Vintage Aviation
fotofax

GERMAN BOMBERS OF WORLD WAR ONE

Alex Imrie

GERMAN BOMBERS OF WORLD WAR ONE

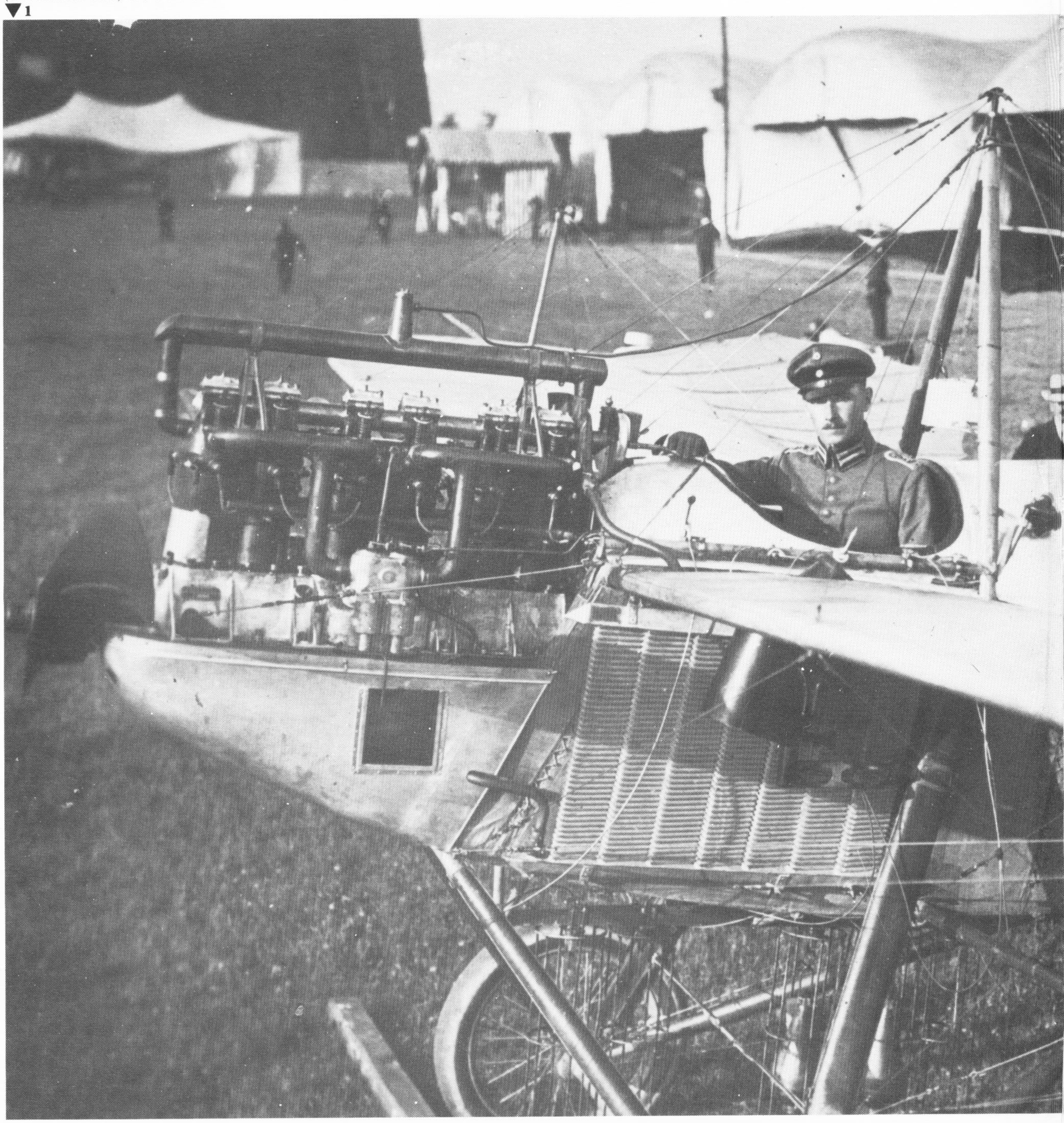
Alex Imrie

Front cover illustration:
Friedrichshafen G IIIa 826/18 near Bolchen, Lothringen, in October 1918; see plate 73.

Back cover illustrations:
Top left: AEG G 7/15 of Feldflieger Abteilung 42; see plate 17.
Top right: Albatros C I; see plate 12.
Bottom: A Gotha, G IV 409/16, of Kasta 13, Kagohl III after an emergency landing; see plate 38.

1. The first German bombs intended for aerial use were the Artillerie-Pruefungs-Kommission (APK) weapons of the 1912/13 period; the blast effect of these cast steel spherical bombs was not great and their trajectories were unpredictable. Elongated bombs (but still fin-less) are visible in the vertical wire 'cages' under the fuselage of Leutnant Canter's Rumpler Taube during the 1913 Kaiser Manoeuvres. Alongside the observer in the front cockpit can be seen the five levers which operated the bombs' release via Bowden cable.

▼1



GERMAN BOMBERS OF WORLD WAR ONE

Alex Imrie

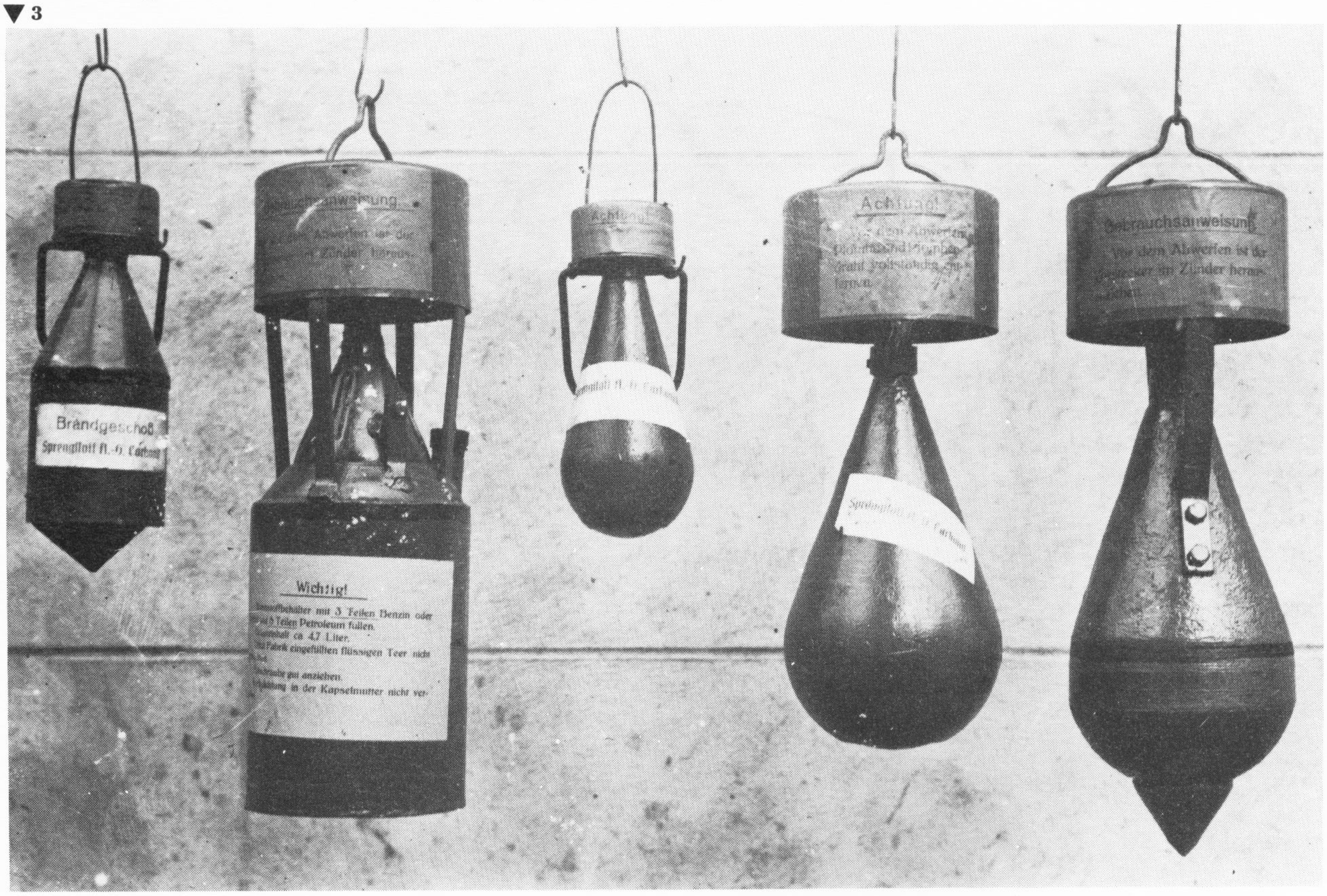
ARMS AND ARMOUR

▲ 2

2. Major Siegert, Kommandeur of the Fliegerstation at Metz, began night flying training for his pilots in February 1913. Although the practice was officially frowned upon, Siegert showed that the pilots lost any apprehension they might have had once they were introduced to night flying, and on 23 April he even held night manoeuvres when ten aircraft flew without incident, in co-operation with searchlights. In this early night flying scene at a military aerodrome an Aviatik biplane (whose rudder has suffered from retouching) is being put into the hangar. The aircraft in the foreground is a dual-control Otto-built Farman copy powered by a 100hp Argus engine.

3. The shortcomings of the APK bombs led to the development of new bombs by Sprengstoff A.-G Carbonit-Schlebusch; introduced early in 1914, they remained in use until mid-1916. Made in the calibres of 4.5, 10, 20 and 50kg, they had a high rate of fall due to their pear shape and were fitted with a tail ring for stabilization. The percussion fuse in the tail was armed by the rotation of a small windvane during the initial 200 metres of descent. The two canister bombs on the left are early incendiary weapons of 5 and 10kg filled with liquid tar and petrol or paraffin.

▼ 3



INTRODUCTION

First published in Great Britain in 1990 by Arms and Armour Press, Villiers House, 41–47 Strand, London WC2N 5JE.
Distributed in the USA by Sterling Publishing Co. Inc., 387 Park Avenue South, New York, NY 10016–8810.

Distributed in Australia by Capricorn Link (Australia) Pty. Ltd, P.O. Box 665, Lane Cove, New South Wales 2066, Australia.

British Library Cataloguing in Publication Data
Imrie, Alex
German bombers of World War One.
1. German military forces. Military aircraft, history
I. Title II. Series
623.74630943
ISBN 1-85409-015-1

Designed and edited by DAG Publications Ltd. Designed by David Gibbons; edited by David Dorrell; layout by Anthony A. Evans; typeset by Typesetters (Birmingham) Ltd, Warley; camerawork by M&E Reproductions, North Fambridge, Essex; printed and bound in Great Britain by The Alden Press, Oxford.

Before World War One bombing attacks were seen as the prerogative of the airship, but the military authorities also investigated the possibility of aeroplanes carrying bombs of small calibre, and were keen observers of the bomb-dropping competitions that were a feature of the early flying meetings. When Victor Stoeffler, flying an LVG monoplane, scored three hits from a height of 50 metres on an airship-shaped target during the 1912 Berliner-Herbstflugwoche at Johannisthal, he won first prize and no doubt was invited to take part in the Prussian War Ministry competition held at Doeberitz shortly afterwards, when prizes totalling 16,000 Marks were offered. However, progress was slow and the aeroplanes that went to war were not built for specific purposes and the A and B category unarmed aircraft performed any duty required of them. With the coming of the C category armed two-seaters in 1915 this still applied, and even after the appearance of the first twin-engined Kampfflugzeuge (fighting aeroplanes), bombing was just one of the tasks that befell them, the participation in which really depended on the enthusiasm of individual crews.

Major Wilhelm Siegert appreciated the value of bombing in the strategic sense, and he caused the formation of the first unit to specialize in this work; known as the Fliegerkorps der Obersten Heeresleitung (Flying Corps of the Army High Command), it used the cover name of Brieftauben-Abteilung 'O' (BAO) (Carrier Pigeon Section 'O'). This formation became the model on which the later Kampfgeschwader (Kagohl) (Fighting Squadrons) were based. Initially the main purpose of the BAO lay in bombing attacks on important targets in southern England, but the fact that the required base at Calais remained in enemy hands, coupled with the inadequate range of the aeroplanes then in use, meant that the formation was used in a less important role against continental targets. As second-in-command to Feldflugchef (Chief of Field Aviation) Thomsen, Siegert stressed the need for special bombing aeroplanes that could be used at night. He knew that frequent attacks against important objectives in the enemy rear areas would bring success. The emphasis now was to produce aircraft of increased wing area, since speed at night was not such an important requirement as load-carrying ability.

The failure of the Kagohl to undertake bombing attacks at Verdun and on the Somme – when they were, of necessity, used instead on fighting patrol work – led to a major transformation that saw a drastic reduction in the numerical strength of the bombing force, which at that time possessed 288 aeroplanes, 24 of them G category twin-engined machines. Four Kagohl were disbanded in the reorganization of the Luftstreitkraefte (Air Service) in October 1916, their aeroplanes being formed into Schutzstaffeln for the defence of the working two-seaters. The three remaining Kagohl were equipped with G category aircraft purely for bombing purposes, and shortly afterwards Kagohl III was reinstated with similar equipment, primarily for attacks against England. The established strength was now 144 aircraft, and when a further expansion of the Luftstreitkraefte took place in June 1917, known as the Amerika-Programm, there was no increase over the four Kagohl already in existence.

The Kommandierende General der Luftstreitkraefte (Kogenluft) (Commanding

General of the Air Service) considered that an increase in strength of the Jagdstaffeln (fighter units) was more important, and resources did not allow for the creation of new Kampfstaffeln as well. Nor did an increase in numerical strength result from General Ludendorff's emphasis that the development of heavy bombers should be made 'with all possible means'. The Kogenluft reply in October 1917 merely allowed the current Kagohl (I to IV) of six Kasta to be increased in number to seven units – redesignated Bombengeschwader der Obersten Heeresleitung (Bogohl) (Bombing Squadron of the Army High Command) – but each of these was to have only three Bombenstaffeln (Bosta), except for Bogohl III which was still under orders to carry out attacks on England and was to retain its six Bosta. Thus the bomber arm (Bogohl I to VII) in this year of preparation for the great battles of 1918 remained at a static strength of 144 aeroplanes, although to this figure should be added the R category machines of Riesenflugzeug-Abteilungen (Rfa) 500 and 501 which were now deployed in the West.

When Siegert became Inspekteur der Fliegertruppen (Idflieg) his task was to institute the organization necessary for equipping the whole air service and although the bomber formations did not occupy the top priority, the technical development of suitable aircraft fostered by Idflieg was of the highest order; thus, despite the relatively low numbers of aircraft in use, they comprised a powerful bombing force. An important operational change took place in the autumn of 1917. More effective enemy opposition by both anti-aircraft artillery and fighter aircraft had inflicted unacceptable losses and this led to the heavy, less manoeuvrable G types being used solely at night. Operations were more difficult at night, not only in the take-off and landing phases, but also in navigation and target identification, so the force was generally less effective at night. In April 1918 Bogohl VIII was formed. Shortly afterwards, in order that day bombing attacks could be carried out, Kogenluft increased the establishment of each Bosta by three C category two-seaters. This gave the bomber force a strength of 162 G and 81 C aircraft, plus approximately 8 R types.

During 1918 there was a marked increase in the weight of bombs dropped, but this was not entirely due to the increase in strength mentioned above, or to the fact that attacks against England had ceased during May. On two nights in July 166,480 kilogrammes of high-explosive were dropped on the Western Front. Such amounts were only possible, bearing in mind the number of aircraft available, when crews carried out a number of flights each night; on 21/22 August several crews from Bogohl IV actually undertook six operational flights each! Two examples of the effectiveness of the 1918 German bomber offensive were the operation on the night of 21/22 May when No 20 Ordnance Depot at Saigneville was hit and 5,600 tons of ammunition were destroyed, including the whole stock of 69 million rounds of small-arms ammunition; and the attack on 11 August on No 2 Base Mechanical Transport Depot at Calais by nine aircraft which inflicted damage amounting to £1¼ million – or almost as much as the estimated total value of damage caused by the 52 day and night aeroplane raids on the UK during the whole war.

However, the German bomber arm was not as effective as it might have been. Apart from Kogenluft's decision to concentrate on the formation of tactical units at the expense of an even stronger bomber force, the real significance of strategic bombing was not fully appreciated by the High Command. Targets were not chosen carefully enough and at various times the High Command allowed the Bogohl to be deployed by Army HQs, who used the aircraft for tactical purposes. This led to a dissipation of the concentrated effort which is the bomber instrument's key to success. The force had good weapons and its aeroplanes were the most technically advanced available at the time: the crews were skilled, resolute and brave and were imbued with a fine fighting spirit. The might of their conflict is reflected in the total

▲4

4. Siegert, as aviation advisor to the Obersten Heeresleitung (OHL) (Army High Command) from October 1914, was able to create a special bombing force, which, like the airship fleet, was directly at the disposal of the OHL. Although he had to settle at first for a heterogeneous collection of 36 obsolete aeroplanes, he obtained the most experienced pilots and observers in the service. Based on Ghistelles aerodrome near Ostend in Flanders, this formation used the cover name of Brieftauben Abteilung 'O' (BAO) (Carrier Pigeon Section 'O') and was operational from 6 December 1914. (Initially 'O' denoted OHL but later was taken to mean Ostend.) When eventually enemy defences restricted daylight operations, BAO flew at night and on 28/29 January 1915 put up fourteen aeroplanes that successfully bombed Dunkirk; all returned and landed safely.

weight of bombs dropped during the period of hostilities – 27 million kilogrammes.

The photographs are from the author's collection and include some which originated with men whom I was honoured to know personally, who had actually participated in some of the events recounted here. Others came from the growing number of World War One aviation enthusiasts, among whom particular mention should be made of Bill Evans, Ed Ferko, Peter M. Grosz, Ha-Jo Klein and Bruno Schmaeling. I acknowledge their assistance with thanks. For permission to use some of the photographs in their collection, I am also indebted to the Bayerische Hauptstaatsarchiv in Munich.

Alex Imrie

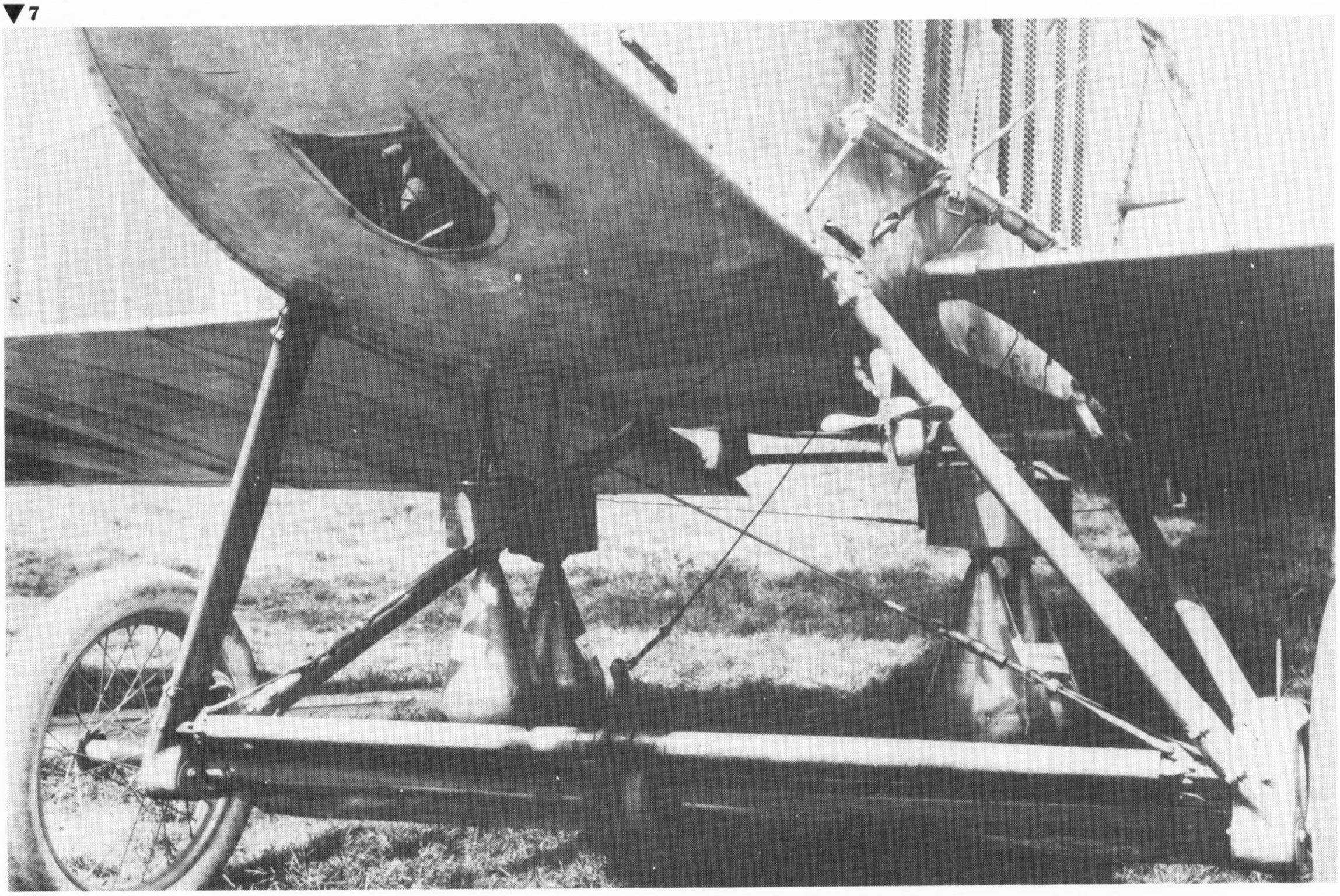
5. Vertical cage rack for 10kg Carbonit bomb on an Albatros B II of Feldflieger Abteilung 32; the release wire leading into the pilot's cockpit can clearly be seen. Due the limited room for these racks on fuselage sides between the side radiator and elevator operating bellcrank, they were often fitted below the fuselage. However, regardless of their position they created a great deal of drag which seriously reduced the aircraft's speed and rate of climb, especially when loaded.

5 ▶

▲6

6. This LVG B I of Feldflieger Abteilung 16 on the Eastern Front, depicted during winter of 1914/15, has been fitted with an oblique wire cage chute so that bombs, carried in the front (observer's) cockpit, will not foul the bottom wing during release. Usually two 4.5kg Carbonit bombs comprised the bombload. The safety wire and pin that prevented inadvertent rotation of the windvane-armed fuse had to be completely removed before placing the bomb in the chute. The issue bomb chutes were of varied design to suit different aircraft types but improvised examples were also made in the field by unit personnel.

▼7



8 ▲

7. Four early 10kg Carbonit bombs suspended from release hooks under the fuselage of an LVG B I. The safety pins to prevent windvane rotation had to be tied with wire or string to the release hooks, the operation of which withdrew the pins and allowed arming of the fuse. Later a disc was spring-loaded against the windvanes to prevent rotation. After release, air pressure forced the disc clear of the windvanes and the bomb was then armed in the usual way. the four-bladed windmill-operated air pump for pressurizing the fuel system can be seen on the port front undercarriage leg.

8. The belly of this crashed Aviatik B II from Feldflieger Abteilung 34 shows the two bomb chute exits and the celluloid-covered downwards viewing panel immediately ahead. Two 10kg Carbonit bombs were suspended in the chutes in the pilot's cockpit beside his knees. On a bombing run the pilot rested his head on the crash pad and viewed the ground through the transparent panel; he used an intersection of fuselage bracing wires as a sight, unhooking the bombs at the appropriate moment.

9. Aviatik B type biplanes of BAO on Allenstein aerodrome on the Eastern Front in April 1915 before taking off for Lomza. Completely mobile, housed in special railway trains, the BAO could be easily moved to different parts of the Front as required. The aeroplanes were often flown solo, allowing the weight of the observers to be used for increased fuel and bombloads. The effect of this force led to the creation of a second Brieftauben Abteilung at Metz, which additionally included aerial fighting in its duties. To differentiate between this unit and BAO, it was known as Brieftauben Abteilung Metz (BAM). These two formations formed the nucleus of the German bomber arm.

9 ▼

10. The crew of an Aviatik B category machine from Feldflieger Abteilung 9b at Colmar, well wrapped up against the elements and about to leave on a reconnaissance flight during Winter 1915, show their 25cm hand-held camera and the two 4.5kg Carbonit bombs to be dropped on targets of opportunity. These will be carried by the observer in the front seat, hung by their carrying handles on any suitable projection. He will then have to undo the safety wires, remove the pins, and either hand the bombs to the pilot for release or lean precariously aft out of his cockpit as he throws them over the side.

11. With the advent of the C category two-seater which placed the observer in the rear cockpit, there was no longer any need for improvised bomb chutes and bombs could simply be dropped over the side in the manner shown here by the observer of this well armed Albatros C I. Apart from the

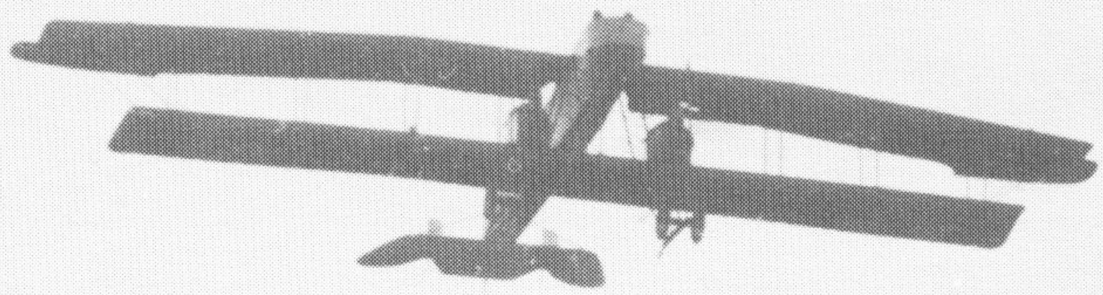
▲10 ▼11

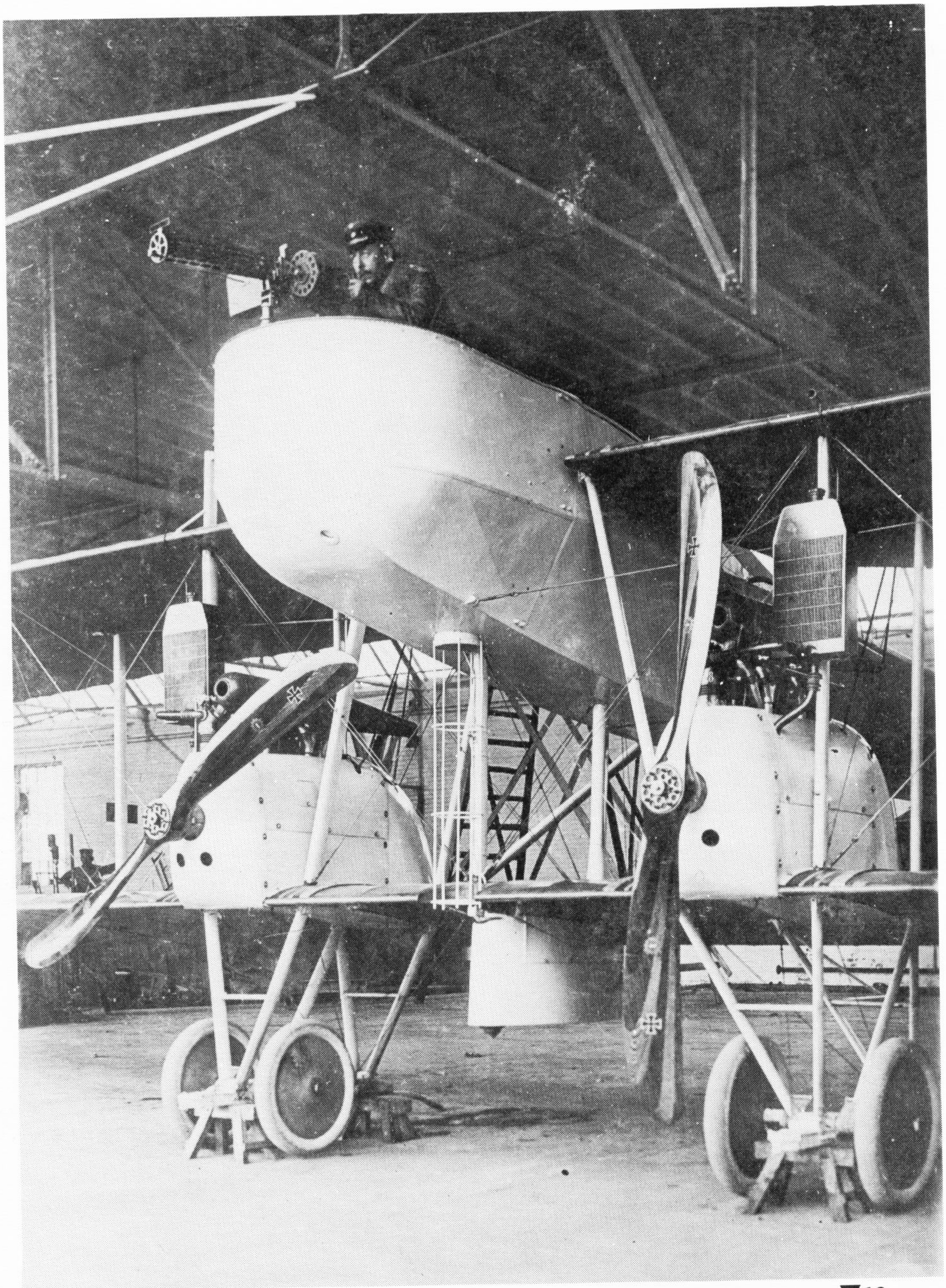
Parabellum LMG 14 on the pivot of the rotatable gun ring, this aircraft carries a Madsen (known as 'Die Muskete' in the service) firing forward over the tips of the propeller, and for good measure a '98 Carabine is strapped to the side of the fuselage. The claw brake pivoted on the centre of the undercarriage spreader bar was a standard fitting on all two-seaters.

12. When Major Thomsen became the Feldflugchef (Chief of Field Aviation) in March 1915, he constantly reminded all units that he expected every German aeroplane that crossed the frontline, regardless of its operational assignment, to carry some bombs to drop on towns or military installations in the enemy rear areas which were out of artillery range. Even if the only result was a few broken windows, the effect on the enemy's morale was considered a good enough reason. It was an unpopular instruction and not always acted upon. The observer of this Albatros C I would appear to be an adherent as he accepts a 10kg Carbonit bomb for delivery.

13. Although the twin-engined Kampfflugzeug (fighting aeroplane) designed by Oskar Ursinus, the Editor of *Flugsport* magazine, in association with Major Friedel, was not originally intended for bombing duties, it was used at the Front in this role early in 1915 and thus became the first German twin-engined bomber. Since the G category had not yet been introduced, the Friedel-Ursinus was designated B 1092/14. It is seen in flight with experimental aerodynamically balanced ailerons. Improved versions were manufactured by the Gothaer Waggonfabrik and by the end of 1915 six machines were operational, the first of the twin-engined Gothas.

12▲ 13▼



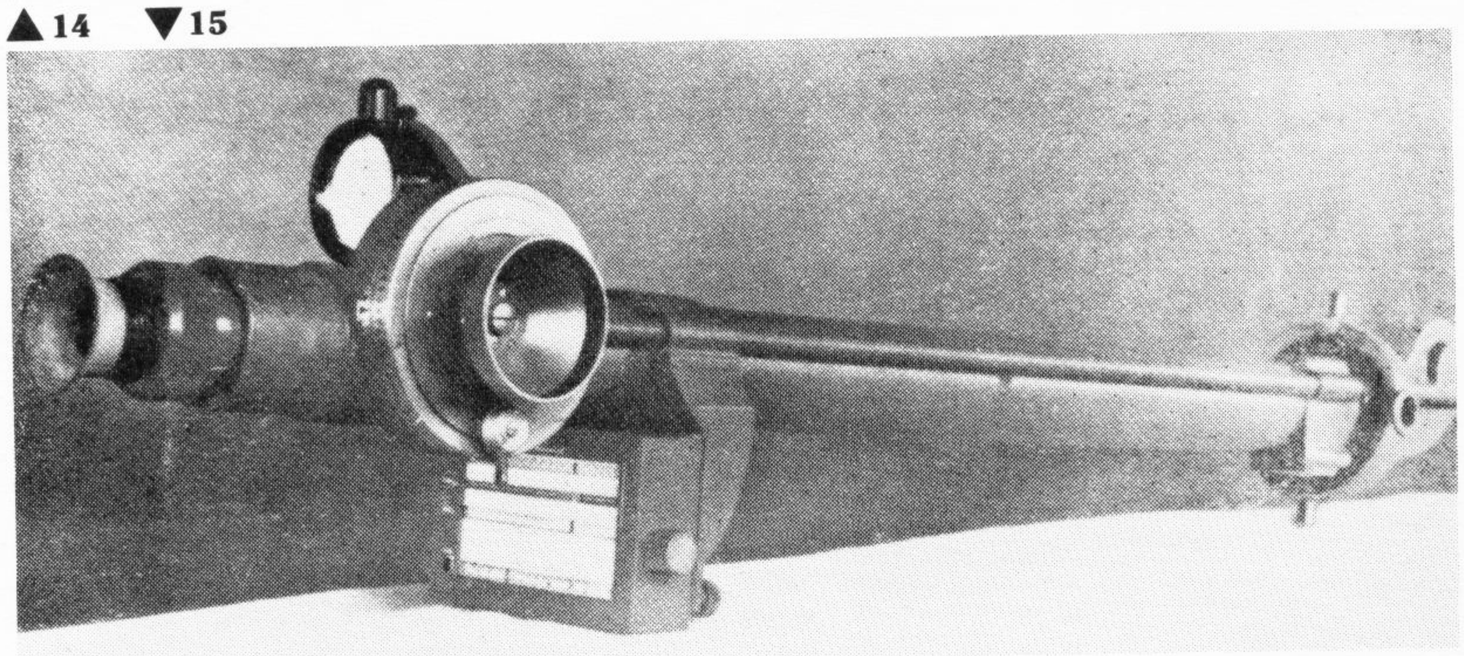


14. The curious configuration of the Gotha G I stemmed from fears that continued flight might not be possible if one engine failed. Because the engines were mounted close together for this eventuality, the fuselage had to be raised and this provided an ideal field of fire for the machine-gunner. The streamlined container under the centre of the bottom wing carried vertically suspended Carbonit bombs, while the cage tube allowed additional bombs carried in the fuselage to be discharged without fear of hitting the propellers. Note the use of 'handed' propellers to counter the effect of torque.

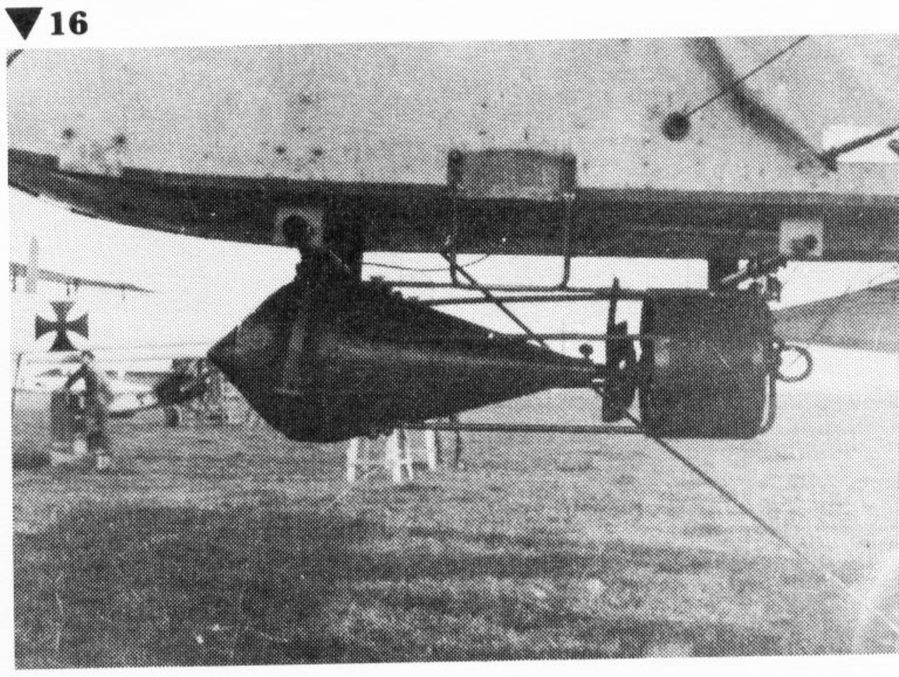
15. Goerz bombsight showing the graduated disc which tilted the viewing prism at the foot of the telescope from 90deg ahead to 20 deg astern, allowing objects to be tracked (the sight being held vertically by reference to a bubble level) and timed via the fitted stopwatch. The time found was corrected for height from the scale and the resultant value set on the disc. At about 4km from the target, flying dead into wind to eliminate drift, the target was followed along the sighting wires until disc rotation became blocked by the pre-setting, and the bombs were released. Despite its apparent sophistication, the early model of this instrument made by Zeiss gave only approximate results, and was considered as unnecessary ballast by BAO crews who did better by estimation.

16. The Ago C I twin-boom pusher had an auxiliary double-

▲14 ▼15



▼16



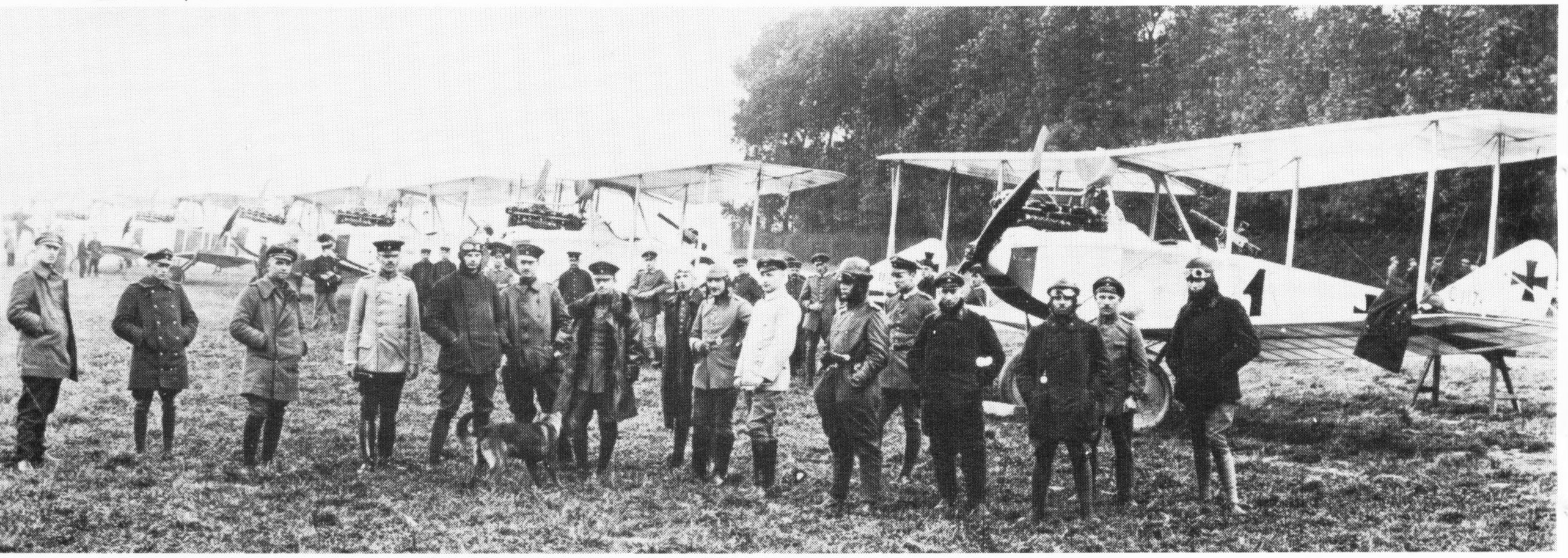
wheel landing gear approximately under the observer's front seat, but Hauptmann Hailer of Flieger Abteilung 9b had this removed from his unit's machines so that a simple rack could be installed to carry Carbonit bombs. Some pilots in other units devised means of carrying bombs under their aeroplanes by removing the claw brake usually fitted to the undercarriage spreader bar, but a number of minor accidents because of this resulted in an order forbidding 'unauthorized modifications'.

17. In mid-1915 Feldflieger Abteilung 42 received AEG G 7/15 and during the next six months this machine underwent various modifications to improve its use as a bomber. Here it already has an improved front gun position for the LMG 08, which is fed from the angular container on the right side of the gun; a canvas tube leading into a funnel on the other side collects the empty cartridge cases, thus preventing them from causing damage to the propellers. Note the completely uncowled 150hp six-cylinder Benz engines topped by massive radiators. The aircraft is seen on 12 September 1915 before taking off to attack Nancy and Lunéville.

18. The same aeroplane after major modifications made by the Armee Flug Park (Army Aviation Supply Depot) at Strassburg. A streamlined nose has been fitted and two outrigger rudders installed on the tailplane. Placing these in the propeller slipstreams gave better directional control and improved the aircraft's performance in the event of an engine failure. AEG were on the right track in this respect but reverted to single aerodynamically balanced rudders on the majority of their subsequent designs, only returning to the 'rudder in slipstream' concept after in-depth evaluation some two years later proved its undoubted superiority.

17▲ 18▼

▲19 ▼20



▼21

19. BAO returned to the Western Front in mid-1915 and was equipped with armed aircraft of the C category. Some of its LVG C II machines, in a variety of finishes, are seen here on Ghistelles aerodrome in December. Shortly afterwards BAO's designation was changed to Kampfgeschwader der Obersten Heeresleitung (Kagohl) (Fighting Squadron of the Army High Command) I and its aircraft were reorganized into six Kampfstaffeln (Fighting sections) – Kasta 1 to 6 – each having a strength of seven aeroplanes. At the same time BAM became Kagohl II with Kasta 7 to 12. Both formations were to have been used in the offensive against Verdun, in concentrated bombing attacks on targets behind the French lines, but this plan suffered attrition because the aircraft were used instead on fighting patrol work.

20. Such was the faith in the Kampfgeschwader concept that a further five units were formed in 1916 (Kagohl III to VII), thus creating another 30 Kampfstaffeln. These pilots and observers in front of the seven Rumpler C I machines of Kasta 14, Kagohl III, are seen shortly after that unit's formation. Completely mobile, and capable of being moved rapidly to specially prepared aerodromes on any front, their duties were two-fold: they could be operated in strength on bombing attacks or used in a pure air-fighting capacity. The Kagohl were the kernel of German air might and were seen as the key that would ensure aerial supremacy.

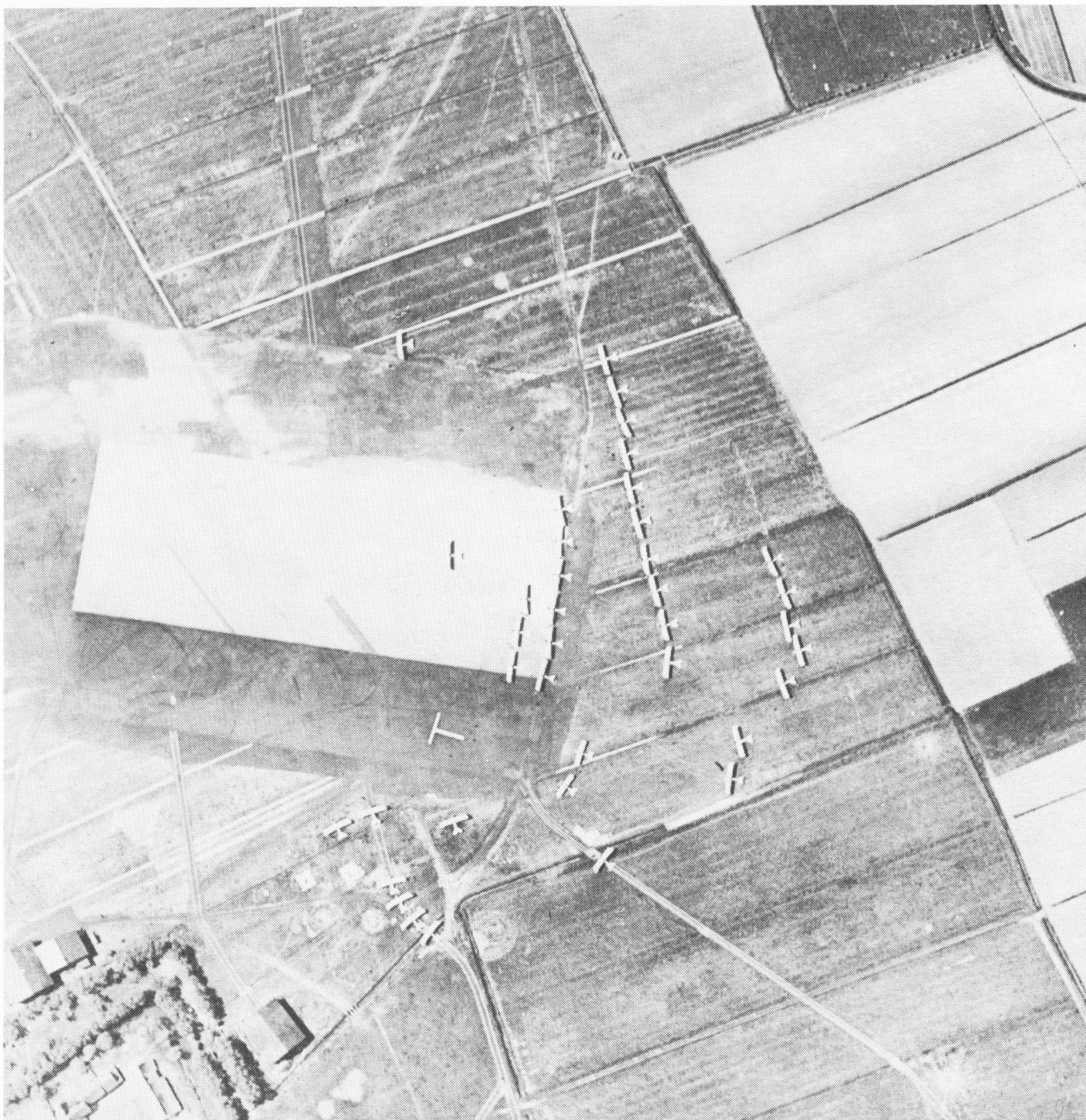
22 ▲

21. Because of their heavy defensive armament, the Kagohl's first twin-engined G types of aircraft were used singly for reconnaissance duties, and when accompanying a number of smaller two-seaters on a bombing raid the inclusion of a G type guaranteed that enemy fighters would concentrate on the big machine, leaving the main bomb-carrying force almost unmolested. But a hot reception awaited the attackers. This Rumpler G II (107/15) is seen over the Eastern Front, operating with Kagohl II from Kowel aerodrome in 1916.

22. On 20, 21 and 22 May 1916 Kagohl I and III mounted concentrated attacks against Dunkirk. Shown are Kampfstaffeln of Kagohl I, equipped in the main with LVG C II two-seaters (Rumpler C I machines of Kasta II in the foreground) and assembled in take-off order on Ghistelles aerodrome, near Ostend, on 21 May. A strict count-down procedure was maintained; all engines of a Kampfstaffel were started at the same time and machines were broght into line at the edge of the manoeuvring area before the previous unit had taken off. As soon as the last aircraft was airborne, the leader of the following Kasta started his take-off run, the other six machines following within a few seconds of each other. It was thus possible to get the whole Kagohl away in similar despatch, and surprisingly few accidents accompanied these high-density movements.

23. This aerial view of the same scene shows the specially prepared take-off area, to combat the Flanders mud, that allowed the heavily laden machines of each Kasta to depart in rapid succession. Once airborne, individual aircraft formed up easily on their leader's machine, which flew at reduced speed in a specified direction. Units then adopted their prearranged position in the 40-aircraft-strong formation, and climbed to operating height (generally above 10,000ft) before setting course for the target.

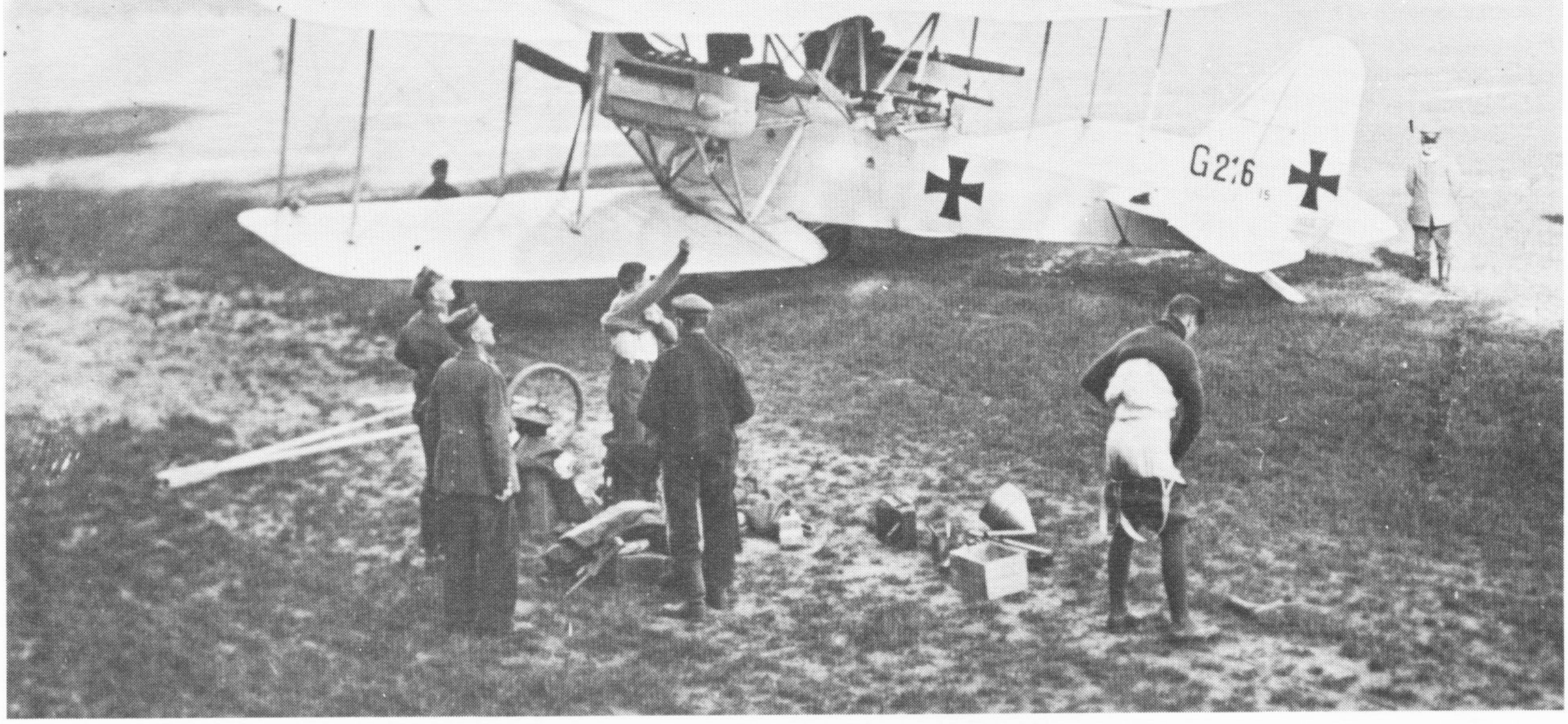
23 ▼



24. By mid-1916 crews of Feldflieger Abteilung 42 were experienced twin-engined fliers and received AEG G III 216/15 which was operated in conjunction with the Rumpler C I two-seaters of Kagohl II from Frescaty aerodrome at Metz. Despite damage to this interesting print, it shows the machine being refulled on 16 June 1916, and is one of a series showing preparation for a typical Kagohl operation. The front gunner (Vzfw. Schadt) is manning the wobble pump, while petrol is loaded into the fuselage tank. Note the twin LMG 14 armament, guns being fed via funnel-shaped chutes from fuselage cartridge magazines.

25. As evening shadows lengthen, the crew don warm clothing for the night's operation that would result in bombs being dropped on Bar-le-Duc, Dombasle, Einville and Lunéville, all military concentrations south and west of Verdun. The purpose of the big AEG's presence on this occasion was that of protection for the bombing two-seaters, a common Kagohl practice at the time.

▲24 ▼25

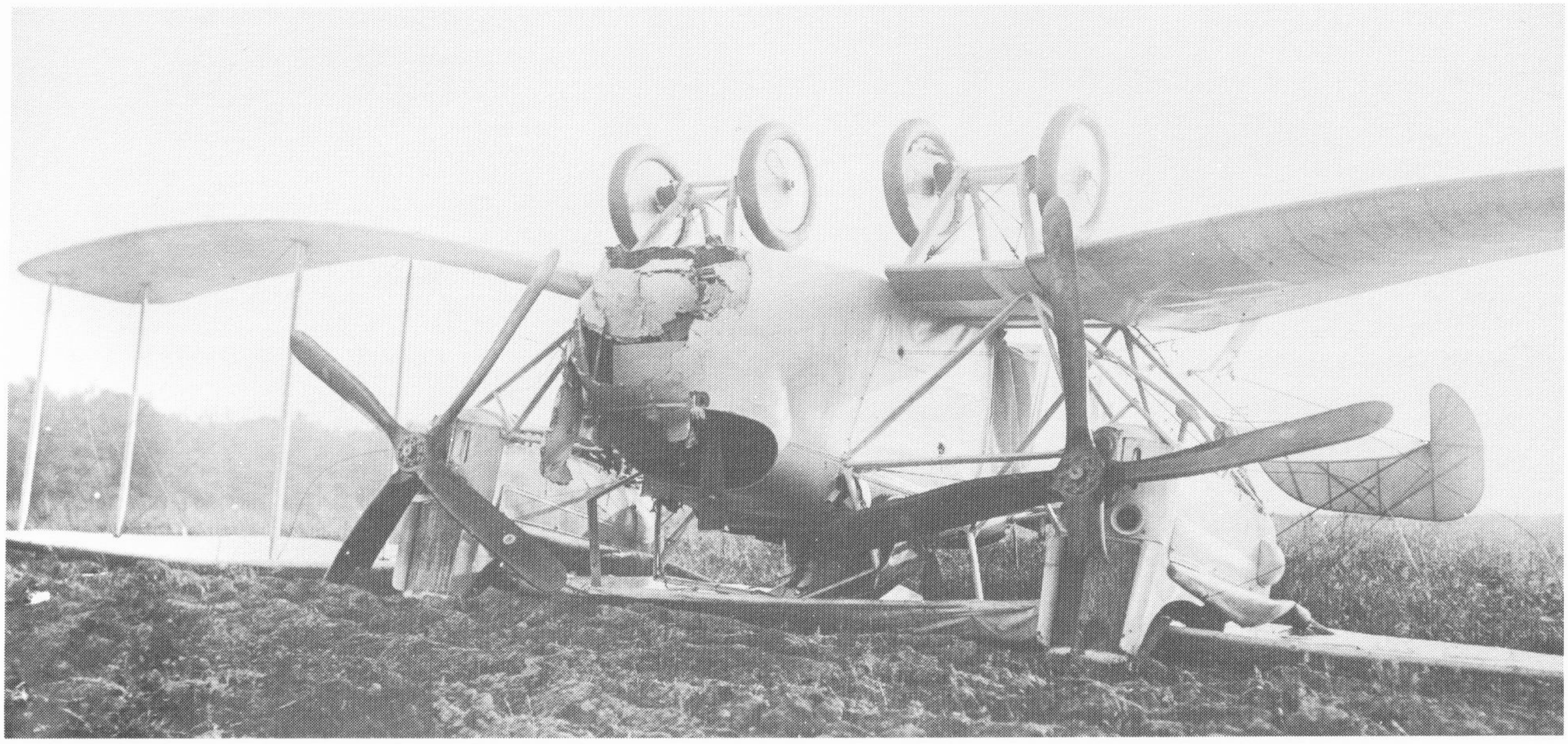


26▲

26. The touring car, a 30hp Benz 'Runabout', its bonnet marked with Kampfstaffel 7 OHL, about to pull the AEG to the take-off position by means of a wheeled towbar under the tailskid. It also provides transport for the aircrew, already attired in flying kit. The fuel containers and pump previously shown now lie abandoned in the foreground.

27. The big AEG joins the Rumpler two-seaters ready for take-off. Twenty-five aircraft can be seen, and due to the varied nature of the evening's targets, seventeen machines have probably already departed, since Kagohl bombing operations invariably utilized the 6 Kampfstaffeln at full strength of 42 aeroplanes. Unserviceability of aircraft did not normally reduce this force as reserve machines were always available so that the planned weight of high-explosive could be delivered as planned.

27▼



▲ 28

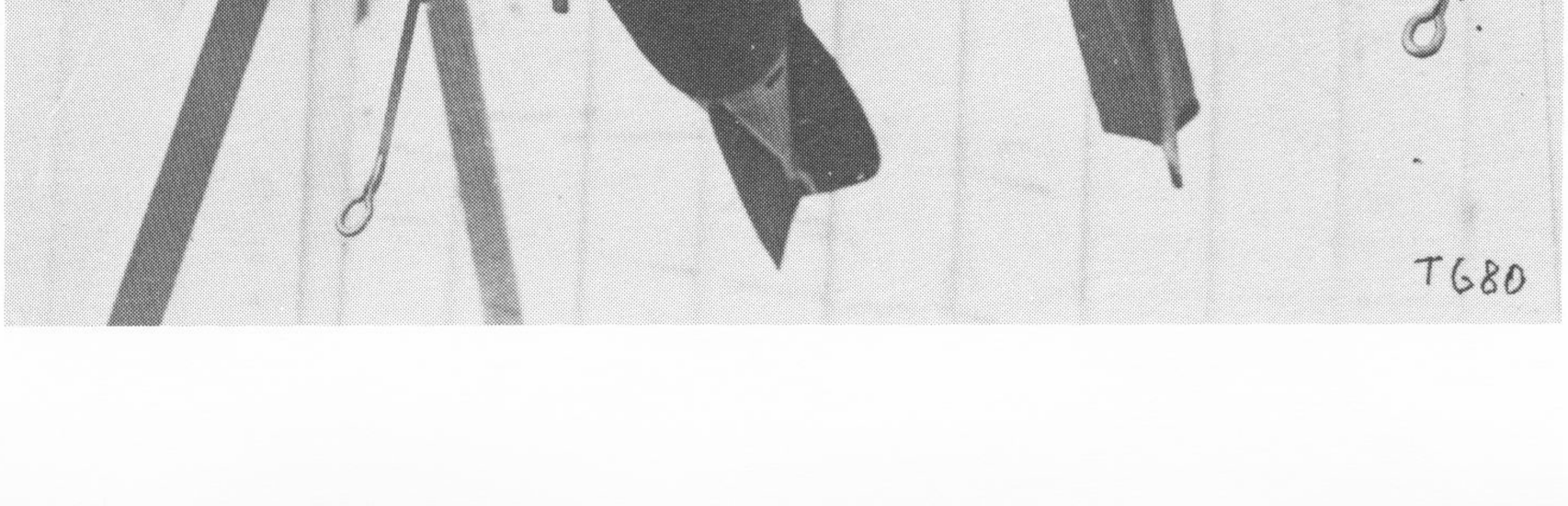
28. Returning to Frescaty in the dark, the big AEG overran the landing area, a not uncommon occurrence at the time when aerodrome illumination left much to be desired. The machine turned upside down in the rough, without injury to the aircrew, and this was the sorry sight the aircraft presented in the early morning of 17 June 1916.

29. There was no category for Riesenflugzeug (Giant aeroplane) when this large Siemens-Schuckert machine was ordered and it was initially known as a G type, but was given the designation R I 1/15 in November 1915. It was powered by three 150hp Benz BzIII engines in the fuselage driving two large-diameter tractor propellers via a gearbox and clutches to transmission shafts and bevel gears at the well braced outrigger propeller shafts between the wings. This machine was on the Eastern Front for evaluation late in 1915 but was not used operationally. However, it paved the way for an order for six aircraft of similar type.

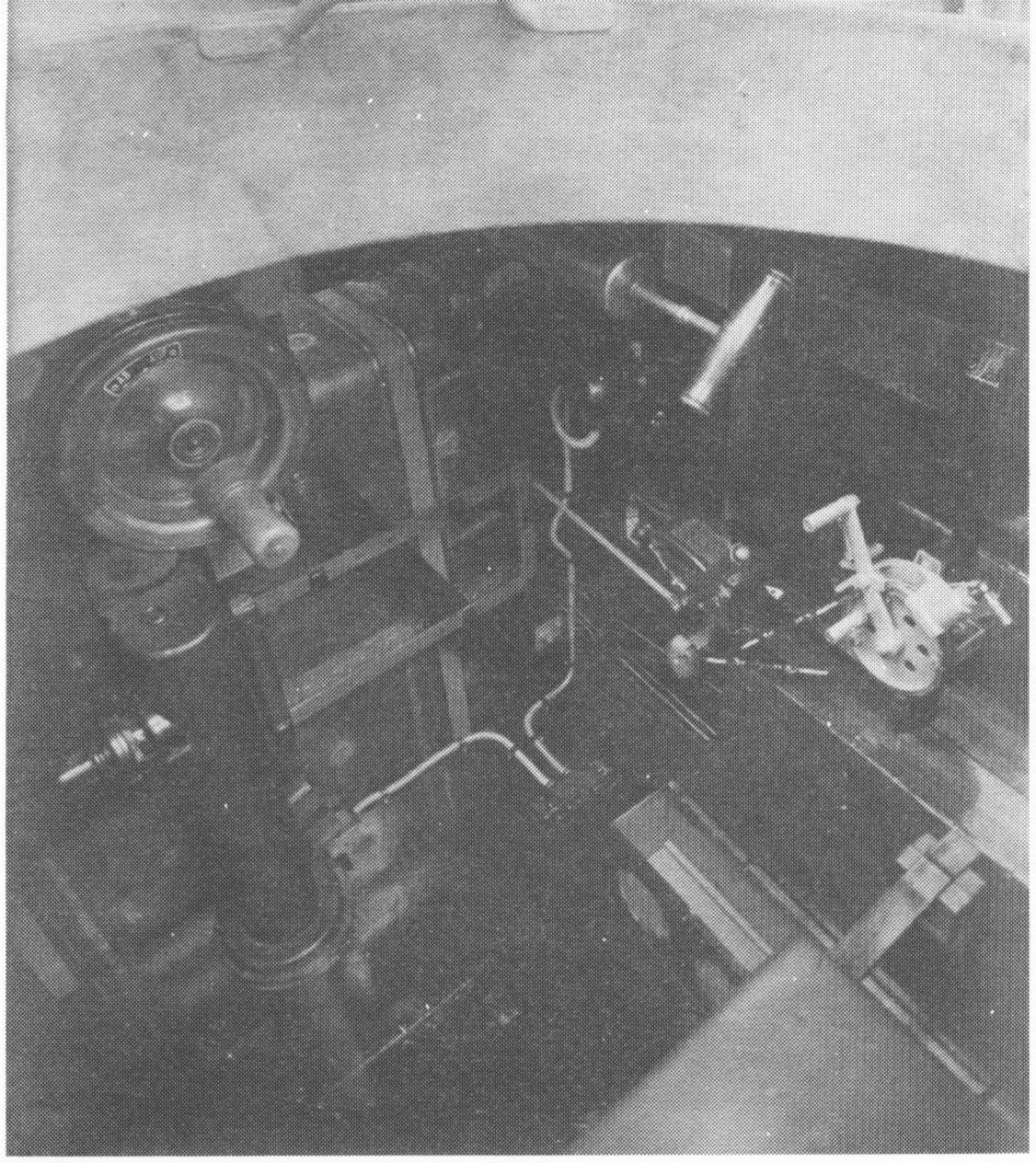
30. Siemens-Schuckert-Werke R VI 6/15 in flight. The rear fuselage consisted of two tapering triangular-section booms, which with the high-mounted tailplane provided a good field of fire for the aft beam guns. Increased wing area by the insertion of an extra bay and other modifications allowed the carriage of some 500kg of bombs. This aircraft in company with R4, R5 and R7, all machines of similar type, served operationally on the Eastern Front in Riesenflugzeug-Abteilung (Rfa) 501 until mid-1917.

▼ 29

30▲ 31▼



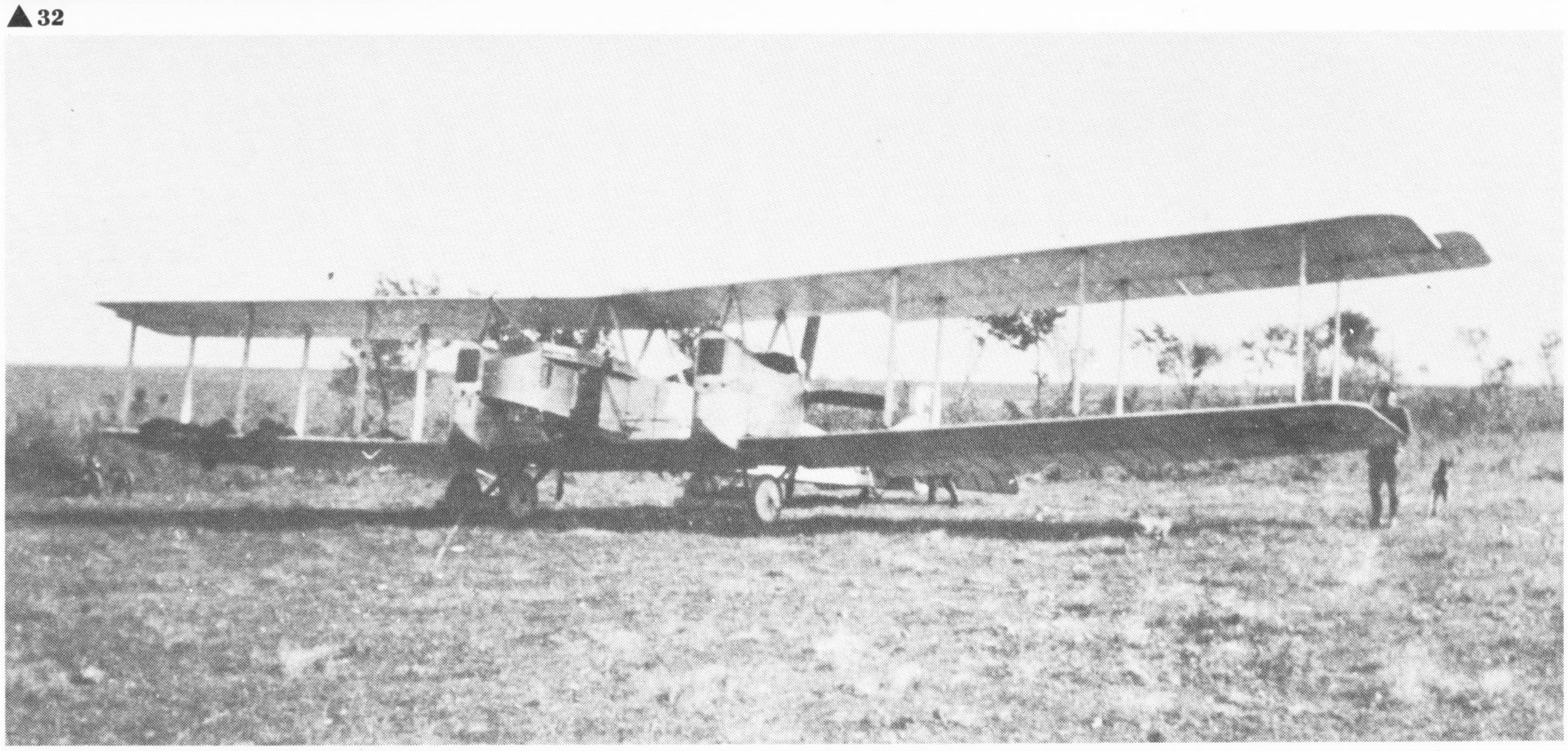
31. When the Pruefanstalt und Werft (Test Establishment and Workshop) of Idflieg introduced their new bombs of improved aerodynamic shape in July 1916, these were accompanied by a special bomb rack capable of being fitted to the main types of two-seaters then in use (AEG C I and C II, Albatros C I, C II and C III, LFG C II, LVG C II and Rumpler C I). This allowed four bombs of the 12.5kg size to be carried under the fuselage at the aeroplane's centre of gravity. Steel bands retained the bombs against adjustable steadys and cams spaced 60deg apart on a rotary shaft released the looped end of the retaining band (and the bomb) when the shaft was rotated via cables from a special selector lever in the observer's cockpit. In this demonstrator the larger bomb is a P.u.W. incendiary.



▲32

32. Observer's cockpit of Albatros C X 6303/16 (licence-built by Linke-Hoffmann) showing the standard bomb release lever on the starboard cockpit wall. Linked via a ratchet free-wheel and cables to the camshaft on the P.u.W. bombrack, five pulls of the lever were needed to release the four bombs; the first pull was a safety measure that positioned the first cam to the release position. The lever operated over an angular segment and had to be moved forward between each selection. Other equipment includes the handpump for pressurizing the fuel system, the trailing aerial reel and, in front of the bomb release, the lever for engaging and disengaging the clutch of the AC generator which supplied the power for the Telefunken wireless transmitter.

33. A small production batch of Gotha G II bombers was completed in 1916 and partially equipped Kasta 20 of Kagohl IV which served on the South-East Front, becoming a component of Kagohl I. Despite the unreliability of its 220hp Mercedes DIV engines, this particular Gotha G II (207/16), flown by Leutnant Frommherz with Leutnant Lohr as his observer and Unteroffizier Reese as machine-gunner, took part in many of the successful Kagohl I operations in this theatre. These included attacks on railway yards in Bucharest and the Cernavoda railway bridge over the Danube when based on Razgrad aerodrome in Bulgaria,



▲33 ▼34

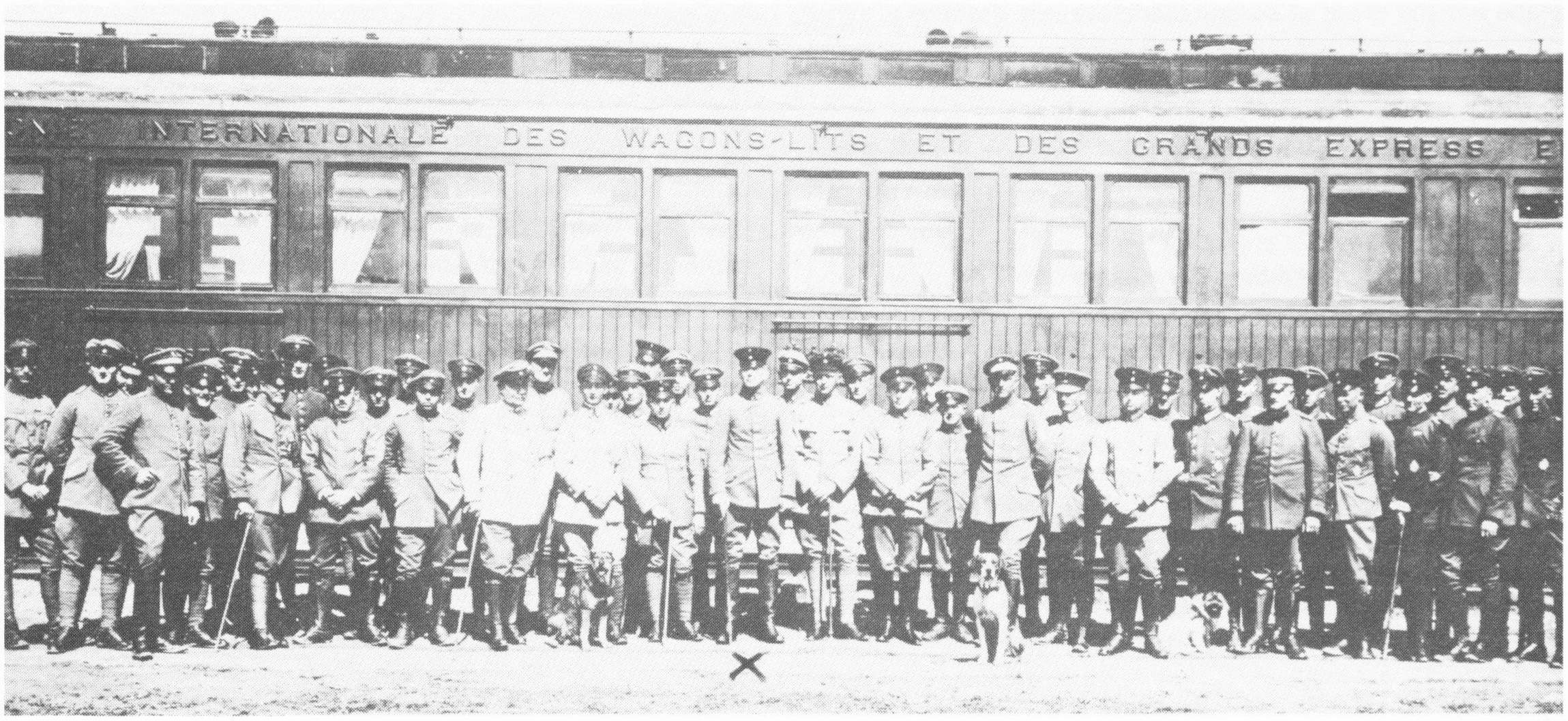
and Vertekop railway station and camps and dumps in Salonika when operating from Hudowa in Macedonia.

34. The equipping of three Kampfstaffeln of Kagohl I with the AEG G III, and the unit previously mentioned with Gotha G IIs and G IIIs in September 1916 for use in the Balkans, marked a major change in the development of the heavy bomber units. (From April 1917 Kasta 20 of Kagohl IV became Kasta 1.) Kagohl I was the first formation to be completely equipped with twin-engined aircraft of the G category for the sole purpose of bombing. It set the scene that would be adopted by the other Kagohl. By the end of February 1917 there were 22 AEG G IIIs at the Front, most of them serving in Macedonia. Shown here against a mountainous backdrop on Hudowa aerodrome are the seven AEG G IIIs of Kampfstaffel 5.

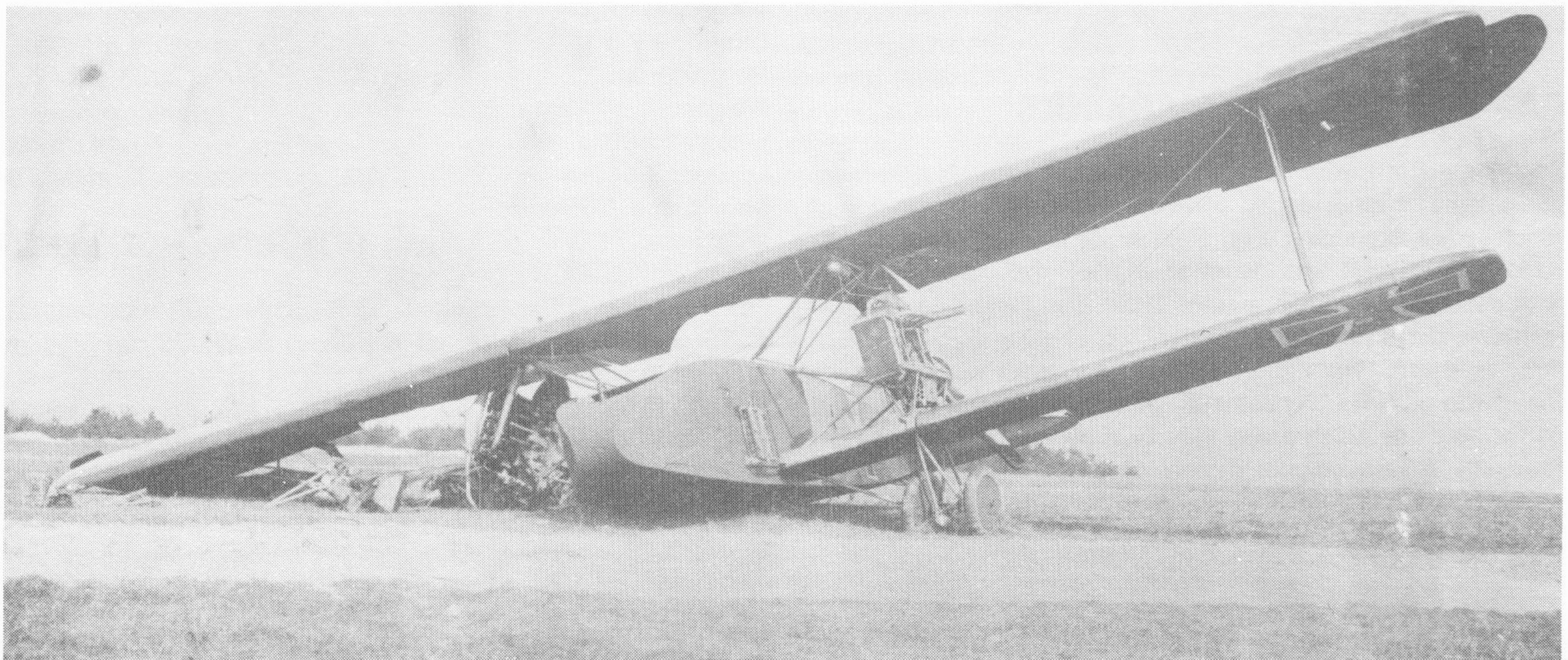
35. Officers of Kagohl I with their Kommandeur, Hauptmann Hermann Kastner (marked with 'X'), in front of the dining car of their mobile quarters in Macedonia, April 1917. The unit then had 20 twin-engined AEG and Gotha G types, and the dismantled components of each aeroplane needed three flat railway wagons for transportation. Workshops, tents, tools, spare parts, motor transport and other equipment, as well as accommodation carriages, meant that fourteen trains were required to move the unit from one theatre of operations to another. The additional need for fuel, oil, bombs and ammunition called for masterful organization. Assuming that all trains arrived at their destination within a reasonable time span, unloading, erecting tent hangars, assembling and rigging the aircraft, refuelling and bombing-up meant that three days and nights of non-stop activity were required before a full-strength operation could be mounted.

36. Albatros G II of Kasta 7, Kagohl II, flown by Leutnant Graf von Guerard with Leutnant Meye as observer, crashed on Neuflize aerodrome near Le Chatelet in April 1917 on return from an operational flight. This aircraft type was produced only in small numbers and from the maximum of nine at the Front, achieved at the end of April, some were also used by Kagohl IV. The magazine rack for the horizontal stowage of six P.u.W. 12.5kg bombs can be seen attached to the fuselage in front of the port bottom wing root. Magazines of this type were also installed internally. Bombs could be dropped individually, six movements of the bomb release being required to empty the rack; each selection released the lowermost bomb, but a salvo selection was also possible so that all the bombs could be released at the same time.

35 ▼



36 ▼



EXPLANATORY NOTES

By leaving the actual design and construction to the German aircraft industry, the Flugzeugmeisterei (technical section of Idflieg) created healthy competition among the various manufacturers and this resulted in accelerated technical development of the various types. This authority set the standards in its Bau und Lieferungsvorschriften fuer Heeresflugzeuge (BLV – Construction and Delivery Regulations for Army Aircraft) and these standards, plus the issue of technical reports that were continually updated to reflect the latest technological changes, gave the necessary guidance. Each new type was thoroughly tested as to performance, safety factor and reliability in operational use before its suitability for mass production was evaluated. Licence production was a feature of aircraft delivery in order that deserving types could be produced in sufficient numbers that would make an impact on the operational scene when they entered front-line service.

The G category was introduced in August 1915, G denoting Grossflugzeug (large aeroplane) having more than one engine and armed with a machine-gun. Early aircraft included in this category had been designed to meet the Kampfflugzeug (fighting aeroplane) specification and their duties were soon seen to include bomb-dropping. The development of the G-type aeroplane was the result of several manufacturers devoting a major part of their effort in this specific direction, the most successful being AEG, Friedrichshafen and Gotha.

At the Armistice there were 244 aircraft of the G type at the Front. AEG and Gotha types were present in almost equal numbers and comprised about 30 per cent of this total. The remainder were machines of Friedrichshafen design and included G III, G IIIa, G IV and G IVa types, many of them licence-built by Daimler Motoren-Gesellschaft of Stuttgart and Hanseatische Flugzeugwerke A.G. (Hansa) of Hamburg.

The AEGs were good strong aeroplanes and their G V was especially highly rated, but unlike the late models of the other bombers it lacked the nose landing gear. The Gotha G IV was the best G type in mid-1917, but this company's developments had not kept pace with the advances made by other manufacturers and the late models of the G V type were known to have weak structures and poor landing gears. There is no doubt that Friedrichshafen were the pace-setters in this class of aircraft and the features introduced in their final products indicate the considerable lead that this company possessed over its rivals. In August 1918 Gotha were contracted by Idflieg to build 50 Friedrichshafen G IVa's under licence, a reversal in the fortunes that had caused LVG and SSW to build almost 200 Gotha G IVs under licence in 1917.

CAMOUFLAGE AND MARKINGS

Bombing aircraft were initially unpainted and merely presented the colours of clear doped plywood and fabric, the shades of which varied depending on the materials used. On aircraft with darkish finishes it was usual to provide the iron cross type national insignia with a square white background to improve legibility, but on machines of light appearance this was ofter dispensed with. The lighter coloured airframes were generally thought to possess 'sky camouflage' properties and were, for a period, actually painted very light blue overall to enhance this. Gradually terrain colours mainly of green and brown, were applied to upper and side surfaces in large patches, these aircraft being either clear doped natural fabric underneath or painted light sky blue.

With the change to night bombing, light areas were naturally toned-down and aircraft now began to appear covered in fabric that was dyed in dark colours of black, dark green and violet, the areas being small and irregular. These colours were also painted in a similar manner on white fabric, while another method was to paint the colours in large hexagons covering the whole airframe. Crosses ceased to be displayed on white grounds and often were only represented by their white borders. Eventually even these fell into disuse and the bombing machines used at the end of the war had sombre finishes where often the black Balkenkreuz (straight-sided cross), which had been in use since March/April 1918, marked without the benefit of borders, was difficult to discern against its almost black background.

At various times during the war units used a system of lettering for Kasta/Bosta identification. These were usually Roman characters marked on rear fuselages or tail units, with Arabic numerals for the identity of machines within the formations. No markings were ever carried to denote Kagohl/Bogohl afiliation, but some crews displayed personal emblems, usually on fuselage noses. Such markings were rare by the end of the war and few of the aircraft handed over to the Allies were so decorated.

SPECIFICATIONS

The data given here have been extracted from a number of sources, which were generally in agreement, but some discrepancies existed even in official documents, especially in regard to weights and areas, and these naturally affect rate of climb figures. No data were found for the climbing performance of the Gotha G IV at the lower altitudes, but it is considered that this must have been similar to that given for the Friedrichshafen G III. Nor was any satisfactory explanation obtained for the almost fighter-like figures given for the Gotha G V, but these are presented here as the best information available.

AEG G IV

Manufacturer: Allegemeine Elektrizitaets Gesellschaft (AEG)
Engines: Two 260hp six-cylinder in-line water-cooled Mercedes D IVa
Dimensions:
Wingspan: 18.4m
Length: 9.7m
Height: 3.9m
Weights:
Empty: 2,400kg
Loaded: 3,640kg
Max. speed: 165km/hr
Wing area: 74.0m^2
Wing loading: 49.2kg/m^2
Power loading: 7.0kg/hp
Rates of climb:
1,000m in 5min
2,000m in 11min
3,000m in 21min
Ceiling: 4,500m
Endurance: 4hrs 30mins

Crew: 3
Armament: 2–3 Parabellum LMG

AEG G V

Manufacturer: Allegemeine Elektrizitaets Gesellschaft (AEG)
Engines: Two 260hp six-cylinder in-line water-cooled Mercedes D IVa
Dimensions:
Wingspan: 27.3m
Length: 10.8m
Height: 4.5m
Weights:
Empty: 2,700kg
Loaded: 4,800kg
Max. speed: 145km/hr
Wing area: 140m^2
Wing loading: 34.2kg/m^2
Power loading: 9.2kg/hp
Rates of climb:
1,000m in 6min
2,000m in 12min
3,000m in 23min
Ceiling: 6,500m
Endurance: 8hrs
Crew: 3
Armament: 2–3 Parabellum LMG

FRIEDRICHSHAFEN G III

Manufacturer: Flugzeugbau Friedrichshafen GmbH
Engines: Two 260hp six-cylinder in-line water-cooled Mercedes D IVa
Dimensions:
Wingspan: 23.7m
Length: 12.8m
Height: 4.1m
Weights:
Empty: 2,695kg
Loaded: 3,930kg
Max. speed: 135km/hr
Wing area: 95m^2
Wing loading: 41.3kg/m^2
Power loading: 7.5kg/hp
Rates of climb:
1,000m in 6.3min
2,000m in 13.5min
3,000m in 23.2min
Ceiling: 4,500m
Endurance: 5hrs
Crew: 3–4
Armament: 2–3 Parabellum LMG

FRIEDRICHSHAFEN G IVa

Manufacturer: Flugzeugbau Friedrichshafen GmbH
Engines: Two 260hp six-cylinder in-line water-cooled Mercedes D IVa
Dimensions:
Wingspan: 22.6m
Length: 12.0m
Height: 3.5m
Weights:
Empty: 2,880kg
Loaded: 4,520kg
Max. speed: 142km/hr
Wing area: 90m^2
Wing loading: 50kg/m^2
Power loading: 8.6kg/hp
Rates of climb:
1,000m in 6min
2,000m in 18.3min
3,000m in 28min
Ceiling: 3,600m
Endurance: 5hrs
Crew: 3
Armament: 2–3 Parabellum LMG

GOTHA G IV

Manufacturer: Gothaer Waggonfabrik AG
Engines: Two 260hp six-cylinder in-line water-cooled Mercedes D IVa
Dimensions:
Wingspan: 23.7m
Length: 12.2m
Height: 3.9m
Weights:
Empty: 2,413kg
Loaded: 3,648kg
Max. speed: 135km/hr
Wing area: 89.5m^2
Wing loading: 40.7kg/m^2
Power loading: 7.0kg/hp
Rates of climb:
1,000m in – min
2,000m in – min
3,000m in 28min
Ceiling: 5,000m
Endurance: 3¾–6hrs
Crew: 3
Armament: 2–3 Parabellum LMG

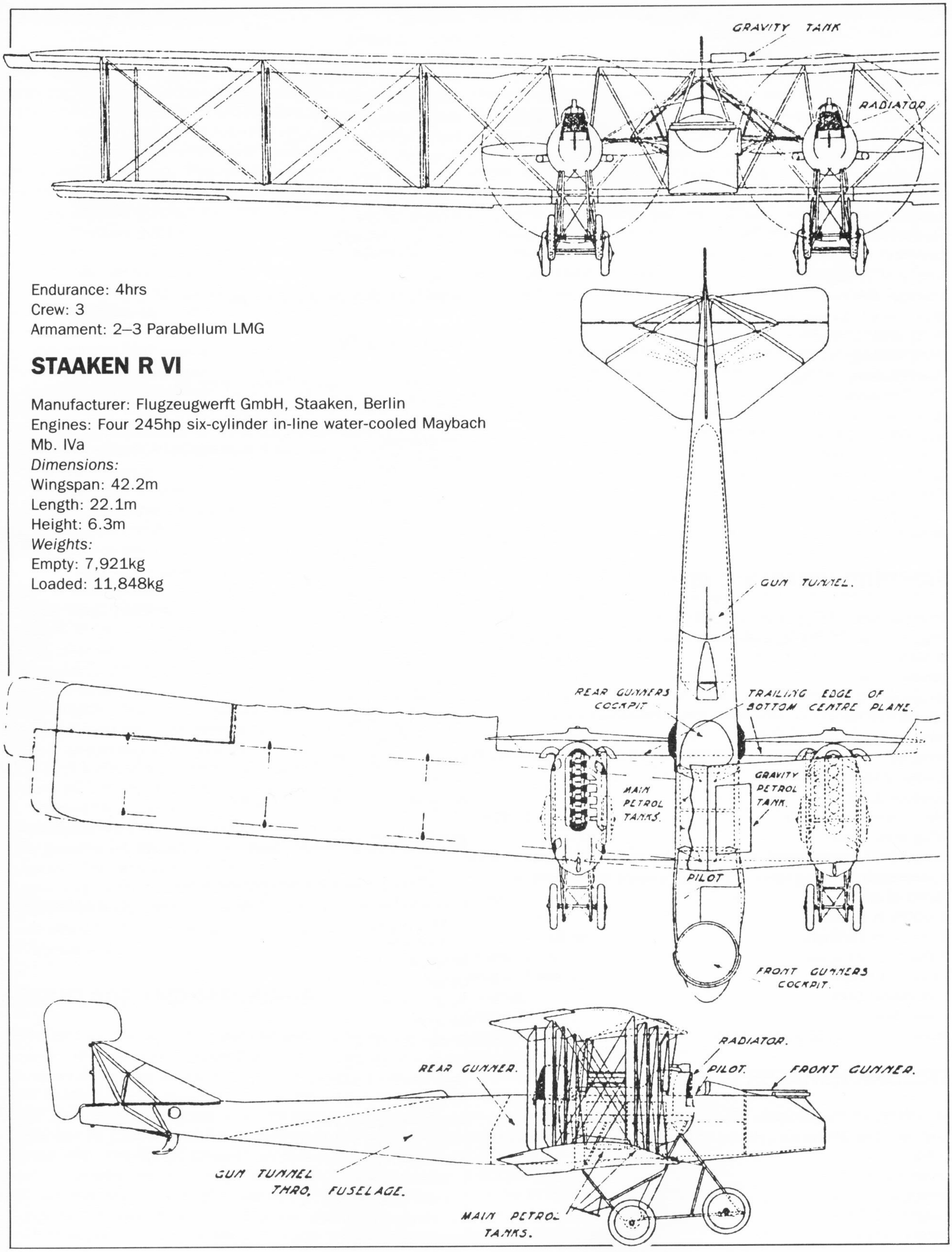
GOTHA G V

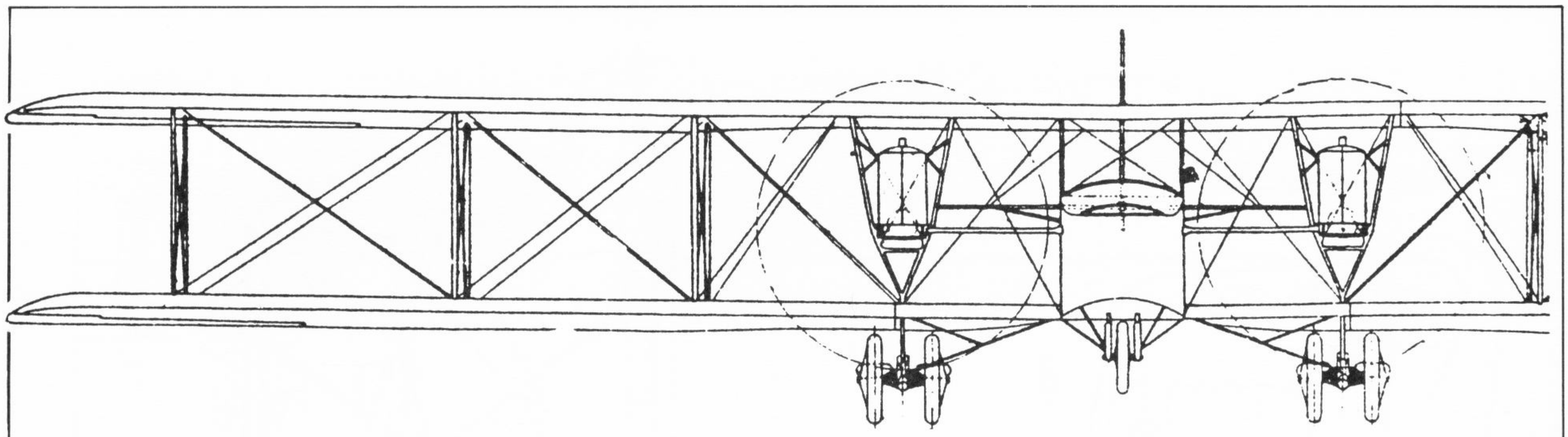
Manufacturer: Gothaer Waggonfabrik AG
Engines: Two 260hp six-cylinder in-line water-cooled Mercedes D IVa
Dimensions:
Wingspan: 23.7m
Length: 12.4m
Height: 4.3m
Weights:
Empty: 2,570kg
Loaded: 3,895kg
Max. speed: 140km/hr
Wing area: 91.2m^2
Wing loading: 42.7kg/m^2
Power loading: 7.5kg/hp
Rates of climb:
1,000m in 2.5min
2,000m in 8.5min
3,000m in 17min
Ceiling: 6,500m

Endurance: 4hrs
Crew: 3
Armament: 2–3 Parabellum LMG

STAAKEN R VI

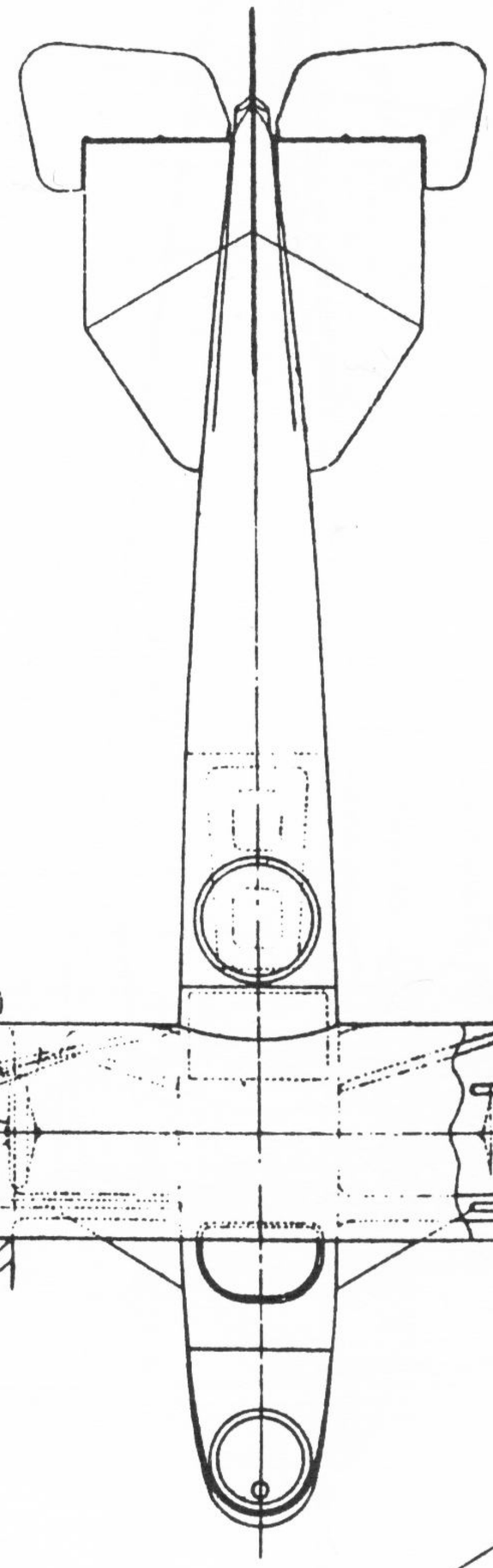
Manufacturer: Flugzeugwerft GmbH, Staaken, Berlin
Engines: Four 245hp six-cylinder in-line water-cooled Maybach Mb. IVa
Dimensions:
Wingspan: 42.2m
Length: 22.1m
Height: 6.3m
Weights:
Empty: 7,921kg
Loaded: 11,848kg

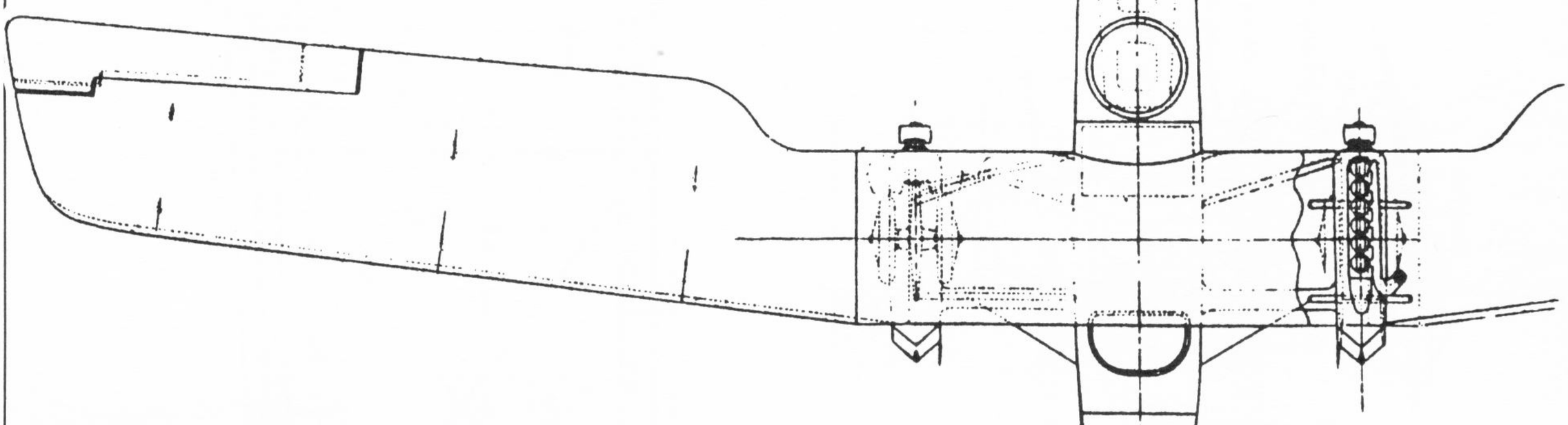




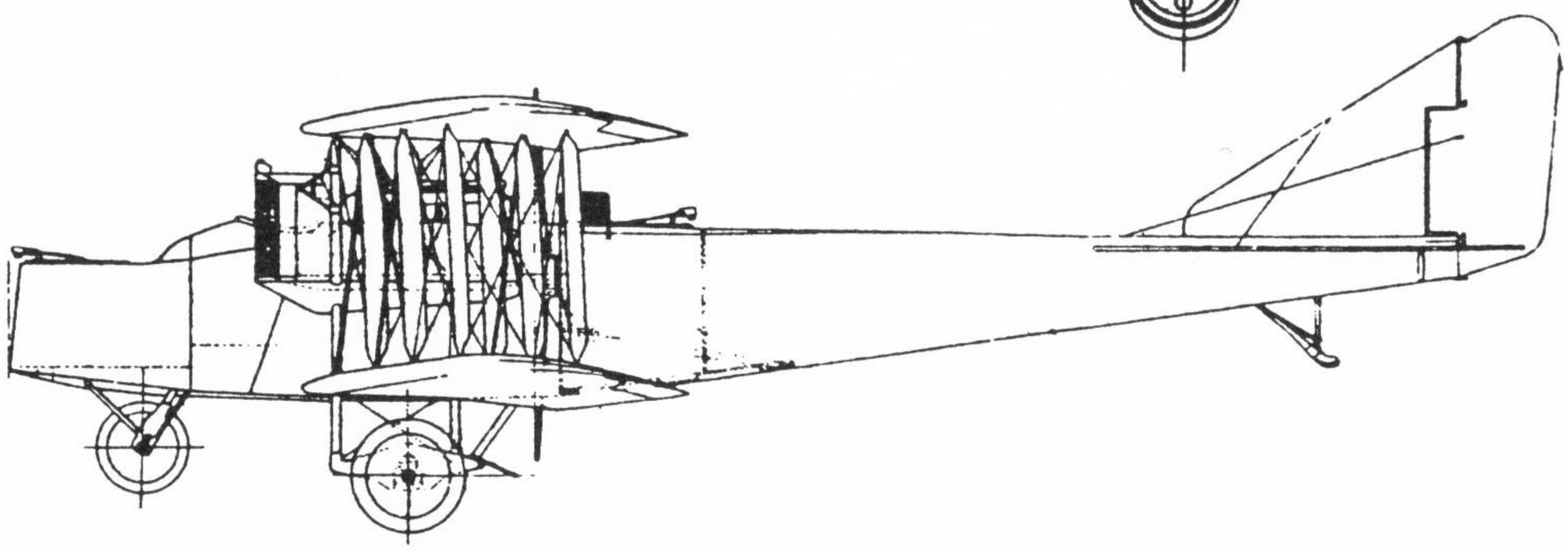
Max. speed: 135km/hr
Wing area: 332m^2
Wing loading: 35.7kg/m^2
Power loading: 12kg/hp
Rates of climb:
1,000m in 10min
2,000m in 23min
3,000m in 43min
Ceiling: 4,320m
Endurance: 7–10hrs
Crew: 6 to 8
Armament: 3 Parabellum LMG and 2 Lewis guns

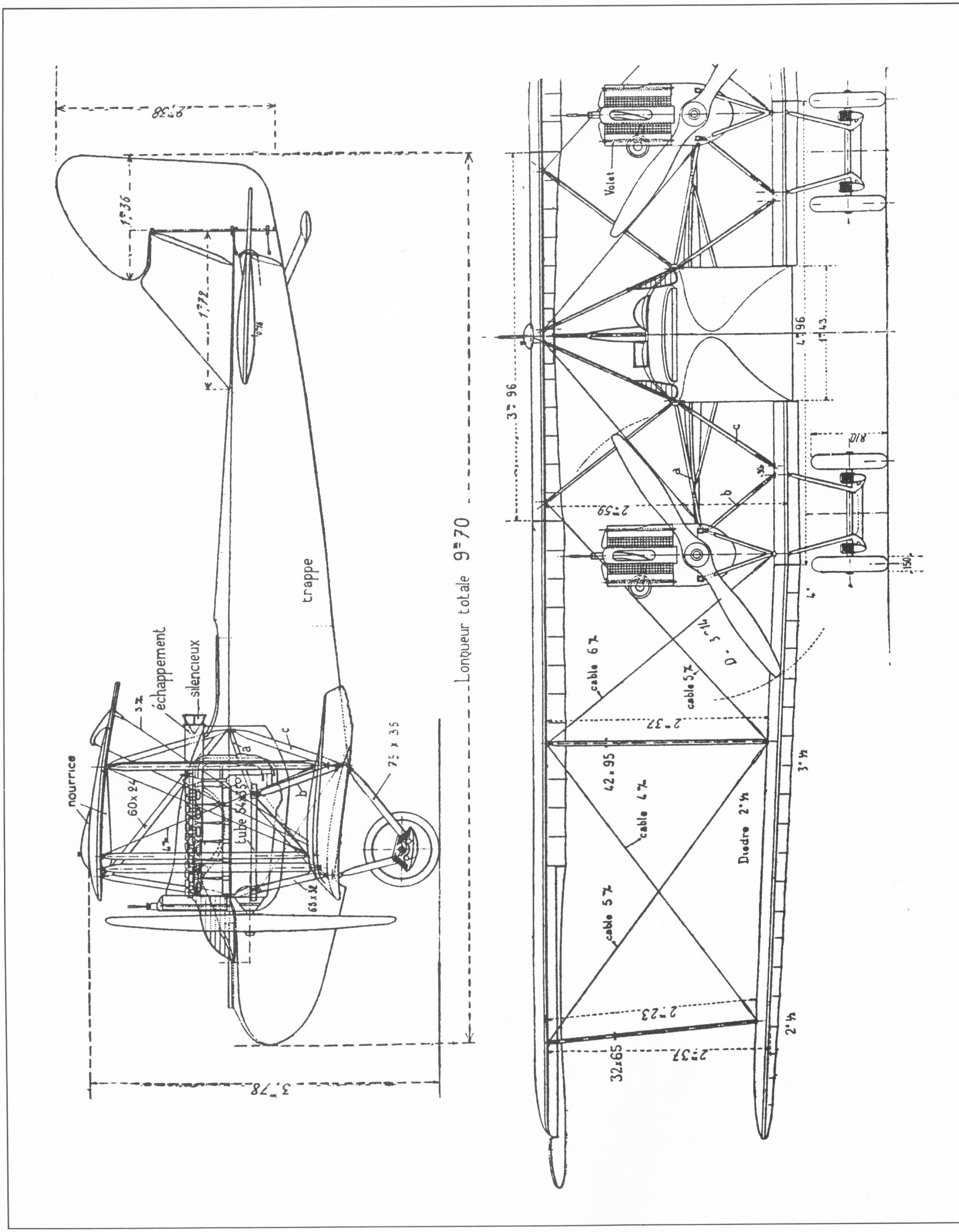
◄GOTHA TYPE GO G5

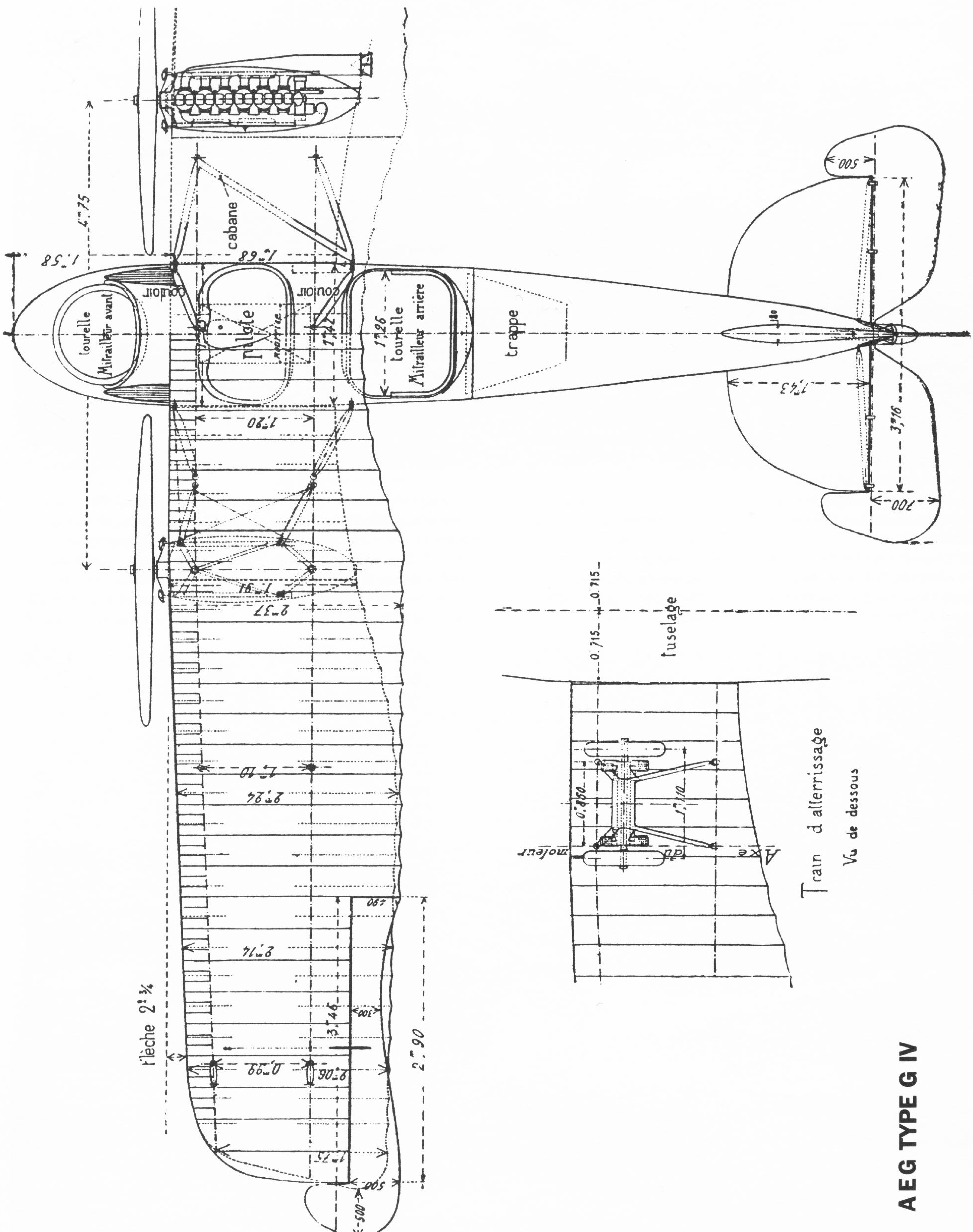




FRIEDRICHSHAFEN TYPE G III




2.38
1.36
1.72
trappe
échappement
silencieux
Longueur totale 9 70
nourrice
60x24
tube 54x35
75 x 35
63x32
3.78
Volet
3 96
4 96
1 43
810
2 59
D - 3 14
150
cable 6 %
cable 5 %
2 37
42x95
cable 4 %
Diedre 2°½
3°½
cable 5 %
2 23
32x65
2°½


tourelle
Mitrailleur avant
couloir
Pilote
cabane
tourelle
Mitrailleur arrière
trappe
fuselage
Train d'atterrissage
Vu de dessous
moteur
Axe
flèche 2° 3/4

A E G TYPE G IV

▲37

37. First London night bomber. Flying an aircraft of this type (Albatros C V), Offizierstellvertreter Klimke and his observer, Oberleutnant Leon, from Flieger Abteilung 19 based on Handzaeme aerodrome in Belgium, undertook a voluntary attack on the capital during the night of 6/7 May 1917, dropping five 12.5kg P.u.W. bombs which fell in a line from Hackney to Holloway. Despite their offensive spirit, a severe reprimand was forthcoming, since Kagohl III was being readied for just such work at this time, and it was considered that the Klimke/ Leon action had unnecessarily alerted the British defences to such a possibility. They were transferred to Kagohl III and took part in several raids against Britain flying the unwieldy Gotha G IV, which was, as Klimke later said 'not as much fun as our own effort!'

▼38

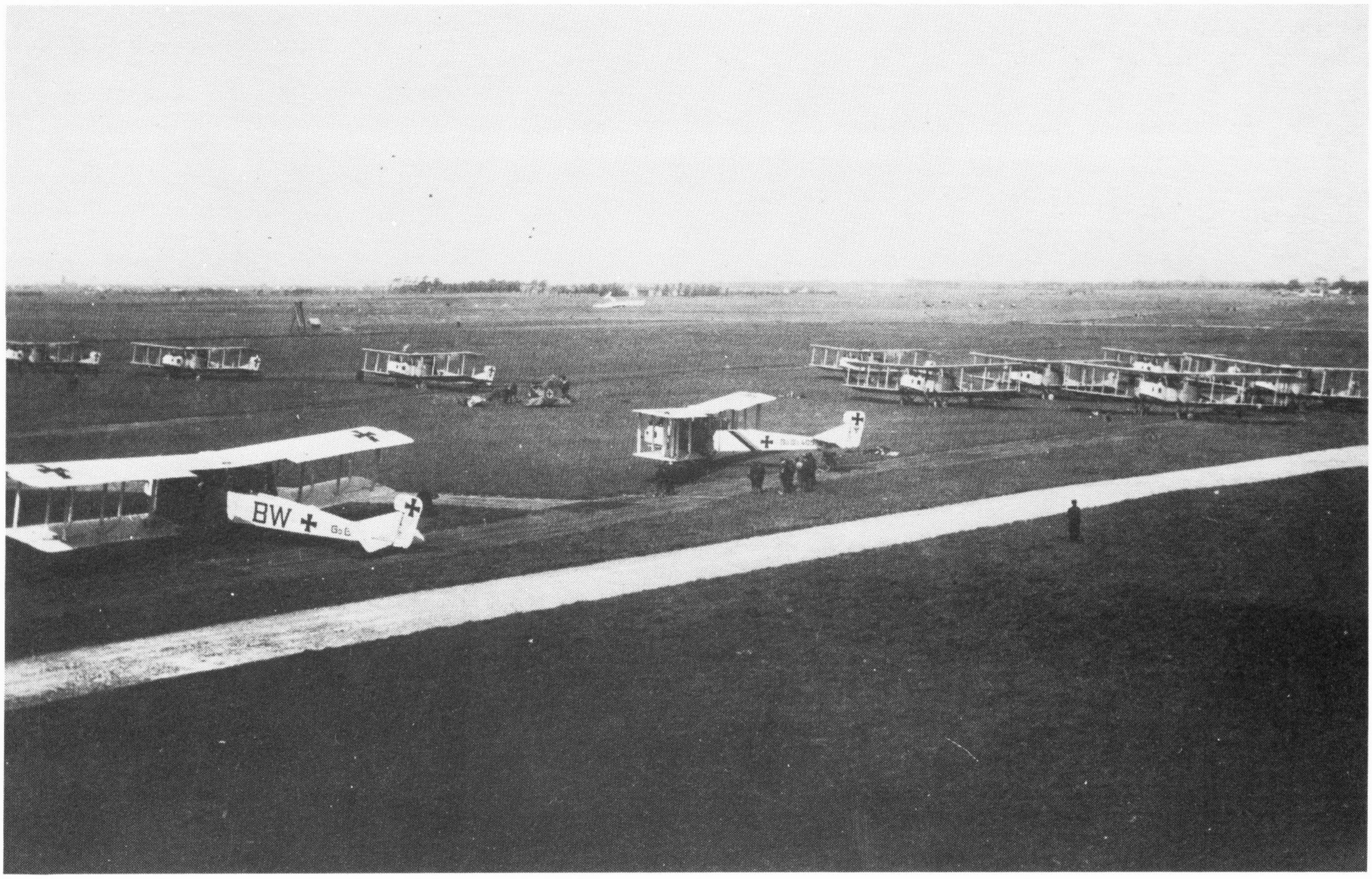
38. Gotha G IV 409/16 of Kasta 13, Kagohl III, on its nose after an emergency landing in a ploughed field, 10 May 1917. The frail nose structure could not stand up to this sort of thing and was one of the reasons why the nose cockpit was unmanned during take-offs and landings. The Gotha auxiliary landing gear of the 'stossfahrgestell' (shock-undercarriage) type would have prevented damage such as this, but it was not introduced to production aircraft until over a year later. The unfused bombs show that the aircraft was on a practice flight. Other points of interest are the mudguards behind each undercarriage wheel to prevent mud and stones being flung off the tyres into the pusher propellers, and the recess of the well-known Gotha tunnel of the rear fuselage which allowed the rear gunner to fire aft and down into what was previously considered a blind spot.

39. Leutnant Scharffenberg of Kasta 13, Kagohl III, in the front cockpit (in flying kit) with the crew of his Gotha G IV 625/16. The steel retaining bands for the P.u.W. bombs in the racks under the fuselage and the provision for the forward carriage of bombs under the nose to alleviate the extreme tail-heaviness of this aeroplane can clearly be seen. Also visible under the nose is the streamlined fairing for the prism and mounting gimbals of the Goerz telescope bombsight. With bombs and most of the fuel gone, the Gotha G IV was almost unmanageably tail-heavy, a factor that was responsible for a large number of landing accidents.

39 ▲

40. Due to limited fuel and the prevailing westerly wind, Kagohl III used the naval aerodrome at Nieumunster on the Belgian coast as a refuelling point for early raids against south-east England. The first mass attack against London was planned for 18 May 1917 and the Gotha G IVs positioned to Nieumunster; however, the wind remained stronger than forecast and late in the day the aircraft flew back to their main base at Ghent. On 25 May wind conditions were acceptable and again fuelling was undertaken at Nieumunster. In the event cloud obscured London and the 21-aircraft formation dropped 5,200kg of high-explosive on alternative targets in Ashford, Folkestone and Dover. Two Gothas were lost, one over the Channel and one near Brugge on return. It has not been possible to determine which of these dates this photograph of Kagohl III Gotha G IVs at Nieumunster in May 1917 depicts.

40 ▼



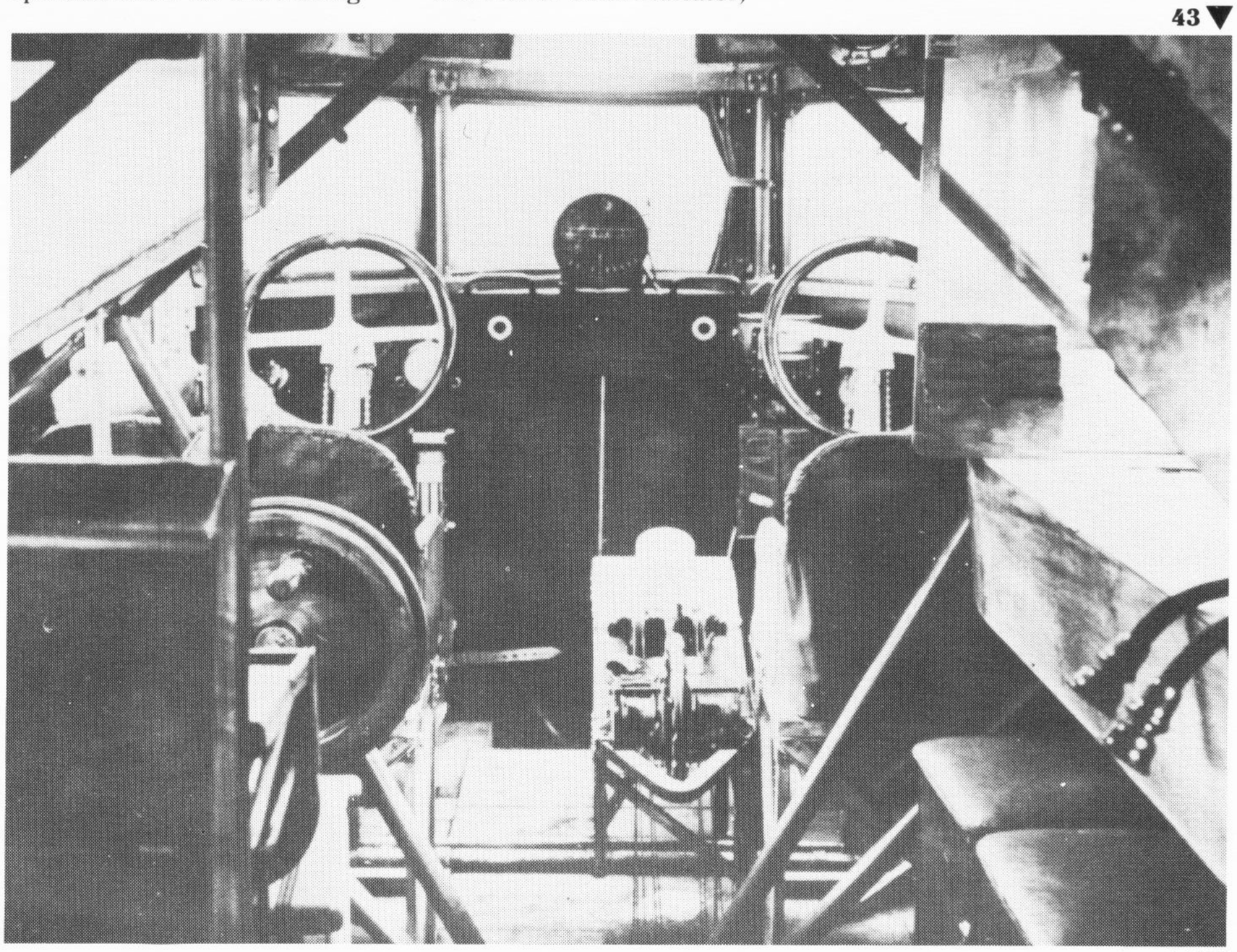
▲41 ▼42

41. This photograph (one of a sequence) was taken at 11.40am on 7 July 1917 from a height of 4,300m (14,200ft) with a 25cm hand-held camera by Oberleutnant Fiebig of Kasta 13, Kagohl III, from Gotha G IV 623/16 during the second mass-daylight raid on London. The column of smoke near St Paul's Cathedral indicates a direct hit on the Central Telegraph Office in St Martins-le-Grand. A total of 4,775kg of bombs was dropped by the 22 participating Gothas, one of which was crewed by Oberleutnant Leon and Offizierstellvertreter Klimke who, with their machine-gunner Vizefeldwebel Kientrup, were credited with shooting down one of the Sopwith defenders (see caption No 37).

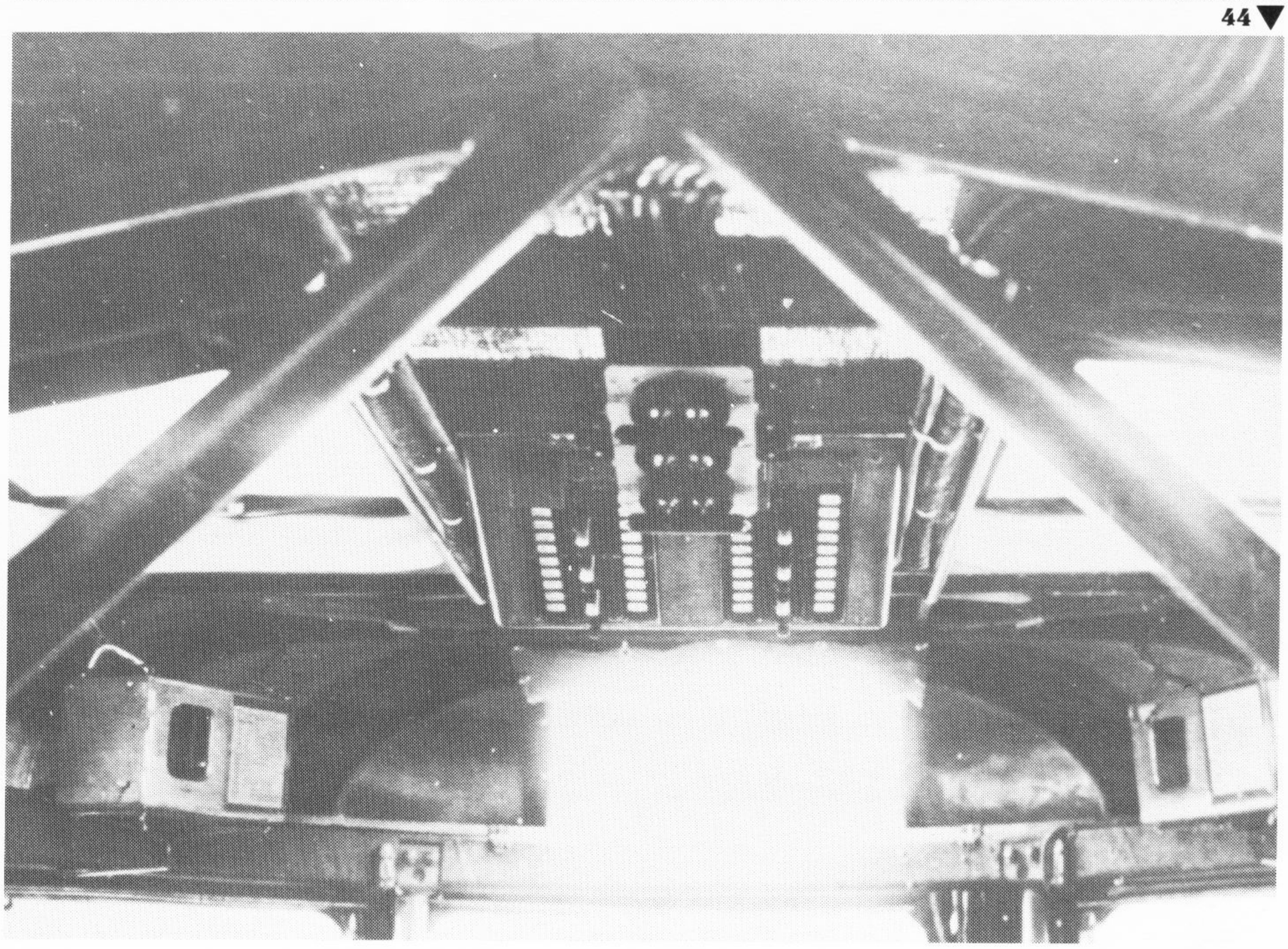
42. At various periods some Kasta used a number of C category two-seaters to augment their normal establishment of six twin-engined bombers, employing them on short-range day and night operations. The most used machine for this purpose was the DFW C V, over 1,000 of which were at the Front by the end of August 1917; shown here is an aircraft of this type from Kasta 8, Kagohl II. During 1918 in order to provide a low-altitude day bombing force (also used in the Schlachtstaffel role) – for which the large twin-engined machines were unsuitable – Kogenluft increased the establishment of each Bosta to include three C type aircraft with a further three held in reserve.

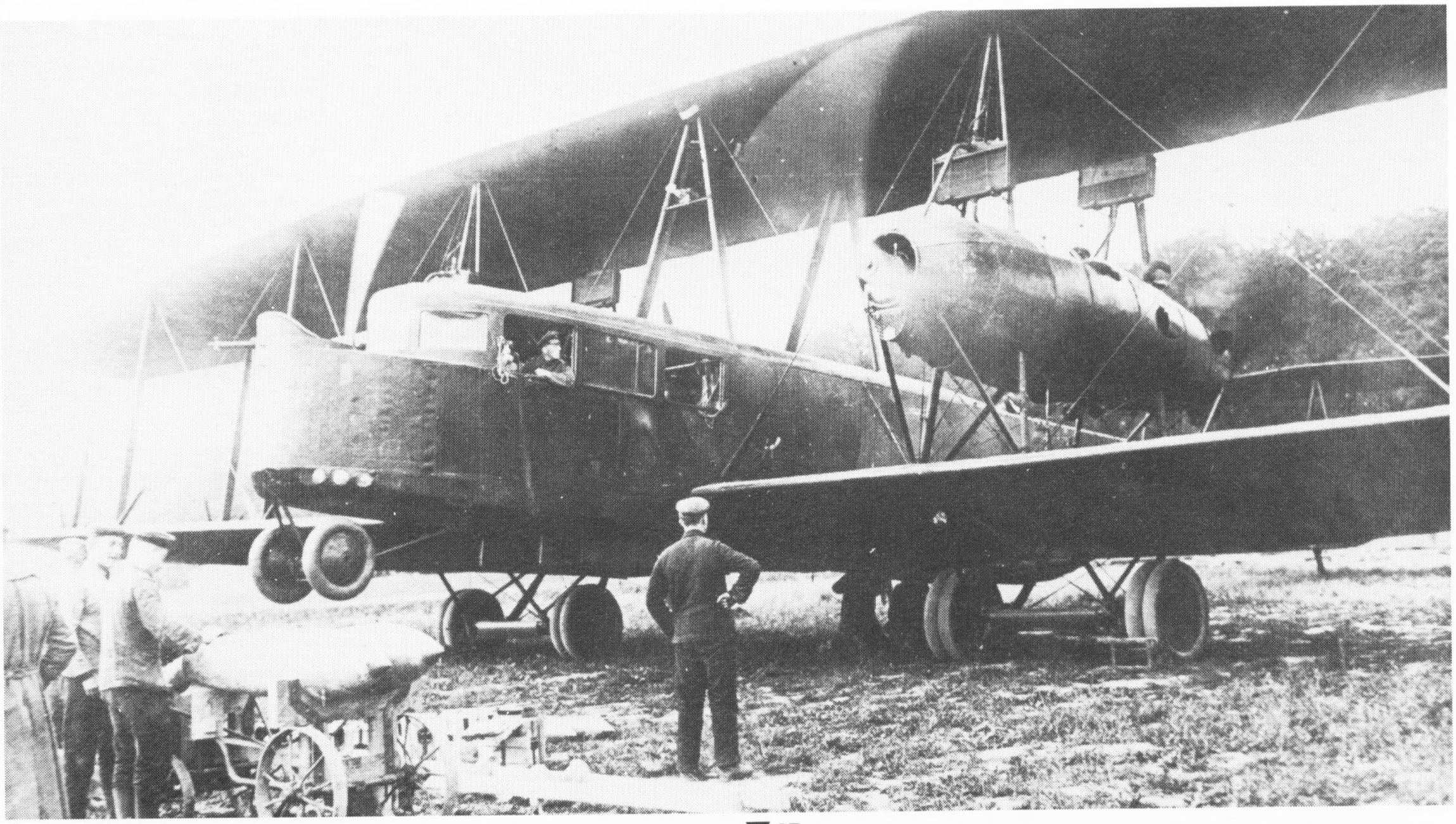
43, 44. Pilots' cockpit of Staaken R VI 31/16. The apparent deficiency in the number of instruments is explained by the fact that engine indicators were situated in the mechanics' cockpits in the engine nacelles, whence they kept the commander informed of the condition of their charges by a signalling system, whose battery of lights and switches can be seen in the roof panel in the upper photo. Note the two barographs that recorded height against time on a clockwork-driven paper cylinder, the carriage of these being a normal requirement on all German military aircraft. The dual flying controls with the throttle levers on the pedestal and the tail trim wheel at the rear is a layout that has not changed in principle over 70 years. The hand-operated drum for the trailing wireless aerial can be seen on the left and two mouthpieces and speaking tubes are draped over the navigator's table on the right. Prominently positioned in the centre of the forward windscreen (note stowed curtain at right vertical member for excluding searchlight glare) is the Drexler bank indicator, which used a front view of the aeroplane on a moving card stabilized by a gyroscope revolving at 20,000rpm powered by three-phase current provided by a windmill generator, thus being independent of the aircraft's electrical system.

43 ▼



44 ▼





▲45 ▼46

▼47

45. Staaken R VI 39/16. Eighteen machines of this type were built and they formed the backbone of the equipment of the two Riesenflugzeug-Abteilungen. In just over 12 months' operational service with Rfa 501 from August 1917, R39/16 dropped some 26,000kg of bombs, including three of 1,000kg size, on the UK. While the bombload is being readied in the foreground, the mechanic in the pilot's seat is watching the mechanic in the port nacelle cockpit between the engines as he runs up the two 260hp Maybach Mb IVa to check their serviceability.

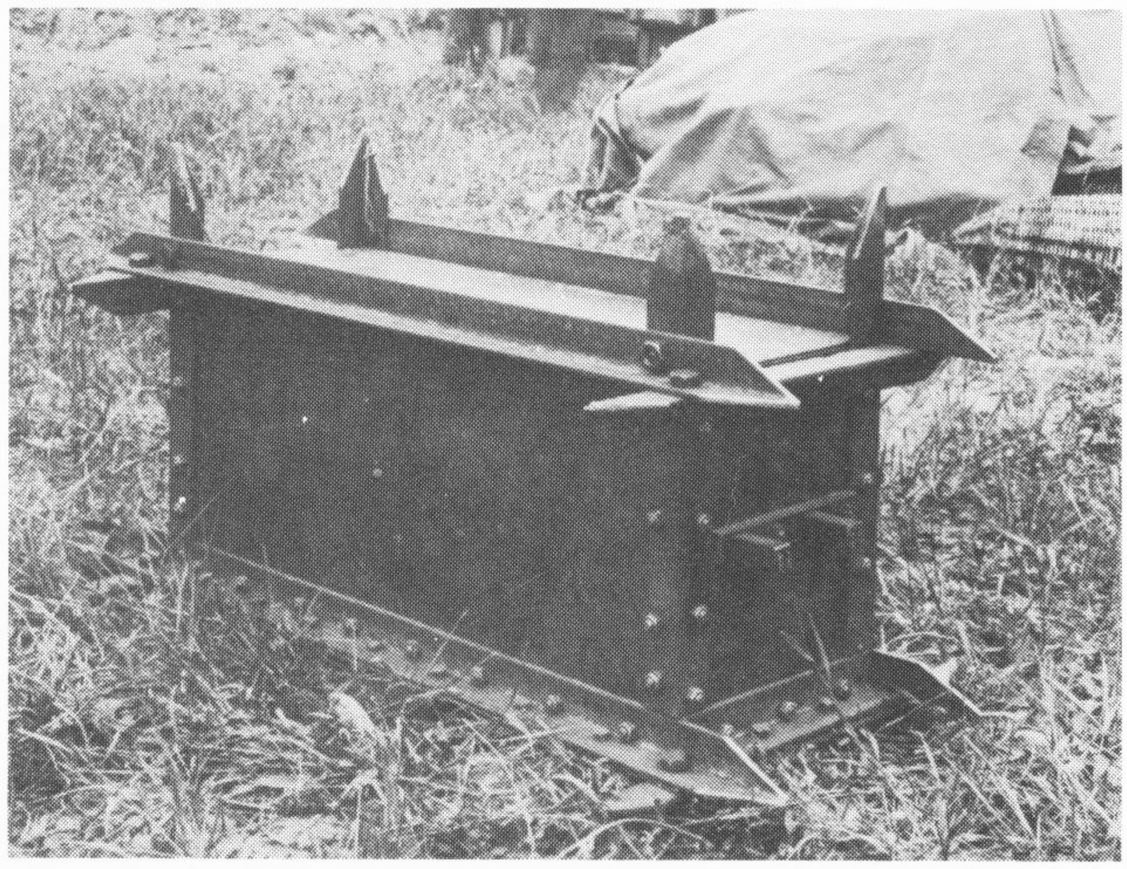
46. Staaken R VI 30/16. Engine mechanic leaving his nacelle cockpit in flight, to mount the ladder that led to a bulged fairing on the upper wing surface fitted with a machine-gun. Not all machines of the type had these installations which utilized captured Lewis guns because of their light weight and ease of portability, but they increased the defensive armament considerably and had better fields of fire than the other gun positions on the aircraft.

47. Before the larger sizes of P.u.W. bomb became available, 21cm howitzer shells weighing 93kg were fitted with sheet steel tailfins and used as an improvisation. Since their blast effect was found to be greater than the P.u.W. bomb of the same weight their use continued until late in the war. However, the shells were not as reliable as the P.u.W. bombs, they lacked their sophisticated arming system and only employed one fuse.

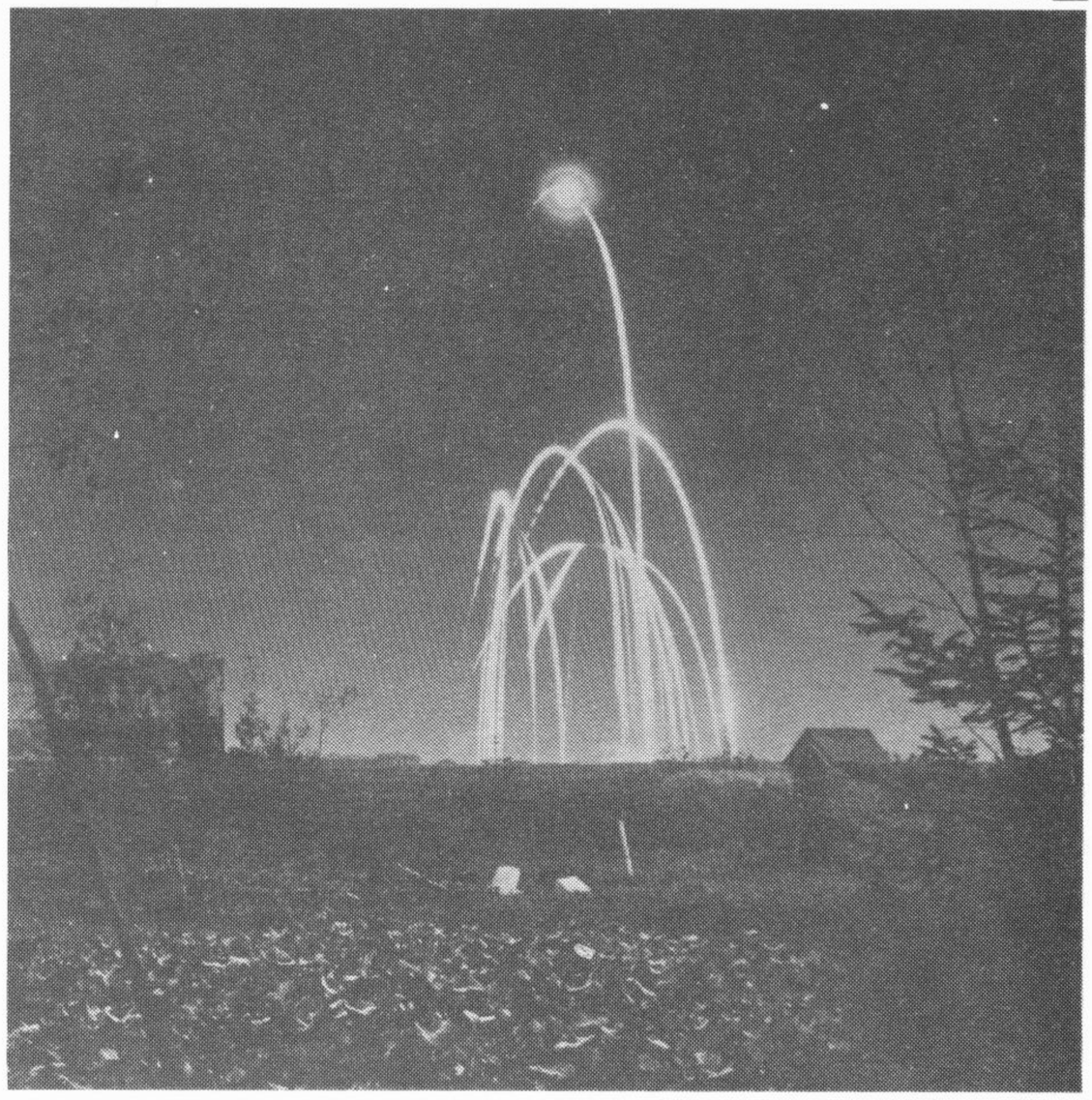
48. Blockbuster of World War One. Although it does not look like an aerial bomb, this device of similar weight to the 21cm howitzer shell had even greater blast properties due to the extremely thin-walled construction and lack of penetration. The trajectory of this 'geballte Ladung' (concentrated charge for special purposes) must have made accurate aiming difficult. A number were used, slung under the fuselage of powerful two-seaters like the DFW C V, on makeshift wooden bomb racks.

49. Various types of aerodrome illumination were used, the most primitive being a triangle of three lights. For landing, an aircraft positioned itself to pass at a low height between the two white lights on the triangle's base on the aerodrome boundary, aiming at the red light of the apex on the other side of the field. Flarepaths, if laid, were usually a single line of manned paraffin pots, acetylene gas or portable electric, and their operation was controlled by the officer of the watch using a signal pistol. A high degree of illumination could also be obtained by the discharge of starshells, seen here in use at Gontrode.

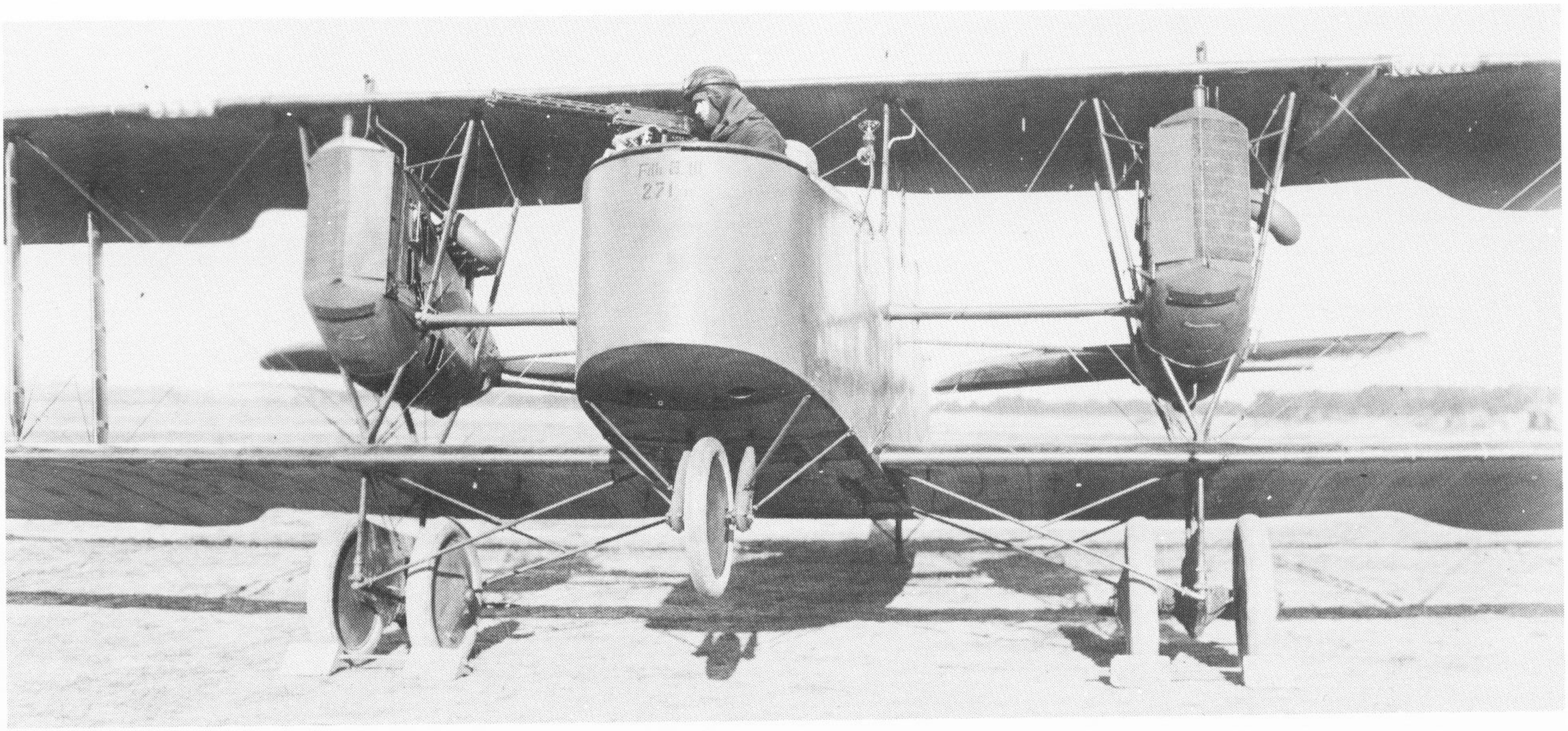
50. Searchlight beams laid across the landing area were generally unsuitable as aerodrome illumination, due to the unevenness of the surface, but this method was used on the big bomber fields since it was easier to control the period of lighting, especially with hostile aircraft in the vicinity and the necessity of recovering returning aircraft that might be short of fuel. Two searchlight beams intersecting at the touchdown point were used. The landing area was kept smooth by large heavy horse-drawn rollers, shown in use at Gontrode.



48 ▲



49 ▲ 50 ▼



▲ 51

51. The landing lights built into the top wing leading edges of this Friedrichshafen G III (271/17) used low-resistance bulbs, fed by a battery of 12-volt accumulators, and they could illuminate the ground for a distance of 50m ahead from a height of 4m. The aerodrome lighting did not always provide the necessary reference to allow the pilot to place his aeroplane in the correct landing attitude at the right height, and the nosewheel undercarriage was used to lessen the risk of damage by flying into the ground.

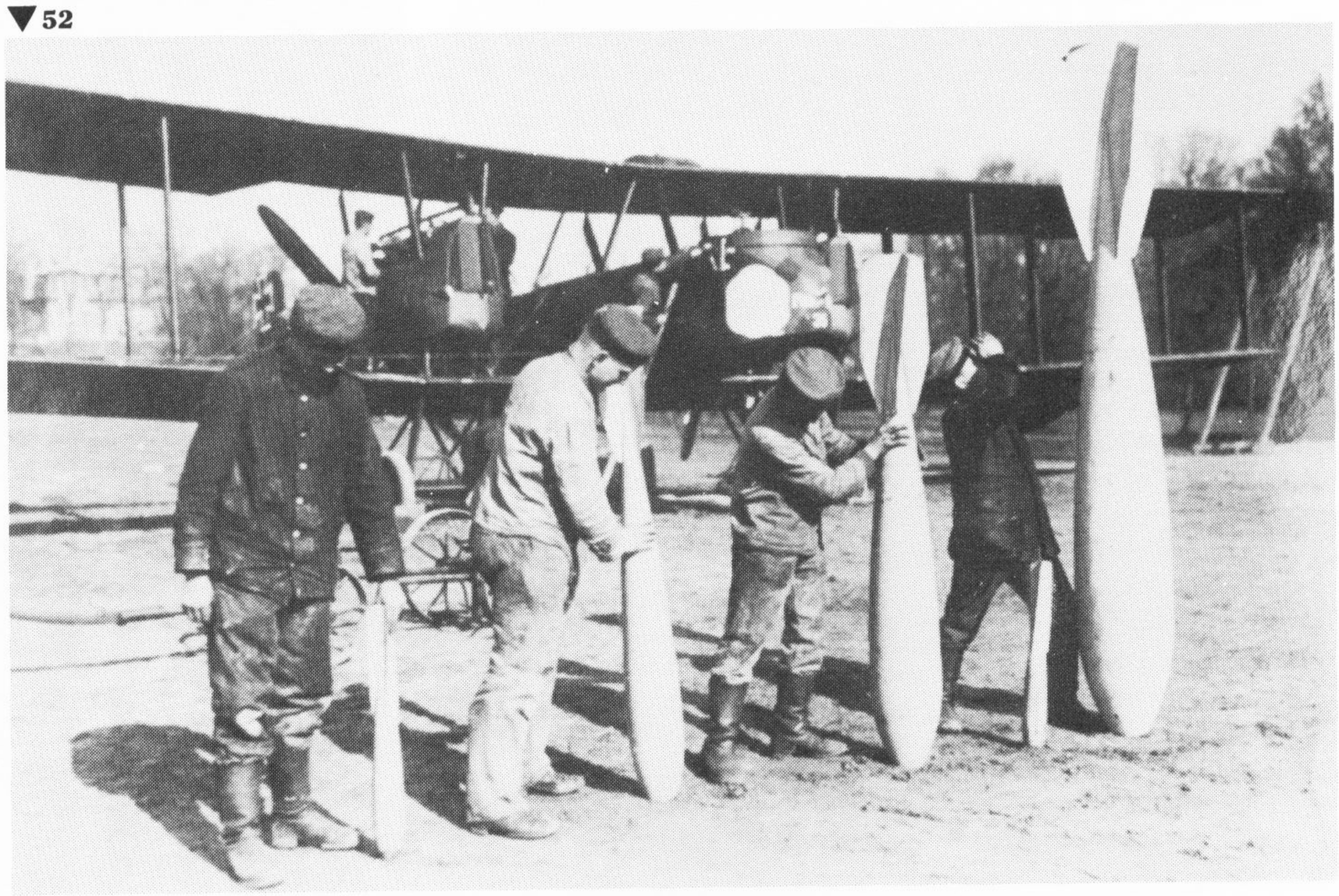
52. Mechanics of Kasta 14, Kagohl III, give scale to the range of P.u.W. bombs, 12.5, 50, 100 and 300kg, The smaller sizes were in use from mid-1916, but the 100kg and 300kg P.u.W. bombs did not appear until over twelve months later, the first examples being dropped on St Omer by Kagohl I on 23 August 1917.

53. Mechanics of Kagohl III filling the containers of the Ahrendt and Heylandt breathing equipment with liquid oxygen. This was done shortly before take-off and the containers were sealed. Although the speed of vapourization varied, the pressure in the containers increased with the passage of time and a safety valve was necessary, but this had the effect of reducing the amount of oxygen available with increase of altitude. Later a barometric valve was fitted to similar equipment made by Fluessige Gase (Liquid Gas) of Kiel and this automatically regulated the oxygen supply for altitude, and was more economical in use.

54. On the giant bombers of the R category electrically operated bomb releases were used. Shown is the bomb selector panel on Staaken R VI 30/16. Bombs could be released as required or in sequence, but there was also a salvo or jettison override that allowed all bombs to be dropped at the same time. Each selector switch had an adjacent light which was illuminated by contacts that closed once a bomb had left its rack. The instrument at upper right is an altimeter suspended by three coil springs to prevent errors due to vibration; its dial is calibrated in hundreds of metres, maximum scale being 5km (16,400ft).

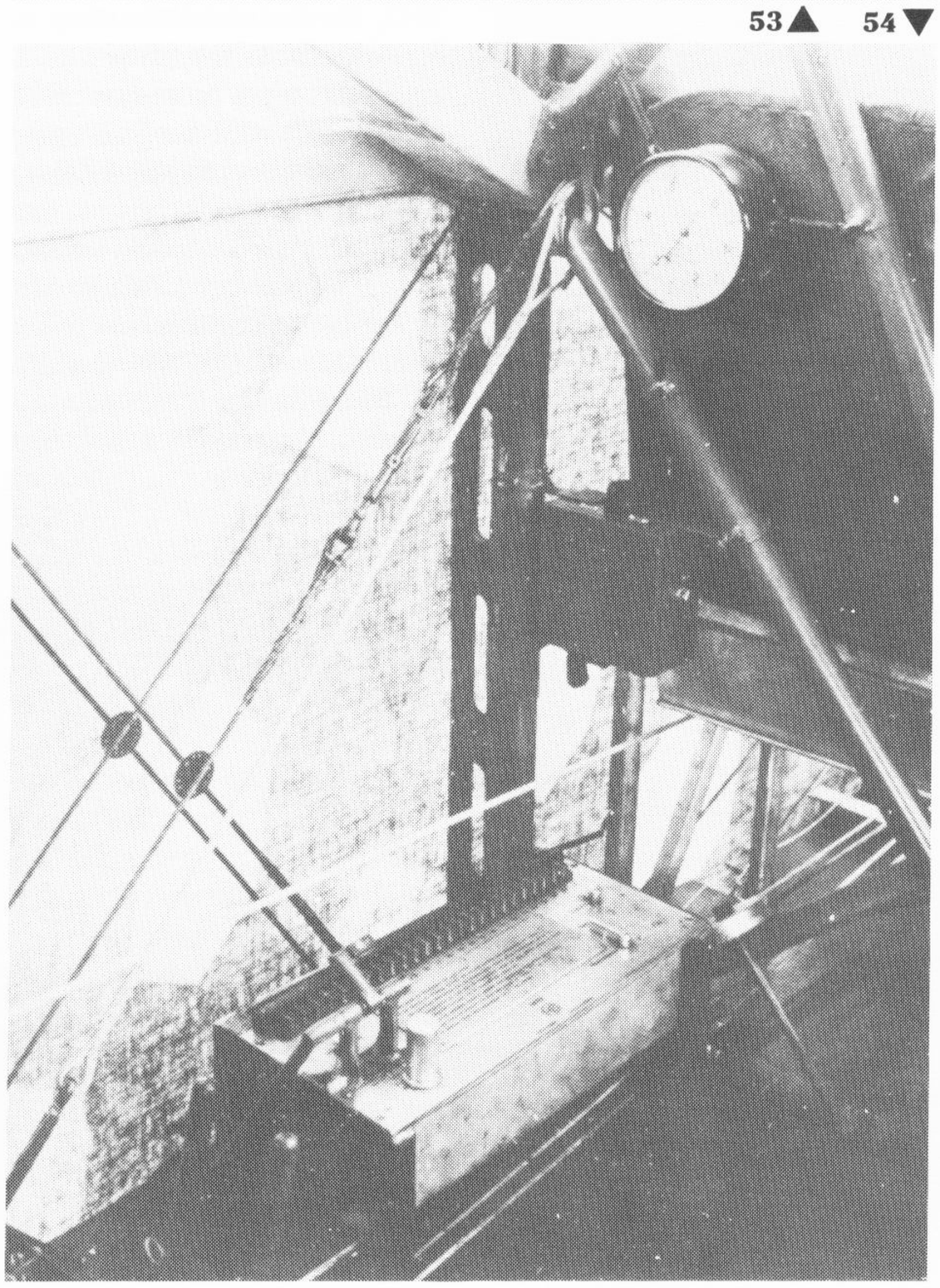
55. An observer in the front cockpit of a Gotha G V of Kagohl III demonstrates the use of oxygen supplied via the bladder to the breathing tube fitted with a mouthpiece. The oxygen produced by vapourization was extremely cold and uncomfortable to breathe and experiments were made to heat the supply tube by various means such as engine exhaust gases, radiator water and electrical elements. Despite the shortcomings of the basic Ahrendt and Heylandt equipment good results were reported.

▼ 52



53▲ 54▼

55▼



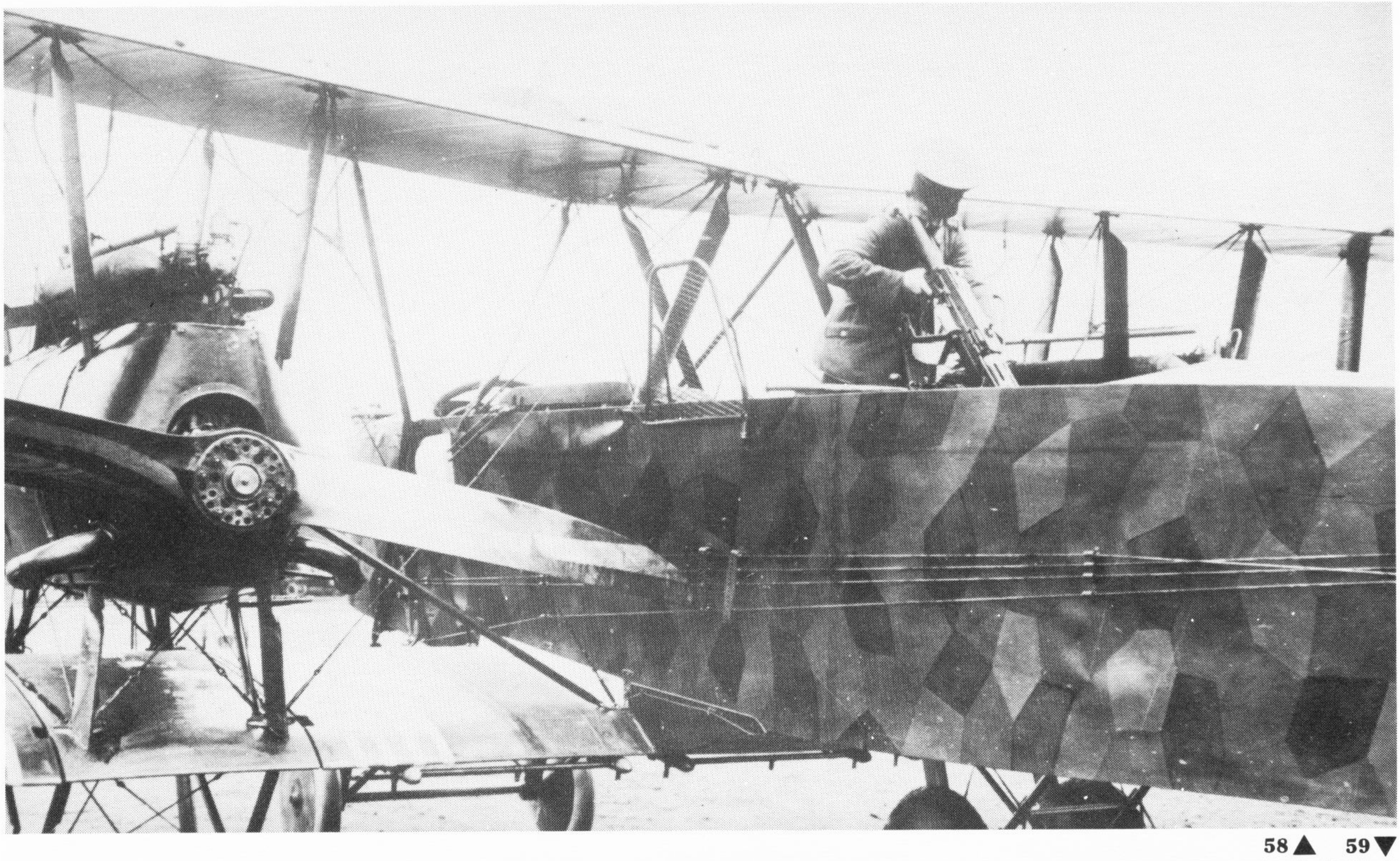
▲ 56

56. The success of the Rumpler G II at the Front during 1916 led to the development of the Rumpler G III powered by two Mercedes D IVa 260hp engines, but the aircraft had constructional shortcomings and could not compete with the designs of AEG, Friedrichshafen and Gotha, the main suppliers of twin-engined G types. From a limited production batch, the Rumpler G III was used only in small numbers by the Kagohl, reaching a maximum at the Front of ten machines at the end of October 1917.

57. The good results achieved by C class two-seaters at night led to the development of night bombing versions with increased wing area and capable of carrying heavy loads on short-range operations. Although the AEG N 1 was slow and took 50 minutes to reach an altitude of 1,800m, it was capable of very short take-off and landing runs and could carry six 50kg P.u.W. bombs on its wing racks. Note external additional span-wise bracing on the top wing centre-section, the exhaust pipe extension flame-damper and landing lights in the top wing leading edge. Thirty-seven machines of this type were with the front-line units at the end of February 1918, but the ever-improving performance of the twin-engined G types caused further experiments with the N category to be abandoned in May 1918.

58. Gotha G V with twin-wheel nose undercarriage. This is probably the example that was evaluated in the field by Bogohl III. Based on the Friedrichshafen type nose

▼ 57



58▲ 59▼

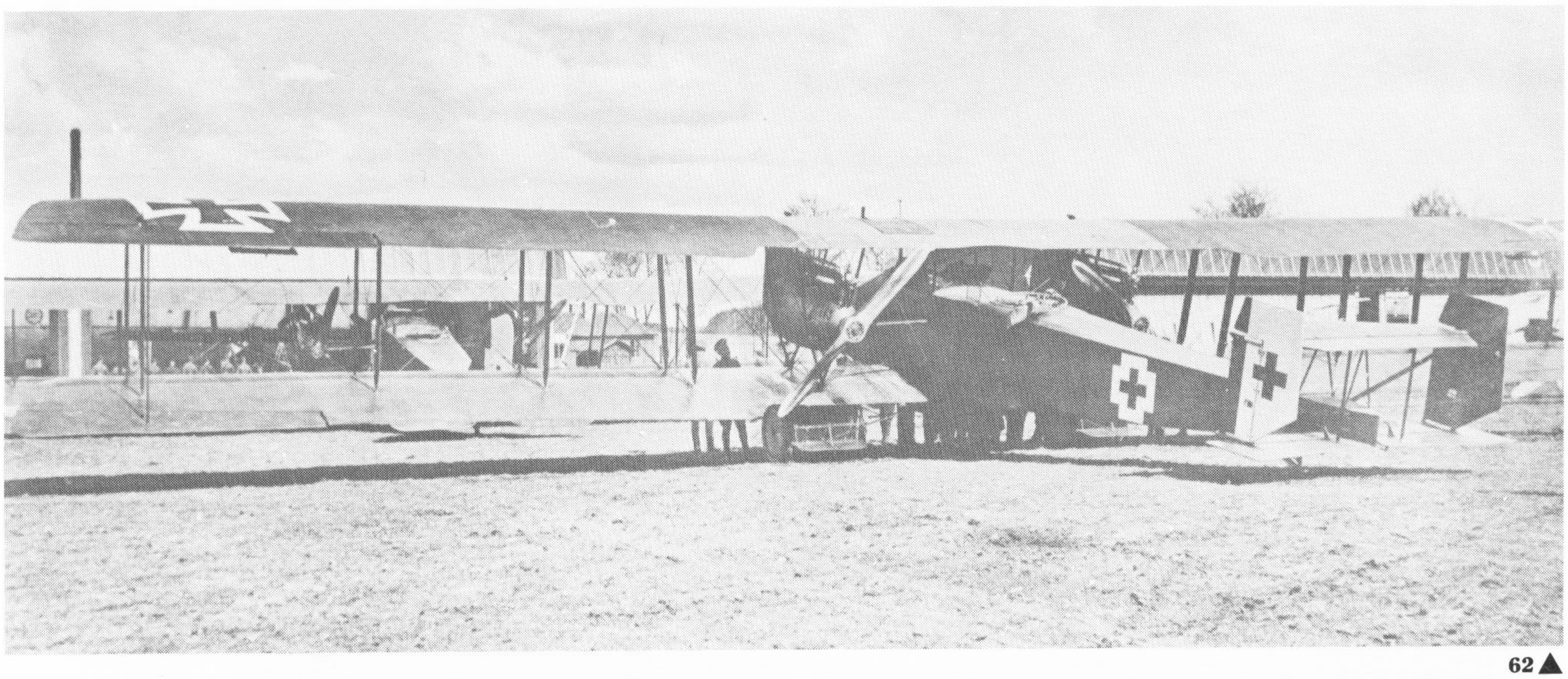
undercarriage and using rubber-in-compression as a shock-absorber, it was not adopted; but Gotha fitted their own 'stossfahrgestell' to the G V's undercarriage assemblies with success and all late production Gotha G Va and G Vb machines had this refinement which greatly enhanced the safety of night operations. The gunner is demonstrating how he could fire via the tunnel aperture into the machine's 'blind spot'.

59. Gunner of a Halberstadt CL II of Schlachtstaffel 27 taking on trench mortar fragmentation bombs (Wurfgranaten 15) to augment the ten 'potato-masher' stick grenades carried on the external fuselage rack. From the very low altitudes at which these aircraft operated in attacks on enemy troops and trenches, they were ideally equipped with these slightly modified infantry weapons. The bandolier across the fuselage decking contains signal flares for communicating with German troops. A total of 750 machines of the CL category was operational at the end of April 1918.

▲60 ▼61

60. Using the standard racks for the P.u.W. bombs, the composition of bombload could easily be varied. Under the centre-section of this Gotha G V can be seen five 50kg and two 100kg bombs. Aircraft of this type seldom carried more than a maximum of 500kg bombload even on short-range operations. Care of the precious rubber tyres is shown by the use of small trestles under the undercarriage vees, with load-spreading boards to prevent the trestles sinking into the earthen floor of the hangar.

61. Increased night bombing operations often resulted in aircraft becoming lost and landing away from base. From April 1918 the system of recognition and orientation signals to help their navigation was expanded to cover the whole of the Western Front in a 'Nachtbefeuerungsdienst' (night lighting service). The automatic quick-firing 3.7cm Maschinenflak used special



62▲

pyrotechnic ammunition fired at time intervals; the firing sequences and locations of particular batteries were known to the bomber crews and enabled them to fix their position by this means. These guns acted as aerial lighthouses and were known as 'Feuerspucker' (fire-spitters). A typical sequence might be three shots fired every three minutes, the second and third shots fired three seconds after the first. Additionally, the colours of the bursting pyrotechnics could be changed to convey particular information, such as poor weather at base necessitating diversion to a pre-arranged alternate aerodrome. (G type bombers did not normally have wireless equipment.)

62. Two Friedrichshafen G III machines on a training aerodrome in Germany, probably the Geschwaderschule at Paderborn, in April 1918. The nearest aircraft (G 347/17) has the box tail unit that became standard on the G IIIa; it also has the four-bay wing cellule that was the hallmark of the G IV, and is possibly one of the prototype aircaft used to introduce these features, brought to Paderborn for demonstration purposes. Pilots were converted to twin-engined types at this school. After flying solo, flights were made with increasing amounts of ballast up to maximum weight, by both day and night. Cross-country flights were undertaken during which specified periods had to be spent above a height of 2,000m. The final requirements included day and night exercises on the bombing range. Duration of courses varied but could take up to eight weeks.

63. The small but highly effective Elektron incendiary bomb produced early in 1918 weighed only 1kg and could not be extinguished with water. It measured 14in long and was 2in in diameter, was filled with compressed thermite, and its three straight fins terminating in a circular tail ring made it almost identical to the weapon used by the Luftwaffe in World War Two. The intended use of the bomb against centres of population was prohibited on humanitarian grounds. However, in March 1918 large-scale incendiary attacks using these bombs were planned, to be carried out by Bogohl III against London, and Bogohl I, II, V and VII against Paris. Each aircraft could carry 500 bombs of this type, and in round-the-clock operation by both day and night it was considered that the number of fires started would swamp the fire protection services. (Fire-storm properties were understood at this time.) The German High Command (under whose auspices the Bogohl operated) must have issued the attack instructions, but they were countermanded (it is said by the Kaiser himself) only 30 minutes before the first aeroplane was due to take off. Forty Elektron bombs are shown here in special racks under the nose of a Gotha G V, while others are visible in the vertical magazine exits.

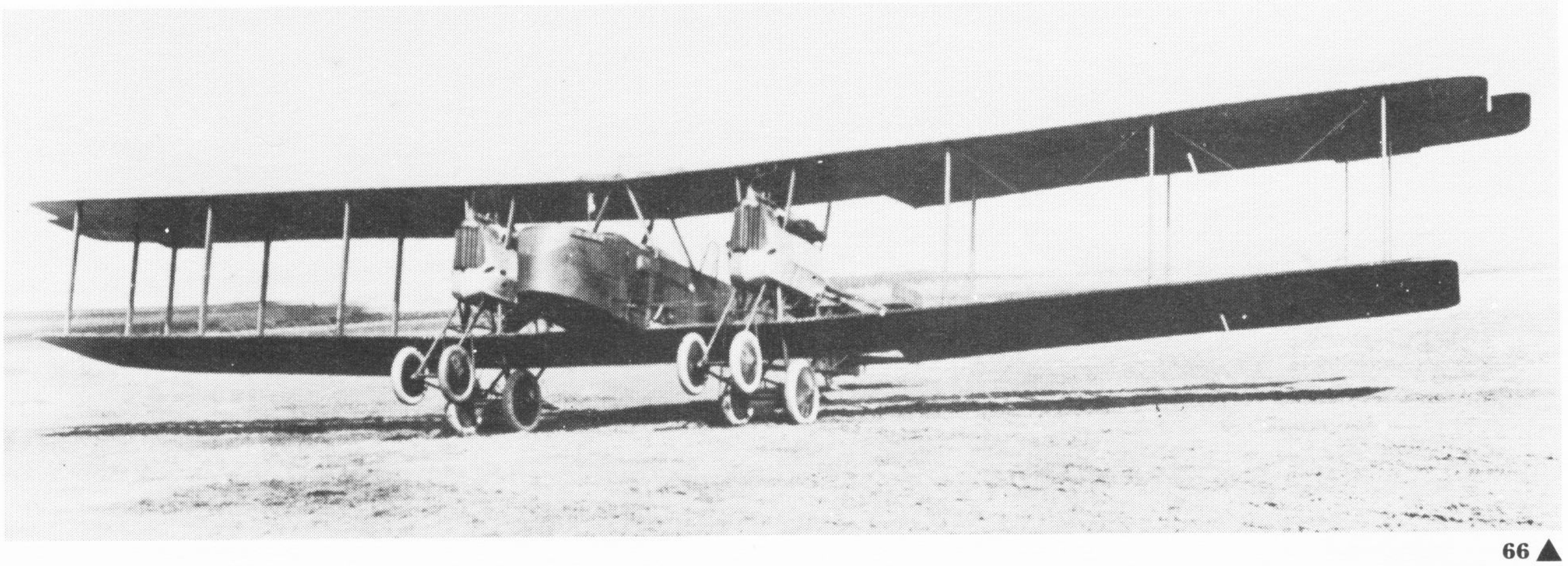
63▼

▲ 64

64. Staffelfuehrer's Friedrichshafen G III 367/18 of Bosta 25, Bogohl VIII. Rittmeister Freiherr von Beckmann is in the observer's front cockpit: the Staffelfuehrer, Oberleutnant Freiherr von Crailsheim (with signal flares in his top pocket), and Leutnant Freiherr von Polnitz in the pilot's cockpit. The non-optical Goerz bombsight on the nose was more suitable for use at night than the 'bombing telescope'. It consisted of a fixed foresight at the apex of the triangular frame and an illuminated backsight at the top which was set with height and groundspeed; when the target entered the crosswires on the backsight, and lined up with the foresight, the bombs were released.

▼ 65

65. AEG G V 625/18. The outrigger hinged aileron tab was attached by a rod to the aileron operating linkage. When the control surface was actuated, the tab moved in the opposite direction and partially balanced the aileron movement, making it easier to operate. It was thus not a true servo tab; its patented name was Flettner Hilfsruder (assisted rudder). It made the aircraft of the G class less tiring to fly and was in use in a variety of forms on the late models of twin-engined bombers. (British Air Ministry technical reports of 1919 indicate complete ignorance of the aerodynamic properties employed!)

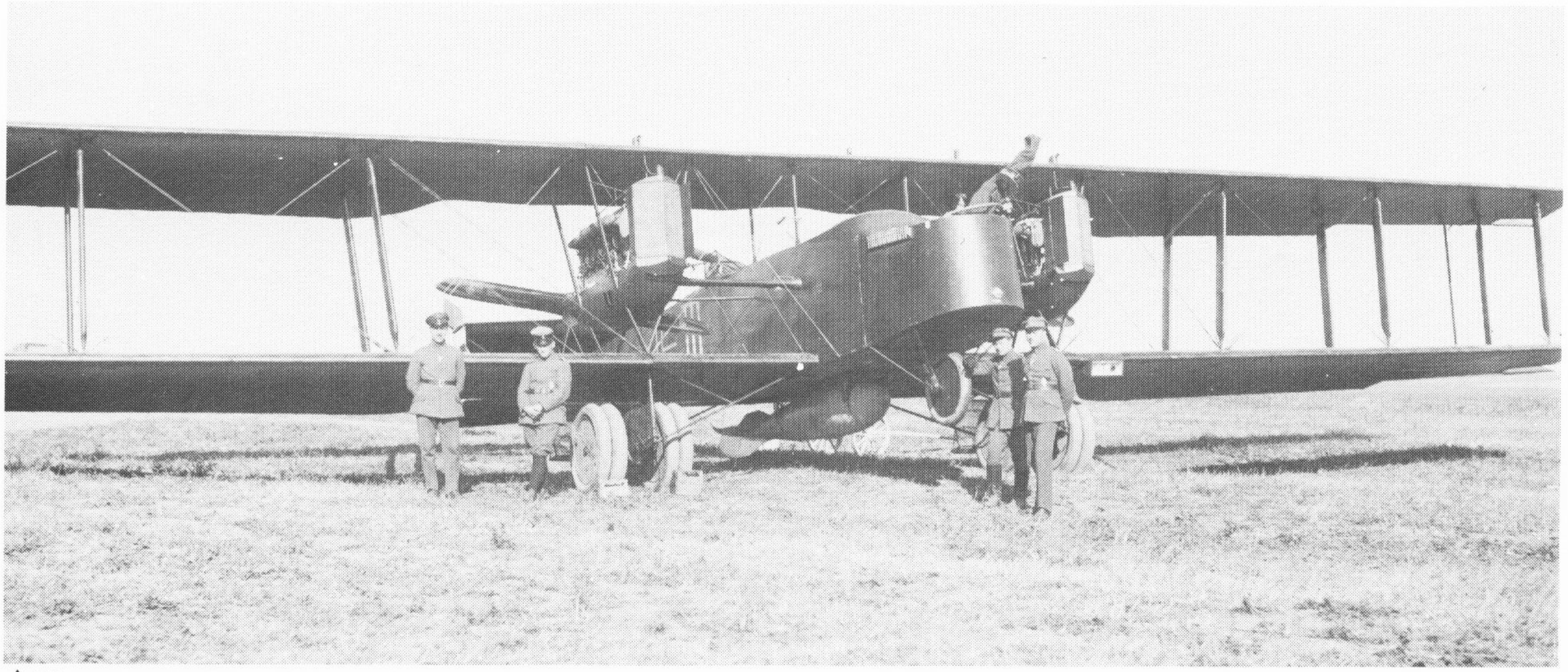


66 ▲

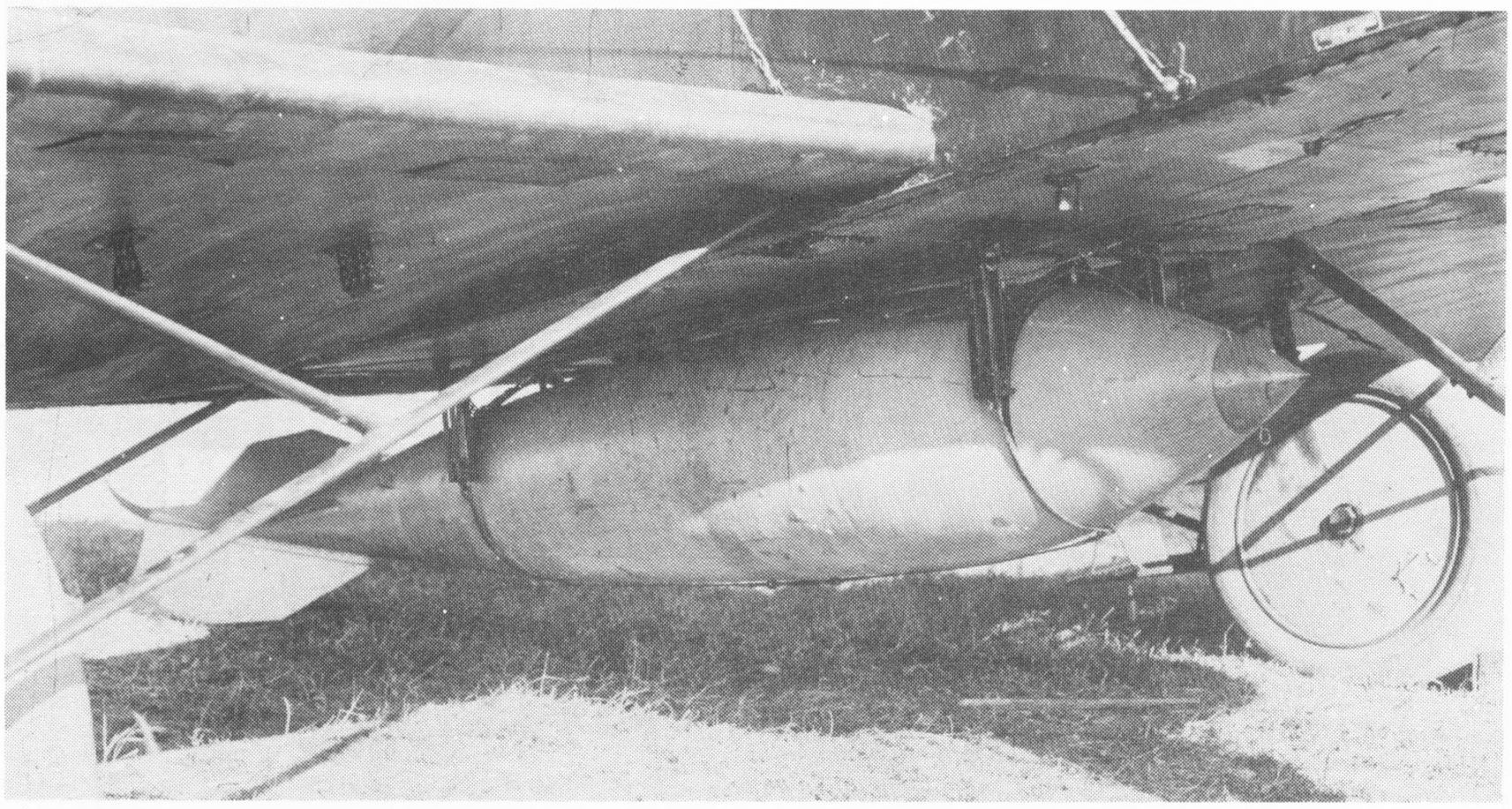
66. Gotha G Vb 935/18 showing the auxiliary landing gear angled well forward to prevent the machine touching the ground with the fuselage nose, especially during night take-offs and landings. This 'stossfahrgestell' revived the feature first used on the prototype Gotha G II and patented in 1916, whereby the powerplant, including a section of the bottom wing, could be completely disconnected from the airframe and wheeled away on the undercarriage assembly while the aircraft was trestled into flying position and supported at the appropriate wing tip. A replacement unit could than be moved into place and coupled up, thus greatly simplifying the procedure used in engine changes. The Flettner tabs can be seen hinged directly to the aileron trailing edges and not carried on outriggers as on Friedrichshafen and AEG designs.

67. Friedrichshafen G IIIa (Daim.) 779/18. This view of a sub-contract machine built by Daimler shows the Flettner balances mounted ahead of the aileron hinges on outriggers and details of the tail unit. Not only were twin-engined aircraft of the time unable to maintain height on one engine, but full power on the good engine caused the loss of directional control. During 1918 much experimental work resulted in the 'box tail unit' being adopted by AEG, Friedrichshafen and Gotha. The main asset was the placing of the rudder in the propeller slipstream where it benefitted from increased airflow, allowing straight ahead flight at full power on one engine, the rate of descent being considerably reduced. The biplane configuration of the tail unit was merely the best way to produce a braced structure strong enough to support the vertical tail surfaces.

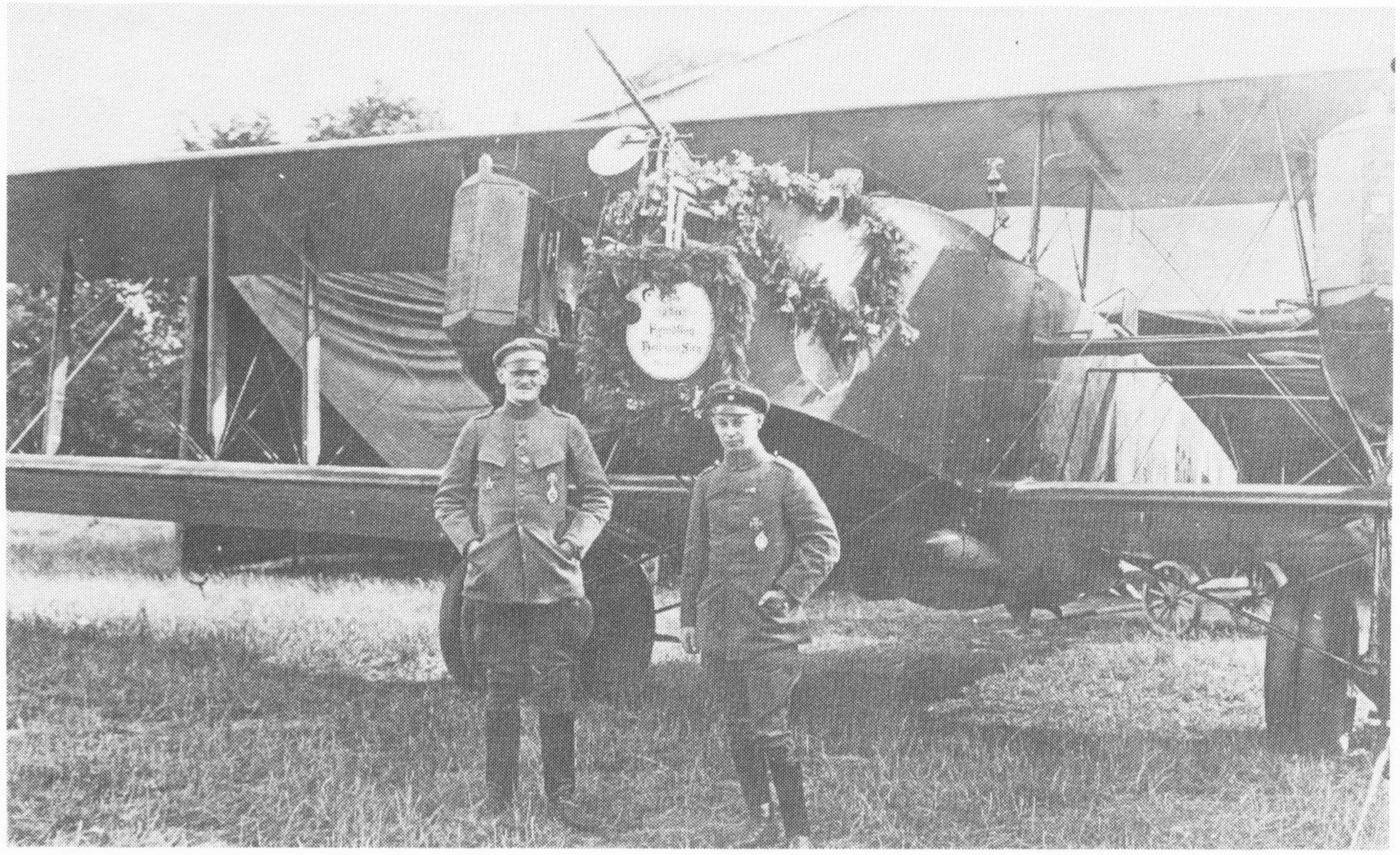
67 ▼



▲68

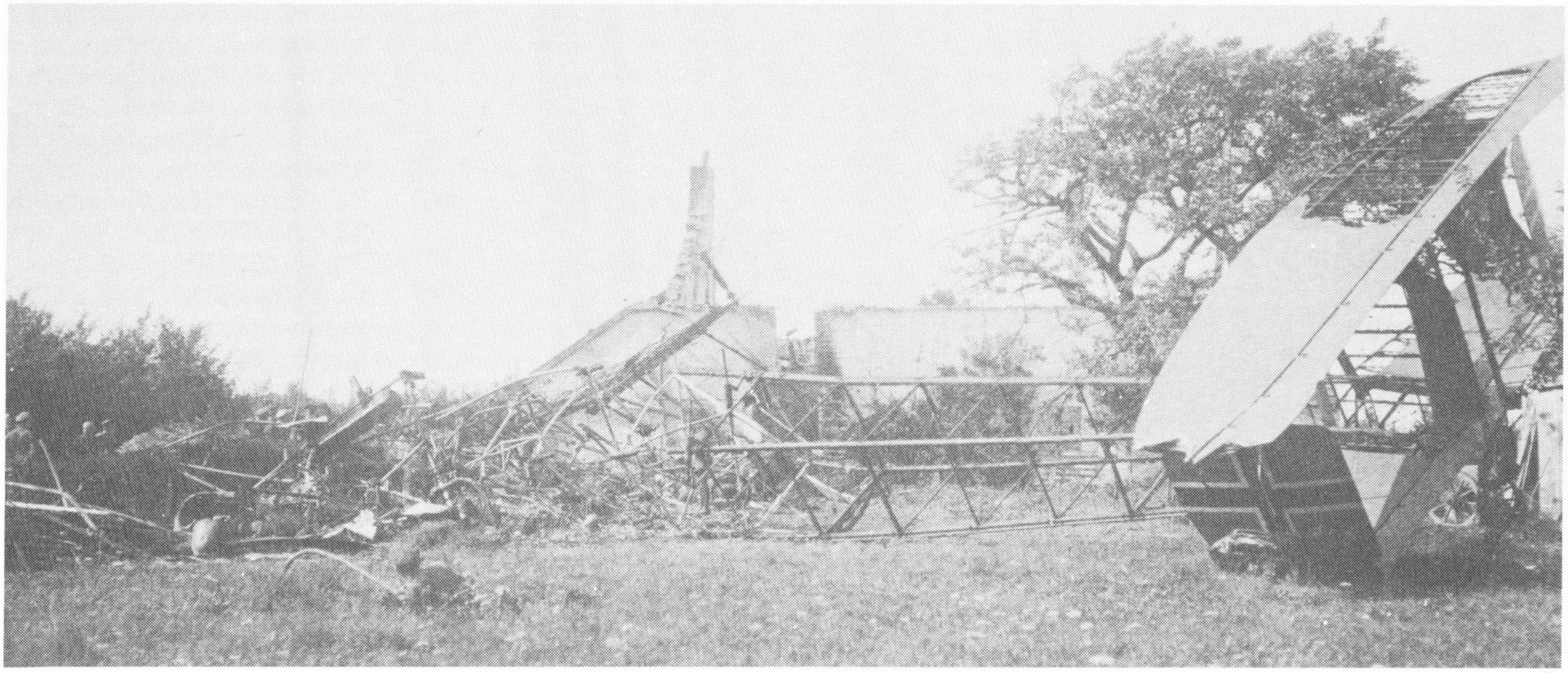


▲69 ▼70



68. Friedrichshafen G IIIa of Bosta 26, Bogohl VIII, with a 1,000kg bomb in its rack. This machine, probably the best G type to reach the Front in quantity, was actually capable of carrying a 1,500kg bombload with fuel for 6 hours. The already excellent undercarriage was further strengthened for heavy work by doubling the number of wheels originally fitted. Two hefty streamlined-section steel tubes filled with wood extended from the wing spars to a steel girder that supported the axles; shock-absorption was by coiled steel springs, this assembly being covered by a fabric bag to prevent the ingress of mud, etc. The nose wheel shock struts also used steel springs in compression. All undercarriage assemblies had drift bracing of streamlined steel tube; that on the main wheels precluded the use of bomb racks on the wing undersurfaces of the centre-section.

69. Close-up of the 1,000kg P.u.W. bomb on its simple rack showing the nose safety pin in place. This weapon was first dropped experimentally in December 1917, had two fuses and was thin-walled to obtain the maximum blast effect from its 680kg of high-explosive. The angled tail fins imparted a rotary motion to the bomb during its fall which stabilized its trajectory. The centrifugal



71▲

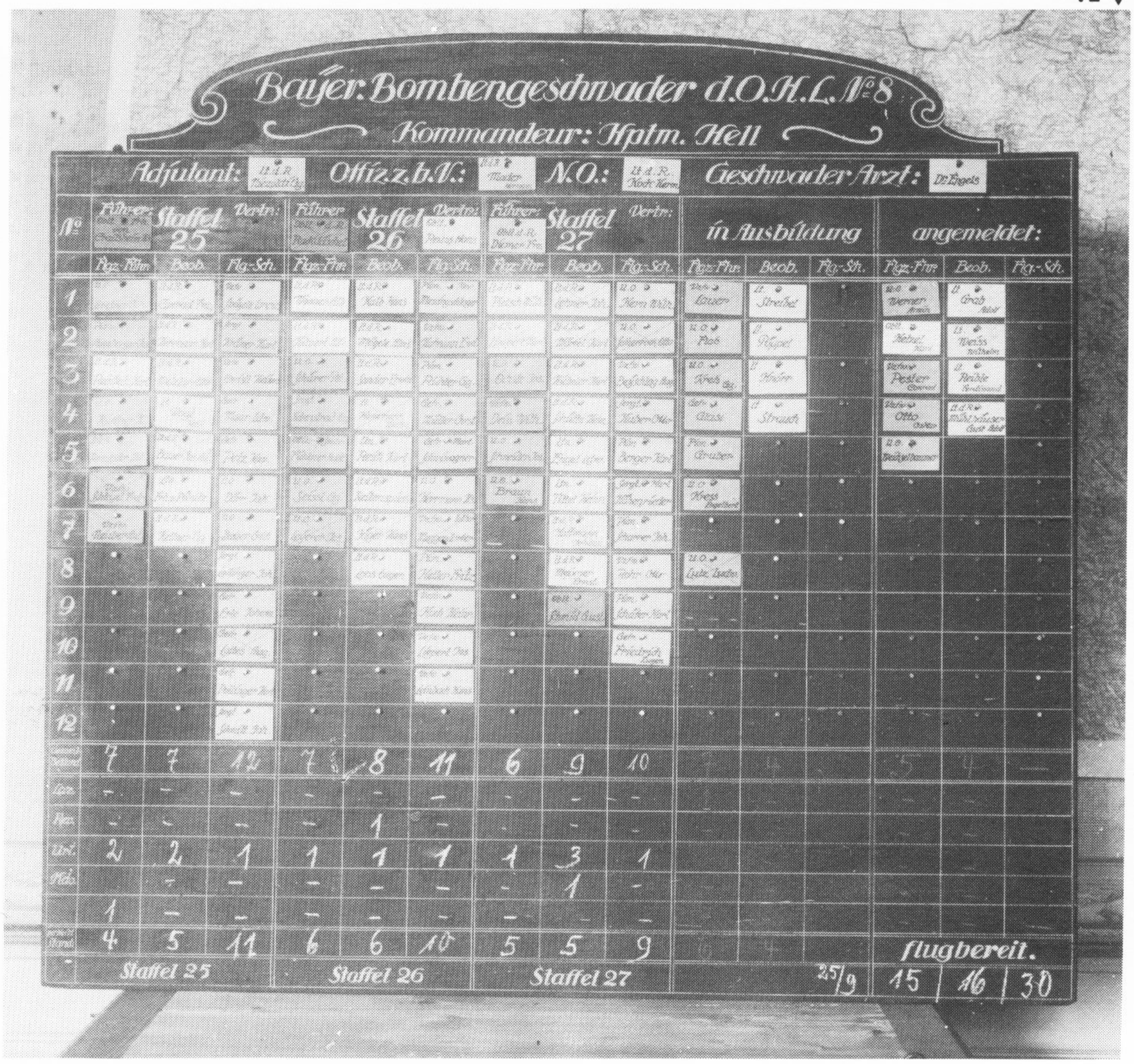
force generated was used to arm the bomb by causing three brass segments to move clear of the firing pistol, and needed a fall of 1,600m to operate. First live drops were made in January 1918 and 710 bombs of this type had been dropped on enemy targets by the end of the war.

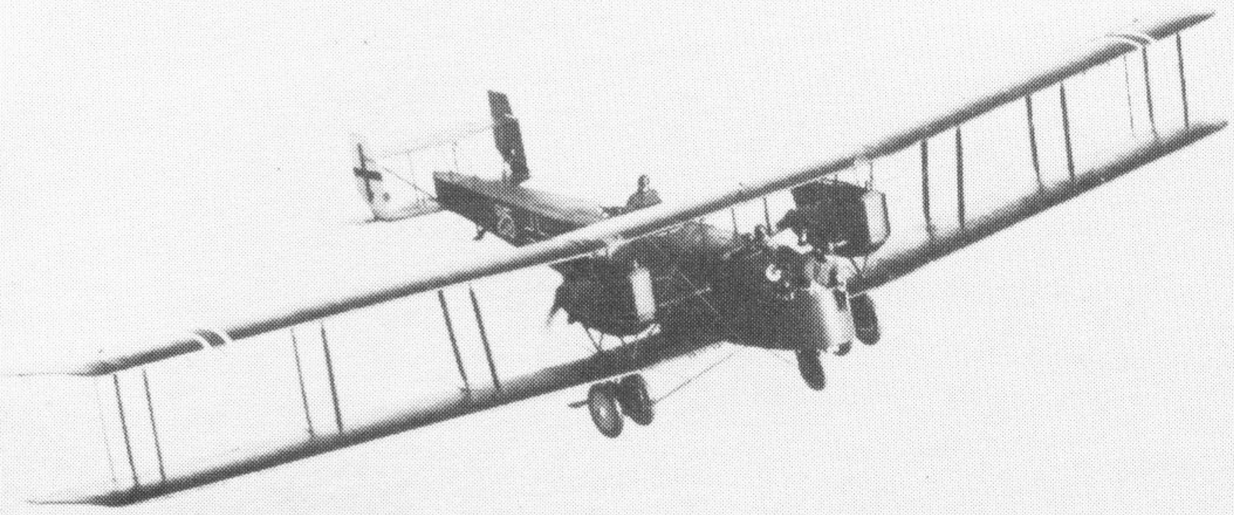
70. Oberleutnant Freiherr Marschall von Bieberstein, Staffelfuehrer of Bosta II in Bogohl I, with his pilot, Leutnant Nieber, in front of their Friedrichshafen G IIIa 836/18. One of the most resolute bomber commanders, von Bieberstein, for whom the heaviest anti-aircraft fire held no terrors, rejoiced in the nickname of 'Emir – enemy of the infidels'. The decorative laurel wreath on the nose of his aircraft is in celebration of his return from his 250th operational flight.

71. Hauptmann Schilling, Kommandeur of Rfa 501, and four members of his crew were killed when Staaken R VI 52/17 crashed into a house south-east of Chimay near Villers la Tour early in the morning of 12 August 1918; they were returning from a short-range operation against Beauvais. Unfamiliar with the more aft position of the pilot's seat compared with previous types and the increased weight of the newly assigned R52, the handling pilot became disorientated when flying blind and lost control. By this time machines of the R category were fitted with quite sophisticated instruments including artificial horizons, but the art of blind flying would not be understood for some years to come.

72. Crew state board for the Bavarian Bogohl VIII on 25 September 1918 shows an availability of fifteen pilots, sixteen observers and 30 air-gunners to crew the established strength of eighteen Friedrichshafen G IIIa bombers. There was never any shortage of gunners and the two columns on the right show that of the additional twelve pilots on strength, seven are undergoing conversion training, and four of the eight additional observers are likewise employed.

72▼



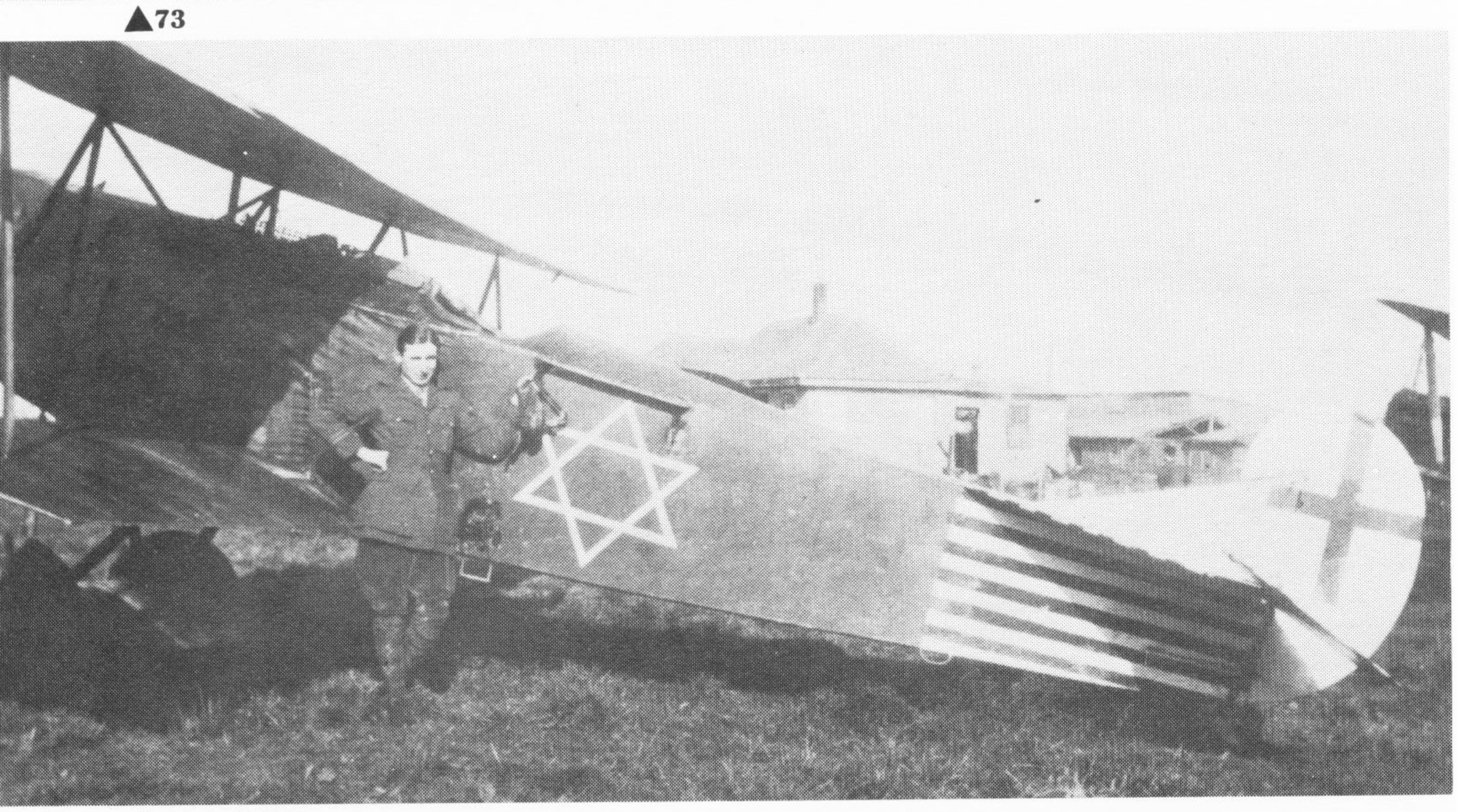


73. On the crew state board (at caption No 72) Oberleutnant Karl Hetzel had just reported to Bogohl VIII. Possibly because of his rank and the fact that Bosta 25 was below the established pilot strength, he was assigned to Bosta 25, taking over Leutnant Reinlein's crew: Leutnant Wetzlar, observer, and Vizefeldwebel Christl, machine-gunner. He is seen here flying Friedrichshafen G IIIa 826/18 with these crew members on a practice flight which involved dropping parachute stores from the bottom hatch of the gunner's cockpit. This photograph, which is one of a sequence, was taken by Leutnant Woyl in the vicinity of Bolchen in Lothringen in October 1918.

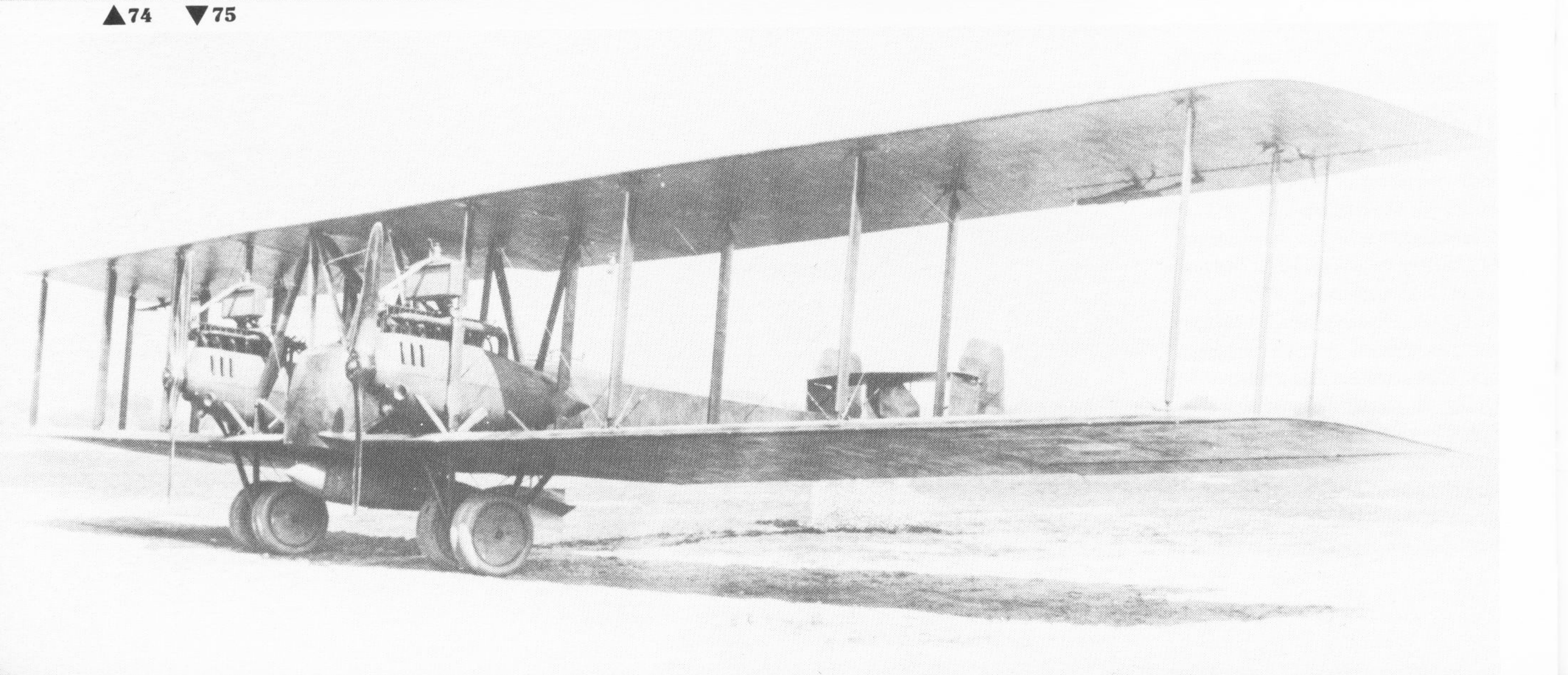
74. At various times during the war single-seat fighters undertook bombing operations. Shown here is Captain F. O. Soden of No 41 Squadron, RAF, with Leutnant Auer's Jagdstaffel 40 Fokker D VII which he forced to land at Ooteghen on 28 October 1918. This aircraft was fitted with wooden shelf racks on either side of the fuselage enabling eight Wurfgranaten 15 to be carried. These were suspended upside down by a length of wire through their noses, as was normal on CL category machines used by the Schlachtstaffeln. Withdrawal of the wires released the grenades which had ordinary percussion fuses.

75. The Friedrichshafen G IV was a four-bay version of the G IIIa (see caption No 62). The increased wing area allowed it to fly on one engine for 70–90 minutes from a height of 3,000m until it reached the ground, which was a great improvement on other types in use. Further attempts to improve single-engine performance produced the Friedrichshafen G V; by shortening the fuselage nose, the engines could be placed closer together, thus reducing their asymmetric moment. This is the G V prototype with a centre fin added to its biplane tail unit during a modification programme. The aircraft had a payload of 2,100kg but had not been placed into production before the Armistice.

▲73



▲74 ▼75

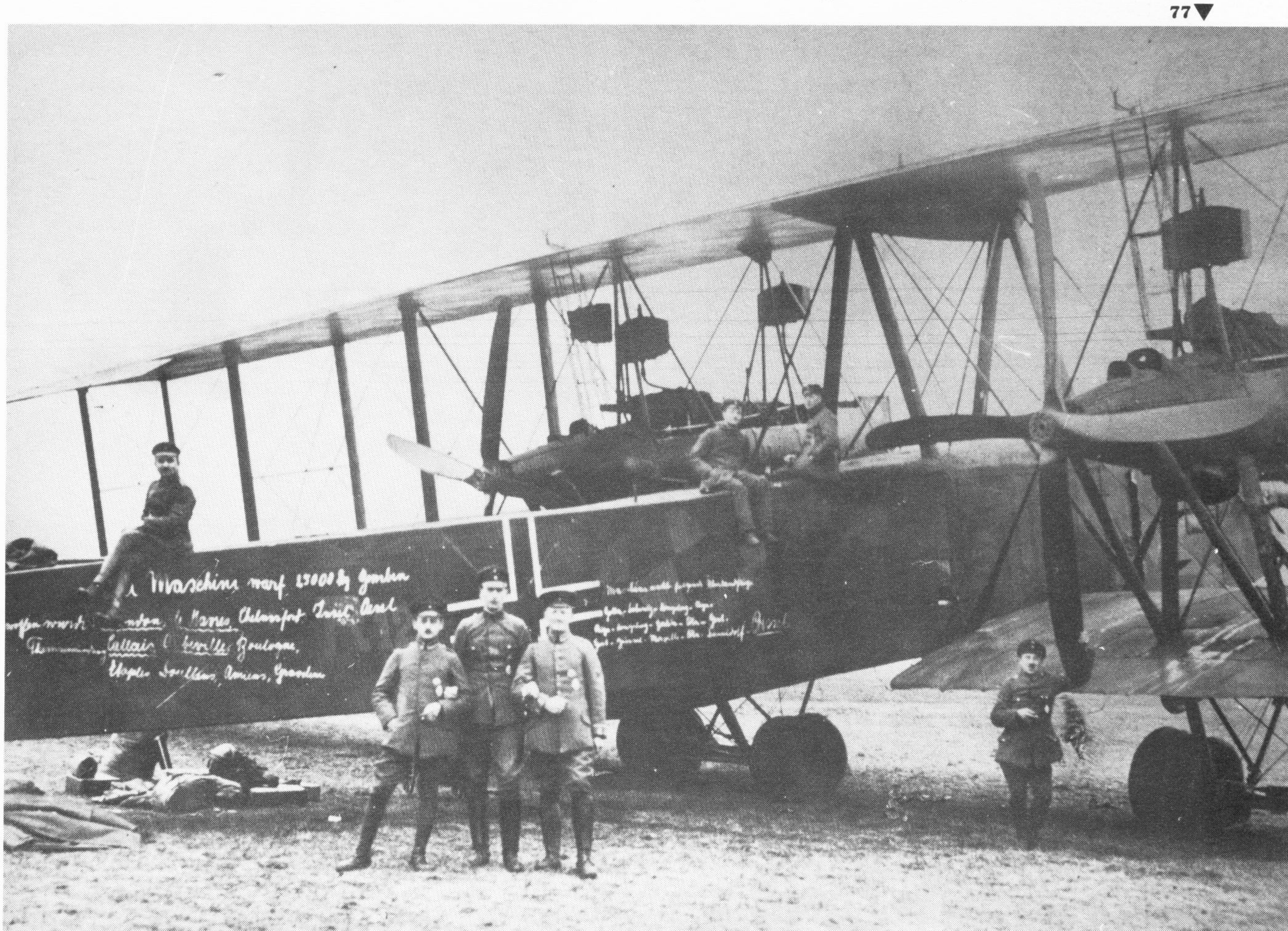


76. There was disbelief about the relatively small numbers of machines in use when bombers of the Bogohl were handed over to the Allies after the war, and this is surely the highest tribute that could be paid to the devotion to duty of the Bogohl commanders and their crews. This AEG G V (635/18) is shown at Avere aerodrome after the Armistice with a Gotha G Vb in the background. All the machines at this aerodrome were of the latest types, having the aerodynamic refinements that have already been mentioned, but in a last defiant gesture all the bombers had been damaged in various ways to prevent them from flying again.

76 ▲

77. The Staaken R IV 12/15 had the longest operational career of any machine in the R category, and was the only one to be flown on both the Eastern and Western Fronts, from May 1917 until the Armistice. It survived a collision with a balloon cable over London in February 1918 and dropped a total of 25,000kg of bombs. It is seen at Kassel in April 1919 with its fuselage inscribed with the names of the main targets attacked (including London, Harwich, Chelmsford, Oesel Island (Baltic), Calais, Abbeville, Boulogne, Etaples, Doullens and Amiens) and the routeing of several long-distance flights occasioned by ferrying from one theatre of operations to another; eg, Gotha–Doeberitz–Koenigsberg–Riga.

77 ▼



78. Hauptmann Ernst Brandenburg, Kommandeur Kagohl/Bogohl III. He qualified as an observer after being wounded as an infantry officer in 1914 and was Fuehrer of Kampfstaffel S I on the Somme. He led Kagohl III (known as the 'England Geschwader') in its first attack on London on 13 June 1917 and was awarded Germany's highest military decoration, the Ordre Pour le Mérite, for this action, but was seriously injured in a flying accident two days later. After recovery, and following the loss of Hauptmann Kleine, he led Bogohl III until the Armistice. After the war Brandenburg was director of the aviation section of the German Transport Ministry which was responsible for the amalgamation of the then various aircraft operating companies that produced Lufthansa, but left this position upon the formation of the German Air Ministry in 1933. He died on 1 July 1952.

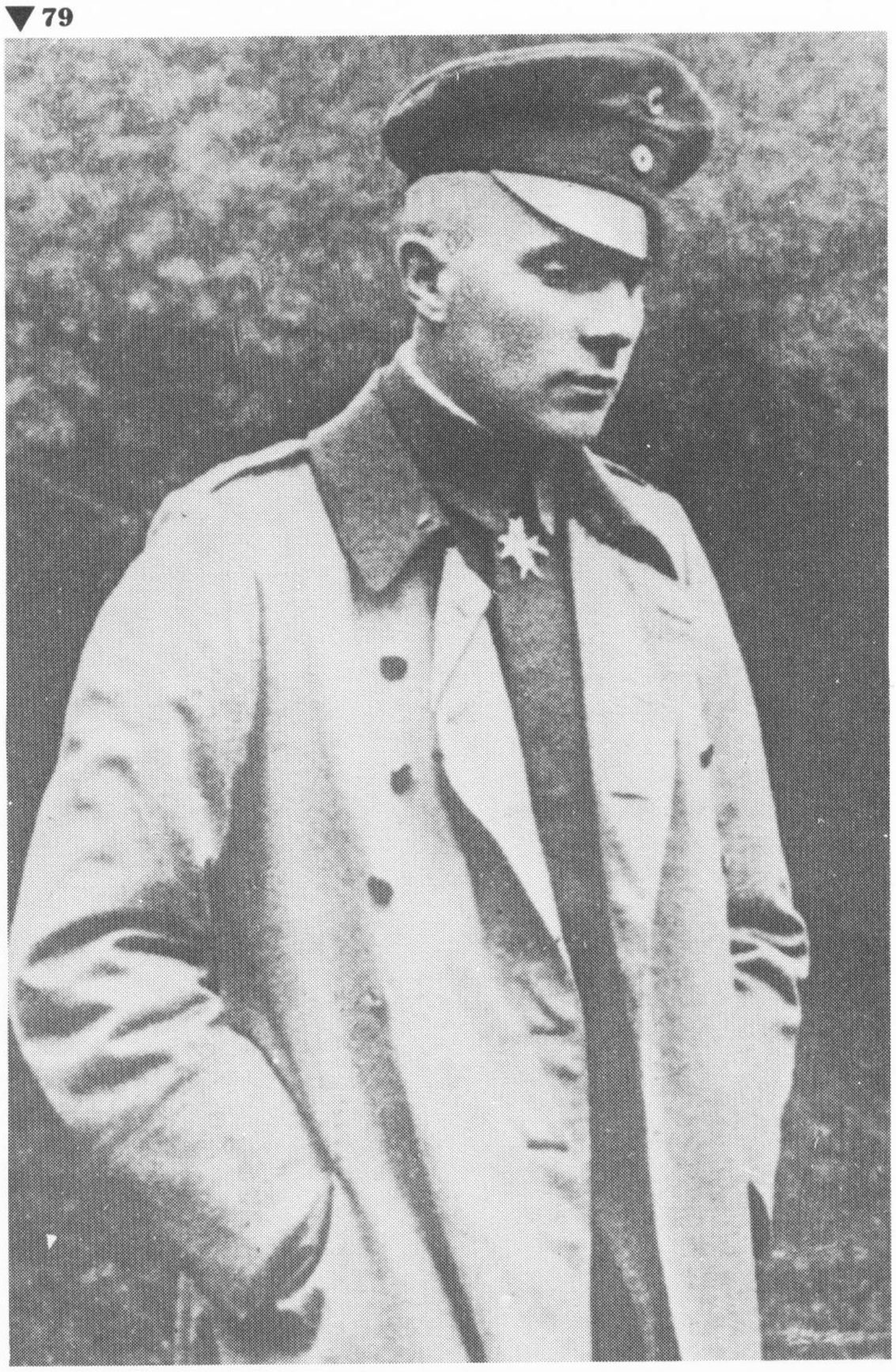
79. Hauptmann Rudolf Kleine, Kommandeur Kagohl/Bogohl III. He transferred from Infantrie Regiment 65 to Flieger Battalion 3 in 1913 and learned to fly. After attending the War Academy, he served as a pilot in Flieger Abteilung 9, later being Staffelfuehrer in Kagohl I and Fuehrer of Feldflieger Abteilung 53. On 23 June 1917 he became Kommandeur of Kagohl III, leading this formation in ten day and night attacks against Britain. During the period 24 September to 2 October he flew six times against London and was awarded the Ordre Pour le Mérite on 4 October. Kleine was shot down and killed while on a short-range daylight bombing attack against Ypres on 12 December 1917.

80. Hauptmann Alfred Keller, Kommandeur Kagohl/Bogohl I. He learned to fly in 1913 and was Fuehrer of Feldflieger Abteilung 27 on the outbreak of war; later he was Fuehrer of Armee Flug Park 5 during Verdun and Armee Flug Park 1 during the Somme. He succeeded Hauptmann Hempel as Fuehrer of Flieger Abteilung 40, which unit had become one of the earliest formations to specialize in night bombing, and had achieved success with the destruction of the Andruicq ammunition dump on 20/21 July 1916. Keller introduced night bombing techniques to Kagohl I, whose Kommandeur he became in April 1917. He was awarded the Ordre Pour le Mérite on 4 December and led Bogohl I with distinction until the end of the war, undertaking many attacks against Dunkirk and Paris. Known as the 'Iron-Keller', he was always first over the target and usually remained there during a raid observing the bombing accuracy of his crews. Active in the post-war German civil air transport training organization, Keller served in the Luftwaffe from 1 March 1935, reaching high rank, and died in Berlin on 11 February 1974.

81. Hauptmann Hermann Koehl, Kommandeur Bogohl VII. Trained as an observer after being wounded as a Pioneer officer, he served in Feldflieger Abteilung 41 before becoming the Fuehrer of Kasta 22 in Kagohl IV. Frequent requests for pilot training were turned down but he learned to fly during a leave period and qualified as a pilot. Kommandeur of Bogohl VII from March 1918, his most outstanding success was the partial destruction of No 12 Ordnance Depot at Blargies,

▼ **78**

▼ **79**



south-west of Amiens, during the night of 20/21 May when 6,000 tons of ammunition were destroyed. Awarded the Ordre Pour le Mérite for this action, he was brought down and captured two nights later. After several escape attempts he reached Switzerland in September 1919. Koehl achieved fame as the pilot of the Junkers W 33 'Bremen', when on 12/13 April 1928 this machine made the first east-west Atlantic crossing by aeroplane. He died in Munich on 7 October 1938.

82. Hauptmann Leo Leonhardy, Kommandeur Bogohl VI. When learning to fly at the beginning of 1914, he was seriously injured in a mid-air collision but after recovery qualified as an observer and served with Feldflieger Abteilung 59 before becoming the Kommandeur of Bogohl VI. He led this formation on 83 successful bombing raids, the most important being attacks against Malzeville aerodrome and depots at Etaples. Awarded the Ordre Pour le Mérite on 2 October 1918, he remained in aviation and obtained his pilot's licence in 1927 when 47 years of age, but died as a direct result of his previous injuries on 12 July 1928.

80 ▲ 82 ▼

81 ▼

The *Fotofax* series

A new range of pictorial studies of military subjects for the modeller, historian and enthusiast. Each title features a carefully-selected set of photographs plus a data section of facts and figures on the topic covered. With line drawings and detailed captioning, every volume represents a succinct and valuable study of the subject. New and forthcoming titles:

Warbirds
F-111 Aardvark
P-47 Thunderbolt
B-52 Stratofortress
Stuka!
Jaguar
US Strategic Air Power: Europe 1942–1945
Dornier Bombers
RAF in Germany

Vintage Aircraft
German Naval Air Service
Sopwith Camel
Fleet Air Arm, 1920–1939
German Bombers of WWI

Soldiers
World War One: 1914
World War One: 1915
World War One: 1916
Union Forces of the American Civil War
Confederate Forces of the American Civil War
Luftwaffe Uniforms
British Battledress 1945–1967 (2 vols)

Warships
Japanese Battleships, 1897–1945
Escort Carriers of World War Two
German Battleships, 1897–1945
Soviet Navy at War, 1941–1945
US Navy in World War Two, 1943–1944
US Navy, 1946–1980 (2 vols)
British Submarines of World War One

Military Vehicles
The Chieftain Tank
Soviet Mechanized Firepower Today
British Armoured Cars since 1945
NATO Armoured Fighting Vehicles
The Road to Berlin
NATO Support Vehicles

The *Illustrated* series

The internationally successful range of photo albums devoted to current, recent and historic topics, compiled by leading authors and representing the best means of obtaining your own photo archive.

Warbirds
US Spyplanes
USAF Today
Strategic Bombers, 1945–1985
Air War over Germany
Mirage
US Naval and Marine Aircraft Today
USAAF in World War Two
B-17 Flying Fortress
Tornado
Junkers Bombers of World War Two
Argentine Air Forces in the Falklands Conflict
F-4 Phantom Vol II
Army Gunships in Vietnam
Soviet Air Power Today
F-105 Thunderchief
Fifty Classic Warbirds
Canberra and B-57
German Jets of World War Two

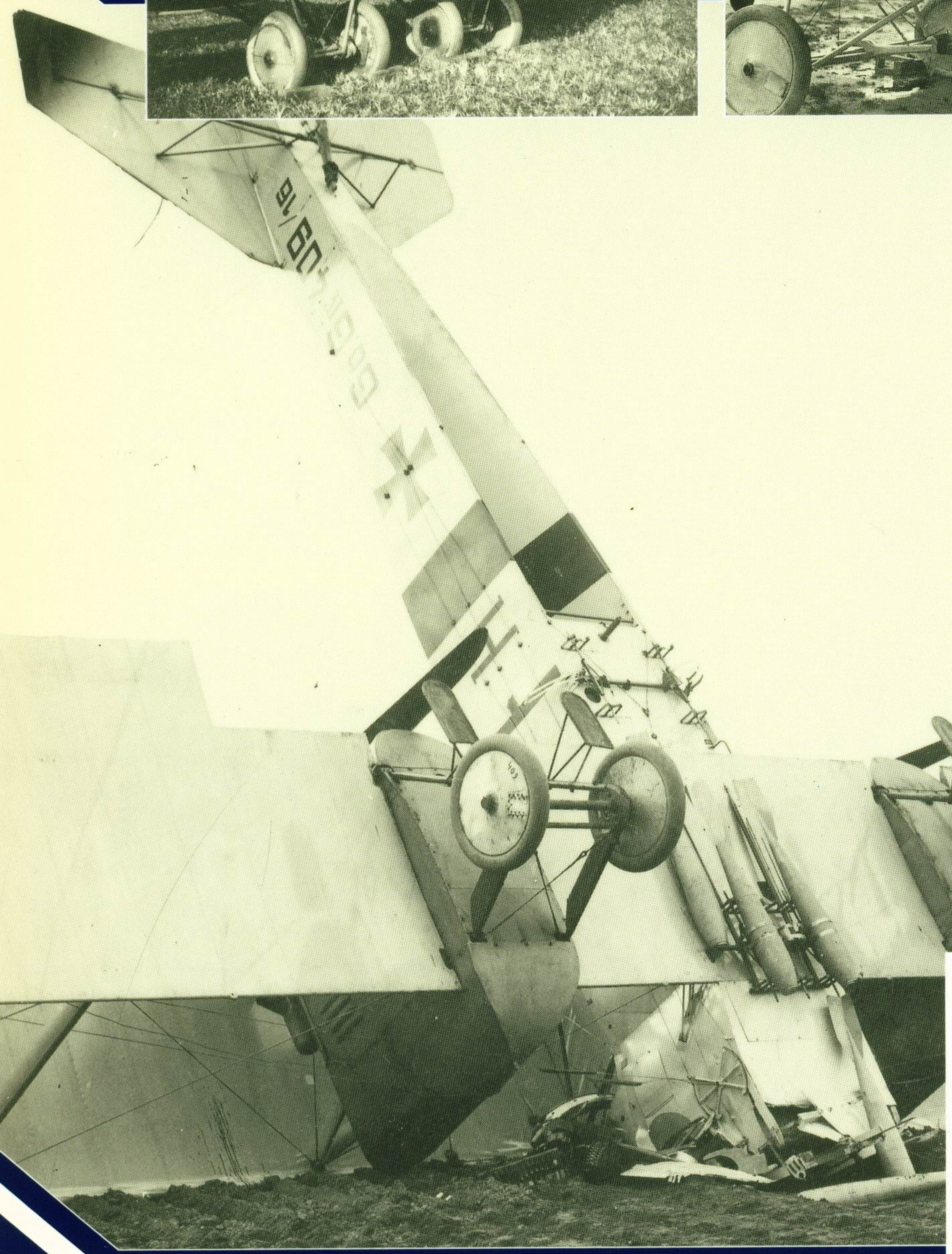
Vintage Warbirds
The Royal Flying Corps in World War One
German Army Air Service in World War One
RAF between the Wars
The Bristol Fighter
Fokker Fighters of World War One
Air War over Britain, 1914–1918
Nieuport Aircraft of World War One

Tanks
Israeli Tanks and Combat Vehicles
Operation Barbarossa
Afrika Korps
Self-Propelled Howitzers
British Army Combat Vehicles 1945 to the Present
The Churchill Tank
US Mechanized Firepower Today
Hitler's Panzers
Panzer Armee Afrika
US Marine Tanks in World War Two

Warships
The Royal Navy in 1980s
The US Navy Today
NATO Navies of the 1980s
British Destroyers in World War Two
Nuclear Powered Submarines
Soviet Navy Today
British Destroyers in World War One
The World's Aircraft Carriers, 1914–1945
The Russian Convoys, 1941–1945
The US Navy in World War Two
British Submarines in World War Two
British Cruisers in World War One
U-Boats of World War Two
Malta Convoys, 1940–1943

Uniforms
US Special Forces of World War Two
US Special Forces 1945 to the Present
The British Army in Northern Ireland
Israeli Defence Forces, 1948 to the Present
British Special Forces, 1945 to Present
US Army Uniforms Europe, 1944–1945
The French Foreign Legion
Modern American Soldier
Israeli Elite Units
US Airborne Forces of World War Two
The Boer War
The Commandos World War Two to the Present
Victorian Colonial Wars

A catalogue listing these series and other Arms & Armour Press titles is available on request from: Sales Department, Arms & Armour Press, Artillery House, Artillery Row, London SW1P 1RT.



£4.95

Arms and Armour Press
Villiers House,
41-47 Strand,
London WC2N 5JE.

Design by David Gibbons
Printed in Great Britain

Sterling Publishing Co. Inc.,
387 Park Avenue South,
New York, NY 10016-8810,
USA.

Capricorn Link (Australia) Pty. Ltd.,
P.O. Box 665, Lane Cove,
N.S.W. 2066, Australia

ISBN 1-85409-015-1

9 781854 090157