LUFTWAFFE COLOURS

CLASSIC COLOURS

AUFKLÄRER

Volume One

David Wadman

LUFTWAFFE RECONNAISSANCE AIRCRAFT AND UNITS

1935-1941

1935–1941

LUFTWAFFE RECONNAISSANCE AIRCRAFT AND UNITS

"...the military organisation that has the best photographic intelligence will win the next war".

Generaloberst Werner Freiherr von Fritsch,
Oberbefehlshaber des Heeres 1935–1938 writing in 1937

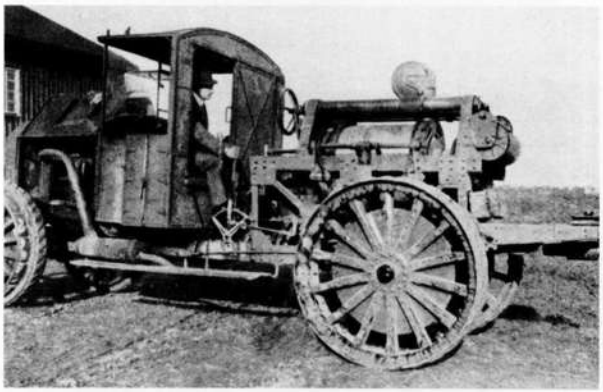
1914 - 1918

Throughout the First World War, the German military employed three aerial platforms for gathering intelligence: the balloon, the rigid airship and the aeroplane. For static observation, the two balloons most frequently used by the Germans were the Parseval-Siegsfeld and the Ae 800, a copy of the French Caquot balloon. Each of these balloons carried an observer in a wicker basket suspended beneath the balloon who was equipped with a wireless/telegraphy set, binoculars, maps, and cameras, all for observing and reporting enemy activity and directing artillery fire. Initially, these observers were the only 'aircrew' routinely equipped with parachutes, which had a failure rate just high enough to ensure that they would only use them as a last resort.

Viewed as important targets and the frequent focus of fighter attacks, they were tethered to a motorised winch allowing them to be pulled down rapidly to relative safety when an attacking aircraft was spotted. Heavily protected by anti-aircraft guns and, more often than not, fighters, attacks against these balloons were a particularly hazardous undertaking and it became an accepted rule never to engage them below 1,000 ft, as the anti-aircraft fire was too intense at that altitude. In addition, Germany also employed two types of powered rigid airship, which, with their

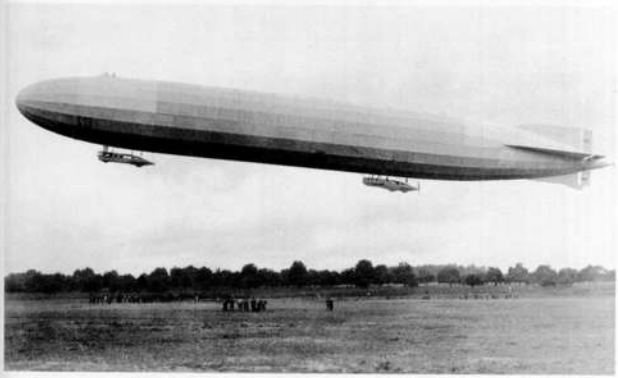
A Parseval-Siegsfeld Drachen (Kite) balloon and its observer ascend above an area of the Belgian countryside in the summer of 1915. Based on the original balloon designed by Major von Parseval and Hptm. von Siegsfeld in 1896, aside from their First World War German use, these later versions also saw service with the Belgian Army; copies of the design also found their way into British, French and Russian service during the same period.

The Caquot balloon was of teardrop shape with three stabilising fins. The Germans used a copy of a French Caquot, the designation was "Typ Ae 800" or Achthundert Englisch (Eight hundred English) which was a reference to its cubic meter capacity, the reason for this being that it was based on a captured British balloon design. The improved Caquot could ride higher, and fly in higher winds than the Parseval-Siegsfeld, so it quickly replaced the Drachen.



This motorised balloon winch mounted on the chassis of an early lorry is of the type used to control the height of the static observation balloons of all major combatants during the First World War.

(Below) Commissioned in July 1915, Zeppelin L 13 was originally under the command of a man who would become the most experienced airship commander in the Imperial German Navy, Kapitänleutnant Heinrich Mathy. On 1 October 1916, Mathy and his entire crew were killed when Second Lieutenant W.J. Tempest, a Canadian pilot with 39 (Home Defence) Squadron RFC, shot down Zeppelin L 31 over the Hertfordshire town of Potters Bar while flying Be 2c No.4577.

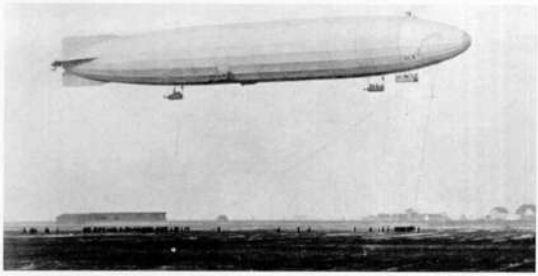


An Ae 800 balloon drifts high above the French or Belgian countryside after breaking free of its mooring cable. It is interesting to speculate on what must have been on the mind of the observer at this time who can be seen apparently perched on the edge of the observation basket suggesting that he may be contemplating the use of his parachute.

load-carrying and long-range capability, were considered ideally suited to either the strategic offensive or reconnaissance role. While it has become customary to refer to all German airships of the period as *'Zeppelins'*, they were, in fact, manufactured by two separate companies: *Zeppelin* and *Schütte-Lanz*.

For the most part, those airships manufactured by *Zeppelin* saw service with the German Naval Airship Service while those produced by *Schütte-Lanz* more often were to be found in the service of the army. These airships were able to conduct reconnaissance flights over enemy lines or over naval forces at altitudes above effective gunnery range. When flying above cloud, or in poor visibility, a small aerodynamically shaped observation vehicle, known as a 'cloud-car', could be lowered from the airship by cable to a point below the cloud-base. Communicating via a telephone link, the occupant of the car could then pass back navigation, bombing, and other information to the airship's captain.

Although a unique idea, the car's main disadvantage was that it created a considerable drag penalty, markedly reducing the airship's performance. When confronted with an emergency where it needed to gain height and speed rapidly, an airship would normally dump its water ballast, but if caught with the 'cloud-car' down it would become necessary not only to dump the water ballast but also to sever the cable to the car, thus condemning its unfortunate occupant to almost certain death. Relatively immune to attack at first, the airship became increasingly vulnerable as improved Allied fighters and anti-aircraft weapons entered service.



Although the majority of Schütte-Lanz airships were destined for Army use, SL 3 served with the Imperial German Navy until May 1916 when it was taken out of service due to structural problems with its wooden framework. Throughout its one year of service, SL 3 flew a total of 30 reconnaissance missions and one bombing mission over England. In all, twenty-four Schütte-Lanz airships were designed before the end of the First World War but by the time the last eight were ready, most could not be operated due to the losses of trained crews and the serious problems that had developed with their wooden structures.

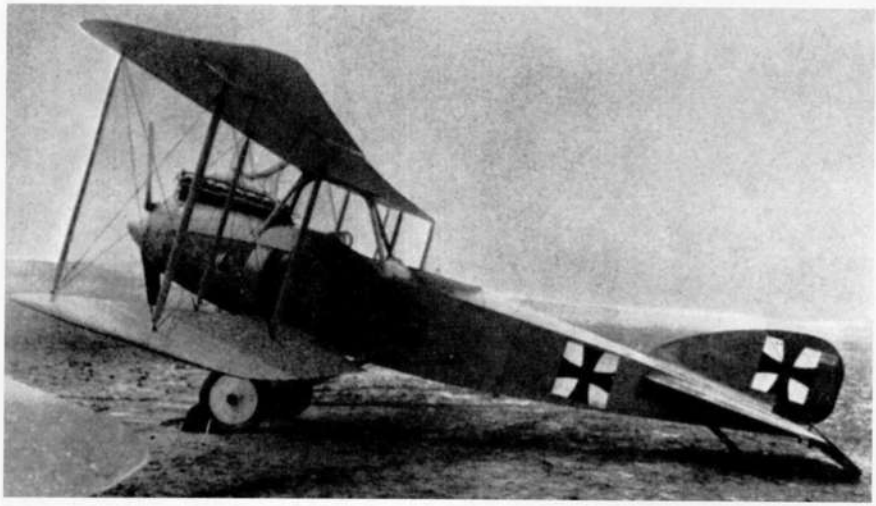
First used as unarmed 'Scouts' to reconnoitre enemy positions and spot for artillery fire, as with their Allied counterparts the crews of these early aircraft had no means of harming an aerial opponent. Soon, however, they began carrying rifles or pistols to fire at any enemy aircraft they encountered. In time, this form of combat gave way to a variety of weapons, ranging from steel darts to automatic weapons. Thus, the role of the aircraft began to diverge along three unique paths: fighter, bomber and reconnaissance.

With the escalation of the air war over the Western Front during 1915, the dedicated reconnaissance 'Scouts' were soon fitted with fixed, forward firing automatic weapons. In addition, the observer now had a flexible defensive machine gun while his previously hand-held camera was more usually mounted to a rigid frame on the fuselage side, thus allowing him unimpeded use of his defensive weapon.

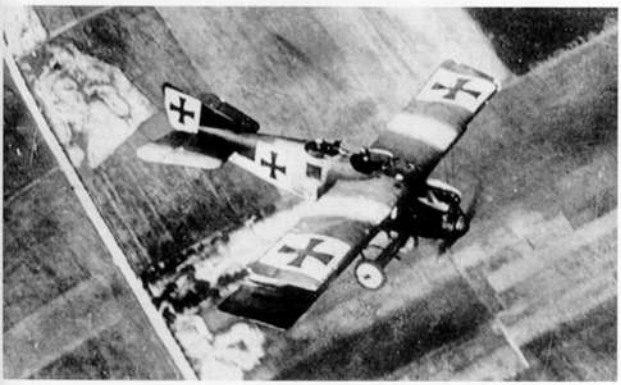
There were, however, two main disadvantages with this rigid form of camera installation. Firstly, only vertical photographs could be taken, although this may have been unavoidable since the film magazines of many early automatic cameras were gravity-fed; and secondly, engine and other vibrations transmitted through the airframe frequently blurred the images, rendering them of little use. In an effort to overcome this latter problem, cameras were mounted on the inside of the fuselage with various rudimentary methods of suspension to dampen the vibrations. These installations provided such encouraging results that by the end of the war, their fitment became an almost standard requirement.

With an increasing demand for greater ground detail in photos taken from any given altitude, new, larger lens systems were introduced to meet this requirement. However, while the new lens

Close-up view of an Albatros C.I and its crew taken in 1915 showing the rear gun mounting which has been modified for the attachment of a small, light camera. Finished overall in clear doped linen, the aircraft carries four white panels on the fuselage and rudder on which the 'Maltese Cross' national markings were applied, those on the wings being applied directly on the doped linen surfaces. The aircraft serial number of 598 was applied to both sides of the lower fuselage in black.



A product of the Albatros Werke GmbH, the first two Albatros C VII two-seat reconnaissance aircraft first arrived on the Western Front for service evaluation in April 1916. Powered by a Benz Bz IV, 6-cylinder, in-line, 149kW (200 hp) liquid-cooled engine it was an aircraft with fine handling qualities and an excellent performance and by 28 February 1917, 372 C VIIs were in service with the Luftstreitkräfte. Remaining in service until mid-1918, in addition to their primary reconnaissance role, C VIIs were often used in the light tactical bombers' role.



A late-built LFG Roland C.IIa seen flying over a relatively placid area of the Western Front during the early months of 1917. Although the camouflage colours in this 90-year-old monochrome photograph are virtually impossible to determine with any degree of certainty, it is believed that the colours of this factory-applied upper camouflage scheme are more likely to be the early green and red-brown rather than the post April 1917 scheme of green and purple.

systems often produced the desired results, they added to the weight of the camera, often making them so heavy that only multi-engined bomber aircraft could carry them, which, with their marginal performance, were far from immune to fighter attack.

As enemy fighter performance improved, reconnaissance aircraft attempted to use height to improve their chances of survival. While only marginally successful, other problems soon became apparent: photographic scales became smaller, while the colder temperatures at higher altitudes created other problems. Camera mechanism lubricants often froze, while the condensation or freezing of any moisture in the cameras often cracked lenses and caused film or the emulsion on glass plates to crack. In an effort to overcome these problems, Germany developed a primitive but effective electrical camera heating system.

In a further attempt to improve the survival ratio of its slow reconnaissance aircraft, the German Army again took the lead by developing automatic cameras. Although prone to malfunction, they could be easily mounted in the faster, more agile fighters and operated by the pilot, extensively reducing losses in trained reconnaissance aircrew while introducing yet another dimension to military aviation that would come into its own some twenty-two years later: the reconnaissance fighter.

Overall, the quality of German aerial photographs taken throughout the First World War was surprisingly good, but the means of getting them - even when the reconnoitring aircraft was left unmolested by the enemy - was difficult, to say the least. Ranging in weight from 11 to 45 kg (25 to 100 lbs), these cameras, when not physically mounted to the aircraft, could often only be used as hand-held instruments for taking oblique photographs and even with the use of roll film on the increase, many images continued to be recorded on heavy, difficult to handle, photographic plates.

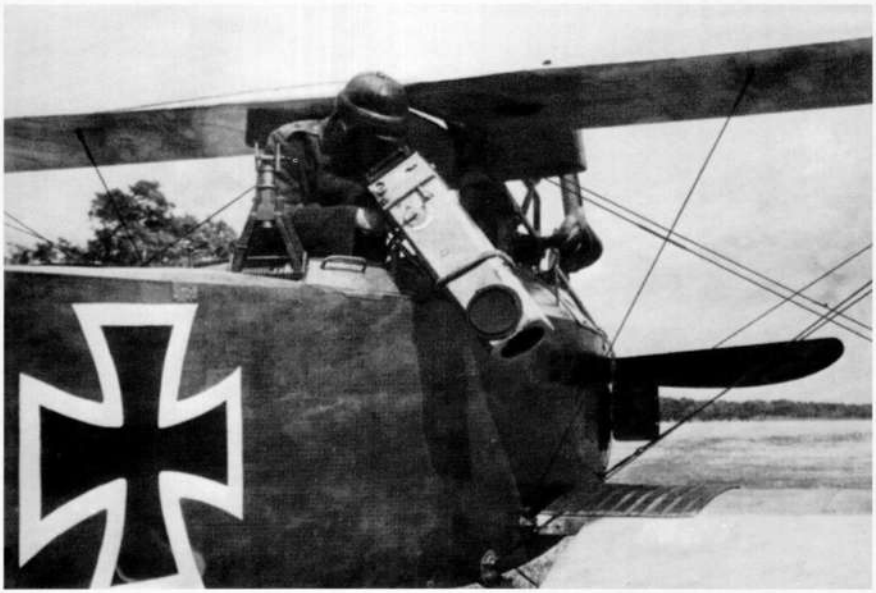
Nevertheless, and despite the problems encountered, the *Luftstreitkräfte* (Air Service) continued to fly reconnaissance missions whenever conditions allowed. By the end of 1917, the German Army was photographing the entire Western Front at least twice a month, and often this meant taking in excess of four thousand photographs a day.

One of the first of the second production batch of LFG Roland C.II Walfisch (Whale) photographed at an unknown location of the Western Front at the end of 1916. This production batch was the first to be fitted with a forward-firing 'Spandau' 08 machine gun for the pilot and the revised overturn pylon. Finished in an overall pale blue-grey dope, while the exact colour is unknown it was of a sufficiently deep tone so as to require eight white or clear doped linen panels on the horizontal and vertical surfaces over which were applied the black 'Maltese Cross' national markings.

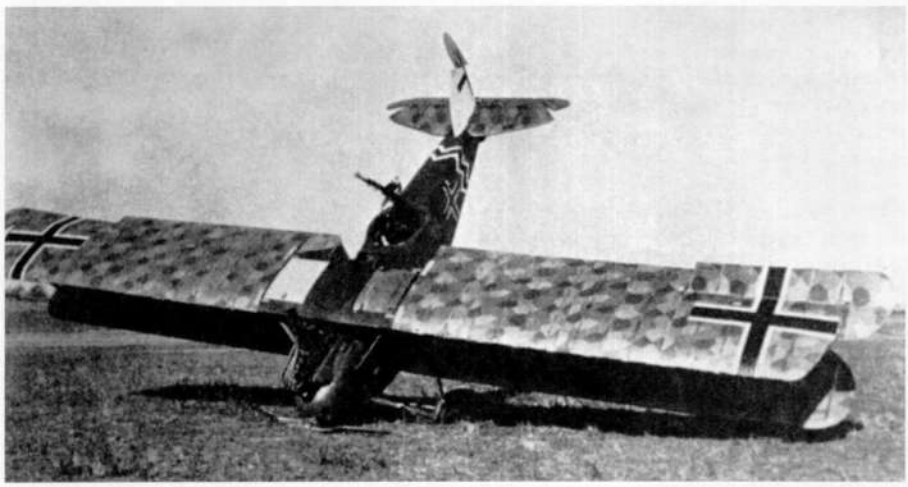
The AEG G IV was the most widely produced of the AEG G bomber types and saw service from 1916 until the end of the First World War. Carrying a crew of three it was powered by two 190 kW (255 hp) Mercedes D IVa engines which gave it a top speed of 103 mph and a range of 750 km (467 mls). Usually operated in the short-range bombing role it could carry 400 kg (880 lbs) of bombs and was occasionally equipped with a camera for reconnaissance duties.

Throughout the First World War, the use of aerial imagery had sat astride a then poorly stated dividing line between intelligence gathering and aerial mapping. Taken in mapping style, the photographs were primarily used as a military support medium but frequent coverage of the same areas quickly gave rise to one of the most fundamental uses of aerial imagery intelligence, the detection of change.

By the end of the conflict, aerial photographic reconnaissance had become an established military practice for all participants, with dedicated aircraft to undertake the missions and trained personnel to develop and interpret the results. For Germany, the lessons learned and the advances it made in this field would provide it with a firm foundation on which to build a future military reconnaissance organisation.



The observer of an Albatros CIII demonstrates the operation of a Fliegerkammer (Flyer camera) FK 111 in the oblique position. Using the camera while in flight must have been an interesting and awkward experience.



Clearly showing the five or six-colour lozenge fabric of its upper wing surfaces and later style crosses, this Halberstadt C V appears to have fallen victim to the soft or waterlogged soil of its chosen landing place. Designed and built for the high altitude, long-range reconnaissance and photographic role by the Halberstædter Flugzeug Werke, the two-seat C V entered service in the early months of 1918 and remained in front line service until the Armistice. Powered by the reliable Benz Bz IV engine fitted with high compression cylinders to provide better performance at altitude, it had a top speed of 170 km/h (106 mph) and could reach an altitude of 5,000 m (16,405 ft). It usually carried one or two reconnaissance cameras within the fuselage, which the observer trained downwards through a trap door in the floor of the rear cockpit when in use.

1919 - 1933

Wartime commander of the German Eighth Army in East Prussia and first post-war Chief of the General Staff, Generlfeldmarschall Paul von Hindenburg, seen here with Hermann Göring, resigned his position in June 1919. Elected president of the Weimar Republic in 1925, his advancing senility was later a major factor in his appointing Adolf Hitler as Chancellor in 1933.

"In the event of a resumption of hostilities we can ... defend our frontiers in the east. In the west, however, we can scarcely count on being able to withstand a serious offensive. ... The success of the operation as a whole is very doubtful, but as a soldier I cannot help feeling that it is better to die honourably than accept a disgraceful peace."

***Generalfeldmarschall* Paul von Hindenburg, the first post-war Chief of the General Staff commenting on the terms of the Treaty of Versailles in 1919.**

Following the end of the First World War, the severity of the terms imposed by the 1919 Treaty of Versailles forced a demoralised and virtually disarmed Germany to conduct a crucial review of its military future. Containing 'Air Clauses' designed to prohibit the country from reviving and maintaining military air forces, a major weakness of the Treaty was its failure to include any clause forbidding the manufacture or possession of civilian aircraft.

While it is true that Article 201 had imposed a six-month ban on the manufacture and importation of aircraft and aviation-related material, there was none to prohibit the limited manufacture or possession of civilian aircraft after the ban had expired. These omissions would become a significant factor in the future development of Germany's military aviation interests.

Undeterred by the constraints of Versailles and in spite of constant, if not very vigilant, Allied scrutiny, the German military set about studying the lessons of the First World War. Carefully analysed, the results of these studies emerged, in conjunction with notable facets of post-war air doctrines of other nations, as a mould in which to create a covert, 'shadow' air arm. By exploiting every treaty loophole to the fullest, Germany created aerial police units, airlines, and a secret reserve air arm, expanded its civil aviation industry and established gliding clubs and flying schools. All these allowed the military to train covertly and at the same time created a nationwide aviation awareness that would serve a future air arm well.

An experienced wartime staff officer, Generaloberst Hans von Seeckt, the second post-war Chief of the General Staff from 1919 – 1920 and Commander in Chief of the German Army from 1920 - 1926, was keenly aware of the future potential significance of an air force. By emphasising the need for high standards of military leadership and training at all levels he broke with many aspects of Prussian-German military tradition to establish a doctrine to develop concepts of offensive mobile warfare carried out by well-trained land, sea and air forces to defeat an enemy.

In addition to prohibiting all forms of military aviation and ordering the dissolution of the Army General Staff, the clauses in the Treaty covering the remainder of Germany's armed forces were equally severe. Its Great General Staff was ordered abolished and the strength of its armed forces was reduced to a lightly armed *Reichsheer* (National Army) of 100,000 personnel and a *Reichsmarine* (National Navy) restricted to 15,000 personnel and equipped with a few elderly ships and torpedo boats with which to form the country's post-war *Reichswehr* (National Defence Force).

Nevertheless, in spite of its ordered disbandment in November 1919, the Army ensured that a thinly disguised nucleus of the general staff remained in being within the departments of the *Truppenamt* (Troops' Office) and *Waffenamt* (*Weapons Office*) at the *Reichswehrministerium* (National Defence Ministry). It was here, within these departments, that even as the terms of the Treaty came into effect, the organisational foundation and doctrine for a new German air force would be laid under the direction of the then *Chef des Generalstabs* (Chief of the General Staff) *Generaloberst* Hans von Seeckt.

An experienced and far-sighted wartime staff officer, von Seeckt was fully aware of the value of mobility and believed in the use of well-trained, technically superior mobile armies supported from the air to defeat enemy forces. A significant air power theorist in his own right, he recognised the value and importance of an air force as an independent branch of the armed forces and not solely as a support weapon for land and naval forces. Perhaps his greatest contribution to the future of the German military was his recognition that Germany would undoubtedly need an air force in the future, if she were ever again to be taken seriously as a military power.

Accordingly, von Seeckt ordered that an air staff be set up within the *Truppenamt* under the command of his air adviser, *Hauptmann* Helmuth Wilberg. As the senior air staff officer for the army, Wilberg served in the planning and operations section of the *Truppenamt* with the title of

The author of what would become Luftkriegführung 16 (Luftwaffe Regulation 16; The Conduct of the Aerial War), Helmuth Wilberg had served as the commander of the air units for the First and Fourth Armies during the First World War. Joining the Reichswehr, he served as senior air officer for the army until 1927, after which he spent three years with the 18th Prussian Infantry Regiment before taking up the position of commandant of Breslau, which he held until retiring from military service on 30 November 1932. In 1934, he returned to active service with the RLM where he remained until his retirement on 31 March 1938 in the rank of General der Flieger. Considered by many to have been the natural commander for the new German air force, he was killed in an air accident on 20 November 1941.

A leading personality in pre-war German aviation and Chief of the Luftwaffe Technical Office from October 1935 until May 1936, Wilhelm Wimmer was regarded by many as having the 'best technical mind in the Luftwaffe'. Promoted to Generalmajor in April 1936 he commanded the air units in Luftgau III until 1939 when he was given command of Luftwaffe forces in East Prussia. Although rising to the rank of General der Flieger and despite never holding an operational wartime command, his contribution to the development of the Luftwaffe was considerable nonetheless.

Erhard Milch began his military career in an artillery regiment before later joining the Luftstreitkräfte as an observer and finishing his career as the last wartime commander of Jasta 6. Following the end of the First World War, he spent a brief time in command of a police air squadron before joining the Danzig office of Lloyd Ostflug (Lloyd Eastern Airlines). In 1923 he was promoted as head of the Junkers management office at Dessau and in January of 1926, played a major role in the merging of the Junkers airline with Deutsche Aero-Lloyd AG to create one large nationally subsidised airline; Deutsche Lufthansa.

As director of the new airline and typical of the cooperation that existed between German civil aviation and the Reichswehr during the inter-war period, Milch collaborated willingly with Wilberg and the staff of the RWM air offices, continually providing them with extensive information on prevailing technological developments in aviation and navigation. Under his directorship, Lufthansa rapidly developed into the leading European airline, which allowed him to provide for the covert aviation training of Reichswehr personnel for its 'shadow' air arm and the testing and development of military aviation equipment. Later appointed to the position of State Secretary for Air, he was regarded as a competent technical officer with an alleged ability to make bitter enemies. In June 1944, he was made deputy to Albert Speer, the Minister of War Production and Armaments. Retiring from the Luftwaffe as Inspector General in January 1945, he was taken prisoner by the Allies in May 1945.

Luftschutzreferat (Air Defence Desk) or, in its abbreviated form, *TA (L)*. Originally introduced as a stopgap measure by von Seeckt, the air staff offices created under Wilberg gradually developed into what became the nucleus of the future German Air Force.

Although the *Reichsheer* possessed neither aircraft, airships nor an air arm of any kind, directly subordinate to Wilberg were 180 qualified *Luftstreitkräfte* pilots and observers who, originally selected by von Seeckt, were assigned to the different departments within both the *Truppenamt* and *Waffenamt*. Having selected this group of former aviators, von Seeckt did everything he could to both protect them and promote their ideas. This dedication later prompted *General der Flieger,* Wilhelm Wimmer to recall, "*Seeckt used all of his influence and authority to protect his group of flyers against attacks all the way up to cabinet level.*"

While many of these officers worked directly within the air staff offices to deal with intelligence, personnel, planning, policy and training, others later served as air staff officers within the various *Wehrkreise* (Military Districts) to provide instruction on air war doctrine and conduct practical and theoretical training. It is perhaps an indication of von Seeckt's keen insight and judgement of military character and capacity, that many of these officers, such as Helmuth Felmy, Albert Kesselring, Kurt Student and Hugo Sperrle would go on to become accomplished air commanders.

In mid November 1919, in coordination with a similar programme undertaken by the *Truppenamt*, Wilberg created a series of air staff committees to study and analyse the lessons of the First World War. The first of these examined the three significant components of aerial warfare: combat tactics, the organisation of air units and the technical developments that affected air power.

By late December, a further twenty seven sub-committees had been created to study the specific organisational and tactical aspects of aerial warfare and, by early 1920, no fewer than 130 experienced air officers were serving on committees studying every aspect of aerial warfare doctrine. Of these, no fewer than five dealt specifically with aerial reconnaissance. One such officer involved in the studies on tactical reconnaissance was the former observer and last wartime commander of *Jasta* 6, Erhard Milch, who would rise to prominence as director of the *Deutsche Lufthansa* airline and later play a significant role in the creation and development of a new German air force.

With many of the air officers serving on these committees having been wartime reconnaissance personnel, the value of aerial reconnaissance and the intelligence that it could provide was fully

First produced in 1919, the Junkers F 13 was a pioneering all-metal design from the Dessau-based Junkers Flugzeugbau, this F13fe example, D-1425 W.Nr.2021 was operated by the Deutsche Versuchsanstalt für Luftfahrt (German Air Transport Experimental Department) as evidenced by the DVL logo on the fuselage.

appreciated. Working in cooperation with the relevant air staff committees and later, civilian photographic and aerial survey companies, they set out to ensure that not only would timely intelligence be available to the German military in future conflicts, but that it would also possess an effective means of obtaining it.

In keeping with the requirement to create an efficient aerial reconnaissance organisation, the air liaison officers in each *Wehrkreis* (Military District), utilising the knowledge and experience gained in the First World War, secretly taught the lessons of aerial reconnaissance. Frequently this meant using the aircraft of sports flying clubs and local aerial police units to instruct students on the more practical applications of aerial reconnaissance.

While these methods of instruction worked well, their wide dispersion created a lack of uniformity which, in 1924, led to the creation of a separate department within the air offices of the *RWM*. Known as the *Hauptbildstelle der Reichswehr* (Main Photo Department of the National Defence Force), for the next eleven years, this department and its civilian staff, many of whom were experienced former *Luftstreitkräfte* reconnaissance personnel, worked in close cooperation with military and civilian organisations to provide an efficient, centralised control for all aerial reconnaissance matters.

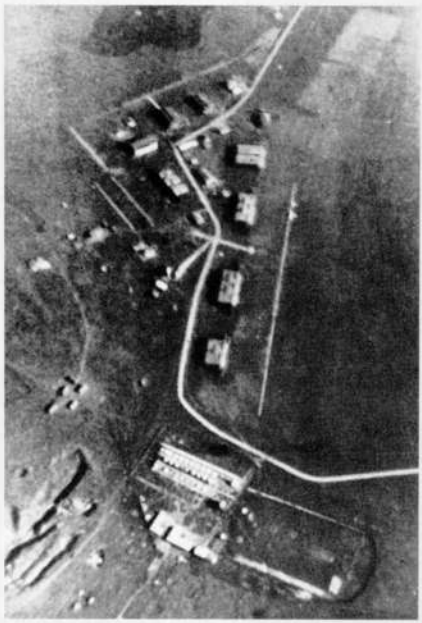
In the meantime, as the activity in the air offices in the *Truppenamt* progressively moved from a theoretical to a more practical nature, an event took place at Rapallo in Italy that would ultimately provide considerable benefit to the creation of a future German air arm. For it was there, on 16 April 1922, that a treaty between Germany and Russia, completely independent of the Conference of Genoa then in session, was agreed upon and signed by their respective delegates, thus paving the way for closer economic and military ties between the two nations.

Particularly advantageous to Germany in what was termed the Treaty of Rapallo, was a series of secret provisions that allowed for the establishment of a military training facility within Russia. This military base would provide Germany with the opportunity to gain much of the knowledge and experience required to create practical operational policies while also allowing for the development and testing of weapons forbidden by Versailles, notably tanks and aircraft.

In April 1922, a restriction had been imposed on the German aircraft industry to limit the size of aircraft being built and this was followed in 1924 by additional restrictions on the quantity of aircraft that could be built and the size of the German aviation workforce. The Paris Air Agreement of 21 May 1926, however, withdrew these restrictions when Germany pledged not to manufacture military aircraft, to end subsidies for flying clubs and schools and to limit the number of military personnel with flying licences.

Thus, with the restrictions removed, Germany was able to exercise complete freedom of action within the realm of civil aviation. Yet, even prior to the Paris Agreement and despite the restrictions originally imposed on it, due in no small part to carefully applied subsidies from the *RWM*, Germany's

Lipetsk



First established in 1925 near the spa town of Lipetsk some 500 km south-east of Moscow, Germany's new military training and testing centre was far enough removed to be secure from Allied observation but close enough to Moscow to allow both parties to monitor its training activities and share the lessons learned.

Temporarily released from the *Reichswehr* for the duration, the personnel selected for training at Lipetsk underwent a greater degree of essential practical and operational training than would normally be the case with a routine flying course.

Operating as a fighter school when first opened, in 1927 it began to run courses for observers with each course having both a *Beobachter Staffel* (Observer squadron) and a *Beobachterlehrstaffel* (Observer demonstration squadron). After attending and passing courses of instruction in Berlin, observers were sent to Lipetsk where the vast open spaces provided an invaluable resource for both reconnaissance and artillery observation training which were far more practical than their previous locations of practice from tall buildings, high ground and, frequently, mountain peaks!

These observer courses began at Voronezh in 1928 and lasted for a period of six months with those for artillery observation supported by Russian artillery batteries. Not only did Lipetsk provide operational training, but new techniques in ranging and spotting were developed and, like that of the fighter pilot, the role of the observer came to be viewed as being both highly skilled and specialised.

In all, some 100 observers had successfully passed through the Lipetsk courses before they were consolidated in Braunschweig in 1931, where it was found that students could receive the same level of training at a fraction of the cost.

One of the more interesting types of aviation training provided for German military aircrew during the inter-war period was that given to observers. In a multi-crewed reconnaissance or observation aircraft, as for the crews of other multi-engined aircraft, the observer was normally the captain of the aircraft and as such had to be the most experienced member of the crew, capable of carrying out any of their duties in the case of an emergency. Thus, his training was both varied and thorough. He was a trained 'C' class pilot with over 150 hours of flying experience who had also taken courses at an observer school in navigation and night flying along with courses in gunnery and bomb-aiming. Additionally he would have taken and passed a course in blind flying.

However, soon after the outbreak of the Second World War, the rule of the observer being the captain of the aircraft was relaxed before being dropped altogether. From 1942 onwards, the course of instruction was reduced to a period spanning less than six months.

Representative of the aircraft types used for observer and reconnaissance training at Lipetsk were the Albatros L-78 (left) and the Heinkel HD 17 (right). Both were two-seat biplanes with similar performance ranges but with that of the 592 hp, BMW V1 powered L-78 being slightly better than that of the 444 hp Napier Lion powered HD 17.

post-war civil aviation industry was far from defunct. As early as June 1919, the Dessau based *Junkers Flugzeugbau*, although severely hampered by the terms of Versailles, had already produced a successful new commercial aircraft in the Junkers F 13.

Three years later, Ernst Heinkel established an aircraft factory at Warnemünde on the Baltic coast to build floatplanes for export, while at the same time Claudius Dornier began building up his company from the former *Zeppelin-Werke Lindau* at Friedrichshafen. In 1924, Heinrich Focke and Georg Wulf founded the Focke–Wulf company in Bremen and were followed two years later with the founding of the Augsburg-based *Bayerische Flugzeugwerke* (Bavarian Aircraft Company) which became *Messerschmitt AG* in 1938.

The civil aviation industry had also kept abreast of technical developments and made technological advances of its own while maintaining production levels comparable to those of many of its neighbours. So much so that by 1926, Germany's civil aircraft industry was once more amongst the leading aviation nations in Europe. Its efficient and ongoing mobilisation along with that of its civil airlines and aircrew training, together with the work initiated by von Seeckt and Wilberg, also allowed the *Reichswehr* to begin building up a secret, 'shadow' reserve air arm that would later provide a firm foundation for the creation of a future German air force.

In the years leading up to the National Socialist seizure of power, one major benefit enjoyed by the 'shadow' air arm was that of a close and effective cooperation between itself, the army, the air, defence, and weapons offices at the *RWM*. This was in addition to the links it had forged with manufacturers of aviation and aviation-related material. It was because of this cooperation and the influences that all concerned exerted, that the initial rearmament plans drawn up between 1923 and 1925 were to form the basis for future 'shadow' air arm planning.

A significant factor in determining the future of Germany's 'shadow' air arm was the occupation of the Ruhr district by French and Belgian troops in January 1923 in the light of Germany's failure to meet its reparations obligations as stipulated by Versailles. This occupation would provide Germany with sufficient stimulus to forge ahead with plans for a 'shadow' air arm throughout the 1920s.

This same period saw the air staff and its various offices also undergo several organisational changes, resulting in an increasing centralisation of the 'shadow' air arm and its subordinate departments. It was during this period that the air staff embarked on its first, albeit limited, rearmament plan known as the 'A' programme. Drawn up during 1928 and 1929, the intent of the plan was to provide for the creation of a small, secret air force within Germany by 1932 – 1933 for which it would be necessary to create a force of some 150 combat aircraft to form fourteen *Staffeln* comprised of eight reconnaissance and three each of fighters and heavy bombers.

The heavy emphasis on reconnaissance was one that was to be continuously acknowledged in subsequent plans. To this end, the inclusion of both tactical and strategic reconnaissance units at almost comparative levels to those for bombers was noticeable throughout the future *Luftwaffe*'s existence.

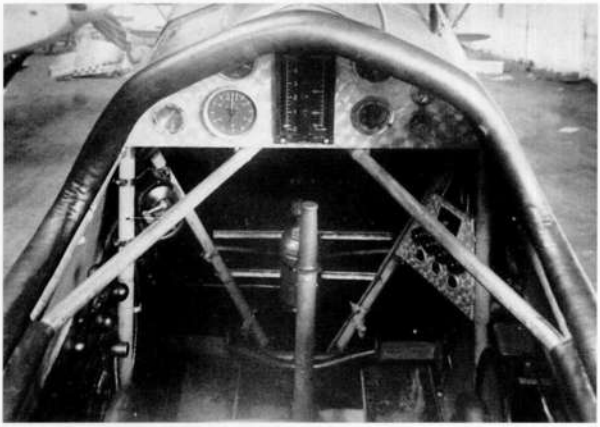
To cope with this expansion of reconnaissance capabilities, in 1930 the air staff published *"Principles for Employment of the Air Force"*, the first thirty pages of which were devoted entirely to the role of reconnaissance aircraft in support of the Army, whose philosophy of waging a rapidly moving, mobile war would require a high proportion of tactical reconnaissance units.

Although by June 1930 the last remaining French troops had withdrawn from the Ruhr, throughout the occupation the aviation ambitions of the German Army had not wavered. With the departure of the French troops removing the final risk of Allied intervention, the German Army moved quickly to exploit a much improved strategic situation and accordingly recalled a small number of instructors from Lipetsk in October to form three small *Reklamestaffeln* (advertising or skywriting squadrons) in the *Wehrkreise* of I (Königsberg), II (Berlin) and III (Nuremberg).

Equipped with unarmed Albatros L 75a or L 82 aeroplanes, in reality they were the first of the *Fliegerkurierstaffeln* (Air Courier squadrons) originally planned in 1927 to increase air awareness. Crewed by a pilot and trained observer, they became the first truly military aircraft to fly openly in post-war Germany. While these new units carried out target-towing duties for the training of anti-aircraft batteries, and were, in fact, the forerunners of the *Aufklärungsstaffeln* (reconnaissance squadrons) of later years, Germany was still forced to camouflage their existence by occasionally contracting them out to private industry for banner towing duties.

Then, in 1932, Helmuth Felmy (the *Reichswehr* senior air staff officer from 1929 to 1932), in taking note of the rapidly increasing demise of the controls set by the Versailles Treaty, submitted a plan to develop an even larger air force. In total, Felmy's plan called for a front line strength of 720 aircraft

Three views of a BMW Iva powered Albatros L-75 trainer of the type used by the various Reklamestaffeln during the early 1930s.



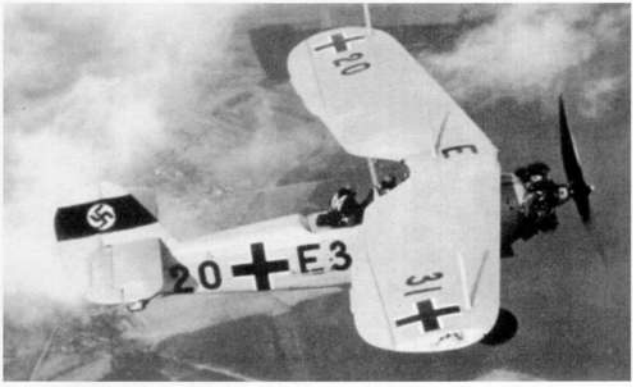
A former wartime aviator, Helmuth Felmy played a leading role in the development of the new German Air Force. Going on to hold various command positions including that of Senior Air Staff officer of the Reichswehr from 1929 -1932, he retired from military service in January 1940. Recalled to active duty as military commander in Greece in May 1941 he later served as the Commanding General of the LXVIII and then XXXIV Armee-Korps. Captured by the Allies in May 1945 and sentenced at Nürnberg to 15 years imprisonment, he was released from prison in December 1951.

plus a further 240 in reserve by 1938. These were to be distributed amongst six long-range and fourteen short-range reconnaissance *Staffeln*, eighteen fighter and forty-two bomber *Staffeln*.

At this time, five of the types envisaged by Felmy for his projected air force were already well into their developmental stages, as were two models for the *Reichsmarine*. The most prominent of naval designs, the Heinkel He 59 seaplane, would figure in early naval reconnaissance work during the Spanish Civil War and the opening stages of the Second World War. Of those under development for the future air force, three would serve with the reconnaissance *Staffeln*. The first two, the Heinkel He 45 and He 46 would serve in the long and short range roles while the third, the Junkers Ju 52, although only later operating in the support role for reconnaissance units, would become a veritable maid of all work and arguably the most important aircraft in the future *Luftwaffe* inventory.

In the interim, as the reorganisation of the air staffs continued, a commission under the leadership of then *Major* Albert Kesselring proposed that all aviation agencies and their staffs be combined openly into one central organisation. However, due to political reasons, the Army was unable to create an

A Heinkel He 45c seen here being prepared for flight at an unidentified location. Photographed during 1933 – 35 while the Luftwaffe was still a secret organisation, it carries a civilian D-registration rather than any form of specific military marking.



A well-known view of Heinkel He 46c 20+E31 of the 1./Aufklärungsgruppe (H) 112 airborne from its base at Stargard in the summer of 1936. Equipped with both the Heinkel He 45 and He 46, on 1 October 1937 it became the 1.(H)/.Aufklärungsgruppe 12, retaining the designation until 1 November 1938 when it was renamed as the 1.(H)/.Aufklärungsgruppe 21. On the same date and equipped with the early version of the Henschel Hs 126, the Staffel was reformed at Münster-Loddenheide from the 1.(H)/ Aufklärungsgruppe 14.

Heinkel He 59 B D-ATYP viewed from the rear as it begins its take-off run. Subsequently given the Wehrmacht Luft registration of WL-ATYP, its subsequent service and fate are unknown.

Arguably, what would become one of the most versatile aircraft in the Luftwaffe inventory was the Junkers Ju 52/3m or, as it was often referred to, 'Tante Ju' (Aunt Ju). Seen here in May 1933, W.Nr.4019 originally carried the registration D-2468 and bore the name; 'JOACHIM VON SCHRÖDER; it was later re-registered as D-AFIR.

independent aviation department at this time and, in October 1929, a new training inspectorate was established under *Generalmajor* Hilmar *Ritter* von Mittelberger to serve as a cover for uniting all army aviation activities under the direct supervision of Helmuth Felmy. Interestingly, it was also at this time that the term *Luftwaffe* to describe the air arm began to appear in official correpondence and, although this usage was encouraged by Felmy, many in the army continued to refer to it as either the *Luftstreitkräfte*, or simply the *Fliegertruppe* or *Flugwaffe* (Flying Troop or Flight Weapon).

The consolidation of the various air agencies was seen by some as a move by the air staff to create a semi-independent air arm. The then current Chief of the General Staff, *Generalleutnant* Kurt *Freiherr* von Hammerstein-Equord, raised objections to these plans for its seeming independence and in 1931, with the backing of the chief of the *Truppenamt*, put forward a proposal for the wartime organisation of military aviation. Under this, all aviation would be divided into three separate branches with the greater part under direct army control. A second, smaller branch would be under the commander-in-chief of the Navy while the remainder would be grouped together under the commander of *Reich* air defence. This proposal would represent the final attempt by the Army to gain control of all aviation.

Hans Jeschonnek, future Chief-of-Staff of the *Luftwaffe*, answered this opposition to a unified air arm in a paper written in 1932. In it, Jeschonnek countered the von Hammerstein-Equord proposition, outlining instead a plan whereby all aspects of aviation would be consolidated under a single department, which in turn would either be under the control of the aviation office of the transportation ministry or the defence ministry. In the end, ownership of the various air arms was quickly resolved following Adolf Hitler's seizure of power.

Seen here with Hermann Göring during the summer of 1940, former First World War fighter pilot Hans Jeschonnek was a protégé of General Walter Wever and held numerous command appointments until becoming Chief of the Luftwaffe General Staff in February 1939. Never reluctant about candidly sharing his views with either Göring or Hitler, whom he considered a genius, he committed suicide in August 1943.

In the interim, an event occurred in 1930, directly related to reconnaissance aviation and indirectly, to the Versailles Treaty, the outcome of which would later figure prominently in German reconnaissance aviation. One of the earliest in a series of covert aerial reconnaissance missions arose out of the recreation of Poland after the First World War and the creation of the Danzig or 'Polish' Corridor. This area of land, formerly West Prussia, had been ceded to Poland by Article 28 of the Versailles Treaty and, while giving Poland access to the Baltic Sea, it severed East Prussia from the rest of Germany, a move that left Germany bitterly resentful and would later provide Hitler with the pretext he needed to attack Poland.

During that same year, rumours were circulating in Germany that Poland was building fortifications along the frontiers of the corridor, but no accurate information was available with which to substantiate them. German commercial flights crossing Poland to and from East Prussia had to follow set routes that kept them far from any such construction work while flights over the neutral Baltic Sea to obtain information yielded little of any use. Thus, the job determining whether the rumours of Polish construction were accurate would fall to an experienced former First World War naval observer who would determine conclusively whether any such work existed.

Theodor Rowehl, the Danzig Corridor and the *Aufklärungsgruppe* ObdL

In order to resolve the questions raised by the alleged construction of Polish fortifications along the borders of the Danzig Corridor, entirely of his own accord Theodor Rowehl hired a civilian aircraft in which he flew across the forbidden areas at high altitude and entirely undetected, in order to photograph the areas in question.

The successful results produced by these flights were quickly and secretly endorsed by the *Abwehr* (Military Intelligence) which undertook to employ Rowehl on similar flights. To this end, the *Abwehr* placed at Rowehl's disposal, a Junkers F 13, registration D-833, and a Junkers W 34, D-2239. The latter proved ideal for Rowehl's purposes as, on 26 May 1929, the Junkers W 34, perfectly suited for such flights, and flown for the occasion by the Junkers test pilot *Flugkapitän* Willi Neuenhofen, set a new world altitude record of 12,739 m (41,795 ft). Although still a civilian, Rowehl continued his work for the *Abwehr* and while these flights officially violated the then current arbitration treaty between Poland and Germany, they continued until 26 January 1934 and the signing of the non-aggression pact between the two countries.

During the brief lull that followed the suspension of these flights, Rowehl was permitted to select a small group of pilots and aircraft, mostly from the *Hansa Luftbild GmbH* aerial photography and mapping company, with which to form a small, specialised and ostensibly civil aerial photography unit. On 1 January 1935, this still civilian unit officially became the *Fliegerstaffel zbV* (Air Squadron for Special Duties). That same month, the unit moved its headquarters from Kiel to Berlin-Staaken from where, still under *Abwehr* control, it began flying covert high-altitude missions over both Russia and Western Europe, frequently following the regular passenger routes of the *Deutsche Lufthansa* airline to disguise its activities.

On 1 January 1939, the *Fliegerstaffel zbV* transferred to Oranienburg where, under the overall command of Rowehl, it was reorganised into two new units, the *Versuchsstelle für Höhenflug* (Experimental Station for High Altitude Flight) and the *Fernaufklärungsgruppe ObdL* (Long-Range Reconnaissance Group of the Commander-in-Chief of the Air Force); both of these units would have a long and interesting operational life.

A former First World War naval observer, in early 1935 Theodor Rowehl formed a covert aerial reconnaissance within the Hansa Luftbild company which later formed the basis for two new units: the Versuchsstelle für Höhenflug (Experimental Station for High Altitude Flight) and the Fernaufklärungsgruppe ObdL (Long-Range Reconnaissance Group of the Commander-in-Chief of the Air Force). Awarded the Ritterkreuz in October 1940 for his contribution to aerial reconnaissance operations, in early 1943 he was replaced by Major Wolfgang Heese and spent the remainder of the war serving in various administrative positions.

Formed in 1923, the Hansa Luftbild GmbH was the only organisation in National Socialist Germany authorised to carry out aerial imaging. The original company logo was retained until 1976.

Junkers W 34 D-OZOR was one of the aircraft types used by the Hansa Luftbild GmbH for its early imaging operations.

One of the first aircraft put to use by Theodor Rowehl for his clandestine imaging flights was a Junkers F 13 similar to that seen here in the service of the Deutsche Lufthansa airline.

This Hansa Luftbild operated Heinkel He 111 D-AMSO, W.Nr.5173 was frequently crewed on its imaging sorties by pilot, Lt. 'Mulli' Böhm, his navigator/observer Newe and a mechanic by the name of Wolf. The company also used Heinkel He 111, D-ALLA - a similarly configured early model of the He 111 during the same period.

Theodor Rowehl, the Danzig Corridor and the Aufklärungsgruppe ObdL (continued).

Following the German occupation of Norway, Lt. 'Mulli' Böhm, as a member of the Rowehl unit, flew frequent reconnaissance sorties from Stavanger to the Royal Naval anchorage and base at Scapa Flow during April 1940 and is credited with having flown the earliest Luftwaffe imaging sorties over the Firth of Forth.

Taken before the war, the natural metal finished Ju 86 V9 W.Nr. 005 carrying the civil code D-AXII was used to carry out clandestine reconnaissance operations. Standing in front of the aircraft are three unknown members of the Hansa Luftbild GmbH company. From right to left, wearing a warm suit is the pilot of the aircraft, next to him a company employee in a Luftwaffe uniform with another wearing a civilian pilot's uniform and overcoat. The figure on the extreme left is Hermann Göring, dressed in civilian clothes no doubt in an effort to be inconspicuous while visiting this undercover unit.

One of the most respected civilian test pilots and instructors in Germany, Siegfried Knemeyer began his Luftwaffe flying career during the Polish campaign as the personal pilot to Generaloberst Walter von Brauchitsch. Joining the AufklGr.ObdL in January 1940, he regularly flew reconnaissance missions in both the Junkers Ju 88 and the Dornier Do 215B before later flying high altitude missions in the Mediterranean in a Junkers Ju 86P-2. A qualified engineer, he also designed the circular navigation computer widely used by Luftwaffe aircrew and often generally referred to as a 'Kne' or 'Knemeyer'.

(Above right) An unidentified but specially modified Junkers Ju 86 of the Rowehl unit photographed at Budapest on 23 July 1938. Standing in front of the aircraft is pilot Otto Vullgraf and to his left is Herr Weber, who became the chief administrative officer of the VfH.

In this wartime colour photograph of Luftwaffe aircrew preparing for a sortie, a Knemeyer navigation computer can be seen lying in the centre of the table.

Theodor Rowehl, the Danzig Corridor and the Aufklärungsgruppe ObdL (continued).

Another equally gifted and respected flyer from the ranks of the AufklGr.ObdL was Oblt. Cornelius 'Conny' Noell. Attached to Rowehl's unit in the latter part of 1938, he rejoined the Gruppe at about the same time as Siegfried Knemeyer with whom he flew reconnaissance sorties over Norway in a Focke-Wulf Fw 200 in early 1940. Along with his observer, Josef Bisping, he was awarded the Ritterkreuz on 22 October 1941 for their reconnaissance sortie carried out over Moscow in a Junkers Ju 88B-0 on 26 June 1941.

This Junkers Ju 88 B-0 of the 1./AufklGr.ObdL is thought to be K9+RH which 'Conny' Noell flew to Moscow on an imaging sortie on 26 June 1941 shortly after the onset of Operation Barbarossa and which earned him the award of the Ritterkreuz.

Junkers Ju 88 B (the V 24) carried the civilian registration D-ASGQ which was changed to the unit code of K9+QH when it was transferred to the 1./AufklGr.ObdL during the spring of 1941. It was lost while on a reconnaissance sortie on 1 September 1941.

Two views of Dornier Do 215 B-1 T5+AC of the AufklGr.ObdL taken at Utti, Finland on 11 July 1941. The aircraft is finished in the standard splinter scheme of 70//71/65 with a yellow fuselage band and the upper and lower surfaces of both wing tips also painted yellow.

1933 – 1941

"I will employ my strength for the welfare of the German people, protect the Constitution and laws of the German people, conscientiously discharge the duties imposed on me, and conduct my affairs of office impartially and with justice to everyone."

With this oath, taken on 30 January 1933, Adolf Hitler took the reins of a 14-year-old German republic, which in the minds of many had long outlived its worth. Now, the man who had spent his entire political career denouncing and attempting to destroy the republic was its leader. Within one month, Hitler and his National Socialist party would be on the way to absolute power.

When Hitler took power, the air staff of the *Reichswehr* was already prepared to initiate its limited 'A' rearmament programme and could look back on a relatively successful 14-year period during which it had laid down a viable air doctrine, an efficient training programme and practicable plans for creating an air force. Even so, the staff was unprepared for the level of rearmament envisaged by the new government. Within a year, they would face the demanding task of creating a large independent, strategic air force in a short period of time from a minimal foundation. This they achieved and the subsequent secret development of the *Luftwaffe* would see it emerge as the most combat-ready air force of the period - an achievement unequalled by any other major power of the day.

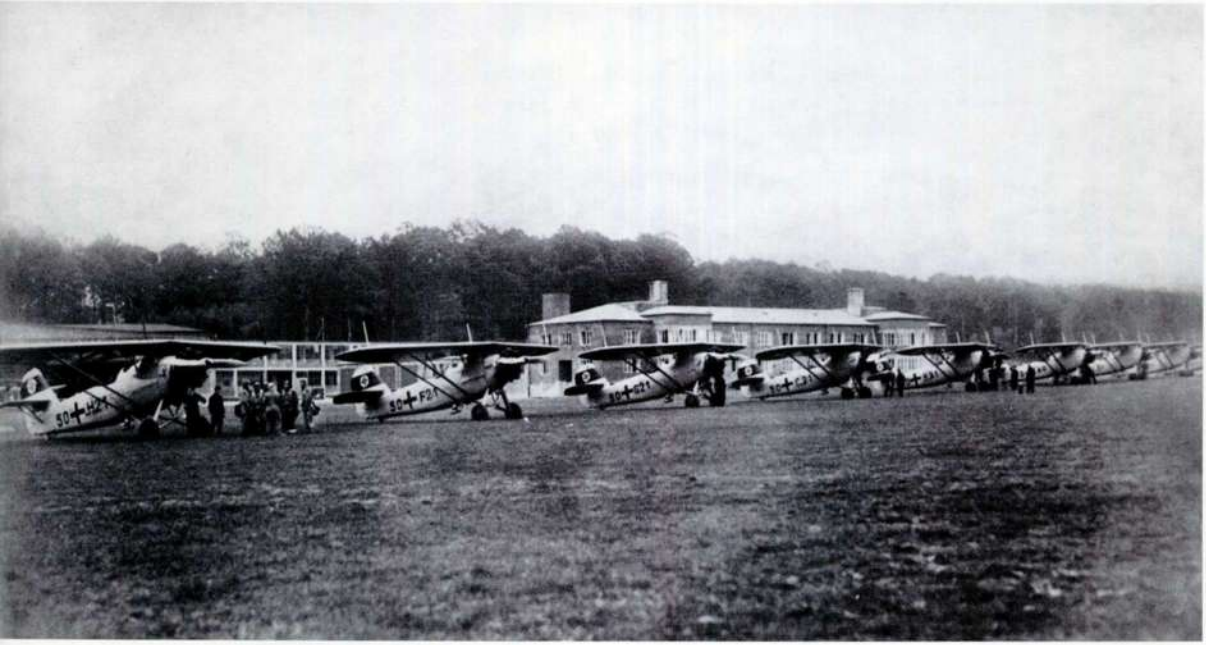
Within hours of becoming Chancellor, Hitler had appointed Hermann Göring as NSDAP *Reichskommissar für die Luftfahrt* (State Aviation Commissioner) then, in March 1933 and headed by Göring, the *Reichsluftfahrtkommissariat* (State Aviation Commission) was created, retaining that title until 1 May when it became the *Reichsluftfahrtministerium – RLM* (State Aviation Ministry). With this latter change, Göring was elevated to ministerial status as *Reichsminister für die Luftfahrt* (State Minister for Aviation) and head of the *RLM,* while concurrently becoming *Oberbefehlshaber der Luftwaffe – ObdL* (Commander-in-Chief of the Air Force) of the soon to be unveiled *Luftwaffe.* Simultaneously, with the creation of the new ministry, the *Hauptbildstelle der Reichswehr* was absorbed into it and renamed simply by replacing *Reichswehr* with *RLM.*

With initially only a small staff, the first and most important change at the newly created *RLM* occurred on 15 May 1933, when the *Luftschutzamt* (Air Defence Office) was transferred to the *RLM* and on 1 September 1933, renamed as the *Luftkommandoamt (*Air Command Office). This was the first time that a major defence department had come under the control of another outside either the Army or Navy, thus significantly expanding the size of the *RLM* into two large, separate *Ämter* (Offices): the military *Luftschutzamt* and the civilian *Allgemeines Luftamt* (General Air Office). This latter office was directly subordinate to the *Staatssekretär der Luftfahrt* (State Secretary of Aviation) Erhard Milch, an appointment that he had held as Göring's deputy since 9 February 1933.

On 26 February 1935, the decree officially establishing the *Luftwaffe* as the third arm of the *Reichswehr* (renamed the *Wehrmacht* – Armed Forces on 1 June 1935) was signed by Hitler, Göring and *Generalfeldmarschall* Werner von Blomberg. Officially unveiled on 1 March 1935, the strength of the new air force stood at 1,888 aircraft of all types and some 20,000 trained competent personnel. A heavy emphasis was placed on the rapid mobility of both its flying units and their ground support organisation and their ability to become fully operational at short notice from either established airfields or improvised or temporary landing grounds. It was a proficiency that would serve the *Luftwaffe* well in the coming years.

Although both the *Heer* and *Kriegsmarine* had originally desired their own autonomous air component, Göring, in his position as *ObdL,* had determined that there would be only one, uniformly controlled air force. Founded on a territorial basis of mobility and flexibility, the *Luftwaffe,* as an independent, strategic arm of the *Wehrmacht* would, as outlined in detail in *Luftwaffe* Regulation 16: *Luftkriegführung* (The Conduct of the Aerial War), provide for effective cooperation with the *Heer* and *Kriegsmarine, "...within the overall framework of combined operations".*

A view of the Heinkel He 46c aircraft of the 2./Aufklärungsgruppe 114 lined up at Münster in 1937 prior to 1 October that year when it became the 2.(H)/Aufklärungsgrupe 14. Like the Heinkel He 45, the short-range He 46 also proved an operational disappointment in that its speed, range and limited maximum operating altitude rendered it ineffective for anything but the most basic of tactical reconnaissance requirements. Although like the He 45 it provided a good field of view for its crew and its rugged construction proved suitable for operation from unprepared airstrips, it was extremely vulnerable to attack, carried insufficient armament for self-protection and lacked the equipment necessary for night or blind flying. In spite of their obsolescence, both types remained in operational service until after the beginning of the war when the newer Henschel Hs 126 and Focke-Wulf Fw 189 gradually began to replace them.



The Heinkel He 46c aircraft of the former 'Nahaufklärungsgruppe Göppingen' lined up at the airfield of the same name shortly after it's acquisition by the Luftwaffe. Renamed as the Aufklärungsgruppe (H) 115 on 1 January 1936, in November 1937, it became Aufkl.Gr.(H)15 and exactly one year later less its Stab, it became Aufkl.Gr.(H)13 and remained so until the mid-war period when its Staffeln became elements of the newly formed Nahaufklärungsgruppen. Interestingly, in the accompanying photo, the He 46 immediately to the left of 50+B21 carries the civilian D type registration that was introduced in 1934.

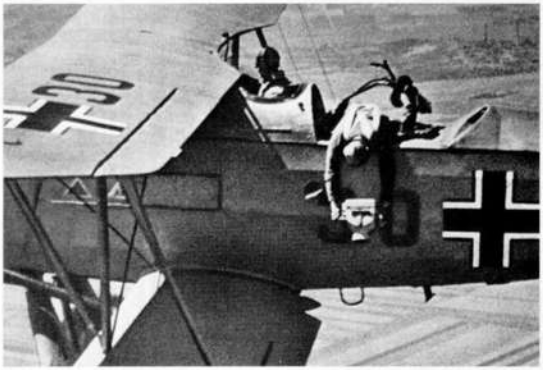
He 46c, 50+F21 of the Aufklärungsgruppe (H) 115

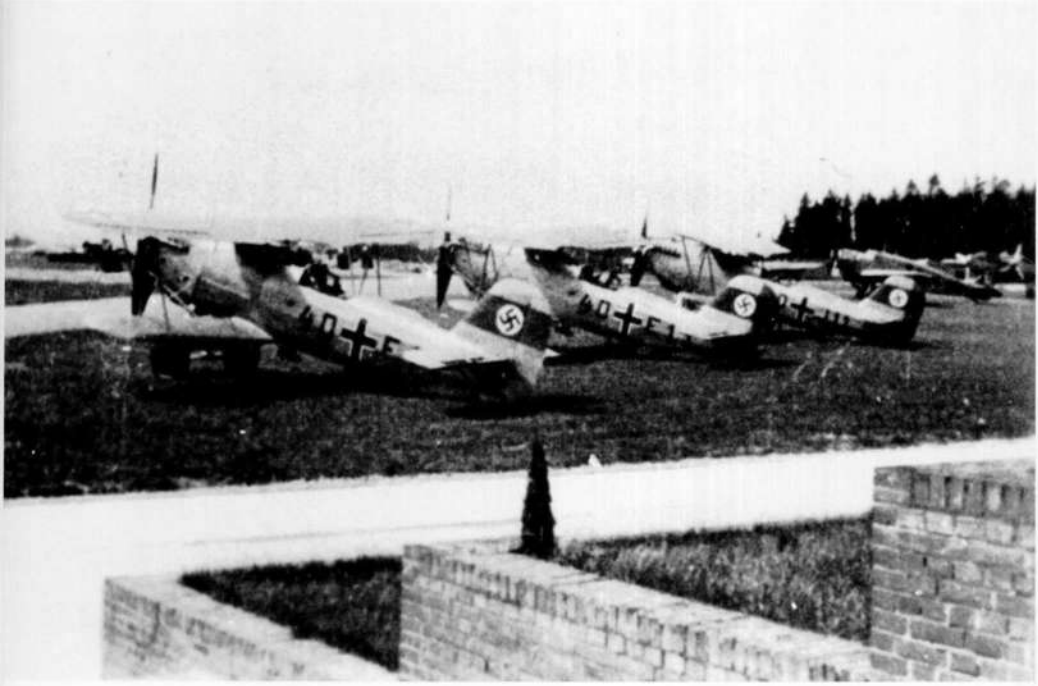
Finished in overall grey 02, He 46c 50+F21 carries the early style of Balkenkreuze with a thin white border that were introduced on Luftwaffe aircraft circa mid to late 1935 while across the fin and rudder is the red Hoheitszeichen (National emblem) introduced in August 1936.

A line-up of He 45cs of the 2.(F)/Aufklärungsgruppe 121 seen at Neuhausen, East Prussia circa late 1936 – early 1937. Wearing a pristine finish of 63, each aircraft carries the name of an East Prussian town on the nose of which the initial letter corresponds to that of the individual letter allocated to the aircraft. Visible in this view are 'F' – Frögenau, 'C' – Christburg and 'E' – Eydtkuhnen while visible farther down the line are two Heinkel He 70s, the first of which carries the name 'Hohenstein' on the nose. In October 1937, the Staffel became the 2./AufklGr.11 but was re-formed in November 1938 from the 2./AufklGr.22. In November 1939, it became the fourth Staffel of the Aufklärungsgruppe ObdL.

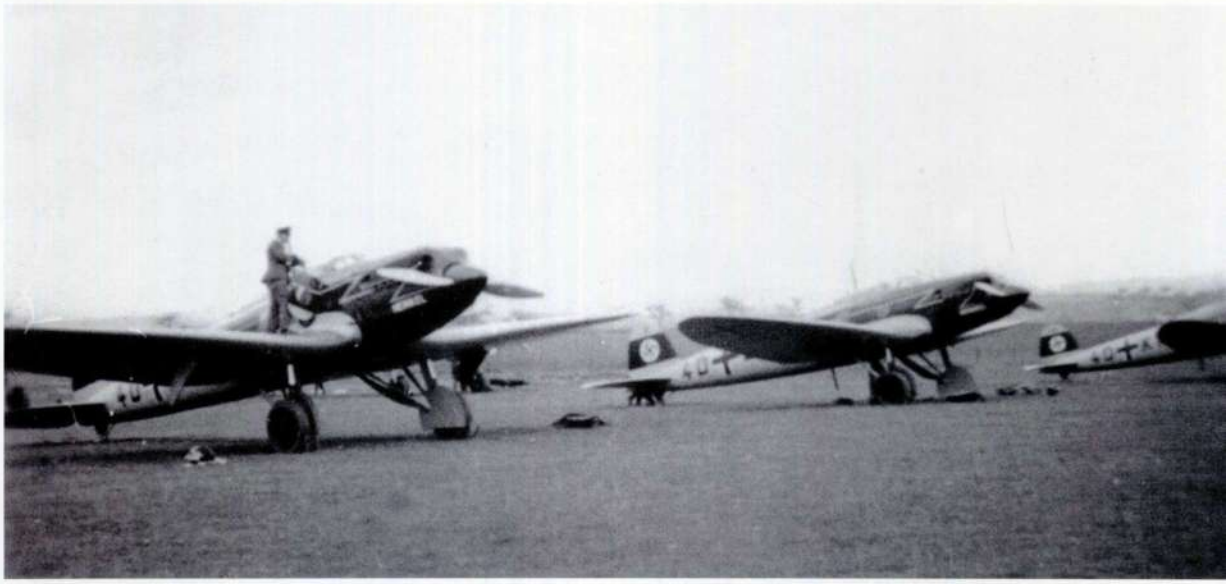
An unidentified group of Staff personnel of the Aufklärungsgruppe 121 pose in front of Heinkel He 45c 'E' 10+E12 – 'Eydtkuhnen' of the 2. Staffel at Neuhausen. Visible on the top of the fuselage immediately forward of the base of the fin can be seen the unusual location for the pitot head mast.

The observer of a Heinkel He 45c of the Aufkl.Gr. (H)/13 demonstrates the precarious profession of obtaining pre-war vertical photographs with an 8.0 kg (17.6 lb) hand-held camera.





Two views of the Heinkel He 45cs of the 1.(F)/AufklGr.124 lined up on their airfield at Kassel circa 1936 - 1937. Redesignated as the 1./AufklGr.24 on 1 October 1937, the Staffel was reformed from the 1./AufklGr.28 at Wiener-Neustadt in November 1938. In January 1943, while operating under the command of Luftflotte 5, the Staffel absorbed Aufkl.Kette Lappland.



Taken in early 1937 these two views show Heinkel He 70 F-2 aircraft of the 1., 2. and 3 Staffeln of the Aufklärungsgruppe (F)/124 lined up on their home airfield of Kassel-Rothwesten. First formed at this same airfield in October 1936, exactly one year later, along with the 2. Staffel, the 3. Staffel left the Gruppe to become the second and third Staffeln of the Aufklärungsgruppe (F)/ 24 where they remained until November 1938 when, equipped with the Dornier Do 17, they became the 2. and 3.(F)/22.

Heinkel He 70 F 40+K13 of the 3.(F)/Aufklärungsgruppe 124

Wearing an overall grey 63 finish relieved only by its familiar black trim, national markings and red, white and black Hoheitszeichen across its fin and rudder, the unit code of this Heinkel He 70 F identifies it as aircraft 'K' of the Kassel-based 3.(F)/Aufklärungsgruppe 124. Applied to each side of the nose, while the Heinkel company name was white, the trademark lightning bolt motif, contrary to popular belief, was not white but grey 63.

A line-up of Heinkel He 70s in service with Aufkl.Gr.(F)/124 at an airfield in Germany, probably Kassel, before May 1939 when the units '40+' pre-war code became 'G2+'.

Officers and men of the photo-section of Aufkl.Gr. 121 with He 70 aircraft in the background. The aircraft of this unit displayed a variation to the standard Heinkel factory finish, with a place name replacing the word 'Heinkel' on the engine cowling, as evidenced by the aircraft behind. Additionally the lightning flash on the cowling is usually depicted as being white, but it is obviously not so in this picture by comparison with the colour of the name. The red nose and spinner of another of the unit's machines can just be made out under the spinner of this aircraft.

As the highest operational command within its assigned territory, a *Luftflotte* (Air Fleet) could have one or more *Fliegerkorps, Fliegerdivision* or *Fliegerführer* (Air Corps, Air Division or Air Leader) - subordinate commands depending on the prevailing operational requirements. Each *Luftflotte* was essentially an independent air force that often had as much as one quarter of its total operational aircraft strength comprised of reconnaissance aircraft. The organised mobility of its subordinate commands allowed their flying units to concentrate rapidly at specific locations as dictated by an existing or developing military situation. To facilitate their movement between airfields within a *Luftflotte* region, flying units were relieved of their administrative responsibilities through the division of each *Luftflotte* into *Luftgaue* (*Luftwaffe* administrative commands), each with its own headquarters providing administrative, second-line servicing and supply services as well as the supply of personnel and equipment to flying units within its area.

As the operational equivalent of a *Luftgau*, a *Fliegerkorps* could contain between 300 and 700 aircraft of all types depending on the nature and importance of its aerial commitments and although usually operating under *Luftflotte* control, the *Fliegerkorps* or its subordinate *Fliegerdivision* and *Fliegerführer* commands were able to operate autonomously should the need arise.

Put simply, the function of aerial reconnaissance within each of these commands, was the securing of visual and photographic information for the different command levels of the *Wehrmacht* and on which, together with other collected forms of intelligence, their operational decisions would be based.

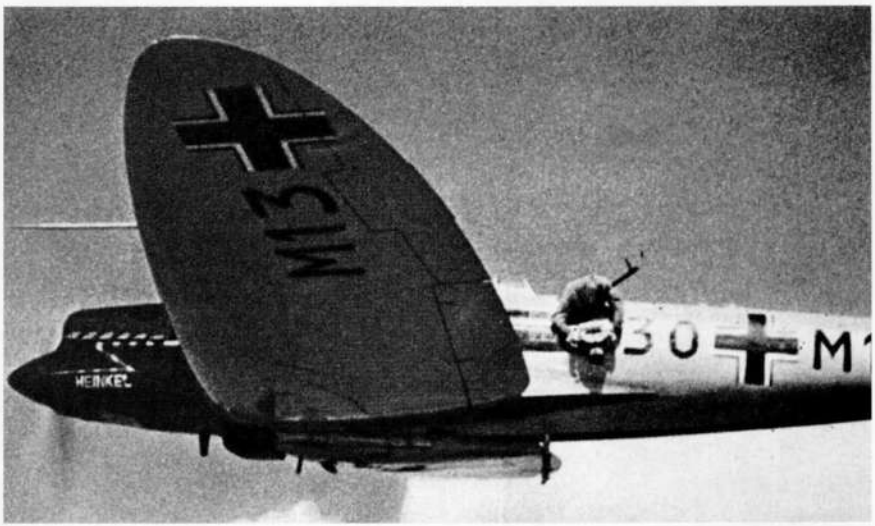
While providing reconnaissance units for the various levels of *Wehrmacht* commands, between 1935 – 1936 senior *Luftwaffe* staff had given much thought as to whether the *Heer* needed strategic

Ground personnel are seen here refuelling the short-range Heinkel He 46 aircraft of the Aufklärungsgruppe 212 from underground refuelling points at their home airfield of Cottbus during the summer of 1936. Redesignated as the 1. and 2. Aufklärungsgruppe 52 on 1 October 1937, they were redesignated for a second time in November 1938 as the 1. and 2. Aufklärungsgruppe 41.

An undated winter view of a Heinkel He 46c from the Aufkl.Gr. 52 running up its Siemens/Bramo 322B radial engine prior to departing on a sortie. Although by no means conclusive, the tonal values of the camouflage applied to the upper surfaces of the aircraft suggest the use of 02 or a similar grey and green 71.

A rare picture of an operational Heinkel He 46, coded H1+ML, of Aufkl.Gr.(H)/12. This unit was formed in 1939 at Münster and served on the Western Front before going to Russia in 1941.

Another view of an observer using a Handkammer to obtain vertical images, this time from the rear cockpit of Heinkel He 70 F, 30+M13 of the 3.(F)/13. While no doubt difficult enough to accomplish with the relatively sedate cruising speed of a Heinkel He 45 or He 46, it must have been considerably more difficult to undertake in an aircraft with a cruising speed some 112 km/h (70 mph) higher.

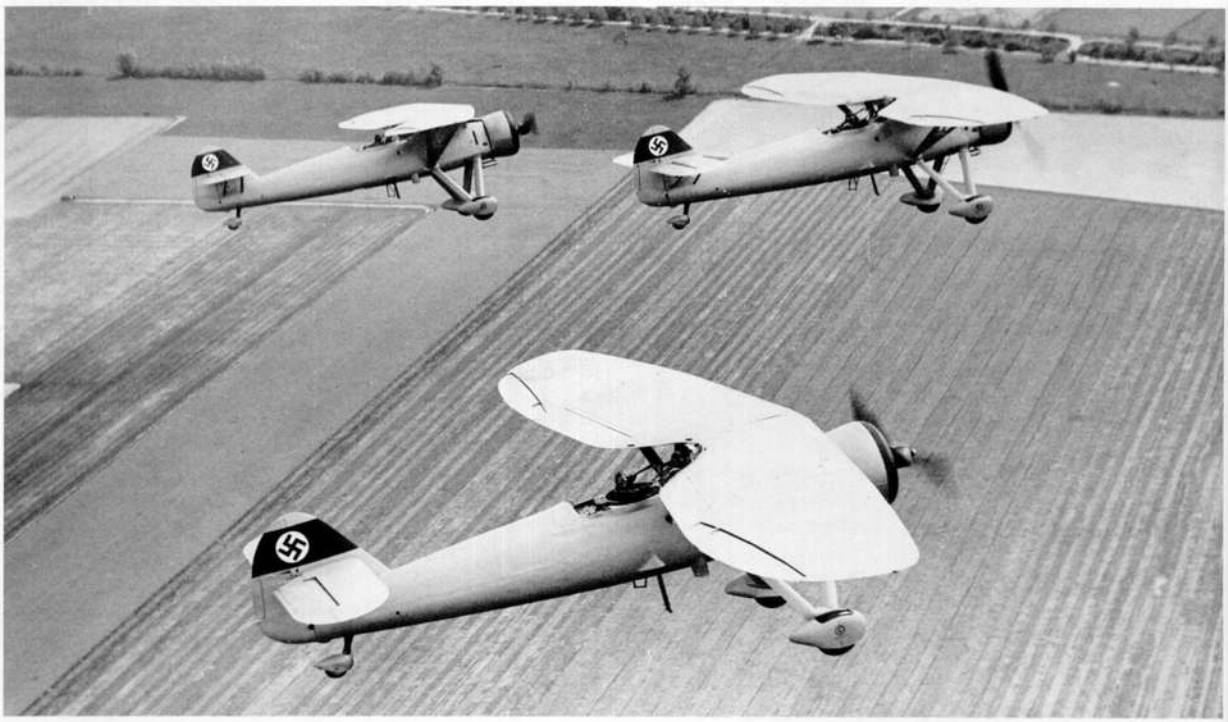


units of its own or if such missions would be carried out by the *Luftwaffe*. In recognition of the variety of requirements involved, it was determined that strategic reconnaissance for the *Heer* and *Luftwaffe* would, for the time being, remain separated. Since the *Luftwaffe* would provide for its own reconnaissance needs as required, it would assign the necessary properly trained and equipped units and personnel to provide for all aerial reconnaissance requirements for the *Heer* and *Kriegsmarine*, while also providing for the maintenance of their chain of command.

For support and cooperation with the *Heer*, *ObdL* provided for the appointment of a *General der Luftwaffe beim Oberkommando des Heeres – Gen.d.Lw.b.ObdH*, (*Luftwaffe* General on the staff of the Army High Command) and the attachment of a senior officer (*Kommandeur der Luftwaffe bei einen Armee Oberkommando - Koluft)* to each *Heeresgruppe*, *Armee*, or *Panzerarmee* (Army Group, Army or Panzer Army respectively). Working under the direction of the relevant army commander, the *Koluft* advised on all aviation matters and coordinated all supporting air force missions for that army formation but had no authority over *Luftwaffe* combat aircraft.

Additionally, the *Luftwaffe* also supplied air liaison officers known as *Fliegerverbindungsoffiziere*, or *Flivos* who were detached from units flying in support of army missions and assigned to corps headquarters and, when working with *Panzer* divisions, at division level. A *Flivo* had with him his own communications team and was responsible for reporting the prevailing ground situation to the supporting air commander, to provide him with a quick and accurate picture of the combat situation. Armed with this information the air commander could then determine the deployment of his air units. Having first taken part in *Wehrmacht* manoeuvres in 1937, the *Flivo* subsequently became a regular part of army and *Luftwaffe* cooperation.

These two views show a trio of Henschel Hs 122 aircraft, which was intended to replace the Heinkel He 46 in the short-range, army cooperation role. First flown in 1935, while the type's overall handling and slow speed performance was excellent, it was no faster than the aircraft it was meant to replace. As no real urgency then existed for a Heinkel He 46, the RLM proposed that work should commence on adapting the airframe to accept a more powerful engine. Accordingly, Henschel continued with the construction of seven pre-production Hs 122A-0 airframes to be powered by the slightly more powerful Siemens Sh 22B radial engine which, when completed, were used for experimental and development work, with the fourth pre-production airframe becoming the prototype for the subsequent and highly successful Henschel Hs 126.



Long-range reconnaissance

Long-range reconnaissance units were known as *Fernaufklärungsstaffeln* which was usually abbreviated to either *Aufkl./*(F) or simply (F) indicating their *Fern* (Far) strategic role. Formed between 1934 and 1935, the first six long-range *Staffeln* responsible for strategic missions in support of the army in time of war remained under *Luftwaffe* control until 1937. By 1939, these six *Staffeln* had been joined by a further 19, with ten of those being placed at the disposal of the *Oberbefehlshaber des Heeres - ObdH* (Commander-in-Chief of the Army). Of the fifteen remaining under *Luftwaffe* control, two were assigned to support the I. and II. *Flakkorps* with another four, the *Fliegerstaffel zbV*, 8.*(F)/LG* 2, *Wettererkundungsstaffel/ObdL* and the 2.*(F)*/121 being brought together to form the *Aufklärungsgruppe ObdL* at Berlin-Werder.

An example of the uncommon practice of giving individual aircraft within a unit a name, this is Heinkel He 70 F 10+G12 of the Aufkl.Gr.121 seen at its home base of Neuhausen, East Prussia circa 1936 – 1937. Operating a mix of Heinkel He 45 and He 70 aircraft, each aircraft carried an alliterative name of a town in East Prussia such as 'Gumbinnen' seen here. Other known named He 70s of the unit were 'Hohenstein', 'Johannisburg', 'Kraupisch' and 'Marienburg'.

Carried out by individual *Staffeln* and concerned mainly with the broader aspects of operational planning, strategic missions were typically long-range photographic or visual sorties or occasionally, a combination of both. The objective of these missions was to obtain indications of the strategic intentions of the enemy in order to provide the intelligence on which the organisation and conduct of future operations was planned. The photographs and information to be collected during these missions would concentrate on the enemy's war industry and transportation networks, airfields, harbours, the location and movement of military units and their support organisation as well as all military and other pertinent objectives in enemy rear areas.

Pre-war close-up view of the cockpit areas of a Heinkel He 45c of an unidentified unit in which the observer's defensive 7.9 mm MG 17 on its flexible mounting and his cockpit instruments are clearly visible.

An in-flight view of close formation flying by Heinkel He 45c aircraft of the Kassel-based 1.(F)/ Aufklärungsgruppe 124 circa 1935 – early 1936 with 40+C11 closest to the camera. Formed from the 1./Aufkl.Gr. 424 in April 1935, in October 1937 the Staffel became the 1.(F)/Aufkl.Gr. 24 but was reformed again in November 1938 from the 1.(F)/Aufkl.Gr. 28 and remained in service until its disbandment in May 1945.

Heinkel He 45c, 40+C11 of the 1.(F)/Aufklärungsgruppe 124

Finished in an overall pristine grey 02 with dark painted wheel centres, Heinkel He 45c 40+C11 carries the standard Luftwaffe markings for the 1935 – 1936 period, but with a slightly stylised Luftkreis (Air district) number '4'.

During the early part of the war, both the Dornier Do 17s and Junkers Ju 88s of the 4.(F)/121 were frequently seen to carry this Staffel emblem, consisting of a wise, bespectacled raven sitting on a pencil.

A close-up view of the bespectacled raven emblem carried by the Dornier Do 17s and later, the Junkers Ju 88s of the 4.(F)/121.

For strategic missions carried out for the purpose of aerial warfare, long-range *Staffeln* were assigned to each of the *Luftflotten* and their subordinate commands. Their missions were structured into two distinct types: command and operational.

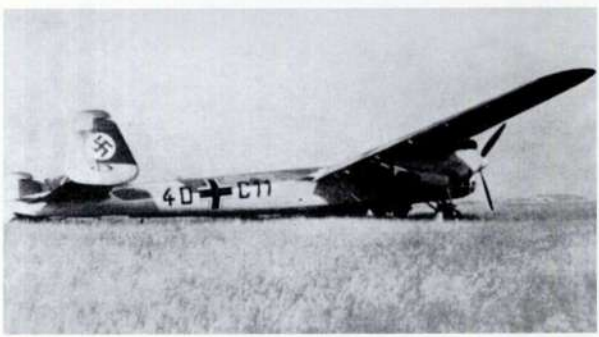
Command missions provided the information that allowed the appropriate commands to prepare and position their units in accordance with their operational objectives. Operational missions provided those units participating in an operation with the information on which to base the preparation and execution of their assigned tasks through the detailed reconnaissance of their objective, its defences or vulnerabilities and the routes flown to and from the target area. To begin with, some *Kampfgeschwadern* (Bomber Wings) had also included a reconnaissance *Schwarm* (*Luftwaffe* term for a flight of four aircraft) to carry out reconnaissance sorties before an attack and frequently to undertake further sorties to photograph its results. Already the subject of strong pre-war criticism, the idea was proved inadequate during early wartime operations. Thus, these *Schwärme* were reduced briefly to flights of three aircraft, before the idea was discarded altogether on 7 March 1942.

Heinkel He 45c, 50+G13 of the 3./Aufklärungsgruppe 125 (See) is prepared for a pre-war training sortie in mid-1936. First formed at Jüterbog on 1 April 1936, after going through a number of re-designations the Staffel re-formed at Kiel-Holtenau on 1 April 1941 and remained as such until 13 July 1943 when it became the 3./SAGr. 125.

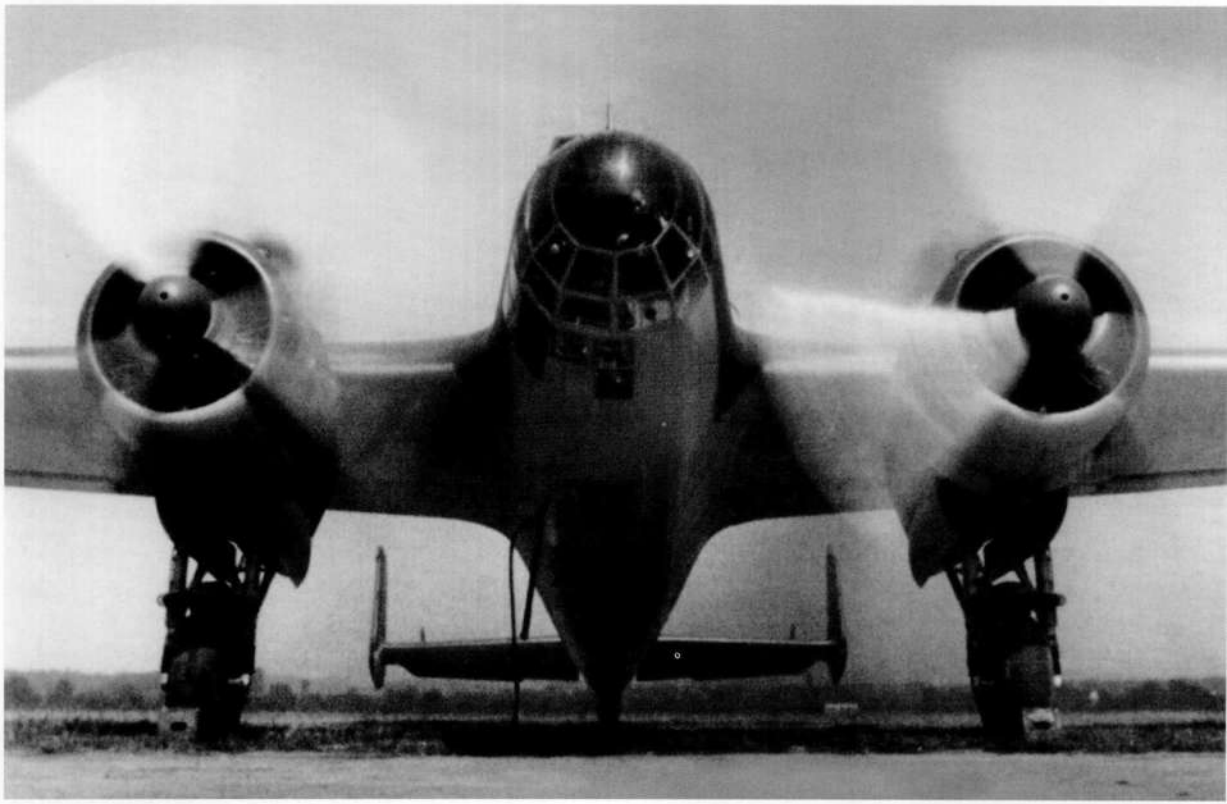
Up until May 1942, orders for long-range air force missions were issued to the *Staffeln* by the operational staff of the *Luftflotte* or its relevant subordinate air force command. In certain cases a long-range unit assigned to air force reconnaissance or, occasionally, a twin-engined fighter *Staffel*, would undertake strategic missions for the army if none of its assigned units were available. One such example of this was the use of Messerschmitt Bf 110 twin-engined fighter units to keep areas of western Egypt and the shipping lanes to and from Tobruk under observation during the opening stages of the North African campaign.

Long-range missions carried out for the army covered the disposition or approach of enemy forces, their forward and rearward transportation movements, airfield activity, the locations and strengths of reserve forces, armoured and mobile units as well as shipping, harbours and the construction of defences beyond the battle area. Because of this, it was important to carry out regular reconnaissance missions along the areas of open flanks and far into enemy rear areas, while the coastal and long-range units assigned to the *Kriegsmarine* or *Luftwaffe* would frequently carry out

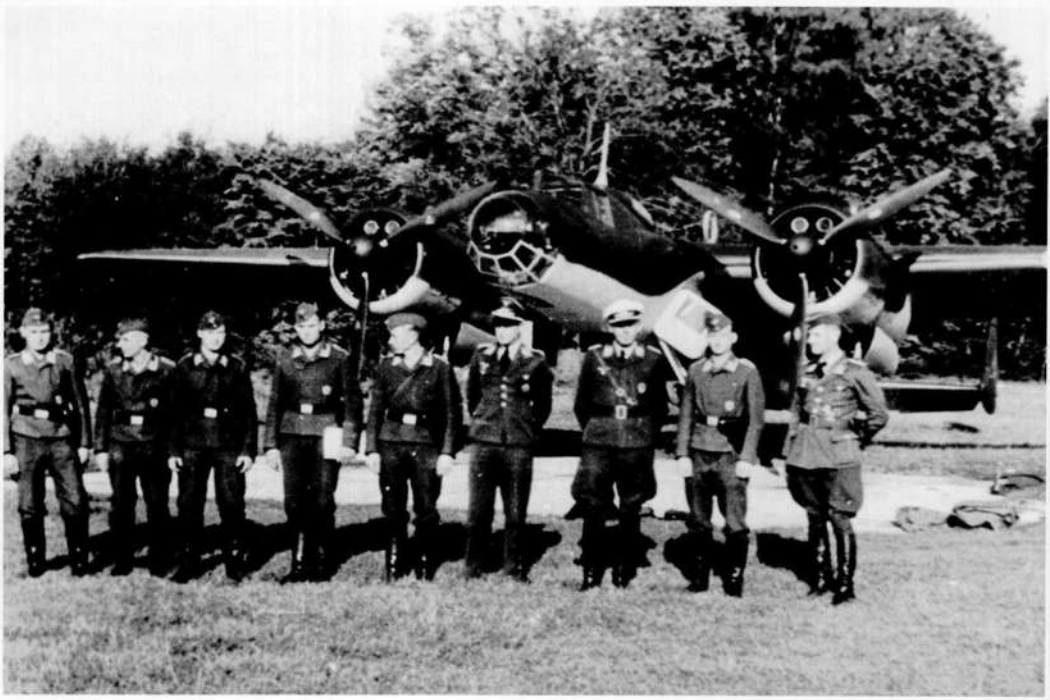
Seen here at its home base at Kassel-Rothwesten in 1938, Dornier Do 17 F-1 coded 40+F11 of the 1.(F)/22 finished in the newly introduced, three-colour segmented camouflage of 61/62/63 over 65 under surfaces.



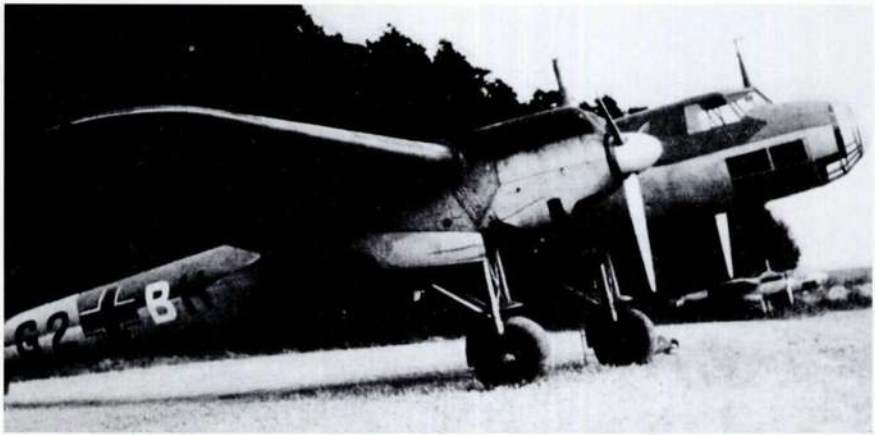
Also wearing the three-colour camouflage of 61/62/63, Dornier Do 17 F-1 'C' of the 1.(F)/22 lays forlornly on the grass at Kassel-Rothwesten after suffering a major failure to its port main undercarriage during the summer of 1938.



With an external power lead plugged into its starboard mounted ground power socket, an unidentified Dornier Do 17 P-1 runs up its BMW 132N engines during ground tests by Staffel servicing personnel. Clearly visible in this view are the trailing aerial fairlead, the under-fuselage external light bomb carriers and camera ports.



Personnel of the 3.(F)/ Aufklärungsgruppe 10 (Tannenberg) pose in front of a Dornier Do 17 P-1 of their Staffel in September 1939 during the early stages of the Polish Campaign.



Dornier Do 17 F-1 G2+BH of the Schlosswalden-based 1.(F)/124 is seen here lined up along the forested edge of an airfield with other aircraft of the Staffel during the campaign against Poland in September 1939. Finished in a 61/62/63 upper camouflage, it carries the earlier style fuselage Balkenkreuz with the aircraft letter 'B' and propeller spinners finished in the Staffel colour of white.

A Dornier Do 17 P of the 3.(F)/11 undergoes maintenance to its port BMW 132N engine at Grossenhain during the autumn of 1939. Just visible beneath the fuselage aft of the trailing aerial fairlead is an external light bomb carrier of the type frequently carried by the early reconnaissance Dornier 17s. Essentially identical in appearance to the Do 17M bomber series, the Do 17 P had its bombsight and associated equipment removed and the internal bomb bay adapted to carry a pair of Rb 50/30 or 75/30 cameras.

Staffel emblem of 3.(F)/123.

A close-up view of the Staffel emblem on Dornier Do 17 P 4U+LL of the 3.(F)/123 comprising a black hammer and anvil on a black bordered yellow shield. The vertical bar and date is believed to record a victory claimed by the crew on 8 September 1939 while the name 'Lumpi' was that given to the aircraft in accordance with Staffel practice. Information to date suggests that these names utilised the individual aircraft letter e.g., 4U+IL 'Isabella', 4U+EL 'Eisbär' (Polar Bear) and 4U+GL 'Glitzer Marie' (Sparkling Mary).

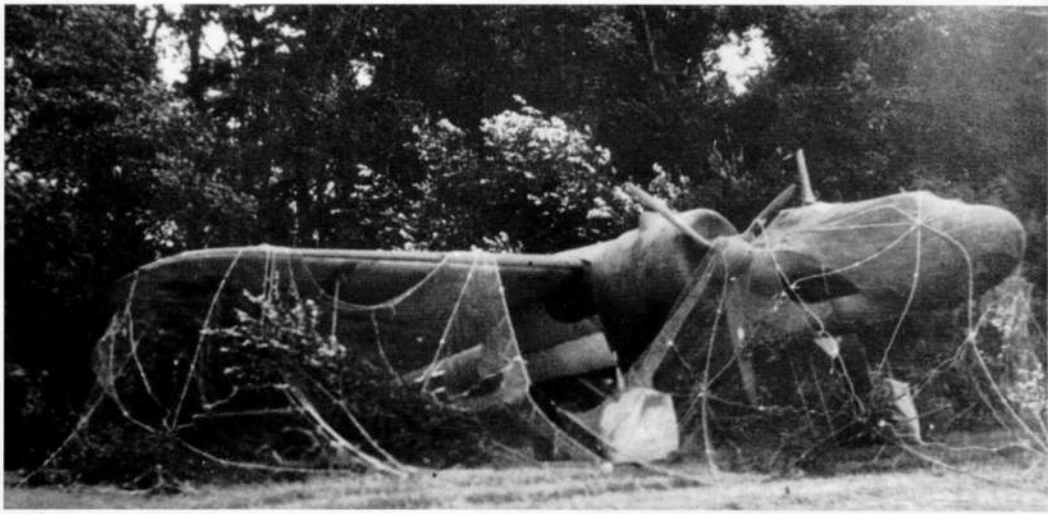
A Dornier Do 17 P-1 of the 3./(F)/11 on the snow covered airfield at Kassel during the month of January 1940. Following the end of the campaign in Poland, a revision was published which called for increasing the overall size and changing the ratio of proportions of the national markings visible from a ground perspective to improve recognition for friendly forces. The oversize and disproportionate underwing Balkenkreuze of this Do 17 and those in the background illustrate just one of the many variations that resulted from the inaccurate interpretation of this revision, many of which were still to be found on numerous front line Luftwaffe aircraft well into the early months of 1940.

Dornier Do 17 Ps of the 3.(F)/123 lined up on the airfield at Langendiebach, Germany during the winter of 1940. Nicknamed 'Die Eiserne Dritte' (The Iron Third), each of its aircraft carried an individual name applied next to the Staffel emblem on the nose, that nearest the camera being named 'Flitzer' (Speedy).

An undated early war photograph of Dornier Do 17 P 4N+TL of the 3.(F)/22 seen parked between two Do 17 Ps of the 3.(F)/11. While the aircraft in the foreground, 6M+TL is finished in the darker combination of 70/71 over 65, as is the third aircraft in line, the lighter colours evident on 4N+TL suggest that it remains in the segmented upper scheme in the 60 series of colours.

Clearly visible in this well-known view of a ground crewman running up the engines of a 3.(F)/10 Dornier Do 17 P-1 is the unit emblem of a black 'Cross of Jesau' on a black-bordered white shield. First formed at Neuhausen in November 1938, the Gruppe received the title Tannenberg in recognition of the victory of the German Eighth Army over the Russian Second Army at the Battle of Tannenberg during the period 26 – 30 August 1914. This was one of the earliest battles of the First World War and one where intercepted radio communications and, according to General von Hindenburg, the early 'Scout' aircraft, played a significant part in the outcome. Interestingly, many units formed in East Prussia frequently incorporated the 'Cross of Jesau' into their emblems.

In this view from an accompanying aircraft of the Staffel, an unidentified Dornier Do 17 P-1 of the 3.(F)/123 cruises through clouds above the French countryside near Brest during the summer of 1940. A close examination of the original print strongly suggests that the aircraft retains an upper surface camouflage of 61/62/63.



For the armies and air forces of the Second World War, the local topography frequently provided more than adequate concealment for their equipment. In this respect the Luftwaffe was no different to its contemporaries, as shown here by this Dornier Do 17 P of the 4.(F)/14 which has been partially hidden under trees bordering an airfield in the Cherbourg area during the summer of 1940. With the natural camouflage augmented by the use of netting and cut branches, the fabric covers normally fitted to protect the engines and cockpit area serve a double purpose by preventing reflections from the glazed nose areas and curved surfaces of the engine cowlings.

With its upper wing Balkenkreuze still in their early extreme outboard location, Dornier Do 17 P-1 5D+CL of the 3.(F)/31 is seen here at its base at Frankfurt – Main during the early summer of 1940. Clearly visible behind the Dornier is a formation of Junkers Ju 52/3m transport aircraft.

Two views of the variations sometimes to be found in the Staffel emblems carried by Luftwaffe aircraft; in this instance the so-called 'Bubble Head' cartoon character usually carried on the engine nacelles of the Dornier Do 17s and Junkers Ju 88s of the 1.(F)/123. The story behind the emblem on the nose of the Do 17 (above right) of a man with a camera sitting on a pencil has yet to be heard.

An in-flight view of a Dornier Do 17 P of the Recques-based 3.(F)/11 over the Pas-de-Calais countryside in August 1940 taken from the rear gunner's position of an accompanying Do 17.

missions over coastal areas to cover the flanks of an army operating near a coastline.

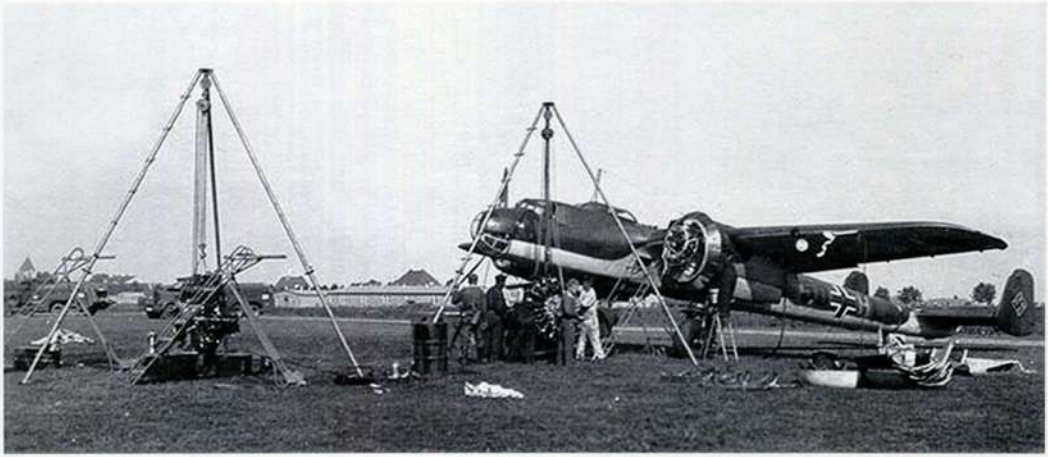
At first, existing political borders and the operational range of the aircraft frequently limited strategic missions such as those flown earlier over Poland and the West, but later missions saw political borders frequently ignored and the primary concern - aside from the operational range of the aircraft - become that of increasing enemy opposition.

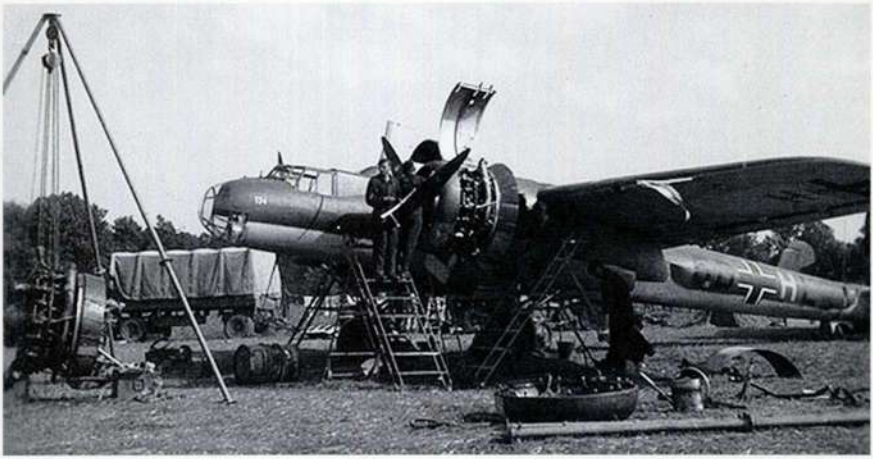
During the campaigns in Poland and the West, *ObdH* had held two long-range *Staffeln* in reserve. While not assigned to specific reconnaissance areas, they were used to obtain detailed information during confusing or decisively important situations: two such examples of these were the Battle of the Bzura in Poland in September 1939 and Operation *Dynamo*, the evacuation of the British Expeditionary Force from France during May and June 1940.

The boundaries for aerial reconnaissance regions within the operational zones of the army were created to coincide with those assigned to the army groups, which in turn determined the reconnaissance areas for those units attached to the various armies in the field. On occasion, some divergence from this arrangement became necessary when the number of long-range *Staffeln* proved insufficient for the required tasks. Such was the case at the beginning of the offensive against Russia where the original ten strategic *Staffeln* assigned to the *Heer,* although found sufficient for the early operations in the West, by mid-1941 had increased to thirteen; even so, they could not adequately cover the immensity of the Eastern Front. Even when supplemented by information from strategic air force missions, long-range army missions were unable to produce the same clear and complete results as those obtained during the earlier Western campaigns.

The division between the areas of reconnaissance allocated to the army and the air force was defined in paragraph 85 of *Luftkriegführung* No.16 as follows: *"As a rule the areas in which the Air Force will conduct air reconnaissance will be farther in the enemy rear than the air reconnaissance*

Two views of 5D+HL of the 3.(F)/31 undergoing a double engine change at Frankfurt-Main during the early summer of 1940 while operating under the Koluft 7.Armee. By August, the Staffel was re-equipping with Messerschmitt Bf 110 C aircraft and operating from St.Brieux under the Koluft 9.Armee where it remained until transferring to the Koluft 2.Panzergruppe for the opening stages of Operation 'Barbarossa'. In January 1942, the Staffel was re-assigned to the short-range role and became part of the newly formed Nahaufklärungsgruppe 1 the following April.





Dornier Do 17 P, 5D+HL of the 3.(F)/Aufklärungsgruppe 31
Finished in the familiar 70/71/65 splinter scheme, 5D+HL has its aircraft letter 'H" painted in the 3. Staffel colour of yellow; the black borders to the fuselage Balkenkreuz are slightly wider than usually seen during this period and the swastika occupies the earlier location where it was bisected by the rudder/hinge line. The small white numbers on the nose are the last three digits of its W.Nr.

Undergoing maintenance to its port BMW 132N engine, Dornier Do 17 P-1 of the 4.(H)/31 sits in the sun at its base believed to be at Stadtkyll, Germany in the summer of 1940.

A close-up view of the nose of a Dornier Do 17 P of the 4.(F)/14 showing a variation of the Baron Munchhausen emblem carried by the aircraft of the Staffel.

areas of the army and the navy. Whenever possible, these areas will be defined by a line marked by distinctive geographical features". Prepared under the assumption that the primary role of the *Luftwaffe* would be offensive, it would ultimately provide direct support for the army on a much greater scale than originally anticipated, with the targets for aerial attack frequently coming within those areas defined as army reconnaissance areas. However, it was noted, *"The current situation might call for another arrangement. The events of war will frequently lead to changing air reconnaissance areas and missions...,"* Cited in paragraph 85, and intended merely as an exception rather than the rule, this in fact, became the rule.

A Dornier Do 17 P of the 3.(F)/10 is seen here parked in a camouflaged revetment at an unidentified airfield or airstrip in the area of Calais during August 1940 from where, along with the 3. and 4.(F)/11, it operated in support of German coastal artillery units under Army Group A. From 14 September 1940 during the period of the proposed invasion of Britain, the 3.(F)/10 and 3.(F)/11 along with Kurierstaffel 2 and Luftnachtrichten-abteilung 5 (Air Signals Detachment 5) were placed under Koluft 16 while the 4.(F)/11 with Kurierstaffel 4 were placed under Koluft A. The Staffel remained with Koluft 16 until moving to Jüterbog-Damm in May 1941, where it stayed until the opening of Operation 'Barbarossa', when it was placed under the Koluft 18 Armee.

A Dornier Do 17 P of the Trondheim-Vaernes-based 1.(F)/120. The antler emblem carried beneath the cockpit window is believed to be a stylised version of the unit emblem, the crest of the Prussian town of Neuhausen, which showed a set of antlers on a quartered shield.

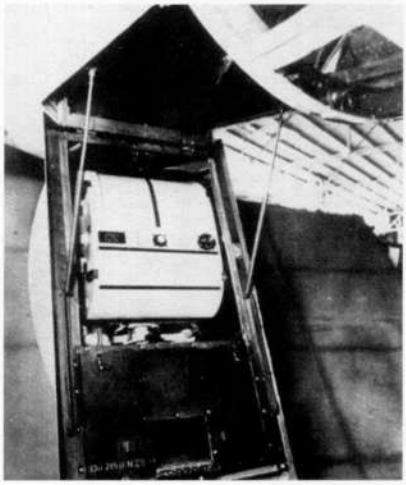
This view of ground personnel servicing the starboard BMW 132N engine of a Dornier Do 17 P of the 3./(F)22 is believed to have been taken at the airfield at Koblenz-Karthausen during the later months of 1940, shortly before the Staffel transferred to Stavanger-Sola.

*Prior to the opening of the all-out air assault against Britain in mid to late 1940, the Dornier Do 215 B-4s of the 4./AufklGr.ObdL were heavily committed to imaging sorties of southern England. Showing to advantage the purpose-built ventral blister to house an Rb **/30 camera, the blue under surfaces of this example have been over-sprayed with a dark mottle, possibly to assist in breaking up the outline of the aircraft when viewed at low-level.*

Although frequently carried out in the same areas, strategic reconnaissance missions for the army and the air force, while not divided into areas, differed in both execution and mission type. This often resulted in some overlapping of coverage which, for the most part, provided the additional benefit of a more complete source of information. Although often desirable, given the *Luftwaffe*'s limited resources, this would normally have been hard to achieve.

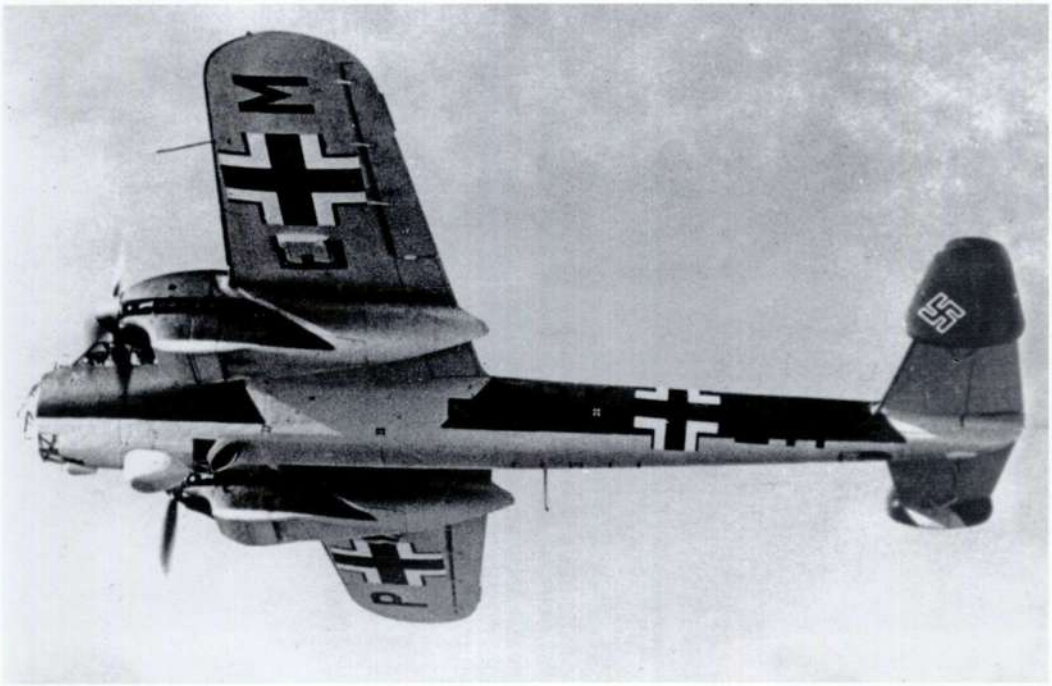
Until 1942, all strategic army missions were the responsibility of the individual *Staffeln* attached to the *Heeresgruppen* and their subordinate *Armee* and *Panzerarmee* (Army and Panzer Army), with each *Staffel* being under the operational control of the *Koluft* assigned to a particular army command. Once completed by the pertinent army command, the mission order was issued to its *Koluft* for assignment to the appropriate *Staffel*.

Usually issued in written form, the orders for a long-range mission frequently contained additional instructions for a number of days in advance. Included in the form of annexes under the heading of *Besondere Anordnungen für die Luftaufklärung* (Special Instructions for Air Reconnaissance), they contained points laid out approximately as follows;

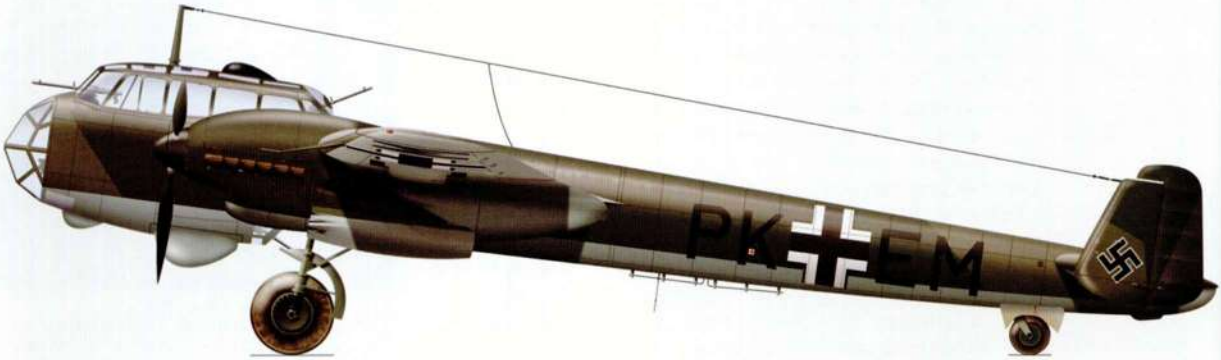


A Dornier factory photograph showing the opened blister housing for the Rb 50/30 camera installation in a Dornier Do 215 B, the installation of which must have provided for the easiest accessibility of all fixed on-board reconnaissance cameras in Luftwaffe aircraft.

1. Supplemental information on the enemy situation that was of importance to the execution of the aerial reconnaissance mission.
2. Information on the current aerial situation, such as the presence of enemy fighter or anti-aircraft forces.
3. Information on the commitment of friendly fighter or bomber forces.
4. Details on the width and depth of the reconnaissance areas to be covered for operational (strategic) and, if so required, tactical missions.
5. The specific air reconnaissance mission for the period involved with an emphasis on the information required by the command. This was usually accompanied by details of road and rail routes and other targets such as defence or similar installations to be reconnoitred by means of aerial photographs.
6. Reporting method. As an example, instructions could specify that a report could be made by radio if it could detect signs that the enemy had crossed a specific river or other geographical feature.



This in-flight view of Dornier Do 215 B-4, PK+EM clearly shows the under-nose blister fairing which housed an Rb 50/30 camera and the angular demarcation between upper and lower colours peculiar to the type. Production of the Daimler-Benz DB 601A powered Do 215 B series began in March 1940 but lasted barely a year before ending in early 1941. Reconnaissance units known to have had the type on strength during their existence were the (F)/100, (F)/120, (F)/121, (F)/124, (F)/Nacht and the AufklGr.ObdL.



Dornier Do 215 B-4, PK+EM

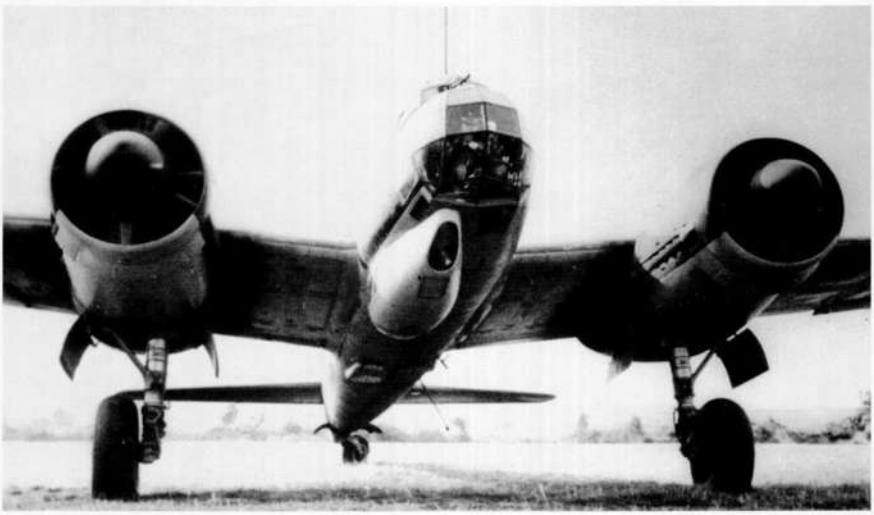
Finished in the standard land plane scheme of 70/71/65 with national markings in eight positions, the angular demarcation between upper and lower colours on the engine nacelles was peculiar to the later Dornier series and was similarly applied at the fuselage to wing join.

This side view of Dornier Do 215 B-4 PK+EH clearly shows the practice of repeating the last two digits of the aircraft Werk Nummer on both the nose and rear fuselage. Although continued almost throughout the war on several aircraft types, the practice appears to have been somewhat random in application.

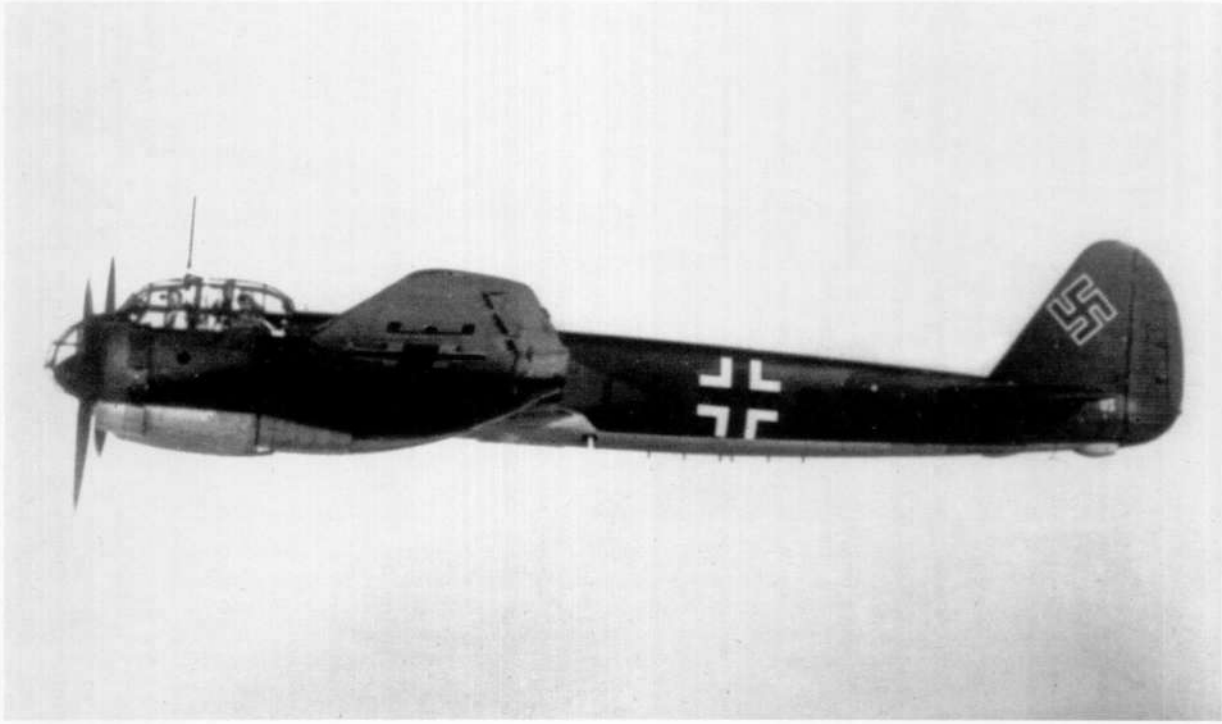
On receipt of the mission orders, either the *Staffelkapitän* or his duty officer would plan the sortie and arrange the pre-mission briefing, while the photographic officer selected the film type and quantity required and issued instructions for the preparation of the cameras, their shutter speeds and aperture settings. Concurrently, the crew or pilot assigned to the mission would examine all known particulars about the objective including information on both enemy and friendly forces, flight routes to and from the area, expected weather conditions, radio code words applicable to the mission and other pertinent data.

Early wartime flight procedure for strategic missions would see the aircraft climb to an altitude of between 4,000 and 6,000 m (12,000 and 20,000 ft) before setting a direct course to the objective where it was not unusual for crews regularly to carry out more reconnaissance than was required as enemy interceptions at this time were few.

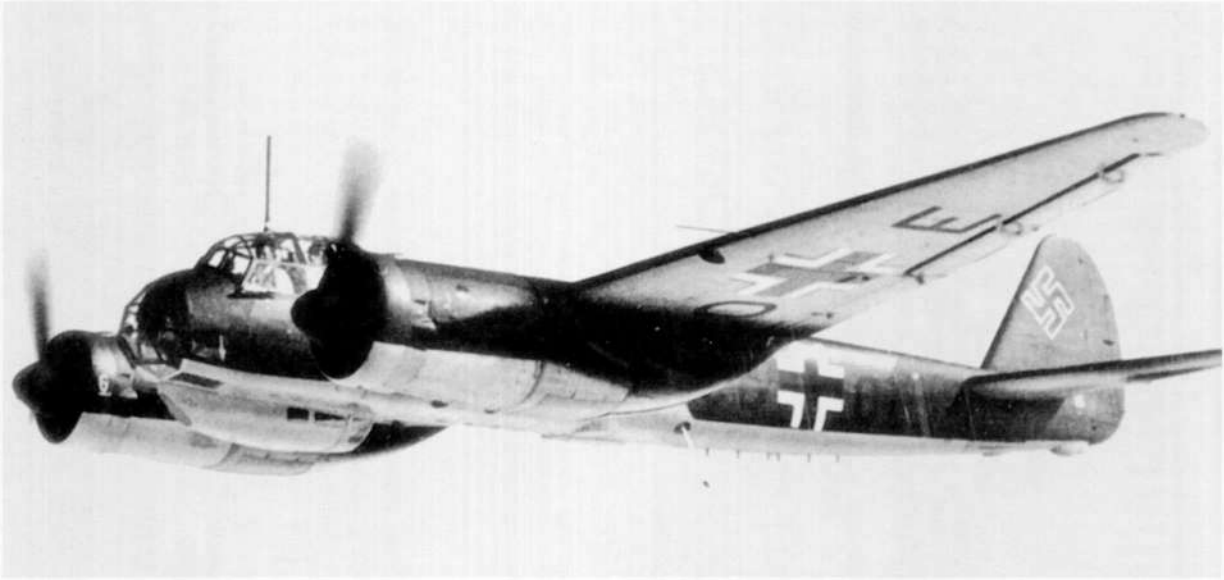
Similarly, little effort was made to avoid vapour trails as the aircraft responsible was often well on its way out of the target area before any response could be initiated. During missions carried out by multi-seat aircraft, the *Bordfunker* (Radio Operator) maintained a listening watch on the *Staffel* or home base frequency and monitored the ground control net for the area over which the aircraft was operating. Although there were no standardised radio silence procedures in force at this time, transmissions from the aircraft were generally kept to a minimum.

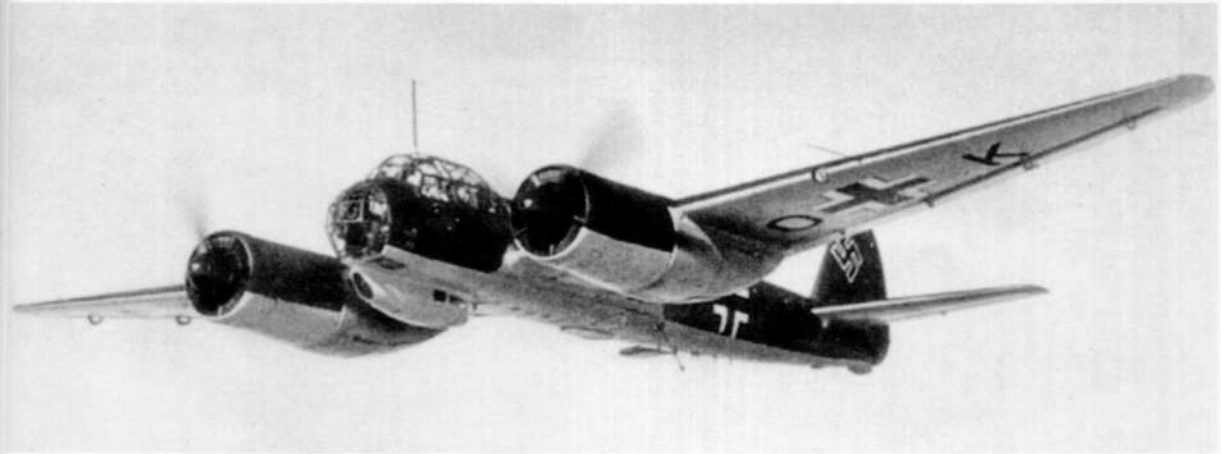


This head-on view of Junkers Ju 88 A-1(F) W.Nr. 0340 shows to advantage the early configuration for the three ventral camera windows for the usual Ju 88 installation of Rb 20/30, 50/30 and/or 75/30 cameras which were installed in various combinations, depending on the mission requirements. W.Nr. 0340 was one of 115 A-1(F) variants built at the Bernburg facility and was lost on 20 July 1941 while on the strength of the 3.(F)/123 and coded 4U+KL. Although listed as an A-5 at the time of its loss, it is entirely probable that by this time it had been converted to A-5 standard, as was the case with a number of the A-1 (F) production run.

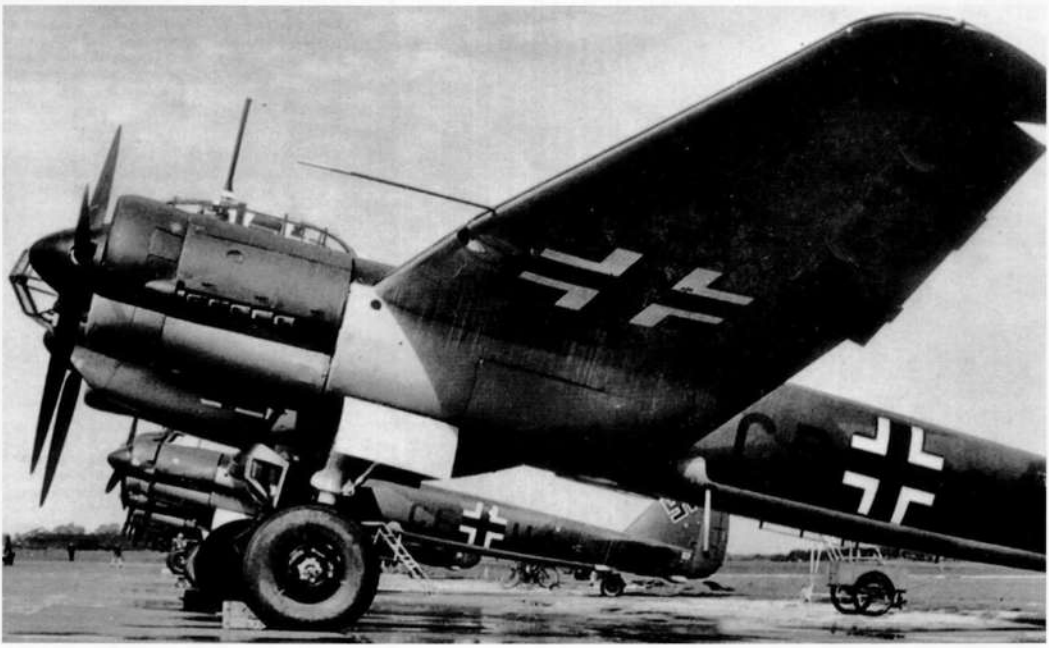


Two in-flight views of CB+OE, the fifth pre-production Junkers Ju 88 D-0 variant. Externally similar to the A-5, the D-0 saw the underwing dive brakes eliminated, the forward section of the bomb bay adapted to carry fuel tanks and provision made for three internally mounted cameras aft of fuselage frame 15.





Three views of CD+OK, an early reconnaissance Junkers Ju 88 A where the three early style ventral camera windows are clearly visible. It is believed that the W.Nr. for this aircraft was 0411; if this information is correct then it would be an early A-5(F) which later became 7A+GL of the 3.(F)/121 and ended its days on 1 Dec 1941 when it was reported as lost due to unknown causes.



Clearly visible in this factory photograph and parked beside Junkers Ju 88 A-5(F) CD+OK is another Ju 88 with the Stammkennzeichen of CF+UA and a possible partial W.Nr. of 27 in white under the tail plane. This, and its long span wings and ventral camera windows visible in a second but poor quality photograph, strongly suggest that it is one of the 298 Bernburg–built A-5(F) airframes.

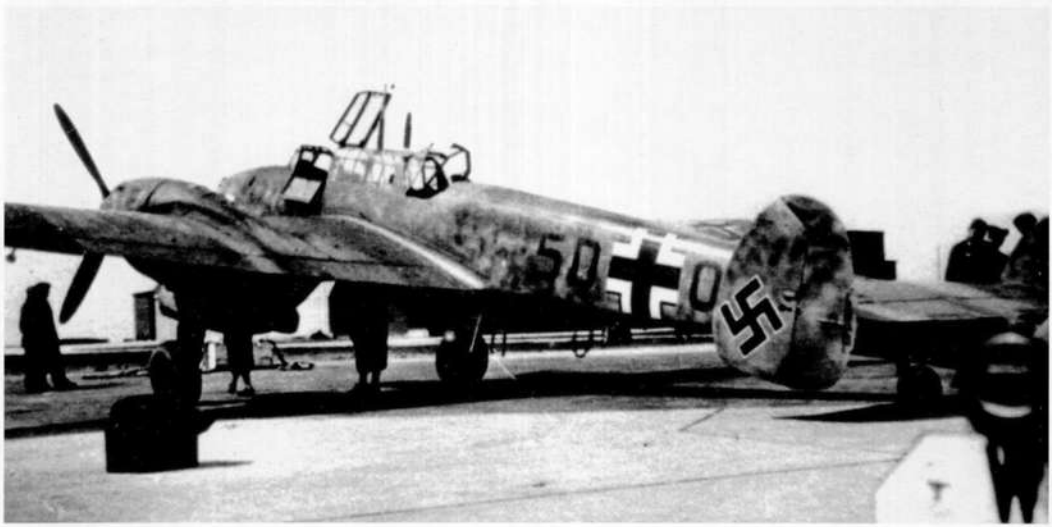
Originally, a report on the progress of a mission would be encoded and transmitted as required, but by mid-1940 a limited level of radio silence was introduced for all strategic missions, requiring that only a single code letter was to be transmitted as important points in the flight were passed. These periods of radio silence however, did not extend to sightings of enemy shipping when the information would be immediately encoded and transmitted. Yet, even these reports and the transmission of code letters, brief as they may have been, were to prove costly in losses to both aircraft and crews and resulted in the strict imposition of radio silence for all missions except in cases of emergency, such as giving the location of an aircraft ditching or in other need of immediate assistance.

As opposition to these flights increased, their operational altitude increased to between 7,000 and 9,000 m (22,000 and 30,000 ft) while making sure that the aircraft did not stay over the target area for longer than was necessary thus exposing it and its crew to unnecessary risk. This change also saw the introduction of a ruling limiting the maximum period spent over each target to 12 minutes as this was considered the average time needed for contemporary Allied fighters to reach the same altitude as the reconnoitring aircraft. Although ordered to avoid aerial combat whenever possible, the normal tactics employed by a multi-engined reconnaissance aircraft when attacked would be a series of violent evasive turns and manoeuvres followed by a rapid dive to low altitude, while its on-board defensive weapons were used to hold the attackers at bay until it made good its escape.

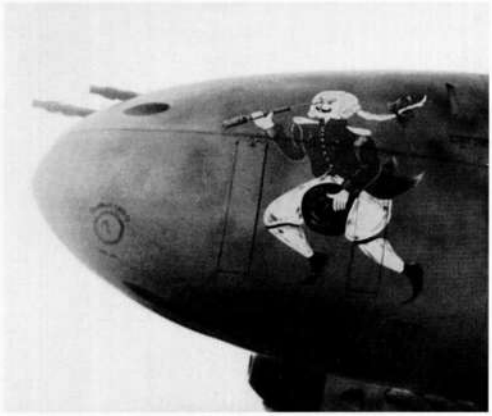
Junkers Ju 88 A-5(F), F6+HL of the 3.(F)/122 at Schiphol, Holland in the late summer of 1940. In common with their Allied counterparts, Luftwaffe flying and ground personnel often found that a bicycle was the perfect means of transport for getting around an airfield. Although not visible in this view, current research indicates that this aircraft is likely to be W.Nr. 0426, which was shot down off the coast of Sunderland at 0845 hrs on 18 November 1940 by the British minesweeper, HMPS (His Majesty's Paddle Steamer) Southsea with the loss of its entire crew.

Junkers Ju 88 A-5(F), F6+HL of the 3.(F)/Aufklärungsgruppe 122
One of 298 Junkers Ju 88 A-5(F) reconnaissance variants built by the Bernburg facility, F6+HL is finished in the standard 70/71 upper splinter scheme with 65 under surfaces. In keeping with normal Luftwaffe practice, the aircraft letter 'H' is painted in the 3. Staffel colour of yellow, as are the bands around the propeller spinners.

Messerschmitt Bf 110 5F+MM of the Cherbourg based 4.(F)/14 taxies out for a mission during the summer of 1940. Finished in an upper 02/71 camouflage pattern with a combined mottle of these colours applied along its blue 65 fuselage sides and to each side of its fin/rudder assemblies, the aircraft letter 'M' is repeated in black outboard of the upper wing Balkenkreuze.



Messerschmitt Bf 110 E-3, 5D+OL of the 3.(F)/31 photographed at St. Brieux during the late summer of 1940. It wears an upper camouflage scheme of 02/71 with a heavily applied mottle of the two colours along the fuselage sides and each side of the fins. Stationed at St.Brieux from mid-1940 until April 1941, the Staffel then moved briefly to Hohensalza (Polish name Inowroclaw) before transferring to the East in July 1941 from where it operated under the control of the Koluft 2.Panzergruppe until returning to Germany in December 1941.



(Above) A view of the cannonball-riding Baron Munchhausen emblem frequently carried by the aircraft of the 4.(F)/14. An 18th century German Baron, Karl Friedrich, Freiherr von Münchhausen later served in the Russian military and participated in two actions against the Turks. Returning home, he is reputed to have told a number of outrageously tall stories including riding cannonballs, travelling to the moon and escaping from a swamp by pulling himself up by his own hair. First formed at Kassel-Rothwesten on 1 March 1936 under Major Rudolf Weimann, the Staffel moved to Köttingbrunn in March 1938 during which time the Munchhausen emblem, the origins of which are still unclear, first appeared on its aircraft.

Reportedly taken at Cherbourg in late 1940, Generalfeldmarschall Albert Kesselring, accompanied by a woman believed to be his wife is seen walking away from Messerschmitt Bf 110 C-5, 5F+HM of the 4.(F)/14 whose Baron Munchhausen emblem may be clearly seen on its nose. An unidentified Junkers Ju 86 is partially visible behind the Bf 110. If the location and period are correct, it brings to mind the question as to why Kesselring would be visiting the Staffel, which at the time was under the control of Sperrle's Luftflotte 3.

With the Allied use of radar increasing, reconnaissance aircrew gave much attention to varying the approach routes to intended targets while allowing for the quickest return routes to friendly territory. Frequently making use of topographical features to shield it from detection by enemy radar, a reconnaissance aircraft would often fly to the target at very low level before climbing to a higher altitude to carry out its mission. On completion of its photographic run, the aircraft would drop down to a lower altitude for its return flight, which was often made to an alternate airfield to avoid the risk of possible interception by enemy fighters.

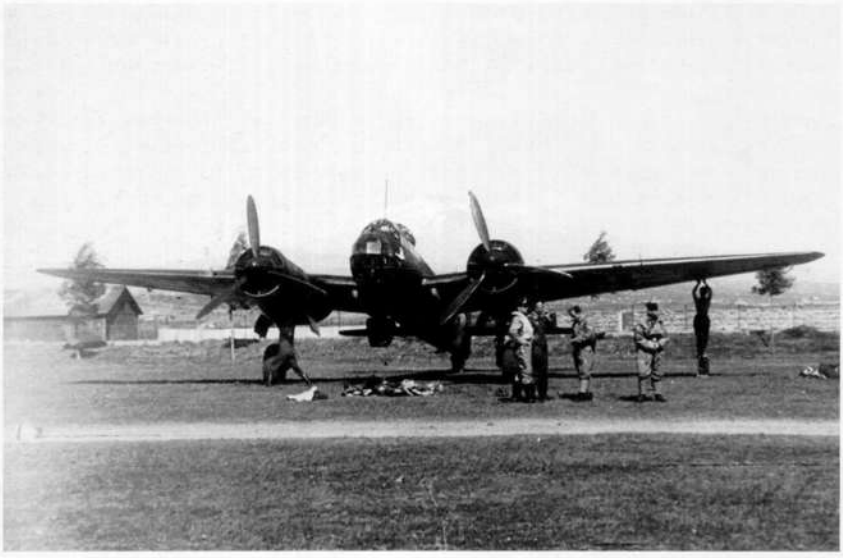
This mission profile was often used to good effect during early *Luftwaffe* reconnaissance flights over Gibraltar and its adjacent seaways where the crews also undertook the additional duty of reporting on and shadowing convoys until bomber units arrived. Frequently referred to as *Lotsendienst* (literally, Pilot Service), this type of mission required the shadowing aircraft to send out a coded transmission giving the exact location, course, size and estimated speed of the convoy while continuing to shadow it for as long as fuel permitted. With the information received and acted upon, a second reconnaissance aircraft would guide the attacking force to the vicinity of the convoy and if necessary, obtain further guidance from the shadowing aircraft; otherwise, strict radio silence was observed.

Following the completion of a mission, two standard reports were submitted: the pilot and a camera technician would complete one, which contained two separate sections, while the second was completed by the observer. In the first report, the section completed by the pilot covered the altitude at which the photos were taken, aircraft speed, visibility, and weather conditions. That completed by the technician covered the film and camera type, lens used, aperture settings, and filter type, if used, and accompanied the exposed film to the photo laboratory where it was used to determine the method and time required for processing.

The observer, who was often accompanied by the whole crew, reported to the *Staffelkapitän* or duty officer to complete and submit a report on the course and altitudes flown, targets or objectives photographed, the time over the target, enemy opposition, weather conditions and other observations of interest. Once completed, the results of the mission were sent to the appropriate requesting command by either courier aircraft, messenger, radio, telephone, or teletype depending upon the situation and type of report, along with copies of rush prints of the more important negatives.

As enemy opposition to these flights increased, single and twin-engined fighter aircraft began to make their appearance in both the long and short-range *Staffeln*, frequently being used for missions over well-defended targets in place of the slower, less agile multi-engined types, in order to increase the chances of a successful outcome.

4U+BH of the 1.(F)/123 undergoes an engine run-up at an un-named location in Northern France in November 1940. Either a Ju 88 A-1(F) or A-5(F) variant, it has undergone a partial conversion from its original bomber configuration with the removal of the underwing dive brakes, the mounting brackets for which can be seen beneath the wing leading edge. In keeping with a practice that began when the Staffel flew Dornier Do 17 Ps, the Staffel emblem of a caricature of a Luftwaffe airman holding a telescope has been applied to the outboard engine cowling panel of each engine.



The information given with this photograph showing a crew of the 1.(F)/121 with their Junkers Ju 88 D states that it was taken in December 1940 as the Staffel was preparing to depart Stavanger-Sola for its new base at Catania, Sicily. This is by no means certain, but it may explain the presence of the white band around the rear fuselage.

Two views of the Bernburg-built Junkers Ju 88 A-5(F) 4N+AL of the Stavanger-Sola based 3.(F)/22 as it lies in a field at Flotterston Farm some 20 miles west of Kirkwall in the Orkney Islands on the afternoon of 25 December 1940. Intercepted and attacked by fighters of 804 Sqn FAA while on an imaging sortie to the Royal Navy anchorage at Scapa Flow, the aircraft was hit in both engines resulting in it being forced to make a wheels-up landing near Loch Skaie where its crew of Lt. K.Schipp, Fw. H.Schreiber, Uffz. J.Spörtl and Ogfr. K.Rotter was subsequently taken prisoner.

A Junkers Ju 88 D-1 of the 3.(F)/123 runs up its Junkers Jumo 211 engines outside a camouflaged hangar at its base at Brest-Süd prior to departing on a reconnaissance sortie early in 1941.

On 18 June 1941, Junkers Ju 88, F6+EL of the 3.(F)/122 crewed by Lt. Behrens, Ofw. Volk, Fw. Schmidt and Uffz. Lentfert was on a "Tarnüber-wachung" (camouflage monitoring sortie) near Rotterdam when it was attacked in error by a Messerschmitt Bf 109. Forced to crash-land in Haringvliet near Hellevoetsluis/Rockanje, the accompanying photographs are from a series taken during its subsequent recovery.

A Junkers Ju 88 D-0 or D-2 of the 3.(F)/10 pictured on the Eastern Front in the latter part of 1941 while the Staffel was operating with the Koluft 18.Armee.

(Below) Close-up view of the nose of a Dornier Do 17 P-1 of the Nikolayev area based Aufklärungsstaffel 1.(F)/Nacht showing the Staffel emblem of a white outlined, dark blue shield containing a candle-holding angel in a white robe riding a telescope against a background of a quarter moon and stars. Formed along with the 2. and 3. Staffeln in June 1941 for operations on the Eastern Front, they were joined by the Aufklärungsstaffel 4.(F)/Nacht in August 1942.

Emblem of Aufklärungsstaffel 1.(F)/Nacht.

These two views are part of a series of photos taken by the crew of W.Nr. 780, a Junkers Ju 88 A-5(F) of the 3.(F)/33 after it suffered a dual engine failure during an imaging sortie on 15 December 1941 and force-landed in the area of Vitebsk between Roslavl and Seshchinskaja. The crew of Uffz. Wagner (pilot), Hans-Günter Mantel (radio operator), Georg Kalbling (observer) and gunner Peter Bickel were later picked up by German troops while the aircraft, which had suffered only minor damage, was later retrieved.

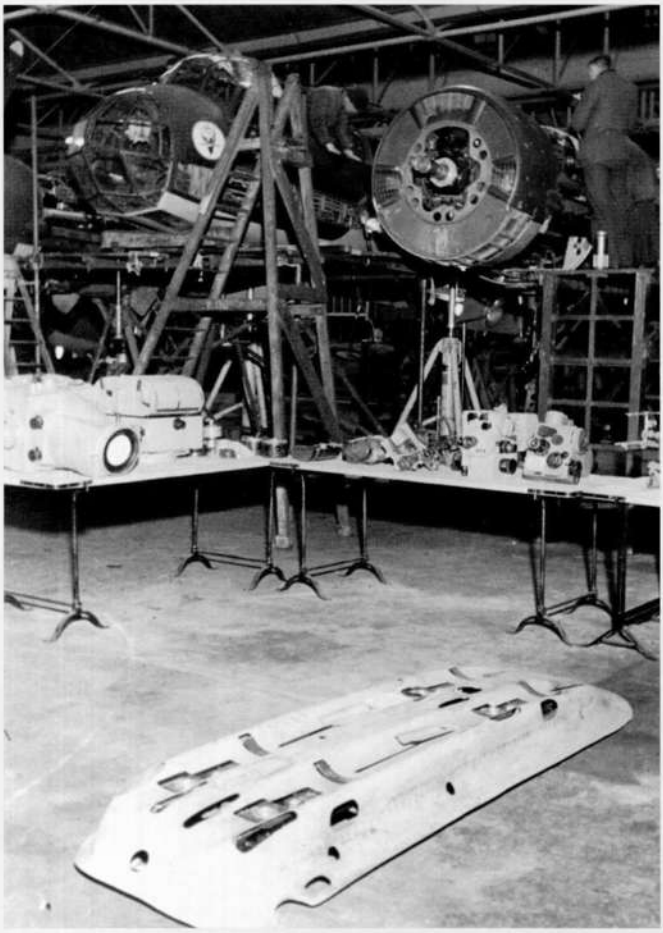
German Lenses, British Cameras

The task of daylight photography sorties of Bomber Command targets was initially the responsibility of the Spitfires of the Oakington-based No. 3 PRU. However, following the first Bomber Command raid on Cologne on the night of 17/18 May 1940, it was found that accurate post-raid assessments were frustrated, as the largest image scale obtainable from these sorties using the in-service 20" focal length camera from an altitude of 30,000 ft was 1:18,000.

With a 5" x 5" print format, the area of the ground covered was inadequate for satisfactory assessment, although the results improved if an F 8 camera producing 7" x 7" format prints was utilised. In order to improve the results of the missions carried out by No. 3 PRU, its commanding officer, S/Ldr Ogilvie had hoped to obtain American Fairchild 24" cameras as supplied to the United States Army Air Force, but these were not forthcoming at the time. However, a suitable substitute was soon literally to fall into Ogilvie's hands when Junkers Ju 88 A-1(F), 7A+FM, of the 4.(F)/121 was forced to land at RAF Oakington on 19 September 1940.

Following its thorough examination by RAF and RAE technicians, in November 1940, with the assistance of the Photographic Reconnaissance Unit at Heston and RAE Farnborough, Ogilvie was able to acquire and put back into service two of its Zeiss lens assemblies which had been adapted to fit British F 8 cameras; one of which was installed into the aft fuselage of Spitfire PR1C X4383.

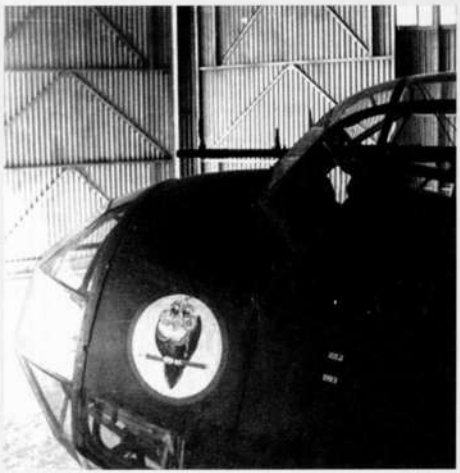
The first F 8/Zeiss hybrid camera flew its first operational sortie when F/Lt Marshall flew X4383 to Cologne on 21 December 1940, during which he photographed the required areas at a scale of 1:13,000. Three days later, following a successful sortie to image the oil plant at Wessling, F/Lt. Marshall had to force-land X4383 near Colchester. With the Spitfire recovered for repair, the hybrid camera was removed and installed in X4385, which suffered a similar fate to its predecessor when P/O Wilkinson was forced to make a wheels-up landing on 9 January 1941. Although having sustained significant damage to the airframe, the undamaged hybrid camera was removed and installed in X4712 where it remained until being lost with the aircraft in the early afternoon of 9 April 1941 when it was shot down near Texel by *Fw.* Mickel of the 1./JG 1. On 2 February 1941 X4493 had arrived at Oakington and was fitted with a second F 8/Zeiss hybrid with which, as the longest known survivor of these first F 8/Zeiss equipped PR Spitfires, it flew until it failed to return from a sortie to Wilhelmshaven on 27 August 1941.



Junkers Ju 88 A-1(F), 7A+FM, W.Nr.362 of the 4.(F)/121 is seen undergoing thorough examination after being forced to land on Oakington airfield near Cambridge during the afternoon of 19 September 1940. Engaged on a combined weather and photo-reconnaissance sortie for Luftflotte 3 over central England, the aircraft developed a fault in its port engine and force-landed at Oakington airfield where the crew of Lt.H.Knab, Uffz.H-J.Zscheket, Uffz.J.Thöring and Ogfr.E.Bresch were made P/W. Arranged on the tables in front of the aircraft may be seen its two Rb 75/30 and one Rb 20/30 cameras and other on-board equipment while the ETC carrier on the floor in the foreground is for a Messerschmitt Bf 110. While the exact location of the photograph is unknown, it is thought that it may have been taken at Oakington rather than at Farnborough where downed Luftwaffe aircraft were usually examined.

Spitfire aircraft known to have been fitted with F 8/Zeiss hybrid camera installations:

X4712 Spitfire PR 1F – Lost over Texel on 9 April 1941.
X4385 Spitfire PR 1C – Last sortie with unit 30 June 1941
X4383 Spitfire PR 1C – Last sortie with unit 7 July 1941
X4493 Spitfire PR 1C – Lost over Wilhelmshaven 27 August 1941



Two views of the bespectacled crow/raven emblem of the 4.(F)/121 carried on the nose of Ju 88 A-1(F) 7A+FM, W.Nr.362. Superimposed on a red-outlined white disc and perched on a red pencil, the bird is believed to have been black and white with brown or grey details.

On 22 September 1941 while being flown on an imaging sortie to Hamburg by S/Ldr Peter Tomlinson, Spitfire X4385 suffered fuel starvation, forcing Tomlinson to force-land the overall blue-painted aircraft in a meadow adjacent to the NJG 1 occupied airfield at Deelen-Arnhem in Holland. Taken into captivity by Luftwaffe personnel, Peter Tomlinson was taken to the officers' mess where, in his own words, officers of the night fighter group and their commander, Oberst. Wolfgang Falck treated him with the utmost courtesy and respect. After being entertained in the mess, Falck and his staff broke somewhat with the conventional method for the handling of prisoners of war by flying Tomlinson, under the guard of a third crew member, to Frankfurt in one of their Messerschmitt Bf 110 aircraft. After arriving at Frankfurt, Peter Tomlinson underwent conventional prisoner of war interrogation before being sent to the Dulag Luft P/W camp at Frankfurt am Main.

Short-range reconnaissance

Finished in the standard scheme of the greens 70/71 over blue 65 under surfaces with early style Balkenkreuze and the swastika applied across the rudder/fin hinge line, Heinkel He 46, P2+HM of the 4.(H)/21 was photographed at Gross-Lassewitz on 1 September 1939.

Short-range formations were known as *Aufklärungsstaffeln (Heer)*, abbreviated to *Aufkl./*(H) or simply (H) to identify their short-range or tactical role.

Formed in January 1935, the first two short-range reconnaissance *Staffeln*, the 1. and 2.*(H)*/214 were joined the following month by the 1. and 2.*(H)*/315 and by an additional six the following year, which had been created around former students of the schools at Braunschweig and Hildesheim. By 1937, the number had grown to 14 *Staffeln*, distributed between the six newly formed army reconnaissance group staffs. Increased by a further four *Staffeln* the following spring, they were formally transferred from Air Force to Army control on 1 July 1938 and by August 1939, their number had risen to 36.

To co-operate closely with the ground forces, each short-range *Staffel* was organised for complete and independent mobility and this flexibility was particularly evident over the vast distances encountered on the Eastern and North African Fronts later in the war. They were equipped with nine aircraft plus three reserves, with as many as 50-plus heavy vehicles and approximately 300 officers and men. This high proportion of personnel to the number of aircraft was due to the number of maintenance and photographic staff involved.

These units could transfer their entire ground element and equipment to a new location in their own motor transport, taking with them their rations, ammunition, and other stores. Most also had their own mobile records office in a special vehicle also containing office accommodation and a store of maps. On arriving at a new location, they were responsible for setting up their own tactical radio station and for establishing their links with the appropriate air command. As the *Luftnachrichtenabteilung* (Air Signals Detachment) often included Junkers Ju 52 and Fieseler Fi 156 *Storch* aircraft equipped as flying radio stations, one of these aircraft was occasionally put at the disposal of a *Staffel* to establish and maintain radio communications until its own signals section was brought into operation.

To provide for rapid communications between the various *Luftwaffe* and army commands concerned, one or two aircraft from a *Kurierstaffel* (Courier Squadron) were often detached to an *(H) Staffel* and would frequently convey officers to and from meetings and were often used for the delivery and collection of photographs, reports and dispatches. Usually, one aircraft was set aside for the personal use of an army commander for travel to and from staff meetings or for flying over battlefield areas to obtain a first-hand view of the tactical situation. As the war progressed, this practice later became less commonplace as enemy opposition increased and the fuel situation worsened.

A 1937 Henschel factory photograph of D-ODBTR, one of ten Henschel Hs 126A-0 aircraft completed and finished in the three-colour upper camouflage of 61/62/63 over 65 under surfaces shortly before the adoption of the 70/71/65 camouflage scheme for all land-based aircraft. First introduced into service circa October 1938 with the short-lived Aufklärungsgruppe (H) 35, the Henschel Hs 126 was a vast improvement over the earlier Heinkel He 45 and He 46 designs, not only by virtue of its all-metal construction and armour protection for its fuel tanks and crew but also for its robust construction, short take-off and landing capabilities and limited blind-flying capacity which rendered it an almost perfect tactical reconnaissance machine.

This close-up view of the cockpit area of an unidentified Henschel Hs 126 A-1 clearly shows the Revi gun sight for the fixed, forward-firing 7.9 mm MG 17 machine gun, canopy slide rails and latch and the four sighting reference lines painted on each fuselage side for the observer's use in photographic work with a hand-held camera.

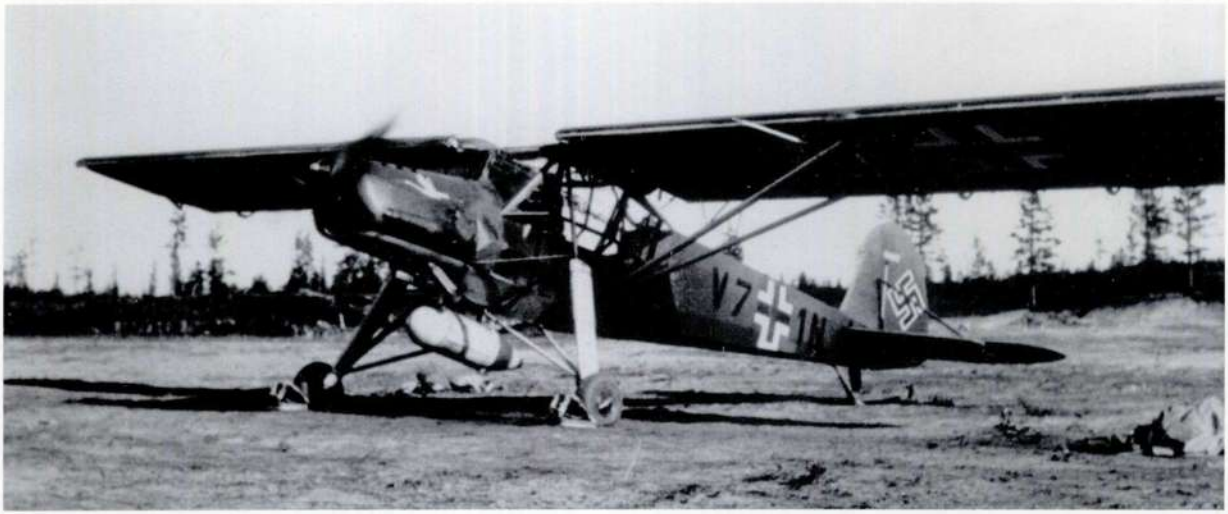
The pilot of Henschel Hs 126 A, L2+L37 of the 7./LG 2 holds his aircraft on a slow, steady course while the observer hangs precariously over the side to operate his hand-held HK camera. The blemishes visible in the photograph on the upper wing surface surrounding the L2 and 37 are believed to be the residue remaining after temporary 'war games' markings were removed.

Finished in the standard camouflage scheme of 70/71/65, this early war photograph of an Hs 126 A-1 of the Aufklärungsgruppe (H) 23 shows to advantage the auxiliary light bomb carrier that was often fitted to the port side of the fuselage for the carriage of a single 50 kg bomb.

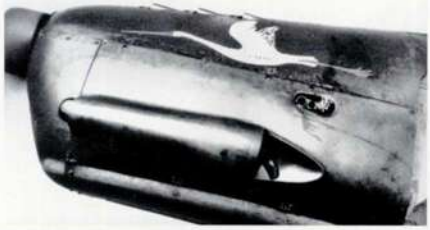
Short-range reconnaissance missions were carried out for the tactical commands and provided information for the deployment of friendly forces and, in the case of battle reconnaissance, the conduct of the battle. At the same time, if carried out as target reconnaissance, they provided information on which was based the control and employment of aerial support provided to friendly forces.

Attached to a *Heeresgruppe*, *Armee* or *Panzerarmee* and under the tactical control of its commander, missions carried out by the short-range *Staffeln* were planned by the relevant operational army staff who would forward the mission orders to the attached *Koluft*, who would then assign them to the appropriate *Staffel*. Additionally, the short-range *Staffeln* provided all tactical visual and photographic reconnaissance for both the air force and the army within their assigned areas of responsibility. This did not extend to night reconnaissance photography, however, which was normally conducted by the long-range units.

Short-range tasks, whether visual or photographic, were prepared and ordered and the participating aircrew briefed in a similar manner to those for the operational (strategic) mission. For these missions, quickly and easily produced *Punkt-karten* (Point Maps) were frequently used which made use of precisely surveyed prominent features of the terrain such as road junctions, large individual buildings or bridges that were identified on the map by a black dot and a number. All that was required for the observer to do was to report his related observations and/or target by point number together with its longitudinal and lateral distance from that point and thus give the position of his target or observation relative to the referenced point number. Likewise, frequent use was also made of grid maps by dividing an aerial photograph or section of map into squares on which observed targets were marked and reported on accordingly with small celluloid angles used to determine sub-divisions of the squares.



Seen here running up its Argus As 10C-3 engine at Taivalkaskel, Finland in mid-June 1941 is Fieseler Fi 156 C-2 Storch V7+1N, W.Nr. 4487 of the 1.(H)/32 which carries the Staffel stork emblem on its upper cowling and is equipped with an under fuselage auxiliary fuel tank.



Fieseler Fi 156 C-2 Storch, V7+1N of the 1.(H)/Aufklärungsgruppe 32
Finished in 70/71 with 65 under surfaces, V7+1N has the lower portions of the white and black borders to the fuselage Balkenkreuz angled along their bottom edge to conform to the profile of the lower fuselage longeron. The stork emblem on the cowling is white with orange and black details. Although some sources suggest the presence of yellow paint on the underside of the wings, a close examination of photos of this aircraft has proved inconclusive.

The crew of an unidentified Henschel Hs 126 A-1 of the 1.(H)/ Aufklärungsgruppe 10 are photographed as they prepare for a sortie from Oslo-Fornebu, Norway on 21 April 1940.

Taken in France in early 1940, this photograph shows Henschel Hs 126 aircraft of an as yet unidentified 1. or 3. Staffel, as suggested by the light colour outlining the aircraft letters, undergoing some minor open air servicing.

If, for example, the mission was for artillery air reconnaissance, the annex to the mission orders would often contain instructions about making an aircraft available to a specific artillery commander and give the times that it would be required. It might also request that a second aircraft be assigned to the same command for carrying out fire adjustment or damage assessment observations and would also contain instructions regarding radio communications and information on receiving points, signals etc. for air-dropped messages.

As a rule, written orders of this type were only applied to the first mission of the day in question. Usually, if further missions were required, the requests were passed verbally to the air liaison officer who in turn, would pass them on to the *Staffel* or, in exceptional circumstances, directly to the crew of an available aircraft of the *Staffel* on the ground.

Occasionally, there were some exceptions to the division between air force and army reconnaissance units working in the same area, such as the assignment of a short-range *Staffel* to a command for reconnaissance either of coastal installations or to provide information about a specific operational area.

Taken in the area of Emmerich in early 1940, H1+BL, a Henschel Hs 126 of the 3.(H)/12 carries the earlier style fuselage Balkenkreuz with the Hakenkreuz (Swastika) on the fin placed in the earlier position where it overlapped both the fin and rudder.

As an example, the month of August 1940 saw a special arrangement established for co-operation between the *Luftflotten* and the short-range *Staffeln* in preparation for Operation *Seelöwe* (Sea Lion), the proposed invasion of Great Britain. This saw the temporary subordination of many of the short-range *Staffeln* in the West to the *Fliegerkorps,* during which time they carried out reconnaissance of shipping movements in the English Channel, areas of the North Sea and harbour areas and the approaches on both sides of the Channel. This arrangement remained in effect for several months until the units began to move eastwards in preparation for the attacks in the Balkans and against Russia.

Although making no real distinction between the individual *Staffeln* carrying out short-range tasks, the *Luftwaffe* made a distinct division of their missions by identifying them as either Tactical or Close.

Frequently overlapping with strategic army missions, tactical reconnaissance missions usually penetrated for distances of between 80 to 200 km (50 to 120 mls) beyond the front lines and provided information on terrain conditions, the positions of ground defences, mechanised, armoured or other supporting units, and local enemy air activity or advanced landing grounds. They also supplied information on the strength, location, and disposition of approaching enemy forces, as well as information for the command and action of friendly forces until they made contact with the enemy.

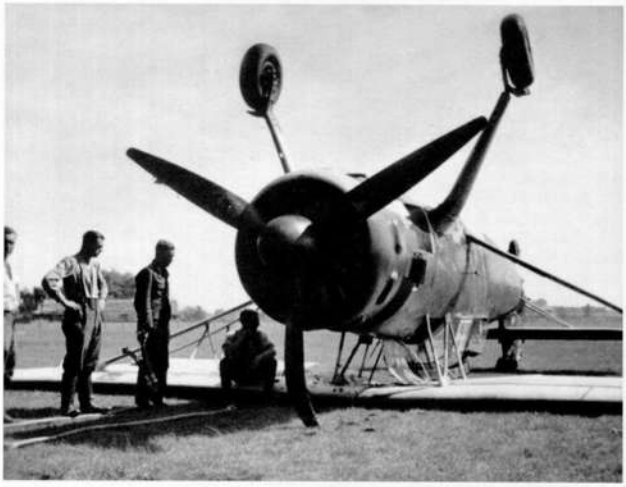
Normally carried out at altitudes from 1,500 to 6,000 m (5,000 to 20,000 ft), tactical missions were concerned more with a detailed determination on the concentrations or advances of enemy troops and it was of prime importance that a report on the presence of mechanised enemy formations was submitted in a timely manner. Preparations for tactical missions were particularly important, especially in open areas of countryside or where contact with the opposing forces was imminent. They required a detailed study of the prevailing situation as well as an indication of the probable plans of friendly forces as unforeseen changes in the routes taken by an advancing enemy force could frequently occur.

"Hummel, Hummel...!" ("Bumblebee, Bumblebee...!") A view of the artwork painted onto the side of the 1.(H)/14 Henschel Hs 126 "5F+HH" crewed by pilot Fw. Hannes Gaub and his observer Lt. Gerd Schroeder from Infanterie-Regiment 134. As far as is known, this artwork was only carried on the port side of the aircraft; the colours used for the letters and character are unknown.

Fw. Hannes Gaub, pilot (left) with Lt. Gerd Schroeder (right) sitting in the observer's position of their Henschel Hs 126 "5F+HH" of the 1.(H)/14 together with Schroeder's Boxer dog 'Tünnes' at Jablonka, Poland in September 1939.

Crash landing of the Hs 126 crewed by Uffz. Ernst Depke (pilot) and Oblt. Horst Scheibel (observer) at Jablonka, Poland in September 1939.

Seen here posing in front of their Henschel Hs 126 at Debica, Poland in the late autumn of 1939 are observer Lt. Wolfgang Steudel of Panzer-Regiment 3 (right) and pilot Lt. Peter Winz (left), the first crew of the 1.(H)/14 to be awarded the EK II (Iron Cross, second class) during the Second World War.



Henschel Hs 126 aircraft of the 1.(H)/14 Pz parked and covered against the elements at either Richebourg or Auxerre, France during the late summer of 1940.

Once combat began, the tactical mission became one of battle and artillery reconnaissance and over the course of the engagement, battle reconnaissance provided the information for the command and control of friendly forces in the battle area. Together with other information available to the army command, the intelligence gathered from these missions provided information on the whereabouts and commitment of enemy artillery, the location of enemy reserves and armoured units and other developments behind the forward edge of the battle area. Additionally, the units involved would observe the progress of the battle as it developed, monitoring the current locations of friendly lines and friendly armoured or infantry spearheads.

Henschel Hs 126 A-1, V7+5B of the 5.(H)/32 in France during 1940. Judging by what appears to be patches of pale grey applied on the fuselage it would seem that perhaps, someone had come up with some creative ideas for improving it for the low-level operations normally carried out by these aircraft. Additionally, careful examination of the original photograph identifies the figure '7' as having been applied in the continental style with a horizontal stroke through the vertical arm of the figure.

When an aircraft was employed in the artillery-spotting role, the crew would provide target data to friendly artillery units, particularly for fire or close air support missions against deployed enemy artillery units or those moving into a firing position. Secondly, they would observe the fall of friendly fire and provide adjustment information if needed and then report on the effects of the artillery fire which followed.

Generally carried out at altitudes between 150 and 2,000 m (500 and 6,000 ft) and often penetrating behind the forward edge of the battle area to a distance of up to 30 kms (20 mls), the detailed information acquired by close reconnaissance missions provided a basis for the execution of the engagement. Intelligence information ranged from the deployment of enemy forces, their artillery locations, the positions and movements to the presence of any armoured or mechanised elements or reserve formations. Once contact had been made, the progress of the battle was observed and the reconnaissance crew were at all times responsible for maintaining visual contact with both friendly and enemy forces.

Following the completion of a mission, the observer would give an oral mission report to either his *Staffelkapitän* or designated liaison officer from which important items would be immediately transmitted to the appropriate command as a preliminary report. After the observer had concluded his oral report, a written report was completed covering a description of the mission, route and altitudes flown, the maps used, precise details of observations, usually in chronological order, details on any photos taken, the air situation during the mission and miscellaneous items such as weather conditions and any technical or mechanical problems encountered. Similarly, any uncertain observations or assumptions made would be specifically stated as such.

The pilot of this Messerschmitt Bf 110 C of the 3.(F)/22 seen here about to climb into the cockpit of his aircraft at Schippenbeil, immediately prior to the invasion of Russia in late June 1941, during which the Staffel carried out both long and short-range reconnaissance missions for the Koluft 16. Armee.

Emblem of the 3.Staffel of 3.(F)/22 consisting of a red diamond superimposed centrally on a stylised black-bordered white Balkenkreuz with white edging.

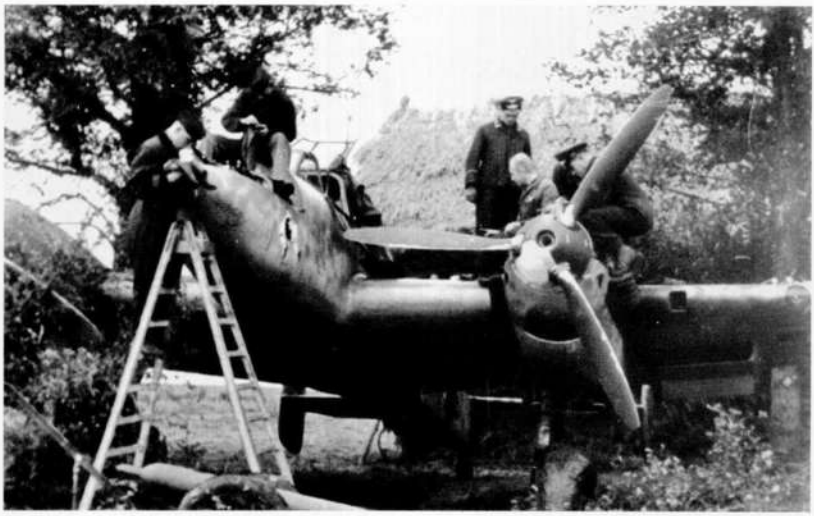
Sporting a yellow cowling and rudder, a Henschel Hs 126 B-1 of the 5.(H)/13 is seen picketed against high winds in the area of Sulany in mid-1941. Just visible on the fuselage immediately aft of the cowling can be seen the 3. Staffel emblem of a seated man holding a telescope within the figure '3'.

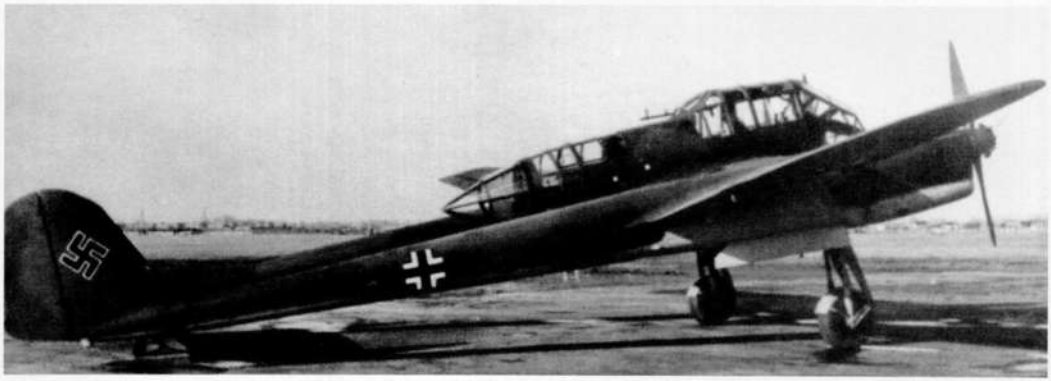
Two Henschel Hs 126 A-1s of the 5.(H)/13 form a backdrop for this meeting between a member of the Luftwaffe and local villagers near the city of Sculeni in mid-1941. Visible on the closest aircraft is the 5. Staffel emblem consisting of three fish on a dark-bordered, light-coloured shield.

Reportedly taken in the latter part of 1941, this view shows Messerschmitt Bf 110, 5D+BL of the 3.(F)/31 on approach to its base on the airfield of Schatalowka-West. One of the relatively few D-3 variants to be configured for the reconnaissance role, it carries an external fuel tank beneath each wing for the additional range needed while carrying out a combination of long and short-range missions for the Koluft 2. Panzergruppe.

Messerschmitt Bf 110 D-3, 5D+BL of the 3.(F)/31
Finished in an upper splinter scheme of 71 and 02 over 65, 5D+BL has various densities of a mottling of these two colours applied over the high demarcation of the under surface blue along the fuselage sides and the blue of the fin/rudder assemblies. The aircraft letter 'B' is outlined in the Staffel colour of yellow and the aircraft carries the prescribed theatre identity colour of yellow applied to the lower engine cowlings and as a band around the rear fuselage.

A Messerschmitt Bf 110 C-5 of the 4.(F)/14 undergoes maintenance beneath trees at an unidentified location near Dubovo during the mid-summer of 1941 during which time, in concert with Junkers Ju 88 D aircraft of the Staffel, it was operating under the control of the Koluft Heeresgruppe Mitte carrying out a combination of short and long-range missions.





Two views of SI+EM, an early production Focke-Wulf Fw 189 A-1 at the Focke-Wulf factory in Bremen in 1941. Although the Hs 126 performed well in its role, delays in the production of its successor, the Focke-Wulf Fw 189 saw the operational strength of many of the (H) Staffeln temporarily reduced from the usual nine aircraft to six, often leaving them without any reserve aircraft. However, by the early stages of 1940, five of the new aircraft had been delivered to the 8.(H)/LG 2 followed that autumn by the delivery of several further airframes for trials under operational conditions. Nevertheless, it was not until the end of the following year that the new aircraft began to appear in significant numbers with priority for delivery given to units operating on the Eastern Front. Although only slightly faster, it was a considerable improvement over the Hs 126; its twin-engine configuration provided a wider safety margin and its wide, high-mounted, enclosed crew area provided more freedom of movement for the crew while providing space for an air gunner. The addition of this extra crew position not only relieved the observer of this function to allow him to concentrate on his observation duties but also provided the gunner with a virtually unobstructed arc of fire to the rear of the aircraft.

Although not clearly visible in this view, the last two letters of its code identify this Focke-Wulf Fw 189 A-1 as being on the strength of the 6.(H)/13 in the area of Kolyschkina in the north-central sector of the Eastern Front circa August 1941.

Starting to enter service late in 1941, the A-2 variant of the Fw 189 differed only from the A-1 in armament with the original MG 15 machine guns being replaced by twin MG 81Z installations. This A-2 was on the strength of the 5.(H)/12 in late 1941 whose Staffel emblem of a figure wearing a Fez and climbing a rope while blowing a horn is clearly visible on the starboard engine cowling panel.

Staffel emblem of 5.(H)/12.

For delivering urgent messages from a short-range reconnaissance mission in flight, one of the following four methods was normally used, but only when their content could have a direct effect on the outcome of the engagement. The methods included radio and air-dropped messages, signal flares or smoke signals or, in an emergency, erratic flying, sometimes accompanied by bursts of gunfire from the aircraft or some similar measure. The contents of these messages were generally related to developing situations on the battlefield where it would be too late for the relevant command to take action if not received before the flight landed.

In addition to their regular duties and as with the long-range units assigned to the air force and the army, the short-range *Staffeln* often carried out what was known as *Tarnüberwachung* (Camouflage Monitoring Sorties) the object of which was to carry out a visual or photographic inspection of the camouflaging of the positions and equipment by friendly forces. Carried out from various altitudes, any concerns were immediately forwarded to the relevant command for rectification and frequently, the photographs taken during these sorties proved invaluable for instructing personnel in the art of camouflage.

An Hs 126, coded 6K+AK of the 2.(H)/23 taken in the Kalinin area during the early winter of 1941. Note the towing attachment mounted aft of the tail wheel.

Henschel Hs 126, 6K+AK of the 2.(H)/Aufklärungsgruppe 23
Wearing a temporary winter camouflage coat of white, 6K+AK shows signs of heavy wear and tear where large areas of the temporary white finish have worn away, as have parts of the yellow painted rudder, to reveal patches of the original 70 and 71 beneath.

Weather Reconnaissance

Although every operational wartime flight routinely included weather observations as a part of its mission, dedicated meteorological *Staffeln* were established for the collection of specific weather data. Known as *Wettererkundungstaffeln* or *Wekusta* (Weather Reconnaissance Squadrons), the usual allocation was one *Staffel* to each *Luftflotte* with others being placed under the control of the *ObdL*.

Dornier Do 17 P of the Rhein/Main weather unit in 1939. The words 'Wetterflung Rhein-Main' are painted just behind the nose emblem, which consists of a long-eared genie or dog sheltering under an umbrella, beset by lightning.

Although each *Staffel* was under the operational control of its assigned *Luftflotte*, they were completely independent self-contained, self-administered units, each with their own supply and signals organisation. Each *Staffel* was usually made up of nine aircraft, but the actual operational strength often varied. During 1940 – 1941, the figure dropped to just five or six machines, but rose again to between twelve and fourteen by 1944. The number of complete aircrews normally assigned to each *Staffel* was nine while its total personnel strength was comparable to that of a long-range reconnaissance *Staffel*, varying from 125 to 270 personnel of all ranks, with members of the flying personnel frequently supervising the technical, navigation and signals branches when not on duty.

Whenever possible, each *Staffel* was strategically located to have as complete a coverage as possible in collecting weather data from all areas adjacent to those occupied by friendly forces. At the beginning of the Second World War, the areas covered by these *Staffeln* extended over Western Europe, the British Isles, the North Sea, and parts of the eastern Atlantic Ocean. As the scope of German influence broadened, so too did the coverage of these flights, extending from the Arctic to Iceland and Greenland, Northern Norway and Finland, the Mediterranean and Russia.

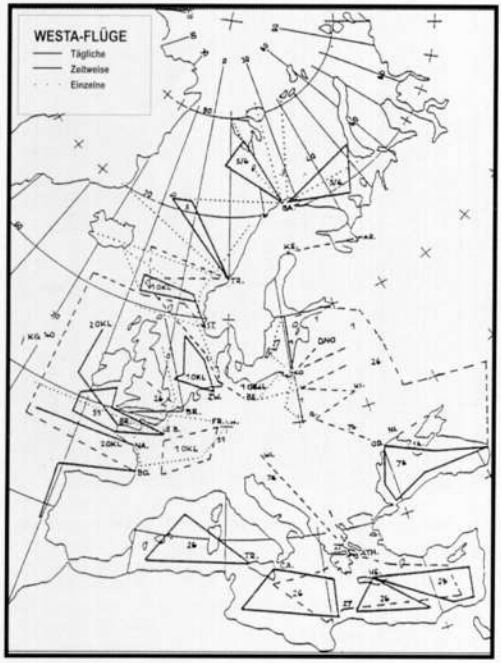
Ordered by the *Luftflotte* operations staff via its meteorological officer, the missions consisted of both area coverage and standard routes to provide uniformity in day-to-day reports. The only changes that were made were done so to avoid enemy interception, shipping searches or extremely severe weather. In 1941, five standard routes for weather flights were established, these being:

From Oldenburg, northwest through the central North Sea to the Fair Isle channel, then northeast to the Faroe Isles before turning south-southeast off the coast of Scotland and then southeast to return to Oldenburg.

From Trondheim, a southwest course to the Shetland Isles then changing to a northeast course for return to Trondheim.

From Brest, a north, northwest course to the Irish Sea and return.

A high-angle view of Heinkel He 111 H-2 T5+AU of the Wekusta/ObdL running up its engines prior to a sortie from either Berlin-Gatow or Oldenburg during the winter of 1939/1940. Formed from the Grossraum-Wekusta (Regional weather squadron) in June 1939, the unit retained its Wekusta/ObdL title until July 1940 when it became Wekusta 1/ObdL.



Based on an original German document, this map outlines the various areas covered by the different Wekusta, identified by their Arabic number, and their frequency of operation. Note that all key areas are over the sea – virtually all of the Mediterranean in particular was to be covered on a daily basis by those Wekusta elements operating out of airfields in Sicily and Crete.
Key to frequency table:
Tägliche = Daily
Zeitweise = Occasionally
Einzelne = Individual

From Brussels, west to the east coast of England then south down along the south-east coast of England and return.
From Vienna to the North to cover areas in both Czechoslovakia and Poland and return.

Preparation for a mission began with a briefing given by either the *Staffelkapitan* or the duty officer outlining the route, radio frequencies and other relevant information. A normal operational flight of this type ranged from four to ten hours' duration with longer flights made possible with either extra tanks fitted into bomb bays or drop tanks fitted on external carriers. Apart from binoculars for visual observation by the observer, the only specialised instrument carried by *Wekusta* aircraft was a Meteorograph, which, using external sensors, continually and automatically recorded, on a drum chart, the temperature, humidity and barometric pressure. On occasion however, a hand camera was carried in the aircraft and used whenever deemed necessary or advisable by the weather observer or *Wetter Frosch* (Weather Frog) as he was more commonly known.

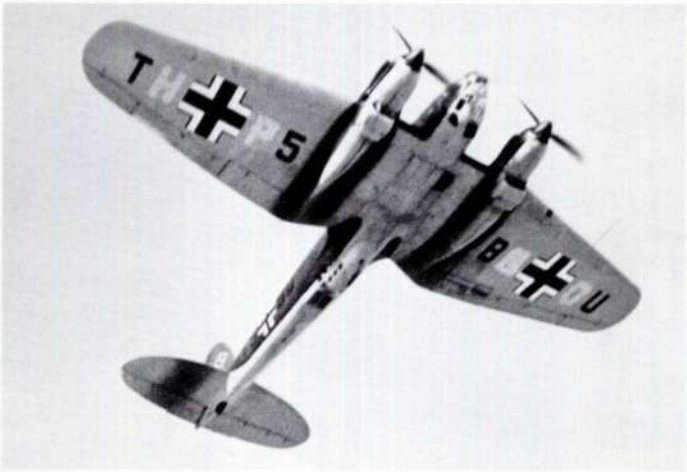
The intended mission route was marked on maps prior to the flight and followed closely by the crews who usually flew these missions at altitudes ranging from sea level up to between 5,000 and 6,000 m (15 and 20,000 ft). Although the *Staffeln* normally flew only one mission a day, it was occasionally necessary to perform an early morning and late evening sortie on the same day.

During the sortie, the observer recorded all visual information such as cloud formations, their movements and heights, wind direction and icing levels. This information was encoded by the observer, along with data from the Meteorograph, and was given to the radio operator for transmission as a *Zenitmeldung* (Zenith message) and usually transmitted at two hourly intervals throughout the flight. Although these Zenith messages proportionally formed only a small part of the aerial intelligence chain of reporting, they were viewed by all levels of command as being a very important element in the planning of offensive operations and, in the later stages of the war, defensive planning.

On completing their mission, while the crew was debriefed for any noteworthy observations made during the flight, the observer immediately confirmed the contents of his weather transmissions before they were passed to the *Luftflotte* meteorological officer. Interestingly, the weather observer was the only member of the crew who received additional specialised training and replaced the regular observer of the crew. Weather observers had a semi-military status in that they were *Beamte* (civil-service officials with a rank equivalent to that of *Leutnant*).

An undated, poor quality view of the nose of a Heinkel He 111 H of the Norwegian-based Westa 5/Luftflotte 5 in which the venturi-like fairing covering the sensors for the on-board Meteorograph is clearly visible. The Meteorograph was the only specialised instrument carried by weather reconnaissance aircraft and automatically recorded the temperature, humidity and barometric pressure on a drum chart.

The aircraft used by the *Wekusta* were primarily the Heinkel He 111 and Dornier Do 17, which were later joined or replaced by Junkers Ju 88s and Messerschmitt Bf 110s. Later in the war, Heinkel He 177s, Junkers Ju 188s, and Messerschmitt Me 410s had made their appearance in the *Staffeln* although by its closing stages, the *Nachtschlachtgruppen* (Night Attack Groups) and the Messerschmitt Me 262s of KG 51 were conducting their own weather reconnaissance because of difficulty in obtaining specialised information for their areas of operation.

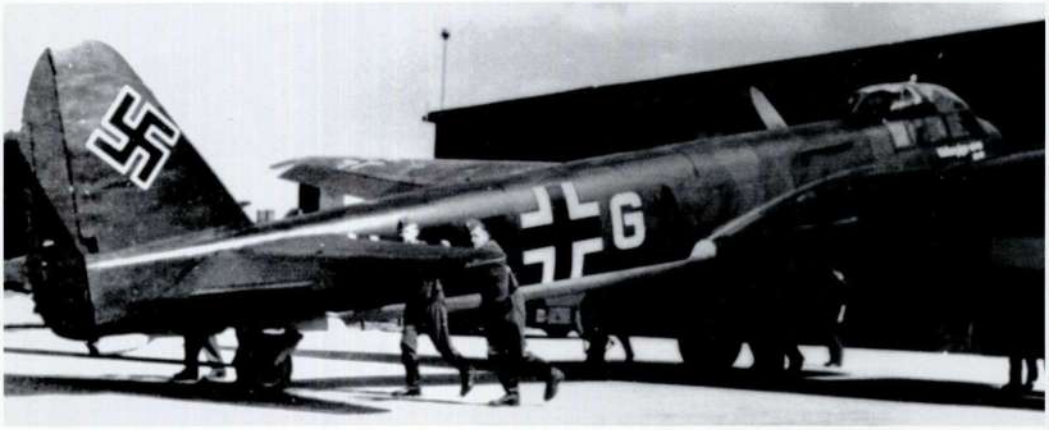


Heinkel He 111 H-2 T5+BU of the Wekusta/ObdL photographed while operating from either Berlin-Gatow or Oldenburg during the winter months of 1939/1940. Formed at Berlin-Gatow on 1 June 1936 from the Grossraum Wekusta, the unit retained this identity until July 1940 when it became the Wekusta 1./ObdL. In July 1944, it underwent a second designation change when it reformed as the Wekusta 1/OKL. Barely visible in this photograph, the aircraft letter 'B' is repeated in black on each wing tip outboard of the Balkenkreuze.

Heinkel He 111 H-2 T5+BU of the Wekusta/ObdL
Finished in the standard upper camouflage colours of 70/71 with 65 under surfaces with its national markings applied in the standard eight positions, the unit codes have been applied in black over freshly painted areas of the fuselage where the four-letter aircraft Stammkennzeichen of HP+MO had previously been located.

Emblem of Westa 1/Luftflotte 1.

These four views show Junkers Ju 88, D7+GA (an A-5 or D-2 variant) of Westa 1/Luftflotte 1 at Pleskau (Pskov) during the summer of 1941. Named 'Wolkenjäger' (Cloud hunter), it carries both the name and a stylised unit emblem consisting of a green and white frog superimposed on a white disc holding aloft a shield containing a 'Cross of Jesau' on each side of the nose. On the back of the original print are given the longitude and latitude of where the photograph was taken; 57° 50' N and 28° 21' E which is in an area located some 10 – 15 km to the north of Pskov.



German naval aviation

A pre-war view of Heinkel He 60c, 60+B11 of the 1./KüFlGr. 106 flying over the cruiser 'Köln' during exercises in the Baltic Sea. Clearly visible between the funnels of 'Köln' is the amidships mounted aircraft catapult in the stored position.

Unlike the Army, in the post-war period the *Reichsmarine* did not carry out a detailed analysis of the lessons of the First World War to create a new post-war naval doctrine. In spite of its wartime aerial successes, it was the initial opinion of senior German naval staff that the post-war mission of a naval air arm was to be that of tactical, fleet-based reconnaissance, performed by a small force of seaplanes, floatplanes and, quite possibly, airships.

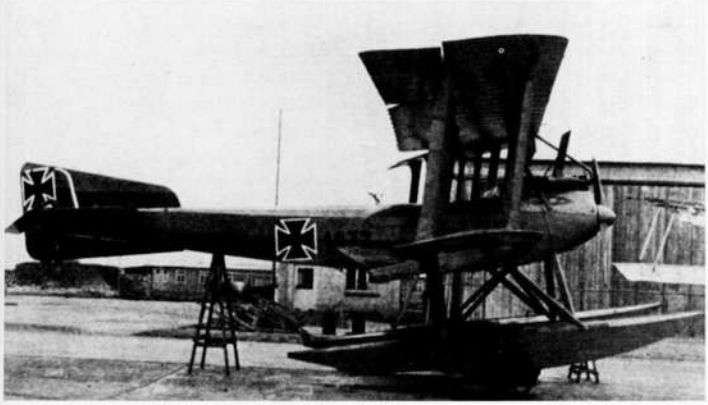
While both the Army and Navy readily co-operated on matters of importance, took part in war games and attended Army manoeuvres, the *Reichsmarine* was initially reluctant to become too involved with the Army on matters of joint aerial operations and philosophy. This unwillingness was due not only to a lingering memory of their wartime inter-service rivalry, but the Navy all-too-well remembered and resented the Army's wartime control of aviation production and its reluctance to effectively provide for the Navy's own aviation logistical needs.

Moreover, the *Reichsmarine* harboured deeper reasons for its reluctance to involve itself too heavily in a joint air programme during the inter-war period. Keenly aware of its status as the junior service, the navy wished to avoid any situation that placed its air force under Army control, fearing, justifiably so, as later events would prove, that it would eventually be absorbed into the army's own air arm. Such levels of mistrust continued to overshadow the relationship between the two services throughout the 1920s and 1930s.

In creating a post-war air arm, the navy held two distinct advantages over the Army. Firstly, to assist in the clearing of mines in the North and Baltic Seas it was able to retain several floatplanes, enabling it to keep open its former air stations at Norderney and Kiel. Secondly, and more beneficially, it was permitted to maintain a moderately sized anti-aircraft arm for whose training needs it was allowed a small number of *Friedrichshafen* FF 49 floatplanes for target towing. These two circumstances allowed the navy to operate its flying programme somewhat more openly than the army and, later, feel less inclined to participate in the latter's secret training programme at Lipetsk.

By 1924, the navy's aviation department, modelled on Wilberg's air offices at the *RWM*, consisted of a small staff of five experienced naval air officers, under the command of *Kapitänleutnant* Faber, and known as the *Flottenabteilung Referent für Seeflugwesen* (Fleet Advisor for Naval Aviation). In this capacity, Faber and his staff were responsible for the establishment of an aviation training programme and the development and acquisition of aircraft and equipment for a small, secret naval air service.

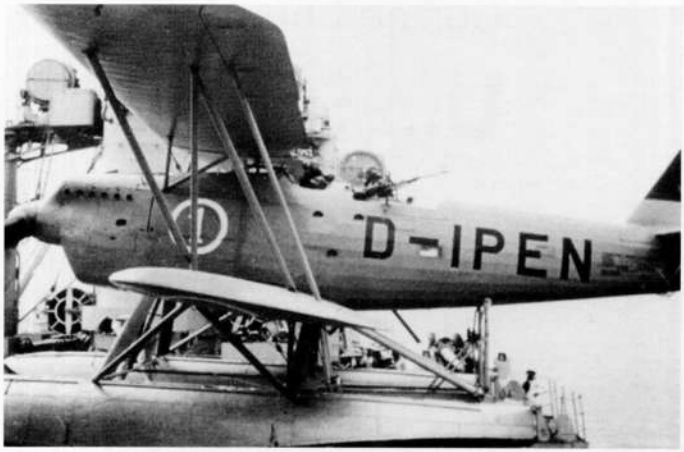
This department (later known as the *A11I* office) was also responsible for providing an air defence 'consultant' to the headquarters of each naval station with each having and maintaining a current archive of photographic and reference materials. It was the duty of these 'consultants' to present regular lectures and demonstrations designed to keep naval personnel mindful of the potential commitment and effectiveness of naval aerial units. It also produced a monthly newsletter to keep its readers abreast of the latest developments in technological advances in naval aviation and related military matters.



A development of the Friedrichshafen FF 39, the FF 49 two-seat reconnaissance floatplane first entered service in 1917. Equipped with the more powerful 220 hp (149kW) Benz Bz IV 6-cylinder engine and balanced controls, close to five hundred examples of this machine were built and aside from their post-war clandestine operations as well as open activities within Germany, also saw military service with countries such as Finland, Holland, Norway and Sweden.

That same year, the Navy was also able to secretly fund and support a small but invaluable aviation programme that would play an important role in the training of naval aviators. Operating out of the former naval air stations at Norderney and Holtenau, *Severa GmbH* was ostensibly a commercial aviation firm but in reality, provided training for both pilots and observers. At first this training,

An overhead view of the Dornier Do 16 Wal (Whale) flying boat, D-ABAU which was a version of the well-known Dornier Do J IId flying boat designed for military use. Subsequently replaced in service by the newer Heinkel He 59 and Dornier Do 18 designs, those Do 16s that remained saw out their days with the maritime flying training units.



Heinkel He 60, D-IPEN photographed aboard the Kriegsmarine light cruiser Königsberg circa 1935. Wearing an overall finish of 02 with her civil registration applied in black, the circle and figure '1' are white and are repeated on the tips of the top wing and again on the lower tips of the bottom wing. This particular aircraft was later assigned to Bordfliegergruppe 196 with the code 60+F95.

carried out with a single *Friedrichshafen* FF 49, served as refresher courses for former wartime pilots and observers, and was later revised and expanded to provide instruction courses for a new generation of observers drawn from young naval officer volunteers.

Throughout the mid to late 1920s, as the tempo of this expansion began to increase, Severa opened two new training bases at Wangerooge and Wilhelmshaven. In the meantime, a *Seeflugzeug – Erprobungsstelle* (Seaplane Experimental Station) was set up at Travemünde and the *Deutsche Verkehrsfliegerschule* (German Commercial Pilot School - DVS) established its first sea and floatplane flying schools at Warnemünde and List.

Yet, even as late as 1929, many senior naval staff officers were still not particularly air-minded maintaining instead that their primary objective was to build a large and powerful surface fleet and thus regain Germany a place as one of the world's great navies. A naval staff report presented that same year all but dismissed the role of naval air power in a single sentence which stated that the influence of such an arm in future conflicts was difficult to determine because both it and defences against it were in a constant stage of uncertainty and development. This was an interesting statement, particularly when it is considered that, the 'battleship mentality' of many of its senior officers aside, the senior naval staff was not only aware of the continuing development and expansion of its own secret air arm, but was certainly also well aware of those openly under development by other major navies around the world.

Adolf Hitler congratulates Hermann Göring on his promotion to Reichsminister für die Luftfahrt (State Minister for Aviation) and head of the RLM, while concurrently becoming Oberbefehlshaber der Luftwaffe – ObdL, (Commander-in-Chief of the Air Force).

Even so, between 1926 and 1932, the Navy continued to develop its air arm and, in January 1931, the first regulations were issued by the navy for co-operations between the fleet and naval air units. In keeping with its requirement for short-range floatplanes and larger, more powerful long-range flying boats for the reconnaissance role, several aircraft were produced under naval contract during this period; two of the best known of these being Dornier's *Militär Wal* (Military Whale) and the Heinkel He 59.

With Hitler's rise to power in 1933, it did not take long for the Navy's fears of losing its air arm to be realised. With the appointment of Herman Göring to oversee aviation development in Germany in 1933, December of that year brought the first clash over who effectively 'owned' the naval air units. While the navy did not deny the need for an independent air force, it contended that naval aviation operations were an extension of the fleet and should therefore remain under its direction, much like motor-torpedo boats or U-boats. Setting the tone for the future, nothing was achieved from the meeting beyond a mistrust that would characterise all future dealings between the Navy and *Luftwaffe* over naval aviation.

Tensions over naval aviation units continued to simmer until March 1935, when the fledgling *Luftwaffe* was revealed to the world. With German military aviation now out in the open, the debate over naval aviation was set to move into high gear. In 1936, the battle over naval air units took on a decidedly political bent when Hitler announced that Göring was to preside over the Four Year Plan – Germany's programme for economic recovery and military rearmament. Combined with his role as commander-in-chief of the *Luftwaffe* and head of German rearmament, Hitler's air minister was set to influence naval aviation in a way that the navy had never thought possible.

With the *Luftwaffe* absorbing so much of the rearmament budget, the Navy was forced to pander to Göring's position in order to equip its various *Staffeln*. Seizing his opportunity, Göring cited economic concerns to deny the Navy's requests. Adding insult to injury, he then went so far as to try

A Heinkel He 59 of AS/88 airborne over the Spanish countryside in the summer of 1936. Commanded by Major Karl-Heinz Wolff, AS/88 was the maritime contemporary of A/88, the reconnaissance element of the Legion Condor and operated in the patrol and reconnaissance role in support of the Nationalist Navy. From January 1937 the Staffel adopted a more aggressive operational role when its aircraft began to carry torpedoes with which to attack shipping targets. One such attack was carried out on 30 January when Oblt. Klümper attacked and damaged the 1200-ton Spanish merchant ship Delfin with a single torpedo launched from his He 59.

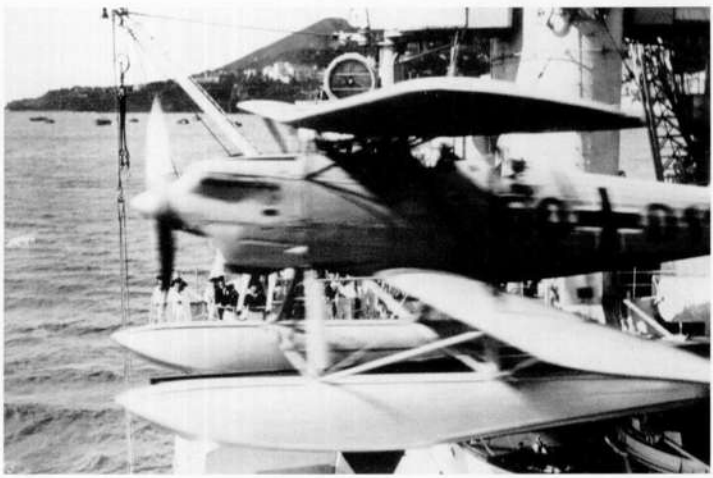
to usurp naval long-range sea reconnaissance and mining operations on the grounds that the Navy's air units were ill-equipped for such tasks! While the Navy was able to fend off Göring's challenge to naval aviation, its position had been seriously weakened.

As the level of acrimony between Göring and the now renamed *Kriegsmarine* continued to worsen, not even the magnificent results of the under-equipped naval aviation unit *AS/88* sent to Spain as part of the *Legion Condor* improved or clarified the situation. In mid-1937, the only hope for naval aviation lay in a conference that was to establish the zones of operation for naval and *Luftwaffe* air units.

From this epic conference, the Navy emerged battered, but not broken. Although it had been able to forestall what increasingly looked like the inevitable, it realised that it was able to extract several concessions from the *Luftwaffe*. Even so, naval air units as an extension of the fleet were on borrowed time. Despite the *Luftwaffe*'s obligations to naval aviation units, for the next two years it increasingly over-stepped the boundaries laid out in the 1937 conference.

In 1939, the Navy made one last-ditch attempt to achieve harmony and regain control of its air units. With what became known as the Spring Protocol, the two services set out the boundaries for their respective air arms. Yet the writing was on the wall as the years of inter-service rivalry had whittled away the Navy's will to fight for its air arm. With Göring's political power and close ties to Hitler, the *Luftwaffe*'s ambitions for control of naval aviation were soon to be rewarded.

Heinkel He 60, 60+D11 of the 1./KüFlGr. 506 photographed at the moment of launch from a catapult on-board the battle cruiser 'Deutschland' during the Spanish Civil War.

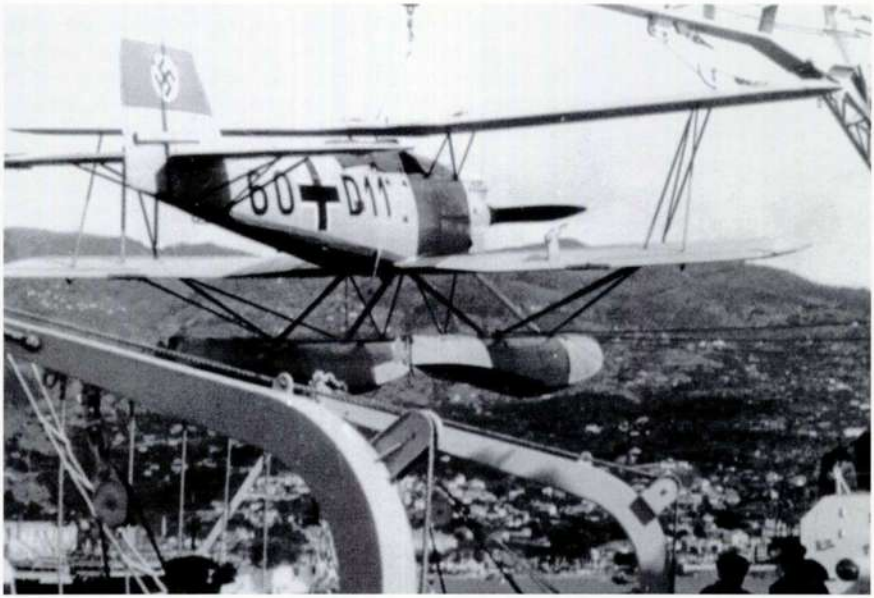


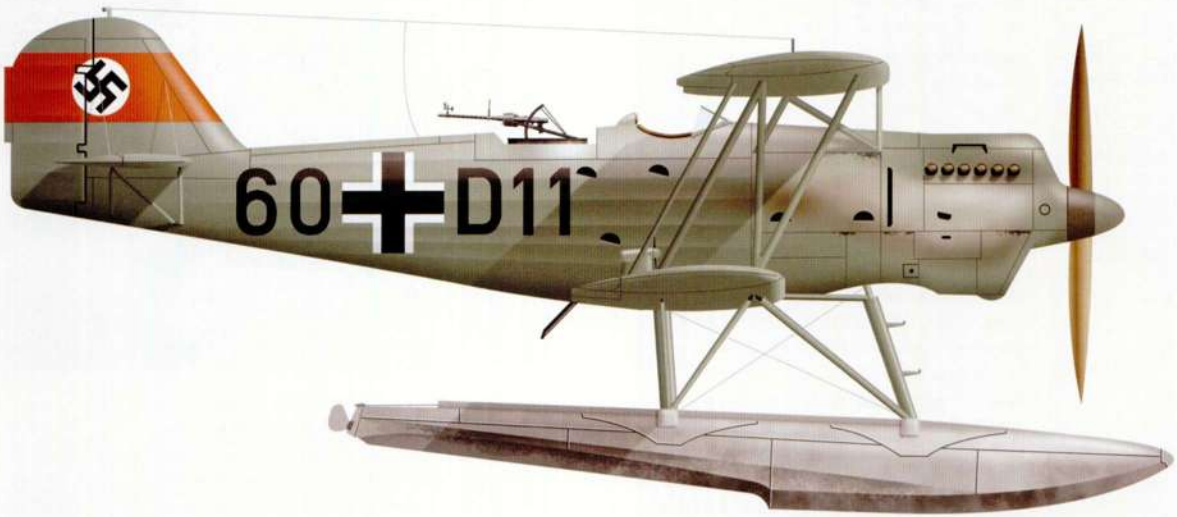
For 20 years, both the Navy and Army had tried to build their own autonomous air component. However, in the six years after Göring's appointment as *Reichsminister* for Aviation and head of the *Luftwaffe*, neither of the two forces controlled much in the way of aircraft. Göring's machinations had ensured that there would only be one uniformly controlled air force which would co-operate at the strategic and tactical levels with the other arms of the *Wehrmacht*. To ensure that such a system functioned properly, the *Kriegsmarine* was provided with its own chain of command for its assigned *Luftwaffe* units.

Responsibility for the aerial requirements of the *Kriegsmarine* - the weakest arm of the *Wehrmacht* – had originally lain with the *Oberbefehlshaber der Luftwaffe - Führer der Seeluftstreitekräfte – ObdL. F.d.Luft* (Commander of naval air units on the staff of *ObdL*), subordinate to *Luftwaffenkommando – See* (*Luftwaffe* Command – Sea) at Kiel. Disbanded on 1 March 1939, it was immediately reformed in Berlin as the *General der Luftwaffe beim Oberbefehlshaber der (Kriegs) Marine - Gen.d.Lw.b.Ob.d.M* (*Luftwaffe* General on staff to the Naval High Command). This new command was responsible for overseeing all *Luftwaffe* units assigned to the *Kriegsmarine*.

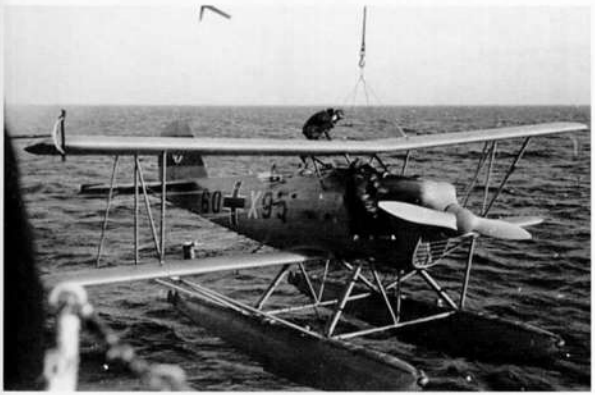
As far as reconnaissance in support of the *Kriegsmarine* was concerned, operations were structured in similar fashion to those previously described for aerial and ground operations. Excluding surveillance missions of harbour and port facilities, reconnaissance operations concentrated on sea lanes and included the shadowing and reporting of convoys and their locations, reporting the disposition of enemy merchant and naval shipping in both coastal waters and on the high seas and tactical reconnaissance sweeps ahead of prowling U-Boats. Ship-borne aircraft such as the Arado Ar 196 and Heinkel He 114, were also used in these operations. Although their primary task was to carry out reconnaissance missions for their parent ship, these floatplanes were also employed in a variety of courier, patrol and air support capacities.

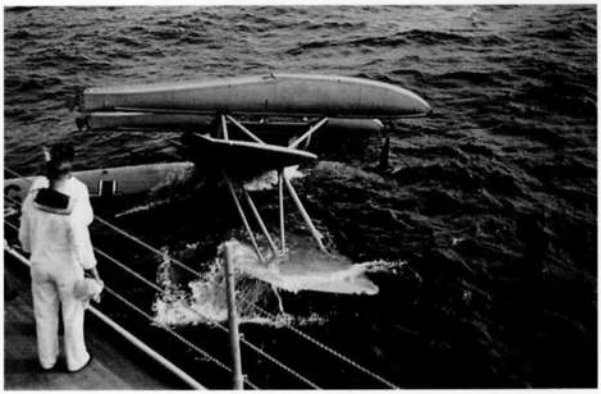
Photographed off the Spanish coast at the time of the Spanish Civil War, float-equipped Heinkel He 60, 60+D11 of the 1./KüFlGr.106 is hoisted aboard the cruiser 'Deutschland'. Clearly visible in this view are the red-painted gust locks fitted to the ailerons, rudder and elevators.





Heinkel He 60c, 60+D11 of the 1./Küstenfliegergruppe 106.
Finished in overall grey 63 with the floats left in treated bare metal and anti-fouling paint for their underwater surfaces, 60+D11 carries the original form of Balkenkreuz introduced in late 1935 with only a white edging to the black cross. Read in reverse order, the black-painted codes identify it as aircraft 'D' of the 1. Staffel of *Küstenfliegergruppe* 106.





Heinkel He 60, 60+X95 of Küstenfliegergruppe 906 suspended outboard from a hoist of an unidentified Kriegsmarine ship. Shortly after the first photograph was taken, the cable broke sending the aircraft crashing inverted into the sea from where it was eventually hauled alongside the ship. It is not known if the aircraft was recovered.

In similar fashion, Heinkel He 60 60+Y95 ended up nosed over into the sea. Neither the cause nor the resulting fate of this aircraft is known, although note the broken starboard float, perhaps due to a heavy landing. In both cases, the addition of a thin black border to the outer edges of the white borders for the arms of the Balkenkreuz suggests that both incidents occurred after mid-1936.

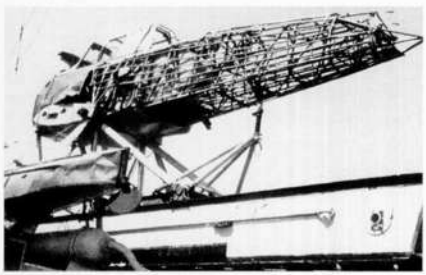
As with all reconnaissance operations in the *Luftwaffe,* coastal and shipping reconnaissance was decentralised. Each geographic area was overseen by its own command which was given the responsibility for the completion of certain tasks. In this way, operations were carried out as part of the general plan for the region which the command was responsible for. As such, actual operational flights were carried out on an area search basis rather than over specific routes. The one exception to this, of course, was the coverage of coastal shipping areas.

Below the *Gen.d.Lw.b.Ob.d.M,* the largest command was the *Führer der Seeluftstreitkräfte - F.d.Luft* (Commander, Naval flying units). Originally there had been only a single such command, which had been tasked with providing air reconnaissance in the North Sea, between 52 and 58 degrees, and the entrance to the Baltic, while at the same time providing air cover to U-boats and German convoys. However, from 1940, as the scale of German territorial acquisitions grew, it became necessary to split the command into specific geographical areas: *Nord, Sud, Ost* and *West* (North, South, East and West, respectively.) Each of the *F.d.Luft* commands were then made subordinate to the respective *Fliegerkorps* or *Fliegerführer or,* in some instances, both. For operational purposes, it was these subordinate commands that directed the operations of naval air units, as it was at this level that close co-operation with the corresponding naval commanders allowed for the best possible inter-service relationship. Of immense value to the inter-service co-operations between the various air units and the *Kriegsmarine* was the assignment of naval trained observers to each individual aircrew. In this way, these officers were able better to relate their observations to other, like-minded naval officers. The best known of the units which performed naval reconnaissance were the *Küstenfliegergruppen* (Coastal Flying Groups).

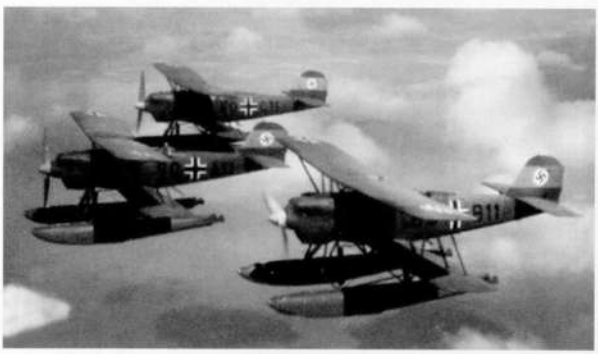
A pair of Heinkel He 114s photographed at a slipway at what is presumably a Heinkel facility on the Baltic coast. Finished in the standard maritime upper surface colours of 72/73, that they still carry their four-letter Stammkennzeichen of IY+YK and IY+YG respectively suggests that they may be undergoing pre-delivery testing. Just visible behind the engine cowling, each carries what may be the last two digits of their respective Werk Nummern; IY+YK being '44' and IY+YG being '42'.

Stern view of the battle cruiser, 'Admiral Graf Spee' at the Spithead review in May 1937 as the German naval representative for the coronation of His Majesty King George VI. Clearly visible mounted on the catapult abaft the funnel is one of her two embarked Heinkel He 60 D aircraft which were replaced by a pair of Arado Ar 196 floatplanes shortly before she left Germany for the South Atlantic in August 1939. Interestingly, as 'Graf Spee' was at sea at the outbreak of war, the 400 kg (880 lb) large bronze eagle motif on the stern was not removed from the ship and was recovered from the wreck during February 2006 and placed on display in a Montevideo hotel.

Aerial view of the stern of 'Admiral Graf Spee ' taken in April 1939 as she passed through the English Channel en route to the Atlantic to carry out exercises with the battle cruiser 'Gneisenau', the cruisers 'Admiral Scheer ' and 'Deutschland ' and other Kriegsmarine units. Visible on the catapult abaft the funnel can be seen an Arado Ar 196 A-1. Although the complete code painted on the top of the wing is indistinct, the visible L2 positioned inboard of the Balkenkreuz on the port wing suggests that the aircraft, which is wearing an overall 63 finish, was from Lehrgeschwader 2.



The burnt-out fuselage of one of the two Arado Ar 196 A-1 floatplanes carried by 'Admiral Graf Spee' sits forlornly on its catapult as she lies at anchor in Montevideo harbour following her running battle in the South Atlantic with the three Commonwealth cruisers, HMS Ajax, HMS Exeter and HMNZS Achilles in mid-December 1939.

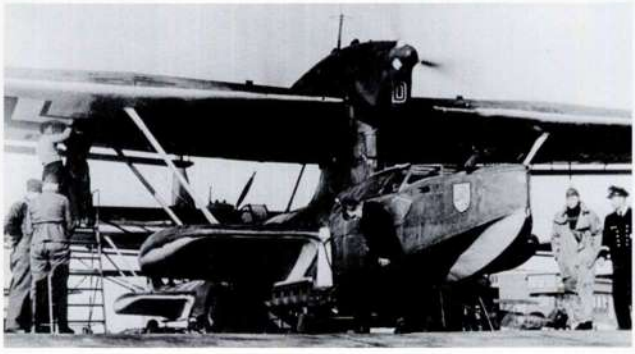


A Kette of 63-finished Heinkel He 60s from the 1./KüFlGr. 106, here airborne from their home base on the Frisian Island of Norderney in the summer of 1937.

Formed from the earlier *Seefliegerstaffeln* (Aerial Sea Squadrons) in 1935, the first *Küstenfliegergruppe* was originally a composite composed of three *Staffeln*: a *Küstennahaufklärungsstaffel* (short-range coastal reconnaissance squadron) tasked to conduct shipping reconnaissance, a *Küstenfernaufklärungsstaffel* (long-range coastal reconnaissance squadron) for long-range duties and a *Küstenmehrzweckestaffel* (multi-purpose coastal squadron) which undertook miscellaneous duties. From their very inception, the crew of each operational maritime aircraft included a trained naval observer who, as with *Luftwaffe* crews, was the captain of the aircraft, reflecting the view that the pilot, usually of non-commissioned rank, was merely the 'driver'

Staffel emblem of the 2./Küstenfliegergruppe 906 which consisted of three black flying fish on a black bordered pale blue shield.

The crew of Dornier Do 18 D, W.Nr.0731 coded KY+YK are seen abandoning their aircraft as it drifts in the North Sea after being forced down by a Blackburn Skua from 803 NAS on board HMS Ark Royal on 26 September 1939. This was the first Luftwaffe aircraft to be lost in operations against the United Kingdom during the Second World War and although the relevant records state that it was from the 2./KüFlGr. 506 there is some evidence to suggest that it was actually on the strength of the 2./KüFlGr. 106 at the time of its loss.



A hive of activity surrounds this Dornier Do 18 D K6+DL of the 3./KüFlGr. 406 on the slipway at its home base of Hörnum on the island of Sylt in late 1939. Visible on the bow of the aircraft is the Staffel emblem of a black and white whale superimposed on a map of Sylt with its lighthouse at the southern tip. The individual letter D on the front of the pylon is black with a yellow outline.

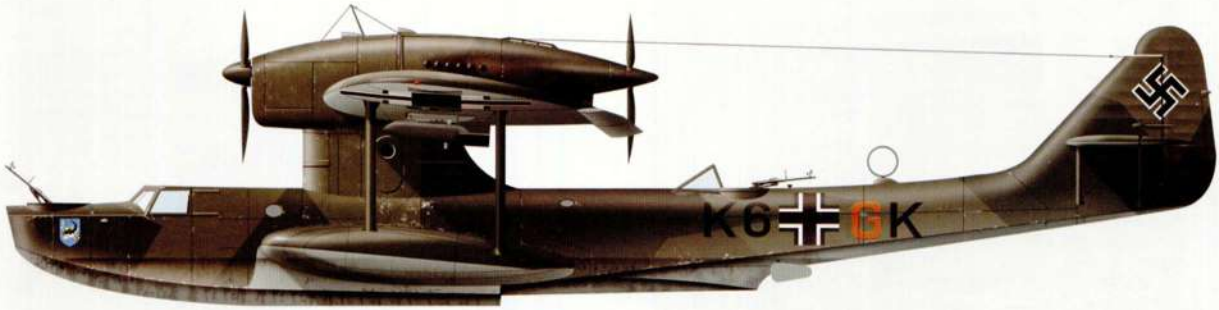
Although its identity is not known with any certainty, the Dornier Do 18 seen here is believed to be either W.Nr.0732 of the 2./KüFlGr. 506 or W.Nr.0804, K6+DL of the 3./KüFlGr. 406. Both aircraft were brought down off the north-east coast of Britain by Lockheed Hudsons: W.Nr.0732 by an aircraft from 224 Sqn RAF on 8 October 1939 and W.Nr.0804 by two Hudsons of 220 Sqn RAF on 10 November 1939. In both instances, the Dornier crews were rescued by passing shipping with the exception of Oblt.z.See W.Lütjens from the second aircraft who was reported missing.

Dornier Do 18 D-1 of the 2./KüFlGr. 906 undergoing servicing of the fuel system for its Junkers Jumo 205C diesel engines. Coded 8L + BK and finished in the standard maritime scheme of 72/73/65, the aircraft letter 'B' is yellow and is repeated on the front of the wing pylon while on the side of the cowling can be seen the Staffel emblem.

and therefore little more than a naval chauffeur. By 1938, additional *Küstenfliegergruppen* had been formed and even though the multi-purpose squadrons were intended mainly for armed reconnaissance duties, it may be said that the principal role of the *Küstenfliegergruppen* was for reconnaissance duties in support of the *Kriegsmarine*.

Until early 1940, Heinkel He 60 and He 114 floatplanes, each with an endurance of about five hours, were the main aircraft used for short-range maritime duties. The longer-range units were initially equipped with the Dornier Do 15 *Militär Wal* flying boat, which was later replaced by the more elegant and up-to-date Dornier Do 18 flying boat, with an endurance of close to 18 hours. Meanwhile, the multi-

Taken on 22 October 1939, this Propaganda Kompanie photograph shows Dornier Do 18 D K6+GK, Red 'G', of the 2./KüFlGr. 306 taxiing past the camera off the North Sea island of Sylt. Just visible beneath the starboard wing adjacent to the struts can be seen the two ETC 50 bomb carriers loaded with a pair of SC 50 bombs. On the day that this photograph was taken, the Staffel was reformed as the 3./ KüFlGr. 406 and it is understood that this photograph is part of a series taken that day.

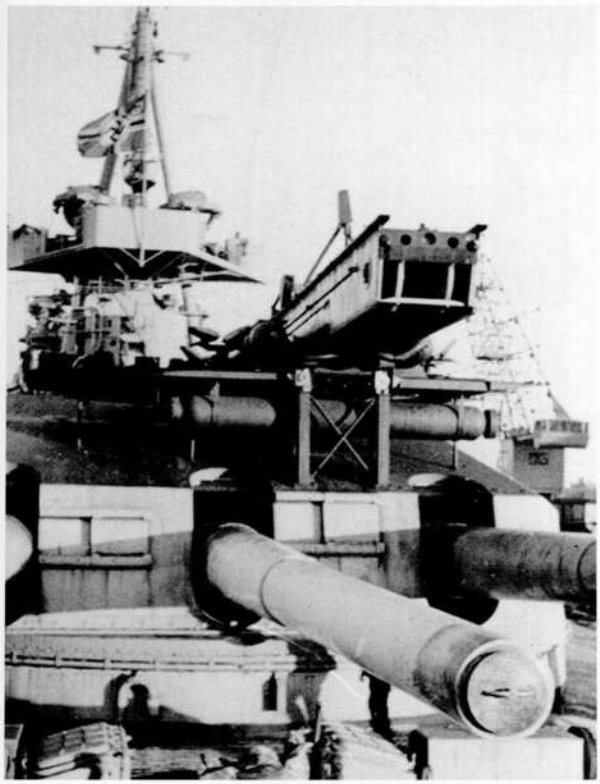


Dornier Do 18 D, K6+GK of the 2./Küstenfliegergruppe 306
Dornier Do 18 D K6+GK is finished in the 72/73 segmented scheme developed for maritime aircraft with under surfaces finished in 65. The aircraft letter 'G' is in the 2. Staffel colour of red and repeated on the front face of the forward engine nacelle and it carries the Staffel emblem each side of the bow. While the fuselage Balkenkreuz is of standard dimensions, those above and below the main wings are of increased size and proportion in keeping with the revision to markings published following the end of the Polish campaign.

purpose *Staffeln* were equipped with another Heinkel design, the He 59 seaplane which had an endurance of about 10 hours. Except for the *Wal*, which through continual over-modification was a constant source of trouble, meaning that forced landings were commonplace, all these aircraft were thoroughly reliable and provided the *Küstenfliegergruppen* with years of excellent service. All of these aircraft were similar in performance regarding speed, which was approximately 200 km/h (approx. 120 mph), and altitude, 3,000 to 4,500 m (9,500 to 14,000 ft). Although by 1940 such figures were laughable, they were deemed adequate, as the reconnaissance duties then undertaken usually relied on visual observation from altitudes of between 100 and 500 m (350 and 1,700 ft.). Furthermore, senior officers of the *Kriegsmarine* felt that sea reconnaissance flights were best carried out at slow speeds to facilitate the best possible observations.

A Heinkel He 60c coasts towards its parent ship while the observer stands by at the rear of the wing in preparation for securing the lifting strop to the ship's crane to hoist the aircraft inboard.

While the *Küstenfliegergruppen* provided reconnaissance support for the *Kriegsmarine*, the aviation unit most closely integrated with German naval vessels was *Bordfliegergruppe 196*. Formed in 1937, it went on to include a total of six *Staffeln*, many of which provided the aircraft embarked on *Bismarck*, *Prinz Eugen*, *Scharnhorst*, *Tirpitz* and a number of other capital and second-line ships. The unit was initially equipped with the He 60, though other types, such as the He 114, were also used on occasion. The aircraft and pilots were controlled, trained, and provided by the *Luftwaffe*, while the *Kriegsmarine* provided liaison support for the pilots, and on most occasions, the observer.



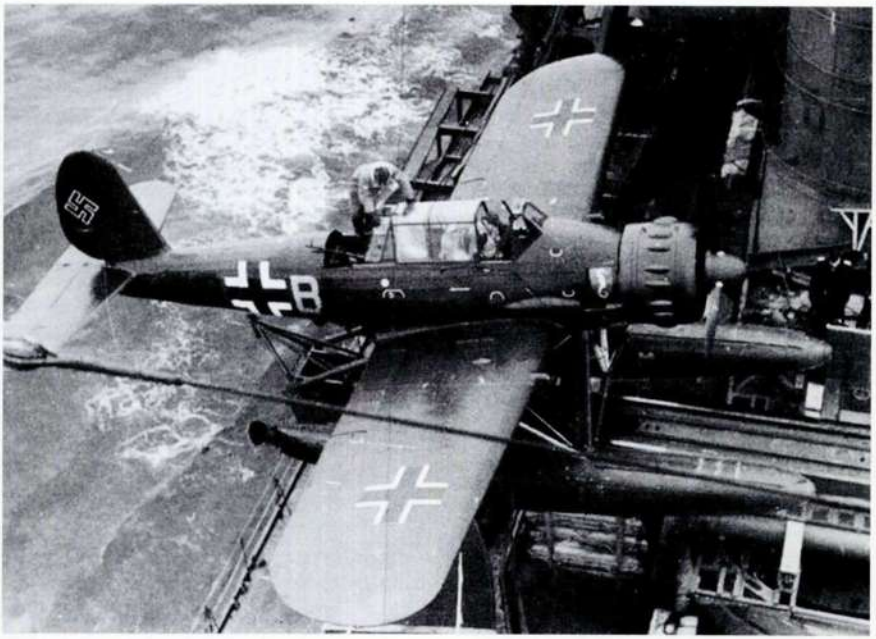
A view of the aircraft catapult mounted offset to the starboard side of the aft turret of the battleship 'Scharnhorst' circa 1939. As with her sister ship 'Gneisenau', she was originally fitted with two catapults with the second mounted amidships abaft the funnel. Both ships had their turret-mounted catapults removed in 1940.

While *BFlGr. 196* did, on occasion, use land-based aircraft, the predominant types used by the unit were floatplanes, which could be stored either above deck or in specifically designed hangars, usually within the amidships region of the ship. Adjacent to this hangar area was a catapult used to launch the aircraft. Once launched, the aircraft remained in radio contact with their parent ship

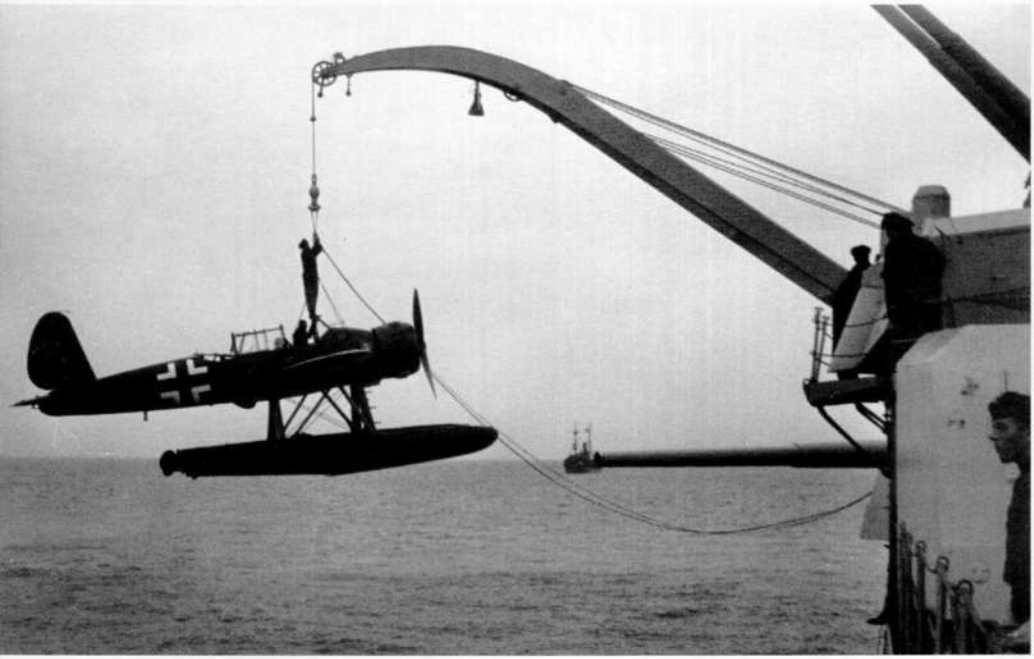
Arado Ar 196 A-3 coded K3+CO seen at the moment of launch from an on-board catapult. Although the aircraft is from Seenotstaffel 6 (Air-Sea Rescue Squadron 6), the photograph is included in this publication as it gives a clear view of the catapult dolly on which the aircraft was mounted for launching.

An Arado Ar 196 A-2 comes in to touch down close to the leeward side of its parent ship.

In this undated photograph the crew of Arado Ar 196 A-3 T3+BL of the 3./BfGr.196 are seen boarding their aircraft prior to launching from the amidships mounted catapult of the battleship 'Tirpitz'.



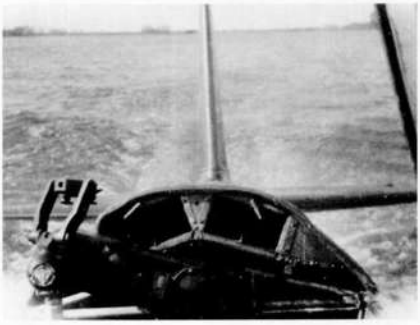
Arado Ar 196 A-3, T3+BL of the 3./Bordfliegergruppe 196 aboard the battleship Tirpitz
Finished in the standard 72/73/65 maritime camouflage, T3+BL has the aircraft letter in the 3. Staffel colour of yellow and carries the Staffel emblem of a forward-facing white or silver seahorse on a blue shield on both sides of the fuselage immediately aft of the engine cowling. Showing signs of wear, the camouflage paint has begun to flake off the floats exposing the primed metal beneath, while the semi-circular light-coloured symbols on the side of the fuselage are the markings for foot and hand holds.



An Arado Ar 196 A-2 of Bordfliegergruppe 196 being hoisted aboard the battleship 'Scharnhorst' by one of the ship's 12-ton cranes. Visible beneath the rear fuselage is the housing for the Peil G V antenna. Note that the normally fitted spinner is missing.

and when the sortie had been completed, the pilot landed close to the leeward side of his parent ship from where he and the crew would be hoisted aboard and made ready for another sortie.

Despite the need to expand naval aviation units given the increased responsibilities that war brought, by late 1940 *ObdL* had managed to separate many short-range and miscellaneous squadrons from their parent *Küstenfliegergruppen* and had re-equipped them with land-based aircraft such as the Junkers Ju 88 and Heinkel He 111. Consequently, the participation and performance of naval aviation units involved in reconnaissance began to decrease as a result of their diminishing numbers. The situation was not helped by the fact that most aircraft were never designed to accommodate photographic equipment so that initially, all reconnaissance observations had to be carried out visually.

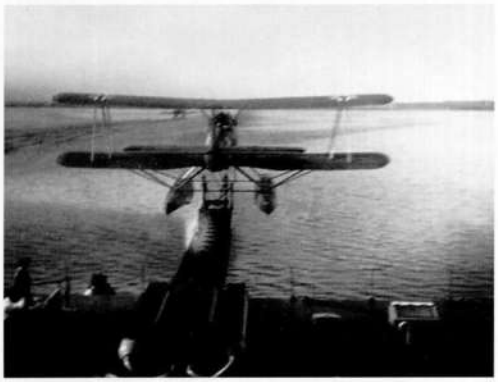


In this view from the observer's position of an Arado Ar 196 A-2 during its take-off run, it can be seen that the Arado-designed flexible gun mounting for the observer's 7.9 mm MG 17 machine gun is in its stowed position.

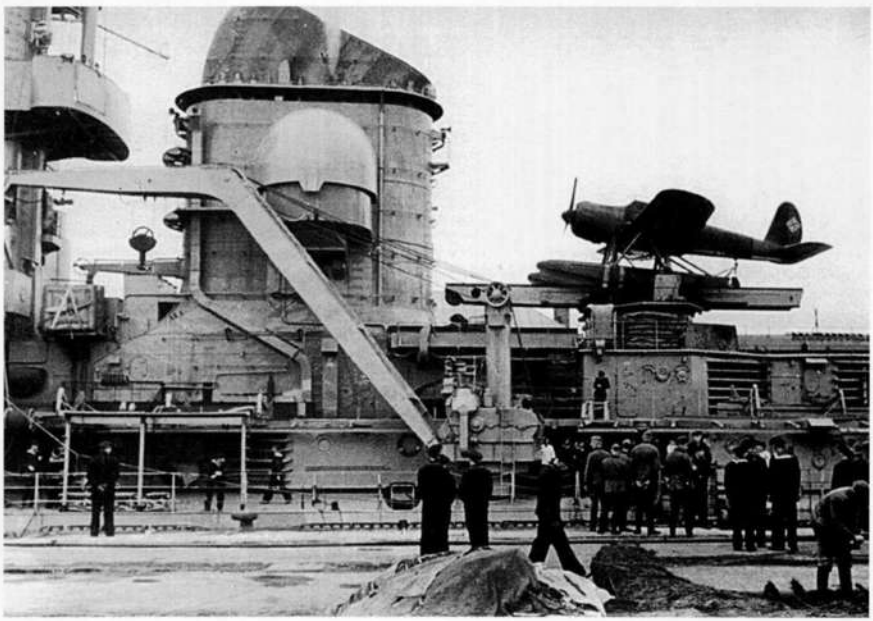
Initially, naval aviation aircraft had no built-in automatic cameras and when photographs were required either the HK 13 or HK 19 hand-held camera would normally be used. To cope with the demands of reconnaissance operations at sea, pilots of naval air units received training at specialised schools on the Baltic coast. Once completed, the pilot, along with his crew, then supplemented their training with additional crew training in gunnery and armament at naval training facilities. It was in this final stage of training that the crews came together and began to familiarise themselves both with each other and in working together as an operational aircrew.

During training, any particular abilities or personal wishes of the pilot were noted and whenever possible, he was posted to a suitable unit. However, as the war progressed and the shortage of aircrew became more pronounced, this practice was obviously stopped. The observers, on the other hand, were drawn from the ranks of the navy. Usually, young men with the rank of *Fähnrich* (Midshipman) were seconded to the *Luftwaffe* for four years, although this was frequently extended. These observers spent their first year in specialised schools under naval instruction where they undertook very thorough training.

While the Heinkel He 60 and He 114 had formed the original core of many short-range naval air units, late 1939 saw the introduction into service of the Arado Ar 196 short-range reconnaissance floatplane. With a performance markedly superior to the obsolescent He 60, it was also better armed, with two 20mm cannon mounted in the wings, a fuselage-mounted MG17 and an MG15 in the rear cockpit for the observer. Used with great success on capital ships, commerce raiders and from coastal

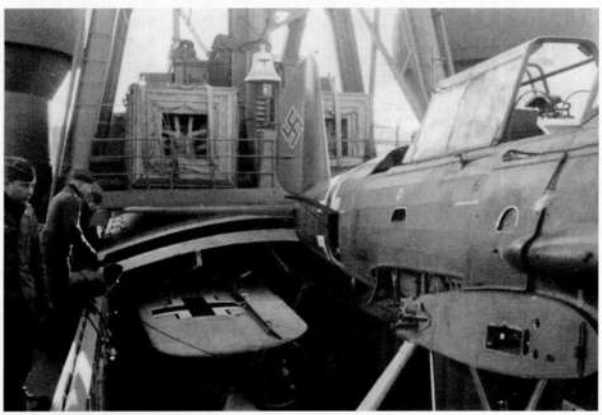


A Heinkel He 60c of the FFS (See) 3 being launched from the amidships catapult of an unidentified Kriegsmarine ship.



With its overall 63 finish broken only by its national markings and code letters, Heinkel He 59 S6+E72 of the FFS (See) 3 is seen here moored stern first to a slipway at Stettin circa 1937.

Taken at Brest or La Pallice between March 1941 and February 1942, this view of the 'Admiral Hipper' class heavy cruiser 'Prinz Eugen' shows one of her embarked Arado Ar 196 A-3 aircraft sitting on the catapult abaft the funnel with protective canvas covers in place over its cockpit canopy and BMW 132K radial engine.



One of the three embarked Arado Ar 196 A-3s, T3+HL of the 3./BflGr.196 is seen here during removal from its amidships storage container onboard the heavy cruiser 'Prinz Eugen' in preparation for a sortie.

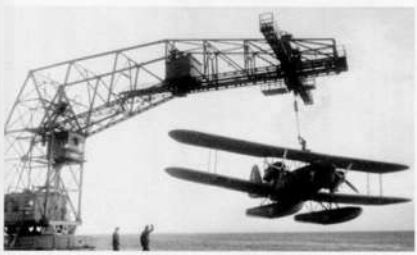
Arado Ar 196 A-3, T3+HL taxies alongside a slowly moving 'Prinz Eugen' as the observer connects the lifting strop in preparation for hoisting the aircraft inboard. To the left of the photograph and trained to port, is one of the four triple torpedo batteries carried by the ship. Although she never sank a single enemy vessel, she is remembered as a 'lucky' ship and although heavily damaged on several occasions, was the only heavy surface unit of the Kriegsmarine to survive the Second World War intact. One of her Arados is currently in storage at the Paul E. Garber Facility in Silver Hill, Maryland, USA.

A Heinkel He 115 B-1 of the 3./KüFlGr. 106 moored in the harbour at the Dutch port of Schellingwoude during the latter months of 1940.

Developed as a replacement for the Heinkel He 59, another very useful maritime design from Heinkel was the three-seat He 115 general-purpose seaplane, which first flew in prototype form in 1936. Following the A-series into service, the B-1 featured increased fuel capacity and was fitted with the release equipment for magnetic mines. In its B-1/R1 form it could carry two cameras for reconnaissance missions. Seen here wearing the standard maritime finish of 72/73/65 is He 115 B-1, PP+AX.

stations, although burdened by two heavy floats, its manoeuvrability in the hands of a capable pilot frequently surprised many an Allied opponent. One of the type's early war successes occurred on 5 May 1940 when two of these floatplanes from *BFlGr. 196* played a part in the capture of the damaged British minelaying submarine HMS *Seal* in the waters of the Kattegat.

At around the same time that *BFlGr. 196* was being introduced to the Ar 196, the multi-purpose *Küstenfliegerstaffeln* began to replace their ageing He 59s for the more modern Heinkel He 115. Having debuted in Spain with the Legion Condor, the He 115 represented a considerable increase in performance and armament over its predecessor. By the close of 1940, most multi-purpose *Küstenfliegerstaffeln* had re-equipped with the type and were employed on 'armed reconnaissance' operations, for which the aircraft was fitted to carry torpedoes. Considerable success was claimed against merchant shipping in this role until increasing defences made this type of operation all too costly. By 1941, naval aviation units were under increasing political pressure from the *Luftwaffe*, while at the same time suffering increasing losses from better defended Allied shipping and long-range Allied patrol aircraft. With no new generation aircraft coming off the production line, maritime aviation was facing a genuine crisis of command operations.

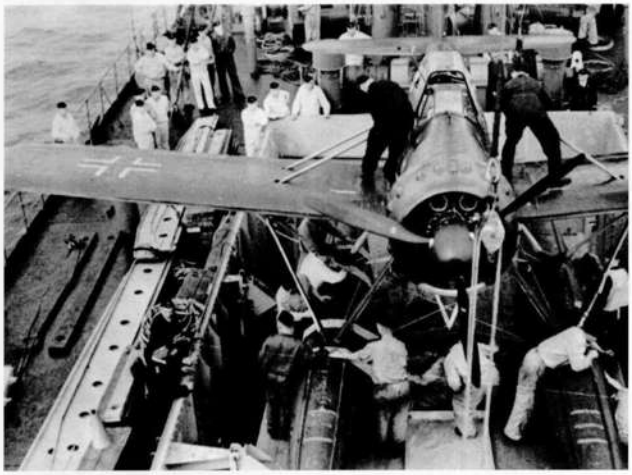


Heinkel He 59 B-2 coded M2+RW of the 3./KüFlGr.106 is hoisted ashore by crane. Visible beneath the cockpit is the Staffel emblem consisting of a skull and crossbones superimposed on a black disc carried within a white shield, which it inherited from the 3./KüFlGr.206 in April 1937.

A Dornier Do 18 G-1 fitted with the fully enclosed HDL 151/1 dorsal turret, which housed a single 20 mm MG 151/20 cannon.

Finished in the standard 72/73 maritime camouflage, this Dornier Do 18 G-1 of the 2./KuFlGr.106 carries the unit code and Staffel letter but has yet to have the individual aircraft letter applied. Although similar in general appearance to the Do 18 D, the G-1 featured a re-contoured bow, more powerful Jumo 205D engines and improved defensive armament consisting of a 13 mm MG 131 in the bow position and a 20 mm MG 151 cannon mounted in a hydraulically operated turret in the rear fuselage. It also carried provision for the attachment of take-off assistance rockets.

Often referred to by British Prime Minister Winston Churchill as 'The Scourge of the Atlantic', the Focke-Wulf Fw 200 'Condor' played an important role for Germany by ranging far out into the Atlantic and northern oceans on long-range maritime reconnaissance missions in support of both the Kriegsmarine and anti-shipping units of the Luftwaffe. BS+AJ seen here in these two photographs was an Fw 200C-1 which, after spending some time at the E-Stelle at Tarnewitz, was transferred to KG 40 where it joined other Fw 200s engaged on offensive maritime reconnaissance operations. Its ultimate fate is not known.



One of the two Arado Ar 196 A-1 floatplanes carried by the German surface raider 'Komet' is seen here being assembled within its crate-like stowage somewhere in the Pacific Ocean on 2 October 1941. During its take-off run a short while later, the aircraft somersaulted, severely injuring the observer Oblt.z.See Lindemann requiring his repatriation to Germany via Japan for treatment.

The wreckage of 'Komet's' Arado Ar 196 A-1 is hauled from the sea. Given its obvious condition, it is likely that very little was salvaged and the wreckage was eventually dumped overboard.

German Aerial Cameras

During the First World War, Germany had some 2000 mapping cameras and between 80 – 100 automatic aerial cameras, with some of these using lenses with a focal length of 50 or 75 cm (19.69 or 29.53 in) in order to provide large-scale images when taken from high altitudes, relative to aircraft technology and performance then available. These automatic cameras were a development of early movie camera technology, modified to produce the desired results, culminating in the *Reihenbilder* (row or series pictures) designation or, in its more commonly used abbreviation, *Rb*. Also inherited from the same technology used in the development of automatic cameras was the use of perforated film, which, advanced by sprocket wheels, allowed for very precise registration of consecutive frames, even with wide rolls of film.

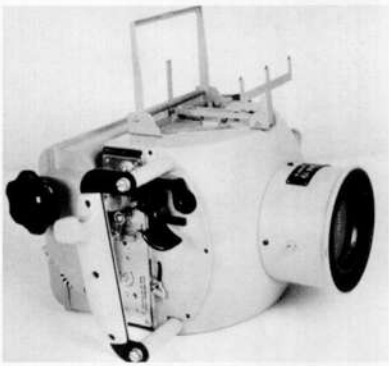
Mechanics removing an Rb 50/18 camera from D-ORAT, a civilian registered Heinkel He 70 believed to have been in pre-war service with Aufklärungsgruppe 11 in East Prussia. The camera sitting on the wing is a Zeiss HK 19 Handkammer while on the grass beneath the wing is a camera mounting frame, film magazines and a second unidentified camera.

As the principal aerial camera manufacturer of the inter-war period, the Carl Zeiss Company understandably wanted to use its own designations for these cameras. Although it originally preferred to refer to them as *Reihenbildmesskammer – RMK* (series-picture, topographic camera), the *Rb* descriptor had become too deep-rooted and virtually all Second World War *Luftwaffe* cameras of this type carried the *Rb* prefix, the *RMK* designation being given instead to the family of mapping cameras. One exception to the *Rb* designator was the addition of the letter N to signify a camera for night use, for example, the *NRb* 35/25.

A third designation in common use was that of *Handkammer - HK* (hand camera), occasionally also referred to as a *Fliegerkammer* (flyer's camera). Such cameras were used extensively by both maritime and short-range reconnaissance units throughout the Second World War. The two primary hand cameras used were the *HK* 13 and *HK* 19.

An HK 19 Handkammer viewed from the right-hand side showing its pistol-like hand grip, sighting frame and vanes, shutter release lever and film cassette mounted on the rear of the camera body. An HK 19 camera with a full film cassette weighed approximately 8.0 kg (17.6 lbs).

The German system of camera designation was quite straightforward. All cameras had a two or three letter designator followed by a series of numbers separated by a diagonal slash. The first two numbers indicated the focal length of the lens, usually 20, 30, 50 or 75 cm (7.87, 11.81, 19.69 or 29.53 in), with the numbers following the slash identifying the exposure size made by that particular camera. For example, *Rb* 50/30 signified a 50 cm lens, producing a 30 cm exposure.



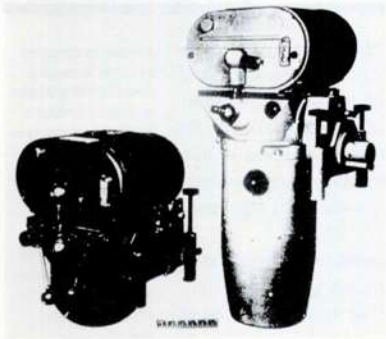
An HK 19 Handkammer dating from 1935 with the serial number 59378.

Of the Zeiss-produced *Rb* cameras, that most widely used by the *Luftwaffe* was the Rb **/30 series. First introduced in late 1937, they were exceptionally large cartographic-quality cameras which used a perforated, sprocket-driven film with a width of 32 cm (12.60 in), producing exposures of almost 0.0929 sq m (1 sq ft). As with other *Rb* cameras, power was provided by an externally mounted electric motor, which was coupled to the camera via a flexible drive shaft while the film magazine was mechanically linked to the camera by a short rigid drive shaft.

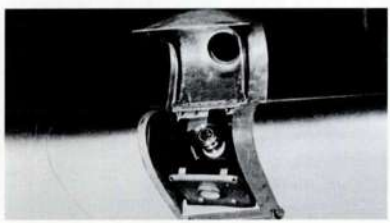
Yet another pre-war camera that saw widespread *Luftwaffe* use was the Rb **/18 series which had an exceptionally fast shutter speed, recycling as fast as the film could be advanced. It was typically loaded with a mere 10 m (33 ft) of film that allowed for approximately fifty exposures.

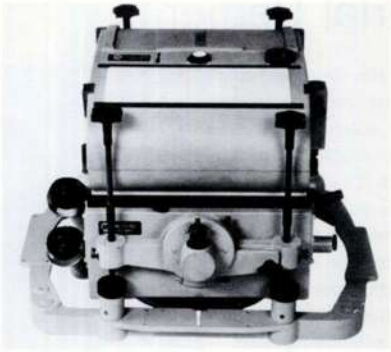
Camera usage for reconnaissance missions during the early stages of the war as well as for many of the clandestine pre-war missions, tended to centre on the *Rb* 20/30, which was frequently installed in an aircraft in conjunction with an *Rb* 50/30, although the lens of either could be exchanged for one of 75 cm if so required.

This view of an Rb 50/30 shows it installed in its mounting frame with a fully loaded film magazine containing 64 metres (210 ft) of film. Also visible in this view are the separate motor, controller, flexible drive and pressure hose.

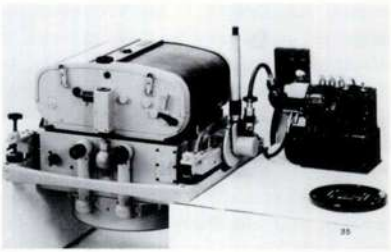


An Rb 21/18 (left) and an Rb 50/18 (right). These are two basically identical cameras with different focal length lenses, both of pre-war design and used for low-altitude operations.

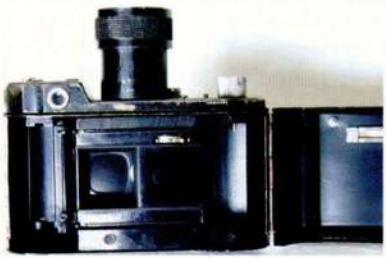


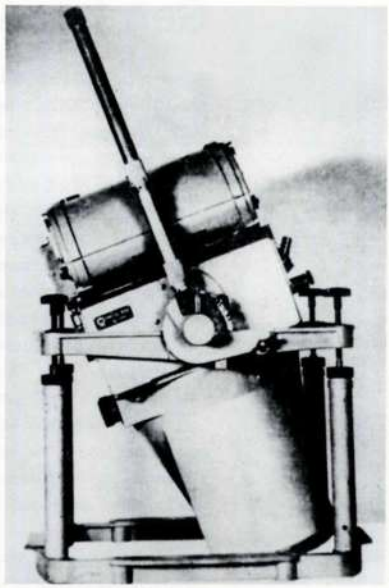


An Rb 20/30 camera, 1938 model. When the war began this was the most frequently used aerial camera, often in combination with the Rb 50/30. All Rb 30 series cameras were essentially commercial mapping cameras, intended for use under peacetime straight-and-level flying conditions. Needless to say, these were not often encountered by the Luftwaffe.

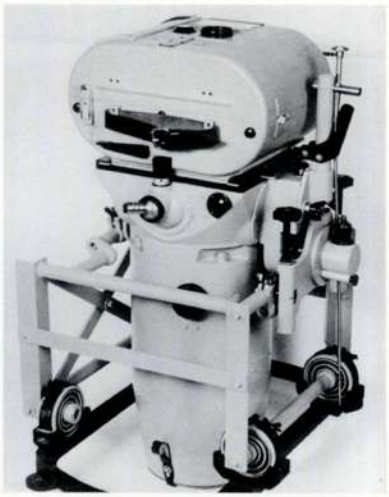


An Rb 20/30 1943-model camera and its controls in a mock-up aircraft installation.





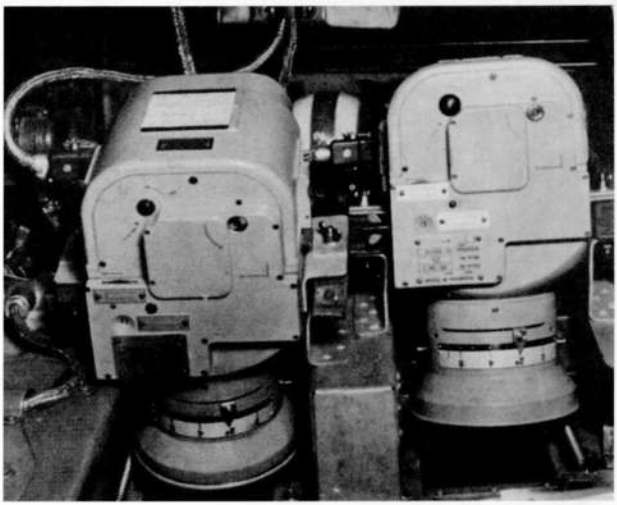
An Rb 50/18 camera and film magazine mounted in a shock-absorbing cradle. This type of camera was used for low-level work as it had a fast shutter speed, but could only carry up to 10 metres (33 ft) of film – sufficient for about fifty exposures.



Side view of an Rb 50/30 installed in its mounting frame without any of the ancillary equipment attached.

(Left) These four photographs show the 35 mm 'Robot' camera, which was frequently installed in a bay in the wing leading edge of both the Messerschmitt Bf 109 and Focke-Wulf Fw 190 fighters (below left). Mounted on an adjustable platform, it was sighted through the aircraft's Revi gun sight. Although the camera could take single photographs from high altitudes down to an altitude of approximately 2000 m (6,562 ft), the results were often disappointing and its use by reconnaissance units was soon discontinued in favour of the paired Rb 12/7.5 installation.

As with most mapping type cameras, an *Rb* 50/30 for example, was fitted with an iris inter-lens shutter and, with a full magazine loaded with 64 m (210 ft) of film and associated attachments weighed approximately 72 kg (160 lbs). In addition, and in contrast to contemporary aerial camera/film applications, the film in the Zeiss *Rb* series of cameras was held flat in the exposure position by means of dynamic air pressure supplied from a blower fan powered via the camera drive motor. Occasionally mounted in the oblique position, the most common method of installation for an *Rb* **/30 was as a single vertical or paired for split vertical photography, the focal lengths of the lenses being dependent on the requirements of the mission.



A view through the port fuselage access hatch of a Focke-Wulf Fw 190A-3/U4 showing the installation of the dual Rb 12/7.5 cameras in the rear fuselage.

During the mid-war years, it became clear that, in the face of increasingly alert and strengthened Allied defences, speed and altitude were essential for the safe collection of aerial photographs. Turning to smaller, more compact cameras, trials were carried out with both the *BSK* and *Robot* 35 mm wing-mounted cameras, but their less than impressive results saw new cameras added to the *Rb* series.

Seemingly modelled on captured RAF F.24 cameras, some examples of these smaller, lighter new cameras were the 32/7 x 9, 12.5/ 7 x 9 and the 12/7.5. In contrast to the larger *Rb* cameras, these newer additions used a focal plane shutter and a pressure plate to hold the film flat. They were usually installed in the reconnaissance fighter types, specifically the Focke-Wulf Fw 190A and Messerschmitt Bf 109G series where their compact size and light weight did not have any appreciable effect on aircraft performance.

The panel below provides a complete list of cameras as laid out in *Luftwaffe* Photographic Equipment Schedule L.Dv.488/6.

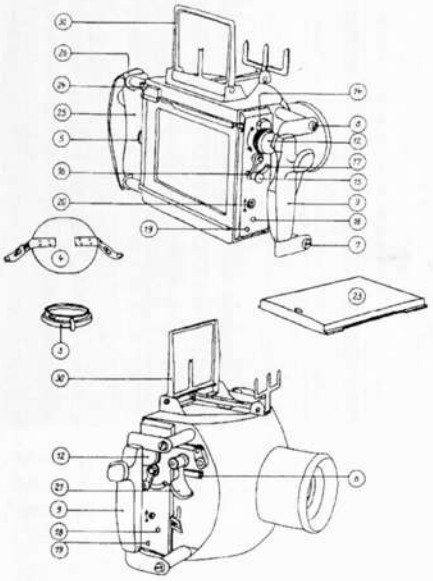
Luftwaffe Photographic Equipment Schedule L.Dv.488/6.

Camera, hand-held.	HKS
Camera, hand-held.	HK 13
Camera, hand-held.	HK 19
Camera, aerial.	Rb 10/12
Camera, aerial.	Rb 10/18
Camera, aerial.	Rb 12/7.5
Camera, aerial.	Rb 12.5/9 x 9
Camera, aerial.	Rb 20/12
Camera, aerial.	Rb 20/30
Camera, aerial.	Rb 21/18
Camera, aerial.	Rb 30/18
Camera, aerial.	Rb 32/7 x 9
Camera, aerial.	Rb 40/12
Camera, aerial.	Rb 50/18
Camera, aerial.	Rb 50/30
Camera, aerial.	Rb 75/18
Camera, aerial.	Rb 75/30
Camera, aerial.	Rb 100/30
Camera, aerial.	Rb 150/30
Camera, aerial, night.	NRB 30/18
Camera, aerial, night.	NRB 35/25
Camera, aerial, night.	NRB 40/25
Camera, aerial, pleon.	Rb 7/18
Camera, aerial, pleon.	Rb 12/30
Camera, aerial, fighter.	SMK 16
Camera, aerial, fighter.	SAK 35
Camera, aerial, fighter.	ROBOT 35 w/motor
Camera, aerial, motion picture.	HMK 16
Camera, aerial, motion picture.	EK 16
Camera, aerial, motion picture.	Airflex
Camera, aerial, motion picture.	ESK 2000B
Camera, miniature.	2.4 x 3.6cm complete
Camera.	9 x 12cm complete
Camera.	61/2 x 9cm complete
Camera, tripod.	3 x 18cm complete
Camera, technical.	3 x 18cm complete
Camera, copy kit. w/adapters for 9 x 12cm	
Camera, gear 24-volt w/accessories in case	

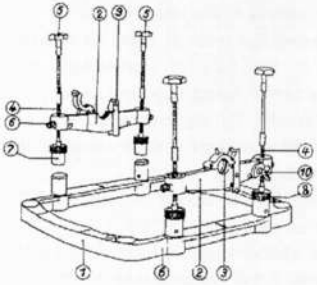
An HK19 Handkammer and parts list from the handbook.

Key:

3 Colour Filter
4 Lens Cover
5 Shutter Retaining Screw
6 Safety Lever
7 Lower Screw for Right Handgrip
8 Upper Screw for Right Handgrip
12 Shutter Wheel
14 Shutter Speed Indicator
15 Safety Lever
16 Safety Catch Rear Stop
17 Safety Catch Front Stop
18 Spring Tension Indicator Window
19 Spring Tension Screw
20 Spring Tension Release
21 Shutter Release Lever
23 Protective Cover
24 Cassette Safety Catch
25 Left Handgrip
26 Leather Strap
30 View Finder



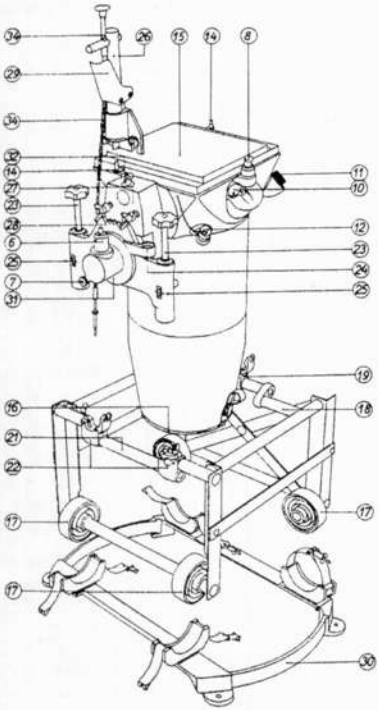
An RMK 10/18 camera installation in the ventral gondola of a Heinkel He 111. This was a pure cartographic camera, normally used for straightforward mapping purposes.

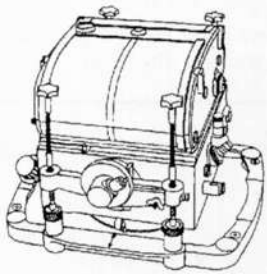


An extract from the Rb 50/18 manual identifying the major external components of the camera and its mounting frame.

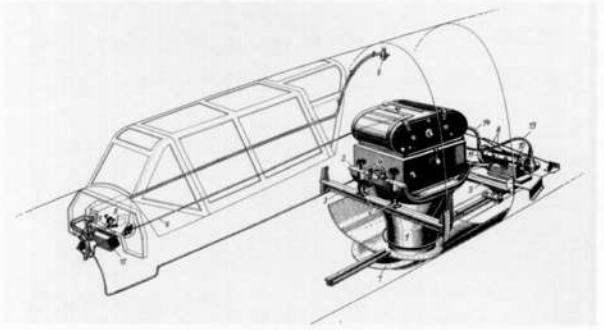
Key:

6 Drive Knob
7 Drive Knob Stop Button
8 Cassette Drive Key
10 Index Disc, Shutter Release
11 Return Signal Connector
12 Adjustment Lever
14 Cassette Lock Bar
15 Image Field Cover
16 Lens Cover
17 Spring Shock Absorbers
18 & 21 Tube Frame
19 & 22 Camera Bearing
23 Set Spindles
24 Level
25 Locating Marks
26 Adjustment Lever
27 Adjustment Lever Wing-nut
28 Adjusting Segment
29 Pressure Key
30 Frame Base
31 Camera Pivot Bearing
32 Vertical Position Bolts
34 Wire line

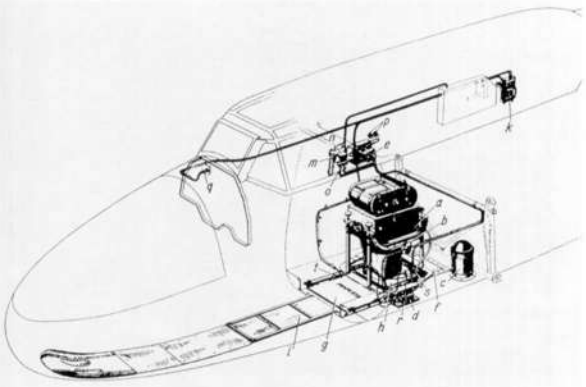




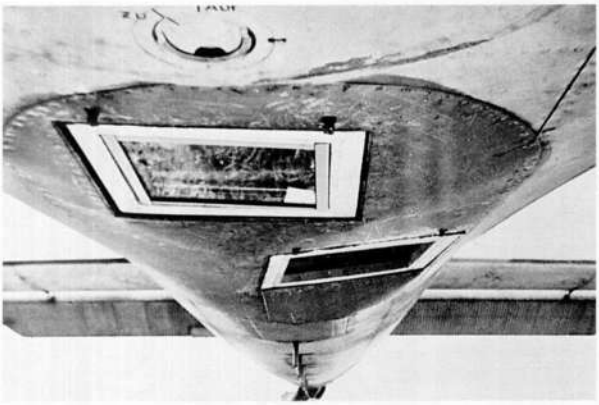
An excerpt from the Rb 20/30 camera manual identifying the major components of the mounting frame.



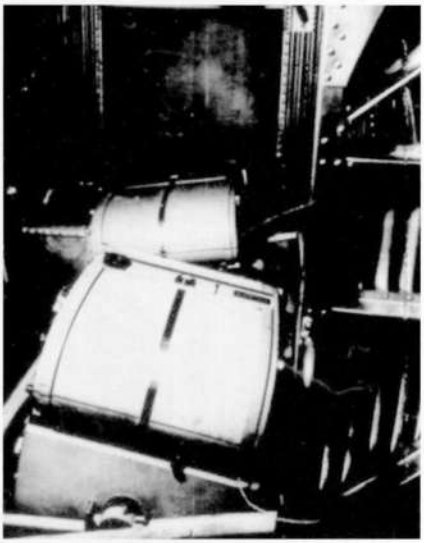
A diagram from a Messerschmitt Bf 109 handbook showing the general layout for an Rb **/30 camera installation. With the camera mounted immediately behind the fuselage fuel tank, access to the film magazine was gained through the access hatch in the rear cockpit bulkhead immediately behind the pilot's head.



Handbook drawing showing the camera installation in a Bf 110 F-3 and G-3.



An external view of the ventral camera windows in the lower rear fuselage of a Junkers Ju 86P-2.



Internal view of the installation of the two Rb 75/30 cameras in the aft fuselage of a Junkers Ju 86P-2

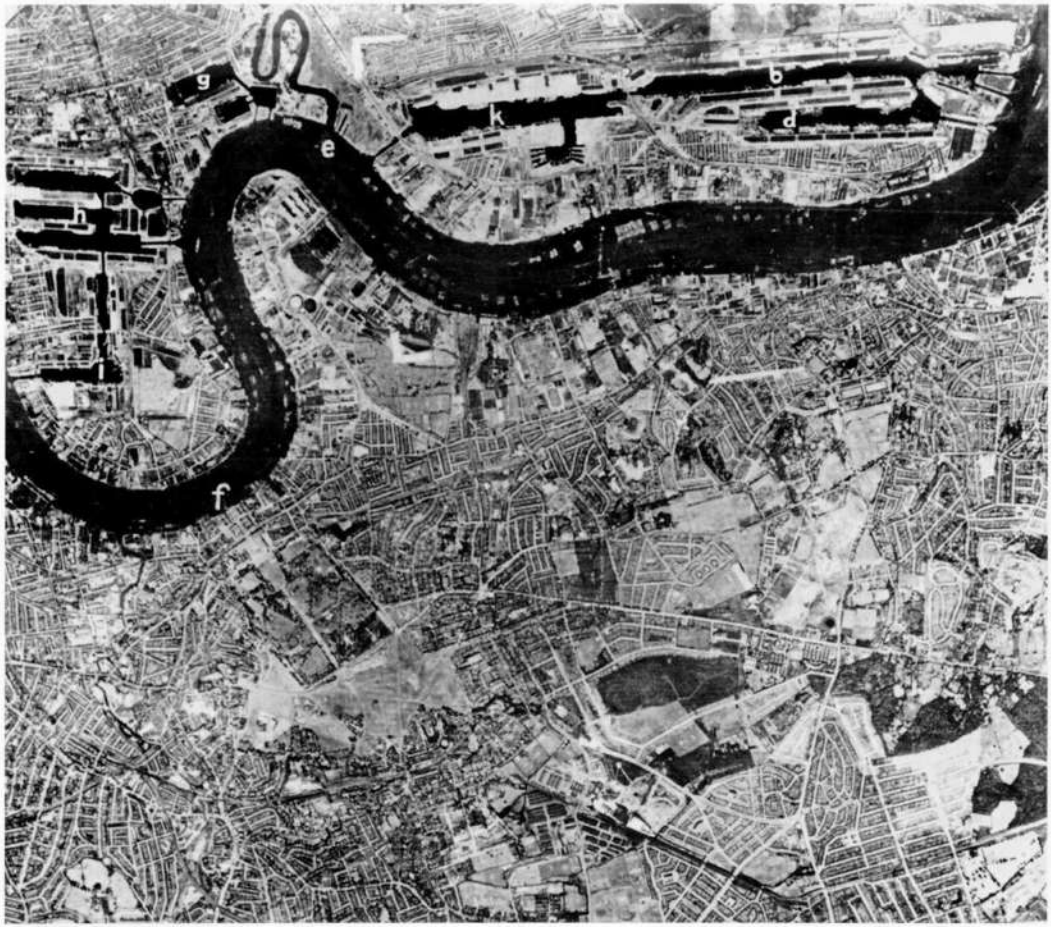
An RAF LAC (Leading Aircraftsman) with a captured Rb 50/30 camera and film magazine fitted into its mounting frame.

Technicians carrying out the installation or removal of a camera from the fuselage bay of an unidentified aircraft believed to be either a Do 17 or Ju 88.

Getting the pictures back to base was only the beginning of the process of intelligence gathering. Here a Luftwaffe Unteroffizier is analysing the results of a photographic sortie. Much of the effort was lost in the interpretation as the Luftwaffe did not make much use of stereoscopic viewers, tending to rely too much upon large-scale images and old data as analytical aids. Additionally, the German intelligence services were seriously handicapped by lack of information obtained at ground level to confirm their conclusions.

Once target data had been obtained and analysed it needed to be issued in a useable form. In this case maps are being marked up with the aid of photographs.

The work of the ground crews of any air force is often forgotten, perhaps even more so in the photo-reconnaissance units, but without the men who literally worked in the dark, others would have been blinder still. Here men of the Fliegerbildschule Hildesheim clean up after a developing session. Their vehicle is a Krupp L3H163, Kfz354 mobile photographic laboratory. The picture was probably taken before the war as the truck is finished in a three-tone camouflage pattern using dark grey, dark brown and green and is in immaculate condition.



A German vertical aerial photograph of the East End of London showing the River Thames, dock facilities and surrounding areas. The locations identified with lower case letters are:

Key:

b) Royal Albert Dock
d) King George V Dock
e) Mouth of the River Lea with the Thames Ironworks and dry dock areas
f) Greenwich, Royal Naval College
g) East India Docks
h) West India Docks
i) Millwall Dock
k) Royal Victoria Dock

The original negative was 30 cm (12 inches) square, the standard size for most high-altitude Luftwaffe cameras early in WW II.

(Above) An aerial image of the dockyard complex at Portsmouth taken in August 1940 and identified as 'Basin 1 State dockyard with workshops'. Annotated for target folder use, specific targets are identified by an upper case letter and GB.

A. GB 12 31 Four entrance locks.
B. GB 12 32 Five dry-docks in Basin 3.
C. GB 12 33 State dockyard floating dock.
D. GB 12 34 Basin 2, State dockyard.
E. GB 12 35 Basin 1, State dockyard.
F. GB 12 36 Submarine port at Haslar Lake.
G. GB 15 31 High-power radio station.
H. GB 13 5 (1) Artillery barracks, (2) Barracks.
I. GB 40 31 Railway line and Goods yard at Fratton.
K. GB 83 34 Vosper works, Gosport.
L. GB Passenger railway station.
M. GB Road bridges.
N. GB 50 32 Electrical main power station, Gosport.

Believed to have been taken by an aircraft of the AufklGr.ObdL prior to 2 October 1939, this aerial reconnaissance photograph from a Luftwaffe target folder covers the Midlothian district of South Queensferry/Port Arthur, target number GB 12 12. Identified on the photograph, item A is the well-known Firth of Forth cantilever railway bridge, the construction of which is clearly shown by the shadows cast on the waters of the Firth, while the North Queensferry anti-aircraft locations are simply noted by the word 'Flak'. Item B identifies coastal defence positions, unidentified depots, storage tanks, a quay and an Öl-pier (oil-pier). In the mid lower right of the photograph is an arrow showing the flight line to Edinburgh, 13 km (8.07 miles) to the south-west.

Aerial reconnaissance photograph of Felixstowe, Harwich and surrounding area originally taken on 13 July 1940 and included in a target folder produced for Luftflotte 3 in October 1941. The number in the top left-hand corner GB 10 78 is that given to the main subject of the photograph which in this instance is the Felixstowe Seeflughafen (literally Sea Airport). At bottom right are listed a further four targets also visible in the photograph; GB 10 97 the Seeflughafen Harwich, GB 16 25 Fortified installations and coastal defences at Harwich, GB 45 138 Port installations at Harwich and GB 56 9, Corn mill and malt works at Felixstowe.

An Overview of Camouflage and Markings

With its rise to power in January 1933, the National Socialist Party inherited a well-regulated aviation industry and an established colour standards system. Yet, within three months of the new government taking power, in April of that year, the *Deutsche Luftfahrtzeugausschuß* (German Aircraft Committee), issued a document with the lengthy title of *Bauvorschriften für Flugzeuge (vom Unterausschuß für Flugzeuge Angenommener Fassung)* – (Construction Regulations for Aircraft (from the Sub-Committee responsible for Aircraft). This document also included an extensive section that dealt with aircraft paint finishes. Entitled *Oberflächenschutz* (Surface Protection), it contained specific instructions governing the protective finishes and paints used by the aviation industry and remained in effect until May 1945.

Wearing a pristine finish of 63, Heinkel He 45c, 10+A11 of the Aufklärungsgruppe (F)/121 has its BMW V1 engine warmed up in preparation for a sortie by Staffelkapitän Hauptmann Edgar Stentzer and his pilot from their airfield at Neuhausen, East Prussia.

Considered as a contingency reserve for the *Luftwaffe* during the mid to late 1930s, land-based aircraft serving with the national airline *Deutsche Lufthansa,* while having access to a few of the *RLM* camouflage colours, usually wore either a clear lacquered finish or more commonly, a very pale grey finish specific to the company's aircraft. These finishes were relieved only by the application of black around the engine areas, walkways, their civil registrations, and the name of a personality, city, or similar significant German or European-related name applied either to the nose of the aircraft or along its fuselage side. They also carried a red chord wise rendition of the *Hoheitszeichen* (National emblem) across the fin/rudder containing a black *Hakenkreuz* (Swastika) superimposed on a white disc.

Initially, between 1933 and 1935, German paramilitary types such as the Heinkel He 45 & He 46 long and short-range reconnaissance aircraft and the He 59 and He 60 floatplanes were finished in an overall scheme of grey 02. This colour, while not intended as a camouflage finish, did act as one when seen against certain daylight conditions and was very similar to green-grey 63 which from 1936 became the basic external finish for front line, pre-war *Luftwaffe* aircraft and provided the base colouring for a new three colour upper camouflage scheme introduced that same year.

A post-October 1936 photograph of Heinkel He 70 F, 10+G12 of the 2./Aufklärungsgruppe (F) 121 undergoing servicing outside a hangar at its home base of Neuhausen, East Prussia. Wearing a 63 grey finish with glossy black trim, it carries the name of the East Prussian town of Gumbinnen in white on the lower nose cowling in place of the more usually seen Heinkel company name. While not visible here, evidence suggests that the spinners of some aircraft of the 2.Staffel were painted red. Possibly a partially posed photograph, the two figures in the foreground can clearly be seen to be holding the film magazines for the onboard cameras.

A wartime hangar view of Dornier Do 17 Ps of the 1. and 3.(F)/123 which shows to advantage the 61/62/63 upper camouflage scheme still carried by many of the aircraft of these Staffeln. While the exact date of the photograph is uncertain, it is known that it was taken after 8 September 1939 because of the dated inscription applied to the nose of 4U+LL, the Do 17P partially visible directly above the man standing on the hangar floor.

First appearing on the pre-production Junkers Ju 86A-0 bomber, this new camouflage consisted of a base coat of 63 over which were added segments of dark brown 61 and green 62 to form a disruptive upper surface pattern with blue 65 used for the lower surfaces. Officially approved in 1937, an interesting feature of this scheme was the ability to interchange one colour with another that allowed at least six variations with one pattern and the three colours. It was also reversible to provide a 'mirror image' of the original scheme.

In the latter half of 1937, some Messerschmitt Bf 109B-1s in Germany had appeared in a new upper surface camouflage scheme comprised of two dark, low contrast colours. Originally thought to be experimental schemes using the colours 61 and 62, it is now known that these colours were two new shades of green, black-green 70 and dark green 71 adopted for all land-based *Luftwaffe* aircraft.

A factory photograph of Dornier Do 17 P W.Nr. 4013 finished in the prescribed 70/71/65 pattern for the type. The light coloured band around the spinner is thought to have been yellow.

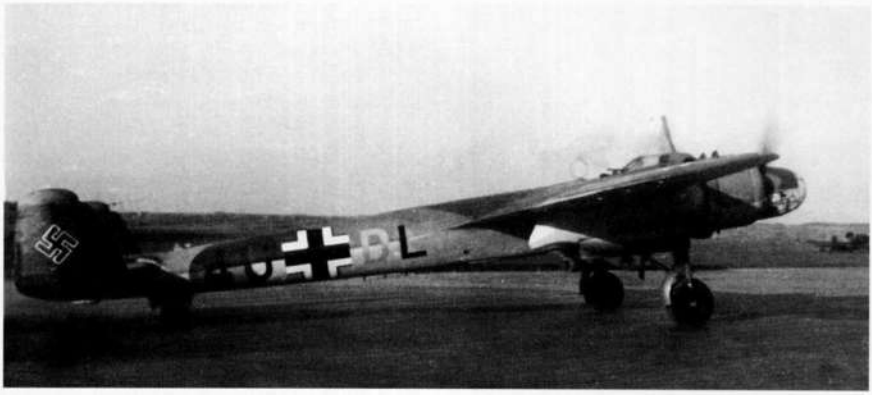
Well suited to European topography, this segmented pattern with aircraft under surfaces painted in 65 was adopted as the standard camouflage scheme for all land-based *Luftwaffe* aircraft. Yet, even with this change, a number of *Luftwaffe* aircraft, most notably Dornier Do 17Ps, remained in the earlier 60 series of upper colours as late as the early summer of 1940.

A few years earlier, a few of the 18 He 70F-2 reconnaissance aircraft serving in Spain with the A/88 reconnaissance unit of the Condor Legion, had a camouflage scheme applied to replace their base 02 or 63 finish, depending on their date of production. This consisted of an upper surface finish of 62 over which was sprayed a disruptive pattern in 61, the under surfaces being painted in 65. These aircraft were supplemented with an additional six Heinkel He 45c aircraft which were delivered in an overall finish of either 02 or 63. During their service with A/88, several of these aircraft had received a three-colour camouflage scheme applied locally in an elaborate pattern using the three colours 61, 62 and 63 applied in small angular patches of square and triangular shapes reminiscent of the First World War German lozenge camouflage. It is thought likely that the under surfaces remained in the original 02 or 63 although the possibility exists that they may have been repainted in 65 or perhaps a locally acquired light blue. Although the scheme applied to these He 45s proved effective, it was fairly complex and time consuming to apply and resulted in most He 45s receiving the simplified pattern as applied to the He 70s, but when used in the night reconnaissance role it is understood that they retained their overall finish of 63.

(Far left) Wearing full Spanish Nationalist markings, this Heinkel He 45c is one of the six aircraft of this type that served with the He 45 Kette of the Aufklärungsstaffel A/88 of the Condor Legion and is finished in a locally applied upper camouflage finish of 61, 62 and 63. It carries a yet to be identified devil and pitchfork emblem on the cowling and a rectangular motif on the fin which resembles a playing card and may well have been a personal emblem related to the crew.

The six new short-range reconnaissance Henschel Hs 126 aircraft sent to Spain were initially given a three-colour finish locally applied in small, angular patches similar to that applied earlier to the He 45s, which strongly suggests that they had arrived in a plain 63 finish. All subsequent deliveries of the Hs 126 would be in the new 70/71/65 finish.

Succeeding the He 70 in the long-range role, the first Do 17Fs to arrive in Spain were finished in a factory applied 61/62/63/65 scheme and were soon joined by the first Do 17Ps, also similarly finished, although later



Still wearing the three-colour upper camouflage pattern of the colours 61, 62 and 63 over blue 65 under surfaces, this undated photograph shows Dornier Do 17 P, 4U+DL of the 3.(F)/123 taxiing out for a sortie, possibly from its early wartime base at Gelnhausen.

This Heinkel He 45c with the Stammkennzeichen of SP+AB is finished in the green splinter pattern of 70 and 71. Even though the photograph was taken under apparently good light, it is still very hard to determine the splinter pattern of these two low-contrast colours on the original print.

deliveries of the -P would be delivered in the by now standard scheme of 70/71/65.

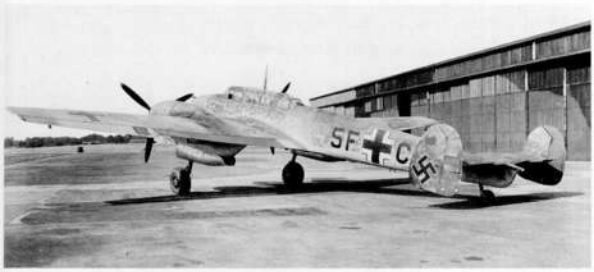
During January 1940, a Dornier Do 17S, W.Nr. 2502 of the 1./*AufklGr.ObdL* forced down at Les Hemmes, Belgium was finished in the standard 70/71/65 over which had been applied a thin but even overspray of 02, which it is thought was applied to provide a better means of concealment in the grey European winter skies. The only exceptions to this were the national markings and the aircraft code of T5+FH, which was applied in solid black. This variation was, however, rare as most reconnaissance aircraft of the period wore the conventional camouflage colours and pattern as directed by the *Oberflächen-Schutz-Liste - OS-Liste* (Surface protection list) and applicable to the aircraft type.

This Dornier Do 17 S W.Nr.2502, T5+FH of the AufklGr.ObdL was shot down by a pair of French Hawk 75 fighters of the GC I/4 on 13 January 1940 and crash-landed at Les Hemmes, Belgium where its crew of Lt. Theodor Rosarius, Gefr. Schaal and Uffz. Koge were taken prisoner but repatriated when France later capitulated. The aircraft was finished in the standard 70/71 upper camouflage over which had been applied a thin, even coat of grey 02.

Aside from that mentioned above, the first major variations in the camouflage worn by reconnaissance aircraft began to appear during the aerial battles over Britain during the summer of 1940. This saw the substitution of 02 for either of the greens 70 and 71 as had earlier been applied to Messerschmitt Bf 109s with a varying in height of the fuselage demarcation between upper and lower colours and the application of various densities of mottling in combinations of 02, 70 or 71 over the blue of the fuselage sides. While such variation was rare amongst heavier reconnaissance aircraft, this was not the case with lighter types such as the Bf 109 and Bf 110 where the adaptations could be quite extensive. One of the first recorded examples of a reconnaissance aircraft so finished was Bf 110C-5 5F+CM of the 2./(H)14 which was forced down over the UK during July 1940.

The next major changes in camouflage took place with the arrival of the *Luftwaffe* into the North African theatre. In April 1941, the 2(*H*)/14 arrived at Ain-el-Gazala in Libya with its Bf 109s and Bf 110s, which were finished in the standard 02/71/65 or 70/71/65 schemes. At a time well before any German tropical colours were available, in keeping with what has been credibly reported for some other *Luftwaffe* aircraft in that theatre at this time, it is entirely reasonable to consider the possibility that some aircraft may have had their camouflage suitably adapted with Italian paint acquired from bases in Sicily or Libya.

During this same period, the Italian *Regia Aeronautica* was beginning the transition from the then-current *Series Mimiteca 1* (Camouflage Series 1) colours to those of the new *Series Mimiteca 2 - Tavola 10* (Camouflage Series 2 – Table 10). Within the former, there were a number of shades extant



Three views of Messerschmitt Bf 110 C-5 5F+CM, W.Nr. 2177, of the 4.(F)/14 taken after being forced down over southern England on 21 July 1940 by Hurricanes of 238 Squadron. Finished in an upper camouflage scheme of 02/71 with 65 under surfaces, a mottle of 02/71 or 70 was applied in varying densities and height along the blue of the fuselage sides and to both sides of the fin/rudder assemblies.

Returned to airworthy status by using parts from another force-landed Bf 110, 2N+EP of the 9./ZG 76, 5F+CM is seen here wearing RAF camouflage and markings while being test-flown at Duxford. Last known to have been at No.47 Maintenance Unit, RAF Sealand in November 1945, its ultimate fate is unknown.

for each specific colour based on which particular manufacturer produced them. Stocks of older colours were ordered used up and together with the introduction and use of newer colours, it is exceedingly difficult to determine the precise shades of paint that ***may*** have been put to *Luftwaffe* use prior to the introduction and use of German desert colours later in 1941.

A number of camouflage schemes, patterns and colours are seen in photographs of *Luftwaffe* aircraft during this period. Bf 110s received a coat of a colour best described as a yellowish sand brown on the upper surfaces over which a random mottling of olive green may or may not have been applied. Undersides were, in some cases, reportedly repainted in an Italian light blue shade while some Hs 126 and Fieseler Fi 156 *Storch* (Stork) aircraft were given similar upper surface treatment, with the olive green being very thinly applied in some areas. In an equal number of examples, a meandering wave scheme of light sand was applied directly over the original 70/71 colours. Under surfaces could have been painted either in an Italian-supplied light blue or left in the original 65. This repainting was also extended to other reconnaissance types such as the Bf 109 and Ju 88.

In this photograph, believed to have been taken in the Benina area circa December 1941, Messerschmitt Bf 110 E-3/trop 5F+PK, W.Nr.4427 of the 2.(H)/14 wears an overall upper finish of the newly introduced colour of sand yellow 79 over blue 78 or 65 under surfaces. Around the rear fuselage is the white identity band commonly worn by Luftwaffe aircraft during the early stages of the North African campaign.

Many, but not all, replacement aircraft for this theatre were delivered in a factory finish of the newly developed light or dark sand yellow 79 for upper surfaces and either 65 or blue 78 under surfaces. The Me 410s which later served with the (F)/122 in the Mediterranean did not receive tropical camouflage, retaining instead the factory applied scheme of grey-green 74, grey-violet 75 and blue 76 consistent with their designation as a heavy fighter.

From 1933 until 1935 and as with all other powered paramilitary German aircraft, those engaged in maritime duties were finished in an overall grey 02 before changing to green-grey 63 in 1936 in concert with the change to the new camouflage colours. First introduced in 1938 with the issue of LDv. 521/1, the official upper surface camouflage for flying boats and seaplanes (and later, land-based aircraft operating in the maritime role) was to be the colours 72 and 73, applied in a splinter pattern similar to that used for other *Luftwaffe* aircraft, with 65 again being used as the under surface colour. This scheme remained unchanged throughout the war, other than for the temporary irregular white patches applied to those aircraft such as the Heinkel He 115 and Blohm und Voss Bv 138 operating over far northern waters.

Photographed circa the transitional camouflage and markings period of late 1936 as evidenced by the thin black border to the fuselage Balkenkreuz, the overall finish of this Dornier Do 15 Militär Wal, coded 60+112 of the 2.(F)/Fliegergruppe (See) 106 could be either 02 or 63.

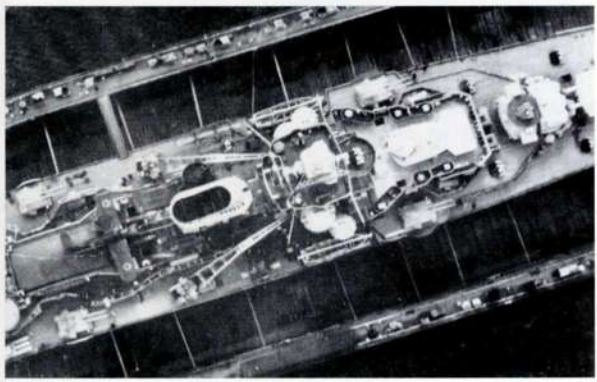
Until the entry into service of the jet powered Arado Ar 234, specially modified Junkers Ju 86P and 86R aircraft usually carried out high altitude photo-reconnaissance flights. Although originally retaining a 70/71/65 camouflage scheme, ongoing trials for a more suitable colour found that a blue or neutral grey colour was more suited to the role. The decision to adopt the neutral or 02 grey finish took camouflage back to the similar overall finishes seen on some specialised reconnaissance aircraft at the beginning of the war. This scheme remained in use until the Ju 86 was withdrawn from service in the reconnaissance role, although it was sometimes compromised by the use of standard national and unit markings and often, a yellow or white fuselage theatre band.

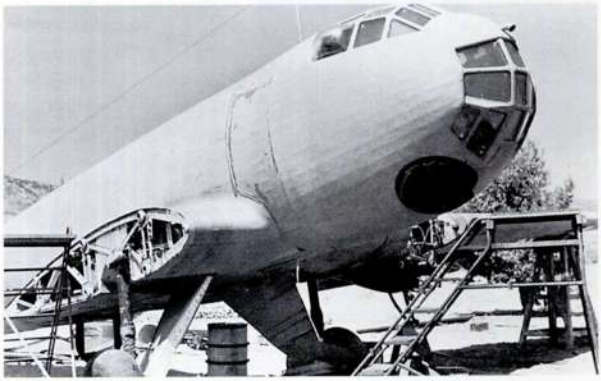
With their high speed and height range, the arrival of the jet powered Arado Ar 234 and Messerschmitt Me 262 in 1944 made the use of specialised camouflage unnecessary. Originally finished in 70/71/65, later production Ar 234A and B airframes, depending on their date of production, could have worn a factory-applied upper surface camouflage of either 70/71 or the late-war 80 series colours with either 65 or 76 under surfaces. However, and as suggested by the careful examination of some well-preserved Ar 234 skin fragments, some later airframes may well have been completed with an upper surface camouflage which paired either 70 or 71 with one of the three colours from the 80 series.

Dornier Do 18 G V1, W.Nr. 841 on the slipway at the E-Stelle Travemünde. Finished in the specified maritime upper splinter scheme of the greens 72 and 73 it carries full national markings as well as the short-lived Wehrmacht Luft code WL – ADBA applied in black across the top of the wing and to both fuselage sides. Clearly visible in the top view is the heavy 'V'-shaped exhaust staining from the wing-mounted exhausts of the forward Junkers Jumo diesel engine.

A number of Me 262A airframes also underwent conversion to the short-range

A colour in-flight view of Arado Ar 196 A-2 T3+HK of the 2./BfiGr.196 finished in the standard maritime scheme of 72/73/65. Clearly visible in this view is the Staffel blue and white sea horse emblem while the aircraft letter 'H' which is painted in the Staffel colour of red was repeated in black underneath each wing tip outboard of the Balkenkreuz.





This German aerial view of the heavy cruiser 'Prinz Eugen' in dry dock at Brest is identified as being taken in 1941. Clearly visible sitting on the catapult abaft the funnel is one of the three Arado Ar 196 aircraft from BfiGr.196 assigned to the ship. Wearing the standard 72/73 maritime camouflage, it may be seen how the highly visible white segments of the wing Balkenkreuz compromise its otherwise dull camouflage.

This Henschel Hs 126, H1+MK of the 2.(H)/12 wears a temporary white winter finish over its usual upper camouflage of 70/71 while operating in the Dugino area of the Eastern Front in early 1942. Wearing a yellow theatre band around the rear fuselage, the regularity of the dark coloured borders surrounding the national markings on the fuselage and fin suggest that they were masked off before the temporary winter finish was applied.

Seen here undergoing major servicing, the Junkers Ju 86 P was a high-altitude reconnaissance machine derived from the earlier Ju 86D bomber. Originally finished in a standard scheme of 70/71/65, this was later changed to an overall finish of 02 which provided for better concealment of the aircraft at its normal operating altitudes.

reconnaissance role and saw limited service with some of the *Nahaufklärungsgruppen* during the final months of the war in Europe. Known as the Me 262A-1a/U3, their camouflage generally consisted of an overall finish of 65 or 76 over which was applied a splinter pattern or mottled finish in a combination of two of the 80 series colours. A very small number of these aircraft did receive upper surface finishes in thinly applied applications of the 'old' green colours of 70 and 71.

Delivery of the pre-production Ju 388L-0 reconnaissance aircraft saw a further adaptation of the earlier grey and blue camouflage used by the high altitude Ju 86 aircraft. The camouflage finish for the ten L-0 models was an overall application of 76 with a light strength application of either grey 75 or 77 for the upper surfaces. The application of the upper surface colour was applied to conform to the extreme plan view of the aircraft with the exception of the engine cowlings forward of the wing leading edges where the demarcation extended a little further down their sides. With delivery of the L-1 production model in late 1944, a change in the upper camouflage colour had taken place. While the colour remained either 75 or 77, it was applied more densely, extending down the fuselage sides to a horizontal line level with the tail plane and applied in a sparse mottle to the fin and rudder assembly

While most major changes to the primary camouflage schemes were undertaken by maintenance facilities, less complicated revisions or modifications were often carried out at unit level. In this photograph, a ground crew member of the 3.(F)/33 is applying a very pale blue ribbon pattern across the fin and rudder of a Junkers Ju 88 D on their airfield at Ottana, Sardinia in July 1943.

which varied considerably in density and style from aircraft to aircraft.

Helicopters, albeit innovative and few in number, were briefly used for light reconnaissance duties. The first of these to reach the production stage was the Flettner Fl 282 which was finished in a modified splinter pattern of the 70 and 71 greens with the under surfaces of the fuselage in 65. Those examples used by the *Kriegsmarine*, such as the V6 for convoy duties in the Aegean Sea, were probably, and this is by no means a certainty, finished in a modified splinter pattern of 72 and 73 with 65 under surfaces. As the rotor blades were technically rotating wing surfaces, they were treated as such and painted in either of the greens.

Designed for towing behind a surfaced U-Boat for convoy spotting work, the Focke-Achgelis Fa 330 folding gyro-kite consisted of little more than a basic framework to which were attached the rotor blades, tail surfaces, pilot seat and dinghy pack. It was usually painted in 02 or 65 although its diminutive size would render it almost invisible from any distance regardless of its finished colour.

As may be expected, there were many additions and exceptions to the rule where the camouflage requirements of German aircraft were concerned. These ranged from the temporary application of washable distemper type paints to specially adapted 'local' schemes. The temporary distemper applications were usually black for application to under surfaces and fuselage sides for night operations or a white upper surface application for winter conditions and were seen applied in a wide variety of styles, many of which went so far as to completely cover national and unit markings.

Short-range units operating fighter-type aircraft such as the Bf 109 and Bf 110 frequently adapted their basic camouflage schemes to suit the topographical conditions of their operational areas such as those found in the central and southern areas of the Russian front. Similarly, the upper surface camouflage of land-based aircraft engaged on over-water operations was often adapted to include a narrow wave pattern of 65 or 76 applied in either irregular patches or narrow meandering lines of varying design over the upper surface colours to assist in breaking up the aircraft outline against an ocean background.

One example of adapting a basic camouflage scheme to suit local operational requirements was that applied to some of the Ju 188s of the 3.(F)/33 operating in the central and eastern areas of the Mediterranean during 1944. This consisted of the application of a tightly patterned pale blue mottle over the complete upper surfaces of the aircraft which was found by the crews to be admirably suited for their mission needs and, like the temporary night and winter applications, often completely obscured both national and unit markings.

As with all operational *Luftwaffe* aircraft, those in reconnaissance units were required to carry the distinctive theatre identification markings applicable to each theatre. Such markings usually required a rear fuselage band and the under surfaces of the wingtips painted in the relevant colour and often extended to rudders, lower engine cowlings and, on odd occasions, to the non-glazed nose areas of the fuselage.

Special temporary tactical markings were also used in November 1942 for aircraft taking part in Operation *Anton*, the German occupation of Vichy France. The colour of the markings for this operation was white, the choice of which would seem to tie in with the fact that much of the operation centred on the coastal areas of southern France and white was the prevailing theatre colour for *Luftwaffe* aircraft in the Mediterranean. For all twin-engined aircraft participating in the operation, the markings consisted of a relatively broad white band applied chord wise around each main wing at approximately the mid point between the engine nacelle and wing tip, a fuselage encircling white band on the aft fuselage and the lower engine cowlings also painted white.

Junkers Ju 88 D 8H+EL of the 3.(F)/33 photographed while en route from Bordeaux to Montpelier in November 1942 in support of Operation Anton. Finished in the standard 70/71/65 camouflage, Emil Ludwig carries the white temporary markings specified for the operation around the wings and fuselage with white painted lower engine cowling.