servir comme bombardier rapide (sous le nom de Do P 231). Mais sa construction particulière (avec deux moteurs en configuration push-pull : l'un à l'avant en position classique, l'autre dans l'arrière du fuselage de l'appareil en propulsion), qui lui assurait des caractéristiques de vitesses élevées, poussa la Luftwaffe à en faire un chasseur.

L'appareil se présentait comme un avion massif à l'allure peu fine perché sur un haut train d'atterrissage tricycle. Le moteur avant était refroidi par un radiateur annulaire (concept cher aux allemands qui l'utilisèrent avec grand succès sur le Ju 88, le FW 190D et le Ta 152) donnant à celui-ci un faux air de moteur radial tandis que le moteur arrière était "fondu" dans la partie arrière du fuselage avec des ouvertures de refroidissement ventrales et latérales (qui ne garantissaient pas un refroidissement suffisant, d'où de nombreuses casses moteur sur les appareils de présérie).

Ces moteurs étaient dotés du dispositif d'injection d'eau-méthanol MW-50 permettant d'accroître leur puissance pendant un court laps de temps (environ 10 minutes). Les ailes étaient de conception classique, à fort dièdre positif et à l'épaisseur caractéristique, contenant des réservoirs de carburant. La queue présentait l'originalité d'être cruciforme, avec une dérive ventrale en plus de la dérive dorsale et l'hélice propulsive au bout. Cette hélice et la dérive dorsale étaient munies de boulons explosifs, désolidarisant ces pièces de l'appareil en cas d'éjection du pilote, garantissant à celui-ci une évacuation plus sûre sans risquer une collision particulièrement dangereuse avec ces éléments.

À l'inverse des concepts allemands de l'époque qui voulaient des appareils de conception simple à la maintenance aisée (tels que le Messerschmitt Bf 109, par exemple), le Do 335 était compliqué à fabriquer, requérait des métaux stratégiques en quantité et était réputé difficilement réparable. Son premier prototype vola en septembre 1943. Il s'ensuivit la construction d'une vingtaine d'appareils de pré-série monoplaces (Do 335A-0) ainsi que de quelques exemplaires d'entraînement biplace (Do 335B-0) destinés à la conversion des pilotes sur cet appareil.

Dans son livre *Le Grand Cirque*, l'as français Pierre Clostermann raconte une des premières rencontres en combat d'un Do 335 avec l'aviation alliée, en avril 1945. À la tête d'une patrouille de quatre Hawker Tempest de l'escadron 3 de la Royal Air Force dans la région d'Osnabrück, au nord de l'Allemagne, Clostermann rencontra par chance un Pfeil isolé au ras des arbres. Ayant détecté la menace, le pilote allemand fit demi-tour à vitesse maximum.

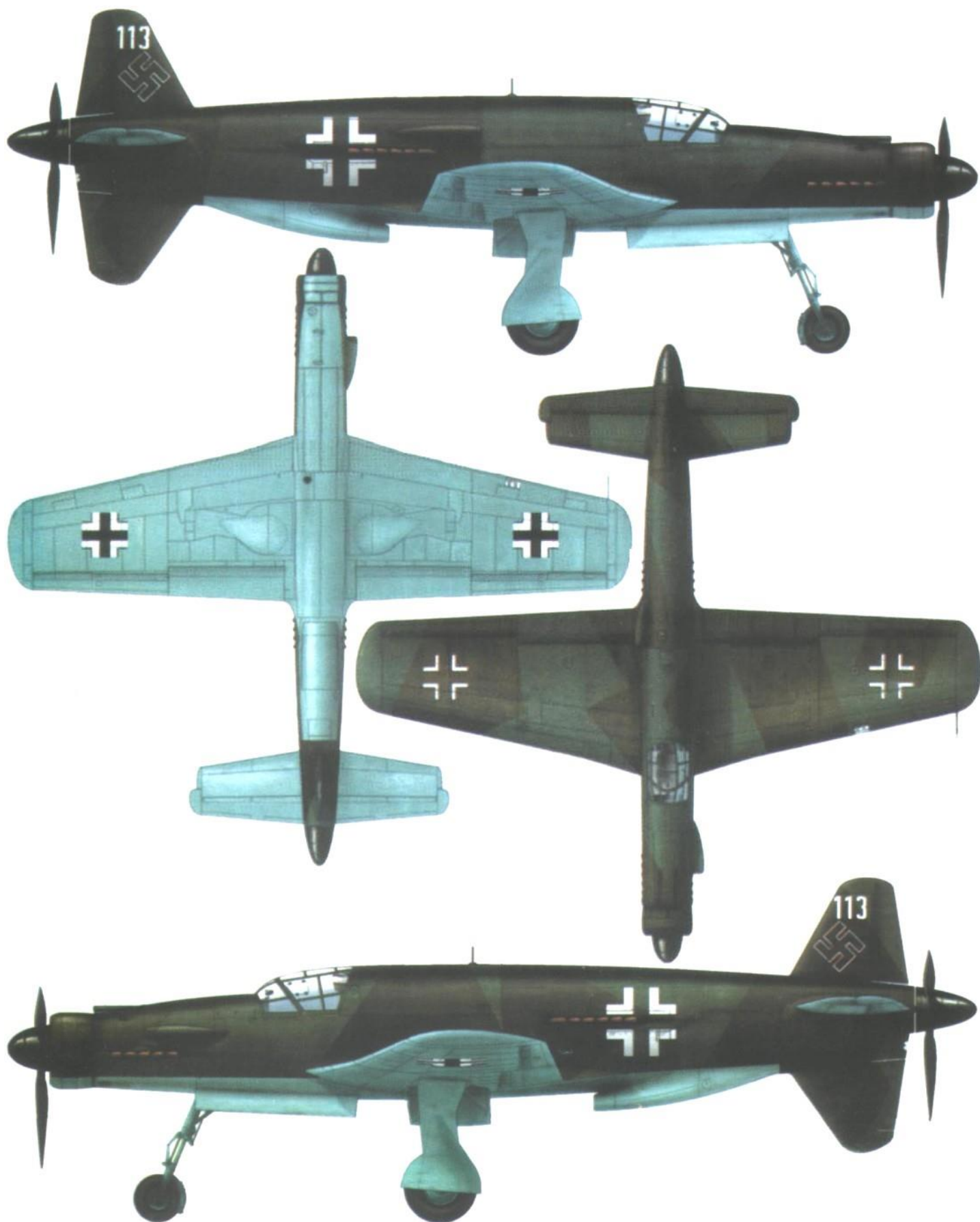


Un seul des quatre Tempest réussit à se mettre en position de tir (sans résultat), mais le très rapide Do 335 distança aisément ses poursuivants malgré la vitesse de pointe supérieure à 750 km/h du Tempest. Le Do 335 ne connut qu'une courte utilisation au sein de l'Erprobungskommando 335, une unité d'évaluation opérationnelle, qui ne rencontra que rarement les appareils alliés.

Le chasseur polyvalent Do 335, avec son hélice tractrice classique à l'avant et son hélice propulsive à l'arrière de son empennage cruciforme, était un appareil tout à fait unique développé par les ingénieurs allemands. Le résultat était un avion très compact et très rapide. Il fut prévu dès le départ en versions biplace et monoplace. Le premier prototype, le monoplace Do 335 VI, fit son premier vol le 26 octobre 1943. Le modèle de série initial, le Do 335A-1, était un chasseur bombardier monoplace propulsé par deux moteurs DB 603E-1 développant chacun 1.800 ch au décollage. Il était armé d'un canon MK 103 de 30 mm et de deux canons MG 151 de 15 mm.

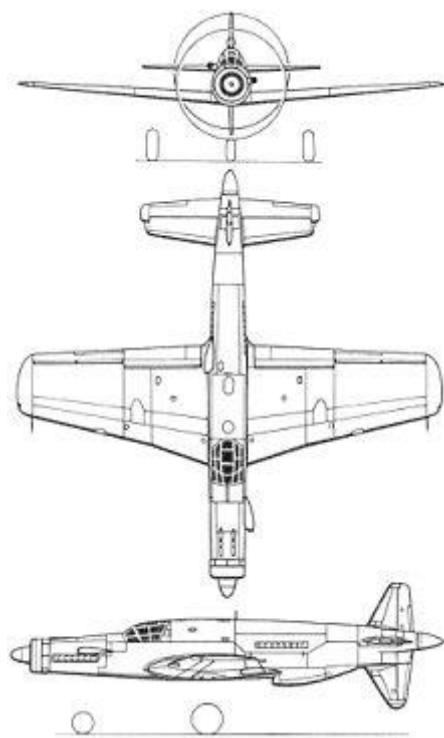
Sur 14 prototypes (appelés Versuchs), le V9 fut achevé aux normes complètes de pré-série. Le V10 fut le premier biplace Do 335A-6 équipé de radar; le V11 et le V12 furent respectivement baptisés Do 335A-10 et A-12, ils étaient des prototypes d'appareils d'entraînement à double commande; le V13 et V14 furent appelés Do 335B-1 et B-2 : leurs soutes à armes intérieures avaient été supprimées et ils étaient mieux armés, un canon de 20 mm remplaçant ceux de 15 mm sur le B-1 et deux canons de 30 mm MK 103 complétant l'armement du B-2.

Avec le Do 335B, l'avion abandonnait toutes ses ambitions de bombardement, mais son armement massivement accru en aurait fait un redoutable chasseur.



Dix Do 335A-0 de pré-série furent construits pour être évalués en opération; seuls 11 Do 335A-1 de série et deux biplaces Do 336A-12 avaient été achevés quand l'usine d'Oberpfaffenhofen fut prise par les forces alliées en 1945.

Malgré quelques défauts (une tendance à onduler à grande vitesse), les Do-335 auraient été de redoutables opposants à la suprématie aérienne alliée si la guerre s'était prolongée. Leur vitesse élevée et leur puissant armement (cinq canons dont trois de 30 mm sur le Do 335B-2), spécialement dans leurs versions de chasse de nuit.



source : <http://www.avionslegendaires.net/encyclopedia/constructeur/dornier/>
<http://milguerres.unblog.fr/dornier-do-335-pfeil/>

The **Dornier Do 335 Pfeil** ("Arrow") is a [heavy fighter](#) built by [Dornier](#) for Germany during [World War II](#). The two-seater trainer version was called *Ameisenbär* ("anteater"). The *Pfeil*'s performance was predicted to be better than other twin-engine designs due to its unique [push-pull configuration](#) and the lower [aerodynamic drag](#) of the in-line alignment of the two engines. It was Nazi Germany's fastest piston-engined aircraft of World War II. The [Luftwaffe](#) was desperate to get the design into operational use, but delays in engine deliveries meant that only a handful were delivered before the war ended.

Design and development

The origins of the Do 335 trace back to [World War I](#) when [Claude Dornier](#) designed a number of [flying boats](#) featuring remotely driven propellers and later, due to problems with the drive shafts, tandem engines. Tandem engines were used on most of the multi-engine Dornier flying boats that followed, including the highly successful [Do J Wal](#) and the gigantic [Do X](#). The remote propeller drive, intended to eliminate [parasitic drag](#) from the engine entirely, was tried in the innovative but unsuccessful [Do 14](#), and elongated, tubular drive shafts as later used in the Do 335 saw use in the rear engines of the four-engined, twinned tandem-layout [Do 26](#) flying boat.

There are many advantages to this design over the more traditional system of placing one engine on each wing, the most important being power from two engines with the frontal area (and thus drag) of a single-engine design, allowing for higher performance. It also keeps the weight of the twin powerplants near, or on, the aircraft centerline, increasing the [roll rate](#) compared to a traditional twin. In addition, a single engine failure does not lead to [asymmetric thrust](#), and in normal flight there is no net torque, so the plane is easy to handle. The four-surface set of [cruciform tail](#) surfaces in the Do 335's rear fuselage design included a ventral vertical [fin-rudder](#) assembly that projected downwards from the extreme rear of the [fuselage](#), to protect the rear propeller from [an accidental ground strike](#) on takeoff. The presence of the rear pusher propeller also mandated the provision for an [ejection seat](#) for safe escape from a damaged aircraft, and designing the rear propeller and dorsal fin mounts to use explosive bolts to jettison them before an ejection was attempted – as well as twin canopy jettison levers, one per side^[3] located to either side of the forward cockpit interior just below the sills of the five-panel windscreen's sides, to jettison the canopy from atop the cockpit before ejection.^[4]

In 1939, Dornier was busy working on the **P.59** high-speed [bomber](#) project, which featured the tandem engine layout. In 1940, he commissioned a test aircraft, closely modeled on the airframe of the early versions of the [Dornier Do 17](#) bomber but only 40% of the size of the larger bomber, with no aerodynamic bodies of any sort on the wing panels (the original Do 17 had twin engine nacelles on its wings) and fitted with a retractable [tricycle landing gear](#) to validate his concept for turning the rear [pusher](#) propeller with an engine located far away from it, through the use of a long tubular driveshaft. This aircraft, the [Göppingen Gö 9](#), showed no unforeseen difficulties with this arrangement, but work on the P.59 was stopped in early 1940 when [Hermann Göring](#) ordered the cancellation of all projects that would not be completed within a year or so.

In May 1942, Dornier submitted an updated version with a 1,000 kg (2,200 lb) bombload as the **P.231**, in response to a requirement for a single seat, [Schnellbomber](#)-like high-speed bomber/intruder. The P.231 proposal was selected as the winner after beating rival designs from [Arado](#), [Junkers](#), and [Blohm & Voss](#).

A development contract was awarded, by the RLM issuing the Dornier firm the airframe approval number [8-335](#), for what would become known as the Do 335. In autumn 1942, Dornier was told that the Do 335 was no longer required, and instead a multi-role [fighter](#) based on the same general layout would be accepted. This delayed the prototype delivery as it was modified for the new role.



Do-335s on the apron at [Oberpfaffenhofen](#) at the war's end, including unfinished two-seat versions

The use of a nose-mount annular radiator for the forward engine (much like a [Jumo 211](#)-powered [Ju 88](#), or [Jumo 213](#)-powered [Focke-Wulf Fw 190D-9](#)) and a ventral-fuselage mount airscooped radiator installation for cooling the rear engine made the aircraft look distinctive. When fitted with [DB 603A](#) engines delivering 1,750 PS (1,290 kW; 1,730 hp) it had a pair of the largest inverted V12 aircraft engines mass-produced during the Third Reich's existence. The Do 335 V1 first prototype, bearing the [Stammkennzeichen](#) (factory radio code) of **CP+UA**, flew on 26 October 1943 under the control of [Flugkapitän](#) Hans Dieterle, a regular [Heinkel](#) test pilot and later primary Dornier test pilot.

However, several problems during the initial flight of the Do 335 would continue to plague the aircraft through most of its short history. Issues were found with the weak [landing gear](#) and with the main gear's wheel well doors, resulting in them being removed for the remainder of the V1's test flights. The Do 335 V1 made 27 flights, flown by three different pilots. During these test flights the second prototype, V2 (*Werk Nr* 230002) CP+UB, was completed and made its first flight on 31 December 1943, again under the control of Dieterle. New to the V2 were upgraded DB 603A-2 engines, and several refinements learned from the test flights of the V1 as well as further windtunnel testing. On 20 January 1944, the Do 335 V3 (*W.Nr.* 230004), CP+UC was completed and flown for its first time by Werner Altrogge. The V3 was powered by the new pre-production DB 603G-0 engines which could produce 1,900 PS (1,400 kW) at take-off and featured a slightly redesigned canopy which included twin rear-view mirrors in blisters, one in each of two matching side panels of the well-framed, eleven-panel main canopy's openable section. Following the flights of the V3, in mid January 1944, RLM ordered five more prototypes (V21–V25), to be built as night fighters. By this time, more than 60 hours of flight time had been put on the Do 335 and reports showed it to be a good handling, but more importantly, very fast aircraft, described by [Generalfeldmarschall Erhard Milch](#) himself as "...holding its own in speed and altitude with the [P-38](#) and it does not suffer from engine reliability issues". The Do 335 was scheduled to begin mass construction, with the initial order of 120 preproduction aircraft to be manufactured by *Dornier-Werke* [Friedrichshafen](#) (DWF) to be completed no later than March 1946. This number included a number of bombers, destroyers (heavy fighters), and several yet to be developed variants. At the same time, *Dornier-Werke* [München](#) (DWM) was scheduled to build over 2,000 Do 335s in various models, due for delivery in March 1946 as well.

On 23 May 1944, [Hitler](#), as part of the developing [Jägernotprogramm](#) (Emergency Fighter Program) directive, which took effect on 3 July, ordered maximum priority to be given to Do 335 production. The main production line was intended to be at [Manzell](#), but a bombing raid in March destroyed the tooling and forced Dornier to set up a new line at [Oberpfaffenhofen](#). The decision was made, along with the rapid shut-down of many other military aircraft development programs, to cancel the [Heinkel He 219 night fighter](#), which also used the DB 603 engines (in well-[unitized installations](#)), and use its production facilities for the Do 335 as well. However, [Ernst Heinkel](#) managed to delay, and eventually ignore, its implementation, continuing to produce examples of the He 219A.

At least 16 prototype Do 335s were known to have flown (V1–V12, *W.Nr* 230001-230012 and *Muster*-series prototypes M13–M17, *W.Nr* 230013-230017) on a number of DB603 engine subtypes including the DB 603A, A-2, G-0, E and E-1. The first preproduction Do 335 (A-0s) starting with *W.Nr* 240101, *Stammkennzeichen* VG+PG, were delivered in July 1944. Approximately 22 preproduction aircraft were thought to have been completed and flown before the end of the war, including approximately 11 A-0s converted to A-11s for training purposes. One such aircraft was transferred to the [Royal Aircraft Establishment](#) at [Farnborough](#), and later, after a rear-engine fire burnt through the elevator controls during a flight, crashed onto a local school.

Flight tests



Do 335 tested in the US, and today the only surviving example

The first 10 **Do 335 A-0s** were delivered for testing in May. By late 1944, the **Do 335 A-1** was on the production line. It was similar to the A-0 but with the uprated DB 603E-1 engines of some 1,324 kW (1,776 hp) take-off power rating apiece on 87 octane "B4" [lignite](#)-derived [synthetic fuel](#), and two underwing [hardpoints](#) for additional [bombs](#), [drop tanks](#) or guns. It had a maximum speed of 763 km/h (474 mph) at 6,500 m (21,300 ft) with [MW 50](#) boost, or 686 km/h (426 mph) without boost, and climbed to 8,000 m (26,000 ft) in under 15 minutes. Even with one engine out, it reached about 563 km/h (350 mph). Delivery commenced in January 1945. When the [United States Army](#) overran the Oberpfaffenhofen factory in late April 1945, only 11 Do 335 A-1 single-seat [fighter-bombers](#) and two Do 335 A-12 [trainers](#) had been completed.

French ace [Pierre Clostermann](#) claimed the first Allied combat encounter with a *Pfeil* in April 1945. He describes leading a flight of four [Hawker Tempests](#) from [No. 3 Squadron RAF](#) over northern Germany when they came across an unknown aircraft whose description matched the Do 335's, flying at maximum speed at treetop level. Detecting the British aircraft, the German pilot reversed course to evade. Two pilots fired on the Dornier but Clostermann, despite the Tempests' considerable low altitude speed, decided not to attempt to chase it as it was obviously much faster.

Do 635

In 1944, [Junkers](#) helped Dornier with work on the Do 335 Zwilling or Dornier Do 635. A meeting was arranged between Junkers and [Heinkel](#) engineers, and after the meeting, they began work on the project, named 1075 01-21. The designer, Professor [Heinrich Hertel](#), planned a test flight in late 1945. At the end of 1944, the Germans reviewed aircraft designs with the Japanese military. Among other projects, the Do 635 impressed the Japanese military with its capabilities and design. This design consisted of two Do 335 fuselages, joined by a common centre wing section, with two [Rb 50](#) cameras in the port fuselage for aerial photography. Armament was confined to provision for five 60 kg (130 lb) photo-flash bombs. The mainwheels were common with [Ju 352](#) wheels. It was also intended that two monopropellant [Walter Starthilfe RATOG](#) units would be fitted. In early 1945, a wind-tunnel model was tested, and a cockpit mockup was constructed, but the project was cancelled in February 1945, due to the desperate war situation.

P 256

The P 256 was to meet a *Luftwaffe* requirement issued 27 February 1945. It was designed to carry a crew of three (pilot, radar operator, and navigator), with pilot and radar operator together under the canopy, while the navigator was in the fuselage, an idea copied from [Arado](#). Departing from centerline thrust, it was to have two [Heinkel HeS 011](#) engines of 12.7 kN (2,900 lbf) each, podded under the wings in the fashion of the [Me 262](#). The low-mounted wing was unswept, and had an [aspect ratio](#) of 5.8:1. Designed armament was four 30 mm (1.2 in) [MK 108](#) cannon in the nose. A field conversion kit was to retrofit two MK 108s in a [Schräge Musik](#) configuration. A fighter-bomber variant would have carried two 500 kg (1,100 lb) bombs. Its loaded weight would have included 3,750 kg (8,270 lb) of fuel, giving a wing loading of 276 kg/m² (57 lb/sq ft). Maximum speed was achieved at 8,000 m (26,000 ft), maximum range at 6,000 m (20,000 ft). Endurance with 4,000 kg (8,800 lb) fuel was calculated as 2.6 hours. Its electronics would have included FuG 24SE with ZVG 24, FuG 29, FuG 25a or c, and FuG 244 *Bremen* with *Gnome* weapon triggers. Criticized for having poor cross-sectional area and unduly large tail surfaces, it was not adopted.

Variants



Dornier Pfeil

Built

- **Do 335 A-0** : 10 pre-production aircraft.
- **Do 335 A-1** : Single-seat fighter-bomber aircraft.

Proposed

- **Do 335 A-2:** single-seat fighter-bomber aircraft with new weapon sights, later proposed longer wing and updated 1,471 kW (1,973 hp) DB603L engines.
- **Do 335 A-3:** single-seat reconnaissance aircraft built from A-1 aircraft, later proposed with longer wing.
- **Do 335 A-4:** single-seat reconnaissance aircraft with smaller cameras than the A-3
- **Do 335 A-5:** single-seat night fighter aircraft, later night and bad weather fighter with enlarged wing and DB603L engines.
- **Do 335 A-6:** two-seat night fighter aircraft, with completely separate second cockpit located above and behind the original.
- **Do 335 A-7:** A-6 with longer wing.
- **Do 335 A-8:** A-4 fitted with longer wing.
- **Do 335 A-9:** A-4 fitted with longer wing, DB603L engines and pressurized cockpit.
- **Do 335 B-1:** abandoned in development.
- **Do 335 B-2:** single-seat destroyer aircraft. Fitted with 2 additional MK 103 in the wings and provision to carry two standard Luftwaffe 300 litre (80 US gal) [drop tanks](#).
- **Do 335 B-3:** updated B-1 but with longer wing.
- **Do 335 B-4:** update of the B-1 with longer wing, DB603L engine.
- **Do 335 B-6:** night fighter.
- **Do 335 B-12:** dual-seat trainer version for the B-series aircraft.
- **Do 435:** a Do 335 with the redesigned, longer wing. Allied intelligence reports from early May 1945 mention spotting a Do 435 at the Dornier factory airfield at Lowenthal.
- **Do 535:** actually the He 535, once the Dornier P254 design was handed over to Heinkel in October 1944; fitted with jet engine in place of rear piston engine^[9]
- **Do 635:** twin-fuselaged long-range [reconnaissance](#) version. Also called Junkers Ju 635 or Do 335Z. Mock up only.
- **P 256:** turbojet nightfighter version, with two podded [HeS 011](#) turbojet engines, based on Do 335 airframe.

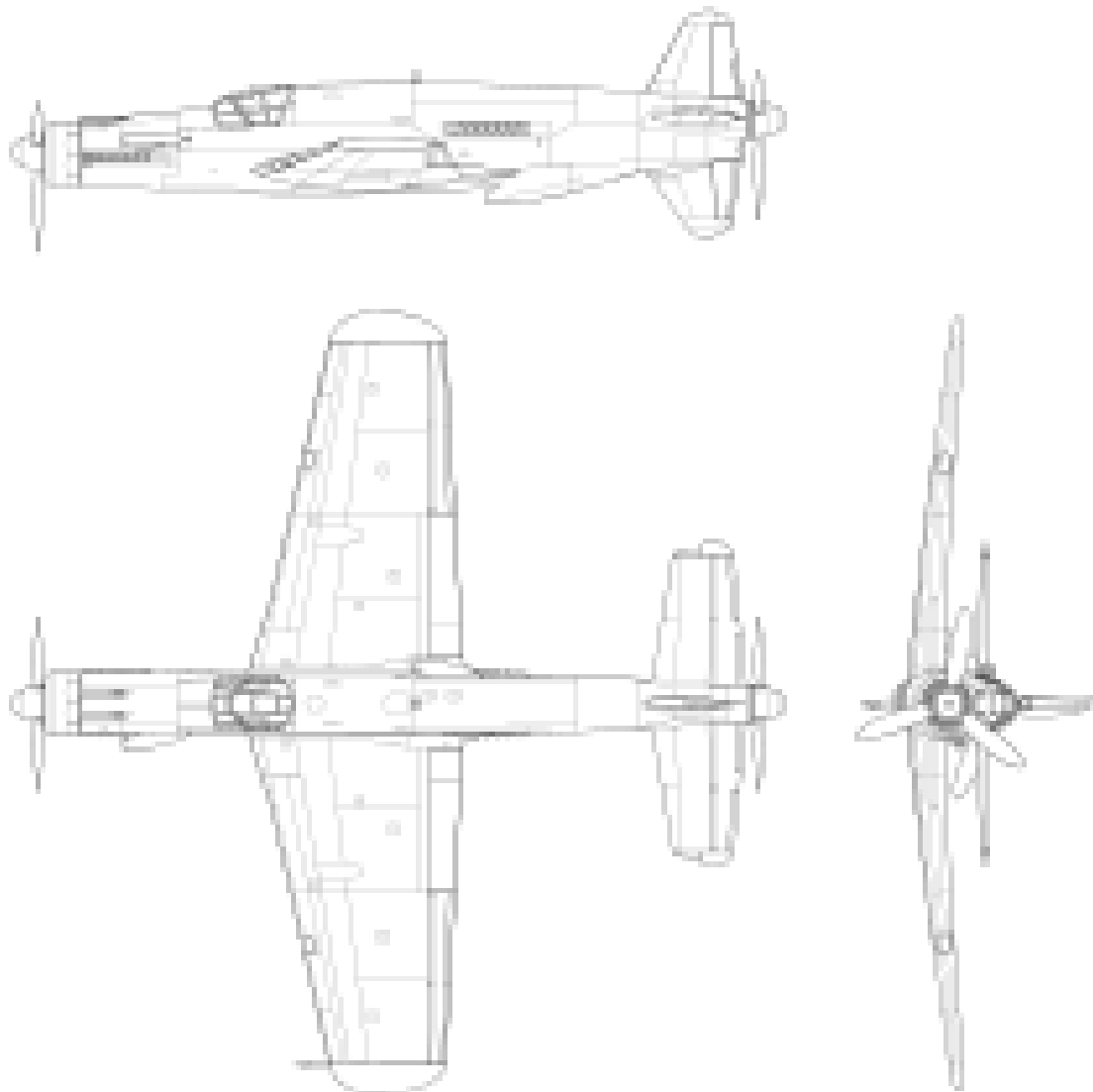
Surviving aircraft

Only one Do 335 survives, the second preproduction Do 335 A-0, designated **A-02**, with construction number (*Werknummer*) 240 102, and factory radio code registration, or *Stammkennzeichen*, of VG+PH. The aircraft was assembled at the Dornier plant in [Oberpfaffenhofen](#), [Bavaria](#) on 16 April 1945. It was captured by Allied forces at the plant on 22 April 1945. VG+PH was one of two Do 335s to be shipped to the United States aboard the [Royal Navy escort carrier HMS Reaper](#), along with other captured German aircraft, to be used for testing and evaluation under a USAAF program called "[Operation Lusty](#)". One Do 335 (registration FE-1012) went to the USAAF and was tested in early 1946 at [Freeman Field](#), [Indiana](#), USA. Its fate is not recorded.

VG+PH went to the Navy for evaluation and was sent to the Test and Evaluation Center, [Patuxent River Naval Air Station](#), [Maryland](#), USA. Following testing from 1945 to 1948, the aircraft languished in outside storage at [Naval Air Station Norfolk](#). In 1961, it was donated to the Smithsonian's National Air Museum, though it remained in deteriorating condition at Norfolk for several more years before being moved to the [National Air and Space Museum's storage facility](#) in [Suitland, Maryland](#). In October 1974, VG+PH was returned to the Dornier plant in Oberpfaffenhofen, Germany (then building the [Alpha Jet](#)) for a complete restoration. In 1975, the aircraft was restored by Dornier employees, many of whom had worked on the airplane originally. They were surprised that the explosive charges built into the aircraft to blow off the dorsal fin and rear propeller prior to pilot ejection were still installed and active 30 years later.

Following restoration the completed Do 335 was displayed at the [Hannover, Germany](#) Airshow from 1 May to 9 May 1976. After the air show, the aircraft was loaned to the [Deutsches Museum](#) in [Munich](#), where it was on display until 1988, when it was shipped back to Silver Hill, [Maryland](#). VG+PH can be seen today in the [Steven F. Udvar-Hazy Center](#) of the [National Air and Space Museum](#) alongside other unique late-war German aircraft that also accompanied the Do 335 aboard the [Royal Navy escort carrier HMS Reaper](#) for shipment to the [United States](#) nearly eight decades earlier, such as the only known example of the [Arado Ar 234](#) B-2 *Blitz* jet reconnaissance-bomber, and the fully restored fuselage and tail surfaces of the only complete surviving [Heinkel He 219A Uhu](#) (Eagle-Owl) night fighter (the wings and engines/nacelles are still undergoing restoration).

Specifications (Do 335 A-1)



General characteristics

- **Crew:** 1
- **Length:** 13.85 m (45 ft 5 in)
- **Wingspan:** 13.8 m (45 ft 3 in)
- **Height:** 5 m (16 ft 5 in)
- **Wing area:** 38.5 m² (414 sq ft)
- **Airfoil:** root: [NACA 23018-630](#); tip: [NACA 23012-635](#)
- **Empty weight:** 7,260 kg (16,006 lb)
- **Gross weight:** 9,600 kg (21,164 lb)

A-6 10,085 kg (22,234 lb)

- **Fuel capacity:** 1,230 L (320 US gal; 270 imp gal) main fuel tank (single-seat) with various extra tankage in the weapons bay and wings, depending on variant
- **Powerplant:** 2 × [Daimler-Benz DB 603E-1](#) V-12 inverted liquid-cooled piston engines, 1,342 kW (1,800 hp) each for take-off

1,417 kW (1,900 hp) at 1,800 m (5,900 ft)

- **Propellers:** 3-bladed VDM, 3.5 m (11 ft 6 in) diameter [constant-speed](#) tractor and pusher propellers

Performance

- **Maximum speed:** 763 km/h (474 mph, 412 kn) at 6,500 m (21,300 ft)

A-6 690 km/h (430 mph; 370 kn) at 5,300 m (17,400 ft)

- **Cruise speed:** 685 km/h (426 mph, 370 kn) at 7,200 m (23,600 ft)
- **Economical cruise speed:** 452 km/h (281 mph; 244 kn) at 6,000 m (20,000 ft)
- **Range:** 1,395 km (867 mi, 753 nmi) on full internal fuel at max. continuous power

2,060 km (1,280 mi; 1,110 nmi) at economical cruise power

- **Service ceiling:** 11,400 m (37,400 ft)
- **Time to altitude:** 1,000 m (3,300 ft) in 55 seconds ; 8,000 m (26,000 ft) in 14 minutes 30 seconds

Armament

- **Guns:** 1 × engine mounted 30 mm (1.18 in) [MK 103 cannon](#) with 70 rounds plus 2 × 20 mm (0.79 in) [MG 151/20](#) cowl-mount, synchronized [autocannon](#) with 200 rpg
- **Bombs:** Up to 1,000 kg (2,200 lb) bombload in internal weapons bay and two underwing pylons

source : https://en.wikipedia.org/wiki/Dornier_Do_335