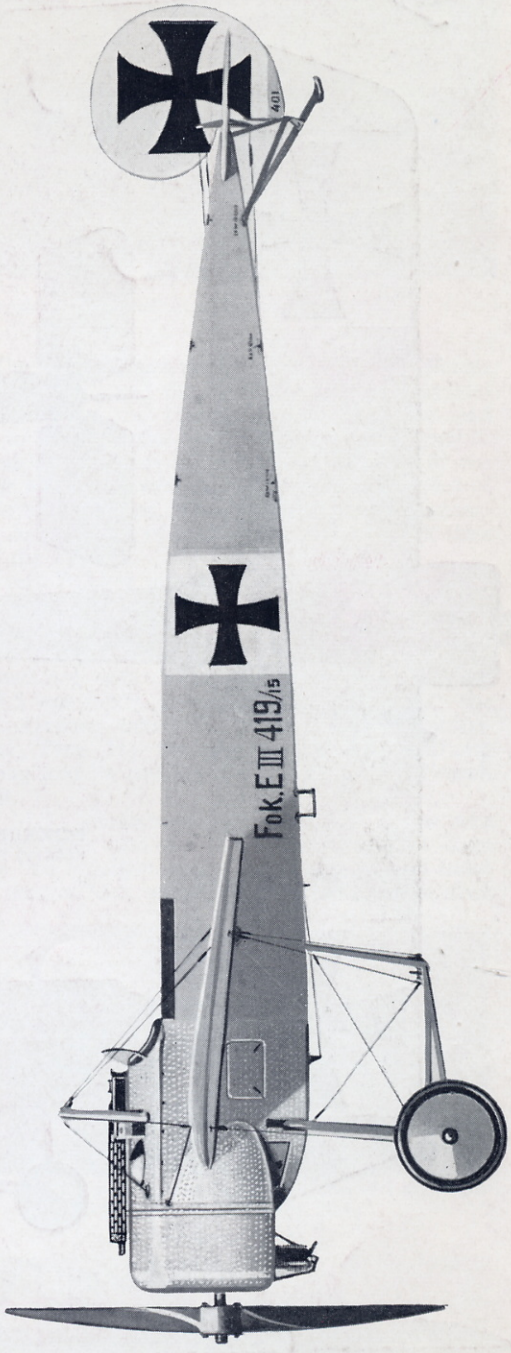
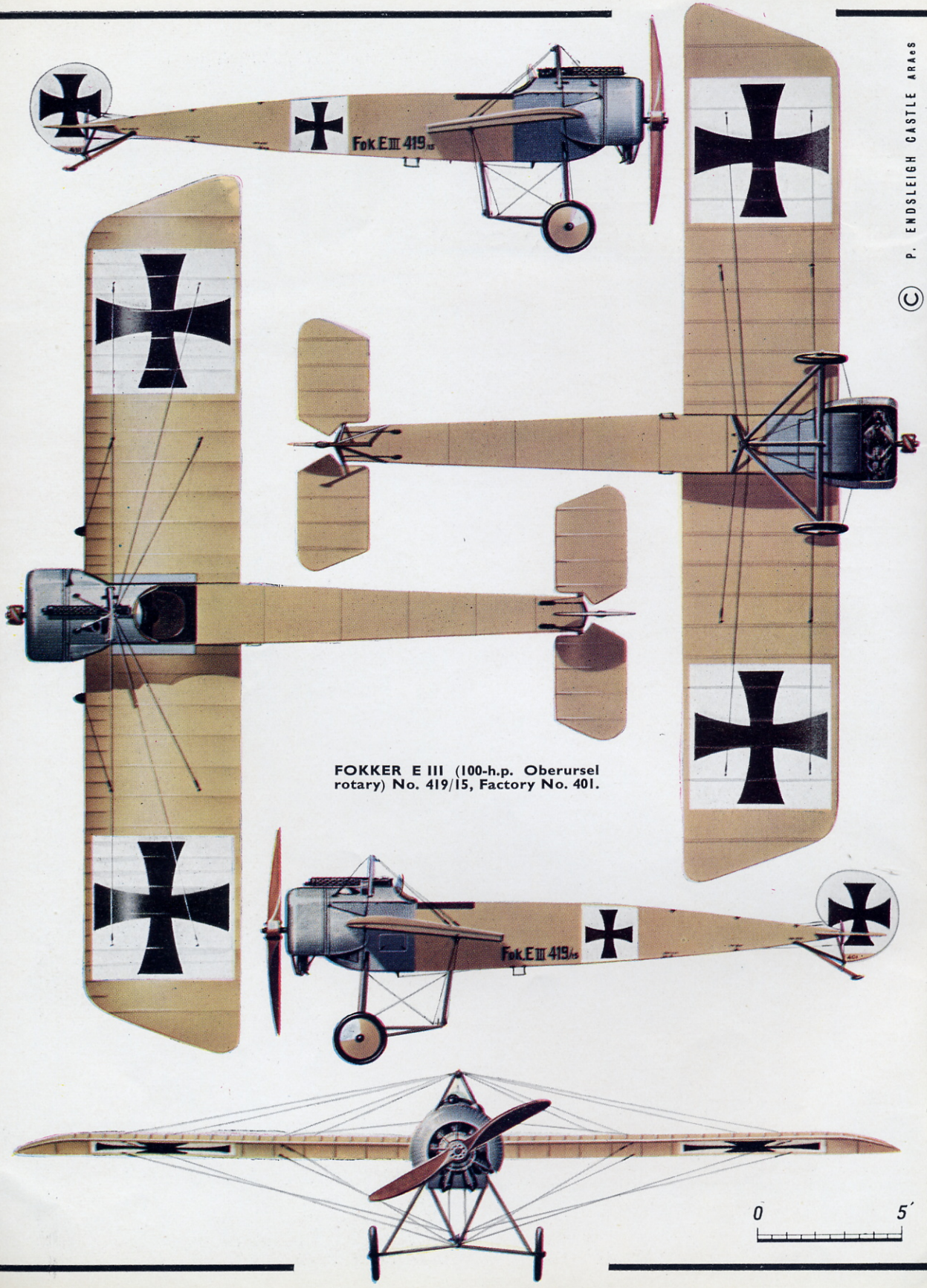
PROFILE
PUBLICATIONS

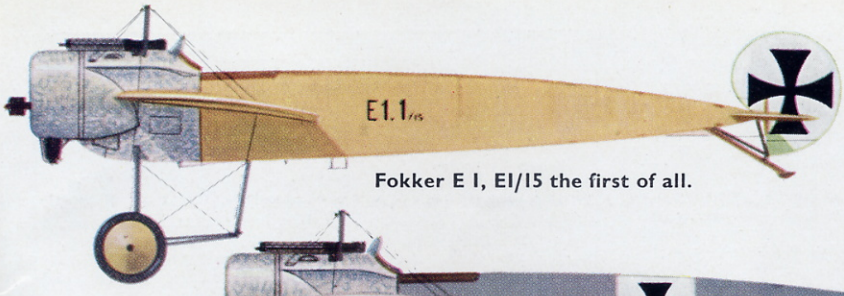
The Fokker Monoplanes



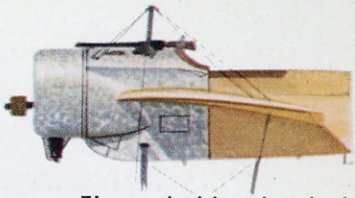
NUMBER 38
TWO SHILLINGS



FOKKER E III (100-h.p. Oberursel rotary) No. 419/15, Factory No. 401.



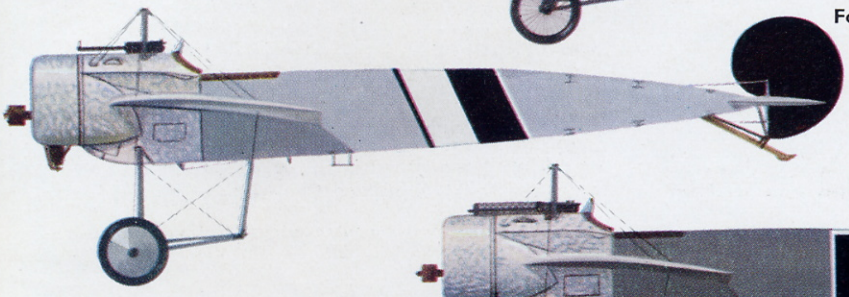
Fokker E I, EI/15 the first of all.



EI armed with sychronised Parabellum gun.

Fokker E III, E III 422/15. Note unusual position of serial number.

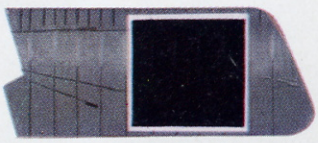
Fokker E III, EIII 210/15. This aircraft is at present in the Science Museum, London.



Fokker E II (Serial number unknown) flown by Vizefeldwebel Eduard Böhme of the Bavarian Air Force. Armed with synchronised Schwarzlose gun.

Fokker E III, EIII 345/15 (Position of serial number probably standard) Flown by Lt. Buddecke on the Turkish Front. The black square eventually became the official Turkish insignia.

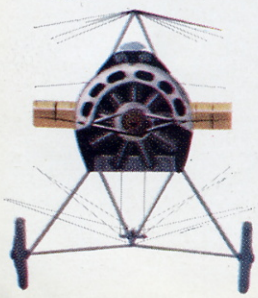
Fokker E I, EI 03.51, Austrian Air Force. Armed with synchronised Schwarzlose gun.

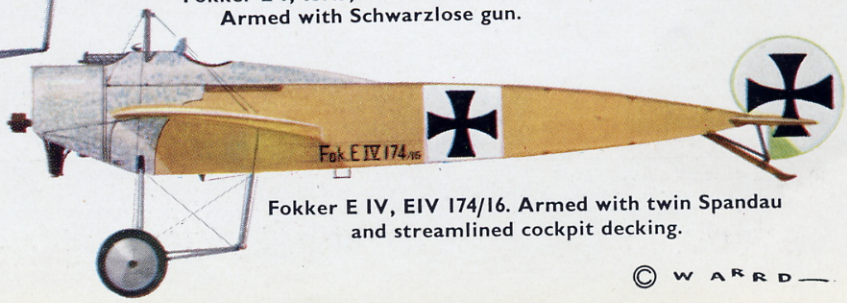


Wing marking, Turkish Front.

Fokker E I, 03.43, Austrian Air Force. Armed with Schwarzlose gun.

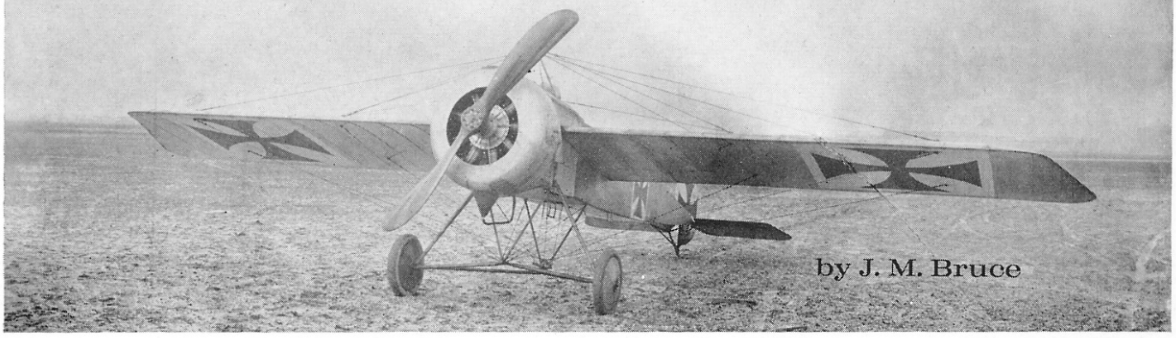
Front view EIV





Fokker E IV, EIV 174/16. Armed with twin Spandau and streamlined cockpit decking.

The Fokker Monoplanes



by J. M. Bruce

The Fok. E III that was fitted experimentally with a full circular cowling and oil recovery system.

It would not be too great an exaggeration to say of the series of monoplane fighters that emerged from the Fokker factory during the 1914–18 war that their aerodynamics were French.

From the primitive Fokker Spider of 1910 an earlier series of crude monoplanes had descended, some incorporating refinements such as fairings about the seats, but all known as Spiders and all basically similar in construction to the first of the series.

The Royal Prussian War Ministry ordered a 100-h.p. (Argus) Spider in June 1912, followed by two more early in 1913, one with the Argus engine, the other with a 95-h.p. Mercedes. The latter two aircraft were designated Fokker M.1, the M signifying *Militär* (military, as a noun). These aircraft were not popular with their pilots. Their immediate successors, the M.2, M.3, M.3A and M.4, were all different and owed virtually nothing to the Spider design; they were, if anything, less successful than the M.1.

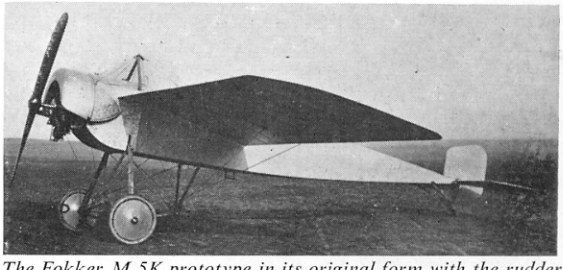
When the M.4 had been condemned by Leutnant A. Muehlig-Hofmann late in 1913, Fokker dismissed Palm, the designer of the aircraft. Palm's successor was his former assistant, Martin Kreutzer.

With the M.1 type obsolete and unpopular, and its successor's failures, Fokker had to produce a successful new design if his firm was to survive. He had seen a Morane-Saulnier Type H monoplane at Johannisthal in 1913, and, so it is said, had had sketches made of its design details. The Morane-Saulnier achieved a number of considerable successes that year, and Fokker determined to copy it. He was not the first to do this: Bruno Hanuschke had built a copy of the Morane-Saulnier in the autumn of 1913.

For this purpose Fokker bought, cheaply, a damaged Type H and had it rebuilt at Schwerin. It was flown by Fokker and a few of his closest associates: all were enormously impressed by its performance. Drawings were prepared for a Chinese copy of the Morane-Saulnier, but the copying was of the principal shapes only: the structure was original and generally stronger than that of the French type. Whereas the original Morane-Saulnier fuselage was a wire-braced wooden box-girder, the Fokker monoplane's fuselage was a welded structure made of steel tubing; a welder named Reinhold Platz, who was later to be Fokker's chief designer for many years, had a hand in its design. The wing spars were larger in section, and compression struts replaced the Morane's compression ribs. The larger spars produced a slightly different aerofoil section, and the Fokker wing not only had more ribs than the French original but also had riblets to preserve the nose contour of the aerofoil. The rudder was that of the unsuccessful M.4; the elevator was a balanced cantilever surface like that of the Morane-Saulnier. The undercarriage was completely original and of appreciably greater track than that of the Type H.

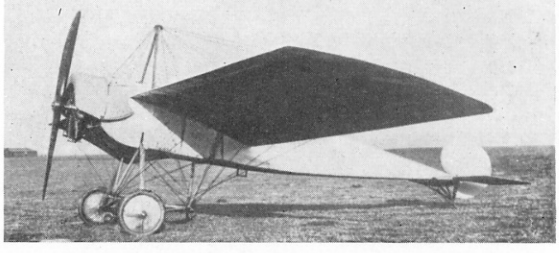
The new Fokker was given the type number M.5 and Fokker had such confidence in it that a small batch was put in hand. He had ordered some 80-h.p. Oberursel-built Gnôme engines for the aircraft, but these had not been delivered by the time when the first M.5 was ready. It was therefore fitted with the 50-h.p. Gnôme taken from the rebuilt Morane-Saulnier Type H; the engine had an overhung mounting and its cowling was a copy of the French original.

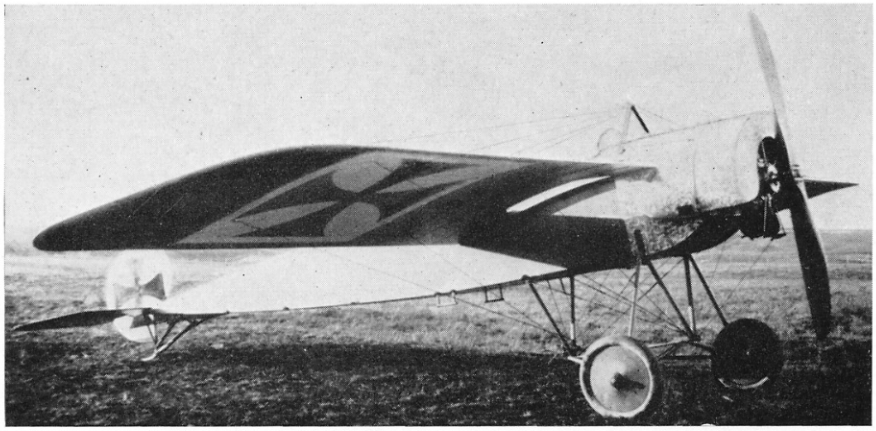
The M.5's performance on its early flights was somewhat poor and the M.4 rudder was not large enough. An enlarged rudder was designed and fitted to the second M.5, which was completed soon after



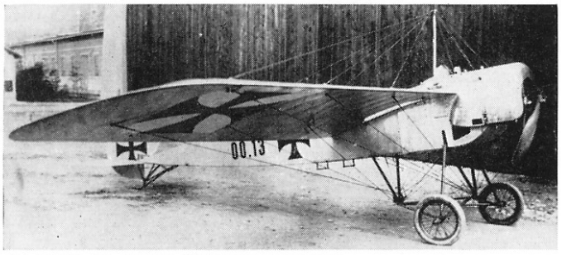
The Fokker M.5K prototype in its original form with the rudder of the unsuccessful Fokker M.4.

The prototype M.5L.





This M.5K may have been one of the Fokkers used as flying dispatch riders in the early stages of the war. It was unarmed.
(Photo: P. L. Gray)



An M.5L in Austro-Hungarian service.
(Photo: Imperial War Museum)

the first machine's maiden flight. This revised rudder was of the balanced "comma" shape that was to characterise Fokker aircraft until the Fok. D VII appeared in 1918.

A longer wing of greater area was fitted to the second M.5, which came to be known as the M.5L, the other prototype being distinguished as the M.5K. The suffix letters denoted the type of wing that was fitted: L signified *lang* (long-span); K, *kurz* (short-span). Both versions could, if need be, carry a passenger, who had to straddle a rearward extension of the pilot's seat. The first M.5L was fitted with a second-hand 70-h.p. Gnôme while awaiting its 80-h.p. Oberursel-built engine.

Both prototypes were fitted with the 80-h.p. engines as soon as they were delivered, and direct comparison of the two aircraft could be made. The M.5L proved to be slightly the slower of the two but was more responsive to the controls. After military pilots had flown both types an official order was placed for a small batch of M.5Ls in the summer of 1914; deliveries began late in June. It seems that, possibly at a later stage, a few M.5Ks were also ordered.

In the opening weeks of the war the M.5Ls saw considerable operational service, but their usefulness became limited after the unreliability of their Oberursel engines had led to several forced landings behind the Allied lines. The type was also used in small numbers by the Austro-Hungarian *Luftfahrttruppen*.

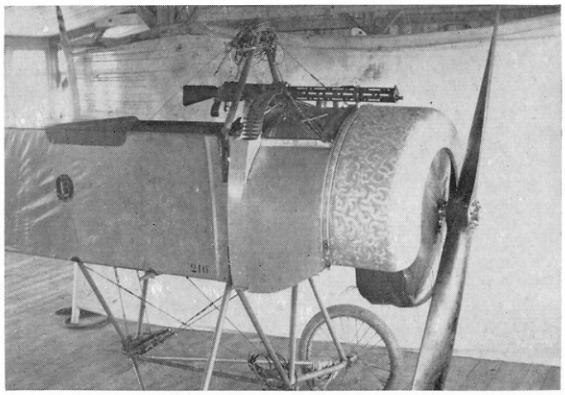
The few M.5Ks that were in operational use were employed as a means of fast communication; others were with training units. The military designations Fok. A I and Fok. A III have been connected with the M.5L and M.5K respectively, but the former was properly the official designation of the Fokker M.8 two-seater.

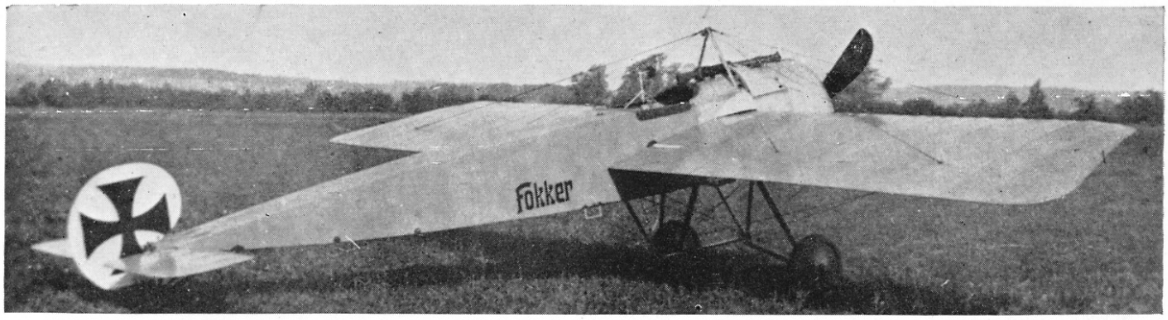
Long before the war the possibility of mounting a machine-gun on an aeroplane had been considered. Franz Schneider of the L.V.G. designed a synchronising mechanism that was the subject of the German patent D.R.P. 276,396 dated 15th July 1913. Early in 1914 he applied to the German military authorities for the loan of a machine-gun in order to put his invention to the test. His request was either ignored or overlooked, for he never received a gun. It has been said that the device appearing in Schneider's patent specification was unworkable. However that may be, it is interesting to speculate about what might have happened if a man of Schneider's ability had been given the means of testing and developing his idea.

In France, during the winter of 1913, Raymond Saulnier conceived a form of synchronising mechanism that by April 1914 had been developed under the direction of Louis Peyret to the point where it could be submitted to the French Ministry of War. It was subjected to firing tests at the Hotchkiss establishment near the Eiffel Tower. The tests were made on a test rig, using an 80-h.p. Gnôme engine and a Hotchkiss machine-gun, under the direction of Colonel de Boigne.

The Saulnier mechanism worked but was not adopted or developed because the ammunition that was used did not have a precisely uniform period of ignition; hang-fire rounds occurred unpredictably and some of them struck the airscrew. To avoid the delay of further research and experimentation, Saulnier dispensed with the mechanism and fitted steel deflector plates to the airscrew in line with the gun; three types of deflector plates were tested. On the outbreak of war Saulnier's Hotchkiss gun was reclaimed by the authorities and his experiments ceased.

The Fokker M.5K/MG (Werke Nr 216) *with Parabellum gun, which still had its shoulder stock and pistol grip.*





The M.5K/MG with Parabellum gun and head-rest fitted behind the cockpit.

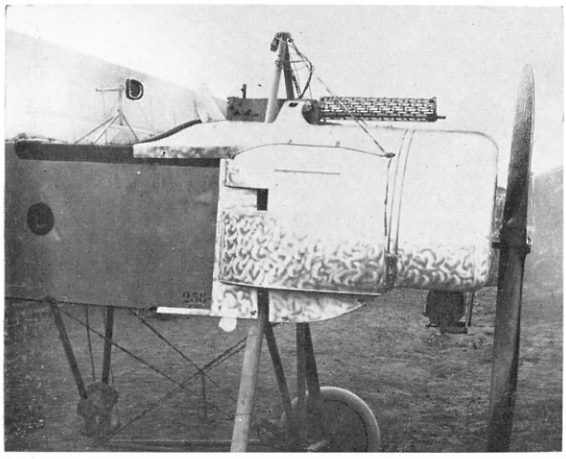
In December 1914 Lieutenant Roland Garros, the celebrated pre-war pilot who had flown Morane-Saulnier monoplanes, notably the Type H, with such distinction, visited Raymond Saulnier. He told Saulnier that he had obtained permission from Commandant (later Colonel) Barès, head of the Air Service at French General Headquarters, to test the Saulnier deflector-plate device. With an aircraft, engine and armoured airscrew lent by the Morane-Saulnier company and a machine-gun entrusted to him by the French War Ministry, Garros made what were probably the first airborne firing tests of any kind of device for firing through the revolving blades of a tractor airscrew.

Flying a Morane-Saulnier Type L parasol monoplane armed with the Saulnier device, Garros opened the era of true fighter aircraft on 1st April 1915, when he shot down an Albatros two-seater. This victory came exactly a month to the day after the formation of the first fighter squadron, *Escadrille de Chasse* MS 12, equipped with the Type L; some of MS 12's aircraft had a machine-gun firing forward over the wing and airscrew. Garros was a member of MS 23.

On 19th April 1915 Garros' Type L* was hit by ground fire from the neighbourhood of Courtrai and he was obliged to land in enemy territory near Ingelmunster. His attempts to set fire to his Morane were only partially successful and the half-burnt parasol monoplane with its gun and armoured airscrew were taken to Iseghem. The secret was out.

Having obtained an undamaged example of the

Installation of LMG·08 machine-gun in Werke Nr 258. *This aircraft also had a head-positioning rest for the pilot.*



* *German reports, contrary to a long-held belief that Garros was flying a Morane-Saulnier Type N, leave no doubt that on 19th April he was flying a Type L parasol monoplane with an 80-h.p. Le Rhône engine.*

device that had enabled Garros to shoot down five enemy aircraft in less than three weeks, the Germans naturally decided to copy it. The first attempt, by Simon Brunnhuber, was unsuccessful. Hauptmann Helmuth Foerster, the *Feldflugchef's* adjutant, then sent for Fokker, who left Doeberitz with the armoured airscrew of Garros' Morane-Saulnier, a brand-new Parabellum machine-gun and a supply of ammunition.

It is unlikely that any of Fokker's staff at Schwerin had any knowledge of the Russian synchronising gears (Poplavko and Smyslov-Dybovski) that were then in existence, but someone may have known something about Schneider's 1913 patent. The likelihood that Fokker personally had anything to do with the design of the mechanical interrupter gear that was evolved at Schwerin can be dismissed, and there is little doubt that the mechanism that Fokker proudly took back to Doeberitz less than a week after he had been summoned there was designed by Heinrich Luebbe, Fritz Heber and Leimberger.

A Fokker M.5K (*Werke Nr* 216) was fitted with the gun and interrupter gear and was successfully demonstrated at Doeberitz. At an early stage an adjustable head-rest was fitted as a means of ensuring that the pilot's head was in the correct position for sighting. This armed M.5K was designated M.5K/MG and was later given the military order number E.1/15.

A second M.5K (*Werke Nr.* 258) was armed with an LMG.08 gun, as were the two single-seat fighters E.2/15 and E.3/15 that Fokker took on a demonstration tour of operational units, starting on 23rd May 1915. A batch of the new Fokker fighters had been ordered with the military designation Fok. E I shortly after the first successful demonstration at Doeberitz. Fokker had been instructed to produce these aircraft with all possible speed, and his demonstration tour was intended to provide training for the pilots who were to fly the new fighters. By the time Fokker left Douai for Schwerin on 12th July 1915 eleven German pilots were flying Fok. E I monoplanes. One of these was Leutnant Oswald Boelcke, who took over E.3/15.

The production E I differed in detail from the M.5K/MG prototype. The engine was the 80-h.p. Oberursel and the bench-type seat was retained; a passenger could therefore squeeze in behind the pilot, as on the M.5, to the detriment of the aircraft's performance. The head-positioning rest that had been fitted to the M.5K/MG was retained on several of the production aircraft. To provide the pilot with a downward view an aperture was cut in the cockpit floor; it was covered by a flap that could be opened by means of a lever. Later aircraft had an additional petrol tank behind the cockpit and the fuel system underwent modifications.

In a letter dated 25th June 1915, Fähnrich Max

Immelmann, then an unknown pilot of *Fliegerabteilung* 62 at Douai, wrote:

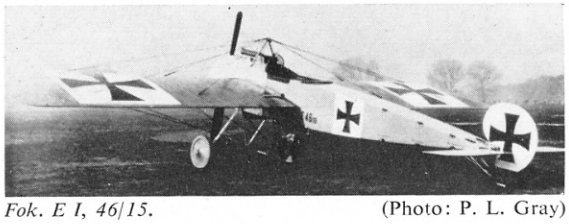
> *"We have just got two small one-seater fighters from the Fokker factory. The Crown Prince of Bavaria visited our aerodrome to see these new fighting machines and inspected us and Section 20. Direktor Fokker, the constructor of this fighter, was presented to him. Fokker and a Leutnant Parschau gave demonstration flights for him and fired at ground targets from the air. Fokker amazed us with his ability."*

Immelmann was promoted to Leutnant with effect from 14th July 1915. On 31st July he flew a Fok. E I for the first time, and on the following day, apparently flying E.3/15, he shot down a British aircraft near Douai. The combat was quite a protracted and one-sided affair, for Immelmann's victim was a two-seater (probably a B.E.) that was being flown without an observer on a bombing mission and was therefore virtually defenceless. During the fight, if it can be so called, the Fokker's gun jammed three times. This was the first of many Allied aircraft that were to fall to Fokker monoplanes in the ensuing months.

As the Fokkers became more numerous their successes grew. Despite its poor performance and the several shortcomings of the armament installation, the Fokker proved to be a deadly instrument in the hands of men like von Althaus, Boelcke, Buddecke, Immelmann, Parschau and Wintgens. A few E Is were used by the Austrian *Luftfahrttruppen*, but records of their activities are scanty.

The Fokker was not at first a wholly unqualified success in the Service, however. In July 1915 some of the production aircraft were sent to the flying school at Doeberitz for use as training aircraft. On 27th July one crashed fatally, and a second Fokker pilot was killed on the 31st. After a third Fokker fatality on 29th August the *IdFlieg* disbanded the Doeberitz Fokker unit, sent the aircraft back to Schwerin, and grounded the monoplanes as Service aircraft. However, the Fokkers' success at the front was so marked that the *IdFlieg* were compelled to allow the resumption of training, but they stipulated that it was to be done at the Fokker flying school at Schwerin. The first group of trainees were sent there from Doeberitz in October 1915.

Before and during the war several attempts were made to produce a more-or-less invisible aeroplane. In every case the normal fabric covering was replaced by a transparent material: all the experiments were unsuccessful because no material that was sufficiently



Fok. E I, 46/15. (Photo: P. L. Gray)

transparent could be made strong enough or taut enough. The "invisible" Fok. E I was no exception. It was covered with a kind of cellulose sheeting, was flown once or twice, but was soon converted to a standard E I.

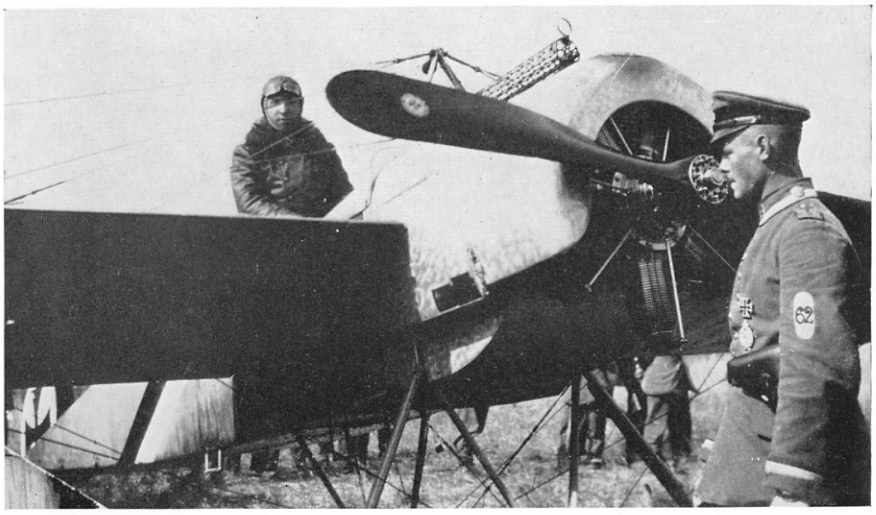
The Fok. E I was a somewhat makeshift aircraft, rushed into production without development or consideration of the need to refine details, and its engine and armament were alike unreliable. While the batch of E Is were going through the shops at Schwerin, Martin Kreutzer re-designed the aircraft to have the 100-h.p. Oberursel rotary engine. The revised design was given the Fokker type number M.14 and the military designation Fok. E II. A slightly taller undercarriage was fitted, the wheels being somewhat farther forward than on the E I; and a small triangular under-fin (more often removed than retained in service) was fitted immediately ahead of the rudder. The height of the cabane pylon was reduced but the struts were more substantial than those of the E I.

A major difference between the Fok. E I and E II was the reduced area of the wings on the later type. This was cut down to about 14 sq. m. with the object of increasing the aircraft's speed, but in practice it made the E II more difficult to fly.

The prototype E II had to be flown with an 80-h.p. Oberursel because no example of the 100-h.p. engine was available. Enough engines had been made by the late summer of 1915 for deliveries of Fok. E II fighters to start in July, and eight were operational by October.

As the 14 sq. m. wings had failed to enhance the performance as had been hoped, new wings of 9·52 m. span were designed; the span of the E I had been 8·95 m. The type number of the modified aircraft remained as M.14, but the new military designation E III was allotted.

Oberleutnant Freiherr von Althaus with his Fok. E I. (Photo: P. L. Gray)



Leutnant Max Immelmann in a Fok. E I, which bore a diagonal black and white stripe behind the cockpit.

The first Fok. E III went to the Western Front in August 1915. Thus the E I, E II and E III were operationally contemporary for a time. The E III was the best and most successful of the three, however, and was therefore the most numerous type. It was much sought after by the German fighter pilots once its qualities had been demonstrated. It retained the standard armament of one LMG·08 machine-gun. A few E IIIs had two guns, but this installation so reduced the aircraft's climbing performance that it found only limited use. Orders for substantial numbers of Fokker fighters were placed by the German army and navy and by the Austro-Hungarian government.

In general, airframes of the war period were simple structures that could be developed and produced much more quickly than contemporary aero-engines. Many aircraft could not be built in the numbers that were desired because suitable engines were not available in sufficient quantities. So it was with the Fok. E III, for the output of the Oberursel Motor Works could not match that of the Fokker factory.

Alternative engines were tried in the E III. At one time the prototype was flown with an 80-h.p. Le Rhône taken from a captured Nieuport 11. The maximum output of this excellent little French rotary was 92-h.p. at 1,300 r.p.m., which was better than the rather theoretical 100-h.p. of the unreliable Oberursel*; consequently the performance of the E III with the Le Rhône was considerably enhanced, particularly in its rate of climb and ceiling.

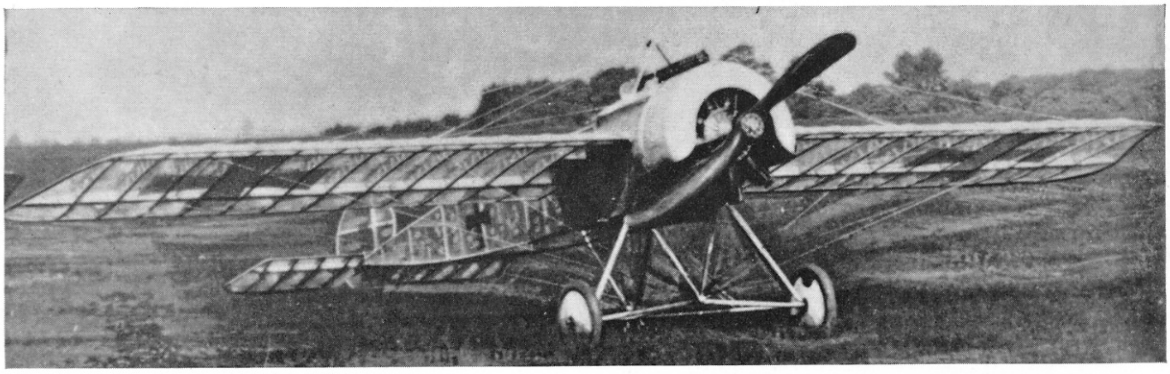
Apparently there was no thought of fitting production E IIIs with captured Le Rhônes, doubtless because too few fell into German hands in a usable condition at that early date. The other engines that were installed experimentally, the 100-h.p. Goebel Goe. I and 90-h.p. Siemens-Halske Sh.I, came too late. A Goe. I was fitted to the E III with *Werke Nr.* 520 in April 1916. The Sh. I came still later and little is known about its installation in an E III.

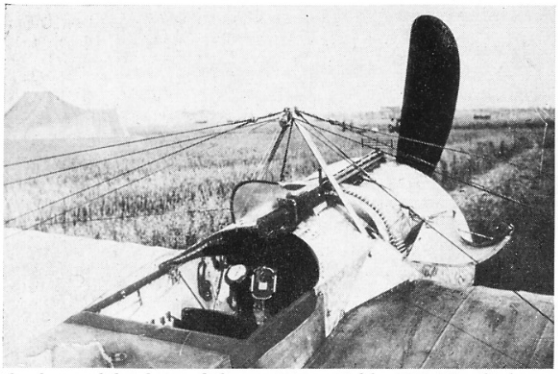
One E III was fitted with a completely circular engine cowling with a drain funnel let into its underside. This was apparently an attempt to recover some at least of the castor oil that was ejected by the engine: a tube ran from the apex of the funnel back and up into the fuselage. The date of this experiment is unknown, but it may have been quite late in the war, when Germany's supply of lubricating oils was beginning to run low. Alternatively, the oil may have been recovered for purposes of chemical analysis.

The first Fokker monoplane to fall intact into British hands was the E III No. 210/15 which, despite some seemingly conflicting records, must have been the Fokker that made a forced landing behind the British lines on 8th April 1916. Photographic evidence proves conclusively that 210/15 was the Fok. E III that was tested at Central Flying School, Upavon, on 30th May 1916; the official test report was No. M.48. The E III's speed was found to be only 83 m.p.h. at 6,500 ft., its service ceiling no more than 11,500 ft.

** The Oberursel of the Fok. E III that was tested at Central Flying School was found to deliver only 85 h.p.*

The E I that was covered with cellulose sheeting in an attempt to make it more or less invisible.





The forward fuselage of the prototype Fokker M.14, which was armed with a Parabellum gun.

This E III is almost certainly the aircraft that now hangs in the Science Museum, South Kensington.

It may also have been the Fokker that was pitted in mock combat against a Morane-Saulnier Type N at St Omer in the spring of 1916. The contest is best described in Cecil Lewis' words:*

> ". . . it was perfectly orthodox, and there remained only to put it up against a British scout to judge its performance. The Morane Bullet was chosen, and the two machines were run out on the aerodrome, side by side. All the General Staff assembled to watch the test. Both machines took off together, and it was immediately clear that the Morane was all over the Fokker. It climbed quicker, it was faster on the level, and when the two machines began a mock fight over the aerodrome, the Morane had everything its own way. A cheer went up from the ground. The bogey was laid. A description of the machine, its size, power, capabilities, was circulated at once to everyone in the Corps. It did a great deal to raise the morale and prepare the way for the Allied air supremacy later that year."

Last of the series was the Fok. E IV, of which the prototype emerged in November 1915. It represented an attempt to combine adequate performance with the twin-gun installation that had been unsuccessful in the E III. The Fok. E IV had a 160-h.p. Oberursel, a two-row rotary that required a fore-and aft mounting. The span was increased to 10 m., and there was a rudimentary top decking behind the cockpit. A new Fokker type number, M.15, was allotted to the E IV.

Immelmann wanted more fire power and suggested three guns. An installation was made in an E IV, for which Immelmann had requested the use of a captured 160-h.p. Le Rhône, another two-row rotary. While this engine was being prepared for the three-gun E IV a 100-h.p. Oberursel was fitted. With the Le Rhône installed, Immelmann took the aircraft over on 16th January 1916. Lack of spares for the big Le Rhône later necessitated a change to the 160-h.p. Oberursel.

The triple-gun installation must have led to complications with the wholly mechanical interrupter gear. In March 1916 it malfunctioned and Immelmann shot away both blades of his airscrew. He recorded that he had scored at least three victories on his multi-gun E IV, but he came to dislike it and changed to a standard two-gun E IV (possibly E.127/16).

The favourable report on the E IV that Parschau had submitted in November 1915 was quickly proved to be over-optimistic. Brute force made the new type faster than its predecessors, but its manœuvrability was poor. In the event, the limited production of the 160-h.p. Oberursel restricted output of the E IV, and the type was reserved for use only by the best of the German fighter pilots.

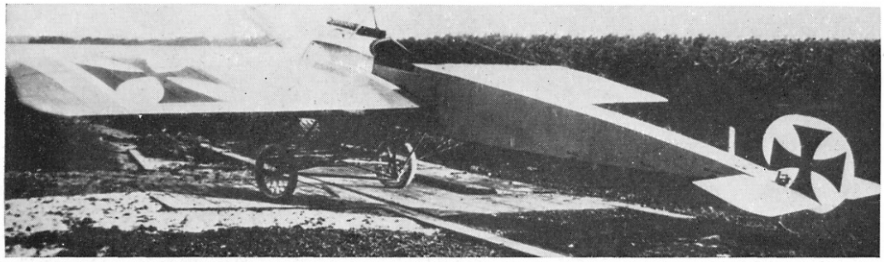
By the standards of the 1914–18 war the Fokkers had a long operational life. Throughout the summer and autumn of 1915 and the winter of 1915–16 the German army generally followed much the same practice as the R.F.C., allotting one or two single-seat fighters to each *Feldfliegerabteilung* for the protection of the two-seaters that were the main equipment of these units. It was under this organisation that Max Immelmann and Oswald Boelcke scored their early victories as the Fokker pilots of Fl. Abt. 62.

Late in 1915 Major Stempel, Staff Officer for Aviation of the German Sixth Army, created three *Kampfeinsitzer-Kommandos* (single-seat fighter commands, abbreviated as KEK). The precise nature of these KEKs is hard to determine, but they do not seem to have replaced the basic Fl. Abt. organisation. KEK 2 was at Douai and included Immelmann, Boelcke and Mulzer; but Immelmann continued to regard himself as a member of Fl. Abt. 62. The KEK concept was probably a control arrangement to enable the army commander to call on all his single-seat fighters in a given area if the need arose.

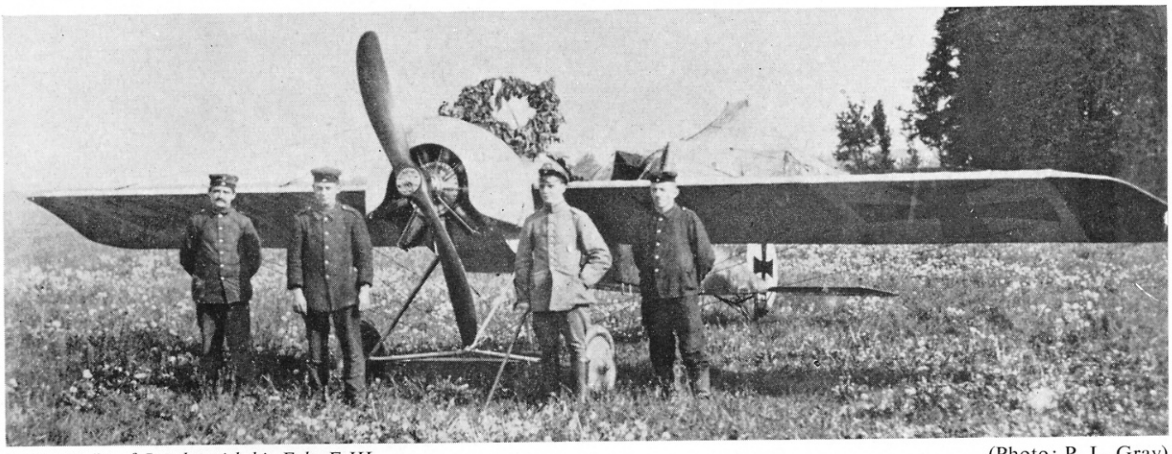
Reports of the number of Fokkers in front-line service are conflicting. According to one source, the German Sixth Army had in August 1915 eight single-seat fighters, presumably Fokkers; by the following month the Third Army had three; and by the end of 1915 the total number of single-seat fighters in operational use on the Western and Eastern Fronts was only forty. On 20th February 1916 the Fifth Army was reported to have 147 aeroplanes, of which 21 were E-type aircraft. Between June 1915 and April 1916 the total deliveries of monoplane fighters to the Western Front were only 180; by 6th March 1916, when the German operations at Verdun were well advanced, the Fifth Army's strength of single-seat fighters had risen to 26. Another source states that 150 Fokkers, of which 110 were E IIIs, were in operational use on all fronts in April 1916.

In action the Fokker was not infallible. Its gun, the LMG.08, was not ideally suited to aviation use; its lubricating grease and the hemp ammunition belt

* *Sagittarius Rising*, page 54.



Fok. E II, No. 69/15, apparently photographed at Schwerin. (Photo: Imperial War Museum)



Leutnant Josef Jacobs with his Fok. E III. (Photo: P. L. Gray)

would freeze. Similarly, the cold of winter or high altitude could cause the parts of the synchronising mechanism to contract sufficiently to cause it to malfunction. The gun could only be relied upon, all other things being favourable, when the engine (itself unreliable) was running at normal speed.

In spite of their faults and relatively small numbers the Fokkers were successful while they were virtually unopposed and had a tremendous influence on aerial combat during the winter of 1915–16, for the Allies did not at that time have an adequate counter-weapon. The combat advantage of the fixed forward-firing gun, when brought to bear on slow and unmanœuvrable two-seaters by an agile single-seater, was enormous. The Fokker gained a reputation that was out of all proportion to its quality as a military aeroplane.

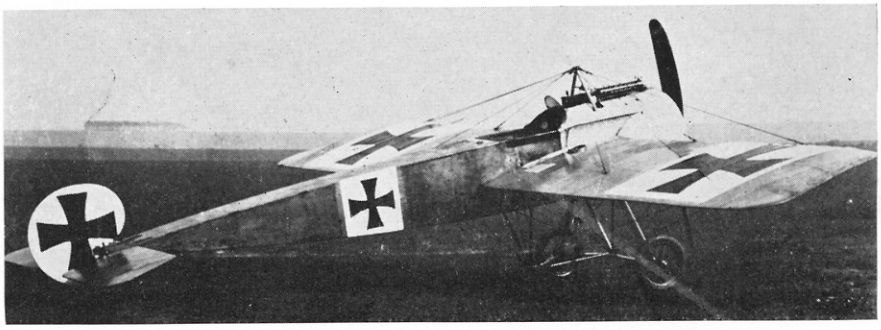
Its depredations began in earnest in October 1915, and by mid-January 1916 the R.F.C. was so alarmed by its activities that special orders were issued, requiring an escort of at least three other aircraft for each reconnaissance two-seater that was to cross the lines.

The material success of the Fokker was augmented by the insidious psychological effect of the wildly over-dramatised outcry that was whipped up in Britain (more, it now seems, with a view to denigrating the Royal Aircraft Factory than to producing a remedy) and culminated in the Burbidge enquiry of 1916. These proceedings consumed a great deal of time and public money, did little more than reveal the ignorance of some of the accusers, and did not shoot down a single Fokker. That last task was left largely to the French Nieuport 11, the D.H.2, and the maligned Royal Aircraft Factory's F.E.2b—all of which had been designed and put into production long before the Burbidge enquiry began.

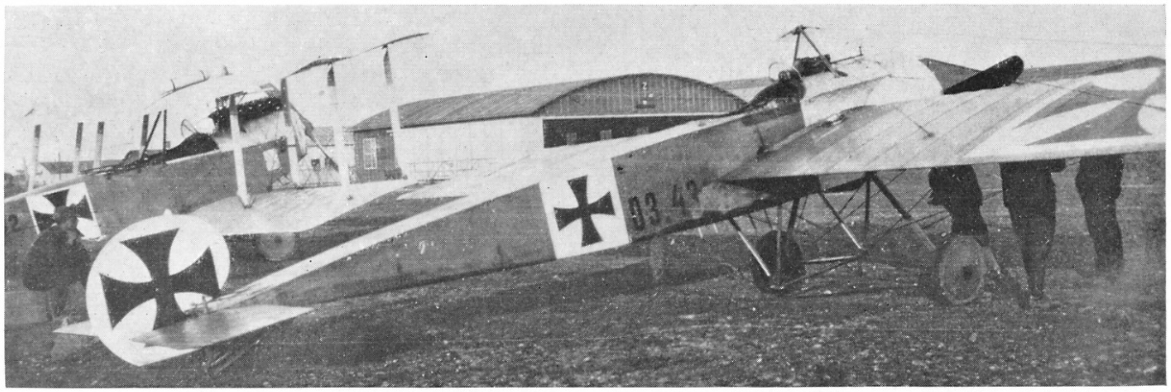
During the operations of the German Fifth Army against Verdun in March 1916 the French flying service began to make determined efforts to aid their cruelly pressed troops and succeeded in penetrating the German air defence. The failure of the German fighters to stop this penetration was attributed to the fact that their bases were too far from the front, and their fuel capacity was insufficient to permit long patrols.

This led to the first real concentration of German single-seat fighters. Hauptmann Wilhelm Haehnelt, Staff Officer for Aviation at Fifth Army Headquarters, gathered his fighter aircraft together at advanced bases at Avillers on the east bank of the River Meuse and Bantheville on the west bank. The units thus formed were known as *Kampfeinsitzer-Kommando Süd* and *KEK Nord* respectively. Boelcke sought and obtained permission to establish a third fighter flight at Sivry. This consisted of only two Fokkers, flown by himself and Lt. Notzke. These units were thus appreciably further east than KEK 1, 2 and 3 had been, and there was no operational connexion between the two groups of KEKs.

The Fokker's decline had begun as early as 5th January 1916, when the first Nieuport 11 was delivered to *Escadrille* N.3. Four and a half weeks later No. 24 Squadron, R.F.C. flew to France equipped throughout with D.H.2s. The first F.E.2a had gone to France as long before as 20th May 1915, but the handful of this type that saw limited operational use had no real opportunity to demonstrate the future qualities of the F.E.2b. The first all-F.E.2b squadron to go to France was No. 20, which arrived there on 23rd January 1916; three more squadrons (Nos. 25, 23 and 22, in that order) followed between 20th February and 1st April. The Fokker-beaters were gathering in strength.



Fok. E III No. 210/15, photographed at Central Flying School, Upavon, May 1916.
(Photo: Aeromodeller)



A few E IIIs were used by the Austro-Hungarian Luftfahrttruppen. *One such was 03.43, which was armed with a single Schwarzlose machine-gun.* (Photo: Peter M. Bowers)

Production: It is difficult to determine precisely how many Fokker monoplane fighters were built. According to some sources, a total of 625 Fokker monoplanes of the E I, E II, E III and E IV types were built. This figure does not withstand scrutiny, however. In 1915 and 1916, the total production of all German E-type aircraft was 647, a figure that must have included at least 150 (if not more nearly 200) monoplanes of designs other than Fokkers.

It seems that about 65 Fok. E Is and E IIs were built, and output of the E III was at least 258. It is possible that some airframes were never fitted with engines, and it seems that relatively few E IVs were used operationally.

Total production of all Fokker monoplane fighters is therefore likely to have been of the order of 450–475.

Service use: One or two Fokker monoplane fighters were on the strength of some *Feldfliegerabteilungen* from the summer of 1915 onwards. By the end of 1915 there were 82 such field aviation sections and about 40 single-seat fighters in operational use on the Western and Eastern Fronts. In August 1916 only 48 German single-seat fighters of all types were serviceable on the Western Front.

Fokker fighters are known to have been used by the following units: *Feldfliegerabteilungen* 6b (Bavarian), 9 (Bavarian), 11, 23, 32, 37, 62 and 67. *German Fifth Army: Kampfeinsitzer-Kommando Nord* at Bantheville; KEK Süd at Avillers; fighter flight (Boelcke) at Sivry. *German Sixth Army: Kampfeinsitzer-Kommandos* 1, 2 and 3. At least one German naval defence squadron in Flanders had some Fok. E IIs. *Home Defence:* Interceptor flight at Freiburg; probably also used by *Kampfeinsitzer-Staffeln* at Trier and Mannheim.

Palestine: Fl. Abt. 300 at Beersheba. *Turkey:* E I and E III flown by Buddecke. *Austria-Hungary: Fliegerkompagnie* 10 at Aisovizza.

Pilots and known aircraft: F.l Abt. 6b: Leutnant Kurt Wintgens.

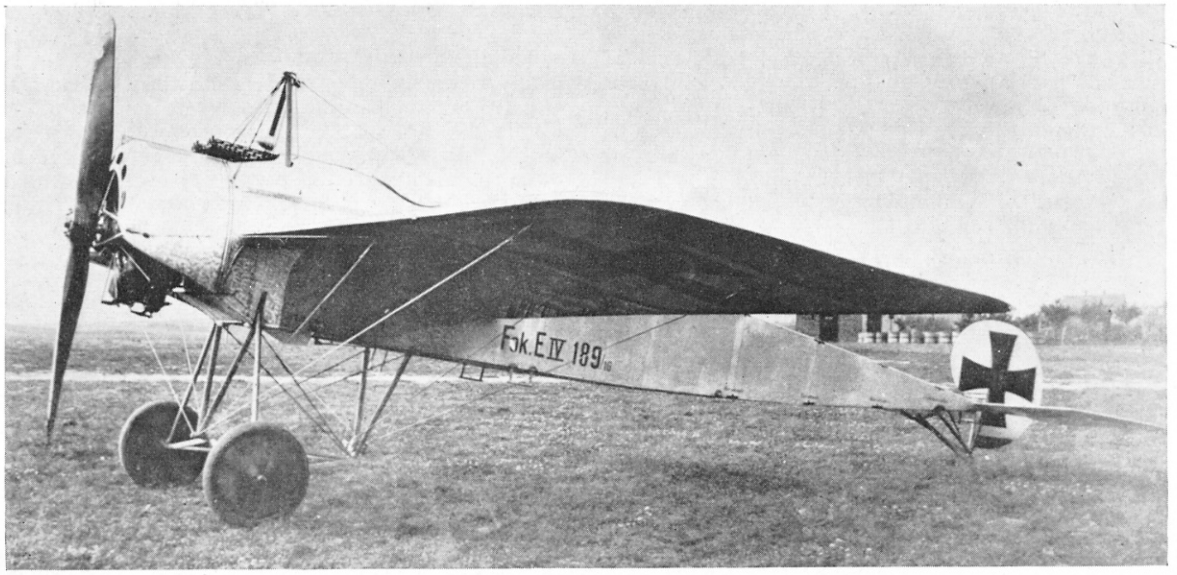
Leutnant Oswald Boelcke with his Fok. E IV, probably No. 174/16.

Fl. Abt. 9: Vizefeldwebel Eduard Böhme; E I 33/15 flown by Leutnant O. Kissenberth. Fl. Abt. 23: Lt Freiherr von Althaus; Lt Rudolf Berthold; E I 36/15 flown by Lt Hans Joachim Buddecke; Lt Carl Josef Jacobs. Fl. Abt. 32: E III 84/15 flown Lt Gustav Leffers; E III 400/15 by Lt Lehmann; E III 420/15 by Lt Diemer. Fl. Abt. 62: E Is 8/15, 13/15 and E II 37/15 flown by Lt Max Immelmann; E I 3/15 and E II 37/15 by Lt Oswald Boelcke; Lt Max Ritter von Mulzer; Lt Weber. Fl. Abt. 67: Lt Walter Höhndorf.

Turkey: E I 36/15 and E III 345/15 flown by Buddecke.

Weights and performance: (except where indicated the figures are from German sources).

Fok. E IV No. 189/16.



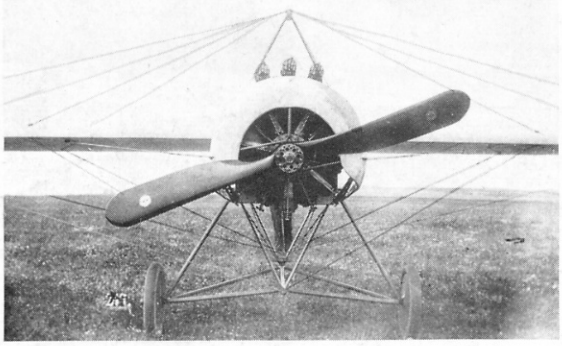
In March 1916 Boelcke was reporting, of the Fok. E IV, that its climbing performance was so poor that Nieuports could escape from it. Other Fokker pilots were less fortunate: their monoplanes were unable to escape from the attentions of the Nieuports, D.H.2s and F.Es. The historian of No. 24 Squadron, R.F.C. wrote:

> *"Each flight frequently did three patrols of 1½ hours each per day. Results however, completely justified the effort, as the once dreaded Fokker monoplane was completely outclassed and defeated, being, indeed, literally hounded out of the sky."*

On 18th June 1916 Immelmann's Fok. E III broke up in the air during a combat with an F.E.2b of No. 25 Squadron, R.F.C., flown by Lt. G. R. McCubbin with Cpl. J. H. Waller as his observer. The R.F.C. naturally claimed that Waller's shots had brought down the Eagle of Lille; the Germans, equally naturally, maintained that structural failure of the Fokker had followed the malfunctioning of the interrupter gear. Immelmann's death remains one of the classic mysteries of the first war in the air.

But it virtually marked the end of the Fokker monoplane's career. A few continued to be encountered for some weeks, and Fokkers remained in limited operational use on the Eastern Front and in the Middle East until the end of 1916. Thereafter the type was withdrawn for use at training units.

The special Fok. E IV, Werke Nr. 385, *that was made to Max Immelmann's specification with three LMG.08 guns.*
(Photo: Imperial War Museum)



SPECIFICATION

Power: **E I,** 80-h.p. Oberursel. **E II** (prototype and training version), 80-h.p. Oberursel; (production), 100-h.p. Oberursel U I. **E III,** 100-h.p. Oberursel U I; experimental installations of 80-h.p. Le Rhône, 100-h.p. Goebel Goe. I 90-h.p. Siemens-Halske Sh. I.

Dimensions: **E I.**—Span 29 ft. 3 in., length 22 ft. 1·7 in., height 10 ft. 5·4 in. **E II.**—Length 23 ft. 11·3 in., height 9 ft. 1·8 in. **E III.**—Span 30 ft. 10·4 in., length 23 ft. 11·3 in., height 9 ft. 1·8 in., chord 5 ft. 10·8 in., dihedral 0 deg., span of tail 9 ft. 6 in., airscrew diameter 8 ft. 3·5 in. **E IV.**—Span 32 ft. 9·6 in., length 24 ft. 7·2 in., height 10 ft. 1 in.

The wing area of the E I, E III and E IV is usually quoted as 16 sq. m. (172·2 sq. ft.), but this is probably an approximation. The wing area of the E II is believed to have been about 14 sq. m. (150·7 sq. ft.). The area of the elevators of the E III was 20 sq. ft; of its rudder, 6·6 sq. ft.

Armament: The M.5K/MG was originally armed with a 7·92 mm. Parabellum MG.14 machine-gun, as was the prototype M.14. Standard armament of the Fok. E I and E II was one 7·92 mm. LMG.08 machine-gun; the E III could have two LMG.08 guns but more usually had only one; the E IV had two LMG.08. One special E IV for Max Immelmann had three LMG.08 guns. Some Austrian Fokkers had a single 8 mm. Schwarzlose machine-gun.

One or two Fokkers flew in Turkish markings, notably in the hands of Leutnant Hans Joachim Buddecke, who was sent to Turkey at the end of 1915 to assist the tiny air force of Germany's ally.

The R.F.C. also encountered Fokkers in Palestine, where several were added to the strength of Fl. Abt. 300 at Beersheba in 1916. In Mesopotamia, too, a few Fokkers were used by a German unit that was operating from an aerodrome at Shumran Bend in support of the Turks during the siege of Kut-al-Imara early in 1916.

With the arrival of the Albatros and Halberstadt biplane fighters the Fokkers were completely withdrawn from the Western Front in the late summer of 1916. A few lingered on on less active fronts—the last E II was still operational on the Eastern Front in December 1916—but by 1917 the Fokker monoplane was a rare bird. Fokker's star remained in eclipse until the Platz-designed triplane appeared at the front in the autumn of 1917.

Type	E I	E III	E III British test report	E IV
Weight empty (lb.)	787	878	920	1,025
Military load (lb.)	—	—	64	—
Crew (lb.)	—	—	180	—
Fuel and oil (lb.)	—	—	236	—
Weight loaded (lb.)	1,239	1,342	1,400	1,593
Max. speed (m.p.h.)				
at unspecified height	81	87·5	—	100
at 6,500 ft.	—	—	83	—
at 10,000 ft.	—	—	79	—
Climb to	m. s.	m. s.	m. s.	m. s.
3,280 ft.	7 00	5 00	— —	3 00
6,500 ft.	— —	— —	12 30	— —
6,560 ft.	20 00	15 00	— —	8 00
9,840 ft.	40 00	30 00	— —	15 00
10,000 ft.	— —	— —	28 00	— —
Service ceiling (ft.)	—	—	11,500	—
Endurance (hours)	1½	1½	2¾	1½

The author acknowledges his indebtedness to the researches of the late A. R. Weyl, especially his book Fokker: the creative years, *and to P. L. Gray for the loan of material.*