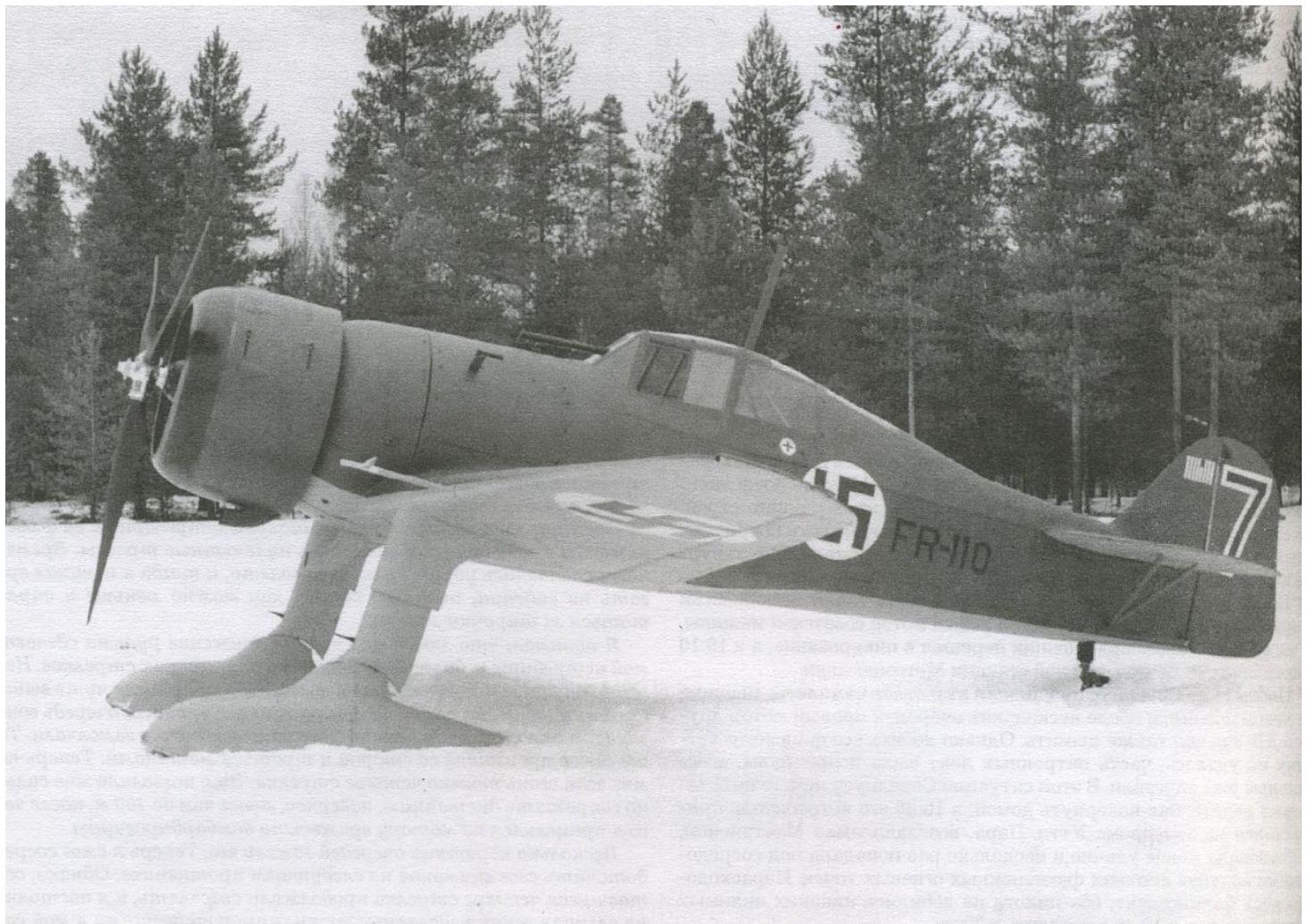


Fokker D.XXI



Fokker D.XXI-3 finlandais

Pendant l'entre-deux-guerres, la KNIL était une force aérienne coloniale, indépendante de l'armée hollandaise. Elle réclama en 1934 un nouvel avion de chasse. Le 14 novembre, Fokker lui proposa un projet d'avion de chasse conçu par Erich Schatzki. Cet appareil reprenait des concepts éprouvés sur de précédents modèles comme le C.X ou le D.XVII, et en même temps des concepts nouveaux. Cela donnait donc un monoplan à ailes basses, avec un cockpit fermé, mais avec un train fixe et classique. Le fuselage était en tubes d'acier, les ailes en bois, le tout recouvert de toile sauf pour les bords de fuite, en aluminium. On envisageait même des canons de 20 mm en plus des mitrailleuses. Le travail initial ayant été mené avec l'aide de Rolls-Royce, un moteur Kestrel IV de 650 hp était prévu. Les performances attendues étaient une vitesse de 420 km/h en altitude, un plafond de 10000 mètres et une distance franchissable de 888 km. Un contrat fut signé début 1935 pour la fourniture d'un prototype. Celui-ci reçut l'immatriculation FD-322 et un moteur Bristol Mercury VI-S de 645 hp, actionnant une hélice tripale. Il effectua son vol inaugural le 27 mars 1936 à Eindhoven, avec Emil Meinecke aux commandes. Mais entre-temps, la KNIL préféra acquérir des bombardiers à la place et abandonna l'idée. En 1937, la Finlande s'intéressa à cet appareil et en commanda un premier lot de 7 appareils, qui allaient être suivis d'une construction sous licence qui commença en juin 1938. Cela aida sans doute à convaincre le gouvernement hollandais à commander, la même année, un lot de 36 exemplaires, destinés à son armée de l'air. Le moteur avait été changé pour un Mercury VIII nettement plus puissant, le même qui équipait le Fokker G.1. Le premier D.XXI de série pour la Hollande effectua son vol inaugural le 20 juillet 1938. Le dernier exemplaire fut livré le 8 septembre 1939. Pour la Hollande, c'était un saut technologique : en effet, elle avait jusqu'ici des biplans à cockpit ouvert pour la chasse. Le D.XXI était même capable d'atteindre les 700 km/h en piqué.



Fokker D.XXI aux couleurs de la Luftwaffe

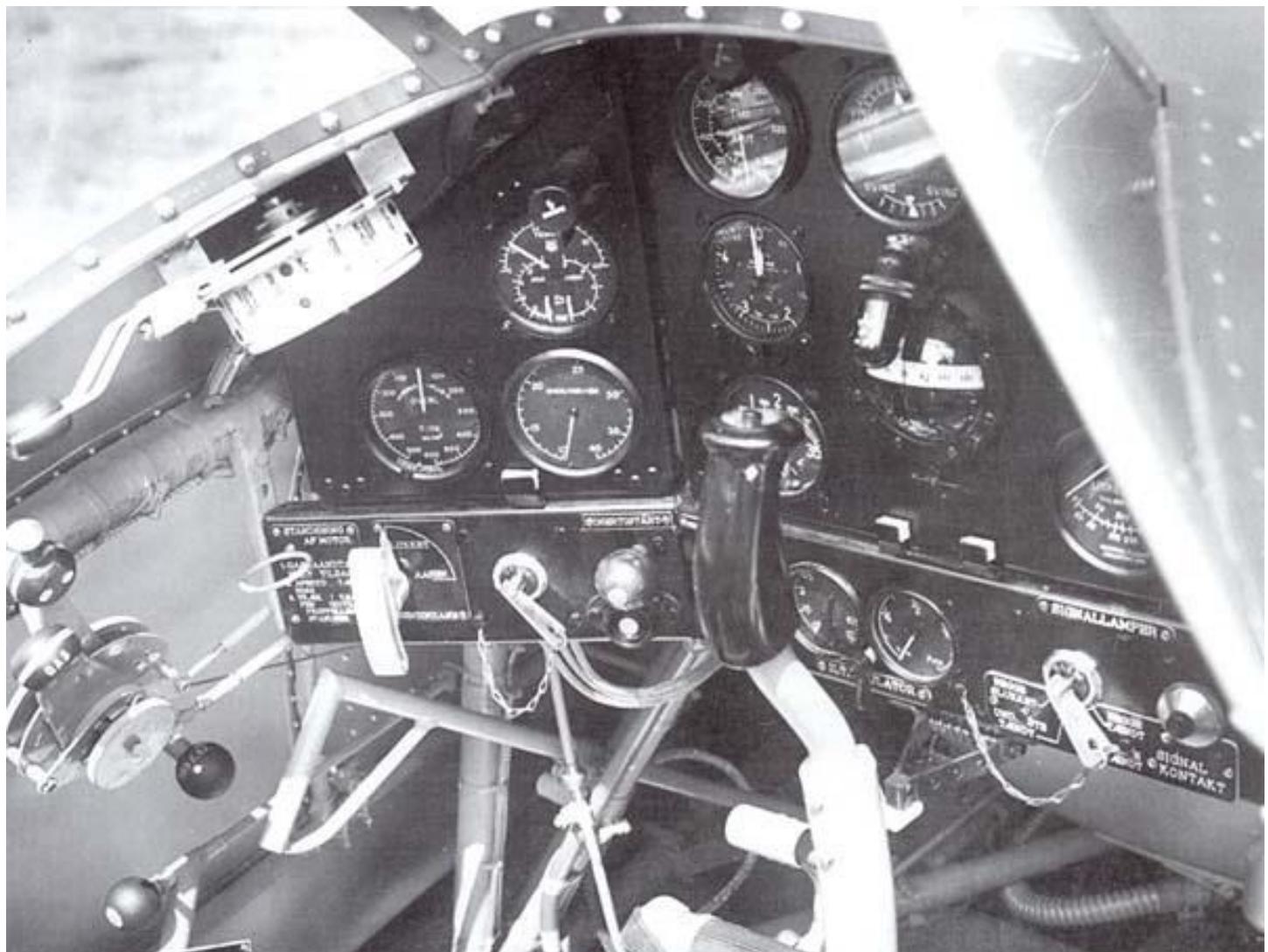
La seconde république espagnole acquit la construction sous licence du D.XXI. Elle put assembler 50 fuselages avant que son usine d'El Carmoli ne soit occupée par les nationalistes. D'après certaines sources, un seul exemplaire se serait échappé par la voie des airs, les autres ne volèrent jamais. De son côté, le Danemark acheta 2 D.XXI en juillet 1937 ainsi qu'une licence de construction. 10 exemplaires furent fabriqués par la manufacture royale de l'Armée à Copenhague en 1939. Ils furent tous détruits avant d'avoir pu décoller lors de l'invasion d'avril 1940. La France lui préféra le Koolhoven FK.58 pour ses colonies en Indochine : bien que plus performant, elle lui reprochait d'être trop dépendant de fournitures allemandes. Chaque client pouvait installer l'armement de son choix sur le D.XXI : Les Danois avaient optés pour deux canons Madsen de 20 mm et 2 mitrailleuses, tandis que les Néerlandais (et les Finlandais) s'en tenaient à 4 mitrailleuses. Il semblerait d'ailleurs que les Néerlandais n'ayant pas encore de viseur pour ces mitrailleuses, les pilotes durent en bricoler un eux-mêmes avec les moyens du bord. Fokker de son côté lança plusieurs projets pour remotoriser le D.XXI, avec un Bristol Hercules (projet 150), un Rolls-Royce Merlin (projet 151) ou un Daimler-Benz DB 600H (projet 152), mais aucun ne fut mené à bout. Bien que dépassé face au Bf 109, le D.XXI semble avoir tiré son épingle du jeu lors de l'invasion allemande en mai 1940. Sur les 36 exemplaires en service, 28 étaient alors opérationnels. Le 10 mai, 6 d'entre eux escortant des Fokker T.V furent pris à partie par 9 Bf 109. 1 appareil fut abattu de chaque côté, plus 2 Messerschmitt endommagés. Le même jour, 37 Ju 52 sur les 55 qui essayaient de franchir la frontière au petit matin furent abattus. Le lendemain, 2 autres Bf 109 au moins furent abattus. Le D.XXI, bien que plus lent et plus faiblement armé que le Bf 109, se révélait plus maniable. Ce fut même un des rares avions à pouvoir suivre un Ju 87 en piqué. Bref, s'il n'était pas fait pour l'interception à haute altitude, c'était un bon dog-fighter.



Fokker D.XXI néerlandais, réplique vue de côté

Mais l'écrasante supériorité numérique de la Luftwaffe et ses bombardements firent qu'au moment de la capitulation, seulement 8 D.XXI restaient en état de vol. Ils furent détruits pour éviter leur capture. Au total, 8 D.XXI avaient été descendus au combat, 8 autres détruits au sol. D'autres exemplaires furent capturés par la Luftwaffe, mais on ignore ce qu'ils sont devenus même si on prétendu qu'ils furent remis en service. Le site <http://www.luftarchiv.de/> montre une unique photo de D.XXI aux couleurs allemandes, sans immatriculation apparente. Ce furent les Finlandais qui utilisèrent le D.XXI en premier et le plus longtemps. La guerre avec la Russie Soviétique, la fameuse guerre d'hiver, commença le 30 novembre 1939. Les Finlandais disposaient alors de 41 D.XXI. L'un d'eux remporta sa première victoire le 1er décembre en abattant un Tupolev SB. Au total, 12 D.XXI furent perdus pendant la guerre d'hiver, dont 6 par accident. Sa construction rustique, son moteur en étoile et son train fixe correspondaient parfaitement aux dures conditions climatiques prévalant en Finlande. L'apparition de nouveaux chasseurs soviétiques montra que le D.XXI était sous-motorisé et sous-armé, mais les améliorations tentées ne furent pas suivies d'effet. Il semblerait qu'un exemplaire ait été équipé d'un train rétractable, sans améliorer notablement les performances. Au contraire, le train fixe était mieux adaptés aux terrains peu préparés, et plus facilement compatible avec des skis. Un autre exemplaire aurait vu 2 de ses mitrailleuses remplacées par 2 canons de 20 mm, mais pour une raison inconnue les autres exemplaires n'ont pas été équipés de la même manière. En revanche, le dernier lot de D.XXI construits en Finlande (de 1941 à 1944) fut motorisé avec un Pratt & Whitney R-1535-SB4C-G Twin Wasp Junior de 825 hp (acquis en Suède) qui remplaçait le Mercury VIII de... 830 hp. La Finlande ayant construit 93 D.XXI au total, qui équipèrent pas moins de 7 escadrons, ceux-ci reprirent du service pendant la guerre de continuation (1941-1944). Plusieurs pilotes finlandais devinrent as sur le D.XXI, dont Jorma Sarvanto avec 12 victoires. Au total, les Finlandais revendiquèrent pas moins de 200 victoires sur cet appareil. La Finlande conserva ses D.XXI en service jusqu'en 1949. L'unique réel survivant du D.XXI est le FR-110 du Musée de l'aviation de Finlande centrale (un D.XXI-3 donc). C'est celui qui a engrangé le plus de victoires, 10 au total. Le musée officiel de la force aérienne hollandaise dispose d'une réplique grandeur nature.

Une épave (moteur et poste de pilotage) est exposée par la Crash Foundation aux Pays-Bas. Enfin, Jack van Egmond, un vétéran de la restauration, est en train de construire une réplique de D.XXI destinée à prendre l'air. Il dispose de 397 des 416 plans d'origine.



The [Fokker D.XXI](#) [fighter](#) was designed in 1935 by Dutch aircraft manufacturer [Fokker](#) in response to requirements laid out by the [Royal Netherlands East Indies Army Air Force](#) (*Militaire Luchtvaart van het Koninklijk Nederlands-Indisch Leger*, ML-KNIL).^[1] The D.XXI was designed as an inexpensive, rugged, and compact fighter aircraft that would possess respectable performance for its era. Entering operational use in the early years of the [Second World War](#), it provided yeoman service for both the [Luchtvaartafdeling](#) (Dutch Army Aviation Group) and the [Finnish Air Force](#). Additionally, a few examples were constructed by the [El Carmolí](#) factory before it fell into [rebel](#) hands during the [Spanish Civil War](#). Following the [invasion and occupation of the Netherlands](#) in May 1940, several captured Dutch D.XXIs were subsequently placed into service with the [Luftwaffe](#).

Development

Origins

On 14 November 1934, design proposals for a new fighter aircraft were submitted by Fokker to the [Luchtvaartafdeling](#) (Dutch Army Aviation Group).^[2] Fokker's design team, led by Erich Schatzki, and based at the firm's newly completed plant in the southern district of [Amsterdam](#), had sought to incorporate and combine various new concepts and recent features from successful fighter aircraft, including the previous [C.X](#) and [D.XVII](#) aircraft. The proposed aircraft was a low-wing [monoplane](#) which adopted an entirely enclosed [cockpit](#); initial design work had been conducted in cooperation with British engine manufacturer [Rolls-Royce](#), and it had been originally envisaged that the type would be powered by a [Rolls-Royce Kestrel IV](#).^[2] Projections of the aircraft's performance included a maximum speed of 420 km/h at an altitude of 4,350 meters, a range of 888 km, and an altitude ceiling of 10,000 meters. The planned armament included [rifle](#)-calibre [machine guns](#) or 20mm [cannons](#), which were to be embedded into the wings and fuselage.^[2]



Fokker D.XXI Prototype

In early 1935, the Luchtvaartafdeling signed a contract for a single prototype of the proposed fighter to be constructed for an evaluation to be performed by the [Royal Netherlands East Indies Army](#).^[2] This prototype, designated FD-322, which was powered by a single [Bristol Mercury VI-S radial engine](#) which drove a three-blade, two-pitch [propeller](#), performed its [maiden flight](#) at [Welschap Airfield, Eindhoven](#), on 27 March 1936.^[3] According to aviation author G.H. Kamphuis, the prospects for series production of the new fighter looked doubtful shortly after the first flight was performed due to a high level change in Dutch defence policy; [Minister for Foreign Affairs Hendrik Colijn](#) informed the Ministry of War that, in response to the changing international situation, a higher priority would be placed on building up a substantial bomber capability over new fighter aircraft.^[4] The change in policy emphasising bombers over fighters was somewhat controversial, in part due to order for new fighters and reconnaissance aircraft being both under consideration at this time, while a requirement for a new training aircraft had also been identified.^[4] In addition to the Luchtvaartafdeling's interest in a trainer aircraft, the service had also attached great importance to the concept of a heavily armed 'cruiser' aircraft capable of performing multiple mission types.^[4] Further doubts and confusion were added by the emergence of a competing aircraft proposal in the form of the [Koolhoven F.K.58](#), which had also been designed by Ir. Schatzki. The F.K.58 was somewhat more advanced than the D.XXI, possessing a retractable undercarriage and a higher top speed of 520 kmh.^[4] It was decided that the D.XXI and F.K.58 should participate in a series of comparative tests against one another, leading to the D.XXI prototype being dispatched to [Soesterberg Air Base, Utrecht](#), in November 1936. However, head-to-head testing between the two types was delayed by the F.K.58, which did not perform its first flight until September 1938.^[4]

Into production

During 1937, the Dutch government gave funding and its approval for a limited expansion of the Army Aviation Group, which resulted in an order being placed for 36 Fokker D.XXI fighters, to be powered by the 830 h.p. Bristol Mercury VII or VIII engines.^[4] According to Kamphuis, Dutch interest in the D.XXI had been revived, in part, due to an examination of the first aircraft by an evaluation board, which itself had been conducted due to interest expressed by the [Finnish Air Force](#), which itself would result in export sales being made to Finland.^[4] On 20 July 1938, the first Luchtvaartafdeling D.XXI conducted its first flight, after which it participated in test flights prior to deliver to Soesterberg. On 8 September 1939, the final aircraft of the first batch of 36 was delivered.^[4] Even as the domestic demand for the D.XXI was being questioned, the type had attracted the attention of a number of foreign governments.^[5] In 1937, the Finnish government decided to place an order for an initial batch of seven aircraft, further negotiations were also conducted towards the acquisition of a manufacturing license, under which Finland proceeded to domestically produce further aircraft as well. Between 1939 and 1944, the State Aircraft Factory (Valtion Lentokonetehdas) at [Tampere](#) manufactured a total of 93 aircraft.^[6] Throughout 1940 and 1941, the Finnish State Aircraft Factory set about reconditioning the aircraft that had been used in the [Winter War](#) for continued service; an additional 50 D.XXIs were ordered in 1941, which were powered by the [Pratt & Whitney R-1535 Twin Wasp Junior](#) engine, acquired via Sweden.^[7] These can be identified by their longer cockpit glazing, smooth cowl, and large ventral air intake under the cowl. The two fuselage-mounted machine guns on these D.XXIs were relocated in the wings and the vertical tail surface was increased in size to offset the new engine. Owing to the increased loaded weight, the R-1535-powered D.XXI had a slightly reduced performance and was not as maneuverable as the Mercury-powered versions.^[7] In 1944, five additional Finnish D.XXIs were assembled from spares.^[8] The [Danish](#) government ordered a pair of D.XXI fighters along with arrangements for its own manufacturing license.^[6] The Danish D.XXI fighters were powered by a 645 h.p. Bristol Mercury VI-S radial and carried a [Madsen 20 mm cannon](#) under each wing. Ten aircraft were completed by the Royal Army Aircraft Factory in [Copenhagen](#) prior to the [German invasion of Denmark](#) in April 1940.^[6] The [Second Spanish Republic](#) also acquired a manufacturing license for the D.XXI. Reportedly, a total of 50 fuselages were manufactured on the Spanish production line; however, the Spanish plant in which the fighter was being produced was overrun by [Nationalist forces](#) before any of the Spanish-built aircraft were completed. Some sources say that a single Spanish D.XXI managed to escape capture after the production facility was captured.^[6]

Design



Preserved forward fuselage of a crashed Fokker D.XXI

The Fokker D.XXI was a low-wing monoplane fighter aircraft.^[2] Following standard Fokker design practice of the period, it featured a welded steel tube fuselage that was largely covered by [fabric](#), including the [flight control surfaces](#); element forward of the [trailing edges](#) of the wings were covered by detachable [aluminum](#) panels instead. The wings were of a wooden construction, being composed of two box [spars](#) attached to [ribs](#) made of [plywood](#).^[2] The aircraft was outfitted with a fixed spatted undercarriage with cantilever legs; braking was provided by independently-operated pedals using compressed air.^[2] The cockpit of the D.XXI was fully enclosed by a [plexiglas](#) hood featuring large sliding sections, and was entirely jettisonable in an emergency situation to enable pilots to [bail out](#).^[2] Pilots were protected against turnover injuries by means of a pylon built into the structure of the aircraft set behind the seat. Fuel was housed in a 350-litre (77 imp gal) tank located aft of the engine, wing-mounted auxiliary fuel tanks could also be installed.^[2] The main armament consisted of two pairs of 7.92mm [M36 FN-Browning machine guns](#), one pair housed within the wings, carrying 300 rounds of ammunition each, and the other pair within the forward fuselage and shooting through the propeller blades, carrying 500 rounds each.^[2] Upon its entry to service in 1938, the D.XXI represented a significant leap forward for the Dutch Army Aviation Group, whose fighter force had until that time consisted of aging biplanes with open cockpits.

The new Fokker quickly proved to be an extremely sturdy aircraft, being capable of attaining a speed of 700 km/h in a dive. During the early production of the D.XXI, Fokker's design office considered a number of developments to the basic design, including a wing re-design. A number of alternative engines were considered, including such power plants as the 650 hp (480 kW) [Rolls-Royce Kestrel V](#) and the 750 hp (560 kW) Pratt and Whitney Twin Wasp Junior. During 1938, work on three extensively modified versions known as the 150, 151 and 152 were initiated. These aircraft were to be powered by the 1,375 hp (1,025 kW) [Bristol Hercules](#), the 1,050 hp (780 kW) [Rolls-Royce Merlin](#) and the 1,090 hp (810 kW) [Daimler-Benz DB 600H](#). Retractable landing gear was incorporated into these redesigns.

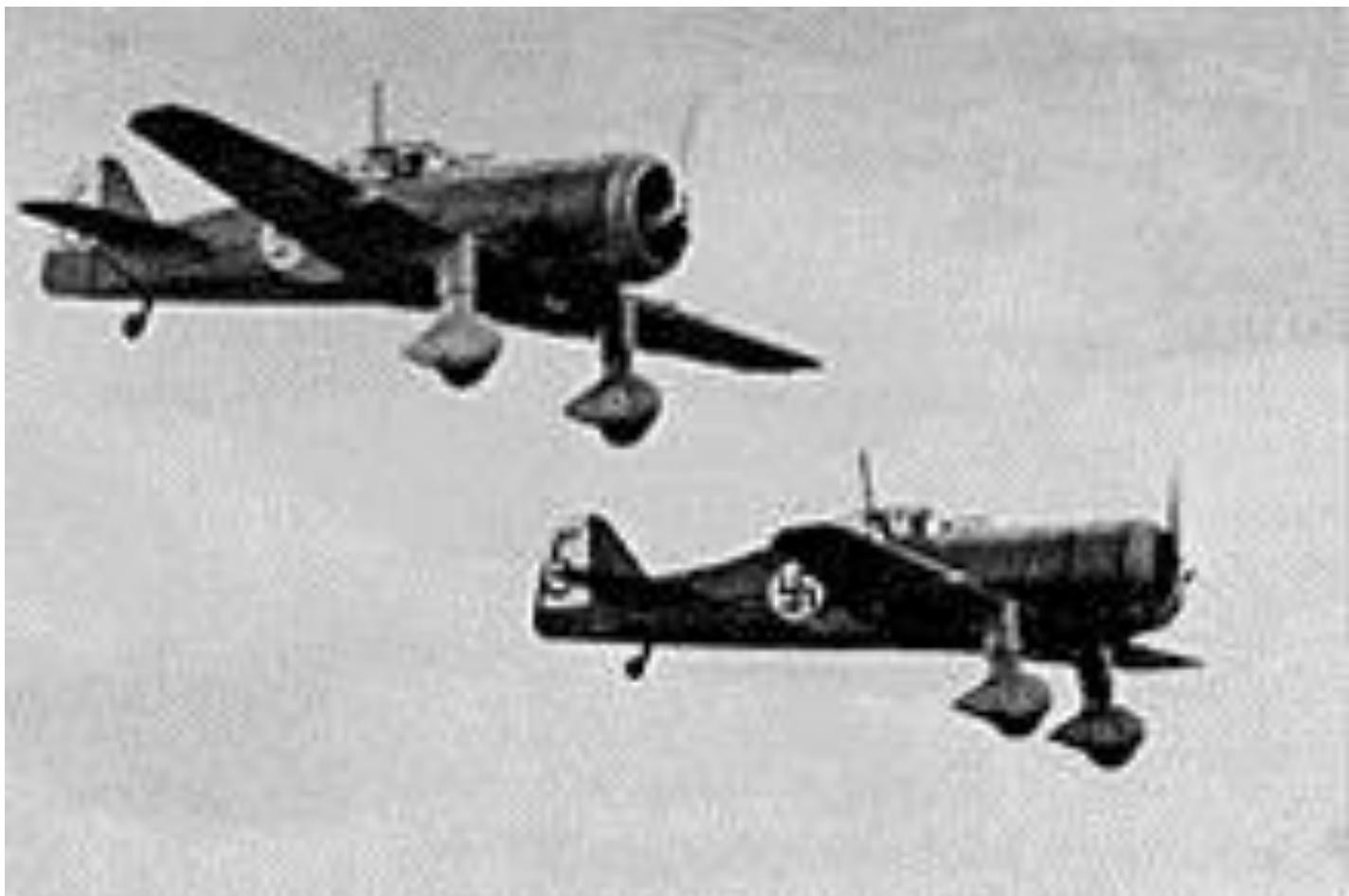
Operational history



A Fokker D.XXI, August 1942

The Fokker D.XXI was first used in combat by the [Finnish Air Force](#) during the 1939–1940 [Winter War](#) between the [Soviet Union](#) and Finland.^[9] Upon the war's outbreak, a total of 41 aircraft were in Finnish service, all powered by the Mercury VIII engine. On 1 December 1939, the D.XXI achieved its first victory with the shooting down of a Soviet [Tupolev SB](#).^[9] The Fokker was evenly matched against the aircraft of the [Soviet Air Force](#), and its rugged design with a [radial engine](#) and fixed [undercarriage](#) made it well suited for Finnish conditions. The performance of the Finnish D.XXI allegedly won the admiration of many Soviet pilots.^[9] As the Winter War continued and newer models of Soviet fighters appeared, the Fokker D.XXI proved to be increasingly underpowered and too lightly armed (with only four 7.92 mm/.312 in [machine guns](#)) to compete; plans to arm the Fokkers with 20 mm cannons were dropped, and only one fighter was armed with two 20 mm cannons and two 7.92 mm/.312 in machine guns. Another fighter was equipped with retractable landing gear, but due to less than anticipated performance improvement was not continued in the series. The fixed undercarriage lent itself to both unimproved runways and conversion to skis for winter use, both of which were advantages in the Finnish theater. A total of 12 D.XXI aircraft were lost during the conflict, six being lost to accidents rather than enemy action.^[10]

The conflict between Finland and the Soviet Union was resumed in the [Continuation War](#) (1941–1944), the D.XXI was again a key element of the Finnish Air Force.^[7] During the first air battle, six Mercury-engined D.XXIs shot down a pair of Soviet [Ilyushin DB-3](#) bombers. Several Finnish Air Force pilots became [fighter aces](#) with the Fokker D.XXI. The top scoring Fokker ace, [Jorma Sarvanto](#), obtained 12 5/6 victories with the type; many other future aces also scored at least one victory with the Fokker. The highest scoring airframe was FR-110, achieving 10 victories; this aircraft survived the war and is on display at the [Central Finland Aviation Museum](#). Finland continued to operate their D.XXIs until 1949, and classified them as surplus to requirements in 1952.^[8]



Pair of Finnish Air Force Fokker D.XXI in flight



Finnish D.XXI equipped with skis.

Although the order by the ML-KNIL was cancelled, the [Luchtvaartafdeling](#) (Dutch Army Air Force before World War II) placed an order of 36 aircraft, which were all delivered in time to participate in the [war against the Germans](#) in May 1940.^[8] On 10 May 1940, the day that Germany launched its invasion of the Netherlands, 28 D.XXIs were serviceable and ready for operations. That first day, six D.XXIs escorted a formation of [Fokker T.V](#) bombers to attack the [Meuse bridges](#) to hinder the German advance; they were intercepted by nine German [Messerschmitt Bf 109s](#), and during the ensuing [dogfight](#), one Bf 109 was shot down and two more damaged for the loss of one D.XXI and two T.Vs.^[8] That same day, a flight of D.XXIs intercepted and shot down 37 out of 55 inbound [Junkers Ju 52](#) transports which had crossed the border during the early morning.^[11]



Damaged D.XXI in 1943.

Due to many aircraft becoming unserviceable as a result of battle damage after the first day, it was decided to regroup at [Buiksloot](#), north of Amsterdam, on 11 May. For the following four days, missions out of Buiksloot were flown by D.XXIs flying in both solo and small formations to escort friendly units as well as in the search-and-destroy role.^[8] On 11 May, at least two Bf 109s were recorded as having been shot down by D.XXI fighters.^[8] Sorties against the numerically superior German forces continued until the middle of 14 May, at which point news of the Dutch capitulation reached Buiksloot, upon which both the remaining aircraft and the airstrip were destroyed to prevent their use by the Germans. Out of the original force of 28 D.XXI aircraft, eight fighters had remained airworthy.^[11] The D.XXI, although much slower and more lightly armed than the Bf 109, performed surprisingly well in combat due to its manoeuvrability. It was also one of the few aircraft that could follow a [Stuka](#) bomber into its dive. Nonetheless, the numerical superiority of the [Luftwaffe](#) led to the destruction of most *Luchtvaartafdeling* D.XXI fighters during the campaign. Some were captured during and after 15 May, but their later fates are unknown.^[12] The LVA (Netherlands Air Force) scored a total of 38 victories against the Luftwaffe during their struggle against the German juggernaut. 16 of those went to Fokker D.XXI pilots.

Source : https://en.wikipedia.org/wiki/Fokker_D.XXI