

PROFILE PUBLICATIONS

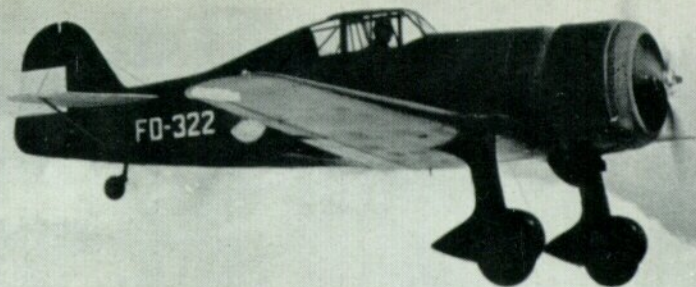
The Fokker D.XXI

**NUMBER 63
TWO SHILLINGS**





FOKKER D.XXI (645-h.p. Bristol Mercury VI-S)
of fighter squadron TLeLv. 12,
Finnish Air Force, June 1941.



The Fokker D.XXI

by G.H.Kamphuis

The prototype D.XXI, FD-322, flew for the first time on 27th March 1936. The pilot for the maiden flight was the Czech chief test pilot of Fokkers, Emil Meinecke.

On 14th November 1934, the design of a new fighter was placed before the Netherlands Army Air Division. Designed by Ir. Schatzki and his team at the Fokker company's South Amsterdam plant, the new type represented a combination of new ideas and the most successful features of the earlier CX and D.XVII designs. A low-wing monoplane with enclosed cockpit and fixed, spatted undercarriage, the D.XXI had been prepared in close liaison with Rolls-Royce Ltd. in England; the powerplant originally envisaged was a 650-h.p. Prestone-cooled Rolls-Royce Kestrel IV. Armament was planned as either rifle-calibre machine guns or 20-mm. cannon in wings and fuselage; and initial performance figures were predicted as including a maximum speed of 410 km./h. at an altitude of 4,250 m., a range of 888 km. and a ceiling of 10,000 m.

Early in 1935 a contract was signed by the Army Air Division (*Luchtvaartafdeling*=LVA) for one prototype, for evaluation for service in the Netherlands East Indies. This prototype was eventually completed with a 645-m.p.h. Bristol Mercury VI-S air-cooled engine; wing construction comprised two

wooden box spars with plywood ribs, the whole covered with a plywood-bakelite skinning. The fuselage was of welded chrome-molybdenum steel tubes, covered forward of the wing trailing edges with detachable dural and aluminium panels, and aft by a fabric skin. Control surfaces were fabric-covered steel-tube frames. The fixed undercarriage had cantilever legs; oleo-pneumatic struts were enclosed by alloy fairings, and the independent compressed-air brakes were pedal operated. The cockpit was enclosed by a plexiglass hood with large sliding sections, and was jettisonable. The pilot was protected from turn-over injuries by a pylon built into the structure behind his seat. A 77-imp. gallon fuel tank was fitted behind the engine, and there was a capability for auxiliary wing tanks. Armament appeared at first as two 7.92-mm. M.36 FN-Browning machine guns in the wings and two in the forward fuselage firing through the airscrew disc. Wing guns carried 300 rounds per gun, fuselage guns 500 rounds each.

Coded *FD-322*, the prototype flew for the first time on 27th March 1936 at Welschap airfield near Eind-

Another view of the prototype in flight.





Two views of the first production machine of the Luchtvaartafdeling batch, No. 212, which was tested at Schipol by Capt. van Gemeren and 2nd Lt. de Zwaan.



hoven, with Fokker's Czech test pilot Emil Meinecke at the controls. However, in the same month high-level policy changes cast doubt over the attractive little fighter's prospects of series production. Minister for External Affairs H. Colijn informed the Defence Ministry that the changing international situation dictated a build-up in bomber rather than fighter strength. This move caused a conflict of opinion; the LVA was in need of new training aircraft, and orders for new fighters and reconnaissance aircraft were also under consideration at that time. Moreover, great importance was attached by the LVA to the value of heavily-armed "cruisers" capable of performing a variety of rôles. This situation of confused requirements was aggravated by the submission for approval of a new Koolhoven design, the FK-58, designed by none other than Ir. Schatzki who had transferred from Fokker to Koolhoven in the meantime. Naturally enough the FK-58 represented a further stage in Schatzki's design thinking and offered such refinements as retractable undercarriage and a projected top speed of 520 km./h. Cost of the machine without engine was to be approximately D.Fl.76,350. Despite the impressive claims made for the FK-58 it was decided to arrange comparative tests between the new type and the D.XXI; thus on 12th November 1936 the

D.XXI prototype was delivered to Soesterberg.

In fact, the FK-58 was not ready for its first flight until September of 1938; and during 1937 the Netherlands Government had voted funds for the expansion of the LVA, leading to an order for thirty-six D.XXIs powered by the Bristol Mercury VII or VIII of 830 h.p. This re-kindling of interest in the Fokker machine was partly due to the examination by an evaluation board of the first machine produced in response to an export order from Finland (see below). Completed in mid-August 1937, this first machine showed many improvements over the prototype *FD-322* destined for the Indies Aviation Division. The first LVA machine, No. 212, flew on 20th July 1938, and was later test-flown by flying instructors Captain W. van Gemeren and Reserve Second Lieutenant G. W. de Zwaan, before delivery from Schipol to Soesterberg. The last of the thirty-six production machines was handed over on 8th September 1939—just one week after the German invasion of Poland.

EXPORT SALES AND LICENCE PRODUCTION

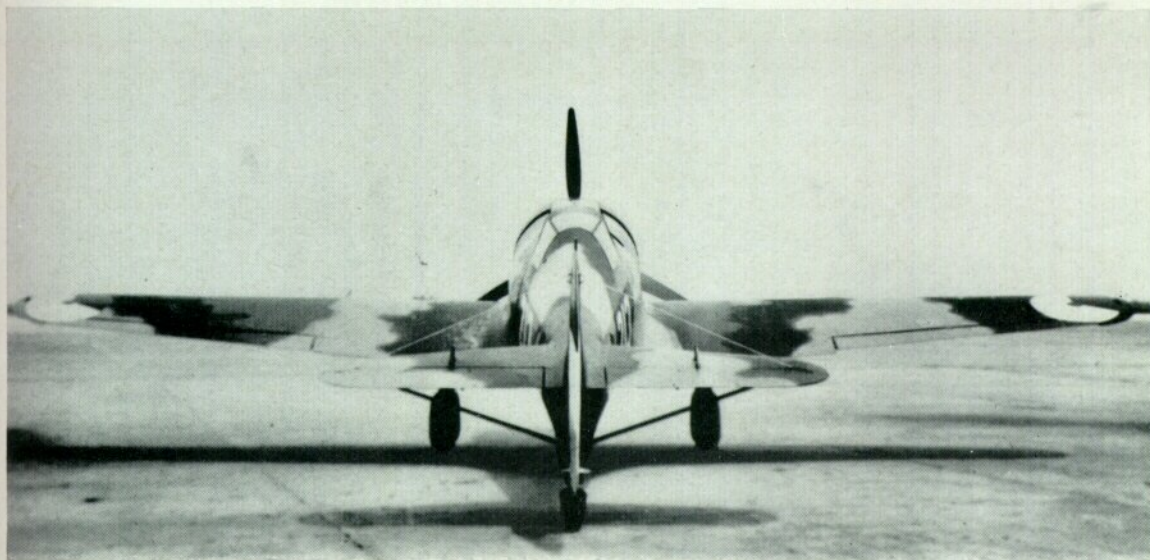
During the period when the D.XXI's home production was in question, considerable interest had been



The second production machine of the LVA batch displays the three-shade Dutch camouflage scheme, pre-October 1939 markings, and the Fokker motif on the fin.



Front and rear views of No. 213; note the slim undercarriage "spats" and the tailplane bracing.



Early production machines lined up at the Fokker plant in South Amsterdam.



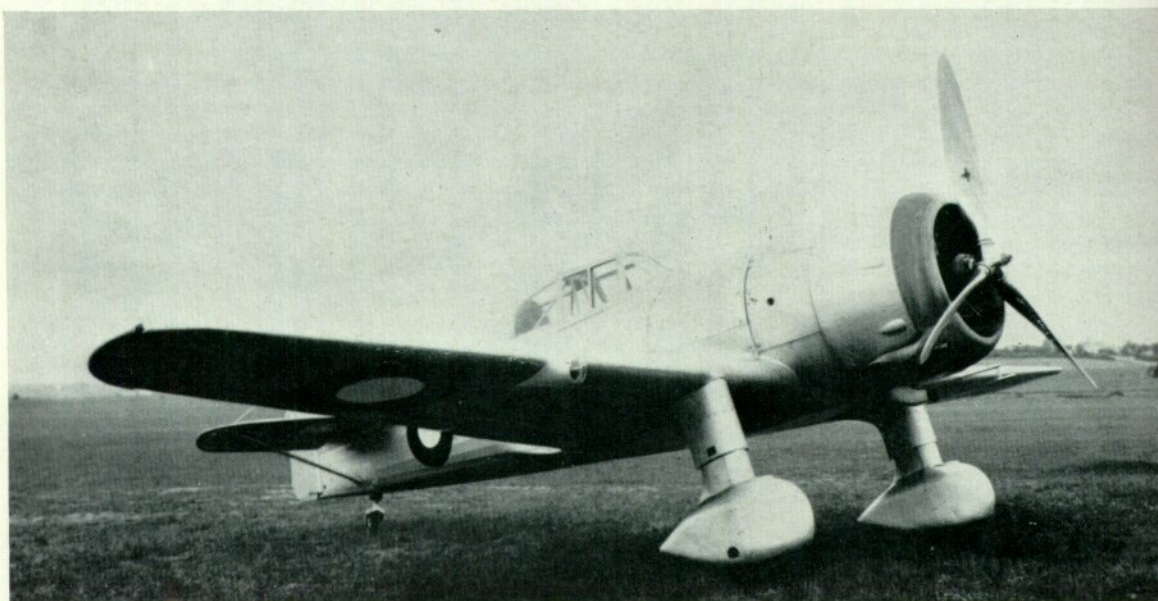
Below: The first, second and fourth D.XXIs of the LVA batch in flight over Amsterdam.



evinced by foreign governments. During 1937 the Finnish Government decided to purchase seven machines powered by the Bristol Mercury VIII, coded FR-76 to FR-82. Negotiations were then initiated for licence production by the State Aircraft Factory (*Valtion Lentokonetehtäs*) at Tampere. Between 1939 and 1944 the Finns manufactured ninety-three

machines. Denmark ordered two D.XXIs, and took out manufacturing licences for the Royal Army Aircraft Factory in Copenhagen, which subsequently produced ten machines. Eight of these were in service with No. 2 Eskadrille of the Danish Aviation Troops when German forces occupied Denmark in the second week of April 1940. The Danish D.XXIs were powered by the Bristol Mercury VI-S and carried a 20-mm. Madsen cannon faired into the underside of each wing. A further manufacturing licence was acquired by the Spanish Republican Government, and about fifty fuselages were built in Spain. The Spanish D.XXI was to have been equipped with the Messier undercarriage later employed on the Hispano Suiza HS-42. Nationalist forces overran the assembly plant before production of the first batch of Spanish D.XXIs was completed; and it is widely believed that no Spanish-built aircraft ever flew. However, it has been reported that one machine, powered by a Russian M-25 engine, flew at El Carmoli in August 1938, and that one machine escaped destruction during the capture of the plant by the Fascists.

One of the two D.XXIs bought by the Danish Government from Fokkers; note faired light in starboard wing leading edge.





FR-76, the first of the seven machines in the original Finnish purchase order, seen here in its delivery colours of dark green and pale blue.



Above: Another Mercury-powered D.XXI of the initial Finnish batch. Note wingtip light and pitot head. Below: Mercury-powered Finnish D.XXI with "snow-shoe" (faired ski) undercarriage.





FR-92, the tenth Finnish-built D.XXI, seen here in the colourful operational markings of TLeLv. 12. The stippled effect on the undercarriage spats was thought to be deliberate decoration, but recent research indicates that it is the result of superficial damage and paint-chipping. This aircraft is the subject of the five-aspect painting on page 2 of this Profile.

THE WINTER WAR

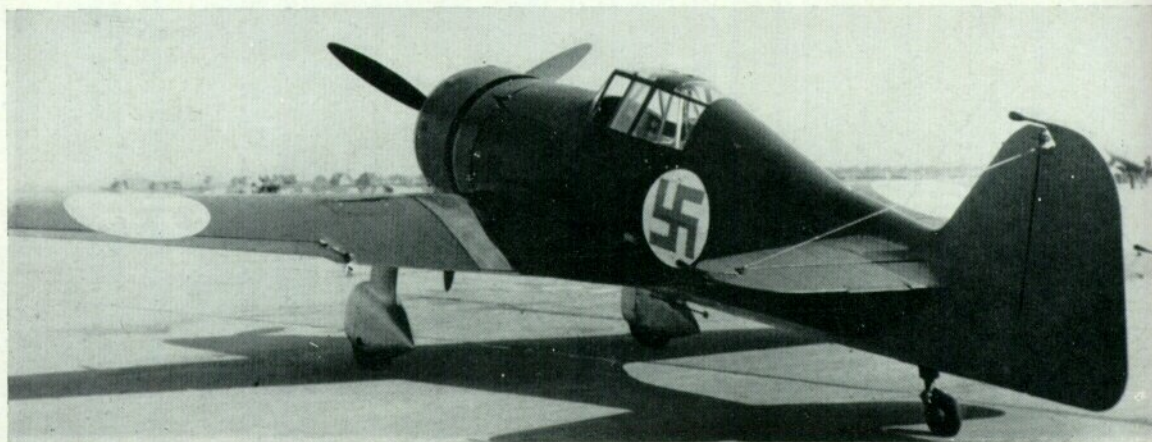
The D.XXI saw action for the first time when Russian forces invaded Finland on 30th November 1939. Besides the seven machines purchased from the parent company, thirty-eight licence-built machines (FR-83 to FR-120) had been delivered to the Finnish Air Force; in all, forty-one machines were on the strength of Fighter Squadron HLeLv. 24 on 30th November, all powered by the Mercury VIII. The first victory was scored on 1st December, when Lieutenant Eino Luukkanen destroyed an SB-2 while flying FR-104. (On the same day, Sergeant Kukkonen became the first Finnish Air Force casualty when his D.XXI was shot down by his own anti-aircraft gunners near Viipuri.) During the "Winter War", which ended in capitulation on 12th March 1940, the Fokkers won the respect of Russian pilots and the affection of the Finns. They were christened "Ukkomokkeri" (Old Man



One of the modifications made by the Finnish State Aircraft Factory to the D.XXI was the rearward extension of the cockpit glazing to improve rear vision. This installation was tested on FR-143, a Mercury-engined machine.

Mokker) by the Finns, and only twelve machines were lost during the hostilities. Six of these were lost through accident rather than enemy action; two of the

The projected re-engining of Finnish-built D.XXIs with the Twin Wasp Junior powerplant necessitated re-design of the tail surfaces; a Mercury-engined machine is illustrated here with the enlarged tail.





This Wasp D.XXI, probably FR-150, displays the small reproduction of the Finnish swastika insignia carried on each propeller blade by VL-built machines.



VL-built Fokker D.XXI, FR-124, powered by the Twin Wasp Junior engine, shows off one variation of the undercarriage decoration employed by some Finnish fighter units in 1941.

six combat losses were flown by Danish volunteers, Rasmussen and Frijs.

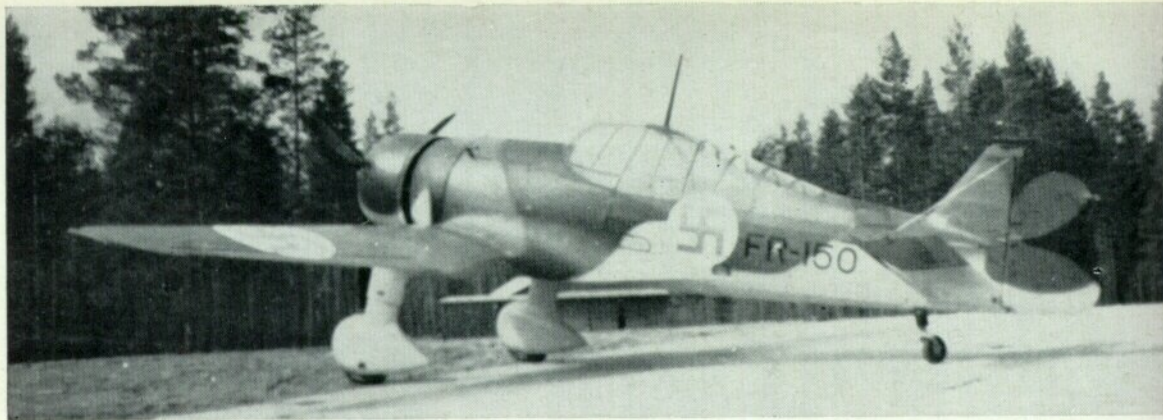
During 1940 and early 1941 the State Aircraft Factory was occupied in the overhaul of "war-weary" machines; and the remainder were transferred to HLeLv. 32. Bearing in mind the successes gained by the Fokker a year previously, the Finnish Government ordered the production of fifty further aircraft in 1941; all available Mercury engines were required for licence-built Bristol Blenheim bombers, however, so it

was decided to undertake limited re-design of the D.XXI to accommodate the Pratt & Whitney R-1535 Twin Wasp engine of 1,050 h.p., eighty of which powerplants had been acquired from Sweden during 1940. Changes included an increase in the area of the vertical tail surfaces, and the shortening of the engine bearers to maintain the centre of gravity with the heavier engine. The two fuselage guns were moved to the wings, and the transparent cockpit panels were extended aft to improve rear vision. When hostilities with the U.S.S.R. were resumed in June 1941, HLeLv. 32 had on strength seventeen Mercury-D.XXIs and nineteen Wasp-D.XXIs. Another Mercury-D.XXI unit was HLeLv. 30; TLeLv. 12 had two flights of Fokkers on strength, but these were replaced in August 1941 by the VL Myrsky II. TLeLv. 30 was equipped with Wasp-D.XXIs. Six of the well-tryed Mercury-D.XXIs destroyed two DB-3 bombers over the Riihimäki railway junction in the first air battle of the "Continuation War".

Several interesting modifications were made during this period. Fokkers were often fitted with "snow-shoe" undercarriages in Finnish service; and *FR-107*, powered by a Twin Wasp and with a retractable

Wasp D.XXIs on a forest airstrip in Finland.





The machine illustrated here is noteworthy for the unusual extent of glazing, carried far back down the spine. Another machine modified in this way, FR-129, was used for reconnaissance duties.

undercarriage, achieved extremely competitive performance figures. *FR-150* and *FR-129*, used for reconnaissance purposes, had the transparent cockpit panels extended almost as far aft as the vertical tail surfaces. In 1944, the last five D.XXIs to be built in Finland appeared, all powered by the Bristol Pegasus engine. Incredible as it may seem, the Mercury- and Wasp-powered D.XXIs continued in service with the Finnish Air Force until 1949, and were not officially declared surplus to requirements until 1952!

Modifications and projects carried out by the parent factory at this time included the installation of several alternative powerplants, and the fitting of a sharply-tapered, completely re-designed wing known as the "E-1" to one D.XXI. Design work was initiated in 1938 on three projects known as the 150, 151, and 152. These were to be powered respectively by the Bristol Hercules, the Rolls-Royce Merlin and the Daimler-Benz DB600H. All were cleaned-up designs with retractable undercarriages.

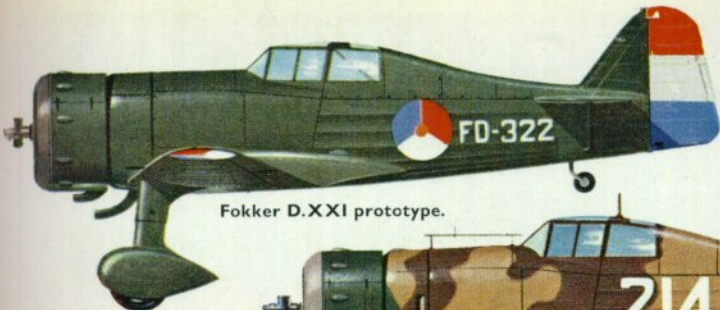
FOKKERS AGAINST THE LUFTWAFFE

When the German forces invaded the Netherlands on 10th May 1940 twenty-eight D.XXIs were ready for operations. These were on the establishments of 1st Fighter Group (1e Ja.V.A.) at De Kooy, near Den Helder (11 machines); 2e Ja.V.A., at Amsterdam-Schiphol (9 serviceable machines); and 5e Ja.V.A., Hague-Ypenburg (9 machines). Establishment/service-

able figures are not available for 1e and 5e Ja.V.A. on 10th May. A few facts stand out from the general confusion of the first day's fighting. One of the pilots of 1e Ja.V.A., which unit decorated engine cowlings with its famous "Three White Mice" insignia, is known to have shot a Junkers Ju 88 into the North Sea on the 10th. Six machines of 2e Ja.V.A. escorted a formation of Fokker T.V bombers on a mission against the Meuse bridges near Rotterdam at mid-day; they were intercepted by nine Messerschmitt Bf 109s and in the combat which followed one Messerschmitt was destroyed and two damaged for the loss of two T.Vs and one D.XXI. The nine D.XXIs at Ypenburg were all unserviceable by the evening of 10th May, only one machine escaping actual combat damage. No pilots had been lost, however. Due to the heavy losses sustained by the Fighter Groups on the first day, it was decided to remuster at Buiksloot, north of Amsterdam; and on the morning of the 11th eleven D.XXIs were gathered on that airfield in operational condition. For the next four days missions were carried out from Buiksloot by single aircraft and small formations, both in the escort and search-and-destroy rôles. On the 11th, at least two Bf 110s were shot down by D.XXIs. A young sergeant, J. Roos, was attacked by three Bf 109s while patrolling alone on the morning of the 11th. Badly damaged, Roos jettisoned his canopy and with this unorthodox missile damaged the propeller of a Messerschmitt close on his tail; the *Luftwaffe* machine lost height and left the combat.

Left: *FR-107*, the only retractable-undercarriage D.XXI. Right: *The eighteenth machine of the thirty-six ordered for the LVA. The aircraft is seen here in the national insignia adopted in October 1939; note that the wing triangle is painted well inboard. Note also the canopy section hinged fully down.*





Fokker D.XXI prototype.

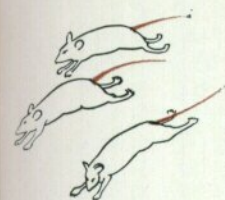


Fokker D.XXI showing starboard side.

Fokker D.XXI, Ja. V.A. I in standard scheme and national markings prior to October 1939.



Fokker D.XXI, Ja. V.A. I in national markings post-October 1939.



"Three White Mice" marking of Ja. V.A. I a/c used by Ja. V.A. I; 214, 218, 219, 221, 223, 233, 234, 240, 241, 242, 244.



National marking pre-October 1939.

Fokker-built D.XXI, Danish Army Air Service.



"Boot with points" marking of Ja. V.A. I.



Upper surface detail.

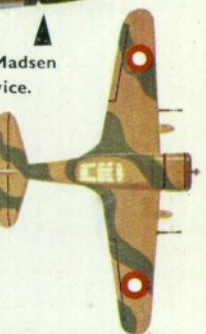


National marking post-October 1939.

Fokker D.XXI, HLeLv 24 in winter scheme fitted with skis.



Fokker D.XXI, Danish-built with 20-mm. Madsen cannon, 2 Squadron, Danish Army Air Service.



Upper surface detail.

V.L.-Fokker D.XXI (Twin Wasp Junior) in standard scheme.



Undercarriage variations.



V.L.-Fokker D.XXI (Twin Wasp Junior) in standard operational scheme.

(Note radio masts have been cut short)

D.XXI No. 228 displays battle damage to the rear fuselage; radio and battery are exposed by the removal of the access panel. This photo was probably taken shortly after Dutch capitulation in May 1940.



Escaping into cloud cover for a brief respite, Roos succeeded in surprising and destroying a second Messerschmitt before his Fokker was hit again, this time by nervous Dutch anti-aircraft gunners, and he was forced to bail out.

On the last day of the war, 14th May, five machines were still serviceable at Buiksloot. Four carried out a further sweep and then diverted to Schipol. In all, eight Fokkers were brought to combat readiness during the course of the day, but the pilots were on the point of collapse through exhaustion. Five machines carried out a second mission late in the morning; and on the news of Holland's capitulation reaching the C.O. of 1e Ja.V.A., the eight remaining serviceable aircraft were immobilised by gunfire through the petrol tanks. The airstrip was systematically destroyed to prevent its use by the Germans.

After five days of combat against hopeless odds, eight of the original twenty-eight Fokkers remained in airworthy condition; no small achievement in itself if

one reflects on the numbers of German aircraft involved and the 100 km./h. advantage of the Bf 109. Those five days provided many admirable examples of the determination and courage of Dutch pilots and the sturdiness of the Fokker D.XXI; and at least one outright victory had been gained on 10th May, when D.XXIs destroyed all but eighteen Ju 52/3m troop transports of KGr.zbV.9 out of a total strength of fifty-five aircraft which crossed the border at approximately 06.45 hours. Total German losses to the Fokker pilots during the "Five-Day War" are unknown; but on 10th and 11th May they accounted for fifteen (confirmed) and seventeen (probable) combatant aircraft including Bf 109s, Bf 110s, Ju 88s, He 111s, and Do 17s. Few could deny that the tough, manoeuvrable little fighter had vindicated itself handsomely to those who had authorised its production with such apparent reluctance three years previously.

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FOKKER D.XXI DEVELOPMENTS AND SPECIFICATIONS

Type	Year	Engine	Description
D.XXI-1	1936	645 h.p. Bristol Mercury VI-S	Single-seat low-wing fighter, prototype; two built for the Danish Air Force, reg. J-41 and 42, C/N 554-555.
D.XXI-2	1937	760 h.p. Bristol Mercury VIII	Version for the Netherlands and Finnish Air Forces. Dutch registration 212 to 247, Finnish FR-76 to 82.
D.XXI	1938	Russian M-25 engine	Spanish version.
D.XXI	1939-40	760 h.p. Bristol Mercury VIII	Danish licence-version; ten built. Carried a 20-mm. Madsen cannon under each wing; reg. J-43/52.
D.XXI-3	1939	760 h.p. Bristol Mercury VIII	Version with armament "eggs" undersl., 38 aircraft built in 1939 in Finland, reg. FR-83 to FR-120.
D.XXI-EI	1938	760 h.p. Bristol Mercury VIII	Experimental version with pronounced dihedral wing.
D.XXI-4	1941	1,050 h.p. Pratt & Whitney R-1535 Twin Wasp Jr.	50 being delivered, the fuselage-mounted armament was transferred to the wing.
D.XXI-5	1944	920 h.p. Bristol Pegasus X	A further batch of five Finnish machines.
Powerplant		645 h.p. Bristol Mercury VI-S	760 h.p. Bristol Mercury VIII 1,050 h.p. Pratt & Whitney R-1535 Twin Wasp Jr.
Performances:			
Maximum speed		245 m.p.h. (395 km./h.)	270 m.p.h. (435 km./h.) 245.6 m.p.h. (410 km./h.)
Cruising speed		207 m.p.h. (333 km./h.)	266.6 m.p.h. (365 km./h.) 213.6 m.p.h. (334 km./h.)
Range		560 miles (900 km.)	590 miles (950 km.) 550 miles (880 km.)
Service ceiling		29,520 ft. (9,000 m.)	31,160 ft. (9,500 m.) 29,520 ft. (9,000 m.)
Absolute ceiling		30,830 ft. (9,400 m.)	31,820 ft. (9,700 m.) 30,500 ft. (9,300 m.)
Weights:			
Empty		2,695 lb. (1,225 kg.)	3,190 lb. (1,450 kg.) 3,278 lb. (1,490 kg.)
Loaded		3,850 lb. (1,750 kg.)	4,510 lb. (2,050 kg.) 4,510 lb. (2,050 kg.)
Dimensions:			
Span		36 ft. (11 m.)	36 ft. (11 m.) 36 ft. (11 m.)
Length		23 ft. 7 in. (7.2 m.)	26 ft. 11 in. (8.2 m.) 26 ft. 11 in. (8.2 m.)
Height		9 ft. 10 in. (3 m.)	9 ft. 8 in. (2.92 m.) 9 ft. 8 in. (2.92 m.)
Wing area		172 sq. ft. (16 sq. m.)	174 sq. ft. (16.2 sq. m.) 174 sq. ft. (16.2 sq. m.)
Armament in Fokker-built machines was 2 x M.36 7.92 mm. machine guns in forward fuselage with 500 r.p.g.; 2 x M.36 in wings with 300 r.p.g.			