EAGLES OF WAR

HITLER'S STUKA SQUADRONS

THE JU 87 AT WAR 1936–1945

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Design and Development

From enthusiastic amateur to aircraft designer par excellence, Hugo Junkers developed one of the most famous aircraft in history.

The story of the world's most famous (or infamous) dive-bomber begins on 3 February 1859, with the birth of Hugo Junkers at Rheydt, near Münchengladbach in Germany. The eventual designer of the Junkers Ju 87 Stuka completed his secondary education in 1878 and then studied engineering at the University of Berlin. In 1881, he moved to Aachen and continued his studies at the Rheinisch-Westfalische Hochschule, graduating as a mechanical engineer in 1883.

Later that year, Junkers took over the technical management of his father's textile company at Rheydt. However, he decided to further his studies in electrical engineering, first in Aachen and then, in 1887, in Berlin.

Left: An early Ju 87 V-4 prototype from the Junkers company. Note the heavily trousered undercarriage.

Left: The man behind the legend – Hugo Junkers. Beginning his career as a gas engine designer, he fell into aircraft design by accident in 1906 whilst professor of the mechanical technical laboratories at Aachen University. It was a fateful event that was to change his life forever. Junkers was not to see the Stuka in operational action, though, dying in 1935.

Right: A German pilot sits in the cockpit of a Junkers J1 fighter prototype in 1915. This prototype was powered by a 120-horsepower Mercedes engine. Later, BMW provided a more powerful replacement engine.

In 1888, the young engineer moved to Dessau and joined the research staff of the Deutsche Continental Gasgesellschaft, which developed internal combustion engines. Its technical director was Wilhelm Oechselhauser and, in 1890, he and Junkers joined forces to found the Versuchsanstalt für Gasmotoren von Oechselhauser & Junkers at Dessau. While Junkers supervised technical development, his partner provided the necessary funds. The partnership lasted until 1893, when the two men went their separate ways.

The year before, while still working with Oechselhauser, Junkers had set up his own civil engineering company in Dessau. It specialized in thermodynamics, the branch of physics that concentrates on changing heat into, and from, other forms of energy. Lacking funds, Junkers found a new partner in Dr Robert Ludwig, a friend from his student days in Berlin. In 1895, with his help, he founded Junkers & Co, also at Dessau.

The new company manufactured gas heaters, and became successful enough to establish new premises in Dessau's Albrechtstrasse. However, arguments over who should exercise control of the company became increasingly acrimonious. The matter eventually went to litigation, and Junkers was compelled to buy Ludwig's shares for 52,000 Marks.

In 1897, Junkers was appointed to a professorship at Aachen University; and in 1906 he met Hans Reissner, a fellow academic and aviation enthusiast. Reissner sought his help and advice on the best techniques for building an aircraft, and eventually the two men decided that it would be practical to construct an all-metal flying machine.

After some experimental flying in a French-built Voisin, Reissner and Junkers produced their own design in 1912. Named the Ente (duck), it was the world's first all-metal canard (tail first) design. It crashed during a demonstration flight at Aachen in January 1913, but was rebuilt.

Shortly afterwards, Reissner and Junkers parted company. Junkers pursued his own line of aerodynamic research which led, in 1915, to the J1 experimental all-metal fighter monoplane design. In May of that year, he received an order from the German War Ministry for the construction of one prototype for evaluation purposes. The aircraft made its first flight from Döberitz on 12 December, piloted by Lieutenant Friedrich von Mallinkrodt.

However, in trials the following year performance was disappointing – rate of climb and manoeuvrability proved particularly poor. Development was halted, and the sole prototype ended its days in the Deutsches

Museum, Munich, where it was destroyed in a bombing attack in World War II.

Later in 1916, a second monoplane, the J2, was built. The following year, Junkers was forced by the German Government into a merger with Anthony Fokker. The idea was that Junkers-Fokker Flugzeugwerke AG would series-produce military aircraft at Dessau.

The J1 to the J10

The J1 became operational at the beginning of 1918, but the first Junkers aircraft to be built on a large scale was the J4. About 230 were produced for the German Schlachtstaffeln, the specialist infantry support units that proved their value during the Ludendorff offensives in the spring of 1918. The two-seat J4, which flew for the first time early in 1917, was an all-metal biplane, designed for close support and tactical reconnaissance. Its primary task was to fly at low level over enemy lines and report troop and vehicle movements via a radio link. The crew were protected by heavy armour, which made the J4 weighty and earned it the nickname Möbelwagen (furniture van).

Instead of radio equipment, early J4s carried two downward-firing Parabellum machine guns, manned by the observer for trench-strafing. However, these proved difficult to aim while the aircraft was flying quickly at low level, so they were deleted.

In 1917, Junkers built two more all-metal monoplane prototypes, the J7 and J8. Their successor, the J9, underwent flight trials the following year. Powered by a Daimler-Benz D.IIIa engine, this all-metal, low-wing, ground-attack monoplane was capable of a top speed of 240kmh (149mph), making it the fastest Junkers aircraft ever produced. The final months of World War I saw 47 delivered.

The J10 (the series production version of the J8) was the last in the series of Junkers two-seater, all-

Right: Another titan of the German aircraft industry, Anthony Fokker, standing beside a Fokker D.IV biplane.

Above: The Kaiser's soldiers go "over the top" during the 1918 offensive in World War I, in which the Germans deployed a number of ground-attack aircraft.

metal, low-wing, ground-attack aircraft, and bore the military designation CL1. Its first flight took place on 4 May 1918, and production started in the summer; 44 were delivered before the November Armistice which brought World War I to an end.

Armament of the J10 comprised two 7.92mm forward-firing Spandau machine guns in front of the pilot, and a single Parabellum on an elevated ring mounting in the observer's cockpit. Racks were fitted on either side of the fuselage, abreast of the rear cockpit, in which stick grenades or other anti-personnel weapons could be carried when the aircraft was being used in its ground-attack role. The J10 was without doubt the best ground-attack aircraft produced in Germany during World War I, and fortunately for the Allies it arrived too late to make any impact on the outcome of the conflict. It was fast (190kmh/118mph), manoeuvrable and very strongly built, and it could climb to 3000m (9843ft) in 14 minutes, an excellent performance for its time.

The J11 was a twin-float version: three examples were built, two of which were converted for civilian use by fitting a canopy over the rear seat.

The Treaty of Versailles, concluded in June 1919, imposed crippling restrictions on the German armed forces. The army and navy were both reduced in size to the point where they could function only as internal and coastal security forces. The German Flying Corps was disbanded completely, thousands of aircraft and aero-engines being handed over to the Allies.

By the beginning of 1920, military aviation in Germany was dead, and companies that had specialized in military aircraft construction had to look farther afield to continue their activities.

The reputation of one aircraft in particular, the Fokker DVII fighter, was such that Article IV of the Armistice Agreement singled it out as one of the items of German military equipment to be handed over at the end of the war. Anthony Fokker circumvented this by smuggling 400 engines and the components of 120 aircraft out of Germany into Holland, where he set up a production line.

Post-war, the DVII saw service in the Dutch East Indies, Poland, the USA, Switzerland, Belgium, Sweden, Romania, Russia, Denmark, Finland and Italy. Some of these aircraft were re-engined with 250hp BMW or 230hp Siddeley motors. Russia was one of the most important customers, acquiring 92 DVIIs.

The Junkers F13

There was no ban on the development of civil aircraft, although engine power restrictions were placed on new designs. Junkers therefore turned his attention to the civil aircraft market and produced the Junkers F13 single-engined airliner, the first all-metal cantilever monoplane with an enclosed cabin. The type, which first flew on 25 June 1919, was produced in several versions, many with different engines.

Deutsche Luft Hansa, formed in 1926 as the German national airline, would become the largest user. Most of its aircraft had previously served with Junkers-Luftverkehr, an airline started in 1921 by Junkers.

More than 320 F13s were built, seeing service with airlines throughout the world. In 1926, Junkers produced developed versions of the F13, designated W33 and W34. These were intended mainly for cargo, but their airline versions could carry six passengers.

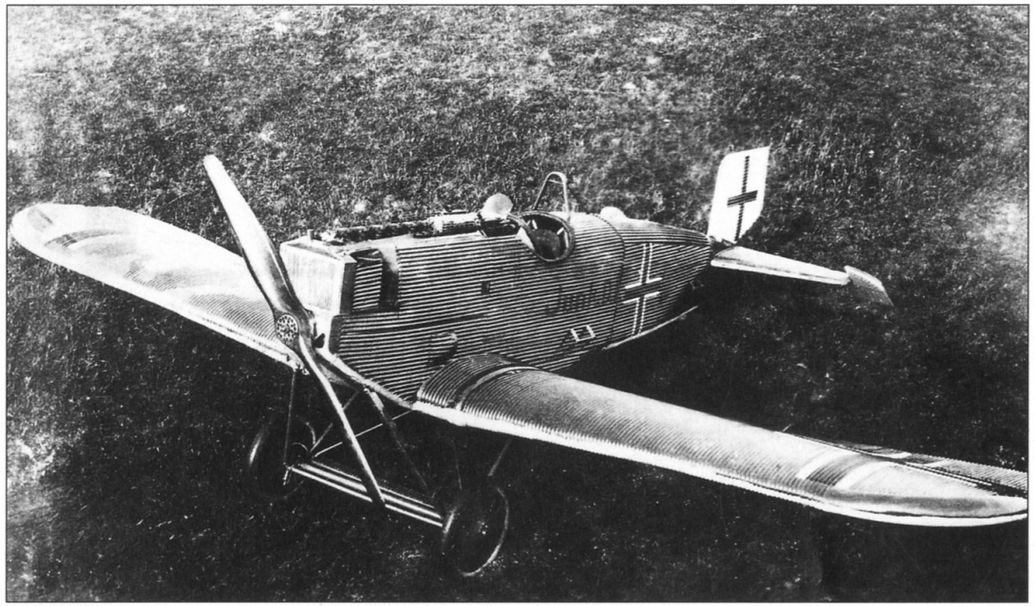
Both types were cantilever, low-wing monoplanes with the corrugated metal skin that had become a familiar feature of Junkers' designs. The pilot was seated in an open cockpit behind the single engine, but the passenger or cargo compartment was fully enclosed. The two types differed solely in that the W33 was normally powered by a liquid-cooled, in-line engine, and the W34 by an air-cooled radial. The W34 served widely with airlines and, later, with the Luftwaffe (German Air Force).

Junkers in Russia

On 6 May 1921, the new German government at Weimar had signed a trade agreement with the embryonic Soviet Union, which opened up the opportunity for German military aircraft manufacturers to set up new facilities inside Russia. The principal object was to provide modern combat aircraft for the Red Air Fleet, as the Soviet air arm was then known. The German Government tried to persuade the Russians to accept the designs of the Albatros company, but these were still based on the wood-and-fabric biplane concept of World War I. Junkers, on the other hand, was already producing all-metal monoplanes.

In 1922, he was granted permission to establish a provisional aircraft production facility at Fili, near Moscow. In addition to producing new aircraft, this would also serve as a repair shop for the various foreign aircraft already in Russian service, many of them the DVIIs supplied in 1919. The agreement, signed in January 1923, made provision for the Fili plant to be greatly extended to the point where it would be capable of producing 100 aircraft a month.

Junkers' first contract was for the production of 20 Ju 20 general-purpose aircraft, 50 Ju 21 (H21) reconnaissance aircraft, and 50 Ju 22 fighters. In the



Above: The Junkers J9 single-seat fighter. It was fitted with a 180-horsepower Mercedes engine.

event, the Ju 22s were not accepted for service because of their poor performance.

Meanwhile, events had been unfolding that were to have a profound effect on the future of the Junkers company as a whole. They would also lead directly to the development of the military aircraft that is the subject of this book.

Although Germany's armed forces had been emasculated by the Treaty of Versailles, a small defence ministry, the Reichswehrministerium, had remained in Berlin under the command of General Hans von Seekt. A far-sighted officer, one of his first acts had been to form a small aviation section within the ministry. In December 1923, the Reichswehrministerium signed an agreement with the Soviet Government for the provision of training facilities at Lipetsk, about 320km (200 miles) east of Moscow. The first contingent of German aviation cadets arrived there to begin their training in 1924.

In Germany itself, pilot training was also provided by the Deutscher Luftsportverband (DLV) with gliders, balloons and, later, with light aircraft. Captain Kurt Student, who was later to command Germany's airborne forces, was in charge of the DLV – which had 50,000 members by 1929.

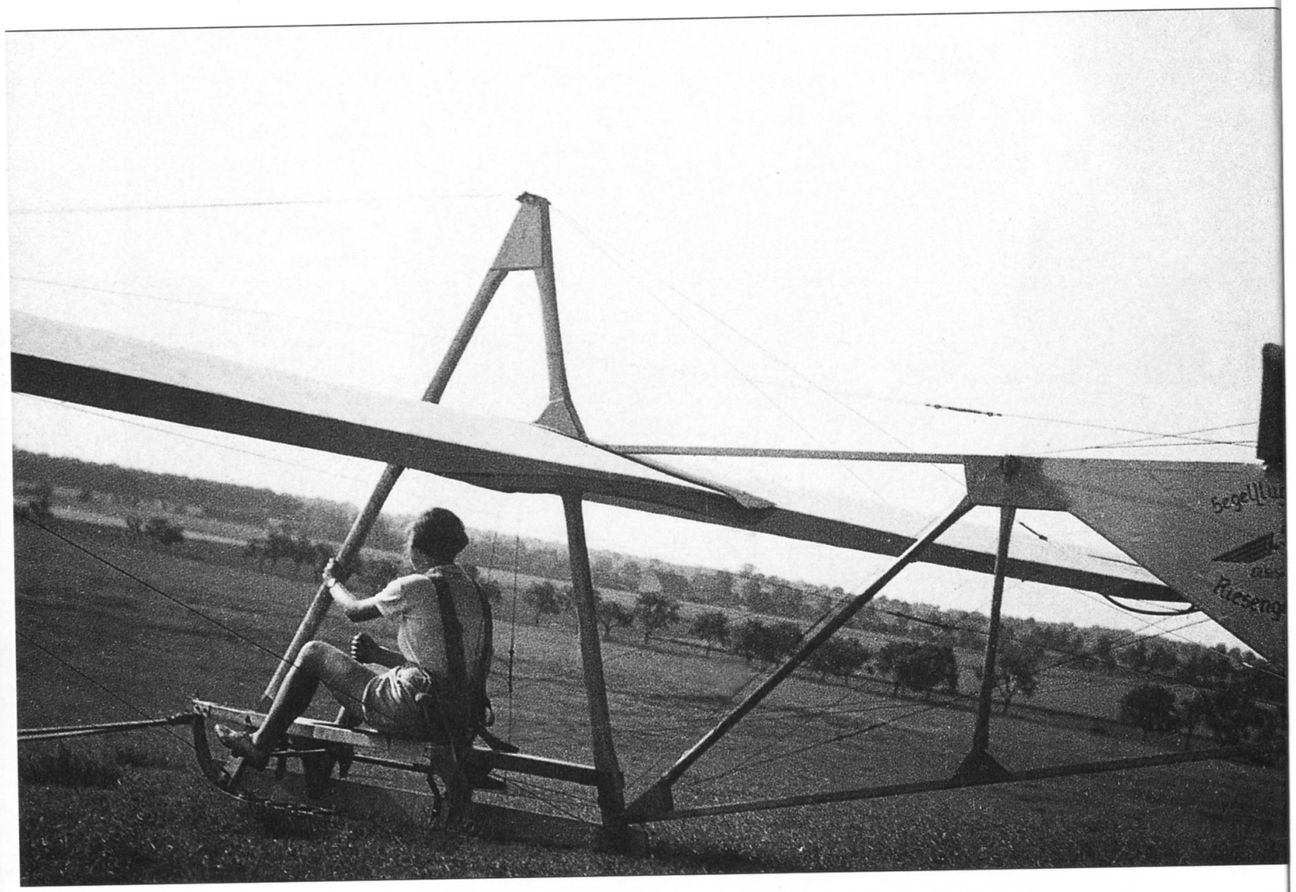
Production at Fili halts

Against this background of clandestine military training, the Junkers company continued to produce civil aircraft in Germany as well as military types – some converted from civil designs – in the USSR. However, in 1924 the Russians began to show increasing dissatisfaction with the aircraft that were being produced at Fili. The quality was poor and delivery slow, due mainly to the shoddy practices of the Russian workforce. The German Government, which had also ordered aircraft from the Fili plant, withdrew its subsidy. Finally, in March 1925, production at Fili was suspended. The facilities were taken over by the Soviet Government, which appointed a Russian director and prepared to manufacture aircraft of Soviet

Left: The Fokker DVII is widely regarded as the best German aircraft of World War I. Its development was championed by famous flying ace Manfred von Richthofen, the "Red Baron". In January 1918, Richthofen tested the DVII but he never had an opportunity to fly it in combat. He was killed just days before it entered service. The DVII proved to be durable and easy to fly. When equipped with a BMW engine, the DVII could outclimb any Allied opponent it encountered in combat. It proved to be more than a match for any British or French fighter aircraft of 1918. A certain young pilot named Hermann Göring was one of the first pilots to fly the DVII in combat.

design. The plant was renamed GAZ No 7, and all German-owned machinery was returned.

Junkers' other foreign outlet was Sweden. In 1923, he made contact with two brothers, Carl and Adrian Florman, who had plans to set up Sweden's first airline. The following year, with aircraft purchased from the Junkers company, they founded Aero Transport AB, inaugurating a route between Stockholm and Helsingfors. In 1925, Junkers and the Florman brothers established an aircraft production and maintenance facility, AB Flygindustrie, at Limnhamn in Sweden. This was subsequently used for the production of Junkers aircraft under licence, and also for the conversion of Junkers civil types to military



configurations. The types principally involved were the Junkers G23 and G24 trimotors, the first all-metal, multi-engine monoplanes to go into commercial service anywhere in the world.

Because of the restrictions imposed by the Versailles Treaty, the G23 was underpowered. More powerful engines were proposed by the technical staff at Dessau, but these were rejected by the Allied Control Commission in Germany. Hugo Junkers therefore hit on the simple expedient of flying the aircraft to Limnhamn, where they were re-engined.

The performance restrictions imposed on civil aircraft designs were lifted in 1926, but the production of military aircraft in Germany was still forbidden. In

Above: A young German woman goes through the motions of learning to fly an aircraft at a special Girls Glider School. Following World War I, flying and gliding as a pastime became increasingly popular with the upper and middle classes in Germany.

secret, a G24 was converted to military standard at Dessau by the addition of three machine-gun positions and bomb stations under the fuselage and wings, and this served as the pattern aircraft for a military derivative designated K30. Production K30s were built in Sweden under the designation R42. The first of 23 was delivered to the USSR in 1926, where the type was designated G1. Six more were delivered to Chile, and one to Spain.

Above: At the Darmstadt Gliding School in Germany, a student pilot takes a glider on a training flight.

Several other military conversions were undertaken at Limnhamn. Among these was the Ro2 low-wing reconnaissance monoplane, developed from the Junkers A20 mailplane of 1923. About 25 were delivered to the Soviet Air Force in the late 1920s, and Iran and Turkey also placed orders. In addition, the Junkers K43, a light bomber development of the single-engined W34 transport aircraft which first flew in 1926, was another type built in Sweden (the Swedish designations, it should be noted, were simply those of the Junkers civil aircraft in reverse).

The man in charge of the Junkers design team at Dessau was Karl Plauth (Dipl. Ing.), an experienced pilot who had flown fighters in World War I. In 1927 he designed the Junkers A48, a single-engined, two-seat, metal-skinned aircraft with twin fins, ostensibly intended for sporting purposes but with fighter-like qualities. Plauth was killed in November 1927 while demonstrating another aircraft, and design leadership was assumed by Hermann Pohlmann (Dipl. Ing.).

The A48 began its flight test programme in 1929, and seven examples were built. In Sweden, it was fitted out as a fighter aircraft and placed on the market under the designation K47. In its new configuration it flew for the first time in January 1929, powered by a Bristol

Left: General Ernst Udet, the famous World War I fighter pilot, following his record-breaking speed flight over a 100km (62.5-mile) distance. Flying a Heinkel Chaser aircraft with a Daimler Benz engine, he was able to cover the course at over 634 kmh (396mph). Udet soared to fame during World War I with 62 confirmed victories in the air, second only to the great Red Baron. He was to feature heavily in the future of the Stuka.

Jupiter VII radial engine. It performed to a high standard for its day, being capable of a speed of 289kmh (180mph) at 3050m (10,000ft). Armament comprised one rearward-firing and two forward-firing machine guns. It was produced in small numbers, 12 examples being delivered to China and two or three to the USSR. Total production of the A48/K47 series was not more than 30 aircraft.

Some of the civil A48s were used by the DLV to train military pilots, and it is known that these aircraft were used to carry out dive-bombing experiments. The concept of dive-bombing was by no means new in the late 1920s. It was certainly used on a limited scale during World War I, and the first officially acknowledged dive-bombing attack appears to have been made by Lieutenant Harry Brown of No 84 Squadron, Royal Flying Corps, who sank a small enemy naval craft in 1917.

After World War I, although some experimentation was carried out, the concept was abandoned by the Royal Air Force (RAF), which preferred to concentrate on level bombing. The Royal Navy kept the idea alive, but was restricted until the mid-1930s by the fact that all naval aircraft came under RAF control. The development of dive-bombing was pursued in the USA, and the technique was employed by the US Marine Corps (USMC) during operations in Haiti in 1919 and for the intervention in Nicaragua in 1927. The aircraft used were de Havilland DH4s.

The development of dive-bombing

Whereas the intention of the USMC was to find a means of providing accurate tactical air support for its ground troops, the US Navy strove to improve its dive-bombing techniques for the purpose of hitting small targets – warships manoeuvring at speed, for example. A major step forward was made in 1927 when the USMC issued a requirement for a DH4 replacement. It was met by Glenn H. Curtiss, who offered a version of the Curtiss O-1 Falcon light bomber and reconnaissance biplane that had been developed for the US Army in 1924.

The USMC requirement was originally for a two-seat fighter, with secondary capability as a light bomber

and reconnaissance aircraft. Two prototypes of the O-1 variant were ordered under the designation XF8C-1, followed in 1928 by four F8C-1 and 21 F8C-3 aircraft. These differed from the army's Falcons in having a Pratt & Whitney Wasp radial engine instead of a Packard 1A-1500.

In 1929, two more prototypes were built. These were the XF8C-2 and XF8C-4, and they represented the development of the aircraft to fulfil the dive-bomber role. The XF8C-4 was selected for production, and 27 were built for the US Navy and for the USMC, the first entering service in 1930. The type was given the name Helldiver.

Ernst Udet

Helldivers were among the star attractions at air displays throughout the USA as they demonstrated the science of dive-bombing. One spectator in particular was captivated by the Helldiver's technique: Ernst Udet. Udet had risen through the ranks to become an officer, and was the second-highest scoring German ace of World War I, with 62 victories. He was also the youngest, being only 22 years old when the war ended in November 1918. He was awarded Germany's highest honour, the *Ordre pour le Mérite*, popularly known as the Blue Max.

After the war Udet established a reputation as a skilled and daredevil pilot, taking part in flying exhibitions and films in Europe and in the USA. He appeared with the famous female producer Leni Riefenstahl, later to become a key figure in the Nazi propaganda machine, in the film *SOS Eisberg*. He was active in the veterans' association of the Richthofen Geschwader (wing), and had an early clash with its last commander, Hermann Göring. Udet accused Göring, who would soon become Commander-in-Chief (C-in-C) of Hitler's Luftwaffe, of making false claims about the number of his aerial victories. (In fact, there was no reason to doubt Göring's claim of 22 triumphs.)

In September 1931, Udet attended the National Air Races at Cleveland, Ohio, in which an F8C made a simulated dive-bombing attack as the climax of its display. It was an experience that convinced him of the dive-bomber's excellence as a tactical support weapon.

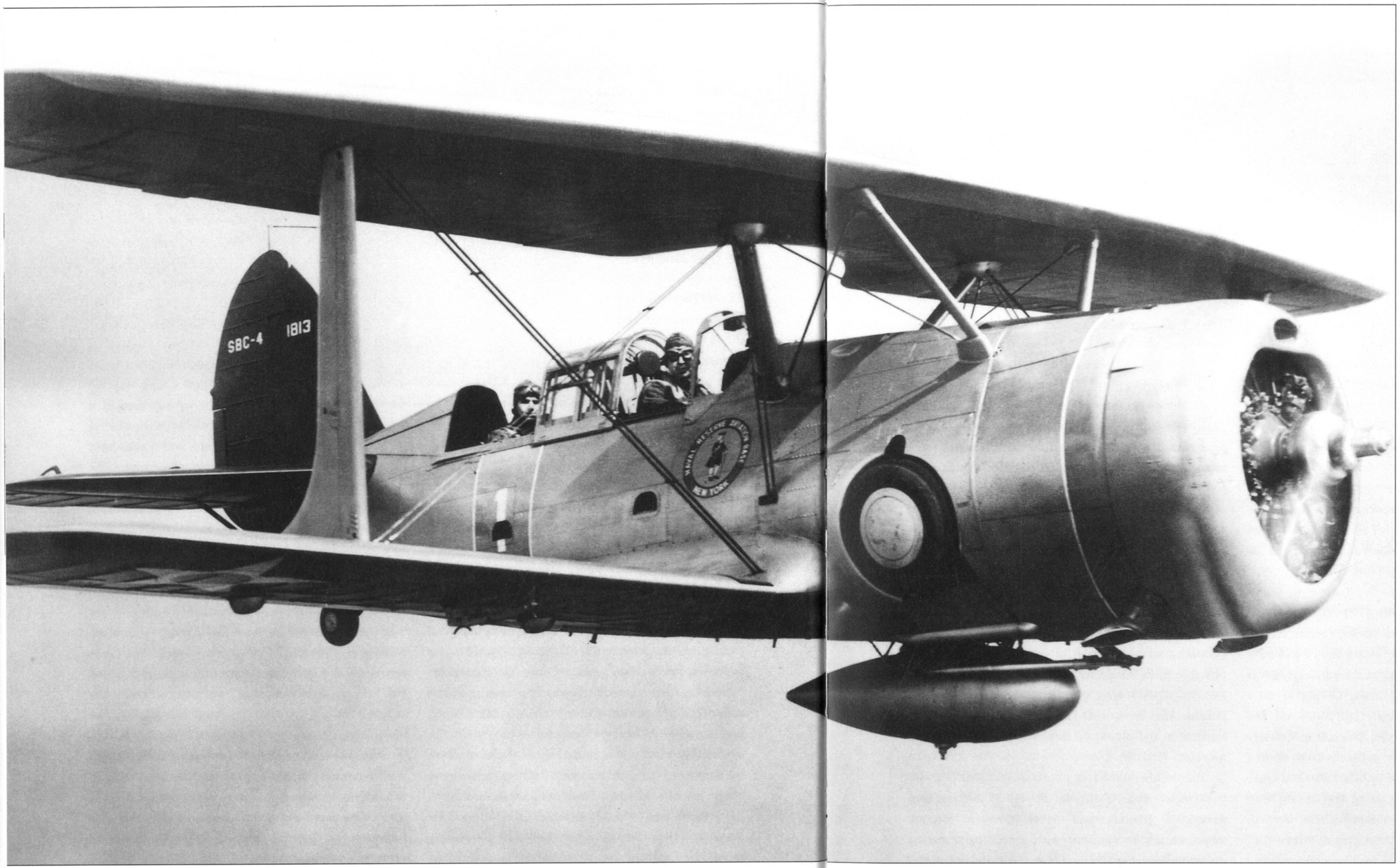
The other nation that maintained an interest in the dive-bombing concept was Japan. During World War I, the Imperial Japanese Navy had made one of the first successful offensive uses of aircraft. In September and October 1914, it operated four seaplanes from the tender *Wakamiya Maru* against the German fortress at Tsingtao, where they sank a small minelayer. However, the Japanese had no further opportunity to test their fledgling air arm in combat, and it was not until it underwent a revival with foreign assistance after World War I that dive-bombing became a serious consideration.

The dive-bomber in Japanese service

From 1931, the dive-bomber became a cornerstone of the Imperial Japanese Navy's offensive tactics. In that year, the Japanese Navy placed a specification with the German Heinkel company for the construction of a two-seat, biplane dive-bomber. It was to be capable of carrying a 250kg (550lb) bomb load, and was to have an interchangeable wheel or float undercarriage. The prototype, the Heinkel He 50aW, was completed in the summer of 1931. It was a sturdy two-bay biplane of mixed wood and welded steel tube construction with fabric covering, fitted with twin floats and powered by a 390hp Junkers L-5 liquid-cooled engine.

This was found to provide insufficient power, so the second aircraft, the He 50aL, was fitted with a 490hp Siemens-built Bristol Jupiter radial driving a four-blade wooden propeller. The second prototype was completed as a landplane, as was the similarly powered He 50b. A small batch of the latter aircraft was supplied to the Imperial Japanese Navy under the designation He 66.

In 1932, the He 50aL (later redesignated He 50V-1) was demonstrated before the Reich War Ministry, and this led to an order for three development aircraft. These were completed in the summer of 1932 and were followed by a production batch of 60 He 50As, all powered by uncowled Siemens SAM 22B radial engines



Left: The Helldiver aircraft, an early US dive-bomber. So impressed was Ernst Udet with its predecessor, the F11C Goshawk, whilst watching it in action at displays throughout the United States, that he bought two examples and shipped them back to Germany, There, he pressed the dive-bomber concept on the German military. Though the dive-bomber was already under consideration in Germany, and had been used elsewhere, Udet played a key role in making it an integral part of Luftwaffe strategic doctrine..

driving three-blade metal propellers. Twelve aircraft ordered by China, and designated He 66b, were commandeered by the newly formed Luftwaffe in 1933 and designated He 50B. The first He 50s were delivered to Fliegergruppe Schwerin in 1935. It was the Luftwaffe's first dive-bomber unit.

Meanwhile, development of the dive-bomber in the USA had taken another step with the introduction of the Curtiss F11C Goshawk, which fulfilled the dual roles of naval fighter and light bomber. The prototype of the new aircraft made its first flight on 25 March 1932, and the US Navy subsequently ordered 27 examples for service on board the 39,370-tonne (40,000-ton) aircraft carrier USS *Saratoga*. Curtiss also produced 28 examples of the F11C-3 variant, which had retractable landing gear in place of the F11C-2's fixed and streamlined undercarriage with spatted wheels. In addition, Goshawks were exported in four versions, the largest customer being China.

On 30 January 1933, Adolf Hitler's Nazi Party seized political power in Germany, and at once embarked on a massive but highly secretive expansion of the armed forces. Hitler's newly appointed Air Minister was Hermann Göring who, for some time (in a gesture that can only be described as magnanimous, given the earlier dispute over his aerial victories), had been trying to persuade Udet to become involved in the organization of the clandestine Luftwaffe.

Early Luftwaffe dive-bombing experiments

In the spring of that year, Franz Müller, a senior official in the Reich Air Ministry, told Göring that he had been asked by Udet to seek approval for the purchase of two Goshawks for dive-bombing trials. Göring at once authorized the necessary transfer of funds via the German Embassy in Washington, DC, and in October 1933 the two Goshawks arrived in Bremerhaven aboard the liner *Europa*. Accompanied by Udet, who had spent some weeks in the USA testing racing aircraft for Glenn Curtiss, the Goshawks were shipped to the German flight test centre at Rechlin, near Berlin, where they were uncrated and assembled in readiness for trials.

In December, Udet himself demonstrated the Goshawk's dive-bombing attributes to assembled Air Ministry officials at Rechlin. They included the head of the ministry's development branch, Major Wolfram von Richthofen, and Göring's deputy, Erhard Milch. Neither was impressed: von Richthofen commented that an aircraft making a dive-bombing attack would be particularly vulnerable to anti-aircraft fire, while Milch was of the opinion that crews would be quite unable to tolerate the high g-forces generated as the aircraft pulled out of its dive.

The only real supporter was General Walther Wever, the Luftwaffe Chief of Staff, but his main priority was to build up a strategic bombing force. (Wever was killed in an air crash in 1936, and the concept of a powerful strategic force of four-engined bombers died with him.)

The two Goshawks acquired by Germany were given the registrations D-IRIS and D-ISIS. On 20 July 1935, Udet was demonstrating D-IRIS over Berlin's Tempelhof airport when the tail came off in a dive; the pilot parachuted to safety, but the aircraft was a total loss. Udet subsequently used D-ISIS, which had completed its evaluation, as his personal aircraft.

A difficult beginning

Udet was now a firm member of the Nazi establishment, having been appointed Director of Fighters and Dive-Bombers in the Luftwaffe. He retained the use of D-ISIS until the outbreak of World War II, when he presented it to the Berlin Air Museum. Following the destruction of many of the museum's prized exhibits in an RAF bombing raid, the survivors, including D-ISIS, were removed to a safer location in Poland. After the war, D-ISIS was seized by the Polish authorities and placed on display at the National Air Museum, Krakow.

Despite the lukewarm response from officials, the trial results of the Goshawks, the He 50 and the K47 persuaded Junkers and other German aircraft manufacturers to continue with the development of dive-bombers as a private venture. In fact, the

Above: Ruined buildings at Tsingtao in 1916, following bombing attacks by the Japanese Navy.

Technisches Amt (technical department) of the Reich Air Ministry had already decided to fund a dive-bomber development programme, to be completed in two stages.

The first involved the design of a single-seat, all-metal biplane, with potential for possible further development. Two companies, Fieseler and Henschel, responded with proposals. It was clear from the outset that the Henschel design was the more attractive of the two, so Fieseler's offering, the Fi 98, was abandoned after only a single prototype had flown.

The Hs 123

The first prototype of the Henschel design, the Hs 123V-1, had its maiden flight in May 1935. The test programme was hit by early tragedy, two of the prototypes shedding their wings during dives. Investigations revealed that the wing had torn away from the centre-section struts, and so the fourth aircraft was substantially strengthened. The type was ordered into production, five Hs 123As being sent to Spain for operational evaluation with the Condor Legion (a Luftwaffe unit of four bomber squadrons and four fighter squadrons which supported Franco's Nationalist forces) in 1936. This resulted in the improved Hs 123B, which was dedicated to ground-attack (rather than dive-bombing) and later saw combat during the German invasions of Poland, France and the USSR.

Although the Hs 123 carried comparatively light armament, its BMW radial engine was very noisy, especially in a dive, and this was used as a device to spread panic among horses and men alike. Despite its growing obsolescence, one unit, II Schlachtgeschwader 2 (II/SG 2), continued to use it on the Russian Front until 1944. The Hs 123C was a variant armed with 20mm cannon.

Between 1931 and 1934, the Junkers design team had been carrying out various trials associated with dive-bombing, using the K47. The aircraft was fitted with an array of devices designed to establish optimum dive-bombing angles, bomb sights, and so on. These trials proved conclusively that a dive-bomber could hit its target very precisely, and they opened the door for the Junkers company, with its vast design experience, to lead the field.

Left: Hermann Göring (far left), the head of the German Luftwaffe and an ardent supporter of the dive-bomber concept.

However, Hugo Junkers had experienced more than his share of problems: the worldwide economic crisis of 1930–31 forced him to sell off some of his companies; and two years later he fell foul of the Nazis and their aims. He became involved in an ongoing legal battle with the German Government, which sought to acquire his shares in Junkers Flugzeugwerke and its subsidiary, Junkers Motorenwerke. Junkers refused to sell, and was placed under house arrest on a trumped-up charge. Stripped of all control over his business concerns, his health deteriorated rapidly and he died on 3 February 1935, aged 76.

A month earlier, the Reich Air Ministry had issued details of its requirement for a definitive dive-bomber, as distinct from an interim type such as the Fi 98/Hs 123. Four companies responded.

First was Arado Flugzeugwerke GmbH, which had been formed in 1925 with the help of funds provided

by a wealthy industrialist, Hugo Stinnes. Its chief designer was Dipl. Ing. Walter Rethel. Arado's submission was the Ar 81. The first of three prototypes, the Ar 81V-1, flew in 1935 and carried the civil registration D-UJOX. Both the Ar 81V-1 and V-2 (D-UPAR) had slim, boom-like rear fuselages and oval, end-plate twin-fin and rudder assemblies. The third aircraft, Ar 81V-3 D-UDEX, which was flown and tested in 1936, had a single fin and rudder and a deeper rear fuselage.

The Ar 81 was of all-metal construction and was the only one of the four contenders to retain a biplane configuration, a fact that played a considerable part in its rejection. The Ar 81 was powered by a 610hp Junkers Jumo 210 engine, giving it a top speed of 314kmh (214mph). Proposed armament comprised one forward-firing, synchronized, nose-mounted 7.92mm machine gun; one flexible 7.92mm machine gun in the rear cockpit; and one 250kg (551lb) bomb.

The Ha 137

The newest aircraft company to submit a proposal was Blohm und Voss Schiffswert, Abteilung Flugzeugbau. On 4 July 1933, the Blohm und Voss shipbuilding company of Hamburg had formed an aircraft subsidiary known as the Hamburger Flugzeugbau GmbH, under the direction of Walther Blohm. The Hamburger Flugzeugbau's design team began work on a single-seat dive-bomber late in 1933, the first project being designated P6. This was to have had a BMW 15 engine, but as this powerplant was not yet available the design was modified to take the Pratt and Whitney Hornet model (later licence-built as the BMW 132) and redesignated P6a.

The project designation was eventually changed to Ha 137: work began on two prototypes powered by the Hornet, the Ha 137V-1 (D-IXAX) and Ha 137V-2 (D-IBGI); and one prototype powered by the Rolls-Royce Kestrel V, the Ha 137V-3 (D-IZIQ), or P6b. All three were completed during 1934–35 and, after initial flight tests at Hamburg, dive-bombing trials were undertaken at Travemünde. The aircraft looked very similar to the Ju 87.

By this time, it had become obvious that the somewhat large Hornet radial engine was unsuited to the single-seat dive-bomber configuration because it severely restricted the pilot's view forward. Thus, when the new Junkers Jumo 210 liquid-cooled, in-line engine became available in 1936, two more prototypes were built around this powerplant. Powered by the 610hp Jumo 210Aa, the new aircraft were the Ha 137V-4 (D-IFOE) and V-5 (D-IUXU). The radial-engined and in-line engined versions were respectively designated Ha 137A and Ha 137B, the latter the proposed production version.

The Ha 137 was designed around a wing based on a single, strong tubular spar that also served as the fuel tank. It was tough and manoeuvrable, and surprise was expressed in some quarters when it lost out to the Ju 87. Proposed armament of the Ha 137 was somewhat different from that of its competitors: it comprised two 7.92mm MG 17 machine guns in the upper forward fuselage and two more – or one 20mm FF cannon – in the top of the landing gear "trousers", plus four 50kg (110lb) bombs on underwing racks.

Blohm und Voss went on to design a range of very viable flying boats and seaplanes. However, since the company was part-Jewish, it refused to accept Nazi subsidies and therefore received comparatively few orders during World War II.

The Heinkel contender

The third contender to design the new Reich Air Ministry dive-bomber was the long-established Ernst Heinkel AG. After a short period as a designer with the LVG and Albatros concerns, Ernst Heinkel had joined the new Hansa und Brandenburgische GmbH as technical director. During World War I, he had produced the famous Hansa-Brandenburg W12 and W29 fighter floatplanes which had proved extremely successful in operations over the North Sea.

Heinkel had formed his own company at Warnemünde in December 1922; in common with Hugo Junkers, he had secretly continued to produce military aircraft for foreign customers. In 1932, a new Heinkel

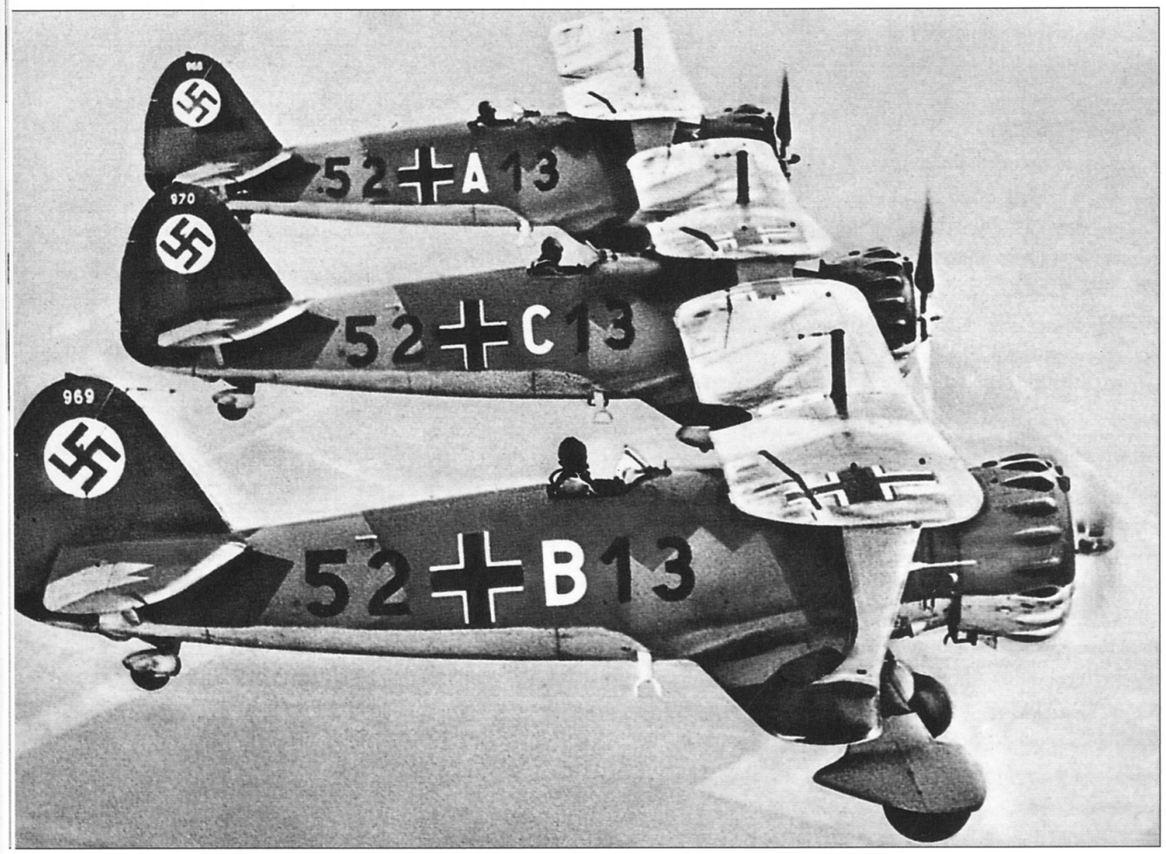
factory was opened at Rostock, and it was there that his design team produced the prototype He 118, aesthetically the most attractive of the entrants in the Stuka design competition. Four prototypes were built, the first and second aircraft both being fitted with the Rolls-Royce Kestrel engine.

Meanwhile, the prototype of the aircraft that was to outstrip all the others had been taking shape at Dessau under the leadership of Pohlmann. A full-size wooden mock-up was completed by the end of 1934, and the Reich Air Ministry issued a contract for three prototypes in January 1935 – some considerable time before similar contracts were issued to the other contending companies.

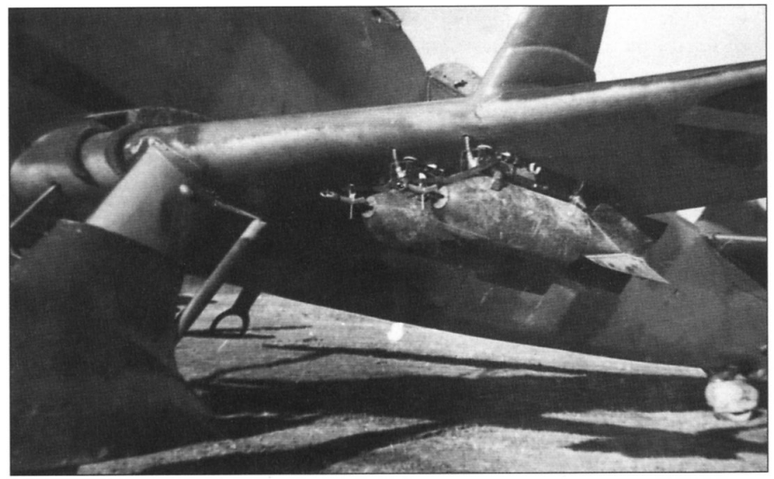
The first prototype was given the designation Ju 87V-1, and was completed in the summer of 1935. It featured a low-mounted cantilever wing, built in three sections. The centre section, which carried the undercarriage attachments, was an integral part of the fuselage; the port and starboard outer sections were secured to the centre section by ball-and-socket joints on the spar flanges. The centre section was set at an anhedral angle of 12 degrees from the fuselage sides; the outer sections had a dihedral of 8 degrees, producing the famous "inverted gull wing" arrangement that was the Stuka's defining feature.

This configuration had a number of advantages. One of the most important was that it reduced the

Below: A flight of Henschel Hs 123 dive-bombers. These aircraft were in direct competition with the Ju 87 Stuka.



Right: The port wing of a Henschel Hs 123 fitted with two small high-explosive bombs. This picture was taken during the Spanish Civil War, where the Hs 123 saw action as part of the German Condor Legion. It helped define the role of close air support aircraft for the Luftwaffe.



height of the undercarriage, thereby saving weight, improving crew vision and reducing drag between the wing and fuselage. The wings were constructed around two spars with extruded L-section flanges riveted together through flat-plate webs. Smooth, stressed metal-skinning was flush-riveted to closely spaced rib sections extending across the chord. The wings were fitted with Junkers double-wing ailerons and hydraulically operated flaps divided into three sections extending along the mainplane trailing edge; this arrangement was first used on the Ju 52 transport and patented by the firm. Hydraulically actuated dive brakes rotating downwards through 90 degrees were fitted under the leading edge of each wing, attached to the front spar outboard of the undercarriage legs. The fuselage was built in two oval sections, joined along the centre line at the side.

Ju 87 construction

Construction comprised a semi-monocoque of frames and stringers, the frame being of Z-section riveted to the all-metal stressed skin. The fuselage was flush-riveted on all external surfaces. The U-section stringers were joined to the skin by a double line of rivets, continuous throughout the frames. A curved angle bracket was riveted to both frame and stringer at each frame junction. In the lower fuselage the stringers were fitted closely together, and very strong frames were fitted where the spars passed through. The addition of thick plating meant that the fuselage was able to withstand the forces experienced in a dive and the subsequent pull-out.

The two crew positions were separated by an anti-crash hoop made of cast magnesium, designed to prevent crushing of the cockpit area should the aircraft turn over on its back as the result of a ground accident. Pilot and gunner were seated back-to-back under a long "glasshouse" canopy, hinged for access on the starboard side.

The forward fuselage carried the mounting for the engine, which in the case of the Ju 87V-1 was a 530hp Rolls-Royce Kestrel – German aero-engine firms were unable to produce an engine of the required power at that time. The Ju 87V-1 was fitted with twin fins and rudders, an arrangement designed to offer the gunner a good field of fire. However, subsequent aircraft featured a single cantilever fin and rudder, the tailplane being braced with V-struts to two points on the lower fuselage. The tailplane was rectangular, the fin and rudder square-cut. The whole fin area was covered by flush-riveted metal skin. Automatic tail trimming by mechanical lineage to the flaps was used to maintain

trim during flap selection. Elevators and rudder were both fitted with trim tabs, which could be adjusted in flight. An auxiliary control surface on the starboard elevator, which was automatically under tension when the dive brakes were extended, disengaged when the bomb-release mechanism was activated and served as an automatic pull-out device.

The bombing system

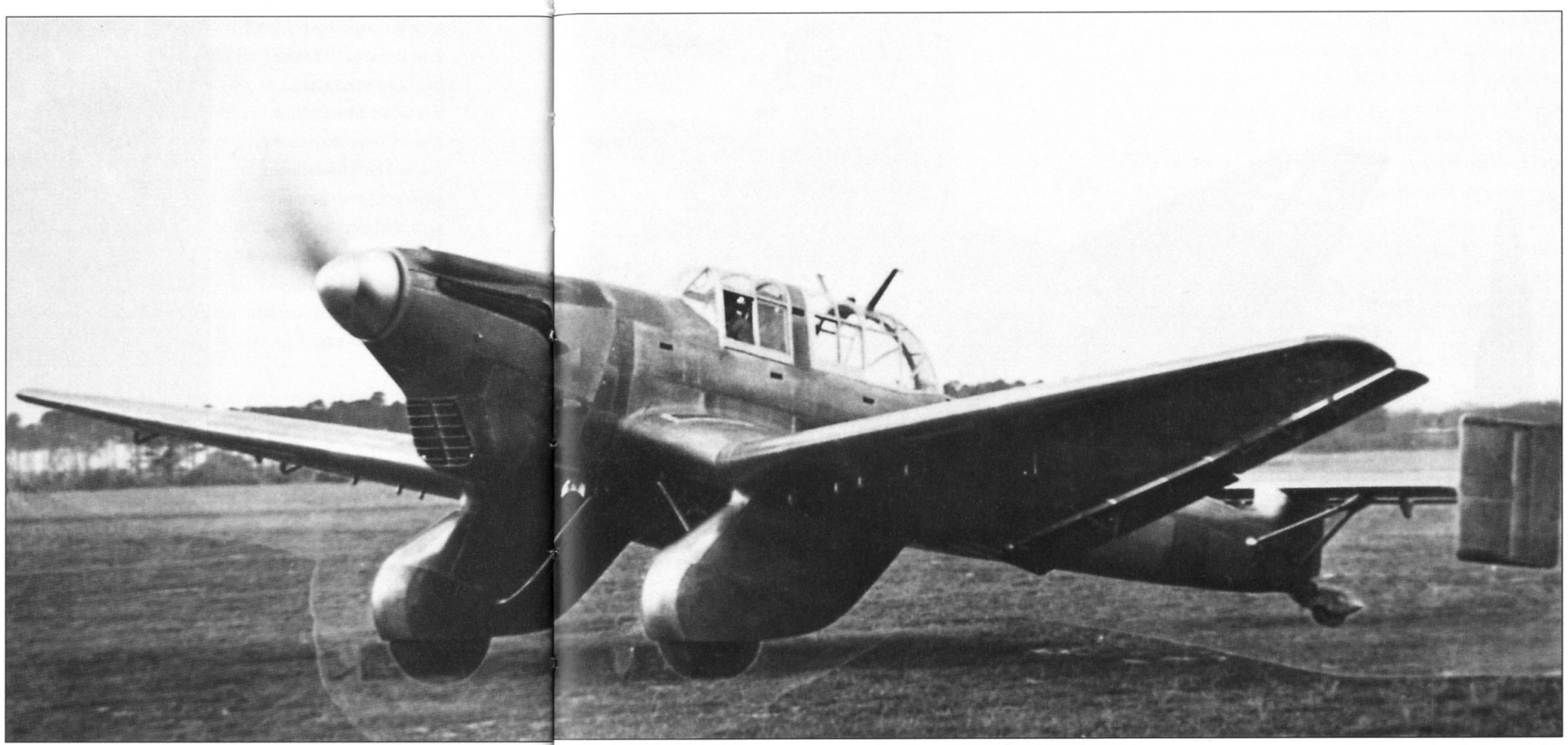
The Ju 87 was equipped with an ingenious automatic bombing system: this consisted of an Askania autopilot, which was used with a Revi gunsight. The bomb-release gear, elevator controls and dive brakes were linked to this system. Before attacking, the pilot would set the bomb-release height. The deployment of the dive brakes automatically adjusted the elevator trim tab, and put the aircraft into a dive. When the bomb-release height was reached and the bombs were dropped, the autopilot adjusted the elevator trim tab again so that the aircraft became tail heavy and pulled itself out of the dive. The use of the elevator was forbidden, except in an emergency. On the pull-out, aircraft and crew were subjected to a force of about 6 g.

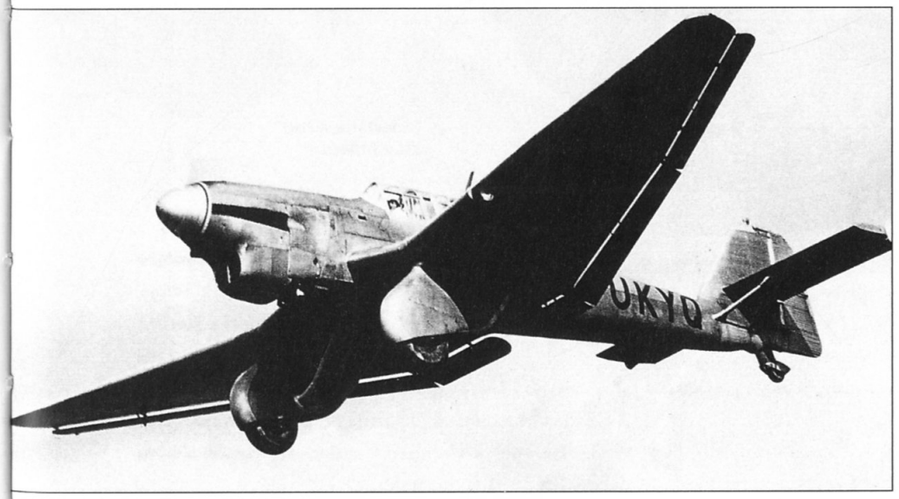
The Ju 87V-1 flew for the first time on 17 September 1935. Apart from a slight lack of stability, its pilot reported that the aircraft handled well and was easily controllable. The only change necessary was the enlargement of the water cooler to prevent the constant overheating of the engine. Once this was done the flying programme resumed, although the aircraft was without dive brakes – these were still under development.

All went well until 24 January 1936, when the tail unit started to flutter in a dive and the starboard fin and rudder broke away. The aircraft entered an uncontrollable spin and crashed, killing test pilot Willy Neuenhofen and his observer. It was a tragic loss, for Neuenhofen had been with the Junkers firm since 1921 and had taken part in many dive-bombing trials, as well as testing new types such as the Ju 60.

As a result of this accident, the Ju 87V-2 and all later aircraft were fitted with a single fin and rudder assembly, a variation of that fitted to the commercial Ju 160. The other major changes were that the V-2 was fitted with the 618hp Junkers Jumo 210Aa 12-cylinder inverted-Vee type engine and sported the Junkers dive brakes under the outer wing panels. It also featured a special under-fuselage cradle hinged just aft of the radiator bath; this was designed to swing forwards and downwards during the dive, enabling the 500kg (1102lb) bomb to clear the propeller arc.

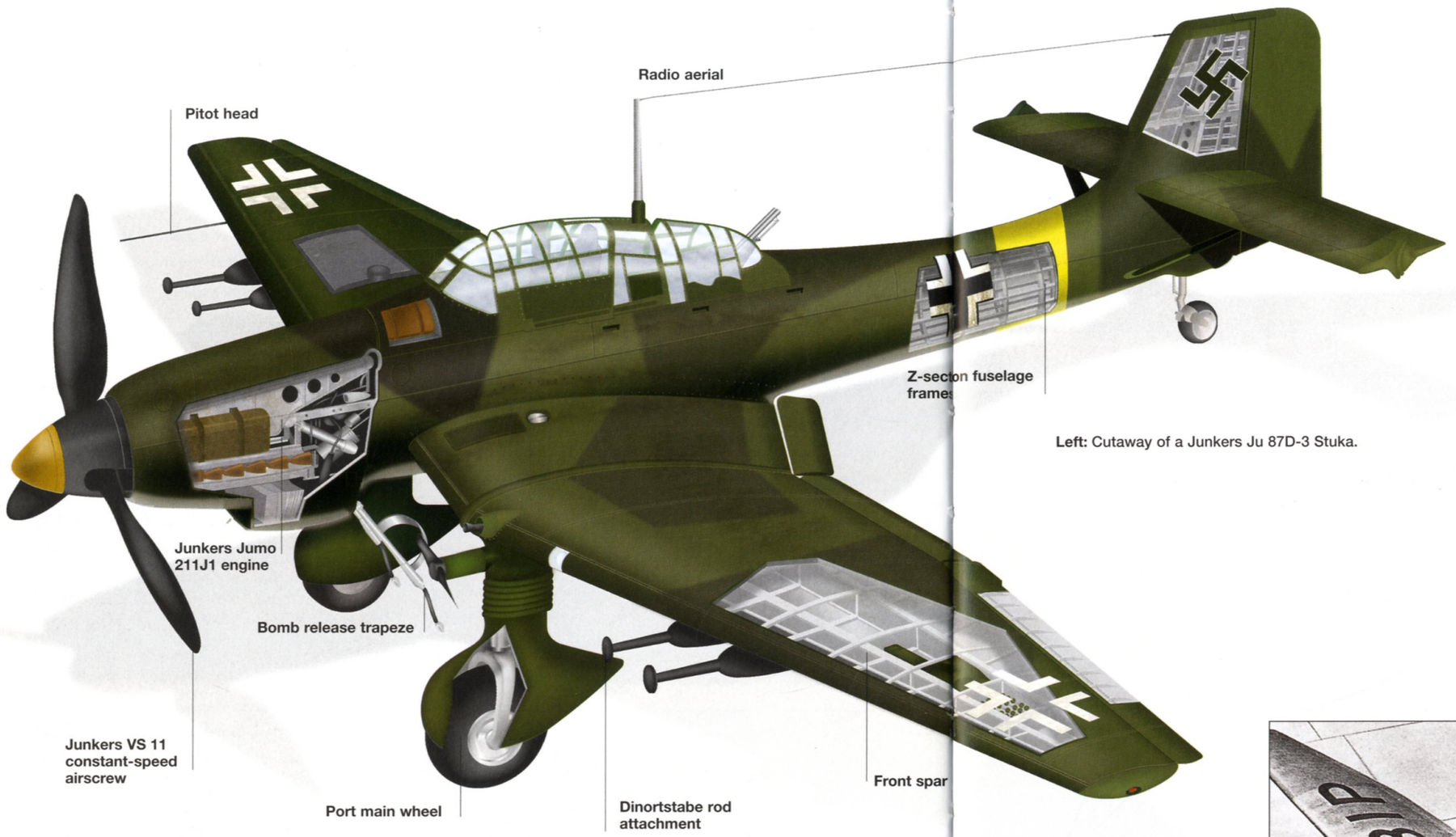
In this configuration it flew for the first time early in March 1936, bearing the civil registration D-UHUH. It was soon followed by a third prototype, the Ju 87V-3 (D-OKYQ), which had a slightly modified vertical tail and a repositioned engine, the thrust line being lowered a little to give the pilot a better forward view





Above: The V-1 prototype version of the Ju 87 Stuka. The V-1 undertook its maiden flight on 17 September 1935. Note the double fin tail.

Left: The Ju 87V-3, the third prototype. The main changes consisted of a lowered engine, the vertical tail surfaces were enlarged, and small end plate fins were added to the horizontal surfaces.



over the long nose. In that month, the contending prototypes went to Rechlin to undergo trials. It was soon clear that there were only two serious contenders: the Ju 87 and the He 118. The latter did not perform well during diving trials in June 1936; whereas the Ju 87 could dive vertically (because of its large dive brakes, the He 118 was restricted to a 50-degree diving angle). It seemed as though the Ju 87's march to success was unstoppable.

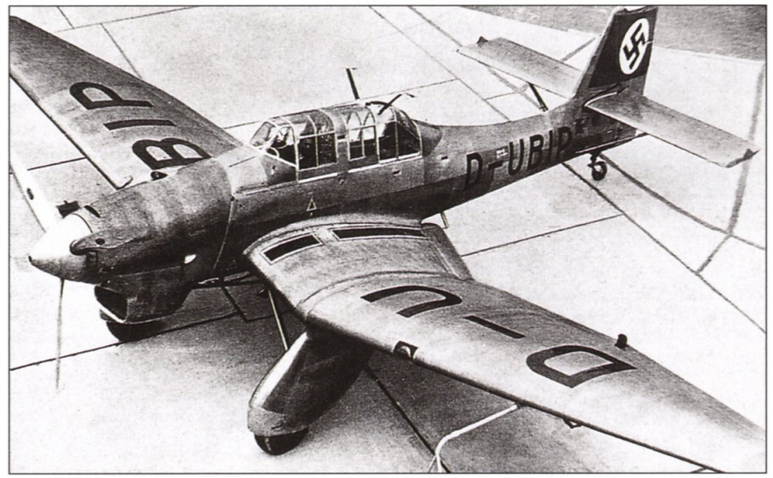
Then, on 9 June 1936, came an instruction from the Reich Air Ministry, issued by von Richthofen. All work on the Ju 87 was to cease, while trials with the He 118 would be allowed to continue. Luckily for Junkers, the very next day Udet was appointed Director of the Reich Air Ministry technical department, and he immediately rescinded von Richthofen's order. It was indeed a narrow escape for the Stuka.

Left: Cutaway of a Junkers Ju 87D-3 Stuka.

Shortly afterwards, on 27 July 1936, Udet had a very lucky escape. He took off in the He 118V-1, which bore the civil registration D-UKYM, to carry out some high-speed dives over Lake Müritz. As he was on the point of pulling out of a dive, the propeller feathered itself, the fast reduction in revs sheared the toothed wheels in the reduction gear, the engine tore away from its mountings and the aircraft literally broke up around him. His seatbelt broke and he struggled clear of the wreckage, opening his parachute a couple of thousand feet above the ground. He received slight injuries on landing. For the He 118, it was the end.

Of the three surviving prototypes, the He 118V-3 and V-4 were subsequently exported to Japan, one for evaluation by the Japanese Navy and the other by the Army. The He 118V-2 was used by the Heinkel factory as a turbojet test-bed, flight-testing the Heinkel-Hirth HeS 3B before this engine was installed in the He 178, the world's first jet aircraft.

Immediately after the crash of the He 118, the Ju 87 was officially pronounced the winner of the Stuka contest. A fourth prototype, the Ju 87V-4, flew in November 1936. Armed with a fixed 7.92mm MG 17 machine gun in the starboard wing, and with a 7.92mm MG 15 machine gun in the rear cockpit, it was the pattern aircraft for the production Ju 87A-0.



Right: The Ju 87V-4 prototype, looking ever more like the production Stuka. This prototype became the A variant Stuka with slight modifications.

Deployment and Combat Evaluation

After eclipsing its rivals in testing, the Ju 87 underwent a baptism of fire in the Spanish Civil War, giving Stuka pilots valuable combat experience.

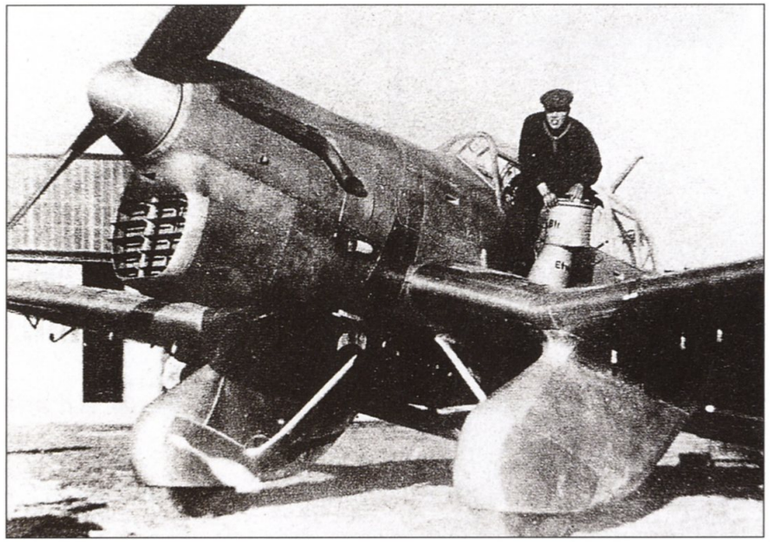
While the contending aircraft were being evaluated in Germany, intensive trials were also taking place with bombs of various weights and with the Stuvi bombsight. Stuvi was an abbreviation of Stukavisier, although its official designation was Revi (Reflexvisier) C12A.

The sight was progressively refined as the trials progressed, test flights being undertaken by He 50s and a Ju A48. In March 1936, an He 50 was flying with a Stuvi A2 bombsight and with an ETC 500 bomb rack, capable of carrying a 500kg (1102lb) bomb.

Trials with the Ju 87A-4 continued throughout the spring of 1937, the aircraft being re-engined with the

Left: A pair of Ju 87Bs from the German Condor Legion over the battlefront during the Spanish Civil War.

Right: The Ju 87V-1 prototype was fitted with a Rolls-Royce Kestrel V engine after the enlargement and redesign of the radiator bath. As with all the early Stukas, this version has the large trousered undercarriage. This design element was discarded in later versions of the Ju 87.



650hp Junkers Jumo 210Ca driving a three-blade, two-position Jumo-built Hamilton propeller.

The first of 10 pre-series Ju 87A-0 aircraft left the Dessau assembly line at the beginning of 1937. It incorporated all the modifications of the V-4, retaining the distinctive heavily "trousered" undercarriage legs and two prominent radio antennae, angled outwards in a "V" configuration from the cockpit canopy – these were later replaced by a single, vertical antenna.

The Anton

The model had a small, rectangular radiator intake, enlarged on subsequent variants. The observer's cockpit was equipped with a FuG radio transceiver, allowing him to transmit and receive wireless telegraphy (WT) messages. The model was still somewhat underpowered, so the 458kg (1012lb) bomb could be carried only if the observer stayed on the ground; with the observer/gunner on board, offensive load was restricted to one 250kg (551lb) bomb. SC 50 anti-personnel bombs could be carried under each outboard wing panel.

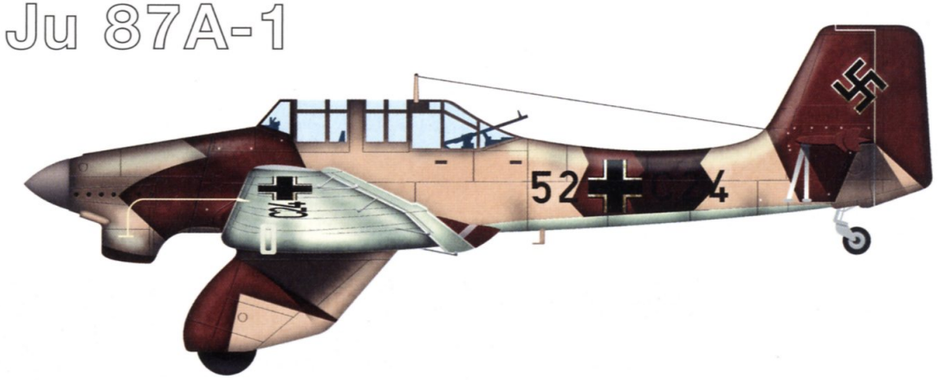
The Ju 87A-0 was issued to I/Stukageschwader 162 (I/St.G 162), the Stuka development unit, at Schwerin. It was followed into service by the production Ju 87A-1, the first examples of which were delivered to I/St.G 162 Immelmann in April 1937.

The Ju 87A-1, nicknamed the Anton (the phonetic pronunciation of the letter "A"), retained the large "trouser" undercarriage legs of the prototypes and of the Ju 87A-0, but had straight wing leading edges instead of the double-tapered section that characterized earlier machines.

The A-1 did not occupy the Dessau production line for long, being replaced by the Ju 87A-2. This was identical, with the exception of its radio equipment. Improvements included the fitting of an Ei V intercom system between the two cockpits, speech transmission facilities for the pilot, and speech and wireless telephony facilities for the observer. It was also fitted with the 690hp Junkers Jumo 210D engine featuring a two-speed supercharger.

Even with the improvements, the pilot's workload was high. The propeller pitch had to be adjusted before and after a diving attack, the boost and/or the blower revs had to be constantly monitored, and the "venetian blind" shutters of the water cooler had to be opened and closed by means of a manual control. Further

Ju 87A-1



SPECIFICATIONS

Type: *dive-bomber (St.G 165, 1938)*
Entered service: *1937*
Crew: *2*

Engine
Powerplant: *1 x Junkers Jumo 210 D*
Type: *12-cylinder liquid-cooled*
Horsepower: *640*

Dimensions
Wing span: *13.6m (44.9ft)*
Propellor diameter: *3.3m (10ft)*
Length: *10.8m (35.6ft)*
Height: *3.9m (12.73ft)*

Weights
Empty: *2273kg (5000lb)*
Loaded: *3324kg (7313lb)*

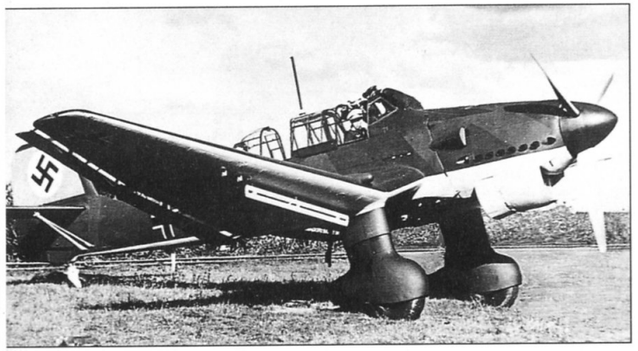
Performance
Maximum speed: *450kmh (281mph)*
Cruising speed: *320kmh (200mph)*
Range: *1000km (620 miles)*
Service ceiling: *8000m (26,250ft)*
Ceiling with maximum load: *4730m (15,520ft)*
Normal radius of operation: *600km (373 miles)*

Armament
3 x 7.92mm light machine guns
1 x 250kg bomb

improvements would make some of these actions automatic, but they would take time to implement. Maximum speed of the Anton in clean conditions was about 320kmh (190mph) at 3700m (12,100ft), reducing to 290kmh (171mph) when a single 250kg (551lb) bomb was carried.

The A-series Ju 87s were issued to I and II/St.G 162, I/St.G 262 and III/St.G 165. A-series production at Dessau ended with the completion of the 192nd aircraft in May 1938, but Ju 87 production was gradually transferred to the new Berlin factory of Weser Flugzeugbau where a further 70 machines were built.

In March 1939, following the German occupation of the Czech Sudetenland, some Ju 87As were deployed to the airfields of Olomouc (Moravia) and nearby Prostejov. Early in 1938, a standard Ju 87A-1 was retained at Dessau and fitted with a 1000hp Junkers Jumo 211A engine. Given the prototype designation V-6, it was followed by a more extensively modified aircraft (the V-7), with an amended cockpit canopy, wheel spats in place of the trouser fairings (the spats being removable to facilitate operation from muddy or slush-covered airfield surfaces) and enlarged vertical tail surfaces. The undercarriage was slightly



Above: A pre-production version of a Ju 87B-0. Note the extended air brakes below the wing.

Right: At an aircraft production plant somewhere in Germany, dozens of semi-built Ju 87s are attended to by skilled factory workers.

repositioned and strengthened, to reduce the chances of it being ripped off during take-off and landing operations over rough terrain.

A less obvious modification was one that, nevertheless, endowed the Stuka with a fearsome reputation: each undercarriage leg was provided with a mounting for a siren, a so-called Jericho Trumpet. This produced the Stuka's characteristic diving screech which had such an adverse effect on enemy morale as the dive-bombers supported Germany's early conquests in 1939–41.

The Ju 87B

The V-7 was the prototype Ju 87B, known as the Bertha. Ten pre-production Ju 87B-0s were completed in the summer of 1938. Before the end of the year, production B-1s were starting to appear. Four sub-variants of the B-1 were produced: the standard B-1/U1; the B-1/U2 with alternative radio equipment; the B-1/U3 with extra armour protection; and the B-1/U4 with a ski undercarriage.

By mid-1939, the B-1 had been succeeded by the B-2, which was powered by a 1200hp Junkers Jumo 211Da engine and was capable of carrying a 1000kg

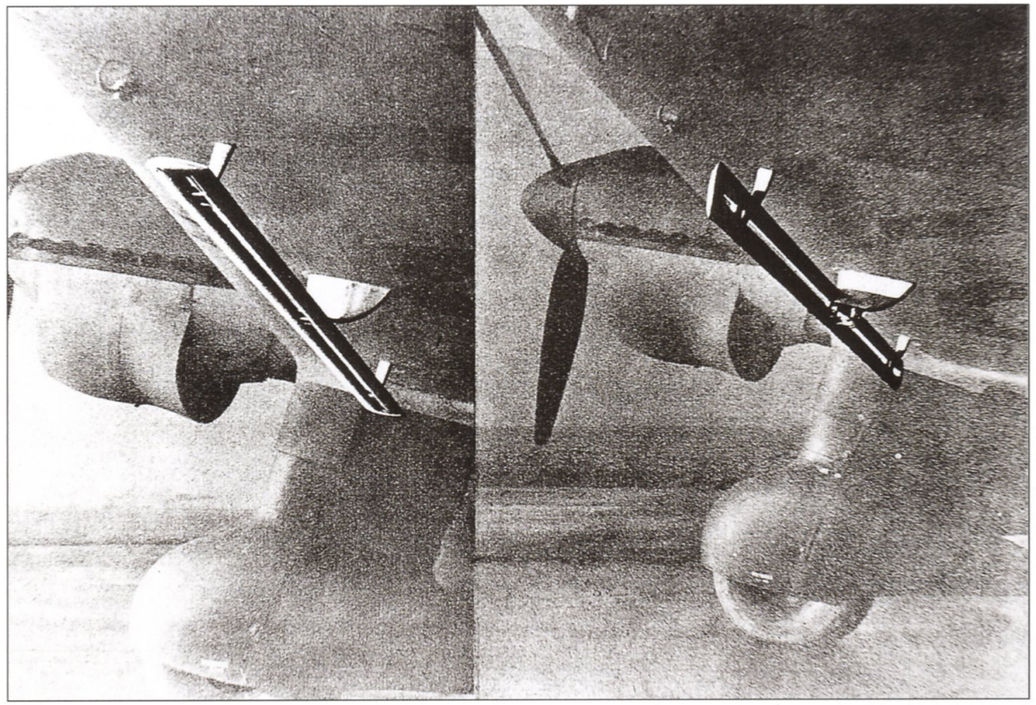
Left: A Stuka in full dive seconds after releasing its bomb load. Note the extreme angle of the dive. Just visible under the fuselage, and between the two mainwheels, is the bomb-release trapeze, a device used to throw the weapon clear of the aircraft on a bombing run.

Right: A close-up shot of the air brakes in closed (left) and open (right) configurations. Despite the great heights from which the Stukas plunged onto their targets, the air brakes were remarkably effective at slowing the aircraft down. This was essential not only for accuracy reasons, but also because of the mechanical strain diving had on the aircraft itself.

(2200lb) bomb load, comprising either a single centrally mounted 1000kg (2200lb) bomb, or a central 500kg (1100lb) bomb and four 50kg (110lb) bombs under the wings. Sub-variants were similar to those of the B-1.

Although the majority of new-build Ju 87s were now being produced by Weser Flugzeugbau at Berlin-Tempelhof (and later at Bremen-Lemwerder), the Junkers plant at Dessau remained responsible for the development of new sub-types. Production was slow: in 1937–38, only 395 Ju 87s were built; production increased to 557 the following year.

An interesting variant of the Ju 87 was the Ju 87C. This was a shipboard development of the Ju 87B, intended to form part of the aircraft carrier *Graf Zeppelin*'s air group. Plans for the carrier had been drawn up without any input from the Luftwaffe, which showed little enthusiasm for the project, and construction had started in 1936. The carrier was launched in December 1938, but was never finished.



After many delays, work was halted in 1940 when she was 85 percent complete, the Germans having formed the erroneous belief that they had won the war.

In its finalized form, the carrier's air group would have comprised 28 Ju 87Cs and 12 Messerschmitt Bf 109 fighters. The Ju 87C's wings, which folded outboard of the undercarriage attachment points to lie flat against the fuselage sides, were of slightly smaller span than the B model. The variant was also fitted with an arrester hook, and the undercarriage could be jettisoned in the event of a ditching – flotation bags being provided. The Ju 87C also had provision for long-range underwing tanks.

Flying the Ju 87

A new Stuka unit, 4(Stuka)/186, was formed for carrier operations at Kiel-Holtenau in September 1939 under the command of Major Walter Hagen. Trägergruppe 4/186 (Carrier Group 4/186) was equipped with Ju 87Bs and, from mid-November 1939, with some Bf 109Bs. It saw some operational service, but only from land bases.

Pilots converting to the Ju 87 from the Hs 123, with which most of the Stuka units had previously been equipped, found operating the new aircraft straightforward enough. The pilot first switched the fuel cock to the "both tanks" position, gave a few strokes of the primer, switched on the fuel booster pumps, set the throttle to the figure "1" on the quadrant, switched on both magnetos and energized the inertia starter and booster coil by pushing in a handle on the lower left side for 10 seconds, then pulled out the handle until the engine fired.

The engine could be run up to 1600rpm on the brakes, or 2200rpm with the tail tied down to prevent the Stuka from nosing over. Taxiing could be tricky, as the aircraft required a good deal of braking to manoeuvre and was sensitive to any crosswind. Once

Left: The Heinkel He 51 was delivered to the Luftwaffe from 1934 onwards, and was originally designed as a fighter. It saw service in Spain with the Condor Legion where its inadequacy as a fighter was exposed by the I-15 and I-16 fighters of the republican forces. It was switched to a ground attack role, where it flew alongside the Hs 123s and the Ju 87s in the region. Despite being a cousin of World War I-designed aircraft, it remained in Spanish service until 1951.

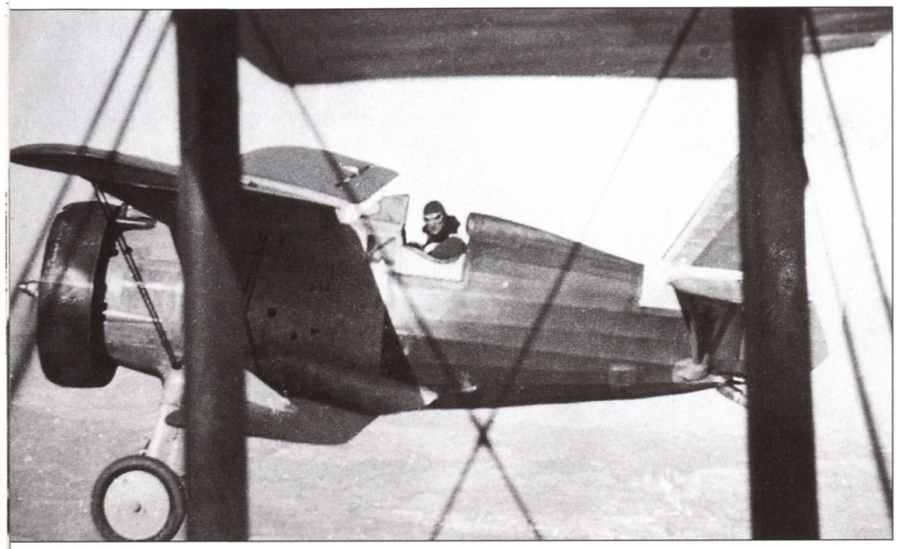
the take-off position had been reached, the pilot taxied the aircraft forward for a short distance to straighten the tailwheel, which was then locked. Thereafter, the drill was to switch on the fuel pumps, set the flaps to the take-off position, the trimtabs to zero and the propeller pitch lever to "START".

Acceleration was good, the Stuka becoming airborne after a run of about 475m (1558ft) at a speed of 116kmh (72mph). Initial climb was at 215kmh (133mph), the supercharger being moved from low gear to the automatic position at an altitude of 3500m (11,480ft). The climb was laborious, the aircraft taking some 20 minutes to reach 5000m (16,400ft).

Before entering a dive, the Stuka pilot went through the following check list: landing flaps at cruise position; elevator trim at cruise position; rudder trim at cruise position; propeller pitch set at cruise; contact altimeter ON; contact altimeter set to release altitude; supercharger set at automatic; throttle fully closed; cooler flaps closed; dive brakes open.

The action of opening the dive brakes made the Stuka nose over under the influence of the pull-out mechanism, which was itself activated by opening the dive brakes. To enable the pilot to judge the dive angle accurately – not an easy thing to do without some form of artificial aid – a series of graduations was etched on the front starboard side of the cockpit canopy. Speed in the dive built up rapidly to 540kmh (335mph) after descending 1370m (4500ft), increasing relatively slowly to a maximum permissible speed of 600kmh (373mph).

As the Stuka dived, the pilot kept an eye on a warning light on the contact altimeter; when this illuminated, he pressed a knob on the control column, activating the automatic pull-out. The aircraft required 450m (1475ft) to recover to level flight, being subjected



Left: The Polikarpov I-15 Chato. This Russian-designed aircraft was in service with the republican forces during the Spanish Civil War, and showed itself to be more than capable of holding its own against German aircraft.

to 6 g in the process. The pilot could override the automatic pull-out and complete the operation manually, although this required considerable strength and careful use of the elevator trimmer. As the nose came up through the horizon, the dive brakes were retracted, the propeller pitch set to take-off/climb, and the throttle and radiator flaps opened.

Landing presented no problems: speed was reduced to about 200kmh (125mph) on the downwind leg of the aerodrome circuit; and to 180kmh (112mph) on the crosswind leg. The tailwheel was locked, propeller pitch set to fully fine, and final approach made at 150kmh (93mph), reducing to 120kmh (75mph) at the flare-out. Thanks to the pilot's raised position, the view on the approach and landing was excellent. A three-point landing was desirable, as the Stuka had a tendency to nose over and there was an inherent weakness in the undercarriage design that could lead to failure of the upper mainwheel fork and subsequent collapse of the wheel assembly.

German participation in the Spanish Civil War provided a golden opportunity for the Luftwaffe to test its latest arms and equipment under operational conditions, and the Ju 87 was no exception. Because the conflict enabled the Luftwaffe to devise the tactics that were to bring it such astounding successes in its land-air campaigns of 1940–41, it is worth examining the German involvement in some detail.

The Spanish Civil War

When civil war broke out in Spain in July 1936, there were some 200 aircraft in the country. Most were obsolete or obsolescent types. The majority remained in the hands of the *Fuerzas Aereas Espanolas*, the air arm of the republican government; very few found their way to the nationalist commanders, General Franco in North Africa and General Mola in northern Spain.

It was the nationalists who were the first to receive substantial aid from overseas. On 26 July 1936, General Franco sent emissaries to Hitler, who promised German support for the nationalist cause. By the end of the month 85 Luftwaffe personnel and six He 51 fighters sailed from Hamburg, bound for Cadiz. The ship also carried spare parts for 20 Ju 52 bomber/transports, which had reached Spain by way of Italy (whose leader, Benito Mussolini, had also promised substantial aid for Franco). The Ju 52s were used to transport thousands of nationalist troops from

North Africa to the Spanish mainland, each grossly overloaded transport making up to seven trips a day. Further air reinforcements for the nationalists came in August, with the arrival of nine Italian Savoia Marchetti SM81 bombers and an initial batch of Fiat CR32 fighter biplanes.

Russian aid to the republicans

Meanwhile, the Soviet Government had been making plans to assist the republicans by supplying arms and military advisers. By the end of October 1936, 30 Polikarpov I-15 fighters had arrived in Spain, along with 150 Russian personnel. The group included 50 fighter pilots under the command of Colonel Yakob Shmushkievich, who was known as General Douglas throughout Russia's commitment in Spain. It was in their hands that the I-15, dubbed Chato (snub-nose) by the Spaniards, made its operational debut on the Madrid Front. The I-15's first combat over Spain took place on 4 November 1936, when 10 fighters, all flown by Russian pilots, attacked an Italian Ro37 reconnaissance aircraft over the Manzanares River. The Ro37 escaped, but two CR32s escorting it were shot down.

However, the first Russian type to see action in Spain was not the well-tried I-15 but an aircraft that had entered service with the Soviet Air Force only a matter of weeks before the first batch arrived at Cartagena in mid-October – the fast, twin-engined Tupolev SB-2 bomber. For weeks, the SB-2s, which were used for both bombing and reconnaissance, roved virtually at will over nationalist-held territory. To deal with them, the nationalist fighter pilots had to develop a completely new set of tactics: these involved flying standing patrols at 5029m (16,500ft) over the frontline. As soon as an SB-2 was sighted, the fighter pilots would build up speed in a dive, their only hope of intercepting the Russian aircraft.

The third Russian aircraft type to enter service in Spain was the Polikarpov I-16 fighter, which went into battle on 15 November 1936 to provide air cover for a republican offensive against nationalist forces advancing on Valdemoro, Sesena and Equivias. The I-16, nicknamed Mosca (fly) by the republicans and Rata (rat) by the nationalists, proved itself markedly superior to the He 51. It was also faster than the more numerous CR32, although the Italian fighter aircraft was slightly more manoeuvrable and provided a better gun platform.

Below: The Tupolev SB-2 high-speed bomber, also of Russian design, saw action in Spain during the civil war.

Left: General Field Marshal Hugo Sperrle (centre left with peaked cap) with the Condor Legion in Spain. He was the man responsible for the Condor Legion, and as such a key figure in the doctrinal development of the Luftwaffe as a fighting force. A fearsome man whom Hitler once described as Germany's "most brutal-looking general", he was highly decorated and well-respected. He is also remembered, however, as the man who ordered the infamous bombing of the Spanish town of Guernica. He was tried for War Crimes at Nuremburg, but was acquitted. He died in Munich in 1953.

Apart from that, the nationalists' tactics were better: the republicans tended to adopt large, tight, unwieldy formations that were easy to see and hard to handle. During the early stages of their commitment, both I-15s and I-16s were used extensively for ground-attack work. However, the responsibility for most missions of this kind was gradually assumed by the fourth Russian type to enter combat in Spain, the Polikarpov R-Z Natasha – the attack version of the R-5 reconnaissance biplane.

Meanwhile, as the Russians continued to step up their aid to the republicans, Germany's aid to General Franco had been placed on a firm and well-organized footing. In September 1936, Wing Commander Walter Warlimont of the German General Staff arrived to command the German contingent and to act as military adviser to Franco. From October 1936, the German contingent became known as the Condor Legion. It was placed under the command of Major-General Hugo Sperrle, whose Chief of Staff was the former dive-bomber sceptic, von Richthofen.

The presence of German personnel in Spain, who would eventually number some 12,000, was kept a

Right: General Wolfram von Richthofen (left), Chief of Staff to Sperrle and cousin of Manfred von Richthofen. He served with the Condor Legion and was leader of its combat formations. He later served in Poland and was another key player in the development of Blitzkrieg strategy, and the use of the Stuka dive-bomber within this strategic doctrine.

closely guarded secret. Luftwaffe personnel posted for a tour with the Condor Legion reported to a secret office in Berlin where they were issued with civilian clothing, Spanish currency and papers. They then left for Döberitz, where they joined a Kraft durch Freude (Strength through Joy) tour ostensibly bound for Genoa via Hamburg.

The Condor Legion

The main body of the Condor Legion sailed for Spain during the last days of November 1936. It consisted of three fighter squadrons equipped with He 51s, four bomber/transport squadrons operating Ju 52/3ms, a reconnaissance squadron equipped with He 70s, a seaplane squadron operating He 59s and He 60s, six anti-aircraft batteries, four signals companies and a repair section.

After settling in, the legion began a series of bombing raids on Mediterranean ports held by the republicans. However, the Ju 52s encountered severe icing difficulties over the Sierra Nevada and were later transferred to Melilla in Spanish Morocco, from where they could make bombing attacks across the Straits of Gibraltar.

One of the most active elements of the Condor Legion was Jagdgruppe 88 (J/88), comprising the three He 51-equipped squadrons. However, the Heinkel fighter's limitations were soon apparent: it proved incapable of intercepting the Republican SB-2 bombers even under the most favourable conditions, and was forced to avoid combat with I-15s and I-16s altogether. By the spring of 1937, the He 51 could no longer carry out its task as a fighter without suffering unacceptable losses; fitted with bomb racks, it was confined to close support duties.

Throughout the spring, the republicans, thanks to the influx of Soviet aircraft, retained air superiority over the vital Madrid battlefront. They had concentrated some 200 I-15s, I-16s, R-Zs and SB-2s in the Madrid area, and the five fighter squadrons assigned to the Jarama sector inflicted heavy losses on the nationalist Ju 52 units engaged there.

Following the failure of the nationalist offensive at Jarama, the Republican Air Arm was substantially reorganized, with many of the I-15 and I-16 squadrons that had hitherto been manned exclusively by Russian personnel being turned over to the Spaniards. However, in some cases, Russians stayed on as squadron and flight commanders.

Ju 87B-1

SPECIFICATIONS

Type: *dive-bomber (Condor Legion, 1939)*
Entered service: *1938*
Crew: *2*

Engine
Powerplant: *1 x Junkers Jumo 211Da*
Type: *12-cylinder liquid-cooled*
Horsepower: *1100*

Dimensions
Wing span: *13.8m (45.3ft)*
Propellor diameter: *3.3m (10ft)*
Length: *11.1m (36.5ft)*
Height: *4.01m (13.2ft)*

Weights
Empty: *2750kg (6080lb)*
Loaded: *4250kg (9371b)*

Performance
Maximum speed: *490kmh (242mph)*
Cruising speed: *310kmh (193mph)*
Range: *600km (373 miles)*
Service ceiling: *8000m (26,250ft)*
Ceiling with maximum load: *4730m (15,520ft)*
Normal radius of operation: *300km (187 miles)*

Armament
3 x 7.92mm machine guns
1 x 500kg bomb, 4 x 50kg bombs

The first all-Spanish I-16 unit was Grupo 21, which began to exchange its Breguet XIXs for Ratas just in time to take part in the final stage of the republican counterattack. The other I-16 squadron that featured prominently in the strafing attacks on the nationalists was a Soviet Air Force unit stationed at Barajas, which was also the base of the Voluntary International Squadron commanded by André Malraux and equipped with I-15s.

By the summer of 1937, there were 13 republican fighter squadrons: 6 were armed with I-16s; and 7 with I-15s. Opposing them were 11 nationalist squadrons, 10 of which were armed with CR32s. The 11th, the Condor Legion's 1 Staffel, had just received the first examples of a combat aircraft which was to become one of the most famous fighters of all time: the Bf 109. Three Bf 109 prototypes were evaluated in Spain in the winter of 1936–37, and these were followed by 40 Bf 109Bs. They now formed the fighter component of the Condor Legion, J/88.

The bomber component, Kampfgruppe 88 (K/88), was equipped with 30 He 111B-1s, which had become operational in March 1937 with an attack on the republican airfields of Alcala and Madrid-Barajas. The He 111 was very successful in Spain, being able to evade interception by virtue of its speed alone – something it

Above: Another Junkers-designed aircraft in Condor Legion service – the Ju 52 transport.

would not have the luxury of doing when it encountered Allied monoplane fighters in World War II.

Fighting in the Brunete sector

In July 1937, bitter fighting raged in the Brunete sector, on the extreme left of the nationalist Madrid Army Corps, following a massive attack by government forces. Some of the biggest air battles of the war raged over this front, with large formations of republican fighters patrolling the battle area. One of the I-15 squadrons began operations as a night fighter unit during this period, although it also continued to fly daylight missions. By 25 July, the battle for Brunete was virtually over, with the town firmly in nationalist hands. Their victory was all the more noteworthy given that the republicans had retained air superiority throughout, the nationalists having laboured under the dual handicap of inferior numbers and, for the most part, worn-out aircraft. In August 1937, the nationalists concentrated most of their air force in the north, in support of their army's offensive against Santander. During two weeks of fighting, the republicans lost almost the whole of their fighter force in this sector – two squadrons of Ratas and two of Chatos. However, when the republicans launched a new offensive at Belchite, on the Aragon front, there were still plenty of aircraft to support it, and here the nationalists suffered a reverse.

Despite this, Franco's forces were victorious on the northern front, where the final nationalist offensive began in October 1937. By the end of the month, the republican fighter force had been virtually destroyed, only four aircraft surviving the air battles and airfield attacks. The loss of the republican fighter strength in the north was critical, for it gave the nationalists overall air superiority for the first time, with 15 fighter squadrons against 12. This was demonstrated during the Battle of Teruel, northwest of Valencia, which raged from December 1937 to February 1938, when packs of nationalist fighters roved deep into enemy territory with orders to seek out the republican formations and engage them in combat. Thanks to these tactics, the republicans were forced onto the defensive right from the start.

In December 1937, three Ju 87A-1s of I/St.G 162 Immelmann were sent to Spain and attached to K/88.

Left: A Ju 87A variant of the Stuka serving in the Condor Legion. Note the pig motif on the undercarriage trouser. This symbol originated in the Spanish Civil War. The four Stukas taking part were known as "Jolanthe Kette" after a popular cartoon pig, most likely because of the Stuka's appearance.

With nationalist air superiority assured, they had very little to fear from republican fighters and were sent into action in February 1938, during the closing stages of the Teruel offensive. Later in the year, from the end of July to mid-November, they took part in the desperate and bloody fighting on the Ebro Front, where they proved their worth time and again in precision attacks on such targets as bridges and ammunition dumps. One Stuka was lost to ground fire at Bujaraloz, and as far as is known was not replaced.

The Ju 87 in Spain

The three Stukas were known as the Jolanthe Kette (Jolanthe Flight), after the aircraft's ungainly appearance as it taxied over rough airstrips. The Ju 87 became known as Jolanthe the Pig, after the central character of a popular German cartoon film, *Trouble with Jolanthe*.

In November 1938, the first five Ju 87B-1 Berthas to come off the production line were also sent to Spain for combat evaluation. During its limited operations in Spain, the Stuka obtained some remarkable results: its average bombing error was only 5m (16ft). Notable successes included the destruction of an enemy ammunition dump near Mayals on 23 December 1938, and attacks on republican shipping in the harbours at Barcelona, Tarragona and Valencia. At the end of hostilities, the Ju 87s were shipped back to Germany, whereas most of the other German aircraft that had taken part in the civil war were handed over to the nationalist air force.

The air operations in Spain proved beyond all doubt that just a few Stukas, each armed with a single bomb, could achieve better results than a whole Geschwader of horizontal bombers. By the time the bitter conflict had ended in 1939, von Richthofen had become a convert; and the concept of Blitzkrieg – a "lightning war" of mobility, with the dive-bomber acting as long-range artillery ahead of advancing tanks – had become reality.

By August 1939, the Luftwaffe had nine Stukagruppen, plus Trägergruppe 4/186. The number of Ju 87s on charge was 366, of which 348 were combat-ready. The designations of the Stuka units had by this time undergone some changes, so that the line-up was as follows: Stukageschwader I (St.G 1) was formed in the summer of 1939, the Stab from Lehrgeschwader 2 (LG 2), I Gruppe from Sturzkampfgruppe 160, II Gruppe from Sturzkampfgeschwader 41 (Dive-Bomber Wing 41) and III Gruppe from Trägergruppe 186.

Its commanding officer was Major Walter Hagen, the highly experienced soldier who had served in a hussar regiment from 1915 to 1917, when he transferred to the Naval Air Service. After World War I he worked as a salesman, then joined Junkers as a pilot in 1924. In 1930 he made the first catapult launch from a ship. Five years later, he joined the new Luftwaffe and worked at the Air Ministry until 1938, when he was promoted to major and given command of Trägergruppe I/186.

Below: A Heinkel He 111 bomber drops its ordnance over the Spanish city of Valencia during the civil war. More than 7000 He 111s were built in total.

Stukageschwader 2 Immelmann was formed in May 1939 from the former I and II/St.G 162. In August 1939, its I Gruppe was at Cottbus, II Gruppe at Stolp-Reitt and III Gruppe at Langensalza. Its commanding officer was Major Oskar Dinort, who had been a professional soldier since 1919. From 1926, when he transferred to the clandestine German Air Corps, he had enjoyed a distinguished and varied career, holding various flying and staff appointments. His association with the Stuka had begun in 1937, when he was appointed to command I/St.G 165.

Stukageschwader 51 was formed in May 1939 with only one group (III Group) based at Cottbus, and commanded by Major von Klitzing.

Stukageschwader 76 was formed in May 1939 from I Gruppe, St.G 168. Based at Graz in Austria, it was commanded by Captain Walter Siegel.

Left: An advert displaying the engine used in the early Stuka versions. Junkers were proud of their Jumo engines, and sought to market them to other aircraft manufacturers, both domestic and international. Though by 1939 (the date of the publication) trade with Britain and elsewhere was impossible, other markets across the word existed. This said, it can assumed that shortly after printing, Junkers went into full-scale production of their engines for the German war effort.

Stukageschwader 77 was formed in May 1939, I Gruppe being based at Brieg and II Gruppe at Breslau-Schöngarten. Its commanding officer was Group Captain Gunther Schwarzkopf, who had served in the infantry during World War I. After being badly wounded at Verdun, he transferred to the Air Service. He joined the army after the Armistice, and in 1933 served as a captain in the Air Ministry, where he became involved in the development of the Stuka. Schwarzkopf flew with the Condor Legion in Spain, and subsequently supervised the formation of the first Stuka units. Attached to Junkers, he led the Ju 87 evaluation programme before being appointed commander of St.G 77. These were the men who

would launch Hitler's Blitzkrieg and plunge the world into another global conflict.

Stuka pilot training

The men they led were, on the eve of World War II, highly trained thanks to the exhaustive training programme organized by the Luftwaffe. The path from civilian life to a Stuka Squadron was a long and intensive one for the young German pilots, at least before 1942 when the training structure of the Luftwaffe began to disintegrate. The first port of call was the Fliegerersatzabteilung or recruit training depot; the equivalent to Boot Camp. After being given basic military instruction at Boot Camp, the trainee pilots were then sent to a Fluganwaerterkompanie, where for two months general aeronautical subjects were taught. From here the pilot attended an A/B Schule, an elementary flying school where light aircraft such as the Focke Wulf 44 were used to teach students the skills needed to gain them their A2 pilot's licence. These included skills such as aerodynamics, navigation, meteorology and flying procedures. His B licence was gained by improving these skills in more powerful aircraft such as the Arado 66, and obsolete combat craft such as the Hs 123. Upon successful completion of his B2, with about 150 hours flying time, the pilot would be awarded his full pilot's licence and his coveted Flugzeugfuehrerabzeichen, his pilot's wings.

By this point the Luftwaffe instructors would have selected which students were to train as particular types of pilot, based on their performance thus far. Those selected to train on single-engined fighters or dive-bombers went straight to the respective specialist schools for training in these roles. Prospective twin-engined fighter and bomber pilots underwent a further six-month training course before attending their specialist schools.

For prospective dive-bomber pilots during the war, the next step was a Dive Bomber Pilot Initial Training School. Two of these existed; one at Aibling that operated from 1940 to 1941 and another at Thalerhof near Graz that operated from 1940 to 1942, before moving to Piacenza in northern Italy. The pressures of wartime demand meant that these initial training schools only lasted a short time. Over a four-month period, the trainees underwent 15 dives under the supervision of a flying instructor. Those judged suitable for the Ju 87 went sent on to one of the dive-bomber pilot schools, whilst those that failed often went to transport units.

Dive-bomber pilot schools

The dive-bomber pilot schools provided the Stuka crews with the technical and tactical skills needed to be effective on the battlefield. The main focus of the training depended largely on the operational situation out in the battlefields, for example when bridge destruction was needed special attention was given to this skill. In addition to the execution of the diving attack, the two-man crews where also given navigational tasks, and were formed into mock tactical units before heading off to a training Geschwader in order to acquire training in tactics, up to the Gruppe framework. The first German dive-bomber class took place at Kitzingen airbase in the summer of 1936. Over the next eight years, the Stuka schools moved around Germany, and indeed around other conquered parts of Europe after 1939.

The training Geschwader was the last stop on a Stuka pilot's development journey before being assigned to a Stuka squadron. The training Geschwader were split into two types; dive-bombing in the early years, and the ground-attack after 1942–43. The dive-bombing Geschwader 101 and 102 arose from Stuka Schools 1 and 2. By 1943, the initial training schools were abandoned in favour of sending pilots straight to the training Geschwader such was the urgency and demand for new pilots. Geschwader 101 was based in St Raphael in southern France and also in Toulon. In October 1943, Gescchwader 101 was renamed Ground Attack Geschwader 103 and its training altered to teach ground-attack tactics.

Blitzkrieg: Poland and Norway, September 1939–April 1940

Always at the spearhead of the German Army's thrust through eastern and northern Europe, the Stuka dive-bomber lay at the heart of Blitzkrieg strategy.

The Junkers Ju 87 Stuka is invariably linked with the German Army's Blitzkrieg (meaning Lightning War) across northern Europe and beyond during World War II. Blitzkrieg is an emotive term, recalling as it does in the layman's imagination massed armoured formations smashing through enemy defences to spread panic and destruction in rear areas, while overhead hundreds of Stuka dive-bombers strafe enemy columns and refugees. In reality, however, the art of Blitzkrieg was something very different.

Blitzkrieg theory was based upon combined arms operations: Attack aviation supported the tanks by attacking hostile defence weapons, artillery and

Left: Stukas on their way to bomb Allied positions around Narvik in northern Norway, 30 April 1940.

reserves. Aircraft flying deep into hostile territory maintained communications between the troop commander and the tanks and could warn of hostile tank attacks. In addition, tanks were used in conjunction with motorized infantry, antitank guns and artillery, never alone. Thus the image of panzer divisions smashing through entrenched enemy positions is entirely false. The principle of Blitzkrieg was to manoeuvre around the enemy, separate different parts of his army from the others, and then destroy the encircled formations piece-meal.

Blitzkrieg doctrine

In order to achieve this effect, however, certain conditions had to be met beforehand. Once the plans had been finalized regarding the point, or points, of main effort, next came the reconnaissance phase. This was crucial to the success of the attack, for it provided the High Command with precise information regarding the location and strength of enemy units and defences. Prior to the invasion of the Soviet Union, for example, the Luftwaffe conducted over 300 reconnaissance flights over Soviet territory. The information was put to good use: within four days of the German invasion the Soviets had lost over 3000 aircraft to Luftwaffe attacks.

Above: Row upon row of Stukas are lined up for this 1939 German propaganda shot.

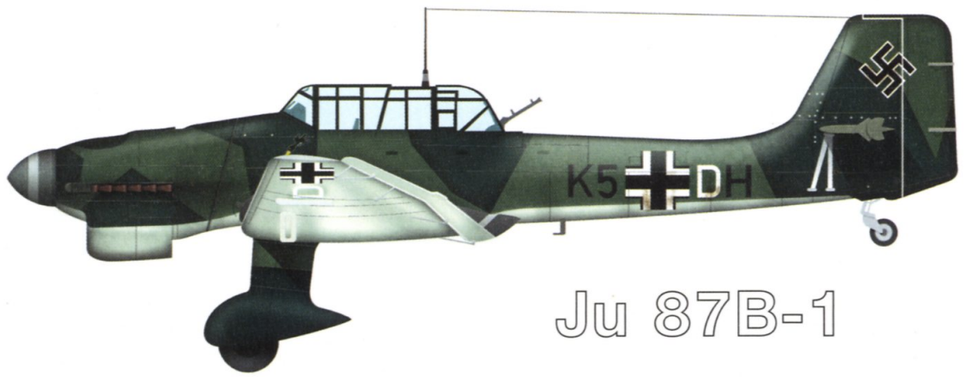
Concealment was another crucial factor during the build-up phase of the Blitzkrieg. However inevitable German offensives may appear with the benefit of hindsight, at the time the High Command was at pains to deceive the enemy as to its intentions until hostilities were under way. Surprise gives an attacker many advantages in war, and thus with the Blitzkrieg the precise time and date of the attack was concealed from the enemy. When it did come, the fear, uncertainty and chaos that resulted all aided the German advance. It meant that enemy units and staffs were like rabbits transfixed in a vehicle's headlights: unsure what to do and vulnerable. This gave the Germans precious time in which the full fury of the Blitzkrieg could be unleashed.

Though the staggering victories of the panzers and infantry divisions on the ground in 1939–41 attest to the brilliance of the Blitzkrieg, it was the Luftwaffe that decided whether the army would be victorious in each campaign – and the first few days decided between success or failure. Total air superiority was critical to German success, and for the Stuka in particular, which could not cope in enemy contested airspace. Thus the air force committed the majority of its assets to the

opening of the campaign. The Luftwaffe had two main roles in the Blitzkrieg. First, to destroy the enemy's air force, preferably on the ground before it had a chance to mobilize and get airborne. The second role, which could be carried out only when total air superiority had been established, was close support for ground units. Air support for the army was crucial for a number of reasons: to offset the vulnerability of concentrating units against enemy air attack, to supplement artillery

Above: A screaming banshee! A Ju 87 Stuka in action, diving onto its target and releasing its bomb load.

fire (as artillery units would be "leapfrogging" forward during the attack), and to protect the exposed flanks of the advancing columns. During ground-support operations, Luftwaffe aircraft concentrated on interdicting enemy supplies and communications, and hitting masses of enemy reserve troops and retreating



Ju 87B-1

SPECIFICATIONS

Type: *dive-bomber (I/St.G 1, 1939)*
Entered service: *1938*
Crew: *2*

Engine
Powerplant: *1 x Junkers Jumo 211Da*
Type: *12-cylinder liquid-cooled*
Horsepower: *1100*

Dimensions
Wing span: *13.8m (45.3ft)*
Propellor diameter: *3.3m (10ft)*
Length: *11.1m (36.5ft)*
Height: *4.01m (13.2ft)*

Weights
Empty: *2750kg (6080lb)*
Loaded: *4250kg (9371b)*

Performance
Maximum speed: *490kmh (242mph)*
Cruising speed: *310kmh (193mph)*
Range: *600km (373 miles)*
Service ceiling: *8000m (26,250ft)*
Ceiling with maximum load: *4730m (15,520ft)*
Normal radius of operation: *300km (187 miles)*

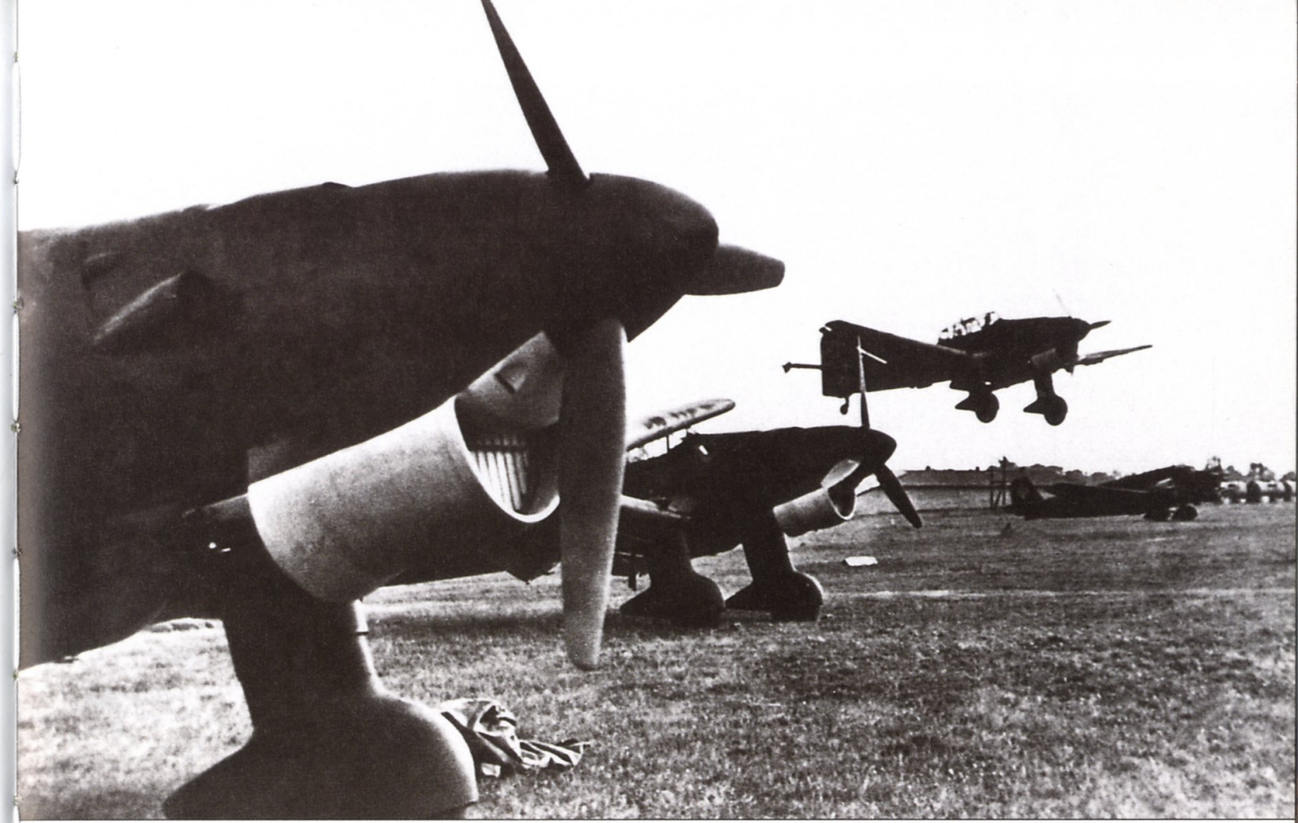
Armament
3 x 7.92mm machine guns
1 x 500kg bomb, 4 x 50kg bombs

units. In France in May 1940 the Luftwaffe's role remained the same, though there was a slight variation in that some German aircraft, including the Stuka, were used from the beginning to support ground operations.

Breaking the enemy

Following a brief but intense artillery bombardment and air assault, the attack was launched. Since it was essential to effect a breakthrough, commanders would deploy a large amount of resources to guarantee success. Having effected a breakthrough, the doctrine of the Blitzkrieg called for the maintenance of the advance, both to prevent the enemy from recovering and to achieve the campaign's objectives as quickly as possible, which would also minimalize casualties. Having pushed the disorganized and demoralized enemy into isolated pockets, the final phase of the Blitzkrieg was the reduction of those pockets. Invariably this was the job of the infantry divisions and artillery regiments, who moved at a slower pace than did the mechanized panzer and motorized infantry divisions. Those troops herded into pockets were invariably short of ammunition, supplies and, most importantly, the will to carry on the fight.

This, then, was the Blitzkrieg. A doctrine of manoeuvre based on having quantitatively inferior



Above: One Stuka comes in to land as other Ju 87s await a mission "somewhere in Poland" in September 1939.

forces when compared to the enemy. However, as theorists such as Heinz Guderian realized, manoeuvre acted as a psychological multiplier to the forces employing it. When one realizes that the 1940 campaign in France was in effect won by 10 panzer divisions, one can appreciate the power of the Blitzkrieg. The aim of the latter was always the destruction of the enemy's mental cohesion and will, rather than the reduction of his physical assets.

The attack on Poland

In August 1939, 219 Stukas stood ready to spearhead the German attack on Poland. The Geschwader involved in the initial assault were St.G 1, St.G 2 Immelmann, St.G 51, St.G 76, St.G 77 and Trägergruppe 186. However, the planning was marred by a disaster that underlined the danger inherent in all dive-bomber operations.

On the 15th of the month, the Ju 87Bs of I/St.G 76, which had just moved up from Graz in Austria to its operational base at Cottbus in Silesia, took off on an exercise. In reality, it was a demonstration, which involved a precision attack with cement bombs on the armaments practice range at Neuhammer, the object being to impress some senior Wehrmacht officers present. Weather reports indicated that the range was covered by cloud between 762m and 1830m (2500ft and 6000ft), with good visibility between the cloud base and the ground. The plan was for the Gruppe, led by its commanding officer (CO), Captain Walter Sigel, to approach at 3660m (12,000ft) and dive through the cloud cover, locate the objective and complete the attack.

Arriving in the target area, Sigel began his dive with his numbers two and three, Lieutenant Eppen and Lieutenant Müller, in close formation. After several seconds in the cloud, Sigel realized that all was not well and ordered the formation to pull out of its dive. As he levelled out, the murk cleared a little and he saw to his

Above: A Ju 87 over Poland. Stukas spearheaded the Blitzkrieg, and inflicted heavy damage on the Poles.

horror that there were trees on either side of his wingtips; by sheer good fortune, he had pulled out over the very spot where foresters had cut a long swathe through the woods, probably to form a firebreak. His wingmen were not so lucky. Both slammed into the forest, as did the nine aircraft of 2 Staffel, diving astern. The third Staffel – all but two Stukas, whose pilots pulled out too abruptly and stalled – got clear, as did 1 Staffel, bringing up the rear. Within minutes, 13 Stukas had been destroyed and 26 aircrew had lost their lives.

Sigel survived the incident to become one of Germany's most distinguished Stuka pilots; another pilot who escaped with his life that day was Flying Officer Dieter Peltz, who later in the war became commanding general of the German bomber forces.

When, shortly after 04:00 hours on 1 September 1939, it was reported that German reconnaissance aircraft were flying over Polish territory, the news came as no surprise to the Polish general staff. The political unrest of the previous months had given the Poles ample warning of Germany's intention to invade, and plans to resist the invasion had already been in force for several weeks. On 29 August, all Polish operational squadrons had been moved from their peacetime bases

to specially prepared secret bases, but the defensive preparations came too late. Because of high-level confusion and the firm belief of the Polish High Command that a major European war was unlikely to take place before 1941 or 1942, plans for the expansion and modernization of the Polish Air Force had been delayed time and again. The result was that when Poland finally went to war it was without modern aircraft or reserves, and with critical shortages of spares, fuel and ammunition.

At the end of August 1939, the Polish Air Force possessed 436 operational aircraft and 15,000 men. Some months earlier, the first-line units had been reorganized around a combat nucleus consisting of a pursuit and a bomber brigade under the direct command of the Commander-in-Chief (C-in-C) of the Polish armed forces, the remainder being split up among the six Polish Army regions.

Poland: the balance of forces

The Pursuit Brigade, whose main task was the defence of Warsaw, was equipped with four squadrons of PZL P11C fighters and one squadron of even older P7As; eight more P11C and two more P7A squadrons served with the Army Air Force. The Bomber Brigade operated four-and-a-half squadrons of modern twin-engined PZL P37 Los (Elk) medium bombers, a total of 36 aircraft; and five squadrons of PZL P43 Karas (Carp) single-engined light bombers.

In the event of a German invasion, plans had been laid to rush British and French squadrons to Poland's aid; apart from helping indirectly by bombing targets in Germany, the Royal Air Force (RAF) was to send 100 Fairey Battle light bombers and a squadron of Hawker Hurricane fighters to Polish bases, while the French planned to send five bomber squadrons. But the expected help never arrived; the terrifying swiftness of the German Blitzkrieg destroyed all hope of that.

In all, some 900 German bombers and a similar number of fighters stood ready for the assault on Poland, but because of adverse weather conditions it was left to a relative handful of units to spearhead the attack. An all-out bombing assault on Warsaw, originally scheduled for 1 September, had to be postponed; dense cloud hung low over the Polish capital, and visibility was reduced to less than half a mile. At 04:26 hours on 1 September 1939, three Ju 87Bs of III/St.G 1 took off from their forward base at Elbing and set course in atrocious weather conditions for their targets. These were the steel bridges spanning the River Vistula at Dirschau (present-day Tczew), situated in what was then the disputed Polish Corridor between Germany and East Prussia. In the event of an invasion, the bridges would have to be seized very quickly in order to prevent their destruction by the Poles. They were originally to have been destroyed by the German 7th Airborne Division, but the intended airdrop was frustrated by the weather. The new plan called for a high-speed dash for the bridges by a German task force in an armoured train. The Stukas' task was to destroy the strongpoints from which demolition charges would be fired by Polish engineers.

The flight was led by Lieutenant Bruno Dilley, a former policeman who now commanded III/St.G 1; his observer was Sergeant Kather. The other two Stukas were flown by Lieutenant Horst Schiller and Sergeant Gerhard Grenzel. Each aircraft carried one 250kg (551lb) and four 50kg (110lb) bombs.

First Stuka actions in Poland

A lot of careful preparation had gone into the mission. On several occasions, personnel of III/St.G 1 had travelled over the bridges on the Berlin–Königsberg express, noting that the detonation cables for the demolition charges ran along the southern slope of the railway embankment between the station and the bridge. At 04:45 hours, the Stuka pilots located their target and attacked from low level, dropping their bombs on the Polish bunkers and their associated array of cables. Fifteen minutes later, the German armoured divisions rolled across the Polish frontier. However, the Stukas' first mission of the war was only a partial success: Polish engineers succeeded in repairing the damaged cables, and were able to demolish one of the bridges before the Germans arrived.

An hour later, the strongpoints were attacked again by a flight of Dornier Do 17Z bombers of III/KG 3 from Heilingenbeil. As the morning fog cleared, 36 Hs 123 assault aircraft of II/LG 2 bombed and strafed Polish positions in the village of Pryzstain. This was the first instance in World War II of the Luftwaffe carrying out direct support operations in conjunction with ground forces. At about the same time, 60 He 111s of I and III/KG 4 dropped 49 tonnes (48 tons) of bombs on airfields in the Krakow area; later, further attacks on these airfields were made by Ju 87s of St.G 1 and by Dornier Do 17s.

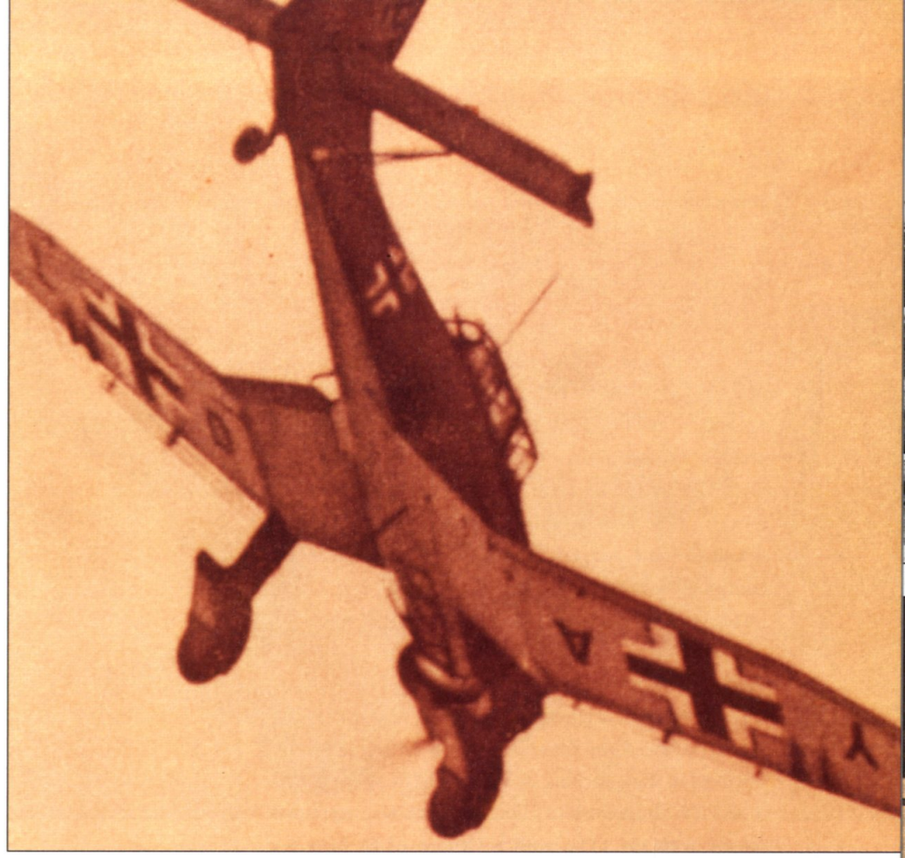
In the course of another attack, Stukas of St.G 2 encountered P11C fighters of the Polish Air Force's 111/2 Dyon (squadron) which had taken off to intercept a formation of Heinkels of KG 4. One P11C was shot down by a Stuka, but another P11C (Lieutenant W. Gnys) destroyed two Do 17s of KG 77. In the afternoon, a Polish cavalry brigade, advancing towards the German frontier from Wielun, was heavily attacked by Stukas of St.G 2 and I/St.G 77, followed by Do 17s of KG 77. The destruction of the brigade was complete after 90 individual aircraft sorties had been flown against it.

The poor weather conditions on the morning of 1 September had forced the Luftwaffe to commit its formations to the battle piecemeal, and it was not until late afternoon that the onslaught began in earnest. At that point, all 20 bomber groups of Luftflotte 1 were engaged in heavy attacks on airfields (mostly the Polish Air Force's peacetime airfields, now devoid of aircraft), ammunition dumps, railway and factory installations, anti-aircraft defences and the Baltic ports. Then, at 17:00 hours, three groups of He 111s from Wunsdorf, Delmenhorst and Langenhagen in northern Germany crossed the frontier. Their target was Warsaw. This time, the Polish Air Force was ready for them. So far, apart from a few scattered combats by small units, the Poles had not met the Luftwaffe in strength. Now, as the Heinkels and their escort of Bf 110 fighters approached Warsaw, two squadrons of the Pursuit Brigade, Nos 111 and 112, were already patrolling the capital. In all, there were 22 Polish fighters to take on 100 German aircraft. A furious air battle developed, resulting in the loss of two He 111s and five P11s. There was another attack on Warsaw 90 minutes later, in which the Poles claimed two more Heinkels but lost another four P11s. In just two

Left: Polish cavalry advance to meet German forces in September 1939. Ju 87s destroyed a Polish cavalry brigade at Wielun.

Right: A Stuka dive-bomber over Poland, photographed seconds after releasing its bomb.

Below: Warsaw in flames during the German invasion. Despite having sizeable armed forces, the Polish were no match for the superior tactics and training of the German military machine.



engagements, the two Polish squadrons had lost half their aircraft.

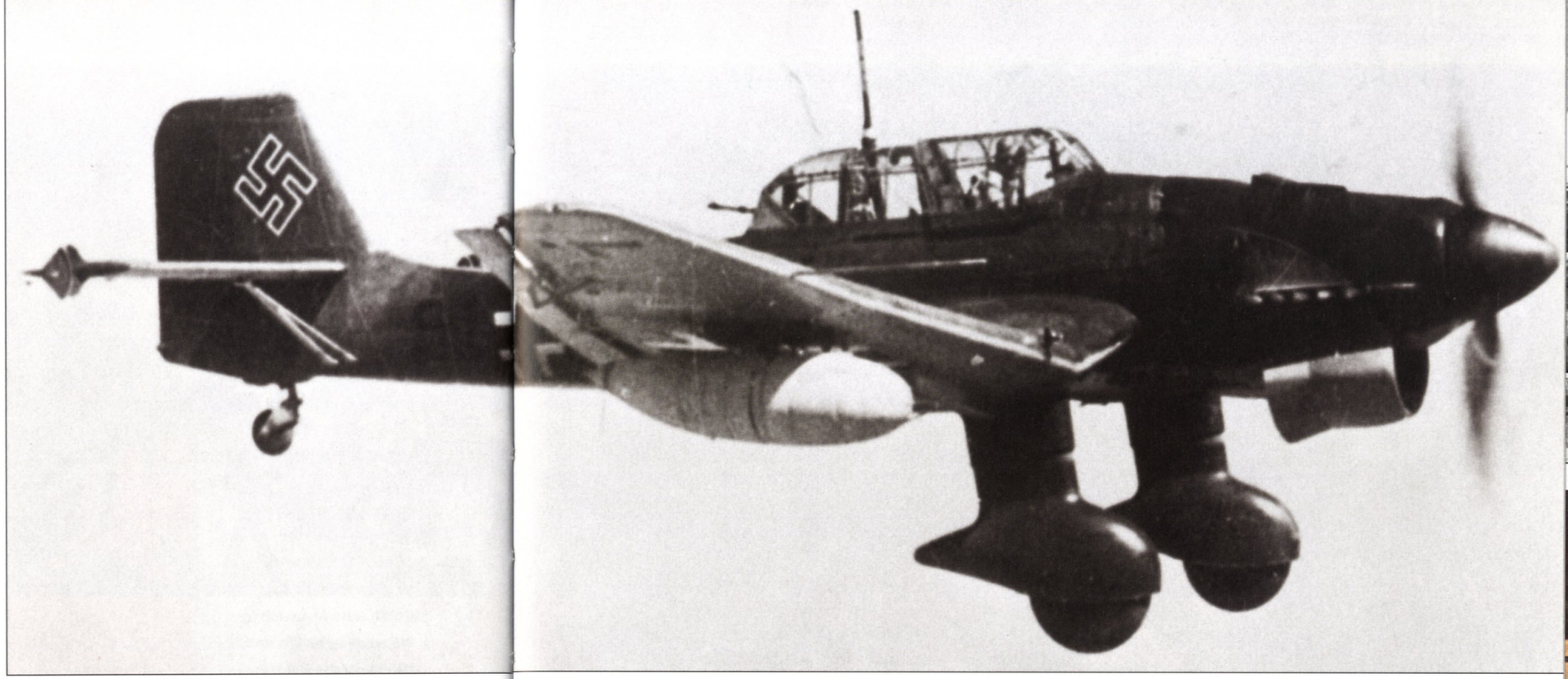
The next morning dawned bright and clear, and began with an attack on a trio of airfields near Deblin by 88 Heinkels of KG 4. The hangars and runways were destroyed and a number of aircraft, mostly trainers, were left in flames after a series of strafing attacks by Bf 110s of ZG 76. Following the airfield attacks, Stukas and other Luftwaffe units struck at lines of communication, supply and ammunition dumps and also bombed harbour installations, warships and coastal batteries. On 2 September, continued attacks by Stukas inflicted further heavy losses on Polish ground forces.

Anti-shipping operations

The Stuka unit originally formed for service on the aircraft carrier *Graf Zeppelin*, IV/St.G 186, was heavily involved in these actions, as were two Gruppen of St.G 2 and IV Gruppe of LG 1. The latter was equipped mostly with He 111s, with a Gruppe of Bf 110s for fighter escort, but its IV Gruppe was armed with Ju 87B variants.

The unit was becoming increasingly involved in anti-shipping operations. The previous day it had sunk the Polish torpedo boat *Mazur* in Oksywie harbour; now, on 2 September, its bombs sent the auxiliary vessels *Gdansk* and *Gdynie* to the bottom of the Gulf of Danzig. On 3 September, IV/St.G 186 was also in action against Polish shipping, sinking the destroyer *Wicher* and the minelayer *Gryf*.

A highly effective attack was carried out by 40 Ju 87s of I/St.G 2 and I/St.G 76, which destroyed the railway station at Piotrkov just as Polish troops were detraining. The Hs 123s of LG 2 were also busy on the 2nd, carrying out dive-bombing operations in support of XI Army Corps, advancing on the town of Dzialoszyn. On the afternoon of the same day, the Polish Bomber Brigade, somewhat belatedly, began attacking concentrations of German armour on the northern front. Its Karas light bombers inflicted heavy casualties, but severe light flak and patrolling fighters



Above: The long-range Ju 87R-1 variant carried extra fuel drop tanks under each wing, as seen here.

destroyed seven out of the eighteen despatched – and three more crashed on returning to base. In one mission, the bombers had suffered more than 50 per-cent losses.

Meanwhile, the Bomber Brigade's four P37 Los medium bomber squadrons, as yet untouched by the German air attacks, were waiting bombed-up and fuelled on their airfields ready to carry out a retaliatory raid on Königsberg in East Prussia. They waited for three days. It was not until 4 September that Poland's most modern bomber saw combat, attacking German armour advancing on the central front.

The first Los attacks were a complete success, the bombers attacking elements of the 1st and 4th Panzer Divisions, pushing ahead of the Tenth Army. The attacks were made at low level, and the effect was devastating. The two divisions lost 28 percent of their effective strength, and were thrown into temporary confusion when a second attack was made by 28 Karas bombers. Between 2 and 5 September, the Bomber Brigade mounted nine major attacks from airfields between Radom and the River Bug against German armour and supply columns, but no fighter cover was available and the bombers suffered crippling losses.

Meanwhile, the dwindling numbers of Polish fighters battled on valiantly. During the first six days of fighting, the pursuit squadrons attached to the field armies destroyed 63 German aircraft, many of them army cooperation types. But with the breakdown of the supply system and the critical shortage of fuel, ammunition and replacement aircraft, the air components were gradually withdrawn to the south to reinforce the hard-hit Pursuit Brigade in the Warsaw sector. Only one fighter unit, the Poznan Squadron, remained with the army to the bitter end.

The Pursuit Brigade, fighting in the skies over Warsaw during the first week of September, destroyed 42 enemy aircraft for the loss of 37 of its own machines. Then, on the 7th, the remnants of the brigade were withdrawn from the Warsaw area to be reorganized. They never returned to the defence of the capital. Crippled by the lack of essential supplies and spares, the brigade ceased to exist as an effective fighting force; between 7 and 17 September, it accounted for only three enemy aircraft, at the same time losing a further 17 fighters.

The gathering momentum of the German advance, which was beginning to outstrip the Polish retreat, was causing problems for the Stukageschwader, and in the confusion there were some unfortunate "friendly fire" incidents. On 8 September, for example, in an effort to cut off the enemy's line of retreat, Stukas launched a heavy attack on the Vistula bridges at Gora Kalwaria. They were unaware that the bridges had been seized by advance elements of the 1st Panzer Division, which was now attempting to form a bridgehead on the opposite bank. With the bridges destroyed, the German advance in this sector could not be resumed until pontoons had been built. Before the campaign, as an aid to identification, white crosses had been painted on the

turrets of the German tanks, but some units had dispensed with these as they also revealed the identity of the tanks to Polish aircraft.

The turning point of the campaign came on 8 September when several Polish divisions were surrounded near Radom and shattered by relentless Stuka attacks. The 4th Panzer Division consequently reached the defensive perimeter around Warsaw. In the air, the Polish situation was desperate, with more and more aircraft being put out of action by the lack of spare parts and the shortage of fuel. Only the Bomber Brigade was able to operate in any strength, since its main supply base at Deblin was still functioning.

The following day, with the German armies about to complete a pincer movement around Warsaw, the Poles launched a desperate counterattack on the River Bzura, aimed at the exposed flank of the German Eighth Army. As the threat developed, General von Rundstedt, commanding Army Group South, called for a maximum air effort. Between 9 and 12 September,

Left: The aftermath of the First Battle of Narvik, 10 April 1940. Wrecked German ships in Narvik Bay lie smouldering after the attack by British warships soon after the German invasion of Norway.

massed dive-bomber attacks were launched from forward airstrips. The impetus of the Polish attack was halted by the destruction of the bridges over the Bzura, and then its main elements were broken up by two days of air attacks by Stukas, Heinkels, Dorniers and Henschels. The 200,000 troops of the Army of Poznan were isolated, surrounded and subjected to almost continual air attack.

The bombing of Warsaw

The Luftwaffe carried out the first phase of Unternehmen Seebad (Operation Seaside), the mass attack on Warsaw, on 13 September. Despite claims to the contrary made since, the Luftwaffe High Command issued an instruction that military targets only were to be attacked, and even then caution was to be exercised if these lay within populated areas. As it turned out, flames and smoke made it virtually impossible to distinguish anything with accuracy. A total of 183 bombers and Stukas attacked the northwest district of the city, causing severe damage. On 17 September, under the terms of a secret agreement between Germany and the USSR, Soviet troops and armour entered Poland from the east. On the same day, the German armies completed their pincer movement from north and south, surrounding almost the entire Polish Army. However, various pockets of stubborn resistance remained to be mopped up, and the garrison in Warsaw continued to hold out. On four occasions between 18 and 24 September, Luftwaffe aircraft dropped leaflets over the Polish capital, calling on the strongly fortified garrison to surrender. But the 100,000 Polish troops in the besieged city dug themselves in further and grimly awaited the onslaught. It was not long in coming. On 25 September, beginning at 08:00 hours, 400 bombers – including 8 Stukagruppen – attacked the city in relays. Thirty Ju 52 transports were also employed as makeshift bombers, their crews shovelling incendiary bombs through the open loading doors. By the end of the day, 508 tonnes (500 tons) of high explosive and 73 tonnes (72 tons) of incendiaries had been dropped on Warsaw. The garrison surrendered on 27 September. On the same day, the garrison at Modlin also capitulated, the town having been subjected to severe air raids for 36 hours. The last organized Polish resistance ended on 5 October.

The verdict on the Ju 87 in Poland

In 26 days, von Richthofen's Stukas flew nearly 6000 sorties over Poland and lost 31 aircraft, a relatively small percentage of the 285 German aircraft lost in total. There was no longer any doubting the validity of the Ju 87 as a precision-attack and close-support aircraft. On average, its bombs had an error of only 30m (98ft), accurate enough to ensure the destruction of targets such as bridges, buildings and communications. Attacks against troop concentrations had been particularly effective. A pilot of St.G 77 recorded: "With their white crosses on their backs the tanks showed us the way. Wherever they went, we came across throngs of Polish troops, against which our 100lb fragmentation bombs were deadly. After that we went almost down to the deck firing our machine guns. The confusion was indescribable."

In December 1939, the Weser Flugzeugbau's new factory in Bremen began production of the Ju 87B-2, which was fitted with a 1217hp Junkers Jumo 211Da engine driving a VS-5 wooden propeller, with wide blades made of laminated wood. The sub-variant had a larger and deeper radiator intake, providing sufficient cooling for the more powerful engine. The more powerful engine made it possible to increase the maximum bomb load to 1000kg (2200lb), which necessitated strengthening the undercarriage. In order to reduce the Stuka's tendency to nose over, the forward rake of the undercarriage was also slightly increased. Other modifications were the result of lessons learnt during the Polish campaign, including the installation of a camera gun in the port wing outboard of the

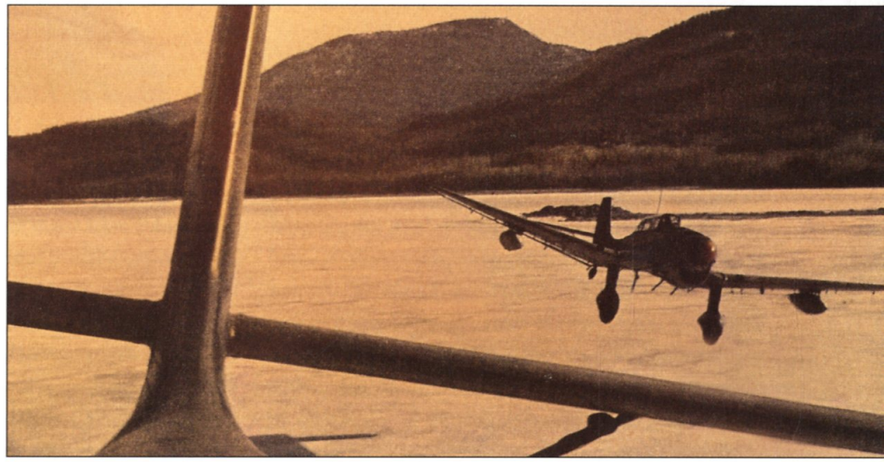
machine gun; as well as the fitting of ejector exhaust stubs and a radiator airflow control flap. Special kits were also developed for modifications in the field, aircraft so modified being given the suffix "U" (Umrüst Bausatz, or re-equipment kit). The Ju 87B/U-2 had better radio equipment, the U-3 had better armour protection for engine and crew, and the U-4 had a ski undercarriage. At a later date, Stukas intended for the North African theatre were fitted with dust filters and carried survival equipment in the wings, these aircraft being designated Ju 87B-2 trop.

The Ju 87R-1

The operations in Poland had revealed that the Stuka's range needed to be increased. The result was the Ju 87R-1 (the "R" denoting Reichweite, or range), which was identical to the B-1 apart from a revised fuel transfer system, the installation of an extra 150l (33-gallon) fuel tank in each wing and hardpoints for the carriage of two 300l (66-gallon) drop tanks under the wings. This gave the aircraft a range of 1412km (876 miles), compared with the 550km (342 miles) of the B-1.

The R-1, known as the "Richard", was issued to I/St.G 1 in time for the Luftwaffe's next offensive operation, the invasion of Denmark and Norway, although full re-equipment would not be complete until the middle of May 1940. Because of the range factor, I/St.G 1 was the only Stuka unit assigned to the Norwegian campaign. This got off to a very bad start on 9 April 1940 when the new German heavy cruiser *Blücher* was heavily damaged by the guns of Feste Oskarsborg, the powerful fortress commanding the approaches to Oslo, and then sunk by torpedoes with the loss of 1000 lives.

Shortly afterwards, Oskarsborg and another fortress, Akershus, were attacked by 22 Stukas of I/St.G 1 from Kiel-Holtenau, led by Captain Paul-Werner Hozzel. Later in the day, I/St.G 1's Stukas deployed from their north German base to Oslo's Fornebu airport, newly captured by German airborne forces. A forward-operating base was established at Stavanger-Sola, which had also been captured earlier on 9 April. A British plan to attack enemy invasion forces at Bergen with four cruisers and seven destroyers early on that day might have delivered a damaging blow to the enemy, but the plan was cancelled by the British



Left: Stukas in the early war years, taken from a propaganda video showing the German aerial war machine in action.

Above: A Gloster Gladiator operating off the ice of the frozen Lake Lesjaskog in Norway, 1940.

Right: Stukas in a Norwegian fjord in 1940.

Admiralty following receipt of an air reconnaissance report that two German cruisers were in the harbour.

German air reconnaissance had also been active, and during the afternoon of 9 April units of the British Home Fleet were attacked almost without pause for three hours by 41 He 111s of KG 26 and 47 Ju 88s of KG 30. The battleship HMS *Rodney* received a direct hit from a 500kg (1102lb) bomb which splintered her armoured deck but failed to explode; the cruisers HMS *Devonshire*, HMS *Southampton* and HMS *Glasgow* were damaged by near misses, and the destroyer HMS *Gurkha* was sunk west of Stavanger. The Germans lost four Ju 88s. During this first encounter, the Royal Navy had learnt to its cost what it meant to operate within range of enemy land-based bombers without fighter cover – a lesson the Germans would hammer home again and again with the Ju 87. However, in Norway the Stuka's opportunities were limited, at least until I/St.G 1 received its full complement of Richards.

Range was a key factor in a brilliantly executed dive-bombing attack on the second day of the Norwegian campaign, and it was the British who delivered it. Early on the morning of 10 April, 16 Blackburn Skua dive-bombers of the Fleet Air Arm – seven of No 800 Squadron led by Lieutenant W.P. Lucy, RN; and nine of No 803 led by Captain R.T. Partridge, Royal Marines – took off from Hatston, north of Kirkwall in the Orkneys, each aircraft carrying a 227kg

(500lb) bomb. Their target was the German naval force at Bergen, which included the light cruisers *Königsberg* and *Köln* and the gunnery training ship *Bremse*. The ships had already been attacked by Hampdens of RAF Bomber Command during the night, but without success.

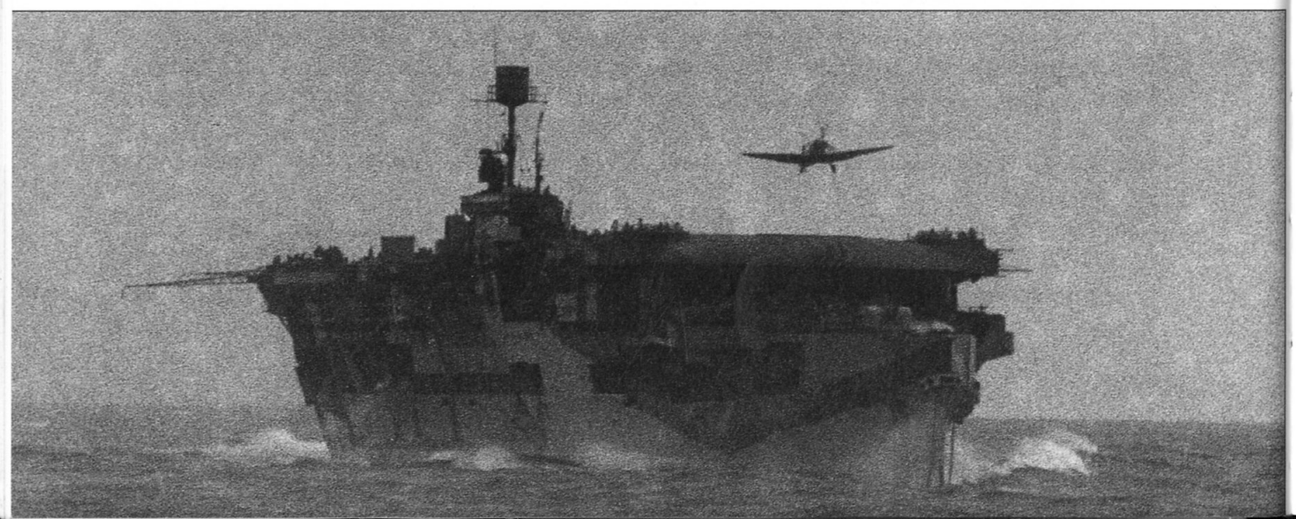
The campaign in Norway

After a gruelling 482km (300-mile) flight in semi-darkness, the Skuas – their number reduced to 15 after one aircraft returned with engine trouble – made landfall on the Norwegian coast just as the sun was coming up and climbed to 2438m (8000ft), making their dive-bombing attack on *Königsberg* in line astern. The bombing was highly accurate and the cruiser, having suffered three direct hits and a dozen near-misses, exploded and sank. She was the first major warship to be sunk by air attack in war. One Skua was shot down by anti-aircraft fire, which was quite heavy once the Germans had recovered from their initial surprise, and two more were damaged. It was unfortunate that *Köln* was no longer in Bergen harbour when the Skuas made their attack: together with *Bremse* and some smaller craft, she had put to sea earlier on the orders of Rear-Admiral Schmundt, commanding the Bergen task group.

As the German occupation of Norway progressed, I/St.G 1's aircraft were able to take advantage of freshly captured airfields close to the battlefront, easily within range of its Ju 87Bs. The middle of April 1940 found the Stukas operating from Vaernes Airfield in central Norway, supporting German forces attacking the harbour town of Trondheim. Stukas fitted with skis also operated from a frozen lake at Jonsvannet. Between 14 April and 2 May, 11,000 Allied troops were landed at Aandalsnes and Molde (Sickle Force) and Namsos (Maurice Force), air support being provided by a squadron (No 263) of Gloster Gladiator fighters, flown off the aircraft carrier HMS *Glorious*. Both ports of disembarkation, however, were soon rendered unusable by the Luftwaffe, whose bombers were operating in the main from Stavanger Airfield. In an ill-conceived scheme to deny the use of this base to the Germans, the cruiser HMS *Suffolk* (Captain J. Durnford) was despatched to bombard it on 17 April. Predictably, she was dive-bombed, and damaged so severely that she only just managed to limp home with her quarterdeck awash.

Before the end of April, it became clear that the position of the Allied forces facing Trondheim was untenable, and on the 28th the British naval commander, Admiral Forbes, was ordered to re-embark the troops with all possible speed. This was successfully achieved by 3 May, nearly all the men being lifted off by eight cruisers, seven destroyers, one sloop and two troop transports. The King of Norway and the Crown Prince were also evacuated to Tromso by the cruiser *Glasgow*. The British destroyer HMS *Afridi*, the French

Below: The British aircraft carrier HMS *Furious* (seen here later in the war launching a Spitfire) was heavily involved during the Norwegian campaign.



Above: A swarm of Stukas over Norway in May 1940. The Ju 87 enjoyed great success during the campaign in Scandinavia, sinking a number of Royal Navy vessels and confirming the effectiveness of dive-bomber aircraft against shipping.

destroyer *Bison* and the sloop HMS *Bittern* were sunk by I/St.G 1's Stukas during these operations.

Other naval forces, meanwhile, had been operating in support of landings farther north, the objective being to capture Narvik. The naval side of these operations was under the command of Admiral of the Fleet Lord Cork and Orrery, who was later placed in command of the whole expedition. Air support was again provided by the Gladiators of No 263 Squadron, joined this time by the Hurricanes of No 46, flown off the carriers HMS *Furious* and *Glorious* and operating from airstrips at Bardufoss and Skaanland. During the landing operations on 21 May, the cruiser HMS *Effingham* grounded on a shoal off Bodö while taking avoiding action during an air attack and capsized. On 26 May, the anti-aircraft cruiser HMS *Curlew* was bombed and sunk by Ju 88s of KG 30 off Skaanland.

Until now, the Gladiator pilots had mostly confronted He 111 and Do 17 bombers, but I/St.G 1 had now received its full complement of Richards and was able to range farther afield. On the morning of 27 May, a force of about 14 Ju 87s, escorted by Bf 110s, began dive-bombing a jetty close to the airstrip at Bodö, where the Gladiators were based. Two Gladiator pilots, Flight-Lieutenant Caesar Hull and Lieutenant Antony Lydekker (a Fleet Air Arm pilot attached to the RAF), took off to intercept. They were credited with a Ju 87 destroyed, but both were wounded and had to make forced landings.

On 28 May, the aircraft carrier *Glorious* flew off 15 Hurricanes of No 46 Squadron, which joined the surviving Gladiators at Bardufoss. They were just in time to cover the final evacuation of Allied forces from Narvik and Halstad, both of which were heavily attacked by all available German aircraft in this closing phase of the campaign. The RAF fighters claimed nine German aircraft destroyed, including three Ju 87s, then flew away to land on *Glorious*. The aircraft carrier was sunk on 8 June by the German battlecruisers *Scharnhorst* and *Gneisenau* while on her way to Scapa Flow with the loss of all her aircraft and most of the aircrew. The campaign in Norway had been a great success for the Stuka, having given the Royal Navy a very bloody nose.

Blitzkrieg: The campaign in the West, May–June 1940

Destroying command bunkers, bridges, enemy formations and railway junctions, the Stuka played a crucial role in the defeat of France in 1940.

On the eve of the campaign in the West, the Ju 87 element of the invasion force comprised nine Stuka Gruppen with 320 Ju 87B and 38 JU 87R aircraft. The dive-bombing forces were under the control of VIII Fliegerkorps, which was commanded by Lieutenant-General Wolfram Freiherr von Richthofen. In preparation the Stuka crews had undergone intense training during the preceding months. St.G 77, for example, had to train for a dive-bombing attack on the Belgian fortress of Eben Emael. To simulate bombing next to previously landed gliders and paratroopers, the Stuka pilots used cement training bombs with no

Left: German Stukas in 1940. The blurred emblem on their fuselages appears to be that of the famous Stuka unit, 2/St.G 2 "Immelmann".

Above: Seen here later in war, General Wolfram von Richthofen was instrumental in the prosecution of the Luftwaffe's aerial campaign against French forces.

explosives when dropping ordnance next to troops on the ground.

The German invasion of France, Belgium and Holland began at first light on 10 May 1940. Airborne forces in 41 DFS 230 assault gliders, towed to their objectives by Ju 52 transports, secured Eben Emael, commanding the Albert Canal south of Maastricht, and the strategic bridges over the River Maas at Vroenhoven and Veldwezelt. These operations were supported by the Hs 123s of II/LG 2 and the Ju 87s of St.G 2, which kept up constant attacks on Belgian artillery positions.

Between dawn and dusk, the Luftwaffe flew more than 1000 individual bombing sorties against targets in the three countries in the course of some 150 attacks. In the morning, 400 He 111s, Do 17s and Ju 88s had struck at 72 airbases, 47 of them in northern France, in an attempt to destroy a large portion of the Allied air forces on the ground. In fact, the Luftwaffe failed to achieve more than a fraction of its objectives during this opening phase. In the French Northern Zone of Air Operations (ZOAN) only four aircraft were destroyed on the ground during the initial onslaught, with a further 30 or so damaged; while in the Eastern Zone of Air Operations (ZOAE) the only real result was obtained by the Do 17s of KG 2, which destroyed five Amiot 143 bombers and two Royal Air Force (RAF) Hurricanes. (Far greater destruction was achieved on 11 May, when the German bombers caught considerable numbers of Allied machines refuelling and rearming at their bases between sorties.)

On the afternoon of 10 May, the Luftwaffe's main effort was directed against communications, the bombers striking in particular at the major rail junctions at Tergnier, La Fère, Laon, Rethel and Hirson. Allied convoys were also attacked, mainly on the roads between Brussels and Liège, Beaumont and Philippeville and Givet and Namur. During the day's operations, the Luftwaffe admitted the loss of 26 aircraft, while Allied fighters claimed the destruction of 49.

Stuka bomb loads

The Stuka crews were engaged in a series of non-stop missions, hitting fortifications, bunkers, command headquarters and defence works. At first the Ju 87s flew from their peacetime bases, but as the German advance gathered momentum they deployed to airfields nearer to the front. The nature of the target dictated the bomb load carried by each Ju 87. For example, against concrete fortifications a single SD 500 would be used, whereas against field artillery positions a normal bomb load would be one SC 250 under the fuselage and four SC 50s under the wings. The Germans designated their high-explosive bombs according to the type of casing and the weight of the bomb. Thus the SC 250 was a Spreng Cylindrische (high explosive, general purpose) bomb weighing 250kg (550lb). The SD 500 was a Spreng Dickwand (high explosive, thick walled – semi-armour piercing) bomb weighing 500kg (1100lb), and the PC 1000 Panzerbombe Cylindische (armour piercing) bomb weighed 1000kg (2200lb).

In the air the Ju 87s would typically fly in a Kette at an altitude of 4572m (15,000ft) and a speed of 240kmh (150mph). Large formations comprised several Ketten in line astern, up to a maximum of 30 aircraft (the strength of a Gruppe). When attacking small targets the aircraft would move into echelon during the approach, and then peel off and attack in line astern. When attacking large targets such as harbours, the Ju 87s would bunt over and attack by Ketten. The dive itself was carried out at an angle of 80 degrees, the bomb load being released at an altitude of 914m (3000ft). The dive took about 30 seconds, during which the pilot controlled his aircraft to hold the target in the centre of his reflector sight. When the aircraft reached the previously briefed pull-out altitude, the pilot pressed a button on his control column which initiated the automatic pull-out system. The bomb was then released automatically, after which the pilot regained control, retracted the dive brakes, opened the throttle, trimmed for level flight and left the area.

The Luftwaffe order of battle

Luftwaffe operations over northeast France during this phase were the primary responsibility of II and V Fliegerkorps, commanded by Lieutenant-General Bruno Lörzer and Lieutenant-General Robert Ritter von Greim. The attacks on targets in Holland were carried out by I and IV Fliegerkorps, under General Ulrich Grauert and General Alfred Keller, although part of I Fliegerkorps also participated in attacks on French airfields. The Stukageschwader of Lieutenant-General Wolfram Freiherr von Richthofen's VIII Fliegerkorps were assigned to the direct support of the Sixth Army and XVI Panzer Corps. The fighter element of VIII Fliegerkorps, whose principal task was to protect the Stukas, was the élite Jagdgeschwader 27 (JG 27), a composite unit made up of Gruppen I/JG 27, I/JG 1 and I/JG 21.

On 11 May, JG 27 was detailed to provide a fighter umbrella over the vital bridges on the Meuse and the

Above: In between sorties in the West, a Stuka crew pose for the camera sitting on a 227kg (500lb) bomb.

Albert Canal; in 24 hours, the German fighter pilots flew 340 sorties, claiming the destruction of 28 Allied aircraft for the loss of only 4 of their own number. After these operations, JG 27 reverted to its more usual task of escorting the Stukas of VIII Fliegerkorps, which were heavily engaged in attacking Allied columns in the Liège sector. The strong Luftwaffe participation in this area was intended to convince the Allies that this was the focal point of the German offensive. However, in the absence of fighter cover, the Stukas suffered heavily. On 12 May, five Curtiss Hawk fighters of Groupe de Chasse I/5 attacked twelve Stukas returning unescorted from a bombing mission between Bouillon and Sedan

Above: A German Stuka pilot leaves his aircraft following a bombing mission in France in 1940.

Left: A Luftwaffe ground crew "bomb up" a Stuka in preparation for a mission in France.

Right: A picture that featured in a contemporary edition of *Signal* magazine, row upon row of 227kg (500lb) bombs await fitting to Ju 87 Stukas.

and shot all of them down, at no cost to themselves. The Hawks then engaged a second Stuka formation coming in to bomb and broke it up, destroying four more dive-bombers in the process.

On 13 May, which dawned bright and clear with a few shreds of mist clinging to the Meuse and the woods on either side, the heavy artillery of the French X and XVIII Corps opened up on the river crossing points, strategic road junctions and the approaches to the Meuse. However, by midday, there was a critical shortage of ammunition. Apart from the general confusion that existed, fresh supplies coming up from the rear were subjected to incessant air attacks by the Luftwaffe. It transpired that requests for further supplies of ammunition sent through urgently to HQ Second Army had never arrived – or, if they had, had been ignored.

During the morning, the Luftwaffe struck the French posts on the Meuse in relatively small numbers, the forward positions being attacked by groups of up to six Stukas or medium bombers. In the afternoon, the full weight of II and VIII Fliegerkorps was applied in support of the critical armoured thrust at Sedan by XIX and XXI Army Corps. Luftwaffe orders were to pin down the French defences while the German ground forces established a bridgehead. This was to be

achieved by small formations of aircraft, primarily Stukas, attacking in relays, rather than by a single all-out air attack. When operating with ground forces, effective command and control was essential.

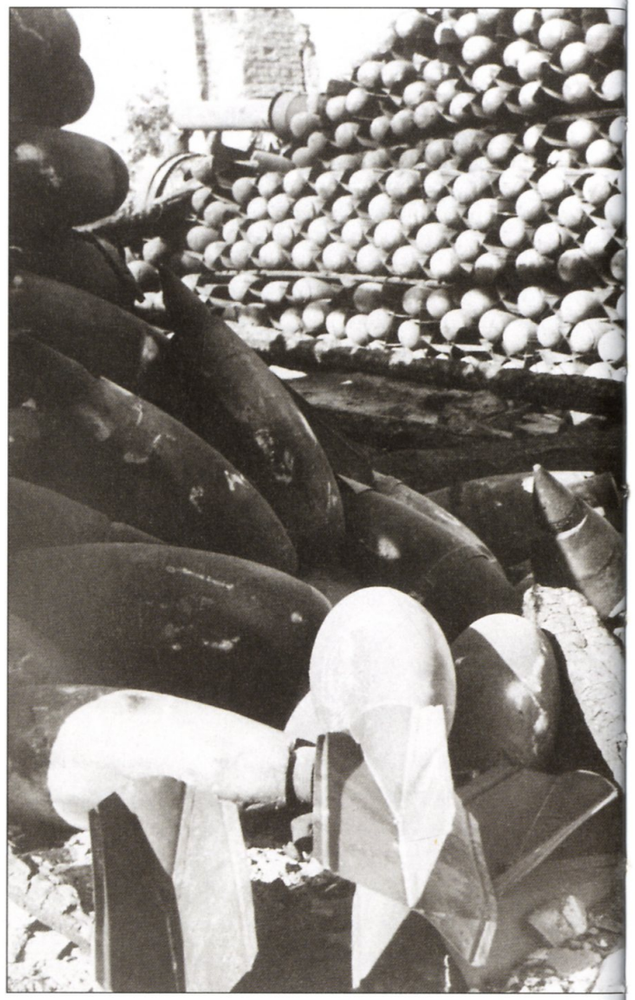
Stuka command and control depended largely on the types of mission that a particular unit was expected to fly over any given period. For targets of strategic importance, such as railway junctions and bridges, predetermined arrangements were made with regards to which Stuka unit was attacking which target. To all intents and purposes, it was similar to the planning for a conventional heavy bombing run. The practice for close air support was somewhat different, as the fluid nature of the battlefield and the changing need for air assets in different sectors of the front required a different system.

Ground-to-air coordination

Initially, Luftwaffe officers known as Koluft (an abbreviation of Kommandeur der Luftstreitkräfte) were installed with army units, and acted as the liaison between the Luftwaffe and organized close air support for army units on the ground. Thanks to this system, Operation Barbarossa and other attacks along the Eastern Front were fundamentally well organized and optimized in their effect. It certainly went some way to making Blitzkrieg the remarkable success it was.

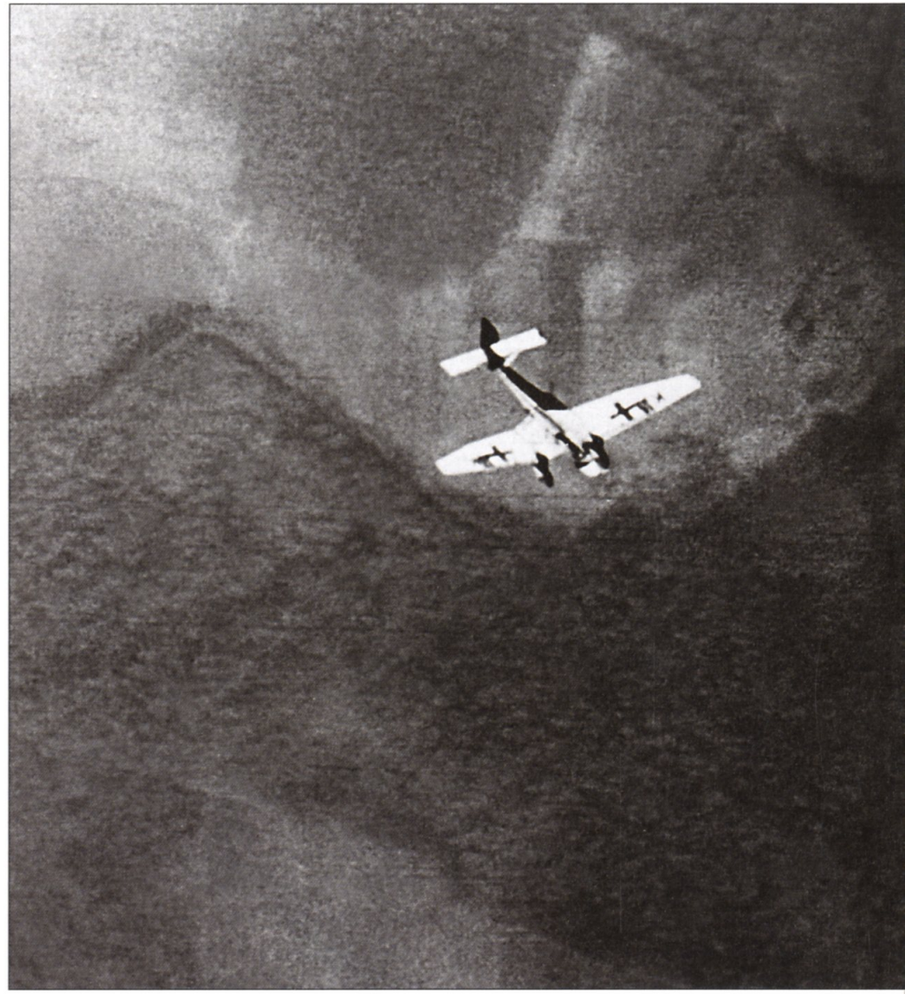
The Ju 87 Stuka close air support was handled by Air Liaison Officers, known as Flievos in German military slang. These liaison officers were in contact with frontline troops known as air guidance troops, or forward air controllers in modern military terminology. These troops consisted of one Luftwaffe officer, one army officer and a radio operator. They were also mobile, kitted out with an assortment of vehicles. This arrangement, which is similar in many respects to the modern method of calling in close air support, meant that the accuracy of Stuka attacks was increased, and the threat of "friendly fire" much reduced in comparison to ground attacks pre-planned at the operational level.

The standard operating procedure for calling in Stukas was that frontline troops requested close air support from the responsible Fliegerkorps through the air liaison command set up at the divisional HQ. From there the request would be forwarded to the appropriate Luftflotte. This ordered the operation and informed the liaison command of the status of the aircraft up until take-off. As soon as the Ju 87s were over the battlefield, the air guidance officer went into action and guided in the ground attack locally. In order to disseminate the German positions from those of the enemy (and thus avoid being attacked by their own



Left: Stacked up in their dozens, bombs of all sizes at a Luftwaffe airfield await deployment to Ju 87 units. Stuka squadrons tore into the defenders of France, flying hundreds of sorties and dropping thousands of tonnes of bombs.

Right: A classic shot of a Ju 87 Stuka in a full dive over France. The process of aiming at a target whilst diving was done by etching angles against the glass of the cockpit, thus allowing the pilot to see what angle he was at in relation to the ground whilst keeping the target in his sights.



aircraft), the troops on the ground displayed any means at their disposal, such as displaying clothing or using other visual markers, such as swastika flags.

In the Ardennes, the first phase unfolded on schedule at 16:00 hours on 13 May with a highly effective precision attack by Ju 87s of St.G 77 on French artillery emplacements on the west bank of the Meuse. The flak was very heavy, though the results were excellent. One squadron member recalled: "The noise was terrifying; the wailing of engines and sirens pierced by the shriek and crash of falling bombs totally demoralized the defenders. After five hours, during which more than 500 Stuka sorties were flown, the German Army crossed the Meuse to find the French soldiers too stunned to fight back." This was followed minutes later by a second raid, this time carried out by the Do 17s of KG 2. The attacks continued for several hours and were virtually unopposed by the French fighters, which were for the most part effectively kept at bay by patrolling Messerschmitts. In other instances,

French air units failed to respond to the emergency because of an appalling lack of communication between the French Army and Air Force.

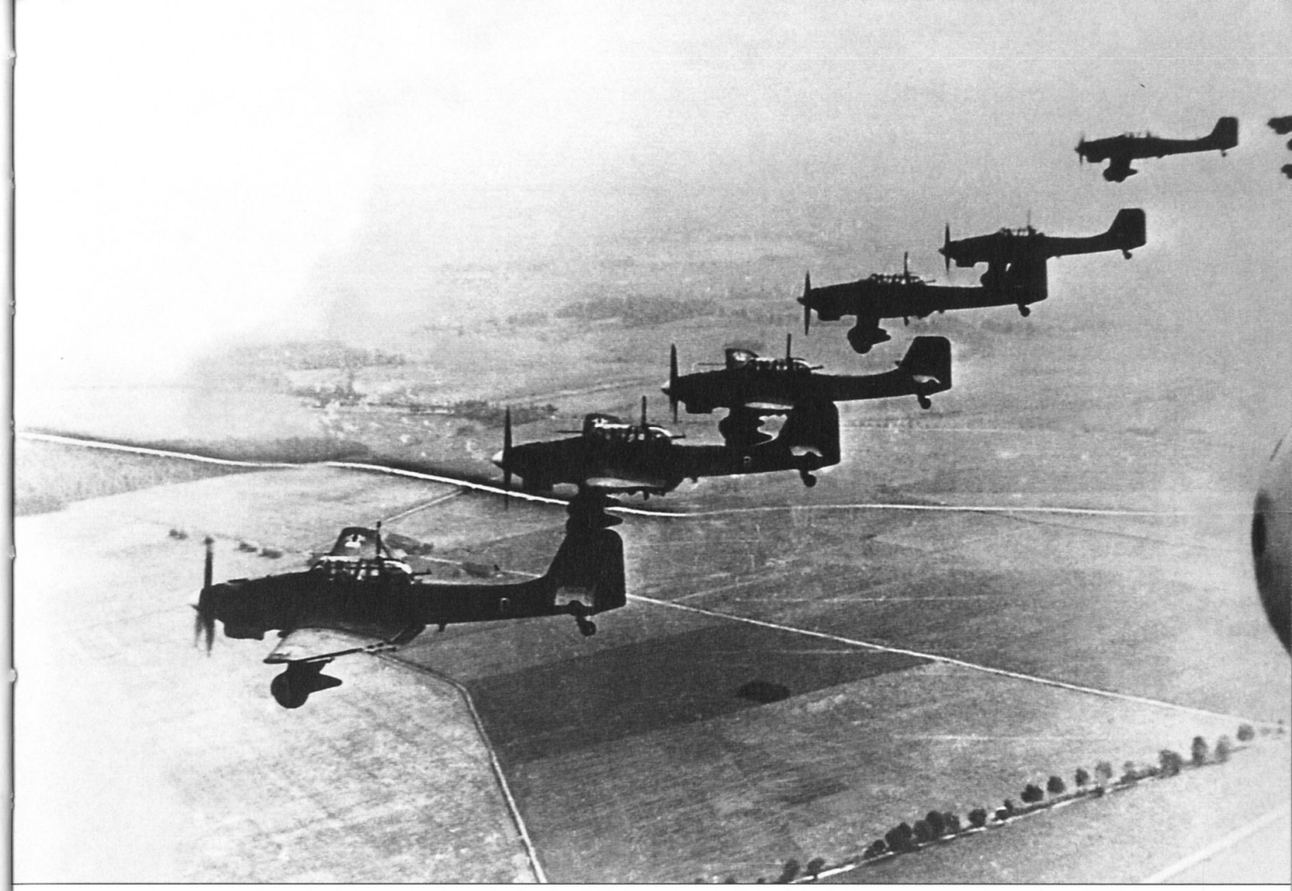
One of the Stuka attacks was described graphically by a German noncommissioned officer (NCO), Sergeant Prümers of the 1st Panzer Division, which was being heavily shelled by French artillery: "Three, six, nine – behind them still more; and, further to the right, aircraft and still more aircraft. A quick look through the binoculars – Stukas! And what we are about to see during the next 20 minutes is one of the most powerful impressions of this war. Squadron upon squadron rise to a great height, break into line astern, and there, there the first machines hurtle perpendicularly down, followed by the second, third – 10, 12 aeroplanes are there. Simultaneously, like some bird of prey, they fall upon their victim and then release their load of bombs upon the target. We can see the bombs very clearly. It becomes a regular rain of bombs, that whistle down upon Sedan and the bunker positions. Each time the explosion is overwhelming, the noise deafening. Everything becomes blended together; along with the howling sirens of the Stukas in their dives, the bombs whistle and crack and burst. A huge blow of annihilation strikes the enemy, and still more squadrons arrive, rise to a great height, and then come down on the same target. We stand and watch what is happening as if hypnotized; down below all hell is let loose! At the same time we are full of confidence. Suddenly we notice that the enemy artillery no longer shoots. While the last squadron of Stukas is still attacking, we receive our marching orders."

Attacks on the Meuse positions

Farther north, the assault on the Meuse at Houx and Dinant by General Hoth's XV Panzer Corps was supported by the Ju 87s of St.G 1 and the Do 17s of KG 76 and 77. For the defending French troops, the attacks were fearsome and demoralizing. Most of the French air-raid shelters were only half-completed and offered hardly any protection from the onslaught. Even before the air attack was over, four brigades of German 105mm guns opened up a heavy fire on the French X Corps' sector. Under cover of the bombardment, the German assault infantry launched itself across the Meuse on river boats and rafts, screened to some extent by the vast cloud of dust and smoke that swirled across the river from the bombing on the opposite bank. By the evening of 15 May, the Luftwaffe had carried out 315 daylight attacks on targets in the ZOAN: 107 against airfields; 66 against rail targets; 28 against factories or military establishments; and 114 against various other objectives.

Now, with the breakthrough at Sedan, the entire Luftwaffe effort in France and Belgium was devoted to supporting the Wehrmacht's dash to the Channel coast. This was where the Hs 126 observation aircraft came into their own: flying at low altitude and covered by an umbrella of Messerschmitts, they continually reported the positions and movements of Allied units. Once a Hs 126 appeared, it was a certainty that the Stukas would not be far behind. It was largely due to the activities of these spotter aircraft that the panzer divisions were able to make such incredible headway in their race to the sea. Flying ahead of the tanks, they would pick the likeliest routes and provide up-to-the-minute information on any opposition.

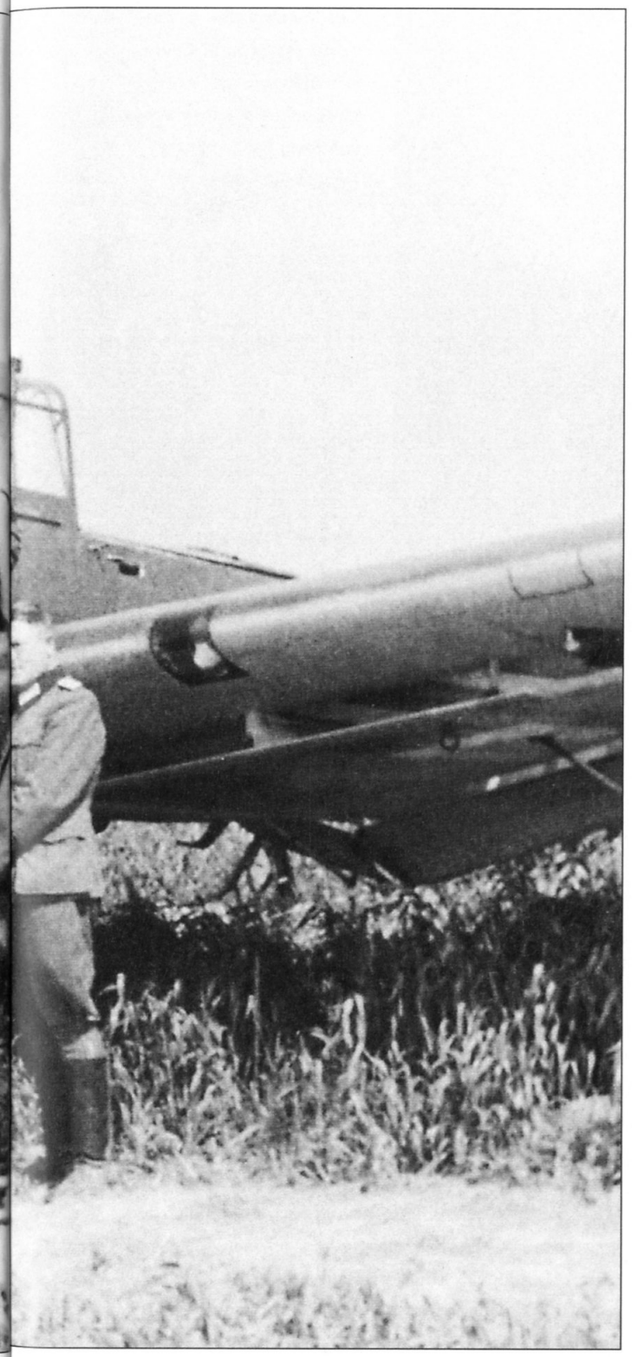
Below: A crucial element of the German Blitzkrieg was fast-moving armoured units, such as these in France.



Above: Flying in formation, a Staffel of Stukas returns from a successful mission against French forces.

On 20 May, the 2nd Panzer Division reached the Somme estuary at Abbeville. It was less than a week since the French line had been broken at Sedan. However, the very speed with which they had achieved their objectives placed the Germans in considerable danger. The panzers had advanced far ahead of their supporting infantry, and it would be some time before the newly won ground could be consolidated. The situation was favourable for the Allies in the north to drive southwards and slice through General Ewald von Kleist's badly overstretched armoured columns, trapping the panzers against the coast and forging a strong link with Allied concentrations in the Amiens area, at least in theory.

While the French were preparing their counter-stroke, General Erwin Rommel's 7th Panzer Division, in the process of advancing around Arras, was attacked by British armour, consisting mainly of heavy Matilda tanks. The British inflicted severe casualties on the enemy, but eventually their counterattack was broken by a combination of the deadly German 88mm guns and Stukas. After the battle, the British Tank Brigade Commander, Brigadier Douglas Pratt, told how the



Matildas "...played hell with a lot of Boche motor transport and their kindred stuff. Tracer ammunition put a lot up in flames. His anti-tank gunners, after firing a bit, bolted and left their guns, even when fired on at ranges of six to eight hundred yards from the Matildas ... none of his anti-tank stuff penetrated our [Matilda] Is and IIs, and not even did his field artillery which fired high explosive. Some tracks were broken, and a few tracks were put on fire by his tracer bullets, chiefly in the engine compartment of the Matilda Is. The main opposition came from his field guns, some of which fired over open sights. Also the air dive-bombing on the infantry – this, of course, did not worry the tanks much. One or two bombs bursting alongside a Matilda turned it over and killed the commander; another lifted a light tank about 15 feet in the air. Had we only been able to stage a methodical battle with a series of reasonably short objectives, with some artillery support and even a little air support and no frantic rush, we should have done far better and saved many lives of fellows we cannot afford to lose."

The Stukas against French tanks

If the Stukas did not worry the British tanks much, they certainly worried the French armour. On 17 May, for example, Colonel Charles de Gaulle's 4th Armoured Division was badly battered by Stuka attacks while attempting a counterattack at Montcornet. Two days later, in attempting another counterattack, de Gaulle was promised maximum French fighter cover: it never arrived, and the Stukas fell on his armoured columns out of an empty sky. Under repeated dive-bombing attacks, de Gaulle managed to pull his forces back in good order to regroup behind the Aisne.

On the morning of 22 May, German air reconnaissance reported a strong force of French armour and motorized infantry approaching Cambrai

Left: At an airbase some distance from the front in France, a Luftwaffe ground crew pose by a Ju 87. Note the small bomb in the foreground. This 50kg (110lb) device was used to attack soft-skinned vehicles.

Left: Barely visible to the naked eye, a Ju 87 Stuka is hidden amongst trees and bushes at a forward operating base in France. Though the French Air Force had been reduced to a ramshackle state and posed little threat, good tactical practice was always adhered to by Luftwaffe units.

Right: From the same forward operating base in France, a flight of Stukas takes off from the makeshift airstrip.

from the north. This was serious news, for all supplies for the German armoured group had to pass through the town, and as yet there were no combat forces to defend it. It was clear that the French armoured thrust would have to be checked before it presented a serious threat to Cambrai, and equally clear that only the Luftwaffe was in a position to do so.

The task was assigned to the Hs 123s of II/LG 2 under the command of Captain Otto Weiss, which shared Cambrai airfield with the Bf 109s of its fighter escort Gruppe, I/JG 21. These two groups were the most advanced units of VIII Fliegerkorps. At 09:00 hours, four Hs 123s carried out an armed reconnaissance and confirmed that about forty enemy tanks were only 6.4km (4 miles) from Cambrai. The armoured vehicles were in battle formation and travelling fast, and some distance to their rear a large dust cloud rose from a convoy of 150 trucks that carried the French infantry.

Led by Otto Weiss, the four Henschels dived down to the attack, then raced for their base at low level. A few minutes later, the rest of II/LG 2 took off, each aircraft armed with a pair of 45kg (100lb) bombs. The Henschels dived on the tanks in flights of three. Their accuracy was phenomenal, and within a few minutes five of the French tanks were in flames and ten more had been halted, their tracks damaged by near-misses. At the same time, the Messerschmitts of I/JG 21 attacked the infantry convoy, sending the French troops scattering for cover. The attack was eventually stopped and turned back by accurate fire from the 88mm guns of I/Flakregiment 33, two batteries of which were positioned on the approach to Cambrai.

Dive-bombing attacks on Calais

Meanwhile, as it advanced along the Channel coast from Abbeville towards Dunkirk, General Heinz Guderian's XIX Panzer Corps had encountered spirited resistance at the harbour towns of Boulogne and Calais. Boulogne, which was cut off on 22 May, was heroically defended for 36 hours by two British Guards battalions, a handful of French territorial troops and

five naval gun batteries before the garrison was evacuated by sea in the early hours of the 24th, having lost 200 men. At Calais, British Prime Minister Winston Churchill ordered the garrison to fight to the death. Under the command of Brigadier C.N. Nicholson, the garrison fought one of the bravest last-ditch actions in the annals of the British Army before it was overwhelmed on the 26th.

Excellent logistical back-up made it possible for the Stukas to support the panzers. Waldemar Plewig, St.G 77, recalled: "We followed the flood of battle moving constantly to various advanced airfields. Thanks to the really excellent organization of General Pflugbeil and the ever-readiness of the two airfield service squadrons, which had been strengthened by the Workers Battalion of young men of under normal service age but who had high technical 'know-how', we could in quick succession give our advancing panzer formations badly needed and required air support."

Although the harbour of Calais had been subjected to limited attacks by Luftwaffe medium bombers at intervals since 19 May, it was only on the 25th that strong formations of Stukas began operating in the area, and even then their principal targets were the warships out at sea rather than the garrison itself. The unit that carried out the first heavy dive-bombing attack off Calais on the 25th was St.G 2. It had moved up to an advanced base at Guise, east of St Quentin, under the command of Major Dinort, who had led the Geschwader through the Blitzkrieg on Poland. While the 10th Panzer Division engaged the town's defences, Dinort led two Gruppen of St.G 2 – about 40 aircraft – against the British naval forces offshore. At that point, these comprised two cruisers and six destroyers, which had either been evacuating personnel who were not fighting troops or employing their guns against targets on shore.

Locating the ships, Dinort ordered his two Gruppe commanders, Captain Hitschold and Captain Brückers, to select their own targets; he led his own section of Stukas into a dive from 3660m (12,000ft). As yet, Stukas had little experience of attacking warships that

Above: Scenes from Dunkirk. The Royal Ulster Rifles on the beach at Bray Dunes awaiting evacuation.

were manoeuvring at sea, and no firm technique had been devised for dive-bombing such small, elusive targets. Dinort picked out a destroyer and placed it squarely in his sight, only to see it drift out again as it took evasive action. He eased out of the dive slightly, captured the warship once more, then lost it again as it turned the other way. Although Dinort had no luck, his bomb missing its target by a considerable margin, other pilots sank the destroyer HMS *Wessex*. As the Stukas formed up and left the target area, they were attacked by British Supermarine Spitfires. Three of the dive-bombers were shot down, but No 54 Squadron RAF, in the thick of the fighting, also lost three Spitfires.

The capture of Boulogne and Calais left Dunkirk as the only North Sea port still open for the evacuation of Allied troops. At 18:57 hours on 26 May, Operation Dynamo, the massive combined operation to save as much as possible of the exhausted British Expeditionary Force, was officially launched. Guderian's panzers were only 19km (12 miles) from the port, and Admiral Sir Bertram Ramsay, directing the evacuation from Dover, counted on only two days of grace before Dunkirk fell into enemy hands. It was thought that no more than 45,000 men might be evacuated in the time available. No one could have envisaged that, by 4 June, an incredible 337,000 men would be brought out, 140,000 of them French troops.

The Dunkirk mystery

Several factors contributed to what became known as the "deliverance of Dunkirk". First, on 24 May – a day on which enemy attacks were pressed home with great severity all along the shrinking Allied perimeter, the British pulled back from Arras, and the panzers seemed all set for a final drive on Dunkirk after capturing several bridgeheads on the Aa Canal – the tanks were suddenly halted on Hitler's orders. This came as a profound shock to the panzer leaders. General Guderian later wrote: "Hitler ordered the left wing to stop on the Aa. It was forbidden to cross that stream. We were not informed of the reason for this. The order

contained the words: 'Dunkirk is to be left to the Luftwaffe'. We were utterly speechless."

A variety of explanations was subsequently given for this famous order, ranging from the possibility that Hitler wanted to provide the British with a face-saving outlet to encourage them to enter into peace negotiations, to the theory that the terrain in front of Dunkirk was unsuitable for armoured operations. What is certain is that, on 23 May, Luftwaffe C-in-C Hermann Göring rang Hitler to boast that the Luftwaffe could finish the job in the Dunkirk pocket single-handed. This was undoubtedly fresh in Hitler's mind when, the following morning, he met General Gerd von Rundstedt, commanding Army Group A, at Charleville to discuss the problems that the offensive had so far encountered. Rundstedt told the Führer that he remained worried about the security of the advance's southern flank, particularly as there was still a chance of a French counteroffensive developing from south of the Somme. The British attack at Arras had also come as a severe shock, and in its wake von Kleist had reported that half of his armour was unserviceable, although much of it only temporarily. It would therefore be too much of a risk to subject what remained of the armour to the possibility of a further mauling by the British Tank Brigade in the marshy terrain before Dunkirk. The timetable for the invasion called for a maximum concentration of the panzer divisions in just over a week's time to launch the second phase of the offensive, against the French armies south of the Somme. This had to be given overall priority – and, besides, it was only a question of time before the Allied forces in the north were compelled to surrender.

The Dunkirk pocket

Hitler agreed with these observations. Above all, the armour had to be rested and brought up to strength again in readiness for the new drive to the south. So the order went out for the tanks to halt, and it was two days before it was rescinded – two days of respite that enabled the British to gear up the evacuation and so avert what would have amounted to the virtual annihilation of their army. There was no immediate large-scale Luftwaffe attack on the Dunkirk pocket. The port was still beyond the useful range of VIII Fliegerkorps' Stukas, which were still supporting German Army units in action against the French. Therefore, on 26 May, Dunkirk was attacked only by small formations of bombers from I and IV Fliegerkorps, operating from bases in Holland and the Rhine valley.

Ju 87s over Dunkirk

It was not until 27 May that the Luftwaffe was in a position to mount intensive attacks. At first light, waves of He 111s of KG 1 and 4 bombed the port and the beaches, followed almost immediately by those of KG 54. The latter's bombs sank the 8128-tonne (8000-ton) French steamer *Aden* by the East Mole. At 07:40 hours, it was the turn of the Ju 87s of St.G 2, now operating from St Omer, which attacked the harbour and sank the troopship *Côte d'Azur*. Then came the Do 17s of KG 2 and 3, which set fire to the town's big oil storage tanks. A total of 300 German bombers attacked Dunkirk and its environs on 27 May during 12 raids, escorted by 550 fighter sorties. Their bombs turned the town into a furnace: fires raged unchecked, as there had been no water supplies for five days; and by noon the air attacks had actually blocked the port.

From then on, the evacuation had to be carried out via the beaches. The 16 squadrons of No 11 Group RAF Fighter Command flew 23 patrols during the day, claiming the destruction of 38 enemy aircraft for the loss of 14 Spitfires and Hurricanes. Most of the damage was inflicted on the Do 17s of KG 2 and KG 3, which lost 23 bombers and 64 aircrew. But Fighter Command was suffering, too, and on 28 May it changed its tactics, mounting only 11 patrols and claiming 23 kills for the loss of 13 of its fighters. In fact, the Luftwaffe made few attacks on Dunkirk that day. The whole area was obscured by low cloud, mingling with the vast pall of smoke from the burning oil tanks, making conditions unfavourable for the bombers. Instead, they

directed their main effort against the Belgian ports of Ostend and Nieuport.

On the afternoon of 29 May, all three Stukageschwader of VIII Fliegerkorps took advantage of clearing weather to launch a blistering attack on Dunkirk Harbour, hitting several vessels and rendering the quays unserviceable. Eleven of the 180 Ju 87s involved in this raid were shot down, most of them by intense flak. At 15:30 hours, the assault was taken up by the bombers of Luftflotte 2, including the Ju 88s of KG 30 from Antwerp and LG 1 from Düsseldorf. Their attacks were highly successful, with three British destroyers sunk and seven damaged. Five large steamers were also sunk during the day by Ju 87s and Ju 88s: the vessels were caught while in the process of embarkation and presented excellent stationary targets.

Exaggerated claims

Five major Luftwaffe attacks were carried out in all, two of them intercepted by RAF fighters. Both sides claimed greatly exaggerated numbers of enemy aircraft destroyed. The Boulton & Paul Defiant crews of No 264 Squadron, for example, claimed 15 Bf 110s, two Bf 109s and a Ju 87 destroyed during their first sortie of the day, with a further 18 Ju 87s and a Ju 88 during a second mission that afternoon. This was a fantastic total for a unit equipped with aircraft that were inferior on every count to the German fighters opposing them – and one totally out of step with contemporary Luftwaffe records, which admitted a loss of 14 aircraft on 29 May, 2 of them shot down by French fighters.

On the morning of 29 May, the Stukas were grounded by low cloud and rain, but in the afternoon the weather cleared and the Dunkirk pocket was attacked by all three Stukageschwader. For the evacuation vessels it was a day of disaster, with five troopships sunk and other ships damaged. The loss was

Right: An RAF Lockheed Hudson aircraft of Coastal Command approaches Dunkirk low and fast on a reconnaissance patrol. The acrid fumes of burning oil tanks forms a suitably dramatic background.

keenly felt, and for several hours the evacuation was threatened with chaos. Nevertheless, 47,310 troops were taken off the beaches that day. The next morning found the beaches once again enveloped in rain and fog, and the Luftwaffe was powerless to intervene. Two Stukagruppen did take off, but they were unable to find targets and returned to base still carrying their bombs.

Attacks on shipping

On the last day of May, bad weather again prevented the German aircrews from operating, apart from a few sorties by twin-engined bombers which resulted in the sinking of one large transport vessel. Then came the morning of 1 June, and with it brilliant sunshine that brought the German aircraft down on the Dunkirk beaches in swarms. As well as the three Stukageschwader, the Ju 87s of I/St.G 186 were also involved in the day's attacks, and were responsible for much of the Allied shipping losses. These included one French and three British destroyers, a minesweeper and two passenger ferries. I/St.G 186 lost two Stukas to anti-aircraft fire, with another badly damaged by an RAF fighter; two aircraft were also lost by I/St.G 77. Ju 87 attacks against shipping did not necessarily require the bombs to actually strike the target. The captain of the British tug *Empire Henchmen*, J.E. Fishe, gave a graphic description of the effect even near misses could have (the Stukas making the attack belonged to St.G 77): "Fortunately neither the tug nor barge was hit, but the terrific explosions of the bombs which were falling very closely all round the tug, which was in shallow water, resulted in violent concussions, which caused fractures to the connections of our fuel oil tanks, and serious leakages of oil into the bilges with risk of fire; also serious damage was done to the tug's electrical installation, pumps and compasses."

It was a day of action for the Lockheed Hudson, Bristol Blenheim and Avro Anson crews of RAF Coastal Command which, unsung and mostly unnoticed, had been flying the Sands Patrol right from the start of the evacuation. On the morning of 1 June, three Hudsons of No 206 Squadron, flown by Pilot

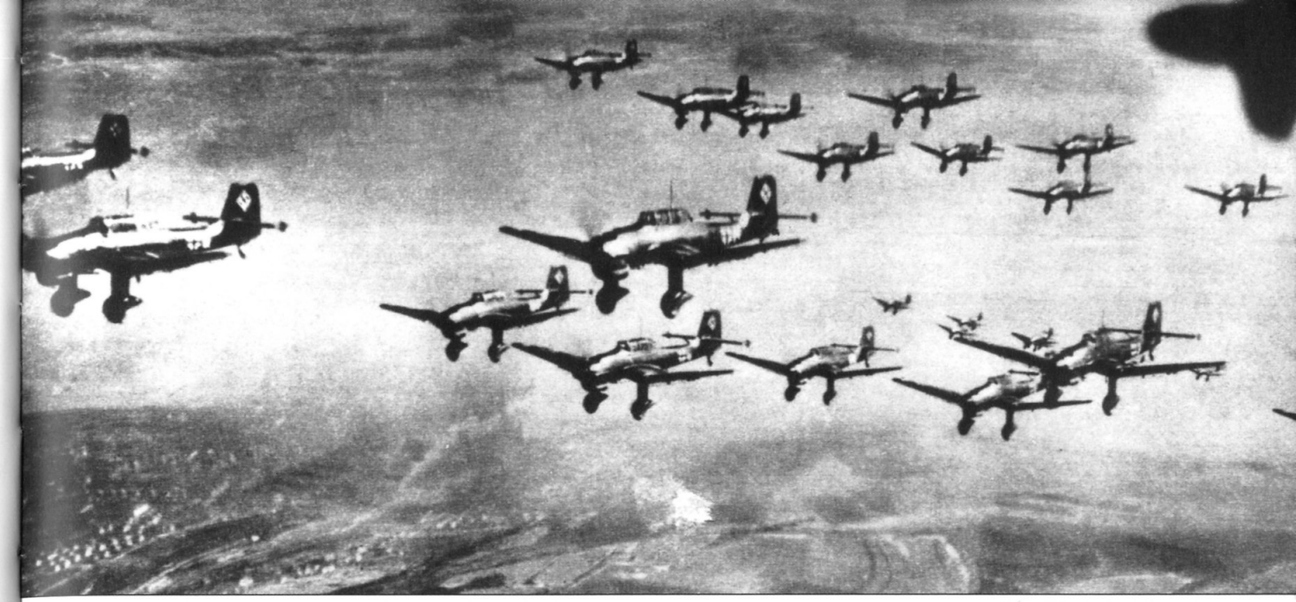
Far left: The wing-mounted 7.92mm MG 17 machine gun fitted to all Ju 87 Stukas. The emblem on the fuselage shows the aircraft is from 4/St.G 77.

Left: A Henschel Hs 126. This one has just dropped a small payload of bombs.

Right: The Hs 126 reconnaissance aircraft. These were used by the Luftwaffe to spot targets on the ground and guide in bombing attacks.

Officers Marvin, Biddle and Keen, attacked a large formation of Ju 87s over Dunkirk and shot two of them down. Similar odds were tackled later that day by another flight of three Hudsons, whose gunners claimed to have destroyed three Stukas. The last major air attack on Dunkirk took place at 11:00 hours, when about 70 Do 17s, He 111s, Ju 87s and Ju 88s struck at fortifications and important bridges in the town. Fort Vallieres, one of the main strongpoints, was wiped out by dive-bombers; the Stukas also damaged two vessels in the harbour. Subsequent attacks were carried out almost exclusively by the Stukagruppen: the twin-engined bombers were preparing for a major attack on industrial targets in the Paris area (Operation Paula), scheduled for the next day. On 4 June, the last Allied troops inside the Dunkirk perimeter surrendered. Most were French, who had held the line while more than 337,000 men of the British Expeditionary Force and many of their own countrymen were evacuated.

Left: A Wehrmacht patrol marches close to the Arc de Triomphe in Paris. The defeat of France was arguably Hitler's greatest military victory.



Right: The Ju 87 played a fundamental role in bringing France to its knees, and it earned its place in history on merit.

After a brief respite, the Stukageschwader were assigned to the support of the German offensive south of the Somme. Although compelled to withdraw gradually before the onslaught of 10 panzer divisions, the French fought hard, contesting every yard of ground, and inflicted substantial casualties on the enemy. But the German armour exploited every gap, racing across country and bypassing the strongpoints that had been set up by the French. On several occasions, the tanks advanced so rapidly that they crossed the Luftwaffe's bomb line. There was a danger that they might be attacked by their own Ju 87s, and they had to be halted while the rest of the offensive caught up.

The Ju 87 against French fighters

On 8 June 1940, as the Battle of France entered its final phase and the French defences were being broken all along the line of the Somme, the pilots of Groupe de Chasse I/2 had a fierce encounter with Stukas. (This was the famous unit that had a white marabou stork as its emblem, and which had numbered some of France's leading World War I aces in its ranks.)

Captain Williame, leading two flights of Morane 406 fighters, tells the story: "At 19:45 hours, we formed up over Soissons and, as we were heading towards Attichy, we immediately spotted two formations of seven or eight single-engined aircraft. We soon identified them as Ju 87 dive-bombers. Just as I was going to attack, four Messerschmitt Bf 109s passed in front of us at the same altitude and made as though to engage us in a turning fight. Then they must have spotted our top cover, because they turned away. I seized the opportunity and dived on the Ju 87s, passing underneath and pulling up to attack as I climbed. I got in a good burst at one of them and he fell away, smoking. Thinking it might be a ruse, I followed him down, glancing behind me at intervals to make sure I was in no danger. The Stuka crashed in the northeast edge of the forest of Villers-Cotterets, his bombs exploding.

"I pulled up again and went after a second Junkers. He did everything to shake me off, and it took me three attempts before I got him in my sights. I fired and he went into a left-hand spiral, trailing smoke. Then he nosed down and crashed in the same forest as the first. At that moment I spotted a third Junkers, hedge-hopping down the Ourcq Valley. He was being chased by three Moranes, flying along the south bank at low level. I was over the opposite bank. I knew that, sooner or later, the Stuka would turn towards me in an effort to get away from the three Moranes. Sure enough, after a few moments I saw one of the Moranes break off and open fire on the Stuka from extreme range. He turned left, and I attacked him repeatedly all the way from the Ourcq to Soissons. The gunner soon ceased to return fire, and shortly afterwards the pilot jettisoned his bombs so as to be more manoeuvrable.

"At first, each time I attacked him, he defended himself by turning, but then he opened his throttle and made a run for it, flat out in a straight line. I saw my incendiary bullets hitting his aircraft, and those that missed bouncing off the ground. Bits of metal started flying off him, some large. Finally, he just seemed to wobble along through the air, and I had the impression that the pilot was wounded. I had used up all my ammo on him but he still flew, and stubbornly refused to catch fire. I had no choice but to break off. I estimate that I must have hit him about 50 times."

In fact, the wreckage of the Ju 87 was found later and the kill was credited to Williame, who had already destroyed three other enemy aircraft that day. The French fighter pilots quickly learnt to be wary of the Stukas, which were manoeuvrable and would often fight back when cornered. One pilot who had this experience was Lieutenant Marcel Rouquette of GC I/5, who on 8 June was at the controls of a Hawk. Nine of the aircraft had left their base at St Dizier and flown to Evreux to reinforce a sister unit, GC I/4, which had been almost wiped out by the bitter fighting on the Somme front. Rouquette described what happened: "In the afternoon we were ordered to patrol the lower Seine. As we arrived in our sector we sighted a mass of Stukas, preparing to attack. We got in amongst the second wave and I latched on to a Stuka, which led me in a memorable steeplechase over the Normandy apple orchards. He was coughing smoke, and I sensed that he had just about had it. Then, out of the corner of my eye, I saw a second Stuka turning steeply towards me, attacking from three-quarters astern. I turned to meet him and fired a burst. To my amazement, he went down and blew up. I must have killed the pilot."

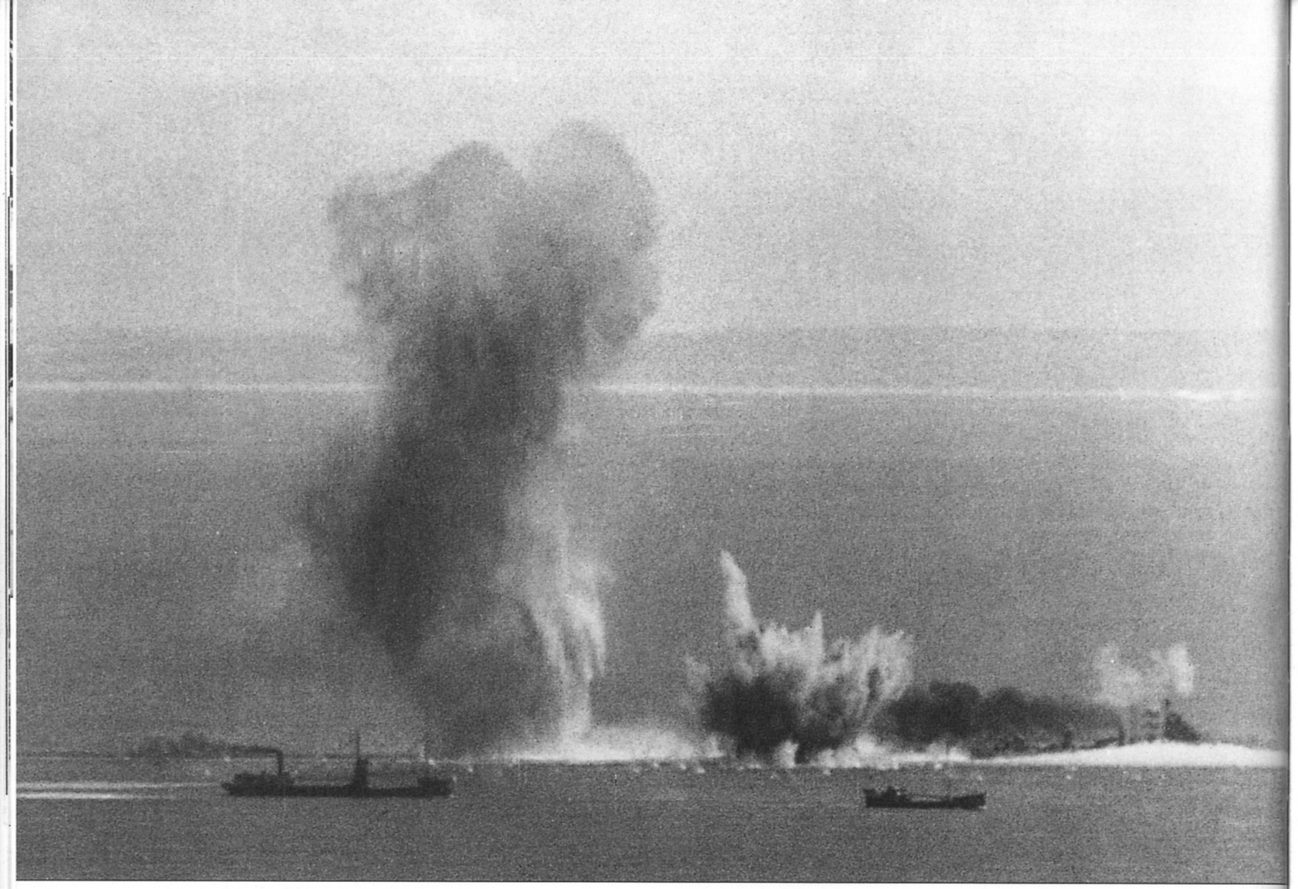
By nightfall on 13 June, the French forces in the west – the Seventh and Tenth Armies and the Army of Paris, the latter formed originally to defend the capital to the last – were in full retreat. The next day, German forces entered Paris, and on the 22nd an armistice brought an end to one of the fastest and most devastating campaigns in the history of warfare. There has always been some dispute over the actual losses suffered by the Luftwaffe in the Battle of France. However, from 21 to 31 May 1940, 727 German airmen were reported killed, wounded or missing; and at the time of the armistice 701 were held prisoner in France. According to documents seized by the Allies after the war, material losses for the months of May and June amounted to 1469 combat aircraft of all types. The total included 635 medium bombers (He 111, Do 17 and Ju 88) and 147 tactical support aircraft (Hs 123 and Ju 87). No precise breakdown by aircraft type was given.

The Stuka in The Battle of Britain

Hopelessly outclassed and outgunned by the Spitfires and Hurricanes of the Royal Air Force, the Stuka suffered its first setback over Britain.

With France conquered, Hitler could now turn his forces on Germany's sole remaining enemy: Great Britain, which was protected from the formidable German Army by the waters of the English Channel. On 16 July 1940, Hitler issued a directive ordering the preparation and, if necessary, the execution of a plan for the invasion of Great Britain. An amphibious invasion of Britain, codenamed Sealion, would only be possible, given Britain's large navy, if Germany could establish control of the air in the battle zone. In his Directive No 17 Hitler stated: "In order to establish the necessary conditions for the final conquest of England ... to overpower the English air force with

Left: Ready to rain down destruction across the English Channel, a line of Stukas stands ready on a French airfield.



all the forces at its command, in the shortest possible time ... primarily against flying units, their ground installations, and their supply organizations, also against their aircraft industry, including that manufacturing anti-aircraft equipment ... in view of our own forthcoming operations ... I reserve to myself, the right to decide on terror attacks as measures of reprisal. The intensification of the air war may begin on or after 5 August. The exact time is to be decided by the air force after the completion of preparations and in the light of the weather."

Order of battle

For the Battle of Britain, the Luftwaffe amassed a force that included 336 Ju 87s, of which about 280 were operational. The Stukas were divided among the following units: IV(St)/LG 1 with Ju 87B-2s; I to III/St.G 1 with Ju 87B-2s and R-1s; I to III/St.G 2 with Ju 87B-2s; I/St.G 3 with Ju 87B-2s; and I to III/St.G 77

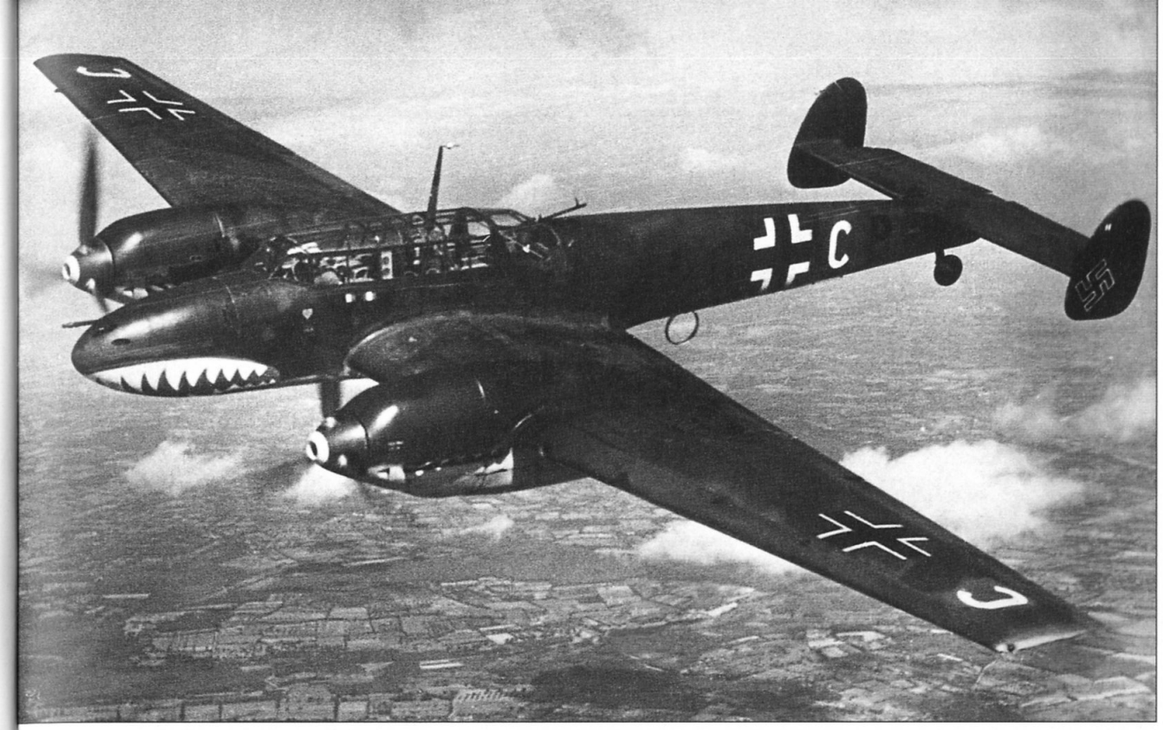
Above: Allied shipping comes under attack from Luftwaffe bombers, possible Stukas, somewhere off the coast of England in July 1940.

with Ju 87B-2s. The Luftwaffe attacked a Channel convoy in strength for the first time on 4 July 1940. The convoy, codenamed OA178, consisted of 14 heavily laden merchantmen outward-bound from the Thames across the Atlantic. It passed Dover, and was off Portland when it was hit by two Stukagruppen of St.G 2 at about 13:00 hours. In the next few minutes, the Stukas bombed and sank four freighters, the *Britsum* (5340 tonnes/5255 tons), the *Dallas City* (5031 tonnes/4952 tons), the *Deucalion* (1825 tonnes/1796 tons) and the *Kolga* (3582 tonnes/3526 tons). Six more ships were damaged. That night, the survivors were attacked by S-boats, which torpedoed and sank the *Elmcrest* (4412 tonnes/4343 tons); the *British Corporal* (7083 tonnes/6972 tons) and the *Hartlepool* (5588 tonnes/5500 tons) were damaged.

Above: Destroying Britain's naval assets, including ports such as Portland Harbour (shown above), was another aim of the Luftwaffe's bomber forces.

In a separate attack that afternoon, 33 Ju 87s of III/St.G 51, led by Major von Klitzing, had dive-bombed Portland harbour, where they sank the tug *Silverdial* and the anti-aircraft ship HMS *Foylebank*, as well as damaging the freighters *East Wales* (4428 tonnes/4358 tons), *William Wilberforce* (5084 tonnes/5004 tons) and *City of Melbourne*. The loss of life was considerable, particularly on *Foylebank*, which was hit by 22 bombs in 8 minutes and lost 176 of her 298-strong crew. One of *Foylebank*'s gunners, Leading Seaman John F. Mantle, was awarded a posthumous Victoria Cross for remaining at his post and continuing to fight despite being mortally wounded. One Stuka was shot down and a second returned to base badly damaged.

On 9 July, III/St.G 51 was renumbered II/St.G 1. That day, Portland was again attacked, this time by 27 Stukas of I/St.G 77 from Caen, operating under a strong fighter escort. One Ju 87 was shot down by a Spitfire. There was more fierce fighting over the Channel on 10 July, when the Luftwaffe lost 15 aircraft to the Royal Air Force's (RAF's) 6. The following day, the Portland area was heavily bombed by the Stukas of III/St.G 2, escorted by Bf 110s of 9/ZG 76. Two Stukas were shot down, and the inferiority of their escorting fighters was demonstrated in dramatic fashion when four were brought down by the RAF. Two crashed off Portland and one off the Ney Breakwater, while the fourth crash-landed at Grange Heath near Lulworth after being attacked by pilots of Nos 238, 87 and 601 Squadrons, in that order. Elsewhere, a convoy off Dover was attacked by Stukas of IV/(Stuka)/LG 1, which suffered one aircraft destroyed and another damaged.



Left: A Stuka pilot hands his rear gunner his weapon just prior to a sortie over Britain in 1940.

Above: The Messerschmitt Me 110 acted as an escort to the Stuka during the Battle of Britain.

Right: Reichsmarschall Hermann Göring (right) observes the aerial battle over Dover from the safety of northern France.

The Hurricanes of No 56 Squadron from RAF North Weald claimed a major success on 13 July when they intercepted a force of Ju 87s of II/St.G 1 and their fighter escort (the Bf 110s of LG 1) over Portland. The Hurricane pilots claimed the destruction of seven Stukas; in fact, all the enemy dive-bombers returned to base except two, which made forced landings in France after suffering damage in combat with fighters. One Stuka crash-landed on the beach at Cap Gris-Nez after being attacked by aircraft of No 56 Squadron, and the other made a forced landing at Noorfontes after an engagement with Pilot Officer Brooker, also of No 56 Squadron. One of the Bf 110 escorts was shot down and three suffered heavy damage – but No 56

Squadron lost two Hurricanes, while No 238 Squadron lost one.

Air Chief Marshal Sir Hugh Dowding, Fighter Command's C-in-C, was anxious to conserve his fighter strength and committed his aircraft to convoy protection work in relatively small numbers. Fighter cover was increased only when a convoy reached the perilous waters of the Dover Straits, where the most hectic battles took place. On 14 July, II/LG 1 lost a Stuka, which was shot down by Yellow Section of No 615 Squadron off Dover Harbour. The entry dated 20 July 1940 in the War Diary of No 32 Squadron, operating out of Biggin Hill, is fairly typical of an 11 Group unit during this period: "Convoy escort, 10 miles east of Dover. At 17:58 hours, with 610 Squadron, intercepted a raid on the convoy by about 50 Ju 87s and Messerschmitt Bf 110s, escorted by Messerschmitt Bf 109Es. Led by S/L Worrall, the Squadron shot down six of the enemy (three Me 110s, two Me 109s and one Ju 87) and damaged four others (all Me 109s). One Hurricane was lost but the pilot, F/Lt Bulmer, is reported to have baled out near North Foreland. Sergeant Higgins was slightly wounded in the face by splinters from bullets striking his protecting armour."

Luftwaffe tactics

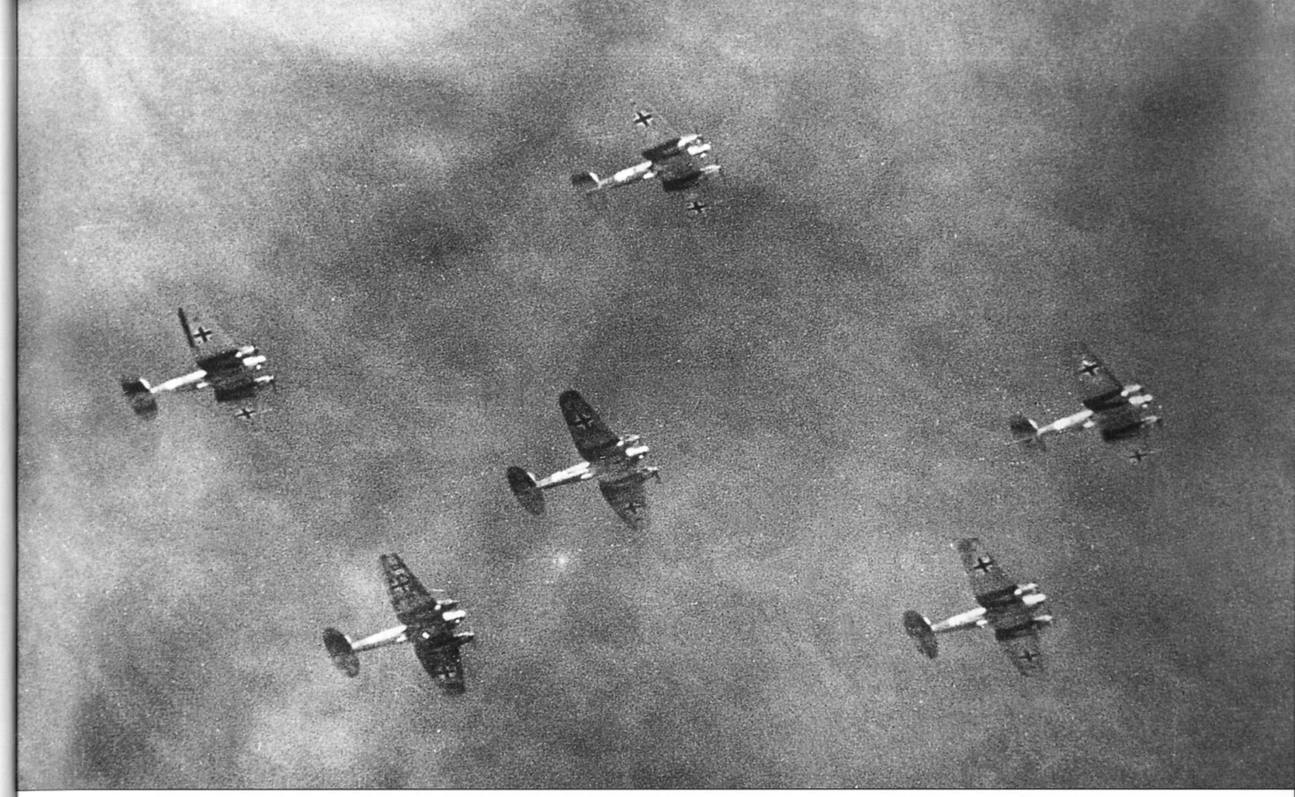
The Stukas involved in this air battle all belonged to II/St.G 1 (the former III/St.G 51). In fact, none was shot down, although four were damaged: of these, two had to crash-land in France. However, no Bf 110s were lost in air combat on 20 July; and although seven Bf 109s failed to return, none was attributed to any pilot of No 32 Squadron. Flight Lieutenant Bulmer was actually a Royal Navy sub-lieutenant, attached to the RAF, and he was the victim of Flying Officer Josef "Pips" Priller of II/JG 51. His body was never found.

On 25 July, the Luftwaffe adopted a change of tactics, sending out strong fighter sweeps to draw the RAF fighters into battle before launching its bomber attacks. As a consequence, 60 Ju 87s of II/St.G 1 (Captain Paul-Werner Hozzel) and IV/LG 1 (Captain von Brauchitsch) were able to bomb Channel Convoy CW8 while the fighters of No 11 Group were on the ground refuelling. Five of its twenty-one ships were sunk, and seven more damaged, including two escorting destroyers. Some fighters did manage to intercept, and accounted for two Ju 87s of II/St.G 1. In a separate incident, a Stuka of III/St.G 1 was shot down off Cherbourg after a cross-Channel chase, and another damaged. The Stukas suffered further combat losses on 29 July when RAF fighters shot down two Ju 87s of II/LG 1 and another belonging to II St.G 1 off Dover. Two other Stukas of the latter unit were damaged.

Stuka attacks against convoys

In four weeks of operations over the English Channel, the Luftwaffe had sunk 40,640 tonnes (40,000 tons) of British shipping, including three destroyers, and the Stukas had been responsible for most of the damage. Combat losses during the month's air fighting were: Luftwaffe 190, and RAF Fighter Command 77 (46 of these were Hurricanes, which had borne the brunt of the fighting and would continue to do so). Fifty RAF pilots were killed or missing and, with German preparations for the invasion of England clearly under way, the loss was serious. It was already apparent that such a rate of attrition would be extremely hard, if not impossible, to make good.

There followed a comparative lull lasting a week. Then, on 8 August, Hurricanes were at the forefront of a furious air battle that developed when large formations of Ju 87s, under strong fighter escort, attacked a 25-ship convoy codenamed Peewit off the Isle of Wight. One of the Hurricane squadrons involved was No 145 from Westhampnett, led by Squadron Leader J.R.A. Peel. The RAF pilots were about to engage a Stuka formation when they were attacked by Bf 109s and forced on the defensive. Two of the squadron's Hurricanes, one of them Peel's, were shot down; the CO was rescued from the sea off Boulogne. That day's fighting cost the RAF 15 Hurricanes and Spitfires against 21 enemy aircraft destroyed; it was the biggest loss sustained by Fighter Command since the offensive began.



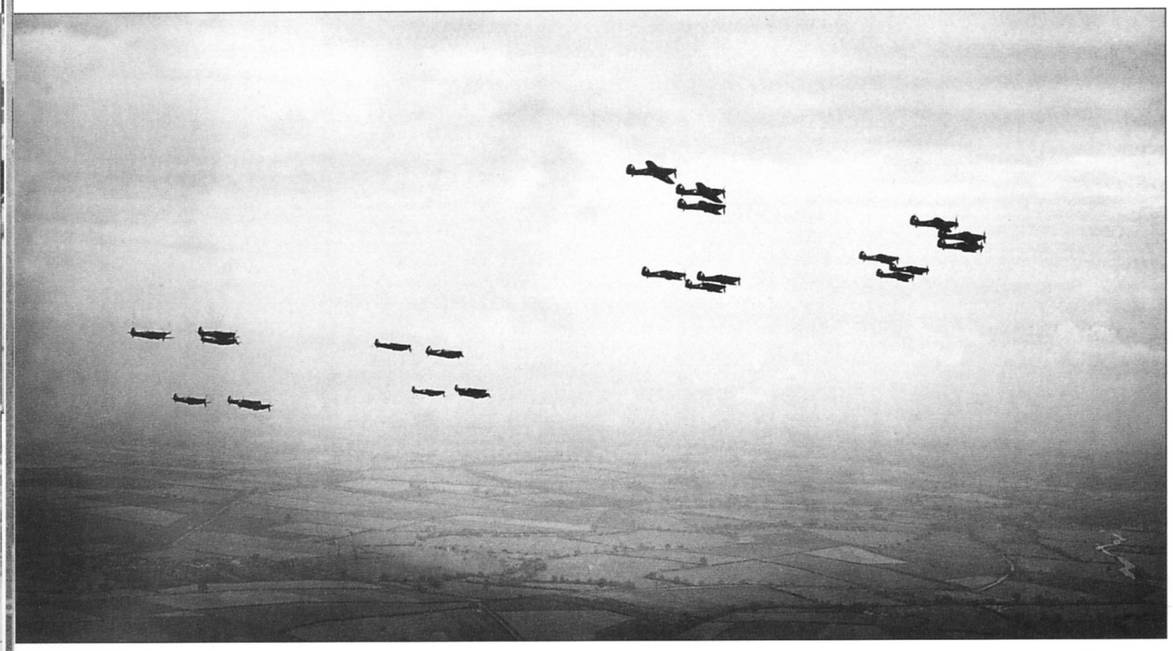
Above: German Heinkel He 111 medium bombers roar overhead on their way to bomb airfields during the Battle of Britain. Each aircraft was capable of carrying 2000kg (4410lb) of bombs up to a range of 1200km (745 miles).

The RAF's losses for 8 August included a number of aircraft destroyed in air actions over Dover and the Thames Estuary, when six squadrons of Hurricanes and two of Spitfires intercepted two heavy raids carried out under strong fighter escort. Six Hurricanes were lost in these battles, the others claiming six enemy aircraft. The losses of the Stukageschwader for 8 August were severe, eight aircraft being shot down into the Channel by RAF fighters. Eleven more were damaged, some of which were beyond repair, and in most cases their crews were wounded. The Stuka units involved were II/St.G 1 (one damaged), II/St.G 1 (one damaged), 9/St.G 1 (two destroyed), I/St.G 2 (one damaged), III/St.G 2 (one damaged), Stab I/St.G 3 (one destroyed), I/St.G 3 (two damaged), II/St.G III (two destroyed), Stab II/St.G 77 (one destroyed), II/St.G 77 (five damaged) and IV/St.G 77 (two destroyed).

One of St.G 77's pilots gave an interview to the German press following his involvement in these August operations, and his narrative provided some interesting insights on Stuka tactics against enemy fighters:

"The coast is getting nearer, to the left, below us, the Isle of Wight and we also see already 10 or 12 ships. They, as they turn spot us, try somehow to avoid out attacks by zigzagging turns. We fly steadily eastward towards them.

"'Puma One – to all Pumas – Attack!' We are above the convoy, it seems to be all smashed ships, coasters. Our 1. Staffel has already started to attack. Now the formations pull apart. Each one of them chooses a ship that has not yet been hit by one of the other squadrons. Our Staffelkapitän's formation starts its attack dive, near to the coast. But what is this? Four aircraft? I cannot believe my eyes, there is also a third formation, which attacks from the left, the same picture. At the same instant I hear, 'Puma – Alert. Enemy fighter diving from above.' When we are diving and banking vertically the English fighters have virtually no chance to shoot our Stukas. So they always

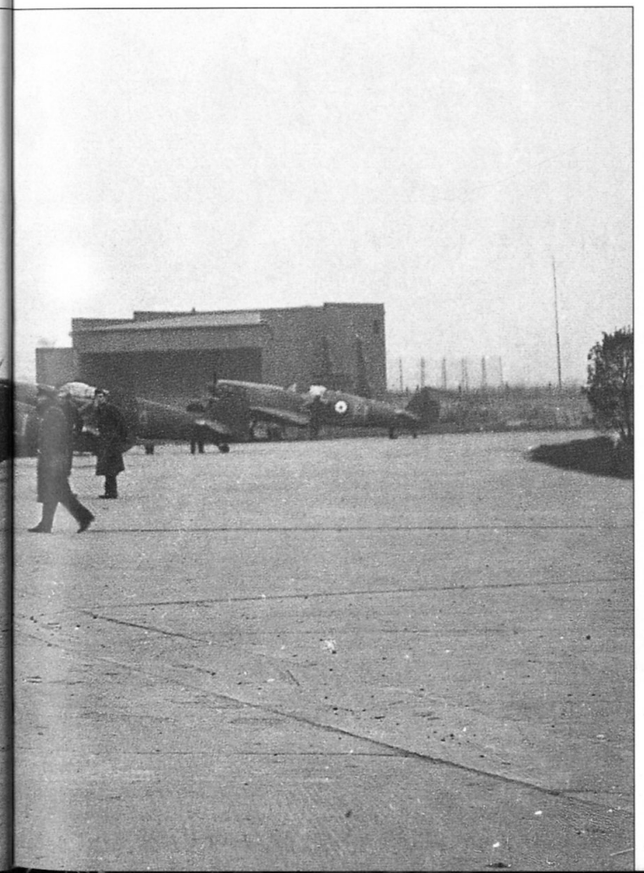


tried to intercept us earlier or catch us later and, on account of them being so much faster than us, we form up for mutual protection.

"Before I commence my dive I make sure by asking my radio operator if everything is clear behind us. I receive the reply, 'All clear'. Then we dive down without braking as in our perilous position we need speed to get back into our unit formation again. My bombs land close alongside the ship, my left-hand Kettenhund aircraft also scores a near-miss by a very small margin, but the third aircraft of my formation hits the ship square amidships with his bombs. Within seconds a huge flame shoots up from the ship and a large cloud of smoke bellows out of her insides.

Left: Dawn patrol. A squadron of Hurricane fighters in the grey light of the early morning during the Battle of Britain.

Below: Spitfires at a British Fighter Command air station in Kent. Their main objective was the defence of London.



"Now the English defenders are right on top of us. Spitfires, Hurricanes ... Only weaving helps if you want to escape the eight machine guns of the English fighters. Our radio operators shoot whenever their guns will bear. Again and again the English attack from astern. Again and again I feel bullets striking my aircraft but I don't think the engine has been hit, the motor is quiet and smooth.

"We land at our base. Unbelievably all the aircraft from our squadron have returned. Some had up to 40 bullet holes in their fuselages and wings, but all landed safely despite this. We praise the sturdiness of the Stuka."

A deadly foe

Some RAF fighter pilots were learning, as their French counterparts had done a couple of months earlier, that the Stuka could be a dangerous opponent. One of them was Flight Lieutenant Tony Miller, who wrote: "In a dogfight, the sky was speckled with aeroplanes. Everybody was manoeuvring for position. People were upside down and going in all directions. I was chasing a Ju 87 one time when my special angel tapped me on the shoulder and whispered, 'My boy, look in your mirror'. I looked into the mirror and it was entirely occupied by another Ju 87. Gull wings. Couldn't mistake it. He was right behind me. I did the smartest diving turn I've ever done. There was so much 'G' on me that my seat collapsed. I sort of went down into the bottom of the cockpit. I even blacked out for a few seconds. He actually put a bullet through one of my wings. I found out about it afterwards."

The Stukas were in action again on 11 August, IV/LG 1 and II/St.G 1 each losing an aircraft in combat with fighters over the Thames Estuary. The following day, the Luftwaffe began the next phase of its offensive, switching the weight of its attacks to the coastal radar stations and the forward airfields of Manston, Lympne and Hawkinge. That morning, 21 Bf 109s and Bf 110s took off from Calais-Marck Airfield and set course over the Channel, flying at low level. They belonged to Erprobungsgruppe (Experimental Group) 210, whose

aircraft had been fitted with racks enabling them to carry 227kg (500lb) and 454kg (1000lb) bombs. The previous day, the Gruppe had tried out the fighter-bomber concept for the first time when 24 of its Messerschmitts had dive-bombed Convoy Booty off the Harwich-Clacton coastline, setting two freighters alight. The German aircraft had been intercepted by the Spitfires of No 74 Squadron and two had been damaged, but all had returned to base.

In some Luftwaffe circles, it was considered that units such as Erprobungsgruppe 210, armed with fast aircraft that could defend themselves adequately once their bomb load had been expended, would make ideal successors to the slower, more vulnerable Stukas. Whether they could achieve the same degree of accuracy was something that had to be put to the test; and, on this morning of 12 August, the Messerschmitts' targets needed to be hit very precisely indeed. They were the radar stations at Dover, Pevensey and Rye. At 11:00 hours, Bf 110s dropped eight 454kg (1000lb) bombs on the Pevensey station, while the remainder of the Gruppe attacked the masts at Rye and Dover. Although the bombs caused some damage, all three stations were operational again within three hours.

Success at Ventnor

It was a different story at Ventnor on the Isle of Wight, where the radar station was attacked 30 minutes later by 15 Ju 88 dive-bombers of KG 51 and KG 54. Their bombing was extremely accurate and the station was damaged beyond repair. To cover up the dangerous gap created by the loss of the Ventnor station, the British transmitted a false signal on the wrecked transmitter's frequency, leading the German listening posts on the other side of the Channel to believe that Ventnor was still fully operational. In fact, it was only after 11 days

Right: In one of the Operations Rooms of RAF Fighter Command, many feet below ground, senior officers in the gallery watch the movements of aircraft over the map below, while female plotters constantly receive information from detecting posts.

of non-stop work that another radar station was brought into action on the island.

While Ventnor was under attack, a further 75 Ju 88s dive-bombed Portsmouth Harbour, Portland and industrial targets in Portsmouth and Southampton, including the Spitfire production plant at Woolston. The Ju 88s made their attack through the balloon barrage and intense anti-aircraft fire put up by shore batteries and ships in the harbour. Their bombs caused substantial damage, especially in Portsmouth. But the attack cost the Luftwaffe dearly: 10 Ju 88s failed to return, falling victim either to the anti-aircraft barrage, the Spitfires of No 152 Squadron or the Hurricanes of No 213. Five Bf 110s and a Bf 109, escorting the bombers, were also destroyed.

More Stuka attacks on the English coast

At noon, the Chain Home Low (CHL) radar station at Foreness, untouched by the morning's attacks, reported 50-plus hostiles off North Foreland. They were the Stukas of IV/LG 1, now commanded by Captain Erwin Röder, who had taken over from Bernd von Brauchitsch on 6 August. The Stuka unit was searching for two Channel convoys, Agent and Arena. Convoy Arena was successfully attacked, several vessels being sunk or damaged, but the attack on Agent was broken up by Hurricanes, which lost four of their number. All the Ju 87s returned to base.

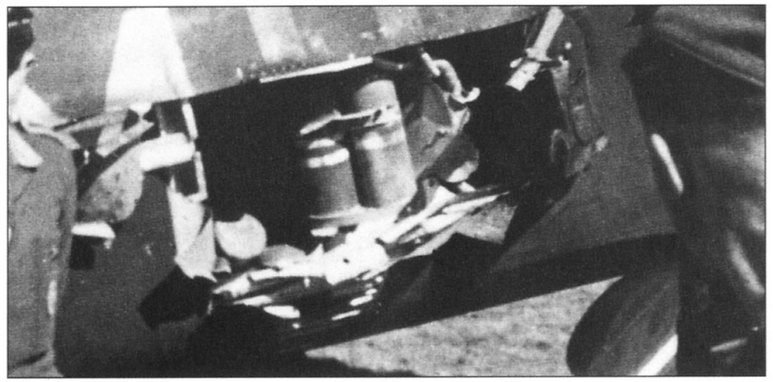
On 13 August, the Luftwaffe launched Adler Angriff (Eagle Attack), the start of the air offensive proper against the British Isles. The plan was substantially disrupted by bad weather, and the main air attacks did not develop until late morning. The Stukageschwader became involved in the middle of the afternoon, when 52 Ju 87s took off from their base at Flers to attack airfields in the Portland area. They were escorted by the Bf 109s of JG 27. However, the Stuka crews found that southern England was covered by a blanket of cloud, so they circled over the coast in search of a target. Within minutes, their fighter escort was being hotly engaged by a strong force of Hurricanes from Exeter and Middle Wallop, while 15 Spitfires of No 609 Squadron attacked the dive-bombers. Five Stukas, one belonging to II/St.G 2 and the rest to 5/St.G 2, were quickly shot down; the remainder jettisoned their bombs and fled home. The pilot and observer of the II/St.G 2 aircraft were rescued by a German E-boat; all the others were killed with the exception of Sergeant Schulz of 5/St.G 2, who was fished out of the Channel.

The next wave of bombers, approaching the coast a few minutes later, ran into the hornets' nest stirred up by St.G 2. They were the Ju 88s of KG 54, and they used the cloud cover to good advantage. One formation dropped its bombs on Southampton Harbour, while others dived on the airfield at Middle Wallop, one of Fighter Command's vital sector stations. The bombs caused only light damage, but heavy damage was inflicted by another Ju 88 formation at Andover, a few miles away. Three Ju 88s were shot down, and eleven returned with battle damage, some making crash-landings.

The attack on Detling

Meanwhile, over Kent, No 11 Group, Fighter Command, was having a hard time. General Bruno Loerzer's II Fliegerkorps had sent in both its Stukageschwader, IV/LG 1 and St.G 1, preceded by the Bf 109s of JG 26. The Messerschmitts were able to beat off a flight of Spitfires from Kenley, allowing the 86 Stukas to proceed unmolested to their target, the airfield of Detling near Maidstone. Fifteen minutes later, the airfield lay in ruins: the hangars were burning, the operations room was wrecked, the station commander was dead and 20 British aircraft were destroyed. It was a brilliant attack, and in terms of execution a highly successful one. But there were no RAF fighters at Detling, a Coastal Command station. Nevertheless, among the aircraft destroyed were eight Blenheim bombers of No 53 Squadron, recently deployed to Detling to carry out attacks on the enemy held Channel ports. All the Stukas returned safely to

Left: Purfleet oil refinery on the banks of the River Thames comes under attack from Luftwaffe bombers.



Left: When the Spitfires and Hurricanes came into contact with the Ju 87, the eight wing-mounted machine guns could rip holes in the German dive-bomber.

Right: The vapour trails of dog-fighting aircraft create a chaotic kaleidoscope in the skies over England.

base. At the close of the day, the Luftwaffe had flown 485 sorties, mostly against RAF airfields: three had been badly damaged, but none was a fighter base. The cost to the Luftwaffe was 34 aircraft, the RAF losing 13 aircraft and 7 pilots.

On 14 August, operations against the British Isles were hampered by bad weather, but attacks by small numbers of aircraft on Manston, Dover, Middle Wallop and Sealand cost the Luftwaffe 11 bombers and six fighters, including a Stuka of LG 1. The RAF lost five Hurricanes and a Spitfire, together with three Blenheim FIs of No 600 Squadron, destroyed on the ground at Manston in an attack by Bf 110s of Erprobungsgruppe 210.

The Battle of Britain reaches its height

At 10:30 hours on 15 August, patches of blue began to show through the grey overcast sky that had stretched from horizon to horizon since dawn; by 11:00 hours, the clouds had broken up completely. A few minutes later, 40 Stukas of II Fliegerkorps, escorted by a similar number of Bf 109s, crossed the French coast at Cap Blanc Nez. Their targets were the airfields of Lympne and Hawkinge. As they approached the English coast, they were engaged by the Spitfires of No 64 Squadron and the Hurricanes of No 501, but these were beaten off by the Messerschmitts. The Stukas caused severe damage at Lympne, putting the airfield out of action for two days. The damage was less severe at Hawkinge, where a hangar was hit and a barrack block destroyed.

This was the hardest day of the Battle of Britain. As well as launching a maximum-effort assault on southern England, the Luftwaffe also attacked targets in the north, where the bombers suffered heavily. In the south, the afternoon saw heavy attacks by the Ju 87s and Ju 88s of LG 1 and by the Ju 87s of St.G 1 and St.G 2. At 16:45 hours, the Ju 88s of LG 1 began taking off from Orleans, followed 15 minutes later by the Ju 87s of St.G 1 from Cherbourg. The bombers rendezvoused with the Bf 109s of JG 26 and JG 53 and the Bf 110s of ZG 2, and the whole armada of more than 200 aircraft set course for the English coast. The Germans, however, had thrown away their tactical advantage. The time elapsing between the raids enabled RAF Fighter Command to take adequate countermeasures, and 14 fighter squadrons totalling 170 aircraft were sent up to meet the attackers. The Spitfires and Hurricanes met the bombers over the coast and concentrated on the Ju 88s, destroying nine of them in a matter of minutes and breaking up the enemy formation. Of the 15 aircraft of II/LG 1, only 3 managed to break through to their target – the Fleet Air Arm base at Worthy Down, northeast of Southampton. The others jettisoned their bombs and turned for home, under continual attack. Five Ju 88s of this wave were shot down.

Fortune favoured I/LG 1: its 12 Ju 88s had been the first to cross the coast, and had managed to achieve an element of surprise. They dived on Middle Wallop, just a fraction too late to catch two fighter squadrons on the ground. The last Spitfires of No 609 Squadron were just taking off when the bombs exploded among the hangars. It was the third raid on Middle Wallop in three days. The fact that the Ju 88s bore the brunt of the RAF fighter attacks probably saved the vulnerable Ju 87s from a severe mauling. Even so, six were shot down. IV/LG 1 lost two aircraft: one was shot down into the Channel near Folkestone, and its wounded pilot captured; the other, attempting to escape at low level and harried by RAF fighters, crashed into high-tension cables, killing both crew members. One of the other Stuka casualties belonged to St.G 1; the remainder to St.G 2.

As night fell on 15 August, both sides retired to assess their losses and victories. The Luftwaffe had flown 1270 fighter and 250 bomber sorties during the day, and had lost 71 aircraft. The RAF's loss was 31. On 16 August, the Luftwaffe returned in force and struck at Brize Norton, Manston, West Malling, Tangmere, Gosport, Lee-on-Solent, Farnborough and Harwell. Some 46 training aircraft were destroyed at Brize Norton, and the radar station at Ventnor was bombed once more. In the afternoon, the weather closed in again; although Luftflotte 2 sent out a force of bombers to attack the fighter airfields of Debden, Duxford, North Weald and Hornchurch, the raiders were forced to turn back, unable to find their targets through a thick blanket of cloud.

Despite the sporadic nature of the fighting, air combats during the day cost the RAF 22 aircraft and the Luftwaffe 44. Nine of the latter were Stukas, with a further six damaged. Three of I/St.G 2's Stuka crews survived damaging attacks by RAF fighters; they regained their bases, their crews miraculously unhurt. II/St.G 2 lost four aircraft, the badly wounded crew of one of them being captured. Three aircraft of III/St.G 2 made it back to base with wounded crews; and VII/St.G 2 lost four aircraft, all their crew members being killed.

Anti-aircraft fire was responsible for damaging a Stuka of I/St.G 3, which regained its base with a wounded crew.

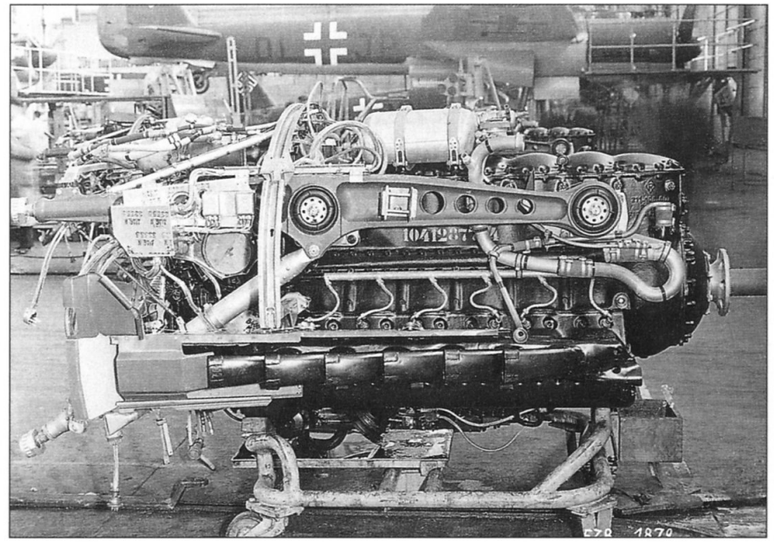
For the Stukas, there was much worse to come. On 18 August, following another spell of bad weather, the Germans launched a series of heavy attacks on the sector stations of Kenley and Biggin Hill. These were carried out mainly by the Do 17s of KG 76 which, despite their fighter escort, suffered heavily, losing six aircraft with several more damaged. Two Ju 88s operating with KG 76, which was in the process of re-equipping with the Junkers aircraft, were also destroyed. The most fearsome German loss of the day, however, was sustained by the Ju 87s of St.G 77, which set out to attack the airfields at Ford, Gosport and Thorney Island, together with the radar site at Poley on the south coast. They were intercepted by the Hurricanes of No 43 Squadron and the Spitfires of No 152, which destroyed no fewer than 18 of the German dive-bombers and damaged 5 more. One of the aircraft belonged to Stab I/St.G 77; its pilot was Captain Meisel, the group commander since 14 July 1940. He was killed, together with his rear gunner, Gefreiter Jakob.

Disaster for St.G 77

I/St.G 77 lost one aircraft destroyed, shot down by fighters 10km (6 miles) off Portsmouth; both crew members were listed as missing. Four more aircraft of I/St.G 77 made it back to France with wounded crews; one crashed while attempting to land on the beach north of Bayeux, killing one crew member. II/St.G 77 lost eight aircraft to fighter attacks, four crew members being captured; while III/St.G 77 also lost eight, some of which were destroyed while attempting to land. This brought the total Ju 87 combat losses since the air offensive began in July to 59 aircraft, with a further 33 damaged. It was too high a price to pay. After the

Left: A Ju 87 Stuka from St.G 2 "Immelmann" on its way to a bombing mission over London. Stukas were very vulnerable to faster and more heavily armed British fighters.

Right: Stuka powerplant – a close-up shot of the Junkers Jumo 211 engine.



debacle of 18 August 1940, with the exception of some sporadic attacks on Channel convoys later in the year, the Ju 87 played no further part in the Battle of Britain.

However, losses apart, the withdrawal of the Ju 87 from the Battle of Britain has never been satisfactorily explained by German historians. Certainly, the loss of about 20 percent of the deployed Stuka force in a period of 10 days or so was very heavy, and in the face of determined fighter opposition the Ju 87 had yet again shown itself to be vulnerable. However, the Stuka had achieved great success against shipping, airfields and other precision targets, the type's *raison d'être*. Whether it was withdrawn in order to conserve the remaining aircraft for operations in support of the planned German invasion of England, or whether Luftwaffe C-in-C Hermann Göring ordered its withdrawal because the loss of so many experienced crews was bad for morale, will never be known. In addition, the invasion of Russia was also on the horizon, in which the Stuka would played a central role, thus it made sense to preserve Ju 87 numbers. But if further losses had been accepted, and the remaining Stuka force committed against the RAF's airfields during the fortnight that followed the disaster of 18 August, the outcome of the Battle of Britain might have been very different.

The Battle of Britain had highlighted a number of shortcomings with the B version of the Ju 87. The lack of armour protection caused immediate problems. One way round this was to strip captured French aircraft of their armour plating and attach it to individual Stukas. The manufacturer responded to aircrew appeals by introducing strengthened passive protection behind the pilot's seat and rear armour for the radio operator.

The B's fixed armament was also found wanting. The forward-firing armament of only two fixed MG 17 machine guns was not enough. Thus investigations were carried out on the feasibility of mounting two 20mm cannon in the wings. These proved successful and the machine guns were replaced by two MG 151/20 cannon.

The end of the Battle of Britain did not mean the end of Stuka operations over the English Channel. St.G 1 continued flying missions, albeit on a much smaller scale. A special command, consisting of selected crews of the first two Gruppen of St.G 1, mounted attacks against the south coast of England until mid-February 1941. Similarly, I/St.G 2 operated over the English Channel and the south coast of England.

Mediterranean Theatre: January–June 1941

After blasting the defenders of Poland and France, the Ju 87 was unleashed on the British forces in North Africa and the Mediterranean.

At the beginning of 1941, the situation in the Mediterranean had changed dramatically since the previous June when Italy had entered the war on the side of Germany. At that point, the Allies had enjoyed an overwhelming naval presence in the theatre, thanks to powerful British and French fleets. However, the French had been knocked out of the equation by the armistice, their naval forces mostly penned up in North African ports, where some had been reluctantly destroyed by the Royal Navy to prevent their possible seizure by the enemy. Then, in November 1940, an attack by the Royal Navy's carrier aircraft had crippled major surface units of the Italian navy at Taranto,

Left: A Ju 87 from III/St.G 2 set against the dramatic backdrop of a Balkan mountain range.

Above: Clouds of smoke and dust rise up over Malta after an Italian attack on the port of Valletta.

alleviating the immediate danger of an invasion of Malta – the island had been under constant attack by the Regia Aeronautica (Italian Air Force).

The possession of Malta was the key to victory in the Mediterranean, and keeping the island supplied involved a major ongoing effort on the part of the British. On 9 January 1941, a convoy of four big supply ships, escorted by the aircraft carrier HMS *Ark Royal* and the other warships of Force H (the Royal Navy taskforce based on Gibraltar), entered the narrows between Sicily and Tunis on its way to Malta and Piraeus. Operation Excess at first followed the pattern of earlier convoys. On the afternoon of the 9th, the usual formation of Italian SM79s appeared and bombed from high altitude without scoring any hits: two of the SM79s were intercepted by *Ark Royal*'s Fairey Fulmar fighters and shot down. As darkness fell, Force H turned back towards Gibraltar, leaving the cruiser HMS *Bonaventure* and the destroyers HMS *Jaguar*, HMS *Hereward*, HMS *Hasty* and HMS *Hero* to shepherd the convoy through the narrows under cover of night.

At dawn on the 10th, the transports were met by the ships of the Eastern Mediterranean Fleet (Force A), comprising the carrier HMS *Illustrious*, the battleships HMS *Warspite* and HMS *Valiant* and seven destroyers, 96km (60 miles) west of Malta. Admiral Cunningham's ships had already suffered: shortly before first light, the destroyer HMS *Gallant* had been badly damaged by a mine and had to be taken in tow by HMS *Mohawk*. Torpedo attacks by 10 SM79s were beaten off in the course of the morning, and the Italian motor torpedo boat (MTB) *Vega* was sunk by *Bonaventure*. Then *Illustrious*' radar detected another incoming formation of enemy aircraft, which soon afterwards was sighted approaching the warships at 3660m (12,000ft). Sailors who had fought in the waters off Norway and Dunkirk recognized the enemy aircraft at once – they were Ju 87 dive-bombers.

The Stukas were the aircraft of I and II/St.G 2, led by Captain Paul-Werner Hozzel and Major Walter Enneccerus. Hozzel, who had been in command of II/St.G 2 since June 1939, had the distinction of being the first Stuka pilot to receive the Ritterkreuz (Knight's

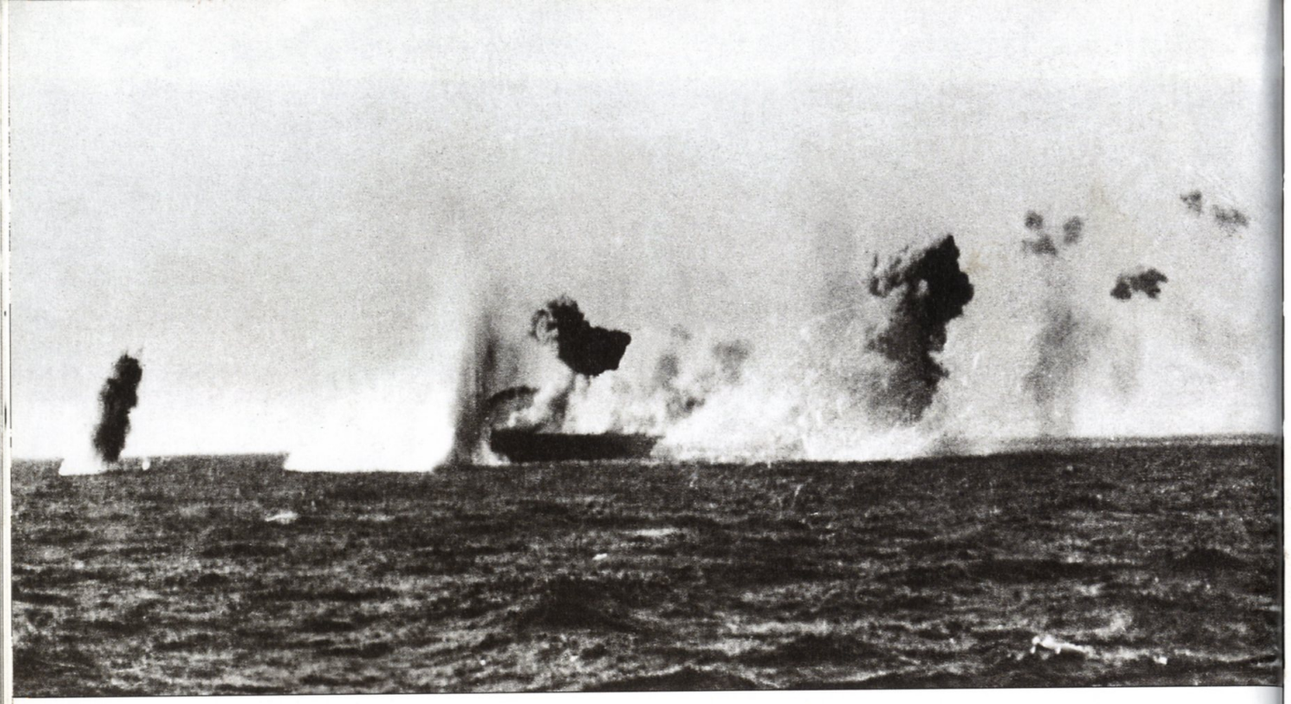
Above: An Italian Savoia-Marchetti SM79 over Malta during the Italian bombardment of the island in 1940.

Cross), awarded for sinking several Allied ships in the English Channel in May 1940. The dive-bombers had arrived at Trapani in Sicily some two weeks earlier, having begun the redeployment from their bases in France on 20 December. Between them they mustered 53 Stukas, to which were added 12 more from Stab/St.G 3. The Stukas now came under the command of X Fliegerkorps, which had simultaneously transferred its HQ to the Mediterranean theatre from Oslo. Commanded by General Hans Geisler, X Fliegerkorps, which had been formed in October 1939 as the 10th Fliegerdivision, established its HQ at Taormina, Sicily. Its chief of staff was Group Captain Martin Harlinghausen.

The presence of this powerful Luftwaffe formation in Sicily should not have come as a surprise: British Air Ministry intelligence, thanks to Ultra intercepts, had been aware since 4 January of X Fliegerkorps' move south; it was also aware of the formation's specialized anti-shipping role. The threat to the Mediterranean Fleet was clear, but there appears to have been an unfortunate breakdown in communication between the Air Ministry and the Admiralty, and the Stukas came as an unpleasant shock. Now, as they began their attack dive, it was clear that they had singled out *Illustrious* as their principal target.

"The Stukas peeled off into their dives"

Admiral Cunningham gave a description of a Stuka attack on the carrier: "We opened up with every AA gun we had as one by one the Stukas peeled off into their dives, concentrating the whole venom of their attack upon the *Illustrious*. At times she became almost completely hidden in a forest of great bomb splashes. One was too interested in this new form of dive-bombing attack really to be frightened, and there was no doubt we were watching complete experts. Formed roughly in a large circle over the fleet they peeled off one by one when reaching the attacking position. We could not but admire the skill and precision of it all. The attacks were pressed home to point-blank range,



Above: HMS *Illustrious* comes under Stuka attack in the Mediterranean, about 160km (100 miles) off Malta.

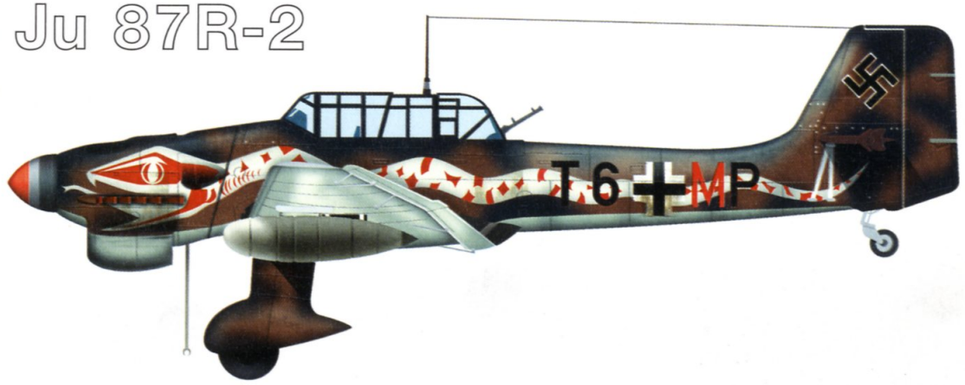
and as they pulled out of their dives some of them were seen to fly along the flight-deck of the *Illustrious* below the level of her funnel."

The attack on *Illustrious*

The first bomb tore through S1 pompom on the carrier's port side, reducing the weapon to twisted wreckage and killing two of its crew before passing through the platform and exploding in the sea. Another bomb exploded on S2 pompom and obliterated it, together with its crew. A third hit the after-well lift, on its way to the flight deck with a Fulmar on it; debris and burning fuel poured into the hangar below, which quickly became an inferno of blazing aircraft and exploding fuel tanks. Splinters struck the eight aft gun turrets, putting them all out of action. A fourth bomb crashed through the flight deck and ripped through the ship's side, exploding in the water; splinters punched holes through the hull, and the shock of the detonation caused more damage in the hangar. The fifth bomb punched through the flight deck and hangar deck and exploded in the wardroom flat, killing everyone there and sending a storm of fire raging through the neighbouring passages. A sixth plunged down the after-lift well and exploded in the compartment below, putting the steering-gear totally out of action.

Illustrious was terribly hurt, but her heavy armour had saved her. Slowly, the crew gained a measure of control and she turned towards Malta, shrouded in a pall of smoke from the fires that still raged, steering on her main engines as the stokers worked in dense, choking fumes and temperatures reaching 140 degrees as they strove to maintain steam. Two hours later, more Stukas attacked, this time from the newly equipped Regia Aeronautica's 237a Squadriglia. The carrier was hit by yet another bomb. She was now listing badly, but she remained afloat. As darkness fell, she limped into Valletta's Grand Harbour and stopped alongside the dockyard wall. During the weeks that followed, *Illustrious* sustained several more bomb hits as she underwent repairs, but she escaped crippling damage and by 23 January she had been made seaworthy enough to sail for Alexandria. From there, she later sailed for the US Navy shipyards at Norfolk, Virginia, where she underwent more permanent repairs before returning to active service.

Ju 87R-2



SPECIFICATIONS

Type: *long-range dive-bomber (St.G 2, 1941)*
Entered service: *1940*
Crew: *2*

Engine
Powerplant: *1 x Junkers Jumo 211Da*
Type: *12-cylinder inverted-vee*
Horsepower: *1200*

Dimensions
Wing span: *13.5m (44.9ft)*
Propellor diameter: *3.3m (10ft)*
Length: *11.1m (36.5ft)*
Height: *4.01m (13.2ft)*

Weights
Empty: *2750kg (6080lb)*
Loaded: *4350kg (9570lb)*

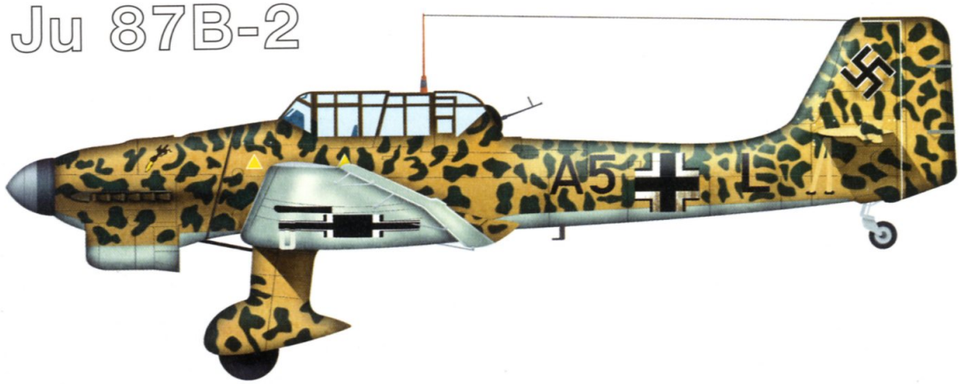
Performance
Maximum speed: *350kmh (218mph)*
Cruising speed: *310kmh (193mph)*
Range: *1200km (750 miles)*
Service ceiling: *8000m (26,250ft)*
Ceiling with maximum load: *5000m (16,500ft)*
Normal radius of operation: *750km (468 miles)*

Armament
3 x 7.92mm machine guns
1 x 500kg bomb

The Stukas' bombs also damaged the cruiser HMS *Perth* and a freighter. In addition to these casualties, Enneccerus bombed the cruiser *Southampton* on 10 January, damaging her so severely that she had to be scuttled the next day. With *Illustrious* out of action, Admiral Sir Andrew Cunningham, the C-in-C, British Mediterranean Fleet, was forced to restrict the operations of the Eastern Mediterranean Fleet for several weeks because of the lack of air cover. Until March, with the arrival of *Illustrious*' sister carrier HMS *Formidable*, the full burden of naval air operations in the Mediterranean rested on *Ark Royal*. The precious carrier could not be risked in operations to relieve Malta, which was under almost continual air attack by X Fliegerkorps' Stukas and Ju 88s during February; no further supplies reached the island until the last week in March, when a small convoy of four ships was sent through from Alexandria. Even then, two of the ships and their precious stores were damaged by bombs while unloading. The situation was critical, and was saved only when the Stuka units on Sicily were withdrawn to take part in the Balkans campaign, leaving the Italians to maintain the siege of Malta alone.

Being on the receiving end of a Stuka attack was terrifying. Jack Millington was in the British merchant

Ju 87B-2



SPECIFICATIONS

Type: *dive-bomber (St.G 1, 1941)*
Entered service: *1940*
Crew: *2*

Engine
Powerplant: *1 x Junkers Jumo 211Da*
Type: *12-cylinder inverted-vee*
Horsepower: *1200*

Dimensions
Wing span: *13.6m (44.9ft)*
Propellor diameter: *3.3m (10ft)*
Length: *11.1m (36.5ft)*
Height: *4.01m (13.2ft)*

Weights
Empty: *2750kg (6080lb)*
Loaded: *4250kg (9371lb)*

Performance
Maximum speed: *390kmh (242mph)*
Cruising speed: *336kmh (210mph)*
Range: *600km (373 miles)*
Service ceiling: *8000m (26,250ft)*
Ceiling with maximum load: *4730m (15,520ft)*
Normal radius of operation: *300km (187 miles)*

Armament
3 x 7.92mm machine guns
1 x 750kg bomb + 4 x 50kg bombs

service throughout World War II: "We had so many thousands of tonnes of ammunition aboard, and we were moved up to a place called Alexandretta, which is in the corner of Turkey. Now, at this particular point, we were to anchor there, we had Turks on board making sure nobody went too far ashore. The forces from the west, American and British and, of course, the Dominions, Australia, New Zealand and South Africa, forced the Germans at a place called Cape Bon off the coast of Tunisia. And this particular dinnertime, around five o'clock, we pushed through Cape Bon and by then they'd moved all the Germans out. At one particular point we had on the ship these parachute mines which were set up to avoid dive-bombers, so that if you had people coming down – these Stuka 87s used to come down almost vertically – all you had to do was get your sight on them and that was it (they used to tell you that at the gunnery courses). But it didn't work that way. You feel very, very scared. And at this particular point I was running on the bridge, and somebody went and pressed the safety. Now, the safety controlled all the anti-aircraft things that were set into position. There were grenade throwers and parachute mines and different things like this, but somebody had gone in there and pressed it. And of course, all the tops of the baskets that held the various wires that went up and

were supposed to do damage to the dive-bombers, were pulled out of their bases and the boxes went up, and I unfortunately was underneath. One hit me on my tin hat and I was out like a light. Somebody lifted me from the gun. I had a bit of a headache, but they took me down below.

"Now, we had one ship behind us, which hit a mine, and at the time she just kept on going right into the water and just disappeared in a few seconds. The other thing, of course, were the guys that should've been paid 10 times as much as anybody else. They were on the tankers. I've seen ships in the North Atlantic torpedoed, and of course they've had this high-grade aviation fluid and they've just gone up, one big explosion, and those that did actually live would come up in burning oil and in other things. On my first trip, I felt like I should've joined the air force or something or gone somewhere."

The arrival of X Fliegerkorps in Sicily did not mark the first appearance of the Ju 87 in the skies over Malta. The first Stuka sorties over the island had, in fact, been made by the Regia Aeronautica's 96th Gruppo in September 1940, the group having equipped

Above: General Erwin Rommel (in the foreground, second from left) inspects the Afrika Corps in Tripoli in 1941.

with Ju 87Bs the previous month to replace its unsuccessful SM85s. The first Stukas delivered to the Regia Aeronautica were a mixed batch of 50 Ju 87B-2s and Ju 87B-2trops; these were followed by another 50 Ju-87R-2s, all delivered before the end of 1940. Later, Italy also received 46 Ju 87D-2 and D-3 aircraft.

The Luftwaffe's appearance in Sicily appeared to indicate that the Germans were about to intervene in the Balkans and North Africa, giving impetus to British operations in the latter theatre – Italian forces under Marshal Graziani had been massing there for an invasion of Egypt. That dream was shattered in a brilliant British campaign that ended, in February 1941, with the utter destruction of the Italian Tenth Army. However, during that same month, units of the newly formed Deutsches Afrika Korps under General Erwin Rommel became established in the theatre. They were supported initially by a small force of about 100 aircraft, comprising the He 111 bombers of II/KG 26, the Bf 110s of ZG 26, and the Stukas of I/St.G 1. These

Above: Stukas of III/St.G 3 based in the Balkans await another bombing mission in the spring of 1941.

deployed to Ain-el-Gazala in Tripolitania with 30 aircraft, of which about 22 were serviceable at any given time. In March, the 38 Ju 87Rs of I/St.G 2 also arrived at Ain-el-Gazala from Trapani.

Logistical back-up

The logistics of deploying a Gruppe of Stukas was considerable. A single Staffel, for example, had a staff of 139 officers, NCOs and men, including 12 pilots who actually flew the machines and 12 radio operators/rear gunners. Important among the ground staff were 14 air weapons armourers, 3 radio mechanics, 18 aircraft mechanics and 24 truck drivers. A Staffel also required many spares to keep the unit functioning. The spare equipment stocked for a St.G 77 Staffel in the summer of 1942, for example, amounted to 175 separate items. These included 36 spades, 3 round tents, 4 small works cases for weapons equipment, 3 engine-changing block and tackles, 30 parachutes and 4 fast fuel pumps.

Rommel, with his experiences in command of the 7th Panzer Division in France still fresh, was under no illusions about the importance of airpower, especially during the period of Axis consolidation in North Africa. This is how he described it: "At about 13:00 hours [on 12 February 1941] I reported to General Gariboldi [Graziani's Chief of Staff] and put him in the picture concerning my mission. He showed little enthusiasm for the plan to establish a defence in the Sirte. With the help of a map, I explained to him the outline of my scheme for defending Tripolitania. Its main features were: not a step farther back, powerful Luftwaffe support, and every available man to be thrown in for the defence of the Sirte sector, including the first German contingents as soon as they landed. It was my belief that if the British could detect no opposition they would probably continue their advance, but if they saw that they were going to have to fight another battle they would not simply attack – which would have been their proper course – but would first wait to build up supplies. With the time

thus gained I hoped to build up our own strength until we were eventually strong enough to withstand the enemy attack."

The success of Rommel's plan depended to a great extent on Italian forces (weak, and armed with obsolete equipment) defending the Sirte area against a British attack until the Afrika Korps came ashore. "We could not expect these Italian formations to arrive at the front very quickly, which meant that the only force we had immediately available with which to hold up the enemy – apart from the weak Italian garrison at Sirte – was the German Luftwaffe. The Luftwaffe commander in Africa, General Fröhlich, was accordingly asked to undertake this task, after it had been impressed on him how vitally important it was for the future of the African theatre. The commander of the Luftwaffe's X Fliegerkorps was asked to provide support. With the limited resources available to them, they did all they could, day or night, to help us out of our predicament."

Rommel in North Africa

With no sign of any British reaction to the arrival of his forces, Rommel launched a probing attack along the coast, pushing some light British forces ahead of him and supposing that the main British body must be lying around Agedabia and along the coast road to Derna. In fact, the British and Dominion forces in North Africa, depleted by the transfer of some 58,000 men and their associated equipment to fight in Greece, had been reduced in number and quantity to a greater extent than Rommel realized. At the end of February, the magnificent 7th Armoured Division had been sent back to Egypt to rest and refit. Its place had been taken by half the 2nd Armoured Division, fresh from home and completely raw; its other half had been sent to Greece. The 6th Australian Division had been replaced by the 9th Australian Division, but part of this was kept back at Tobruk because of maintenance difficulties farther forward.

"Enemy attempts to strangle our supplies [Rommel wrote] by naval action in the Mediterranean and air attack against Tripoli achieved no great success at this stage. On 11 March, the 5th Panzer Regiment completed its disembarkation in Tripoli. The 5th Panzer Regiment was equipped with 120 tanks, but of these only 60 were medium tanks [Panzer III and IV]. In addition, the Italian *Ariete* Division advanced with 80 tanks, all that were serviceable at the time. This force, with its [for those days] up-to-date equipment, made a tremendous impression on the Italians."

The Stuka in the desert

On 24 March, German forces launched an attack on the British garrison at El Agheila. They were supported by Stukas, the first time the dive-bombers had been in action in North Africa. In April, encouraged by the success of his probing attacks, Rommel launched a full-scale offensive against the British Western Desert Force. As the opposition crumbled before him, one of his main concerns was to capture Tobruk and eliminate the port as a hazard. Its possession by Axis forces would also mean that Rommel's supply lines would be shortened for his planned drive into and beyond Egypt. Rommel did not foresee any great difficulty in taking Tobruk: the British had captured it from the Italians in two days, and he thought that it would not take much longer to wrest it back. However, he had reckoned without the tenacity of the Australian and British defenders: his first attacks were literally stopped in their tracks, and losses in armour were so heavy that no further attacks could be made for at least a fortnight. Any thoughts of a rapid thrust to the Suez Canal by the Afrika Korps had evaporated.

On 30 April, Rommel again launched a major assault on Tobruk: as usual, the attack was preceded by a Stuka bombardment. The dive-bombers were unchallenged in the air, for the sole fighter squadron within the Tobruk perimeter – No 73, with Hurricanes – had withdrawn on 25 April, its surviving aircraft no longer able to operate from the shell- and bomb-cratered airstrip. Airpower was not a decisive factor in these operations, for although the necessity to provide air units for Greece had seriously undermined the British and Commonwealth air strength in North

Above left: A Stuka Staffel on its way to attack targets in the Balkan region in April 1941.

Left: Smoke billows over a Yugoslav battlefield after a Stuka attack.

Above right: Ju 87s with their exhaust ports and cockpit canopies covered to protect them from adverse weather during the Balkans campaign.

Africa, the Luftwaffe's strength was also very weak at this time. It comprised around 55 serviceable Ju 87s and 25 Bf 110s, together with a single Staffel of II/KG 26 at Benghazi. However, the psychological effect of the Stukas far outweighed their actual performance, and left the besieged troops in Tobruk in no doubt that the Luftwaffe held the upper hand.

Meanwhile, on 6 April, while Rommel was closing in on Tobruk, 27 German divisions – seven of them armoured – attacked Yugoslavia and eastern Macedonia, supported by some 1200 aircraft of Luftflotte IV. These included the Stukas of 1/St.G 1, 1/St.G 2 and 1/St.G 77, all operating from bases in western Romania. Also active in the campaign were the Stukas of the Italian 96th Gruppo, which had been redeployed from Sicily in October 1940. Early in December they were joined by the 97th Gruppo, also equipped with Ju 87Bs; and in March 1941 by the 101st Gruppo, which effectively meant that all the Regia Aeronautica's Ju 87 units were now deployed either in the Balkans (in Albania) or in North Africa.

The Ju 87 in Greece and Crete

After seizing their principal objectives in Yugoslavia, the Germans launched an all-out attack on Greece. The German Army, with powerful air support, poured southwards through the country sweeping aside resistance. The Greek forces rapidly disintegrated before its onslaught, leaving the burden of defence on the New Zealand Division, the 6th Australian Division, the 1st Armoured Brigade and a handful of depleted Royal Air Force (RAF) squadrons equipped with Hurricane fighters and Blenheim bombers. On 14 April, the Hurricanes were heavily in action against Ju 87s that were dive-bombing Australian and New Zealand troops in the Thermopylae area: the British fighters claimed some successes, and the Luftwaffe retaliated by striking hard in a series of low-level attacks on the RAF airfields.

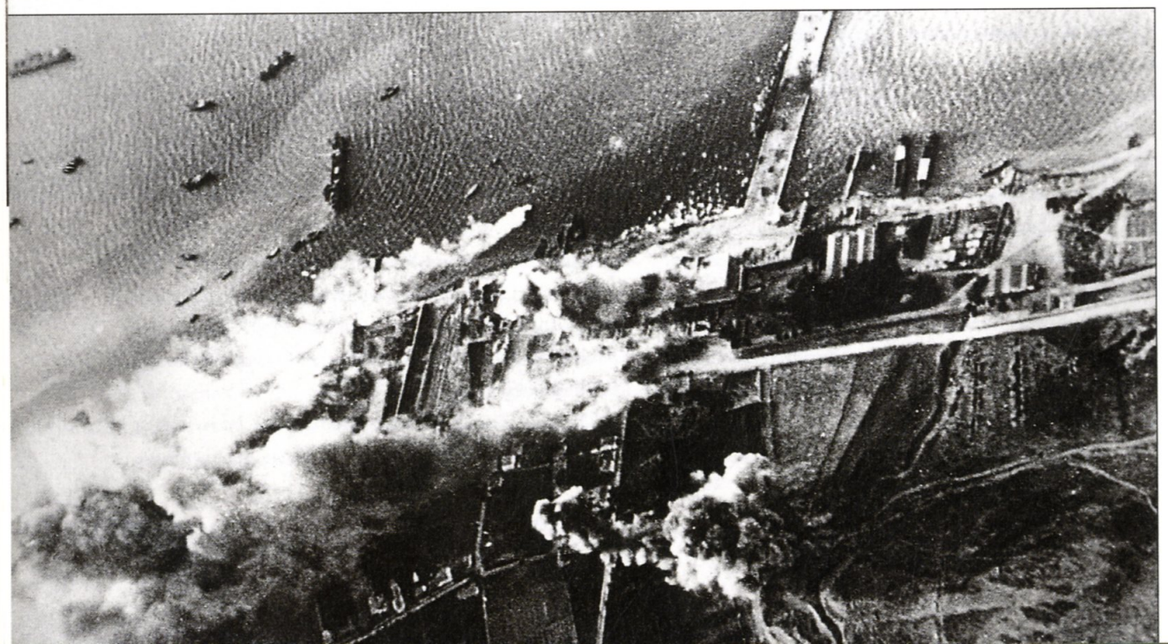
By 2 May, the position in Greece was untenable: 43,000 Allied troops were evacuated from Greek soil, 11,000 being withdrawn to Crete. On the 20th, in the wake of a massive air bombardment centred on the village of Maleme in western Crete, on the adjacent coastal airstrip and on a strongpoint called Hill 107, German airborne forces landed on the island (Operation Merkur). The next morning, the Luftwaffe launched the first of a series of heavy attacks on British warships in the area, sinking the destroyer HMS *Juno* and damaging the cruiser HMS *Ajax*. During the night of 21/22 May, the Germans attempted to send in reinforcements by sea. However, the convoy of 20 motor sailing vessels was attacked by the British Force D under Rear-Admiral Glennie (the cruisers HMS *Ajax*, HMS *Dido* and HMS *Orion*, supported by four destroyers) north of Canea and scattered. Ten enemy vessels were sunk, and 297 of the 2331 troops on board lost their lives.

The toll would almost certainly have been higher had it not been for a determined defence put up by an

escorting Italian torpedo boat, *Lupo* (Commander Mimbelli). Her sister craft, *Sagittario* (Commander Cigala), also fought a gallant action after daybreak while escorting a second troop convoy. This convoy was attacked by Rear-Admiral King's Force C (the cruisers HMS *Naiad*, HMS *Perth*, HMS *Calcutta* and HMS *Carlisle*, with three destroyers), but the British warships came under constant air attack by the Ju 88s of LG1 and KG30 and the Do 17s of KG2, and succeeded in destroying only two transports. *Carlisle* and *Naiad* were both damaged by bomb hits. The Royal Navy suffered heavily in the afternoon, when the fleet came under heavy attack by Ju 87s, Ju 88s, Bf 109 fighter-bombers and also, to a lesser extent, by Italian high-level bombers. The battleship HMS *Warspite* was hit several times, the cruiser HMS *Gloucester* and the destroyer HMS *Greyhound* sunk (the former with the loss of 45 officers and 648 ratings) and the cruiser HMS *Fiji* so badly hit that she had to be abandoned. *Carlisle* and *Naiad* suffered further damage, and the battleship *Valiant* was also damaged to a lesser extent.

Left: German Ju 52 transporter aircraft line up in preparation for the invasion of Crete, May 1941.

Below: Operation Mercury, the invasion on Crete, in progress with a Stuka attack on Suda Bay.



Formidable in danger

On 23 May, the destroyers HMS *Kashmir* and HMS *Kelly* were both sunk by air attack, while raids on Suda Bay by Bf 109 fighter-bombers destroyed five MTBs of the 10th MTB flotilla. Two days later, Vice-Admiral H.D. Pridham-Wippell put to sea from Alexandria with the battleships HMS *Barham* and HMS *Queen Elizabeth*, the aircraft carrier HMS *Formidable* and nine destroyers to attack St.G 2's airfield at Scarpanto. Returning from this sortie on the 26th, HMS *Formidable* and the destroyer HMS *Nubian* were both heavily attacked by 12 Ju 87s of II/St.G 2, led by Enneccerus, now operating from Scarpanto – they came upon the warships unexpectedly while searching for

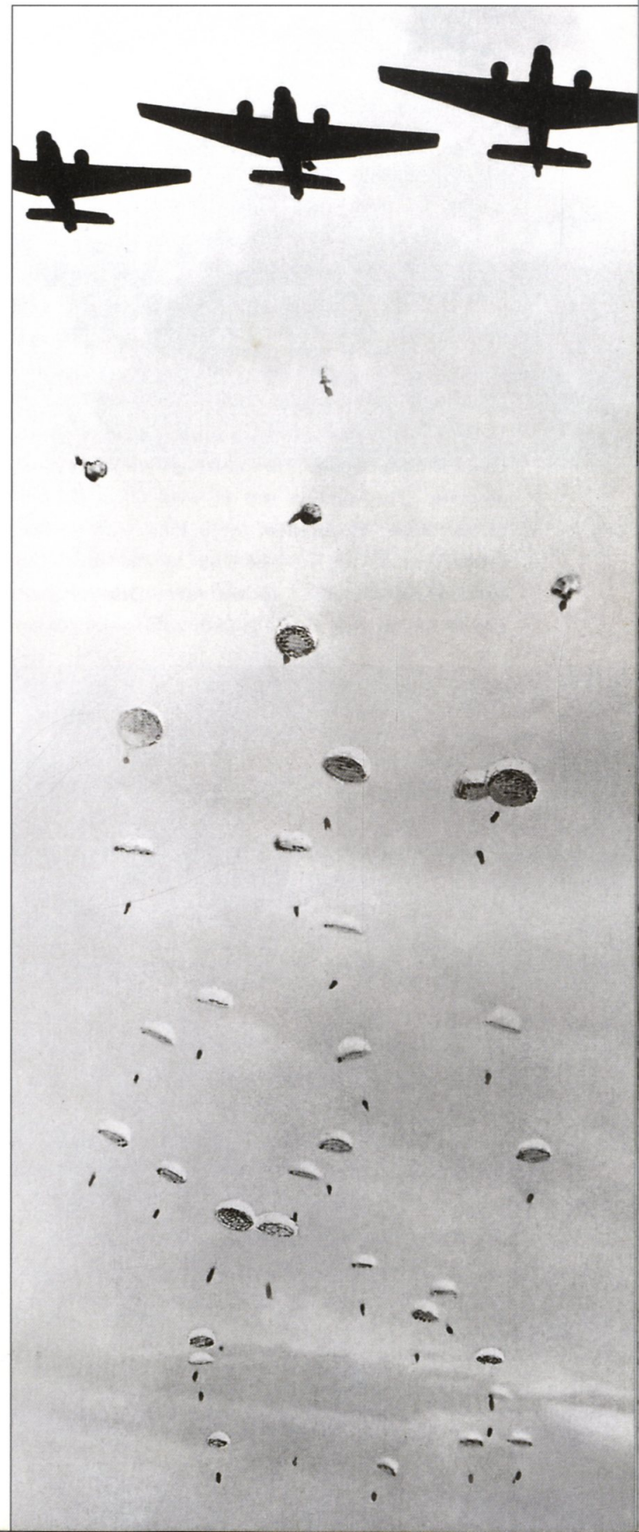
British freighters en route to Alexandria. *Formidable* immediately turned into the wind and flew off her fighters, but they were too late to break up the attack. The Stukas dived through thick anti-aircraft fire and hit the carrier with three bombs. One exploded on the flight deck, and the others ripped holes in her starboard side, but once again the carrier's armour saved her from serious damage and she regained Alexandria. The next day, the battleship *Barham* was damaged by Ju 88s.

The British evacuation of Crete

By this time, Suda Bay was being so heavily bombed that it was no longer possible to run in supplies and reinforcements, and without air cover Admiral Cunningham's forces were certain to suffer unacceptable losses in their efforts to prevent seaborne landings on the island. On the afternoon of 27 May, the British War Cabinet decided to evacuate the garrison of some 32,000 troops; and on the night of 28/29 May, 4700 were embarked at Heraklion and Sphakia. During this operation, the destroyer HMS *Imperial*, part of the evacuation force, was damaged by enemy aircraft and had to be abandoned and sunk by HMS *Hotspur* off Malea Bay. Another 6000 troops were evacuated the next night, but during the day Stukas sank the destroyer *Hereward* and damaged the cruisers *Ajax*, *Dido* and *Orion*, as well as the destroyer HMS *Decoy*. *Orion* suffered fearsome casualties among her troops: of the 1100 soldiers on board, 260 were killed and 280 wounded.

A description of a Stuka attack was given by Theodore Stephanides, a doctor with the Royal Army Medical Corps on Crete: "As each plane arrived nearly overhead it flipped over on its side and then on its nose and seemed to fall vertically down on us. They made a most terrific screaming sound as they dived and, when each plane had swooped down to about one thousand feet, one saw a black speck detach itself from the undercarriage and plummet towards us with a fiendish

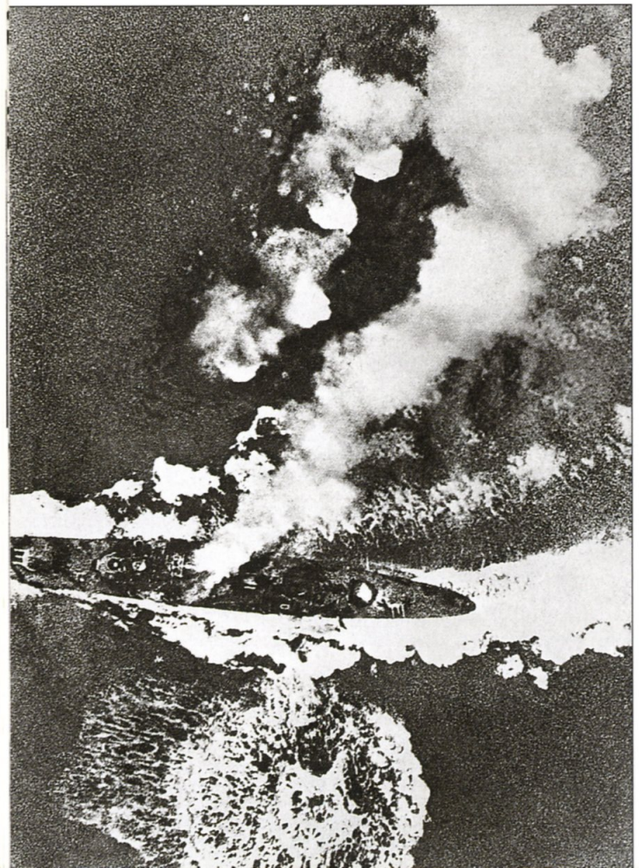
Right: Thousands of German paratroopers descend onto Crete in one of the largest drops of its kind in history.



whistling." Another British Army soldier wrote: "We began to dread the Stukas. At the slightest movement, the ugly, bent-winged Junkers circled the spot with their oil-stained bodies turned towards us. One by one, in leisurely fashion, they peeled off, screaming down in a vertical dive, air brakes extended, sirens wailing, to release their bombs with deadly accuracy. Within minutes the chosen area would be plastered with high-explosives."

The Germans believed that the effect of the bombs used against the troops in Greece had been reduced because the ordnance had penetrated the ground before exploding. If the bombs could be made to explode a little above the hard stony ground on Crete, then the effect against ground troops would be more dramatic. The solution was to weld 60cm (23.6in) metal rods to the front of the bombs, with an 8cm (3.1in) metal disc on the end of the rod. This contraption became known as "Dinortstabe", (Dinort's rods after the originator of the idea, Oskar Dinort) and would cause the bombs to detonate some 30cm (11.8in) above the ground.

On the night of 31 May/1 June, Rear-Admiral King sent in the destroyers HMS *Abdiel*, HMS *Hotspur*, HMS *Jackal*, HMS *Kimberley* and HMS *Phoebe* in a last attempt to evacuate at least some of the 6000 troops assembled at Sphakia. By Herculean efforts, the destroyers lifted off 4000 men before dawn brought an end to the operation and they headed for Alexandria. The anti-aircraft cruisers *Calcutta* and *Coventry* were despatched to meet them, but *Calcutta* was sunk north of Alexandria by two Ju 88s – 255 survivors were rescued by Coventry.



Left: Stuka bombs explode around a British cruiser under heavy attack during the battle for Crete.

Crete – the verdict

The Royal Navy had succeeded in evacuating 17,000 troops from Crete, but 15,743 had been killed or captured – and it had also lost 2011 personnel. German casualties were heavy, too: the enemy had suffered 6580 dead, wounded or missing. The battle for Crete had cost the Royal Navy three cruisers and six destroyers, while two battleships, an aircraft carrier, six cruisers and seven destroyers had sustained varying degrees of damage. It was exactly a year since the Royal Navy had suffered terrible losses at Dunkirk, and yet again the RAF came in for much criticism from both the navy and army for its failure to provide fighter cover. At Dunkirk, RAF Fighter Command had done its best, but in the case of Crete there was simply nothing the RAF fighters could have done. The handful of British aircraft – both RAF and Fleet Air Arm – on the island at the start of the invasion were destroyed quickly; and of six Hurricanes sent out from Egypt to provide cover for the evacuation, two were shot down by friendly naval fire! Once the Cretan airfields had been captured, the RAF was powerless to intervene. Not only was it stretched to the utmost in North Africa, but Crete was beyond the combat radius of its existing single-engined fighters. In such a fighter-free

Above: The British aircraft carrier HMS *Formidable*, whose fighters beat off a Stuka attack in May 1941.

environment, the Ju 87 and Ju 88 dive-bombers had only anti-aircraft fire to fear.

The transfer of X Fliegerkorps and its dive-bombers to the Balkans, leaving the Italians alone to conduct the air offensive against Malta, encouraged the British Admiralty to resume resupply operations to the island. On 2 April 1941, in an operation codenamed Winch, the carrier *Ark Royal*, with a strong Force H escort, set out from Gibraltar carrying 12 Hurricanes and 3 Skuas: these were flown off at a distance of 740km (460 miles) from Malta, and all arrived safely. On 28 April, 20 more Hurricanes, ferried from the UK by the carrier HMS *Argus* and transferred to *Ark Royal* at Gibraltar, were also flown off to Malta, together with three Fulmars (Operation Dunlop).

The scene now shifted briefly to Egypt, where the British Eighth Army, under heavy pressure from Rommel's Afrika Korps, was in urgent need of tank and fighter aircraft reinforcements. Between 5 and 12 May, Force H and the Mediterranean Fleet mounted a joint operation, codenamed Tiger, to push a convoy of five fast merchantmen carrying the necessary equipment through the Mediterranean from Gibraltar to Alexandria. At the same time, the battleship *Queen Elizabeth* and two light cruisers from UK waters were being sent out to join Admiral Cunningham's fleet. The convoy passed Gibraltar on 6 May and was escorted by Force H to a point south of Malta, where it was covered by British destroyers and cruisers from the island base until it could be met by a strong force sent out from Alexandria.

On 8 May, both naval groups were located by air reconnaissance: air attacks from the enemy's North African bases quickly developed, first by SM79 torpedo-bombers, escorted by CR42 fighter biplanes; and then by the Stukas of I/St.G 1 and II/St.G 2, escorted by Bf 110s of ZG 26. The attacks were disrupted by *Formidable*'s fighters, and the convoy escaped unscathed until the next day, when the 9376-tonne (9228-ton) transport *Empire Song* was sunk by mines. Bad visibility prevented further attacks until the afternoon of 10 May, when the destroyer HMS *Fortune* was badly damaged in a Stuka attack. On the night of 10/11 May, Lieutenant Rieger led a Staffel of II/St.G 2 in a night attack on British destroyers that had closed in to shell Benghazi, but this was unsuccessful. The convoy docked safely in Alexandria on 12 May, having lost 57 out of 295 tanks and 10 out of 53 Hurricanes, all on *Empire Song*.

Russia:
June 1941–July 1942

The Stuka wrought havoc on the Red Army during the opening phases of Barbarossa, helping the Luftwaffe achieve almost total air superiority.

In the early hours of 22 June 1941, the Germans launched Operation Barbarossa, the invasion of the Soviet Union. The first German air operations over the USSR, excluding reconnaissance flights, were carried out at 03:15 hours by 30 He 111 twin-engined bombers drawn from Kampfgeschwader 2, 3 and 53. Flown by picked crews, and operating in flights of three, they attacked Soviet airfields close to the frontier with fragmentation bombs. Throughout the remainder of the day, Soviet airfields and other installations were subjected to heavy attacks by 510 bombers and 290 dive-bombers, supported by 440 Bf 109s and 40 Bf 110s.

Left: A Stuka pilot from III/St.G 3 starts up his engines for a mission "somewhere on the Eastern Front".

Four Luftflotten were involved in the assault: Luftflotte 1, operating in support of Army Group North; Luftflotte 2 (Army Group Centre); Luftflotte 4 (Army Group South); and Luftflotte 5 (Northern Norway). Soviet losses in the day's operations were 1489 aircraft destroyed on the ground and 322 in the air; the Luftwaffe's loss was 35, including three Ju 87s. It was the greatest victory ever achieved in a single day by one air force over another.

Stuka deployments for Barbarossa

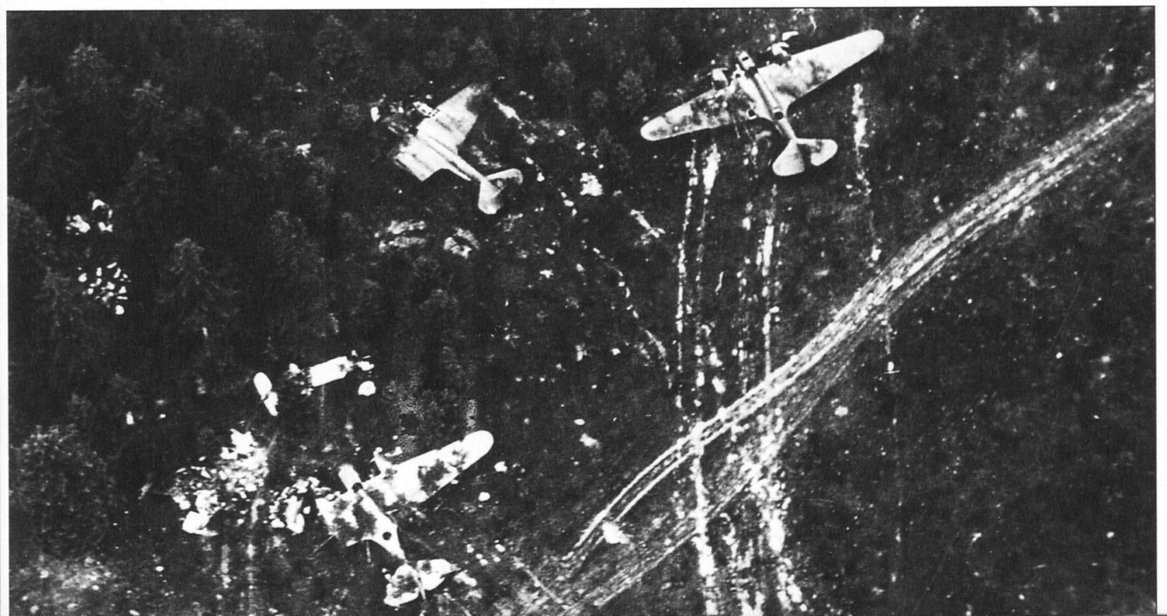
Eight Stukagruppen were assigned to Operation Barbarossa. Farthest north, supporting Aircraft Commander Kirkenes in the Norwegian Arctic, was IV/LG 1 with 42 Ju 87Bs, 39 of them serviceable. In support of Army Group Centre, operating under the control of General Bruno Loerzer's II Fliegerkorps, was St.G 77 under Major Graf Clemens von Schönborn-Wiesentheid, with a strength of 122 aircraft. General Wolfram von Richthofen's VIII Fliegerkorps included II and III/St.G 1, under Colonel Walter Hagen, with 70 Ju 87Rs; and Lieutenant-Colonel Oskar Dinort's I and III/St.G 2, with 83 Ju 87Rs.

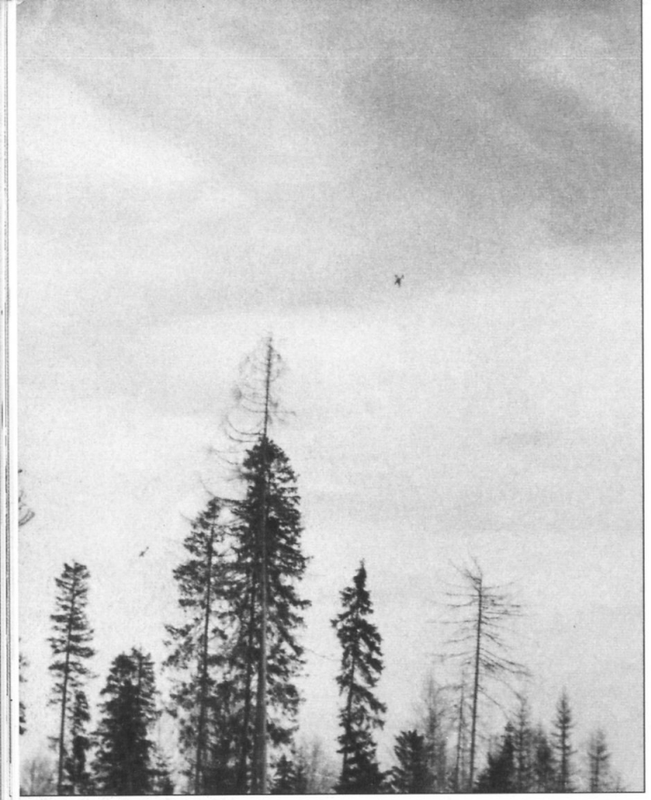
Because of the greater distances likely to be covered in the early stages of Army Group South's offensive, the bomber element of General Alexander Löhr's supporting Luftflotte 4 comprised mainly Ju 88s; Stukas would be redeployed to this sector once the initial objectives had been achieved. The initial attacks took the Russians completely by surprise; when the Soviet Air Force began to react, the Luftwaffe's bomber airfields were given high priority on the target list. At about 11:00 hours, the Ju 87s of St.G 77 had just landed on their operational airfield north of Warsaw after bombing enemy positions near Brest-Litovsk when six Tupolev SB-2 bombers appeared overhead. They had hardly released their bombs – which did little damage – when the Bf 109Fs of JG 51, the Stukas' escorts, arrived and shot all six SB-2s down. Twenty-five more enemy bombers attacked the airfield at intervals during the remainder of the day, and no fewer than 20 were shot down by fighters and flak.

The effect of a Stuka attack on a Russian fortified position near Lvov was described by a Russian officer, Lieutenant-General Nikolai K. Popel, who was Chief Political Officer of VIII Mechanized Corps. "The sun was rising – and to meet it came Hitler's heavily loaded bombers. They turned over the town and came down. The crosses on their wings could be seen with the naked eye. So could the black dots which separated from the aircraft. They bombed with precision: the railway

Right: Ju 87s, escorted by Bf 109s (top of picture), over the Eastern Front during Operation Barbarossa.

Below: Destroyed Russian aircraft after the initial hammer blows of Operation Barbarossa.





Top: Stuka dive-bombers on the Eastern Front swoop down onto their targets during Barbarossa.

Above: A downed Russian bomber, probably a Tupolev SB-2, lies disabled following a Ju 87 attack.

Above right: German soldiers look on as Smolensk burns.

station, the approach roads, the oil refinery, our barracks (German intelligence did not know that they had been emptied some days before). When they had dropped their bombs, they circled slowly over the town. Why should they hurry? Not one of our fighters was there; our anti-aircraft guns had not fired a single shot. The first wave was followed by a second. This time the town centre was bombed, including the blocks where the officers' families lived. The bombing went on for a relatively short time." At least one Stuka pilot had a narrow escape that day. He was Major Hubertus Hitschold, commanding I/St.G 1, who had to make an emergency landing behind enemy lines after his Stuka was hit. A fellow pilot, Lieutenant Freitag, saw his predicament and landed nearby to pick up Hitschold and his observer, flying them to safety.

The Stukas were using a new type of bomb: the 1.8kg (4lb) SD 2 fragmentation bomb. Each container held between 50 and 250 shrapnel particles that could be detonated on impact or just above the ground. Though the spread of each bomb was only 12m (40ft), large numbers of them could be dropped simultaneously. The bombs were carried on the Ju 87s' underwing racks, and proved to be particularly useful

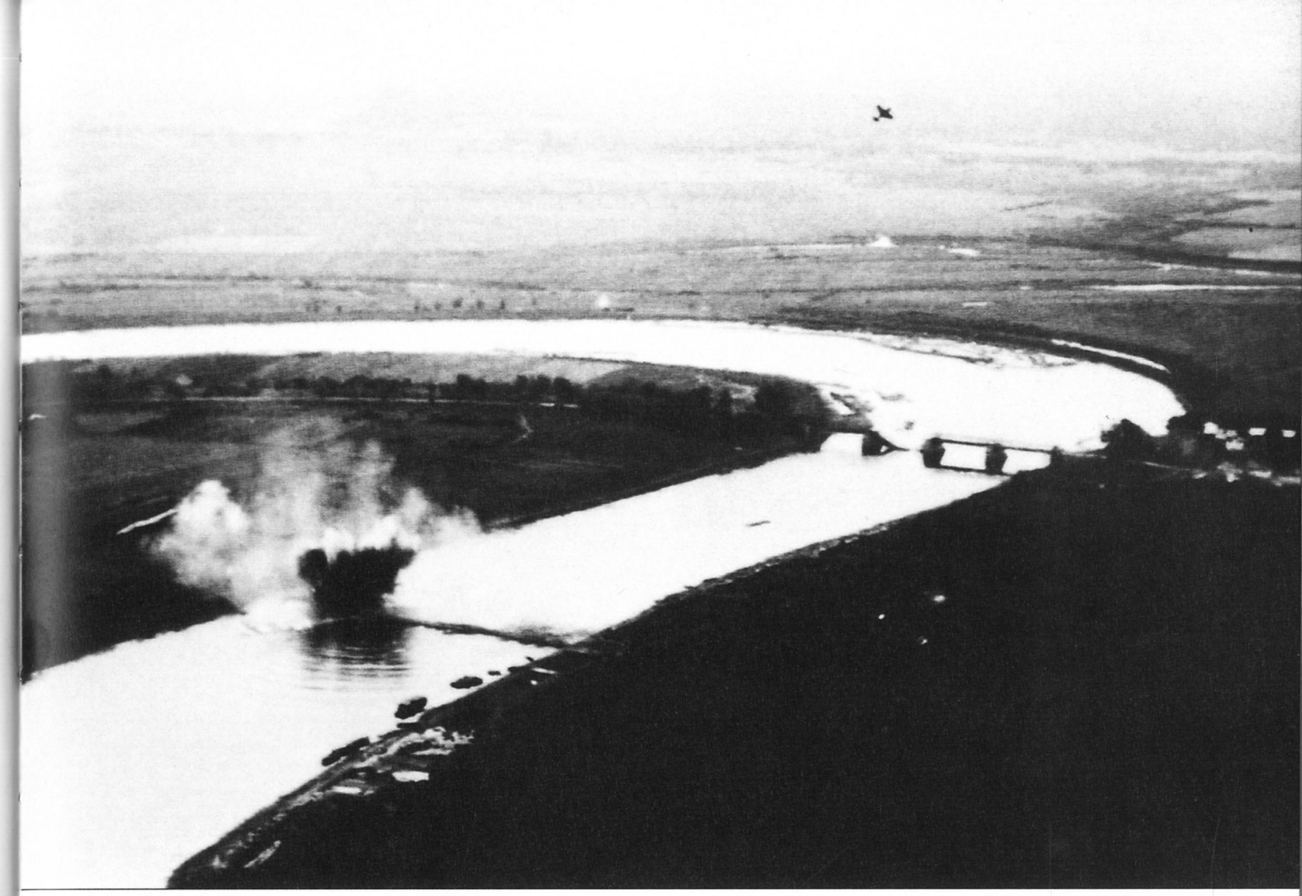
against dense masses of Soviet infantry. In addition, the 9kg (20lb) SD 10 fragmentation bomb was deployed against Soviet tanks with great effect.

On the morning of 29 June, the citadel of Brest-Litovsk, which had held out for nearly a week in the face of strong attacks by Guderian's 2nd Panzer Group and constant air attacks by St.G 77, succumbed at last, its fortifications breached by the Ju 88s of KG 3. With this obstacle behind them, the German armoured units raced on, supported by the Stukas and their escorting Messerschmitts. The Germans now justifiably believed that Soviet air resistance had been virtually eliminated, and the four Luftflotten covering the advance turned their whole effort to ground-attack operations. Then, on 30 June, came a surprise. That morning, as the armoured spearheads of Army Group Centre pushed on with the intention of encircling Minsk, hundreds of Soviet bombers appeared over the front. Once again, they were almost entirely without fighter escort, and

Above: Stuka dive-bombers attack the battleship *Marat* in Kronstadt harbour in November 1941.

they suffered fearful losses: JG 51, covering St.G 77 and other air formations in the Minsk sector alone, shot down 114 Russian aircraft on that one day. To the north, more waves of bombers attempted to destroy the bridges over the River Dvina to slow the advance of 4th Panzer Group, which was heading northeastwards for Leningrad. The Panzer Group's forward echelons were covered by the Bf 109s of JG 54 "Grünherz", and in a day of one-sided air battles they destroyed 65 Soviet aircraft.

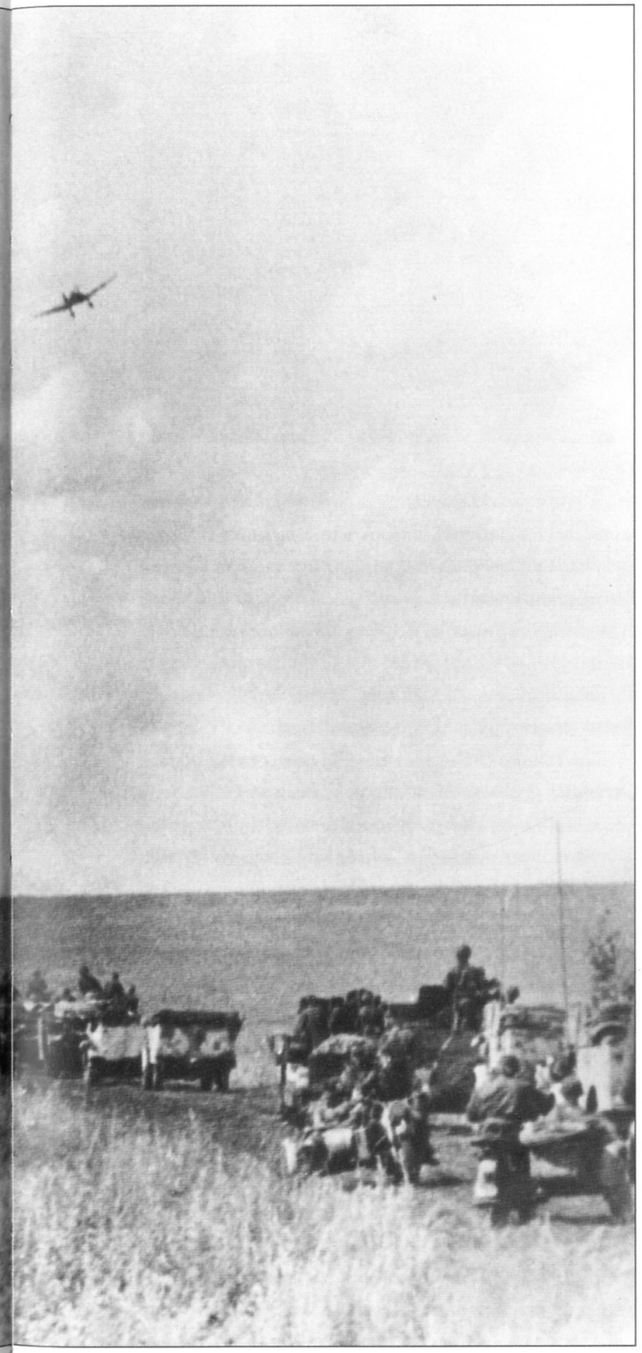
In July 1941, the Luftwaffe was undisputed mistress of the sky on the Eastern Front. The Russians were in full retreat from the Baltic to the Black Sea, harassed by the Stukas that blasted a path for the advancing armour. On 2 July, the Germans smashed their way across the Beresina River and forced the remnants of



Above: Russian bridges are destroyed by Stukas in late 1941. Such attacks were either to prevent enemy troops retreating or to stop Soviet supplies reaching the front.

the Soviet Fourth and Thirteenth Armies back to the Dnieper, where they were reinforced by four reserve armies under the command of Marshal Budenny. In the northwestern sector, the Germans captured Vitebsk on 9 July and soon afterwards launched an offensive designed to take Smolensk. The battle for this city, one of the costliest of the whole war on the Eastern Front, was to last for more than six weeks. Progress was slower on the southwestern front. On the third day of the invasion, General Ewald von Kleist's 1st Panzer Group suffered heavy losses near Kovel during a tank battle with the Soviet Fifth Army, but the Luftwaffe's overwhelming air superiority saved the situation and the Russian armoured formations were broken up by concentrated Stuka attacks. By 11 July, the Soviet Fifth, Sixth, Twelfth and Twenty-Sixth Armies had withdrawn to new defensive positions along the pre-1939 western frontier of the Soviet Union, and their retreat enabled the German armies to push forward into the valley of the Dniester, in the Ukraine. Still farther south, German forces crossed the River Prut into Bessarabia, forcing the Soviet Ninth Army also to retreat to new defensive positions beyond the Dniester.

Meanwhile, the German High Command had decided to divert the Wehrmacht's main thrust from Moscow – hitherto regarded as the primary objective – and to concentrate on the early capture of Kiev (Army Group South) and Leningrad (Army Group North). While the German 4th Panzer Group attacked through Estonia, the Finnish Army attacked strongly to the north of Lake Ladoga and across the Karelian Isthmus, gradually pushing back the Russians until the two sides once again faced each other across the original frontier that had separated Finland and the Soviet Union before



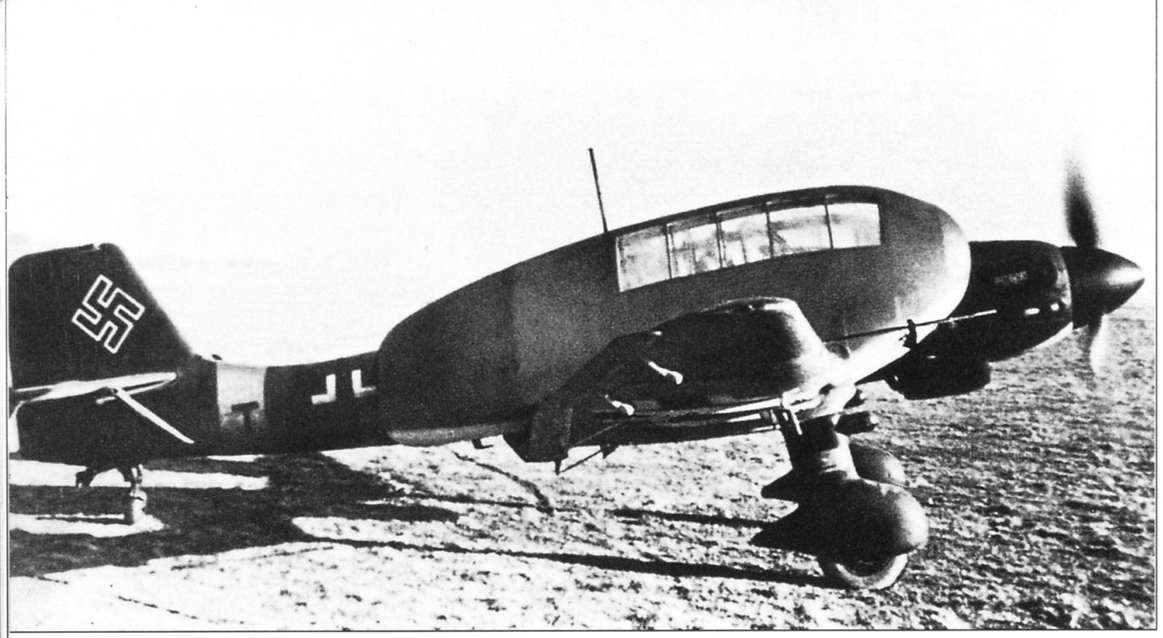
Above: The buffalo emblem on this Stuka denotes it is from VI/St.G 77. Stukagruppe 77 saw a great deal of action on the Eastern Front.

Left: The Blitzkrieg in action in Russia – a panzer division advances as Stukas fly in support overhead.

the Winter War of 1939–40. Air fighting on this front was sporadic, with the majority of the Soviet air divisions fully committed elsewhere. Farther north, on the Kola Peninsula – with its vital port of Murmansk – air defence was primarily the task of the Soviet Naval Air Arm.

At 04:00 hours on 22 June, the Luftwaffe launched a series of heavy attacks on Soviet air bases in the Polyarnoe area. In this case, their bid to neutralize the Russian air defences failed, for the Soviet Air Force and navy commanders in this sector, alerted by German reconnaissance flights which had been going on for a week prior to the invasion, had used their initiative and carefully dispersed their aircraft. On the first day of operations, the Luftwaffe made several attempts to attack Murmansk with small formations of Ju 87s and Ju 88s, but each raid was disrupted by the defending fighters.

September 1941 saw some changes in the deployment of the Stuka units in Russia. III/St.G 1 was



Above: A Ju 87D-3 variant, fitted with two storage pods attached to each wing. These types were very rare.

moved from the Central Front to North Russia, where it came under the operational control of Luftflotte 1. I/St.G 2 and III/St.G 2 continued to operate as part of VIII Fliegerkorps in support of Army Group Centre until late August, when they redeployed to the Leningrad Front for intensive operations against lines of communication between Moscow and Leningrad – also under Luftflotte 1's command. The other Stukageschwader, St.G 77, operated under the orders of II Fliegerkorps in support of Army Group Centre until September, when it moved south for operations in the Crimea as part of Luftflotte 4. In the north, the German encirclement of Leningrad was completed on 30 August, and after that the city's only hope of supply was by air.

The German offensive in this sector, faced with fierce resistance and increasingly poor weather, had become bogged down. Much of the Russians' gunfire support in the Leningrad sector was provided by warships of the Baltic Fleet. One group, comprising three destroyers and three gunboats, was on the River Neva, supporting the Forty-Second and Fifty-Fifth Armies southeast of Leningrad; another group operated in the waters of the canal that linked Leningrad with the White Sea. This group included the cruiser *Maksim Gorki*, which had lost her bows to a mine on 23 June and had undergone temporary repairs; the cruiser *Petropavlovsk*; and six destroyers. The third and most powerful group was in Kronstadt Bay, and comprised the battleships *Oktyabrskaya Revolutsiya* and *Marat*, the cruiser *Kirov*, the flotilla leader *Minsk* and six destroyers, two of which were under repair.

The two battleships were of major concern to the Germans. Both were old, having been completed in 1915; and both had been damaged by gunfire from German shore batteries. However, they were still seaworthy, and carried a formidable armament of 12 x 12in and 16 x 4.7in guns, as well as 6 x 76mm anti-aircraft guns and a host of smaller-calibre weapons. The troublesome nature of these warships was highlighted on 7 September, when *Maksim Gorki*, positioned in the Leningrad merchant harbour, and *Marat*, stationed in the White Sea Canal, fired on advance units of the German Eighteenth Army south of the city and brought them to a standstill. The following day, *Oktyabrskaya Revolutsiya*, *Kirov* and the gunboat *Krasnoya Znamya* joined forces in shelling German assembly areas near Oranienbaum, Krasnoye Selo and Peterhof. On 16 September, following a breakthrough by German forces into Kronstadt Bay near Peterhof, German coastal batteries opened fire on *Marat* and

Petropavlovsk; both were hit by 150mm shells, which had hardly any effect on their thick armour. It was clear that the warships would have to be neutralized from the air, by precise dive-bombing attacks.

"The flak burst from a whole cumulus of cloud"

Beginning on 21 September 1941, St.G 2 launched an all-out offensive. Attacking the warships was extremely dangerous, as explained by St.G 2 dive-bomber ace Lieutenant Hans-Ulrich Rudel in his book *Stuka Pilot*: "After the first sortie our luck with the weather is out. Always a brilliant blue sky and murderous flak. I never again experience anything to compare with it in any place or theatre of war. Our reconnaissance estimates that a hundred AA guns are concentrated in an area of six square miles in the target zone. The flak burst from a whole cumulus of cloud. If the explosions are more than 10 or 12 feet away one cannot hear the flak from the flying aircraft. But we hear no single bursts; rather an incessant tempest of noise like the clap of doomsday. The concentrated zones of flak in the air space begin as soon as we cross the coastal strip which is still in Soviet hands. Then come Oranienbaum and Peterhof; being harbours, very strongly defended. The open water is alive with pontoons, barges, boats and tiny craft, all stiff with flak. The Russians use every possible site for their AA guns. For instance, the mouth of Leningrad harbour is supposed to have been closed to our U-boats by means of huge steel nets suspended from a chain of concrete blocks floating on the surface of the water. Even from these blocks AA guns bark at us.

"After about another six miles we sight the island of Kronstadt with its great naval harbour and the town of the same name. Both harbour and town are heavily defended; and, besides, the whole Russian Baltic fleet is anchored in the immediate vicinity, in and outside the harbour. And it can put up a murderous barrage of flak. We in the leading staff aircraft always fly at an altitude between 9000 and 10,000 feet; that is very low but, after all, we want to hit something. When diving on to the ships we use our diving brakes in order to check our diving speed. This gives us more time to sight our target and to correct our aim. The more carefully we aim, the better the results of our attack, and everything depends on them. By reducing our diving speed we make it easier for the flak to bring us down, especially as if we do not overshoot we cannot climb so fast after the dive. But, unlike the flights behind us, we do not generally try to climb back out of the dive. We use different tactics and pull out at low level close above the water. We have then to take the wildest evasive action over the enemy occupied coastal strip. Once we have left it behind we can breathe freely again."

A rain of steel

On 23 September, Rudel hit *Marat* with a single 1000kg (2200lb) bomb, destroying the whole of her bow, including "A" turret. The warship settled on an even keel in very shallow water, with her hull and superstructure both above the surface. As her machinery and both aft turrets were still operative, she continued in use as a beached gun battery. Later, "B" turret was also brought back into action. She was refloated in 1946 and was used for some time as an artillery ship, being renamed *Volkhov*. In other attacks, *Oktyabrskaya Revolutsiya* managed to escape severe damage, but took hits from six medium bombs. The intense air bombardment was maintained for three days, in the course of which the destroyer *Steregushchi* capsized after a direct hit (she was later salvaged), and the destroyers *Gordy*, *Grozyaschi* and *Silny* were damaged, along with the submarine depot ship *Smolny* and the submarine *Shch-306*. On 23 September, *Maksim Gorki*, already hit during an attack on Leningrad, was damaged again, as were *Kirov* and *Grozyaschi* off Kronstadt. The submarine *P2* was destroyed in the dockyard, and the flotilla leader *Minsk* sank after a direct hit (she was later salvaged). The patrol ship *Taifun* was destroyed, and the submarine *Shch-302* damaged. The attack on *Kirov* cost the life of III/St.G 2's commander, Captain Ernst-Siegfried Steen, and his gunner, Gefreiter Scharnovski, who was normally Rudel's second crew member. According to

eyewitnesses, Steen's aircraft was hit by flak in the dive and the pilot tried to steer it into *Kirov*, but crashed and exploded in the water nearby.

Meanwhile, the Stukas of St.G 77 had been very active in the Crimea. On 21 September, a Soviet amphibious force set out from Sevastopol with the aim of landing the 3rd Marine Rifle Regiment behind the Romanian 13th and 15th Infantry Divisions at Grigorevka. Their ultimate objective was to support the 157th and 421st Rifle Divisions in an attack on Romanian coastal batteries near Fontanka and Dofinovka. The men of the 3rd Marines were carried in the cruisers *Krasny Kavkaz* and *Krasny Krym*. Escort was provided by the destroyers *Besposhchadny*, *Bezuprechny* and *Boiki* under the orders of the Commander of the 1st Cruiser Squadron, Captain 1st Class S.G. Gorshkov. The destroyer *Frunze* was to act as a command ship, and the operation was to be coordinated with a flotilla coming from Odessa, comprising the gunboat *Krasnaya Gruziya*, a tug, 22 cutters and 10 barges with which to disembark the troops.

It was not long before the movement of such a substantial naval force was detected by German air reconnaissance, and what happened next was entirely predictable. A formation of St.G 77's Stukas, searching for the main fleet, located the gunboat *Krasnaya Armenia* off the Tendrivska Peninsula and sank her. *Frunze* and the tug *OP8*, racing to the aid of the stricken vessel, were attacked and sunk in turn. Despite this loss, the landing operation was a success, with the Soviet forces capturing the heights near Fontanka and Dofinovka. At dawn the next day, the escorting destroyers, cruising off the coast to give fire support to the newly landed troops, were attacked by a strong force of Stukas. *Bezuprechny* was damaged by a near-miss, while *Besposhchadny* was badly damaged in the bow and had to be towed stern first into Odessa. Neither ship survived the war: the former was sunk by air attack at Sevastopol in October 1943; and the latter by air attack at Yalta in June 1942.

Towards the end of 1941, the well-tried Ju 87B began to be replaced by a new variant, the Ju 87D. During the spring of 1940, an extensive redesign of the basic Ju 87 airframe was undertaken to accommodate

Below: Soviet troops on the counteroffensive outside Moscow during the winter of 1941.

the new 1400hp Junkers Jumo 211J engine. Designated Ju 87D, the new variant was given more refined nose contours, achieved by moving the oil cooler from above the engine to below it. The oil coolant radiator was also repositioned below the wing, inboard of the undercarriage legs. The aircraft was fitted with a VS 11 propeller with paddle blades. The cockpit canopy was reconstructed, being tapered towards the rear, and fuel tankage was similar to that of the Ju 87R. The variant was fitted with an undercarriage jettison facility, as in the C model, and the wheeled undercarriage could be replaced by skis. The defensive armour was upgraded, and the single 7.92mm machine gun in the rear cockpit was replaced by a twin MG 81Z of similar calibre. The bomb load was also substantially increased, provision being made for a 1800kg (4000lb) bomb under the fuselage and for either four 50kg (110lb) or two 500kg (1100lb) bombs under the wings. In practice, the 1800kg (4000lb) bomb was rarely carried, most aircraft being armed with the 1400kg (3085lb) armour-piercing bomb or with the 1000kg (2200lb) general-purpose weapon. The aircraft could carry a WB 81 or WB FF container under each wing: the former accommodated six MG 81 machine-guns; the latter, two 20mm MG FF cannon.

The Ju 87D

The prototype D-1 (Ju 87V-21) flew for the first time in February 1941. The first production models were the D-1 and D-1 (trop). The next sub-variant, the Ju 87D-2, was identical to the D-1, but with a stengthened tailwheel and a glider towing hook combination. The Ju 87D-3 was identical to the D-2, but with the sirens deleted and their housings faired over. Fuselage undersides and coolant lines were armoured against ground fire. The Ju 87D-4 was a projected torpedo-bomber version of the D-3, but development was aborted; the D-5 was also similar to the D-3, but with wingspan increased to 15m (49ft). The wing-mounted machine guns were replaced by 20mm Mauser MG 151 cannon. The MG 151 had fired a round that was too light for an air-to-air or air-to-ground weapon. It was therefore rechambered to fire 20mm shells, resulting in one of the best weapons of the war in its category. The trajectory was almost straight, allowing for great accuracy, while the explosive charge and the gun's rate of fire caused extensive damage to the target (it fired 86kg/190lb of shells per minute). The MG 151 was used on almost all German aircraft after 1941. Some were also supplied to the Italians and even the Japanese (the latter imported 800 examples by submarine).

Tactical change for the Stuka

The combined bomb release and automatic pull-out system was divided into a dual system, each component controlled by a push button for trim compensation and bomb release. The Ju 87D-6 was similar to the D-5, with very minor equipment changes; while the D-7 was optimized for ground-attack operations at night, being fitted with a 1500hp Junkers Jumo 211P engine and flame dampers over the engine exhaust stubs.

The introduction of the D version marked a move away from the Stuka's dedicated mission of dive-bombing. On the Eastern front, air support was not as adequate as it had been in France in 1940. For one thing, the Luftwaffe was enormously overstretched by mid-1941: too many aircraft had to stay in the West and in the Mediterranean. Gradually, the destruction of enemy tanks would become a prime mission of the Stuka. One of the things that the Germans had not accounted for in their war plans against Russia was the enormous number of tanks the Red Army possessed. The light tanks could easily be dealt with, but confronted with the large numbers of excellent T-34 tanks, and the inadequacies of their own armoured fighting vehicles, the Germans sought to compensate for their numerical inferiority in other ways. One way was to use the Ju 87 as a ground-attack aircraft. For the Stuka it was certainly a "target-rich environment", though flying at low level to strike a target made aircraft more vulnerable to ground fire, hence the additional armour protection for the crew.

By the beginning of 1942, most Stukageschwader were equipped with the Ju 87D-3 variant. In January

1942, the disposition of the Stuka units was as follows:

Stukageschwader 1 II/St.G 1 still operating with Army Group Centre; Stab and 6 Staffel pulled out to rest and refit at Schwäbisch-Hall; III Gruppe pulled back to Schweinfurt; I Gruppe still operating in the Mediterranean theatre.

Stukageschwader 2 Stab and III Gruppe still operational in Russia; I Gruppe pulled back to rest and refit at Neukuhren; II Gruppe operational in the Mediterranean.

Stukageschwader 3 Stab and I Gruppe operating in the Mediterranean theatre; remainder in Greece; IV Gruppe LG 1 operating at Kirkenes in Norway under the command of Major Karl Stepp (in February 1942, IV/LG 1 was redesignated Stukageschwader 5 and assigned to operations in Finland).

Above: The Soviet warship *Paris Commune*, part of the Black Sea Fleet, opens fire with its deck guns during the battle for the city of Sevastopol in 1942.

Right: A Ju 87 awaits take-off on the Eastern Front. Whilst on the ground, aircraft were kept at large distances from one another to guard against multiple damage if the enemy should shell or bomb the airfield.

Stukageschwader 77 all three Gruppen operational in southern Russia with VIII Fliegerkorps.

By this time, the German offensive in Russia had long since come to a standstill in the face of determined Soviet resistance and of an even greater enemy – the Russian winter. On 6 December 1941, the Red Army went over to the offensive in the Moscow sector. Before the counterattack was launched, advanced airstrips were laid down between 15km and 30km (9 miles and 19 miles) behind the front. Units assigned to these bases were supported by teams sent from airfield service battalions, and sufficient supplies were stockpiled for two or three sorties by a complete air regiment. It was logistical expertise that the Germans, with their supply lines badly overstretched and in some cases completely clogged, could not hope to match.

The offensive removed the immediate German threat to Moscow, but there was no major Soviet breakthrough: by the beginning of 1942, both sides had fought themselves to a standstill on the Central Front. In the south, on 23 November 1941, General Ewald von Kleist's First Panzer Army captured Rostov-on-Don, but its occupation of the city was not destined to be a long one. On 28 November, Rostov was retaken by the Soviet Ninth and Fifty-Sixth Armies. The Germans narrowly escaped encirclement, falling back to the River Mius, where they succeeded in establishing and holding a defensive line. In the middle of January 1942, the Russians – encouraged by their successful defence of Moscow, and with their frontline forces reinforced by fresh combat divisions from Siberia – launched a major offensive on the Kalinin Front with the aim of encircling the German Army Group Centre. In bitter cold and deep snow, the Third and Fourth Soviet Shock Armies – driving through the Valday Hills to the north of Rzhev – hammered a wedge between the German Army Group North and Army Group Centre. On the western front, the Russians advanced along the Smolensk Highway and recaptured Mozhaisk. To the south, the Soviet Thirty-Third Army launched a strong thrust towards Vyazma; and on 20 January, IV Airborne Corps was dropped to the southwest of this town.

On the northwestern front, the situation of the German Ninth Army, denied reinforcements by the

Above: Somewhere over the Soviet Union, a flight of Stuka dive-bombers heads off in formation to attack a Russian military construction centre.

Right: Stukas flying over the Crimea on their way to attack Sevastopol in June 1942.

Soviet thrust through Mozhaisk, was becoming desperate. By early February, 100,000 men – six divisions – were completely surrounded at Demyansk, south of Lake Ilmen. The Germans initiated an airlift that lasted for three months, using every suitable type of aircraft, until a narrow supply route was opened in May. Supplies were also airlifted to a second German pocket at Kholm. Although it drove long wedges into German-held territory, the Soviet winter offensive of 1942 failed in its primary aim. Despite savage Soviet assaults, strongly fortified centres of German resistance held out until the spring thaw, under constant attack from the air. The principal type used by the Russians was the Ilyushin Il-2 Shturmovik, a formidable assault aircraft that was to the Russians what the Ju 87 was to the Germans. It was not uncommon, during the winter offensive, for Shturmoviks and Stukas to engage in dogfights over the battle area.

Although the Russian winter offensive had left both sides exhausted, there was to be no respite. The Soviet High Command was already planning another major counteroffensive, while the Germans were getting ready for a massive thrust to the Don and the Volga and into the Caucasus. As well as giving them access to the vast wealth of the region's oil fields, this would open up the northern route to the Middle East – suddenly, a link-up with the Axis forces in North Africa seemed an exciting possibility. The offensive, for which the Germans had assembled 74 divisions and some 1500 aircraft between Voronezh and the Crimea, opened on 8 May 1942, the first blows falling on the Soviet Crimean Front under General Kozlov. The Germans rapidly smashed their way through the Soviet Forty-Fourth Army and thrust on towards the Sea of Azov. Faulty intelligence had led the Russians to believe that the offensive would not begin in this sector, and consequently they were not adequately prepared to meet it. The Luftwaffe quickly established air superiority, enabling General Manstein's Eleventh Army to surround the Soviet Fifty-First Army and capture Kerch. With the Soviet evacuation of the Kerch Peninsula, the Germans captured more than 300 Russian aircraft intact on abandoned airfields. The remainder of the Soviet air regiments in the Crimea were hastily evacuated to airfields in the Caucasus, leaving a token force of 50 fighters and bombers to provide air cover over the Crimea's last bastion, the fortress of Sevastopol – this had been under siege since October 1941.

On the Leningrad Front, the spring thaw was bringing with it a renewal of air activity, which had been severely curtailed during the winter months. On 4 April 1942, General Förster's I Fliegerkorps launched a series of heavy attacks on major warships of the Soviet Baltic Fleet to prevent their redeployment after the ice broke up. The first attack was carried out by 62 Ju 87s of III/St.G 1, I and II/St.G 2, together with 33 Ju 88s of KG 1; 37 He 111s of KG 4 attacked flak emplacements around the anchorage. The bombers were escorted by 59 Bf 109s of JG 54 under Major Hannes Trautloft. The battleship *Oktyabrskaya Revolutsiya* was hit four times and received heavy damage, but survived. The cruisers *Maksim Gorki*, *Kirov* and *Petropavlovsk* and the destroyer *Silny* were each hit by one bomb, suffering serious damage, while lighter damage was inflicted on the destroyer *Grozyashchi*, the minelayer *Marti* and the training ship *Svir*.

Above: The Russian Black Sea Fleet destroyer *Svobodny* lists badly after being attacked by Ju 87s.

The air attacks were resumed on 24 April in a second operation codenamed Götz von Berlichingen, and on this occasion *Maksim Gorky* was lucky to escape with relatively minor damage, being struck by fragments from the near-misses of 15 bombs and 100 German artillery shells. She was hit by another heavy shell three days later, but was repaired and was operational again in the summer. *Kirov* was hit by two bombs on 24 April, but was also repaired and returned to service early in 1943. In all, I Fliegerkorps launched 596 sorties against Leningrad in April 1942; while Luftflotte 1 launched a total of 9047 sorties in support of Army Group North. Twenty-nine aircraft were lost, mostly in the hazardous attacks on Leningrad.

From their bases in northern Norway, the bombers of Luftflotte V resumed their attacks on the Allied convoys which were now pushing their way through the broken ice floes towards the North Russian ports of Murmansk and Archangel. The shipping attacks were mostly carried out by the Ju 88s of KG 30, while the Ju 87s of St.G 5 (the former IV Gruppe LG 1) attempted to disrupt the railways that were transporting the newly arrived supplies from Murmansk to the frontal areas. Attacks were also carried out on the port of Murmansk itself: on 15 May 1942, for example, Ju 87s of I/St.G 5 badly damaged the Soviet submarine *Shch-403* and the US freighter *Yaka*. The Stukas registered a bigger

success on 1 June, when they sank the 6960-tonne (6850-ton) British freighter *Empire Starlight*.

Stukas in the Crimea

In the Crimea, the focus of German air attacks was the Soviet Black Sea Fleet, whose principal task in April 1942 was to run supplies through to Sevastopol. Between 9 and 15 April, attacks by St.G 77 on *Novorossisk* and *Tuapse* damaged the cruiser *Voroshilov* and the destroyers *Nezamozhnik* and *Sposobny*. On 28 April, Stuka attacks on several destroyers carrying a relief force of 2000 troops to Sevastopol forced the warships to turn back, although they completed their mission the following day. The stage was now set for a German assault on Sevastopol. On 2 June 1942, Manstein began an artillery and air bombardment of the fortress that lasted five days, the whole of von Richthofen's VIII Fliegerkorps being committed. On the morning of 7 June, Manstein flung his infantry into the attack. The Luftwaffe maintained a blistering sortie rate, while the German artillery kept up an uninterrupted bombardment of the Soviet positions. The Black Sea Fleet remained fully committed to supplying the fortress and evacuating the wounded, the crews of the Soviet ships taking terrible risks.

One air attack, by Ju 87s and Ju 88s, caught several Soviet vessels while they were unloading: the 4802-tonne (4727-ton) freighter *Abkhaziya*, the destroyer *Svobodny* and the minesweeper *T-413* were sunk. On 12 June, the cruiser *Molotov* and the destroyer *Bditelny* offloaded 3300 men of the 138th Rifle Brigade and had just begun to shell land targets when a Stuka attack developed – both warships managed to outmanoeuvre the bombs. On 13 June, the 4934-tonne (4857-ton) transport *Gruziya* survived a night attack by Italian MTBs, only to be sunk by air attack in Sevastopol the next morning. In a further air attack on 18 June, the flotilla leader *Kharkov* was damaged and rendered unmanoeuvrable by near-misses, but was towed to safety.

In a particularly gallant action on 27 June, the flotilla leader *Tashkent* (Captain 3rd Class

Above left: German troops move through the ruined buildings of newly conquered Sevastopol. St.G 77 was heavily involved in the reduction of the city, flying missions against enemy batteries and headquarters.

Below left: The calm after the storm. German troops relax amongst the debris of war at Sevastopol. This is Maxim Gorky fort, which was targeted by Ju 87s.

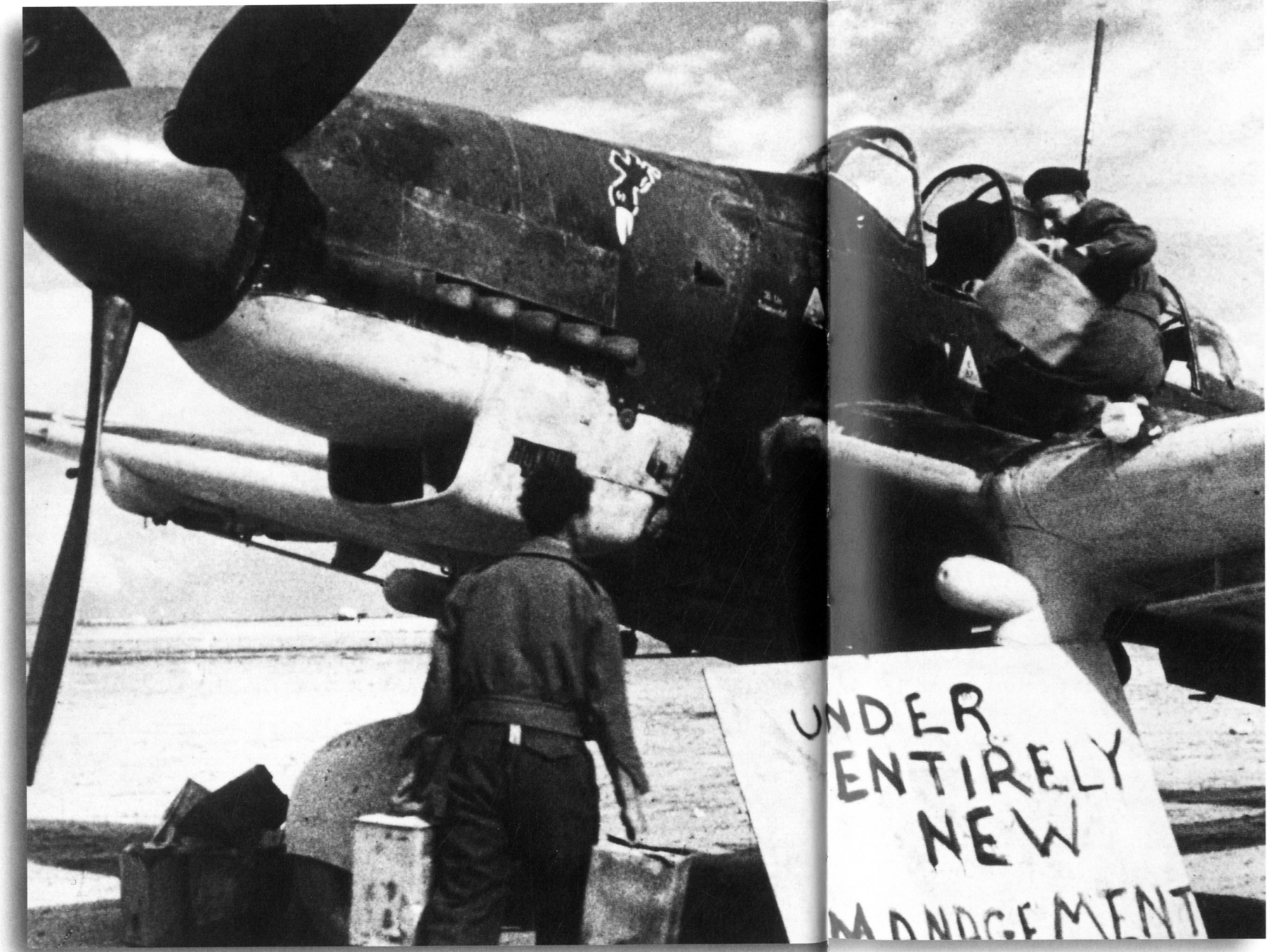
Above: An aerial shot of battle-scarred Sevastopol.

Yeroshenko), which had made some 40 round trips between Novorossisk and Sevastopol, offloaded 944 reinforcement troops at the garrison and then set sail for Novorossisk with 2300 casualties on board. She had to run the gauntlet of almost continual Stuka attacks, and near-misses caused her to spring leaks to such an extent that she shipped 1930 tonnes (1900 tons) of water. She was towed into harbour, but foundered the next day. On 30 June, the Germans broke into Sevastopol, and the Russians began to evacuate the garrison. The evacuation went on until 3 July, under conditions of extreme difficulty. Since the Soviet forces had to force back German frontal attacks, the embarkation areas were under continuous enemy fire, and the Russians had no means of protecting them from the Luftwaffe. Only a small proportion of the garrison succeeded in escaping; the Germans and their Romanian allies took some 97,000 prisoners. It was a victory due in no small measure to the activities of VIII Fliegerkorps, whose aircraft had flown 23,751 sorties and dropped 20,856 tonnes (20,528 tons) of bombs during the siege. Thirty-one Stukas had been lost, all victims of anti-aircraft fire. But the 250-day siege of Sevastopol had cost the Germans 24,000 casualties, which meant that Manstein's forces were badly in need of replacements and a long rest. It was a luxury that was to be denied them.

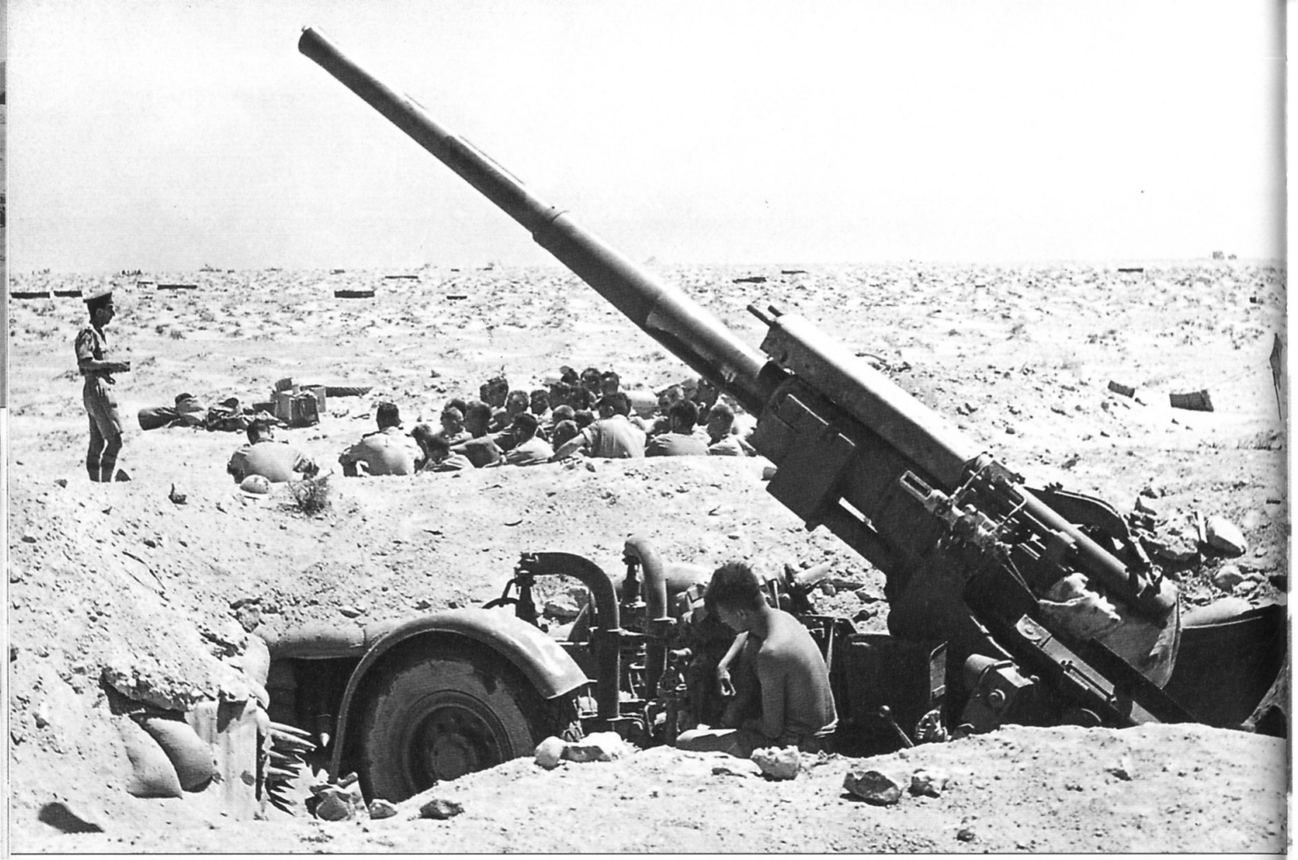
Mediterranean Theatre: June 1941–May 1943

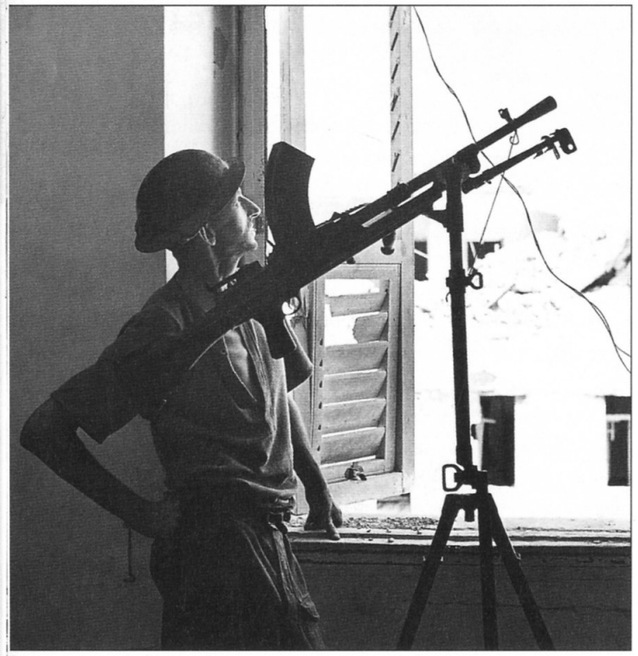
The Stuka made a valuable contribution to the war in North Africa and in the Mediterranean, especially the capture of Tobruk in June 1942.

In June 1941, the dive-bomber component of the Axis forces in North Africa comprised the Ju 87s of II/St.G 2 and I/St.G 3, together with the 209th squadron of the Regia Aeronautica. However, such was the critical shortage of fuel experienced by the Axis that most of the available supplies were allocated to the Luftwaffe, which consequently bore the brunt of the air campaign in North Africa during the second half of 1941. With the Luftwaffe's resources tied up in Russia, the pendulum of the naval war in the Mediterranean seemed to be swinging back in Britain's favour, and the admiralty decided to exploit the situation by basing a small force of cruisers and destroyers (Force K) on



Left: At an Allied airbase in North Africa, a captured German Stuka gets a new coat of paint.





Malta. They arrived on 21 October and were soon in action. On 9 November, in a brilliantly executed night attack, they sank all seven merchant ships in a heavily defended Italian convoy; later in the month, they sent two Africa-bound convoys to the bottom. Between 1 June and 31 October 1941, 223,520 tonnes (220,000 tons) of Axis shipping was sunk on the convoy routes to North Africa. Of this, the Royal Air Force (RAF) and Fleet Air Arm sank 116,840 tonnes (115,000 tons), with Malta-based torpedo-bombers accounting for at least three-quarters of that.

Above: An Allied 3.7in anti-aircraft gun placed in the defence of Tobruk is given a service.

Left: A British soldier in Tobruk keeps an eye out for Stukas. He is manning a Bren light machine gun.

Right: Ju 87s on their way to attack British tanks at Ghobi on 23 November 1941.

Meanwhile, on 14 June 1941, British and Empire forces in North Africa had launched Operation Battleaxe, an attempt by armour and infantry to break Rommel's hold on Cyrenaica and relieve Tobruk. The offensive was supported by every available Allied aircraft, amounting to 105 bombers and 98 fighters. It was a costly failure, the RAF losing 33 aircraft and the Axis 10. The operation underlined the need for effective air/ground cooperation. It also underlined the effectiveness of the Stuka in breaking up formations of armour and pinning down its supporting infantry. But the real architect of victory was the Germans' 88mm anti-aircraft gun, now used with deadly effectiveness against the British armour. For the defenders of Tobruk, the normal everyday problems were not made any easier to bear by the fact that the Axis airfields from which the Stukas flew were sufficiently close for the defenders to hear the aircraft starting up prior to take-off. Two of the airfields, El Adem and Acroma, were only about 16km (10 miles) away.

Operation Crusader

Once the last of the RAF's Hurricane fighters had been withdrawn, the only permanent line of defence against the bombers was the anti-aircraft guns of the Royal Artillery, supplemented by the guns of ships in the harbour. Two regiments of 3.7in and captured Italian 102mm guns, plus three regiments with 40mm Bofors, remained in Tobruk throughout the siege, pitting their wits against each new variation and combination of attack by high-level bombers and dive-bombers. Throughout countless raids, the gunners emulated their colleagues on Malta by maintaining a miniature "Grand Barrage" in the face of fierce bravery from the German and Italian aircrews who sometimes swept in at less than 150m (500ft) above the gun pits. On 18 November 1941, the British launched a rather better planned operation named Crusader, with the aim of destroying the bulk of Rommel's armour, relieving Tobruk and retaking Cyrenaica as a preliminary to invading Tripolitania. The offensive was supported by 14 squadrons of short-range fighters (Hurricane Is and Curtiss P41 Tomahawks), two of long-range fighters (Bristol Beaufighters and Hurricane IIs), eight squadrons of medium bombers (Blenheims and Martin Marylands) and three tactical reconnaissance squadrons (two Hurricane, one Douglas Boston).

Strong fighter sweeps by Hurricanes and Tomahawks quickly established air superiority deep inside Libya, while bombing attacks were made on enemy shipping, oil and supply storage facilities and the ports used by Axis forces in North Africa and Italy. The offensive enjoyed initial success, although an attempted breakout by the Tobruk garrison was forestalled by the rapid redeployment of Rommel's armour. The German defensive line at Gazala was breached in December, and British forces pushed on towards Benghazi but were halted at El Agheila. With British airpower on the increase in the latter half of 1941, it was clear that the fighter support available to the Afrika Korps was no longer adequate. In June 1941, this was the responsibility primarily of the Regia Aeronautica, which had a total strength in the theatre of some 70 fighters. The fighter groups were the 2nd and 155th with Fiat G50s, and the 18th and 151st with CR42s. In July, this force was joined by the 153rd and 157th Gruppi with Macchi MC200s. The only really effective fighter formation at Rommel's disposal was I/JG 27, which established itself at Gazala in April 1941 with Bf 109Es. In September, this Gruppe was replaced by II/JG 27, which was equipped with the greatly improved Bf 109F (trop); and in December, the whole Geschwader was operating from Tmimi, all three Gruppen being armed with the Bf 109F.

Rommel's counteroffensive

At this juncture, the Allied commanders confidently anticipated that the Axis forces would stay put to rest and regroup; however, they reckoned without the dash and initiative of Rommel. Fortified by two supply convoys that reached Tripoli in January 1942, he launched a counteroffensive almost immediately. On 22 January and on 28 January, he almost succeeded in destroying the Hurricanes and Tomahawks of the

Desert Air Force's No 238 Wing at Antelat. The airfield was badly flooded, and this had prevented the RAF fighters from interfering with the Stuka squadrons that supported Rommel's drive eastwards; nevertheless, most of them managed to escape just before the airfield was overrun by German tanks. Before long, despite the efforts of the Desert Air Force, the British forces in Cyrenaica were in full retreat. Only intense air attacks stopped the Axis armour breaking through into Egypt, and in February the Afrika Korps was halted on a line stretching from Gazala to Bir Hakeim.

Fighting in the desert presented new challenges to the Stuka pilots. Very early on they discovered that the dust thrown up by movement on the ground made it difficult to differentiate between friend and foe from the air. Therefore bombing "stoplines" had to be established and clearly defined to present friendly units being hit. The counteroffensive in Cyrenaica highlighted the importance of assigning air liaison staffs to German pursuit forces. These men were equipped with radios to allow them to direct Stuka units to worthwhile targets; more importantly, they could also constantly report the lines reached to units in the air and thus prevent ground forces being bombed by their own side.

Sand and dust had no immediate effect on Stukas, since sand filters were attached to the intake valves. Heavy sandstorms made flying impossible because of the severe reduction in visibility. Airfields that consisted merely of sand made it difficult and often dangerous for several aircraft to take off and land together. When there was no wind the dust hung over the ground for long periods, though when the wind was blowing the dust kicked up by a take-off or landing was blown to one side and did not disturb pilots behind. Dropping

Below: An Australian soldier looks on as a downed Ju 87 is engulfed in flames outside Tobruk.

Above: A Stuka overflies panzers near Tobruk.

Left: An Italian Stuka that was forced to land near British lines on 18 October 1941. The Italian pilot accused the German ground staff of only half-filling his fuel tanks!

bombs on targets also created problems for Stuka pilots, since the dust thrown up by the first bomb often made it impossible to sight the target accurately.

The great heat in the desert also had an effect on take-offs and landings. The density of the air was so reduced that the lengths of take-offs and lengths of landing strips had to be increased by up to 50 percent. Landing operations could also be affected by strong air reflections in the heated ground layer, thus causing errors in the estimation of altitude.

During the weeks that followed Rommel's offensive, there was frequent and bitter air fighting between the opposing sides. On 19 February 1942, for example, three Hurricanes of No 3 Squadron, Royal Australian Air Force (RAAF), flown by Flying Officer Alan Gatward, Flight Lieutenant J.R. "Jock" Perrin and Flying Officer Alan Boyd, set out for Agedabia to carry out an offensive patrol. In the course of this they encountered a number of Ju 87s from II/St.G 2 dive-bombing the village. Perrin looked around for escorting enemy fighters before attacking together with Gatward, leaving Boyd as cover above. Perrin shot down a Ju 87 (WkNr. 5455) of 5 Staffel St.G 2 flown by Gefreiter Kurt Stuber and Gefreiter Walter Nentwig, both of whom survived but were injured. The Hurricanes were then attacked by four Bf 110s from 8/ZG 26. Lieutenant Alfred Wehmeyer and Gefreiter Max Hohmann attacked Gatward and shot him down. Gatward was last seen by Perrin in flames and crashing into the seashore. Sergeant Richard Heller and Lieutenant Prang shot down Perrin, who succeeded in making a forced landing in his burning aircraft. Lieutenant Wehmeyer, who had shot down Gatward, was himself shot down and had to ditch. He and his wounded gunner, Gefreiter Wilhelm Wurst, got into their dinghy and were picked up 48 hours later by an Axis rescue craft.

Perrin was wounded in one eye and severely burned. He was picked up by a patrol car and taken to Benina where he told his colleagues how, as he staggered from his burning aircraft following the crash-landing, he was repeatedly machine-gunned by the Messerschmitts. They had dived on him as, half-blinded by oil and blood, he made a desperate dash for shelter under a tree. On the night of his arrival at hospital in Tobruk, a bomb exploded close to the building, and he ended up on the floor with a window frame draped around his neck. Shortly after this, all the hospital patients in Tobruk were evacuated to Alexandria aboard the hospital ship *RAMB 111*, but this vessel was sunk by Ju 87s en route. Perrin counted himself lucky to survive.

At 16:35 hours on 5 April, a Hurricane patrol from 3 RAAF Squadron took off from Maraua, led by Squadron Leader Campbell, to provide cover for the hard-pressed British forces. They also intended to search for a missing pilot (Flying Officer Edwards, who had force-landed uninjured during another mission earlier in the day and had been taken prisoner). The seven Hurricanes, including three from "B" Flight of 73 Squadron, soon sighted a dozen dive-bombers from 4 Staffel, St.G 2, south of the Barce Pass. In the ensuing combat, Campbell was shot down and killed, presumably mortally wounded by return fire from the Stuka he engaged. Nine of the Ju 87s were claimed to have been shot down in this action. Flight Lieutenant Perrin and Flying Officer Jewell each claimed three destroyed, while Flying Officer Jackson was awarded one and two probables. Pilot Officer Millist and

Sergeant Garton, both from 73 Squadron, each claimed one, while Millist reported a second as damaged. St.G 2's 4 Staffel lost its leader, Lieutenant Hans Sonntag, and his gunner, Sergeant Heinrich Kieselhorst, both being killed when their aircraft (WkNr 6046) crashed. Gefreiter Heinrich Ehlers, gunner aboard Flight Sergeant Heinz Gragert's aircraft (WkNr 5951/T6+GH), was also killed. Gragert was taken prisoner and may have been Jackson's victim. Three other Ju 87s were forced down, each with a wounded gunner aboard (Sergeant Günther Stulken, Gefreiter Kurt Heinrich and Gefreiter Walter Rauer).

As soon as the Hurricanes landed at Maraua, the pilots were told to leave immediately for Derna since enemy ground units were outflanking the British forces in the area. Bitter though the loss of most of Cyrenaica undoubtedly was, it by no means represented a crushing defeat. The Eighth Army still held territory in eastern Cyrenaica, and the defensive line was a long way west of the defensive border. Moreover, the Desert Air Force retained some forward bases in Cyrenaica from which its aircraft could strike deep into the enemy's rear areas. Rommel's success, achieved with

Above: Through the choking dust of the desert, German Stukas taxi to take-off on a makeshift runway.

Right: In North Africa, Stukas were often used to tow gliders containing Ju 87 spares and fuel.

Overleaf (pp158–159): A Ju 87 painted in distinctive desert camouflage undergoes routine maintenance. The emblem on the nose shows it is from I/St.G 1.

fairly limited forces, would not have been possible without the drastic reduction of Malta's offensive capability caused by the renewed air onslaught that opened at the end of 1941. In December, as a preliminary to neutralizing the troublesome and unbowed island of Malta as a strategic base, the Luftwaffe returned to Sicily in strength. This time it was not X Fliegerkorps, but II Fliegerkorps: it comprised I/KG 54, II and III/KG 77, Kustenfliegergruppen (KGr) 606 and 608, all with Ju 88A-4s; I and II/St.G 3 with Ju 87Ds; I/NJG 2 with Ju 88Cs (for night intruder operations); III/ZG 26 with Bf 110s; and JG 53 with Bf 109Fs.

Initially, the bombers carried out dispersed dive-bombing attacks in small groups and suffered substantial losses, but by the end of the year II Fliegerkorps had worked out a revised bombing policy. Its aim was threefold: first, to destroy the RAF fighter defences on Malta by means of heavy and repeated air attacks; second, to neutralize the bomber and torpedo-bomber bases on the island; and, third, to attack the docks and harbour installations around Valletta. When these objectives had been achieved, the island would be open to invasion.

The attacks on Malta's airfields began in earnest in January 1942, but were hampered by bad weather. On 7 March 1942, in an operation codenamed Spotter, 15 Spitfires flew off the aircraft carriers HMS *Eagle* and *Argus* at extreme range. All arrived safely, as did nine aircraft on 1 March (Operation Picket I) and seven more on 29 March (Operation Picket II): the newcomers were divided among the three Hurricane squadrons defending the island, Nos 126, 185 and 249. These had only 30 serviceable aircraft between them, and the Spitfires arrived just in time because, on 20 March, the German air onslaught began to get into its stride with an attack by 60 Ju 88s on Takali airfield. On 22 March, four supply ships, escorted by four light cruisers and 16 destroyers, tried to reach Malta from Alexandria. An attempt by Italian warships to intercept the convoy was beaten off in the Gulf of Sirte, but the ships were later subjected to heavy air attack by the Stukas of St.G 3 from North Africa and then by the Ju 88s of II Fliegerkorps from Sicily. The transport *Clan Campbell* was sunk 32km (20 miles) short of the island, and the naval supply ship HMS *Breconshire* was so badly damaged that she had to be beached. The other two transports reached Valletta

Harbour, but both were sunk by air attack two days later. Only one-fifth of the convoy's supplies reached Malta's storehouses.

The Malta convoys

Within a month, Malta's position was once again desperate. On 20 April 1942, Operation Calendar was mounted, in which 47 more Spitfires reached the island after flying from the aircraft carrier USS *Wasp*. However, their arrival had been detected by the Germans, and within hours their airfields were under attack. By the end of the next day, after further heavy raids, only 18 of the original 47 Spitfires were still airworthy. On 9 May, *Wasp* returned, together with *Eagle*, and between them the carriers flew off 64 more Spitfires, which went into action almost immediately. The following day saw a major air battle over the island when the Luftwaffe made a determined effort to sink the minelayer HMS *Welshman*, which had docked in Valletta Harbour laden with supplies and ammunition. Between them, the island's Spitfires and Hurricanes flew 124 sorties that day, destroying 15 enemy aircraft. Three Spitfires were lost, but two of the pilots survived. Seventeen more Spitfires arrived later in May, and deliveries of fighter aircraft continued throughout the summer months of 1942: *Eagle* alone delivered 182 Spitfires before she was sunk by a U-boat. Most of the ferry work was undertaken by *Furious*, which flew off 37 Spitfires on the day *Eagle* went down, followed by 27 more on 7 August.

The fighter reinforcements flown to Malta brought the island's air defences up to numerical strength, but the supply situation was critical. In the middle of June, therefore, two convoys sailed to Malta's relief: one from Alexandria, Port Said and Haifa, codenamed Vigorous and consisting of 11 transports, escorted by units of the Mediterranean Fleet; and the other, codenamed Harpoon, from Gibraltar, with five freighters and a tanker, shepherded by Force H. This convoy, which had fighter protection provided by the aircraft carriers *Eagle* and *Argus*, was heavily attacked by Italian air and naval forces, and only two freighters reached Malta. The Vigorous convoy, which had no air protection, suffered its first losses when it was attacked by Ju 88s south of Crete; then, on 15 June, it was attacked by the Ju 87s of Colonel Sigel's St.G 3, flying from their North African bases. The Stukas sank the destroyer HMS *Airdale* and also hit and damaged the cruiser HMS *Birmingham* and the destroyer HMS *Nestor*, the latter so badly that she sank the next day. Faced with these losses, and with units of the Italian fleet apparently heading to intercept, the operation was abandoned and the convoy returned to Alexandria.

Ju 87s versus the Royal Navy

The two merchantmen of the western convoy that had got through to Malta carried enough supplies to give the island a breathing space, but it was short-lived. By the beginning of August, the situation on Malta was once again critical. On the 10th, the Admiralty mounted Operation Pedestal, a do-or-die attempt to relieve the island; 13 freighters and the tanker *Ohio* passed into the Mediterranean en route for Malta. To support the convoy, every available warship had been assembled. The escort and covering force included the carriers HMS *Victorious*, *Indomitable* and *Eagle*, the battleships HMS *Nelson* and *Rodney*, seven cruisers (three anti-aircraft) and 25 destroyers. The convoy also included the old aircraft carrier *Furious*, which was to accompany the main body to a point 240km (150 miles) west of Malta, where she would fly off 38 Spitfires (Operation Bellows).

Eagle was an early loss, sunk by the German submarine *U-73* on 11 August. Later in the day, attacks by Ju 88s were frustrated by fighters and the convoy's anti-aircraft defence. On the 12th, further heavy attacks by Ju 88s and Italian bombers and torpedo-bombers resulted in one transport being damaged and left behind. Then, in the evening, it was the turn of St.G 3. Under strong fighter cover, 29 Ju 87s pressed home their attacks with great determination. Several Stukas broke through *Indomitable*'s fighter screen and dropped three bombs on the carrier: they failed to penetrate her armoured flight deck, but for the time being she could not operate

Above: The carrier HMS *Eagle* lists heavily after being torpedoed during escort duties for the Malta convoys.

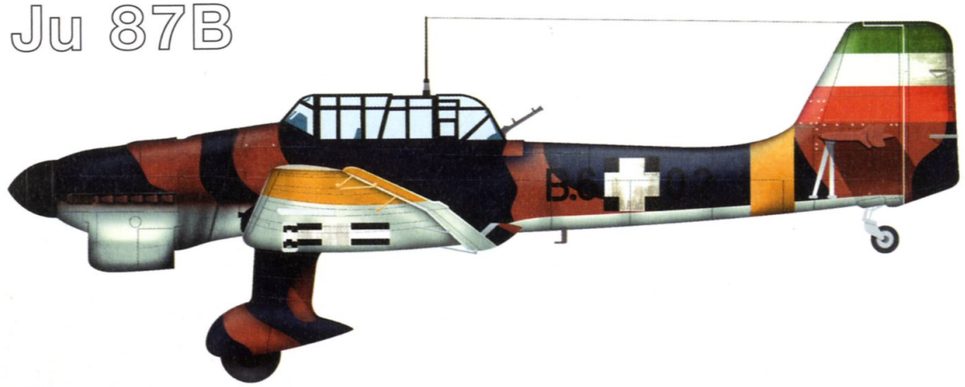
her aircraft. The attacks, by aircraft, surface forces and submarines, continued without let-up. On the 13th, Ju 87s and Ju 88s hit the tanker *Ohio* and the transports *Dorset*, *Port Chalmers* and *Rochester Castle* in two successive attacks; in a third, the Stukas succeeded in sinking the 10,812-tonne (10,642-ton) *Dorset*. Only four of the merchantmen – including the vital tanker *Ohio*, which was terribly damaged – got through to Malta, and the escort suffered the loss of the cruisers HMS *Cairo* and HMS *Manchester*.

Italian Stukas were heavily involved in the attacks on the Harpoon convoy, and one fierce air battle between Italian dive-bombers and their fighter escorts on the one hand and RAF Spitfires and Hurricanes on the other is described by an Italian source: "At 11:00 hours on 15 June, 25 MC.202s from the 155o Gruppo CT (6 of the 351a Squadriglia, 10 of the 360a Squadriglia and 9 of the 378a Squadriglia), led by Maggiore Fanali, took off to escort 10 Italian Ju 87s of the 102o Gruppo (led by Capitano Giuseppe Cenni), which set out to attack the convoy 'Harpoon' bound for Malta. They found the convoy 70km south of Pantelleria. At 12:10 hours, while the Junkers were diving with their 500kg bombs, escorting Spitfires from 601 Squadron attacked them. The 360a Squadriglia attacked the British fighters, and Capitano Carlo Miani (CO of the 360a Squadriglia), Tenente Tullio Martinelli, Sottotenente Francesco Fagiolo and Maresciallo Pasquale Bartolucci claimed a Spitfire each, while Sottottenente Romano Biasiol, Tenente Giambattista Caracciolo, Sottottenente Nicola Longano and Sergente Maggiore Mario Varacca claimed a shared Hurricane. Another Hurricane was claimed by 1o Aviere Motorista Enrico Boerci, gunner of a Stuka flown by Sergente Maggiore Gastone Converso (209a Squadriglia).

"One Ju 87R-2 ('239-8' MM7084; previous Werknr. 5792) of the 239a Squadriglia was damaged by enemy fire and made an emergency landing in the water 50km southeast of Pantelleria Island; the crew (pilot Maresciallo Antonio Marchetti and gunner Aviere Scelto Montatore Luigi Grosso) became MIAs [missing in action]. Two other Ju 87s (flown by Capitano Aldo Stringa – CO of the 209a Squadriglia – and Maresciallo Zaccaria Perozzi of the 239a Squadriglia) suffered heavy damage to wings and rudders but landed safely at base, while two more suffered light damage. None of the escorting MC202s were damaged. The Spitfires claimed two Ju 87s destroyed, two probable Ju 87s and one damaged. Twenty-one-year-old Sergeant Jack Nock McConnell (RAF no. 405293) was killed when he dived into the sea with his Spitfire (BR306). Two more Spitfires were damaged while Sergeant G. Allen-Rowlandson (BR360) had to ditch when he ran out of fuel on the return journey."

The last Spitfire reinforcement to Malta, Operation Train, took place on 25 October, when *Furious* flew off 31 aircraft; 29 reached the island. The enemy raids

Ju 87B



SPECIFICATIONS

Type: *dive-bomber/ground-attack (Italian, 1942)*
Entered service: *1938*
Crew: *2*

Engine
Powerplant: *1 x Junkers Jumo 211A-1*
Type: *12-cylinder liquid-cooled*
Horsepower: *1100*

Dimensions
Wing span: *13.8m (45.3ft)*
Propellor diameter: *3.3m (10ft)*
Length: *11.1m (36.5ft)*
Height: *3.9m (12.75ft)*

Weights
Empty: *2750kg (6080lb)*
Loaded: *4250kg (9371lb)*

Performance
Maximum speed: *390kmh (242mph)*
Cruising speed: *318kmh (198mph)*
Range: *600km (373 miles)*
Service ceiling: *8000m (26,250ft)*
Ceiling with maximum load: *5000m (16,500ft)*
Normal radius of operation: *300km (187 miles)*

Armament
3 x 7.92mm machine guns
1 x 500kg bomb + 4 x 50kg bombs

continued, reaching their climax in November 1942 when the Germans subjected Malta to a furious round-the-clock bombardment that lasted 10 days. The defenders remained unbroken, and the offensive against the supply convoys ferrying desperately needed supplies and reinforcements to the German and Italian forces in North Africa went on almost unchecked.

The battle for Malta was over – by the end of the year, most of the Luftwaffe units in Sicily had been withdrawn for service on other fronts. The Stukas had already departed, III/St.G 3 having made its last attack on Malta on 9 May 1942 before departing to join the rest of the Geschwader at Bir el Hania in North Africa. A fortnight later, the Afrika Korps launched a fierce assault on the Gazala Line, three Axis divisions attempting to outflank the line and meeting fierce resistance at Bir Hakeim, which was held by the 1st Free French Brigade. For 10 days, the French troops resisted fierce attacks by the Italian *Ariete* Division, which lost 40 tanks, and withstood continual artillery and air bombardment. During daylight hours, relays of Stukas were almost constantly overhead, their attacks directed by forward air controllers. The Desert Air Force did what it could, and its Hurricanes and Curtiss P41 Kittyhawks wrought havoc among the dive-bombers, but the British fighters were up against

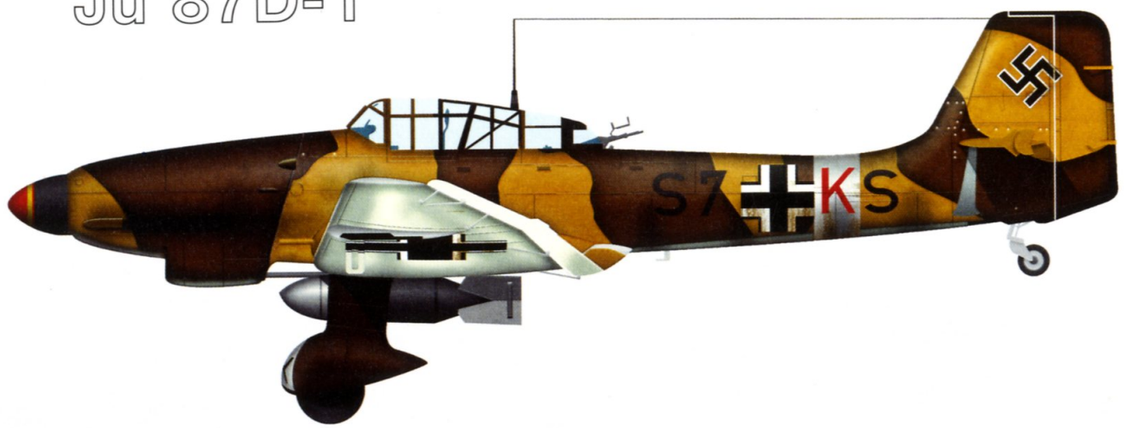
Above: British positions in the Western Desert under heavy bombardment from Ju 87 Stukas. In the foreground, Italian troops watch the action.

formidable opposition. JG 27 was up to full strength in aircraft and pilots, and the sky around Bir Hakeim was the scene of fierce air battles.

One of the biggest took place on 3 June. During the first attack of the afternoon, the Stukas were intercepted by RAF and South African Air Force Kittyhawks, and soon the dive-bombers were beginning to go down in flames. Then two Bf 109s appeared, and without hesitation their pilots attacked the South Africans, who – believing they were being set upon by a superior force – formed a defensive circle. The leading German pilot got inside it and shot down a Kittyhawk. In less than 12 minutes, he had destroyed five more. His wingman, who had been circling watchfully overhead, later said: "I had my work cut out counting his victories, noting the times and position, and simultaneously protecting his tail. His judgement of deflection was incredible. Each time he fired I saw his shells strike first the enemy's nose, then travel along to the cockpit. No ammunition was wasted." The pilot, whose wingman was Rainer Pöttgen, was Flying Officer Hans-Joachin Marseille, the desert ace who was already a legend. In Germany, the newspapers hailed him as "The Star of Africa".

Despite the efforts of JG 27's fighter pilots, the Stukas suffered serious losses in the assault on Bir Hakeim, and Ju 88s were called in from Greece and Crete to reinforce the Luftwaffe's formations. Finally, the Germans set 10 June as the date for an all-out air and ground attack on the Bir Hakeim Brigade Box. The task was far from simple, as Rommel himself explained: "The French fought in a skilfully planned system of field positions and small defence works – slit trenches, small pill-boxes, machine-gun and anti-tank

Ju 87D-1



SPECIFICATIONS

Type: *anti-tank aircraft (St.G 3, 1942)*
Entered service: *1941*
Crew: *2*

Engine
Powerplant: *1 x Junkers Jumo 211J-1*
Type: *12-cylinder liquid-cooled*
Horsepower: *1300*

Dimensions
Wing span: *13.8m (45.3ft)*
Propellor diameter: *3.3m (10ft)*
Length: *11.5m (37.9ft)*
Height: *3.9m (12.9ft)*

Weights
Empty: *3900kg (8580lb)*
Loaded: *6600kg (14,250lb)*

Performance
Maximum speed: *408kmh (255mph)*
Cruising speed: *310kmh (193mph)*
Range: *1500km (937 miles)*
Service ceiling: *7320m (24,000ft)*
Ceiling with maximum load: *4730m (16,520ft)*
Normal radius of operation: *600km (375 miles)*

Armament
3 x 7.92mm machine guns
1 x 1000kg bomb + 4 x 50kg bombs

gun nests – all surrounded by dense minefields. This form of defence system is extraordinarily impervious to artillery fire or air attack, since a direct hit can destroy at the most one slit trench at a time. An immense expenditure of ammunition is necessary to do any real damage to an enemy holding a position of this kind. Under non-stop attacks by our Luftwaffe [from 2 June] up to the capture of the last French positions on the 11th, the Luftwaffe flew 1300 sorties against Bir Hakeim, the French positions were attacked in the north by mixed assault groups drawn from various formations, and in the south by 90 Light Division. Attack after attack came to a halt in the excellent British defence system."

However, in the end the French position became hopeless, and the survivors of the Free French Brigade were ordered to break out. By pinning down the Axis divisions, the brigade had bought valuable time, enabling the Eighth Army to regroup and fall back in good order to the Egyptian frontier. On 17 June, the Axis forces

captured El Adem; and, the next day, the RAF airfield at Gambut. Now, with its air cover completely removed, and the Stukas operating from the newly captured airfields, Tobruk could be assaulted without interference. At 05:20 hours on 20 June, the Stukas of St.G 3 began coordinated attacks with the Axis ground forces, their bombs blasting a path through the barbed wire and minefield defences. After that came the Ju 88s of LG 1, bombing the British artillery positions in front of the Axis spearhead, and then the Bf 110s of III/ZG 76 and the CR42s of the Settore Est ground-attack squadron, strafing machine-gun positions and anti-tank posts. Ninety minutes after the first attack, the Stukas returned, and the process was repeated for hour after hour. At 09:20 hours the next day, the Tobruk garrison, then composed mainly of South African troops under General

Left: A Messerschmitt Bf 109 fighter escorts a Ju 87 over North Africa. Note the flat barren desert landscape, which made vehicles very vulnerable to air attack.

Below: German artillery and aerial bombs batter British formations during the Battle of Gazala in June 1942.

Klopper, capitulated. After withstanding every assault for 28 weeks, Tobruk had fallen within as many hours. Yet again, it had been a demonstration of the deadly effectiveness of Stukas, combined with tanks and supporting infantry. Only two Stukas were lost during the entire operation, both as the result of a collision. Rommel, newly promoted to field marshal, promised to reach the Nile in 10 days once his offensive was renewed.

In August 1942, General Bernard Montgomery assumed command of the Eighth Army. At this time, the Allied forces were holding a short defensive line in western Egypt between El Alamein and the Qattara Depression. This was attacked in strength by the Afrika Korps, again with strong air support, on 31 August, but the Eighth Army held on and inflicted heavy losses on the enemy. By 5 September 1942, it was clear that Rommel's offensive – hampered by continual air attack on its overstretched supply lines – had failed, and the Eighth Army prepared a massive counterattack at El Alamein. As a preliminary, the Desert Air Force redoubled its efforts to achieve complete air superiority: on 9 October 1942, for example, two weeks before the start of the Eighth Army's offensive, three squadrons of Kittyhawks carried out a devastating low-level attack on the airfields in the vicinity of El Daba. These were some 10 minutes' flying time away from the Alamein defensive positions, where reconnaissance had revealed large numbers of German fighters bogged down in mud. Thirty-two Kittyhawks swept down on El Daba in the wake of a medium-level bombing attack by Martin Baltimores, and in the space of a few minutes they knocked out 30 enemy aircraft. The Luftwaffe loss, which could not readily be made good, deprived Rommel's dive-bombers of much of their vital fighter escort, and contributed in no small measure to the subsequent Commonwealth fighter superiority over the El Alamein Front.

Above: Stukas fly a bombing mission over Tobruk during Rommel's assault against the port in June 1942.

Right: A British soldier examines a downed Stuka dive-bomber near El Alamein in July 1942.

The Eighth Army's counteroffensive began on 23 October 1942, and Rommel's forces finally broke on 4 November. The coast road leading to the west was jammed with enemy convoys, which were attacked by the Desert Air Force during the pursuit into Cyrenaica. When Anglo-American forces landed in Morocco and Algeria on 8 November, the fate of the Afrika Korps was sealed. By that time, St.G 3's assets had been reduced to 30 aircraft, the remainder having been shot down or destroyed on the ground. The Germans fought on in Tunisia. For a time, armed with new ground-attack types such as the Focke-Wulf Fw 190G-1 and the Hs 129B, they even managed to establish a degree of battlefield air superiority. However, by the beginning of May 1943, with the Axis collapse in North Africa imminent, all Luftwaffe units were withdrawn to Sicily, Italy, the Balkans and Sardinia. The remnants of St.G 3 were among the first to leave, being withdrawn to Yugoslavia in March, where the Geschwader was reformed and re-equipped. I Gruppe was assigned to Luftflotte 4 in southern Russia; III Gruppe went to support Army Group Centre; and II Gruppe went to Greece in July, where it was joined by I Gruppe shortly afterwards, both under the command of X Fliegerkorps.

Russia
1942–43: Stalingrad and Kursk

The Ju 87G emerged as a major anti-tank platform on the Russian Front. In the hands of pilots like Rudel, it inflicted heavy losses on enemy tanks.

Under constant pressure from the German Sixth Army, the Soviet retreat eastwards continued throughout July 1942. By the middle of the month, the Germans had broken through to the Don: the Soviet southern front narrowly escaped encirclement by a rapid withdrawal behind the Lower Don, and shortly afterwards the armies of this front were transferred to the North Caucasus Front under the command of General A.I. Yeremenko. Air support for this front was provided by General Khryukhin's Eighth Air Army, with the Sixteenth Air Army under General Rudyenko forming part of the Stalingrad Front. While this reorganization went on, the Soviet High Command

Left: A Stuka is bombed-up by a Luftwaffe ground crew during the harsh winter of 1942–43.

Left: Above the house in the foreground, a Stuka in an almost vertical dive screams towards its target on the Eastern Front.

Right: A three-part picture showing the effects of Luftwaffe bombing raids on Stalingard. In the central image it is possible to see a Stuka emerging from its bombing run.

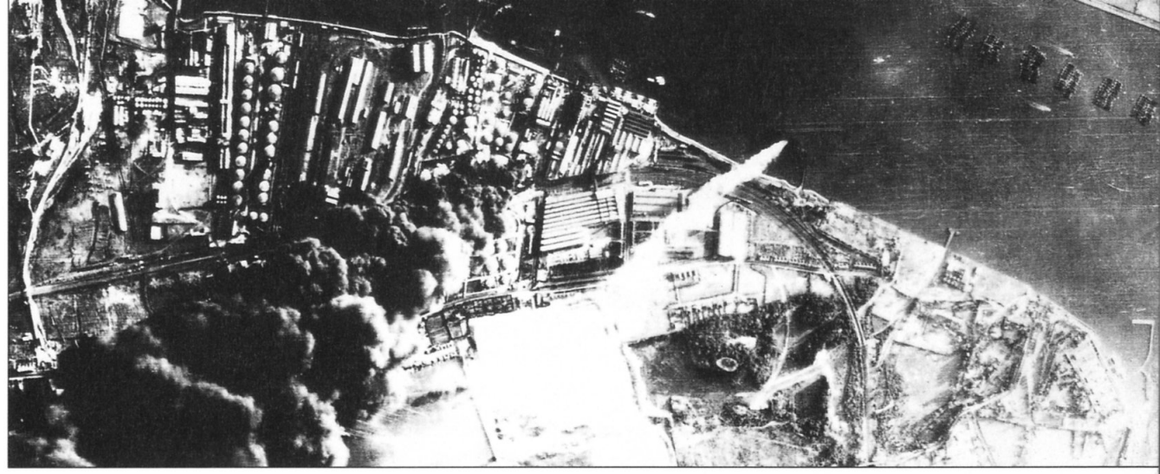
reinforced the two fronts with several reserve armies, hurriedly brought up from the east, and this helped to check the German advance towards the end of July. Then the Germans, too, were reinforced by troops from Army Group A and the Voronezh sector, and this fresh blood enabled them to drive a wedge through the Russian lines and reach the bend in the Don directly opposite Stalingrad.

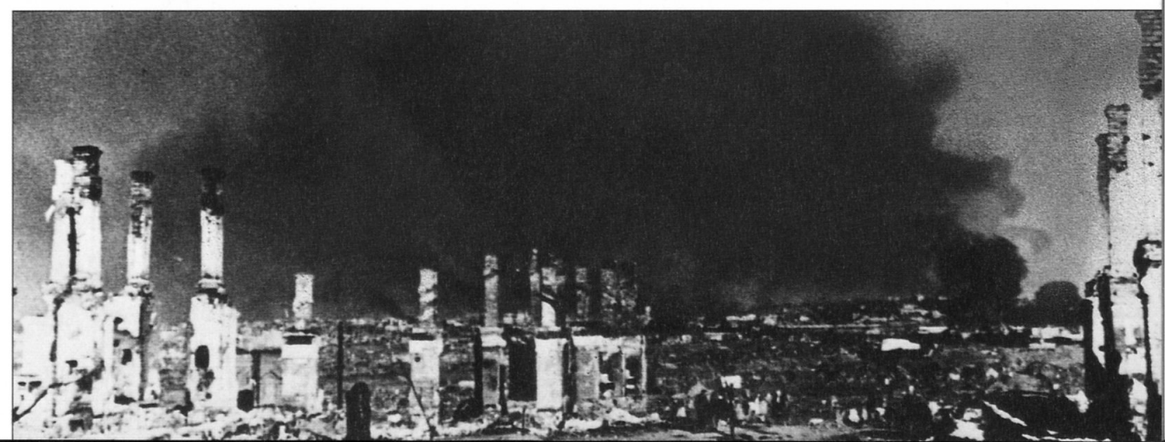
On the last day of July, a new threat materialized in the shape of a thrust from the Caucasus by the Fourth Panzer Army, driving towards Stalingrad from the southwest. A week later, the Sixth Army crossed the Don and established a foothold on the river's east bank. The battle for Stalingrad was on. The Russians counterattacked desperately, fighting for every yard of ground as General Paulus' Sixth Army fought its way from the Don bridgehead to the Volga. Behind the Russians' backs, Stalingrad lay under a pall of smoke as the city became the focus of a massive air onslaught by the whole of Luftflotte 4. The first big raid, which coincided with the breakthrough of the German vanguard to the Volga north of Stalingrad, came on 23 August. In successive waves, 200 German bombers approached the city, escorted by 50 Bf 109s. On the approach, the German formations were attacked by Yak-3 fighters of the 102nd Air Division, tasked with the defence of Stalingrad, and a fierce air battle developed. Although the Soviet fighter pilots were unable to prevent the majority of the German bombers from reaching their objectives, the fighters and heavy flak claimed the destruction of 90 German aircraft for the loss of 30 Soviet machines during the battles of 23 August.

The Battle of Stalingrad

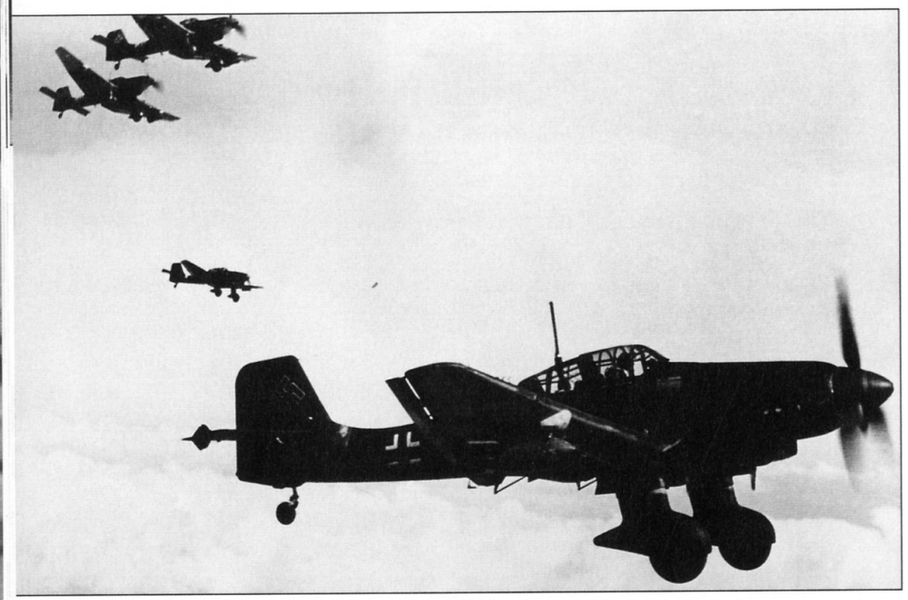
By the middle of September, the Germans were in Stalingrad itself, their advance through the city bitterly contested by General Chuikov's Sixty-Second Army. The Russians fought savagely, and every shattered building or stone wall that was seized by the attackers was paid for with dozens of lives. The battle for Stalingrad became a guerrilla campaign, with individuals or small groups of soldiers stalking each other through the ruins, and victory going to the fastest and the stealthiest. Effective air support in the forward areas became impossible on both sides, with the frontlines separated by a strip of land only a few yards wide. A Stuka flight of St.G 2 continued to operate within the Stalingrad Pocket until December before it, too, had to be withdrawn.

Towards the end of September, when the battle was still raging in the ruins of Stalingrad, the Soviet High





Command laid plans for a massive counteroffensive. It was to take the form of a gigantic pincer movement: one arm would strike northwest from the south of the city; the other would thrust south from the middle Don area, the two linking up on the curve of the Don and nipping off the Stalingrad salient. In this salient were the German Fourth Panzer Army and Paulus' Sixth Army, and the Soviet objective was to entrap and destroy them both. During the preparations for this offensive, large numbers of bomber aircraft as well as transports were used to ferry fresh troops to the Stalingrad Front from reserve areas east of Moscow. In addition, the strength of the Eighth and Sixteenth Air Armies was increased until the Russians enjoyed slight numerical superiority over Luftflotte 4. By the middle of November 1942, one-quarter of the Soviet Air Force's total combat strength had been concentrated on the Stalingrad Front in preparation for the coming counteroffensive, which was scheduled to start on 19 November.



Left: D-variant Ju 87s embark on an anti-armour mission on the Eastern Front in September 1942. Note the bombs on the underwing pylons.

Below: 13 October 1942 – Russian oil tanks blaze uncontrollably following a German bomber attack on an oil field in the Kuban region of the Caucasus.

The Russians had laid their plans carefully: the two arms of the giant pincer were to smash their way through the German defences at their weakest points, to the south of Stalingrad and near Serafimovitch, where Soviet forces already held a bridgehead on the south bank of the Don. In both these sectors, the Russians were opposed by Romanian troops who, as well as being inferior to the Russians in numbers of men and weapons, were for the most part poorly equipped. At 07:30 hours on 19 November, the Soviet Southwestern Front burst into life with a thunderous artillery barrage; a few minutes later, the first waves of Russian infantry went into the attack through fog and darkness, hurling themselves on the Romanian defences. The infantry were followed by three Soviet armoured corps, and against this massive onslaught the Romanian resistance quickly crumbled. Twenty-four hours later, the Soviet spearheads had advanced 32km (20 miles) into enemy territory; the retreat of the Romanian Third Army had become a rout, and it was only the intervention of the German 22nd Panzer Division that averted the annihilation of the Romanian forces by slowing the Russian advance.

The Soviet counteroffensive

Meanwhile, the counteroffensive by the Stalingrad Front, which began at dawn on 20 November, had also broken through the enemy defences south of the city. It was advancing steadily towards the town of Kalach, where the link-up with the armoured vanguard of the Southwestern Front was to take place. Kalach, with its strategic bridge over the Don, fell to General Rodin's XXVI Armoured Corps on the night of the 22nd, and the following afternoon the link-up was successfully completed. Throughout the first three days of operations, the Russian armies had a powerful ally in the weather. In the first week of November, the weather on the Stalingrad Front had suddenly turned bitterly cold, with the temperature dropping to minus -15 degrees. Then, on 17 November – two days before the Soviet counteroffensive began – a warm air stream crept over the steppes, bringing with it thick fog, snow and ice. This meant that the Luftwaffe, which might have smashed the counteroffensive in its early stages, was unable to operate. A few units did get off the ground, including I/St.G 2, and in spite of the murk they managed to deliver a number of attacks on the advancing Russians. However, the Soviet forces had learnt from bitter experience and had reinforced their forward elements with light flak. The Stukas consequently suffered heavy losses. A signal was sent to the commanders of the Luftwaffe bomber units on the Caucasus Front requesting urgent reinforcements, but the weather was just as bad there and the bombers were unable to get off the ground. Worse still, the German airbases in the Don Basin were being directly threatened by the Soviet drive southwards from Kalach. If these were seized, it would be impossible to airlift supplies to the Sixth Army, now encircled in Stalingrad.

Attempts to relieve Stalingrad

On 25 November, the Luftwaffe made a determined effort to supply the Sixth Army by air. The transport aircraft fleet initially comprised 11 Gruppen of Ju 52s and two of Ju 86s, amounting to 320 machines, but only about one-third were serviceable. Consequently, during the first two days of the airlift, Stalingrad received only 66 tonnes (65 tons) of the required daily total of 305 tonnes (300 tons) of fuel, food and ammunition. The operation was further complicated by renewed bad weather. On 30 November, He 111 bombers of KG 27, KG 55 and KG 100 joined the airlift into Stalingrad, with the Bf 109s of JG 3 assigned as fighter escort. During that day, the quota of supplies delivered rose to 102 tonnes (100 tons) – still barely one-sixth of the amount required by the Sixth Army. The trip into the Stalingrad Pocket in daylight was becoming extremely hazardous as more Russian fighters began to appear, and the number of German aircraft that failed to return climbed steadily. On 19 December, in response to a desperate appeal by General Paulus, the airlift was stepped up and the transport groups flew 450 sorties in three days, taking advantage of a spell of relatively clear weather to fly 711 tonnes

(700 tons) of supplies into the pocket. But the weather clamped down again on the 23rd, and once more the tonnage of supplies that reached the only usable airstrip at Pitomnik dropped sharply.

The end at Stalingrad

By this time, the Sixth Army's position was hopeless. An attempt to relieve the besieged garrison in Stalingrad by the newly created Army Group Don under Field Marshal Manstein had ended in failure. Then, on 16 December, an offensive by the Soviet Voronezh and Southwestern Fronts had broken through the Italian Eighth Army. Now the First and Third Soviet Guards Armies and the Sixth Soviet Army were advancing rapidly towards the Donets River. This new offensive was supported by the Second and Seventeenth Air Armies, whose Il-2 and Pe-2 ground-attack aircraft played havoc with the retreating Italian columns. In the face of this threat, Manstein had been forced to abandon all hope of breaking through to Stalingrad; instead, he withdrew his forces to form a new defensive line along the Donets and around Rostov. For the 90,000 men trapped in the Stalingrad Pocket, time was fast running out. Paulus, who had held on to the shattered city on the orders of the Führer, with the latter's assurance that the Sixth Army would not be abandoned, now had no choice – the Sixth Army was no longer capable of breaking out of the trap without help from outside.

On Christmas Eve 1942, the vital air supply base at Tazinskaya came under heavy Soviet artillery fire. Acting on their own initiative, the transport group commanders ordered their aircraft to take off. Conditions were appalling, with snow and fog reducing visibility to 46m (150ft), and 60 aircraft were wrecked in accidents or by Russian shellfire, but 125 got away. The other supply base, Morosovskaya, was also seriously threatened. The bomber units that had occupied this airfield had already been evacuated to Novocherkassk, but as long as the thick fog persisted they could not be used to disrupt the advancing Russians. Then, on 25 December, the fog lifted, and for the first time in days there were clear skies. Before long, the air was filled with the roar of engines as the Stukas and Heinkels swept down on the vanguard of the Russian armour as it crawled over the open steppe. Within minutes, the countryside was littered with the burning remains of tanks, and the remainder fell back. Morosovskaya was saved, if only for the time being.

On 10 January 1943, the Russians launched a strong offensive against the Sixth Army's defensive perimeter around Stalingrad, forcing the Germans to retreat. During this attack, the Russians captured Pitomnik, and the airfield's resident units – a Staffel of Bf 109s of JG 3 and a couple of flights of Stukas – escaped in the nick of time, only to be wrecked while attempting to land on Stalingrad's other bomb-pitted airfield at Gumrak. This, too, was overrun on the night of 21/22 January. On 31 January, General Paulus received a personal signal from Hitler, promoting him to the rank of field marshal. Two days later, the German survivors in Stalingrad surrendered. During the two months of the airlift, as well as carrying supplies into the pocket, the Luftwaffe had also evacuated 42,000 wounded, many of whom survived to fight again. That fact is often overlooked in accounts of this decisive battle. But the cost had been frightful: during the airlift operation, the Germans lost 500 aircraft, a figure that does not include bomber and fighter casualties during operations along the whole front. The total Luftwaffe losses in the battle for Stalingrad were 1249 aircraft, of which more than 900 were claimed by fighters or by flak. A further 542 German aircraft of all types, mostly badly damaged, were captured by Russian ground forces when the German airfields were overrun. The Luftwaffe had flown 70,241 sorties, averaging 1049 a day – nearly twice as many as the Russians. But it had made no difference: the Luftwaffe had been defeated, not in battle, but by senseless orders and by the worst operating conditions that aircrews had ever had to face.

Above: Silhouetted against the sun, a Stuka Staffel on operation over the Kuban region, December 1942.

Yet, the proper application of air power might have made all the difference to the outcome at Stalingrad.

On 10 October 1942, with the battle for Stalingrad raging, von Richthofen had hurled his entire bomber fleet against the Russian oil refineries at Grozny. Luftflotte 4's original force of 480 bombers was by that time reduced to 232, of which 129 were serviceable. Nevertheless, this much-reduced force was still able to strike hard at individual targets; and, since most of the bombers were Ju 87s, their attacks were delivered with great precision. The damage they inflicted on Grozny reminded von Richthofen of the attacks on Sevastopol: huge flames leapt from shattered fuel tanks and burst pipes, and dense clouds of smoke rose high into the air. He was delighted, joyfully noting in his diary the following evening that smoke clouds were still 5500m (18,044ft) high. He

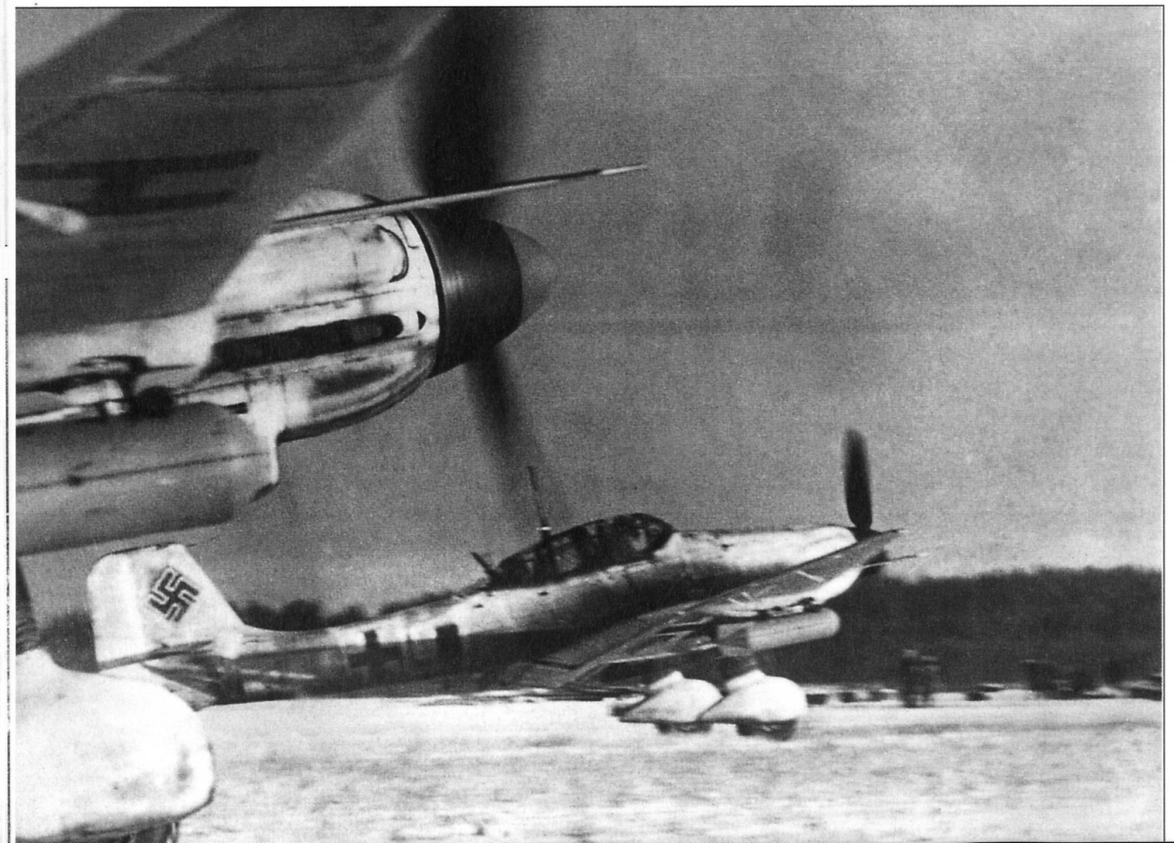
repeated the attacks two days later, with equally pleasing results.

These raids on oil refineries, though, marked the sum total of Luftflotte 4's strategic attacks on enemy industry in the Caucasus. Von Richthofen simply could not spare aircraft from the Stalingrad sector to carry out further raids (against the major oil fields at Baku, for example, which Hitler ordered a month later). It is remarkable that the Wehrmacht High Command did not order the temporary release of all, or at least most, bombers from Stalingrad for these attacks on oil fields. Extensive damage to these facilities (particularly

Left: A D-variant Stuka painted in a distinctive winter camouflage.

Below: Ju 87D Stukas, also painted in white winter camouflage.

Below right: A Ju 87 flies alongside a Fw 198 Uhu reconnaissance aircraft on the Eastern Front.

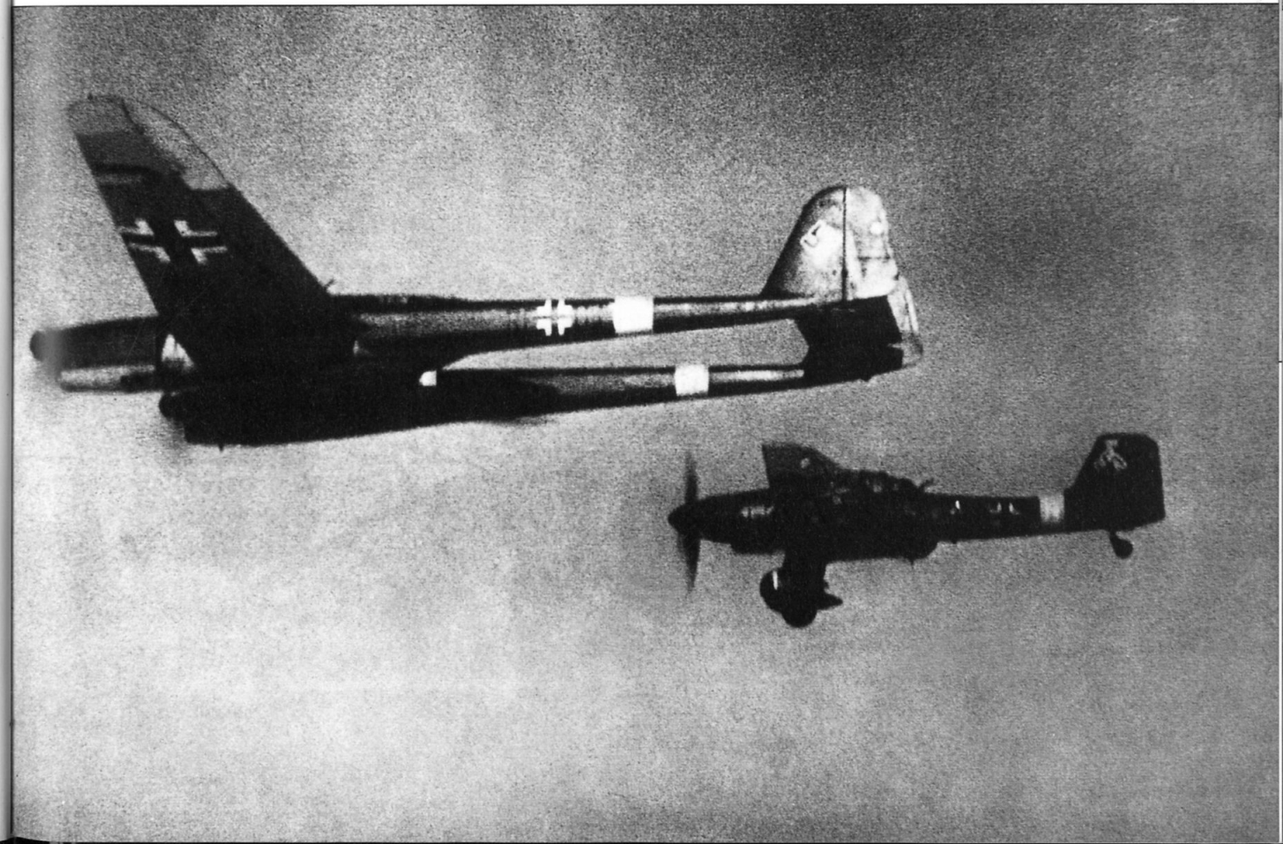


Baku's) would have dealt the Soviet Union a far heavier blow than the loss of Stalingrad's remaining suburbs. When von Richthofen managed to send squadrons south – not often, because of the intensity of combat in Stalingrad and the perceived importance of continued bombing raids on that already destroyed city – they carried out a small number of interdiction raids on Soviet road, rail and sea traffic, but mainly supported the two German armies by attacking the enemy on the battlefield and in his rear areas. VIII Fliegerkorps performed well against its primary target, Stalingrad, pounding it into rubble during heavy raids, but its continued bombardment of the ruins in accordance with Hitler's insistence that every street be cleared of the enemy led to a great waste of resources.

A wasted opportunity

For two months, Fiebig's units rained hundreds of tons of bombs on the ruins each day, turning small heaps of large rubble into large heaps of small rubble, but achieving nothing substantial. This was neither Fiebig's nor von Richthofen's fault. Hitler wanted Stalingrad taken, and he insisted that all efforts be directed to that end. Even after he realized that the oil fields could not be gained in 1942, and ordered von Richthofen to destroy them from the air, he still insisted that the destruction and capture of Stalingrad remained his highest priority. Thus, the air fleet commander was unable to commit strong bomber forces to the destruction of the oil fields. In fact, he could only temporarily reduce the bombardment of Stalingrad and send bomber forces south when bad weather at Stalingrad curtailed operations there. Even then, he lacked sufficient bombers to conduct major raids against the most important installations. As a result, although he occasionally inflicted substantial damage on a few refineries and oil fields, particularly at Grozny, he never succeeded in crippling Soviet oil production.

With the benefit of hindsight, it is now reasonable to argue that von Richthofen's air fleet could have dealt the Soviet economy a major blow – from which it would have taken at least several months to recover –



Right: A D-3 or D-5 variant Stuka from a night ground-attack unit. Note the exhaust cover, designed to eliminate flames from the exhaust ports and prevent detection.

if it had unloaded as many bombs on Baku as on Stalingrad. Heavy damage to that oil metropolis, which alone accounted for four-fifths of all Soviet production, was possible during August and September. Von Richthofen still possessed a strong bomber force and airfields within striking range, and the Soviet Air Force in the Caucasus was still relatively weak. By October, when Hitler finally ordered attacks on oil fields, von Richthofen's bomber fleet was much reduced – in addition, most forward airfields had been badly damaged by enemy action.

Reorganization of the Stukageschwader

Early in 1943, the Stukageschwader in Russia underwent some reorganization. In the north of the country, Stab and III/St.G 1 were under the command of Luftflotte 1. While I Gruppe was non-operational, II Gruppe was at Rostov-on-Don. In April, Stab, II and III Gruppen were assigned to support Army Group Centre. Stab and II/St.G 2 were also reforming at Rostov in February 1943, recovering from the mauling they had received at Stalingrad. III Gruppe was operating with German Air Force Command, Don, while I Gruppe was under the orders of Luftflotte 4 in southern Russia. St.G 3 was still in the throes of withdrawing from North Africa; St.G 5 (formerly IV Gruppe LG 1) was in Finland; and St.G 77 was in southern Russia, the whole Geschwader becoming established at Bobruisk in May. The air units in south-central Russia now came under the command of Luftflotte 6, which had been established by redesignating the former German Air Force Command, East.

The majority of the Stuka units were now armed with the Ju 87D-3 variant which, among other refinements, incorporated additional armour protection. Another Stuka variant introduced on the Eastern front early in 1943, albeit on an experimental basis, was the Ju 87G, which was basically a D-3 equipped with two large 37mm Flak 18 anti-tank cannon. The concept had been tested by veteran Stuka pilot Hans-Ulrich Rudel at Rechlin in January, and a trials unit under the command of Wing Commander Otto Weiss was soon deployed to the Eastern Front. Later, Rudel was to register enormous success with the tank-busting Ju 87G. Each 37mm gun had a magazine holding 12 tungsten-cored, armour-piercing shells, capable of penetrating 58mm (2.3in) of armour at a 60-degree angle of impact from a range of 100m (328ft).

A tank-busting Stuka had been born out of strategic necessity. By the beginning of 1943, it had become obvious to the German High Command that the Soviet Union would not be easily defeated. Worryingly, the Red Army's large quantities of T-34s had broken through the German frontline on a number of occasions. Enemy tanks that broke through could not be easily stopped in the rear areas, and they invariably inflicted much damage on supply lines and communications. The situation was made worse in winter, when the weather conditions and lack of adequate roads made the movement of heavy anti-tank guns difficult. Thus a potential catastrophe could be averted only with adequate anti-tank air support.

Left: An interesting picture of a Stuka, looking down the nose of a Ju 87D based on the Eastern Front in early 1943.

Right: The Russian city of Kharkov and the scene of some of the most fierce fighting of the war. The ebb and flow of battle on the Eastern Front meant that Kharkov was taken and recaptured a number of times during 1942–43. The Second Battle of Kharkov in 1943 was the last major German victory of the war, but even this was short-lived.

The Ju 87G variant was the last version of the Stuka to be mass-produced by German aircraft factories during World War II. From the G variant onwards, the designs became increasingly specialized and in many cases were little more than prototypes. For example, the Ju 87C was designed as a shipborne version, with folding wings for aircraft carrier operation, but very few were ever completed. The Ju 87G was a major departure from the Stuka's traditional dive-bomber role, and its entrance into the war signified the end of Luftwaffe dive-bombers as decisive weapons. Based on the D-3 variant, the Ju 87G was tested and developed by Hans Rudel, the famous Stuka ace, at the new special "Panzerjagdkommando Weiss" unit formed at Bryansk to test the newly developed tank-busting version of the Ju 87.

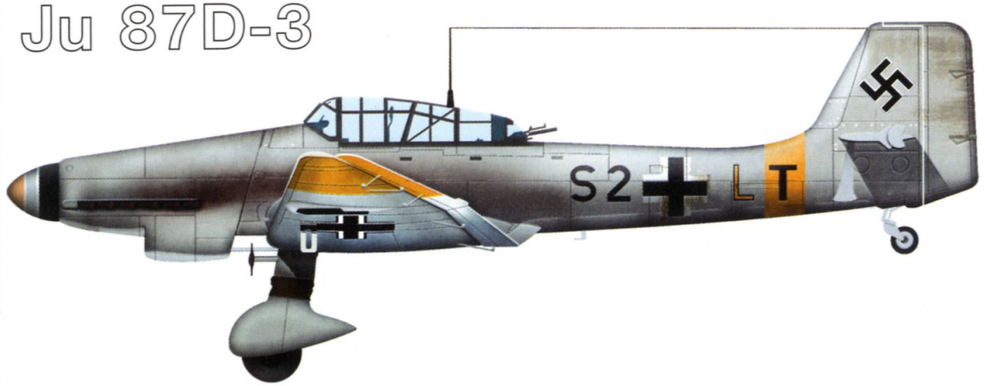
The G version was developed at the Luftwaffe's experimental station at Rechlin, near Neustrelitz in the Mecklenberg region of northern Germany. The Ju 87G prototypes were first used against Soviet landing craft in the Black Sea, and with great success. In the space of three weeks, Rudel destroyed 70 such boats. In March 1943, during a tank battle around Belgorod, the Ju 87G earned its combat wings as Rudel knocked out his first tank with his new Stuka; "my rear gunner said that the tank exploded like a bomb and he had seen bits of it crashing down behind us." (Hans-Ulrich Rudel, from *Stuka Pilot*).

The early successes of the prototypes meant that more Ju 87 D-3s were converted into tank busters and were designated as Ju 87G-1. Because of their effectiveness on the battlefield, they gained the nickname Panzerknacker (meaning Tank Cracker) or Kanonenvogel (meaning Cannon Bird), and started arriving on the Eastern Front in October 1943. Though the Ju 87G was undoubtedly effective, it was limited to attacking the Russian armoured columns largely from the rear. The frontal armour of the Russian tanks, notably the awesome T-34 and the Lend-Lease M4 Shermans, was too thick for the 37mm rounds, and so the Stukas had to attack the rear of the vehicles where the armour was thinner and where the engine and fuel tanks were located. Though this required the Stukas to fly into enemy territory before engaging the tanks, and thus exposing themselves to increased anti-aircraft fire, it had the fortunate side-effect of the aircraft flying back towards friendly lines if they were attacked or shot down.

Though the G version would prove to be an excellent tank buster, there were a number of problems associated with the design. First, the aircraft became more unmanoeuvrable carrying the two cannon. Second, speed was reduced (though landing speed increased due to the extra weight), which made the G difficult to fly and control. Finally, accurate shooting was a problem save in the most experienced hands. And the new version was also more vulnerable in the air due to its slow speed. The tactics that thus evolved were for G versions to fly with a protective screen of Ju 87Ds, which suppressed enemy flak guns to allow the Gs to operate more effectively.

Almost as soon as Operation Barbarossa had been launched in 1941, it had become clear that an effective low-level attack aircraft was needed to support the hard-fighting troops on the ground. It was hoped that the D variant of the Stuka would fit the bill, and thus focus was on armour-piercing freefall ammunition. However, this soon changed to the idea of fitting heavy cannon onto an aircraft that was fast and heavily armoured, much like the Soviet Il-2. As the harsh winter conditions on the Eastern front often prevented anti-tank guns from being brought up in time to repulse Soviet tank attacks, and because of the scale of the fronts, mobile tank reserves could not be relocated in time to halt enemy armour. A mobile airborne tank buster was therefore seen as the ideal solution. Failure

Ju 87D-3



SPECIFICATIONS

Type: *ground-attack aircraft (St.G 77, 1943)*
Entered service: *1943*
Crew: *2*

Engine
Powerplant: *1 x Junkers Jumo 211J*
Type: 12-cylinder *liquid-cooled*
Horsepower: *1300*

Dimensions
Wing span: *13.8m (45.3ft)*
Propellor diameter: *3.3m (10ft)*
Length: *11.5m (37.9ft)*
Height: *3.9m (12.75ft)*

Weights
Empty: *3900kg (8580lb)*
Loaded: *6585kg (14,500lb)*

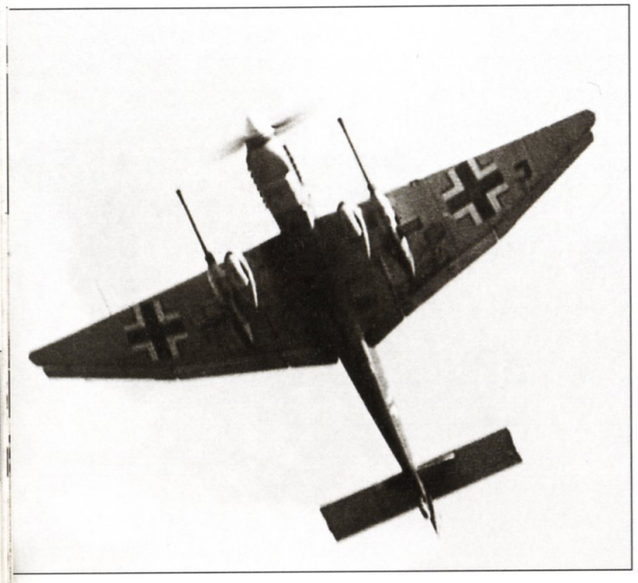
Performance
Maximum speed: *402kmh (250mph)*
Cruising speed: *310kmh (193mph)*
Range: *1500km (937 miles)*
Service ceiling: *7320m (24,000ft)*
Ceiling with maximum load: *4730m (15,520ft)*
Normal radius of operation: *600km (375 miles)*

Armament
2 x 7.92mm machine guns
1 x 1800kg bomb + 4 x 50kg bombs

to deploy anti-tank forces in time could result in a potential disaster for the Wehrmacht. The Ju 87G was only meant as an interim stopgap before a more modern aircraft could be developed. The frailties of the Stuka, especially against enemy fighters, were always present and it was planned that the Fw 190 would take over tank-busting duties in due course. By 1944, the Stuka tank buster as a decisive weapon was no more in any meaningful sense, though operations continued until the end of the war.

On 3 January 1943, as the Russians tightened the noose on the trapped Sixth Army, the Soviet Caucasus Front launched a big offensive aimed at wresting control of the Kuban valley from the Germans, who had been pouring troops and equipment into the area in readiness for a major spring offensive into the Caucasus. During the Battle of Kuban, the Germans tried desperately to regain the air superiority that, for the first time since June 1941, they had lost during the Battle of Stalingrad. In the event, the air battles over the Kuban peninsula did mark a decisive turning point in the air war, but not in the way the Germans had hoped. The Kuban offensive ended on 14 February 1943 with

Right: At a German forward airbase during the Battle of Kursk. Overhead, Ju 87Ds fly towards the front.



Left: A close-up shot of the underside of a Ju 87G. Note the large 37mm anti-tank cannon beneath the wings.

the capture of Rostov by the Russians, which effectively removed the threat to the oil-rich Caucasus. Elsewhere, however, an attempt by the Soviet Southwestern and Voronezh Fronts to encircle the German armies in the eastern Ukraine had failed, mainly because the Soviet leaders believed that the large quantities of armour that had been pouring into the area between the Rivers Dnieper and Donets were there to cover the German retreat – not to spearhead a German counterattack, as was the case.

The Russians took Kharkov on 16 February, and raced on towards the strategic town of Dnepropetrovsk. It was then that the Germans counterattacked with all their available forces. The Fourth Panzer Army attacked savagely on both flanks of the Southwestern Front, and in a matter of days the Russians – battle-weary and badly over-extended – found themselves digging in along the line of the Don once more, back where they had started. The Germans recaptured Kharkov and Belgorod, but the Russians quickly strengthened the Donets line with fresh reinforcements to halt the enemy counteroffensive.The Russian failure was almost entirely due to bad planning: in addition, the redeployment of several air divisions to the Stalingrad and Caucasus Fronts had left the Luftwaffe with an air superiority of three to one in the Donets area, and the Soviet Air Force had found itself incapable of providing adequate support for the ground forces.

German preparations for Kursk

With the coming of the spring thaw, large-scale operations along the whole front came to a standstill. As they had done a year earlier, both sides took the opportunity to strengthen their forces in preparation for a summer offensive. The Germans knew only too well that everything depended on the outcome of this summer of 1943. If they regained the initiative, they would have a second chance to take Moscow; if they lost it, the way would be open for a Russian advance into central Europe. The spring lull in the fighting had left the Soviet Central and Voronezh Fronts in a potentially dangerous situation, with two German salients at Orel and Kharkov flanking a deep bulge to the west of Kursk. In this bulge, the Russians had concentrated 12 armies, including two crack guards and two tank armies. If the Germans could smash their way through the Russian defences to the north and south of Kursk, they would split the Soviet front in two, cutting off all the Russian forces in the Kursk salient and destroying them. If the German plan succeeded, the Soviet Army would have little hope of recovering from such a shattering defeat.

For the coming offensive, the Germans assembled 70 divisions and nearly a million men. Several of the panzer divisions had rearmed with the new Tiger and Panther tanks and with heavily armoured Ferdinand self-propelled guns. To support the land offensive, the Germans had 1700 aircraft: many of the ground-attack units were now equipped with the Hs 129, which had made its operational debut in the Crimea the previous autumn; and the fighter Geschwader had begun to

receive the Fw 190A-4. One thousand aircraft were earmarked to support the southern arm of the German pincer movement, which was to be provided by the Fourth Panzer Army under General Hoth, while the remaining 700 machines were detailed to support the northern thrust by General Model's Ninth Army.

Soviet strategy at Kursk

The Soviet High Command, meanwhile, was well aware of the German intention and was making its own plans to forestall it by striking first. Within the salient, each army had constructed three formidable lines of defence 40km (25 miles) deep, and even if the Germans succeeded in breaking through them they would still have to contend with a reserve line of defences. Six of the Soviet armies were assigned to the northern part of the salient, with General Rudyenko's Sixteenth Air Army in support; the other six, supported by the Second Air Army under General Krasovski, were responsible for the defence of the southern part. There were, in addition, five more Soviet armies in reserve, together with the Fifth Air Army and the Seventeenth Air Army. The First and Fifteenth Air Armies were earmarked to support the armies in the Orel sector. The Russian plan envisaged a massive air strike on the Luftwaffe's airfields, effectively denuding the German panzer divisions of their all-important air support. The German offensive would be allowed to get under way, and the Russian commanders were confident that they could meet and defeat it. Then, once the enemy had been weakened, the Russians would hit back with all the forces at their disposal.

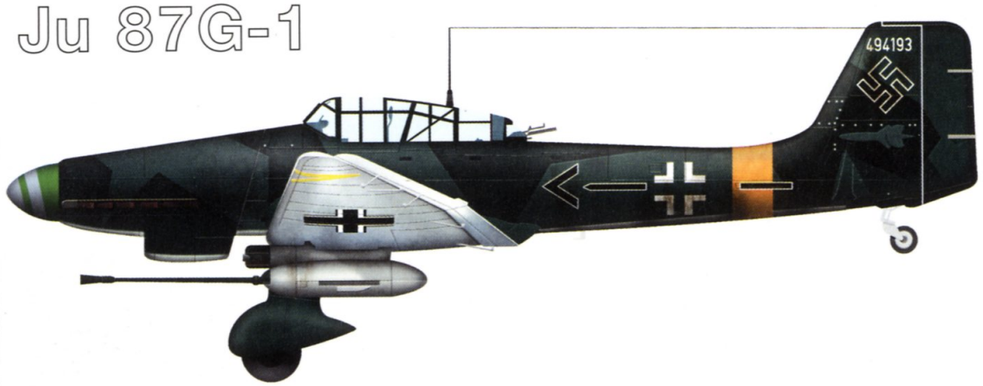
Soviet intelligence learnt that the German offensive, codenamed Zitadelle (Citadel), was scheduled to begin at dawn on 5 July. Shortly beforehand, the commanders of the two fronts defending the salient – Generals Vatutin and Rokossovsky – ordered their artillery to lay down a heavy barrage on the enemy's artillery positions. This resulted in many German gun batteries being knocked out, reducing the firepower available to support the offensive. At 03:15 hours on 5 July, 15 minutes before the offensive was due to begin, the calm summer air resounded to the roar of engines as the 1000 German fighters, bombers and ground-attack aircraft that were crammed into five airfields around Kharkov started up and began to taxi out, ready to take off and blast the forward Soviet positions as the panzer spearheads rolled forward.

The Luftwaffe at Kursk

Suddenly, the carefully planned take-off dissolved into chaos as the alarm went up. First, German radio monitors reported a large volume of Russian radio chatter; then, a few minutes later, a radar station near Kharkov detected what appeared to be a whole armada of aircraft coming in from the northeast. Another minute or two, and there was no longer any doubt: the

Right: A Russian T-34 is reduced to a burning wreck by a Ju 87G at the Battle of Kursk, July 1943.

Ju 87G-1



SPECIFICATIONS

Type: *anti-tank aircraft (St.G 2, 1944)*
Entered service: *1943*
Crew: *2*

Engine
Powerplant: *1 x Junkers Jumo 211J*
Type: *water-cooled inverted V-12*
Horsepower: *1300*

Dimensions
Wing span: *15.25m (50ft)*
Propellor diameter: *3.3m (10ft)*
Length: *11.1m (36.5ft)*
Height: *3.9m (12.75ft)*

Weights
Empty: *2750kg (6080lb)*
Loaded: *6585kg (14,500lb)*

Performance
Maximum speed: *402kmh (250mph)*
Cruising speed: *310kmh (193mph)*
Range: *1000km (620 miles)*
Service ceiling: *7320m (24,000ft)*
Ceiling with maximum load: *4730m (15,520ft)*
Normal radius of operation: *448km (280 miles)*

Armament
2 x 37mm cannon in underwing pods
1 x 7.92mm MG 81 twin-barrel machine gun

Russians were coming, more than 400 of them, descending in waves on the overcrowded German airfields. On the ground, the German bombers got out of the way as quickly as possible, making room for the fighters to take off – only their intervention could save the Luftwaffe from disaster. By some miracle, all the fighters got airborne without incident and climbed rapidly to meet the incoming threat. It was an incredible sight that met the eyes of the German pilots: ahead of them, wave upon wave of Russian aircraft was strung out across the sky. The Russian formations became dislocated as the German fighters made contact. The Germans had taken off in time to gain the advantage of height and speed, and now they exacted a fearful toll, claiming the destruction of 120 enemy machines for the loss of 20 of their own. In fact, the actual total of Soviet aircraft destroyed was nearer 70 but the raid was broken up, and although some of the bombers did get through to the German airfields, they did little damage. With the danger temporarily averted, the Luftwaffe's own bombers were now able to take off. As usual, the function of the Stukas and Henschels was to blast a way through for the panzers, and the morning of 5 July 1943 quickly developed into a slogging match, with the German assault aircraft and the Russian Shturmoviks

heavily committed against the armour of the opposing sides. Later-production Shturmoviks, fitted with long-barrelled 37mm cannon, were deadly against even the heaviest German tanks; on one occasion, Shturmoviks equipped with these formidable weapons attacked the 9th Panzer Division and destroyed 70 tanks in about 20 minutes.

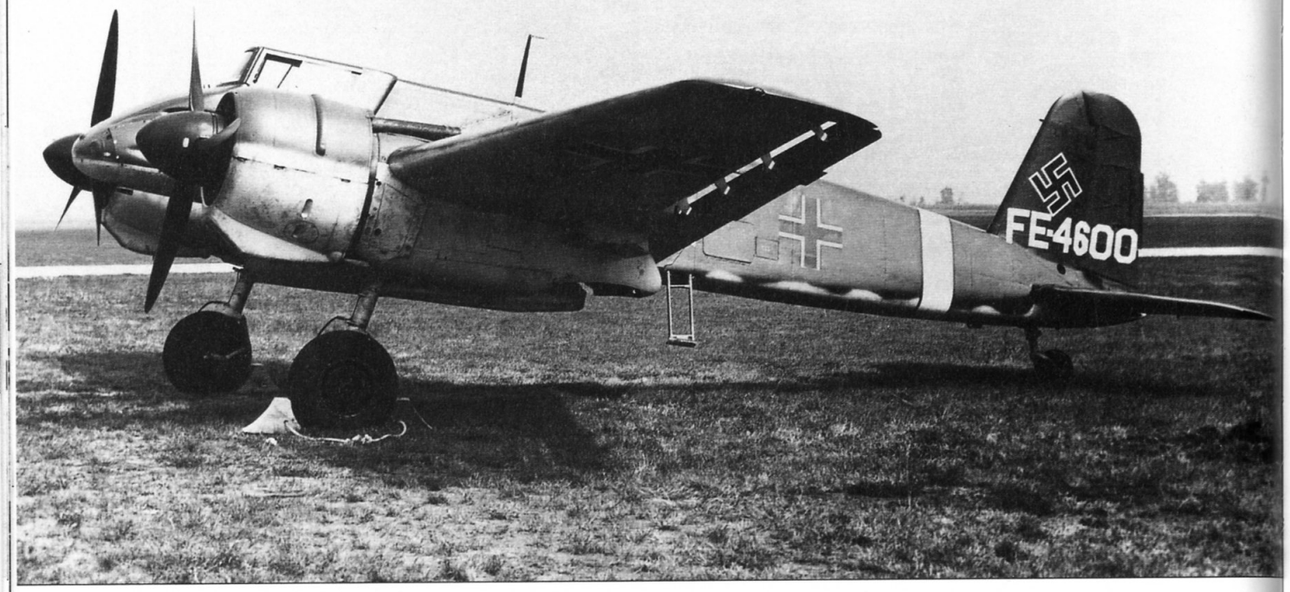
The success, however, was not all one-sided. On the morning of 8 July, German reconnaissance aircraft spotted 50 Soviet tanks and masses of infantry advancing towards the exposed left flank of the Fourth Panzer Army; the Soviet concentration was quickly attacked and thrown into confusion by 40 Hs 129s armed with 20mm cannon. On the second day of the battle, Soviet fighters appeared over the battle area in strength – fierce air battles flared up over the salient. The Russian fighter pilots concentrated their efforts against the German ground-attack aircraft, which began to suffer serious losses. One notable pilot who returned to action on this day was Alexei Maresyev, who 15 months earlier had had both lower legs amputated after being shot down. Fitted with artificial limbs, he had overcome all manner of opposition in order to fly in combat again. His return to the front was eventful: not only was he machine-gunned by a Messerschmitt while on his way to join his regiment, but he spent the next few nights crouching in a slit trench while German bombers attacked his airfield.

Above: Stuka ace Hans-Ulrich Rudel (left), the lone recipient of the Knight's Cross with Golden Oak Leaves, Swords and Diamonds. He claimed over 519 tanks destroyed in his Ju 87G, along with over 1000 other vehicles in 2530 sorties over Russia.

Soviet heroism

Maresyev's regiment – flying La5s – was held in reserve during the first day of the Kursk offensive, and it was not until the following morning that the pilots were ordered into action. Their task was to provide an air umbrella over the Russian armoured units that were advancing to meet the enemy's Fourth Panzer Army. The battlefield was wreathed in smoke, and Maresyev could see a number of Russian T-34 tanks burning on the ground. Then his squadron sighted 20 Ju 87s, flying through a maze of light anti-aircraft bursts. The Russian pilots manoeuvred until the sun was behind them, then attacked. Maresyev destroyed 15 enemy aircraft, and he was made a Hero of the Soviet Union.

Another Soviet fighter pilot, Second Lieutenant Ivan Kozhedub, opened his score at the Battle of Kursk. As this account reveals, his first victim was also a Stuka: "At dawn on 5 July, Kozhedub and the other pilots of his regiment were awakened by the sound of artillery fire. A few minutes later, they were assembled and addressed by their CO, who told them what was happening. He also told them that the regiment would not go into action that day, but would be held in reserve. Their chance came the following morning, when Kozhedub's squadron, led by Captain Semyenov, took off on a dawn fighter sweep. Some time later, they sighted the enemy: 20 Ju 87s, crossing the frontline under strong fighter escort. The Russians dived down to the attack, led by Semyenov. The first victory was his: a Stuka plunged earthwards in flames, one wing torn off by 23mm shells. Then it was



Above: The Henschel Hs 129B single-seat, close-support and ground-attack aircraft, which replaced the Stuka.

Left: August 1943 – a Staffel of Stuka Ju 87Ds head off on a bombing mission in Russia.

Right: Despite the best efforts of the Stuka squadrons and their pilots, the relentless waves of Russian tanks and aircraft made it increasingly dangerous for the Stukas to operate effectively in Russia from mid-1943.

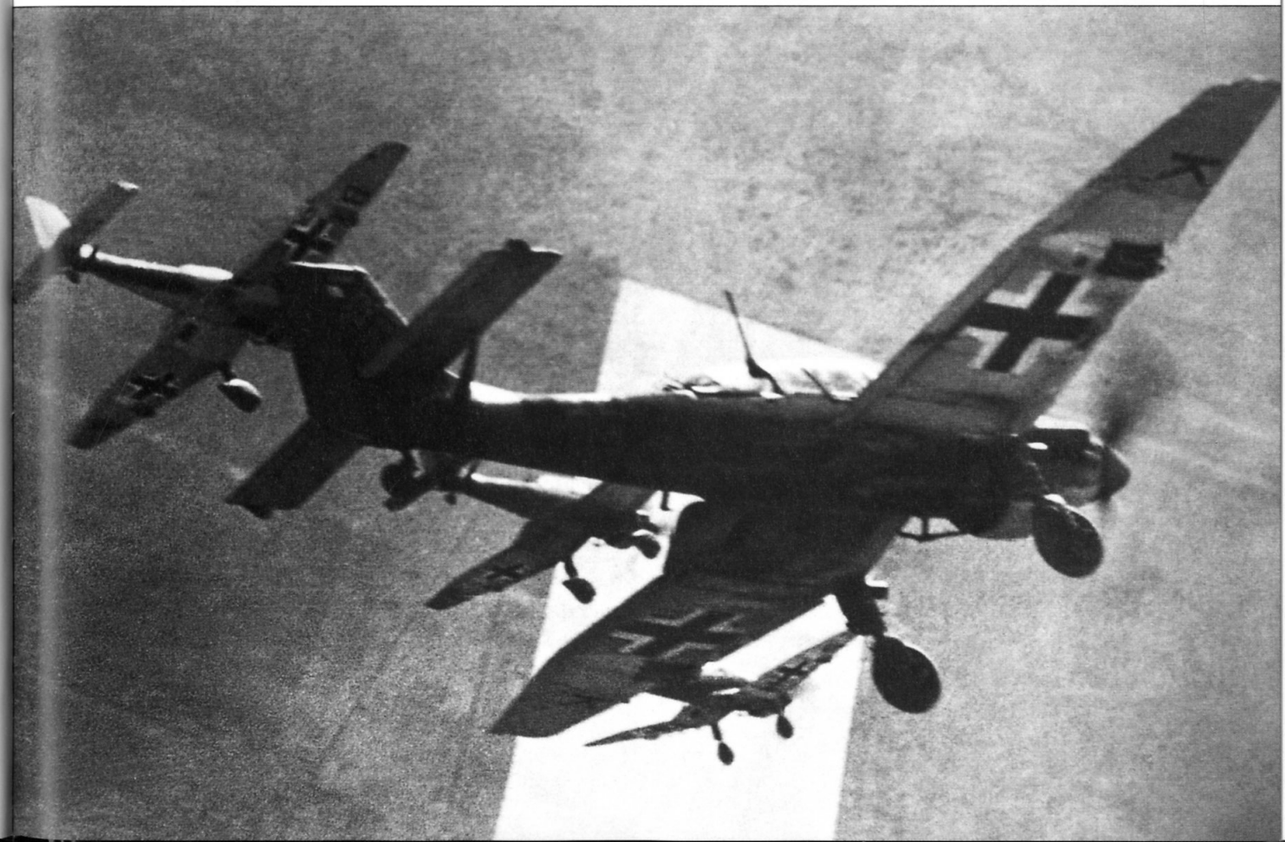
Kozhedub's turn. Glancing behind to make sure that his wingman, Vassily Mukhin, was in position, he closed in on a Stuka and opened fire. The enemy aircraft refused to catch fire or go down. Over the R/T, Kozhedub heard Mukhin shouting words of encouragement. He had almost made up his mind to ram the Stuka when the aircraft began to trail smoke. The smoke soon became shot with flame and the Stuka went down at last, exploding on the ground. Kozhedub had opened a score that was to end with 62 aircraft destroyed, making him the top-scoring Allied air ace."

The Stukas save Model's forces

Faced with determined and increasingly skilled Russian fighter pilots armed with modern combat aircraft, the Stukas were finding it far harder to survive than had been the case just a few months earlier. The experience of Guards Lieutenant A.K. Gorovets was a good example: on 6 July, having become separated from his flight, he encountered a formation of Ju 87s and immediately elected to attack. His skill in handling his Yak-9 fighter, and in using cloud cover to good advantage, was such that he destroyed nine Stukas before being shot down and killed himself. Gorovets was posthumously made a Hero of the Soviet Union.

At first light on 12 July, the Russians launched a counteroffensive against the Fourth Panzer Army towards Prokhorovka. The attack was carried out by the Soviet Fifth Guards Army and the Fifth Guards Tank Army, and was preceded by a short but heavy bombardment of the German positions by aircraft of the First Air Army – which until now had been held in reserve. In strong morning sunshine, a fierce battle involving 1500 tanks developed, with assault aircraft of both sides attacking incessantly. The pilots' task was difficult, for in the swirling dust it was often impossible to distinguish between friend and foe. By nightfall, the Fourth Panzer Army had begun to fall back towards Prokhorovka, having lost 300 tanks and more than 10,000 men.

A second Soviet thrust, to the north and east of Orel, threatened Model's Ninth and Second Panzer



Armies with encirclement, and within a week Russian tanks were almost in a position to cut off the only supply route for Model's forces. The situation was saved by the Luftwaffe. Operating from Karachev, almost under the barrels of the Russian tanks, the Stukas and Henschels launched attack after attack on the enemy armour, checking the onslaught long enough to allow the Second and Fourth Panzer Armies to clear the Orel salient.

Makeshift measures

Thanks to the Luftwaffe's intervention, a German defeat on a scale even more terrible than at Stalingrad had been averted. And although there was no escaping the fact that the Battle of Kursk had ended in an overwhelming Soviet victory, the air operations at Kursk had amply vindicated the concept of the cannon-armed Ju 87G "tank buster". On 5 July, for example, Hans-Ulrich Rudel, flying a pre-production Ju 87G-0, attacked a column of 12 T-34 tanks. He aimed for the lightly armoured rear area (which housed the engine and fuel), and single-handedly destroyed all of them. This and other successes against Russian armour led to the construction of the improved Ju 87G-1 and G-2 production models, and to Rudel being asked to form a special Panzerstaffel within St.G 2. Designated 10 (Pz)/St.G 2, the unit was equipped with the Ju 87G-1; and further successes led to a second unit, III/St.G 2, being similarly equipped. II/St.G 2, commanded by Major Kurt Kennel, re-equipped with the Fw 190 and was given the task of protecting Rudel's ground-attack aircraft.

Although the Ju 87G was extremely effective in the hands of an experienced pilot, it was unstable and difficult to handle, and only one Gruppe and four Staffeln were ever equipped with it. Based on his experiences, Rudel developed new tactics for Panzerstaffels. As mentioned above, he found that the best way to knock out tanks was to hit them in the back (the T-34's rear-mounted engine and its cooling system did not permit the installation of heavier armour plating) or the side.

The success of the G version led to the decision to put the G-2 version into production as soon as possible. This had the airframe and wings of the D-5 version. From September 1943, the production schedule for the D-2 was 20 aircraft a month, though in that month it was also agreed that high-explosive anti-tank bombs were still important weapons. Thus, in that month the SD 50 was successfully equipped with a strengthened explosive head for attacking tanks. In December 1943, production of the Flak 18 37mm cannon was halted due to Allied bombing, which resulted in delays in the production schedule. The dire situation on the Eastern Front necessitated an increase in G production, though. In July 1944, for example, 57 G-2s were manufactured, comprising 53 conversions and 4 repaired aircraft. In total, 20 G-1s and 210 G-2s were delivered to the Luftwaffe, of which 174 were from the Weser aircraft works at Bremen. At this stage of the war, the Germans needed as many anti-tank aircraft on the Eastern Front as they could muster to counter the Red Army.

Above: After mid-1943, Ju 87s were rushed straight from their factories to the Eastern Front to engage the Red Army. These Ju 87s are flying over the Dnieper River.

Last Battles in East and West

Outclassed and outnumbered, by 1944 the Stuka was effectively obsolete. However, it fought on to the bitter end in defence of the Fatherland.

The Russians were not slow in exploiting their success at Kursk. In August 1943, supported by 100 air divisions totalling 10,000 aircraft, the whole Soviet frontline began to roll relentlessly westwards. Kharkov was recaptured on 23 August, and the German armies, their reserves exhausted, fell back towards the Dnieper. By mid-September, the Soviet Southern and Southwestern Fronts had driven the enemy from the Donets Basin, and on the 22nd of that month the Dnieper had been reached by the Third Guards Tank Army. Three days later, two Soviet armies succeeded in establishing a bridgehead 26km (16 miles) long and up to 32km (20 miles) deep on the west bank

Left: Luftwaffe ground personnel remove the branches covering a Ju 87 of III/St.G 3 based on the Eastern Front.

of the river, north of Kiev. The Germans counter-attacked fiercely, but the Russian troops managed to hold on until the main body of their forces arrived. The Luftwaffe attacked with all its might on the bridgehead, but the Soviet Air Force enjoyed air superiority and inflicted severe losses on the German aircraft.

The Schlachtgeschwader

The Stukas again suffered heavily, but on 12 October one of them nearly brought an end to the career of rising Soviet fighter star Ivan Kozhedub, who had scored 11 victories in the previous 10 days. With units of the 240th Fighter Air Regiment, Kozhedub was ordered to take off and cover the crossing of the Dnieper by the Third Guards Tank Army, which was being transferred to the west bank to spearhead the coming assault on Kiev. Patrolling the bridgehead, the Russian pilots soon spotted a formation of Ju 87s heading for the crossing-point. Kozhedub dived on one of them and shot it down, coming under heavy and accurate fire from the Stuka's rear gunner as he did so. As he climbed away, flames burst from the starboard wing of his La5 – the German's bullets had hit a fuel tank. Looking down, Kozhedub saw that the fight had carried him well behind enemy lines. He had little hope of reaching Russian-held territory before the flames ate their way through the wing's main spar. At that moment, a German flak battery opened fire on him and he dived towards it, intent on crashing his aircraft into it. At that moment the flames went out, extinguished by the slipstream. Kozhedub pulled out of his dive and reached his airfield safely a few minutes later.

On 5 October, the Luftwaffe's ground-attack forces had been reorganized. All dive-bomber, ground-attack and fast-bomber groups were incorporated into new ground-attack wings designated Schlachtgeschwader (SG). III/St.G 2 therefore became III/SG 2. In addition to the German Ju 87 units, Stukas were also operated on the Eastern Front by the 3rd and 6th Dive-Bomber Wings of the Royal Romanian Air Force, the 102/1 Dive-Bomber Squadron of the Royal Hungarian Air Force, and by the Bulgarian and Slovakian Air Forces.

The Royal Hungarian Air Force was the first of the Luftwaffe's allies to receive the Stuka, two Ju 87Bs having been delivered in 1940. These were followed by four Ju 87As, also delivered in 1940, which were used for training. In 1943, Hungary received a further 45 Ju 87B-1s, followed by 12 Ju 87D-1s and D-3s; in 1944, it took delivery of 14 Ju 87D-5s. Besides Italy, Hungary received the greatest number of Ju 87 dive-bombers delivered by the Germans to their allies, and these were put to extensive use during the last years of the war – mainly on the Eastern Front.

Hungarian Stuka units

By mid-1943 the first Hungarian dive-bomber unit had been created – Zuhanobombazo-szazad 2/2, or the 2nd Dive Bomber Staffel. Equipped with modern D4 or D5 variants, the Staffel was moved to Kiev by road in May 1943, and took part in its first combat operation on 3 August 1943 against a large partisan encampment in the Bryansk Forest. Immediately following this action, the unit was moved to Poltava where it was placed under the tactical command of Stukagruppe 77. The Staffel ended its operational service on 22 October 1944, by which time it had flown over 1200 combat sorties over the Eastern Front.

The Luftwaffe took back the remaining serviceable Ju 87s, and the Hungarian crews went back to Hungary. This was not the end for the Hungarian Stuka, however. Following Admiral Horthy's (Hungary's Regent) failed attempt to sign an armistice with Stalin and his subsequent "relocation" to Germany, the remnants of the Hungarian Stuka Staffel flew low-level attacks against Soviet armoured units with other German Luftwaffe forces, though they were few in number. This said, there was an attempt in April 1945 to form another Hungarian Staffel, this time a tank-hunting unit equipped with Ju 87Gs, though this never came to fruition.

In the autumn of 1940, a batch of 40 Ju 87B-2s had been delivered to the Royal Romanian Air Force; this was followed by 115 Ju 87D-1s, -3s and -5s in 1942 and 1943. The Royal Romanian Air Force's Ju 87s

Ju 87D-5

SPECIFICATIONS

Type: *anti-tank aircraft (Slovak Air Force, 1943)*
Entered service: *1943*
Crew: *2*

Engine
Powerplant: *1 x Junkers Jumo 211J*
Type: *water-cooled inverted V-12*
Horsepower: *1300*

Dimensions
Wing span: *15.25m (50ft)*
Propellor diameter: *3.3m (10ft)*
Length: *11.1m (36.5ft)*
Height: *3.9m (12.75ft)*

Weights
Empty: *2750kg (6080lb)*
Loaded: *6585kg (14,500lb)*

Performance
Maximum speed: *402kmh (250mph)*
Cruising speed: *310kmh (193mph)*
Range: *1000km (620 miles)*
Service ceiling: *7320m (24,000ft)*
Ceiling with maximum load: *4730m (15,520ft)*
Normal radius of operation: *448km (280 miles)*

Armament
2 x 37mm cannon in underwing pods
1 x 7.92mm MG 81 twin-barrel machine gun

operated within the 3rd Bomber Flotilla, which also operated two Bomber Groups equipped with Ju 88s. As part of the Romanian 1st Air Corps, the Stukas were on the frontline and involved actively on the Eastern Front. Though the number of aircraft was relatively small, they were nonetheless much appreciated by the Romanian pilots who up until delivery of the German machines had been reliant on ageing and obsolete British and French aircraft. It had also become increasingly difficult to obtain spare parts for these aircraft, and thus the arrival of the Ju 87D was a boost for the Royal Romanian Air Force, or *Fortele Aeriene Regale ale Romaniei* (FARR).

The Ju 87D Stuka entered service in 1943 with the 3rd Dive Bomber Group. The group was deployed in early June 1943 north of the Sea of Azov and it began flying missions in support of the Axis troops fighting on the River Mius on 17 June. The 3rd Dive Bomber Group was moved to the Kerch Peninsula (east of the Crimea) in July, tasked with providing air support for the German and Romanian divisions in the Kuban bridgehead. The Romanian Stuka pilots received high praise not only from the troops on the ground for their ferocious attacks and dedications, but also from I Fliegerkorps. Indeed, the operations in this theatre were considered the most support that German ground

troops ever received from allied air forces during the war. In addition to the traditional ground-attack role, Romanian Ju 87s were also tasked with laying light sea mines and attacking Soviet gunboats and enemy coastal vessels. Despite the willingness of the Romanian pilots to continue flying, the losses that the 3rd Dive Bomber Group had suffered (by August 1943, 31 out 45 Stukas transferred to the Romanians were damaged) meant that there were few serviceable aircraft to provide support. By the end of October 1943, the Soviet forces had completely surrounded the Crimea, but the Romanian Stukas kept up their sorties providing air cover for the Axis divisions trying to effect a counterattack. This continued until mid-April 1944, when they were withdrawn. In April 1944, they returned to Romania after almost an entire year on the front, and continual action against the advancing Soviet forces.

In May 1944, the newly formed 6th Dive Bomber Group finished its training and was ready for action on the front in Moldavia alongside the 3rd Dive Bomber Group. On 20 August 1944 the Soviet offensive at Yassy and Tiraspol began, which led to a retreat to the Carpathian passes. Between them the 3rd and 6th Dive Bomber Groups helped ease the Soviet pressure on the Romanian and German ground troops, and also caused a lot of damage to Soviet forces. However, they were unable to halt the Soviet advance on their own, and thus the relentless Russian juggernaut rolled on. On 23 August 1944, the Romanian King Michael announced that Romania was switching sides and ending the alliance with Nazi Germany. Romania lost a number of its Stukas as German units captured vulnerable machines at repair stations before the FARR could remove them, and many other remained unserviceable on the ground due to shortages of spares. The remaining units, chiefly the newly amalgamated 3/6th Dive Bomber Group, spent the last year of the war liberating parts of Romania in support of the Soviet advance until September 1944, when attention was

Above: A G version Stuka on the ground in southern Russia in early 1944.

Pages 196–197: A ground crew works in the snow, bombing-up a Ju 87 on the Eastern Front, late 1943.

Left: A Stuka camouflaged with branches to prevent detection by Russian reconnaissance aircraft.

turned to Hungary, Slovakia and Austria. Because of losses and lack of spare parts, the number of available Ju 87Ds decreased. In October 1944 the group was reduced to the 74th Squadron, which was joined with the 41st Squadron (flying Hs 129B2s) and formed the 8th Assault Dive Bomber Group. It is difficult to say with any great accuracy the effect that the Romanian Stukas had on the battlefield, given that the Axis forces were fighting a losing battle all along the Eastern Front, and that the Romanian aircraft were relatively few in number. But nonetheless, when able to operate in sufficient strength, the Romanian Stuka pilots were able to give a good account of themselves.

The Bulgarian Air Force operated 12 Ju 87R-2s and R-4s in 1942, and the following year received 32 D-5s; Croatia took delivery of 12 Ju 87Rs and Ds in 1944. Slovakia received an initial batch of five Ju 87D-5s in June 1944, followed by about 30 more aircraft, but the story of the Stuka in Slovak service was not one of success. Delivery was slow, spares virtually non-existent, and most were destroyed on the ground in US bombing raids.

In the Mediterranean theatre, having been delivered to the Italian Air Force only weeks after Mussolini declared war on the Allies in June 1940, the Ju 87 became commonplace in the Regia Aeronautica's order of battle. Following the Axis capitulation in Tunisia in May 1943 and the complete retreat of German and Italian forces from Africa, the Regia Aeronautica's Stukas were deployed in the defence of Sicily and other Mediterranean strongholds. As the Allied landings on

Sicily got under way on 10 July 1943, the Stukas were called upon to attack the invaders, which they did with reasonable effect – sinking several freighters in the process. However, the fall of Benito Mussolini in late July 1943, and the subsequent humbling of Italy in September of that year signalled the end of the Stuka's service in Italian colours, as German forces occupied its former ally.

Night Stukas

In addition to the deployment of Stukas by foreign allies, the Germans also altered the way in which Stukas were used to combat the growing losses on the Eastern Front initially, and then on the Western Front following the D-Day landings of June 1944. The Night Ground Attack Stuka entered the fray from the summer of 1942, though only as a concept during the early years. By adding flame eliminators to the engine exhausts, existing Ju 87s could be easily retrofitted for night-time operations by the ground crews rather than the aircraft needing to return to a factory for the work. This feature was aimed at preventing anti-aircraft units on the ground from spotting the Stukas. In addition, in-cockpit instruments were added to aid the highly skilled Luftwaffe pilots fly the aircraft blind, such as ultraviolet lighting behind the instrument panel and a specially designed Revi reflector sight, the Nachtrevi, for use at night. In October 1943, the first dedicated Ju 87 equipped Night Ground Attack Groups – Nachtschlachtgruppen (NSGr) – were formed from pre-existing Harassment Bomber Staffeln. Though the night attacks were only harassment operations, they did provide much-needed relief for German ground troops on the Eastern Front. Following the Allied D-Day landings on 6 June 1944, a number of Night Ground Attack Gruppen, chiefly NSGr 1, NSGr 2, and NSGr 9, moved away from operations on the Eastern Front and on to the West to confront the Allied invasion. As the Fw 190 began to supersede the Ju 87 as the Luftwaffe's preferred ground-attack aircraft of choice, a number of Ju 87s (mostly of the D variant) were transferred to dedicated NSGr units. Thus in the West at least, a large number of Stukas in action were from Night Ground Attack units. Stemming from D-4 and D-5 variants, the NSGr Stukas were eventually designated D-7 and D-8, differing from the previous variants by virtue of the flame eliminators and the addition of a Junkers Jumo 211P 1500hp engine. These aircraft usually operated in flare-dropper/attack teams or under ground-based radio control, the latter referred to as the Egon procedure. The former method required one aircraft to drop flares to illuminate or silhouette the target so it could be attacked by the other aircraft. This was very similar to the method adopted by the British Fleet Air Arm for its night torpedo and bombing strikes, Taranto being the best-known example. It was an extremely effective method of delivery accurate attacks onto enemy positions, but required great skill from both the pilot and the navigator to fly the aircraft to the target zone in total darkness, and then single out a suitable target. The method also had its limitations, in that it was difficult to spot individual targets in the

Right: By the end of January 1944 on the Eastern Front, when this photograph was taken, Stukas had been superseded by the ground-attack version of the Fw 190.

eerie glow of the targeting flare, and it was for this reason that the bombing sorties were considered harassment rather than precision missions. Nonetheless, the Stukas of the various NSGr in the West were able to do some significant damage to Allied vehicles, as well as destroy a number of bridges. However, the speed of the advance of the Allied armies through France and into the heart of Europe meant that the Stukagruppen in the West were under constant pressure to fall back to safer airfields from which to launch their attacks. This constant movement meant that the full potential of each NSGr was gradually eroded as damaged aircraft were not given enough time to be repaired properly before the move orders were given, and the attacking capabilities of the units was steadily reduced.

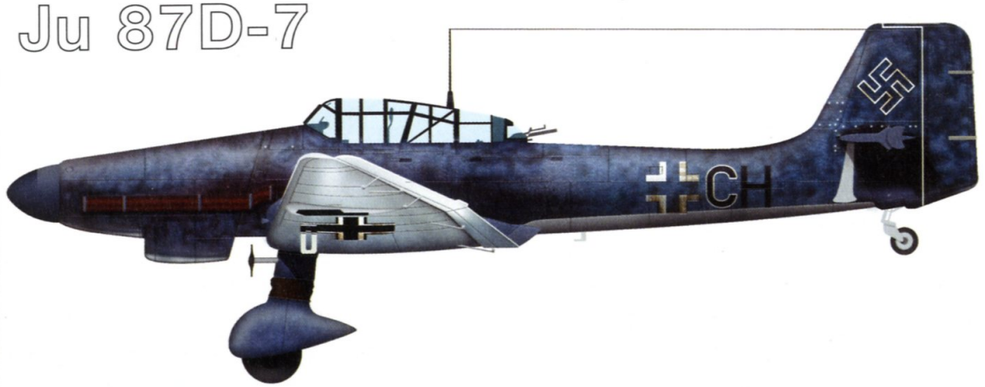
As 1944 rolled into 1945, and the Allied armies continued their advance toward the German frontier, the remaining Stukas were still in action trying to do their bit in an increasingly unfavourable environment.

In terms of manpower and equipment, the Allies dominated the skies and the ageing Stukas were no match for the P-47 Thunderbolts and P-51 Mustangs of the United States Army Air Force (USAAF), but flying at night did give them some protection. Despite defeat seemingly inevitable, the Stuka-equipped NSGr kept fighting well into 1945 and on until the end of the war.

On the Eastern Front, on 6 November 1943, the Russians recaptured Kiev after bitter fighting, and Soviet forces crossed the Dnieper at a number of other points. Farther north, the Central Front under General Rokossovsky smashed across the river and reached the Pripet Marshes, while the Western Front recaptured Smolensk and drove on towards Vitebsk. The Soviet High Command lost no time in striking the first of the giant hammer-blows that, during 1944, were planned

Above: German airmen look on as a Stuka comes in to land at its forward operating base, returning from a ground-attack mission against Soviet armour in 1944.

Ju 87D-7



SPECIFICATIONS

Type: *anti-tank aircraft (NSGr 9, 1944)*
Entered service: *1943*
Crew: *2*

Engine
Powerplant: *1 x Junkers Jumo 211J*
Type: *water-cooled inverted V-12*
Horsepower: *1300*

Dimensions
Wing span: *15.25m (50ft)*
Propellor diameter: *3.3m (10ft)*
Length: *11.1m (36.5ft)*
Height: *3.9m (12.75ft)*

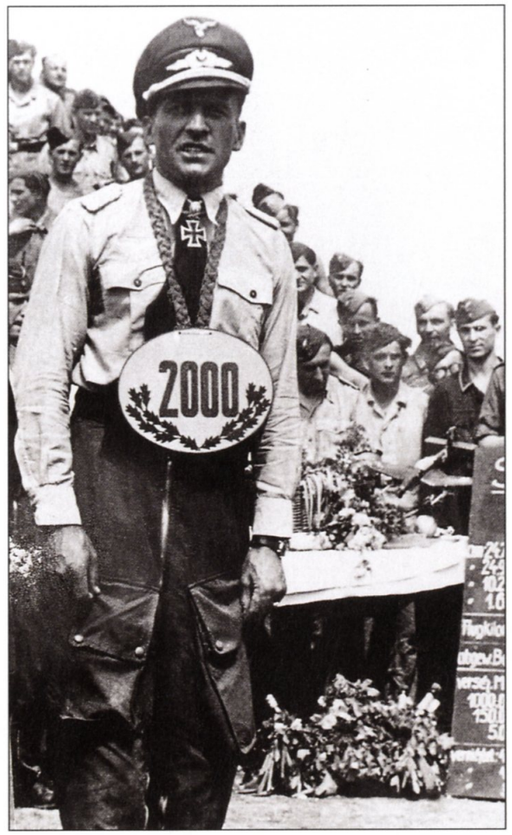
Weights
Empty: *2750kg (6080lb)*
Loaded: *6585kg (14,500lb)*

Performance
Maximum speed: *402kmh (250mph)*
Cruising speed: *310 kmh (193mph)*
Range: *1000km (620 miles)*
Service ceiling: *7320m (24,000ft)*
Ceiling with maximum load: *4730m (15,520ft)*
Normal radius of operation: *448km (280 miles)*

Armament
2 x 37mm cannon in underwing pods
1 x 7.92mm MG 81 twin-barrel machine gun

to drive the Germans from the Soviet Union. On 14 January 1944, the Soviet Second Shock Army and the Forty-Second and Fifty-Ninth Armies struck hard at the German defences in the Baltic sector, driving back the German Army Group North and capturing Novgorod by a huge pincer movement. At the same time, the armies that were massed on the Leningrad and Volkhov Fronts smashed their way through to the Estonian border, where they halted and prepared for the big summer offensive scheduled to follow the spring thaw.

In the south, a massive offensive that would end with the expulsion of the Germans from the Ukraine was getting under way – farther south still, Soviet armies gathered their strength for a big push that would liberate the Crimea. During the preliminaries to this last offensive, the Soviet Air Force and Naval Air Arm played a major part in strangling the Germans' lifelines by attacking enemy transport vessels in the Black Sea. In a bid to force the Russian forces out of Romania, the Germans launched a strong counter-offensive at Iasi (Yassy), a few miles inside the frontier. The air assaults that ensued were marked by a savagery unmatched since Kursk. After several days of bitter fighting, the battle of Iasi ended in failure for the Germans. It was the last time that the Luftwaffe would make a serious attempt to gain air superiority over a



Above: Hans-Ulrich Rudel celebrates the occasion of completing his 2000th sortie on the Eastern Front.

battlefield on the Eastern Front. After Iasi, the German squadrons were distributed piecemeal along the front; and although the aircrews still fought gallantly, their operations became increasingly uncoordinated.

In April and May 1944, the Russians liberated the Crimea. This was the last major operation before the main Soviet offensive of 1944, the object of which was the destruction of the German Army Group Centre. Centred on Minsk, this army group, which was under the command of Field Marshal Walter Model, comprised the Second, Fourth and Ninth Armies and the Third Panzer Army – a total of 50 divisions, with 1000 tanks and 1.2 million men. For air support, the Luftwaffe had managed to scrape together about 1400 combat aircraft. The destruction of Army Group Centre would not only result in the expulsion of German forces from the Soviet Union but in the opening of a broad highway into the heart of central Europe.

Operation Bagration

In readiness for the offensive, the Russians assembled more than 2.5 million men on four fronts, stretching in a huge arc from north to south. The most northerly of the four was the First Baltic Front, which extended from Velikiye Luki on the River Dvina to Vitebsk; then came the Third Byelorussian Front, lying between Vitebsk and the Dnieper; this linked up with the Second Byelorussian Front, whose forces were concentrated on the Dnieper at Mogilev; while the fourth, and biggest, front was the First Byelorussian under General Rokossovsky, which stretched from the Pripet Marshes to Kovel, where its flank was protected by the Eighth Guards Army under General Chuikov, the defender of Stalingrad. Air support along the four fronts was provided by the First, Second, Third, Fourth, Sixth, Eighth and Sixteenth Air Armies of the Soviet Frontal Aviation – a total of more than 70 air divisions.

Early in June 1944, a few days after the Allies landed in Normandy, the Russians struck their first blow, in effect a preliminary to the main offensive. The attack was launched against the Russians' old adversary, Finland, now an ally of Germany. Despite offering fierce resistance, on 4 September 1944 the Finns were forced into an armistice with the Russians for the second time in five years. Under the terms of the agreement, they turned their weapons on their former allies – who were now withdrawing into Norway, blowing up anything of importance as they went. The main Soviet offensive began at dawn on 22 June 1944, three years to the day after the Wehrmacht had invaded the Soviet Union.

The first attacks were directed against the German fortified positions of Vitebsk, Mogilev and Bobruisk,

which were subjected to heavy air attacks and then a fierce artillery bombardment. Despite the fearful battering they received, the German defenders fought back hard and inflicted terrible casualties on the attacking Russian infantry. However, on 25 June, two Soviet armies succeeded in linking up west of Vitebsk, virtually annihilating the Third Panzer Army, and the fortress itself fell two days later. The following day, Mogilev was also captured, but at such appalling cost to the Russians that the Second Byelorussian Front was unable to continue the offensive until strong reinforcements arrived. The greatest initial success came on the First Byelorussian Front, where the Russians managed to isolate part of the German Ninth Army at Bobruisk. The trapped German forces were

Above: Gathered round their officer, Stuka pilots receive their orders prior to a mission in mid-1944. Note the various types of ordnance around the aircraft.

then systematically worn down by the Sixteenth Air Army; on 29 June, they were finally overwhelmed.

A graphic description of what it was like to carry out a Stuka attack in the teeth of murderous fire on the Eastern Front during this Soviet offensive was provided by a Royal Hungarian Air Force officer, Captain Gyozo Levay:

"My unit, the 102/1 Dive Bomber Squadron of the Royal Hungarian Air Force, was stationed at Grodek-Jagiellonski airfield, Poland, in July 1944,

Above: Luftwaffe ground personnel perform essential maintenance on the 37mm anti-tank cannon of a Ju 87G Stuka on the Eastern Front, mid-1944.

attached to III Gruppe of Stukageschgwader 77. The group commander was away on leave and the leader of 7 Staffel, Hauptmann N., was deputising for him. Hauptmann N., a fair-haired man, was the only German squadron leader in the group who had not yet been awarded the Knight's Cross of the Iron Cross. Being in command temporarily, he must have reasoned that this was the time to earn this high decoration. Each time we flew a mission and the bombs were released, he swooped down and strafed the target with machine-gun fire. In the summer of 1944 this was sheer madness. The Ju 87D-5 was, by any standard, a slow and vulnerable machine, vulnerable not only to anti-aircraft guns, but also to small-arms fire. It was designed for dive-bombing and not for low-level attack. As a result of this selfishly displayed heroism, we lost seven planes in two days.

"Reports came in that the Russians were preparing for an attack southwest of Kowel and we were to fly a sortie at once. When we reached the briefing room the Germans were already taking off. A short briefing, then the seven Hungarian Ju 87s raced along the field in close echelon formation and rose in the air.

"I threw my Ju 87 into an 80-degree dive"

"We reached the target area in about 85 minutes. The Hungarian squadron was the second-last to dive, not an enviable position. I threw my Ju 87 into an 80-degree dive. The ground rushed up rapidly and trenches, trees and enemy vehicles seemed to come at me at terrific speed. A slight correction on the rudder and the target moved into my bombsight. A slight pull on the stick – I pressed the button and the bombs were gone. But instead of pulling out sharply I flattened the dive, keeping as close to the ground as I could. I pulled the air brakes in. As I raced low over the countryside I spotted Hauptmann N. and his formation, about five of them. They were waiting for the right moment to sneak in and attack.

"Normally after I had made an attack I would pull up and return to base, but this time it was to be different. Earlier, Hauptmann N. had inferred that I was too cowardly to return and make a strafing attack with machine guns. It was a foolhardy act, but I was determined. I banked at just under 300m (1000ft). As I raced back towards the target area the bombs of the last wave were exploding. I was down to 15m (50ft). Vehicles were now in my gunsight.

"I shoved the throttle forward ... nose down still further. My finger pushed against the firing button and tracers cut through the trucks. Treetops raced past my cabin and panic-stricken soldiers scattered. I pulled over in a steep bank to starboard just as a terrific explosion jarred the Ju 87. We were hit!

Acrid smoke filled the cabin, the engine began to miss. A quick glance at the instrument panel, however, assured me that we could keep going for a little while, at least. Could we make the German lines?

"I called my gunner to ask if he was all right. No reply. I repeated the question. Silence. The engine was missing badly. I looked over my shoulder; Corporal Sarkady was hanging on the straps, motionless, he seemed to be dead. Now I was flying in my crippled plane, thick smoke pouring out of the engine, with a dead gunner in the rear seat. I had to concentrate on flying the violently shaking machine. In the cabin the smoke nearly blinded me. I pressed the release lever and the canopy flew off, almost taking my arm with it. At last I could see. The altimeter showed 275m (900ft), but the speed kept dropping back. I pushed the stick forward, the nose dropped and the needle of the airspeed indicator began to creep up.

"The ground raced towards me"

"A large green meadow appeared in front of me, and I calculated that I must have been over our side of the front, or pretty near to it, therefore I decided to land. Having a second look, somehow the meadow seemed too green to me. I remembered some good advice: if you must make a forced landing on unknown territory, no matter how smooth it looks, blow off your undercarriage (which was fitted with explosive bolts for just such an emergency), because a belly landing is better than a broken neck. I pressed the button. There was a thundering sound and the undercarriage shot past the wing trailing edges. I had never pancaked before, so I was on the alert. Gliding at 128kmh (80mph), the ground raced towards me like a huge, green carpet. I lifted the nose in a three-point landing position, so that the tail would touch the ground first. The aircraft lost speed rapidly. A slight pull on the stick, the nose did not rise. So far, so good!

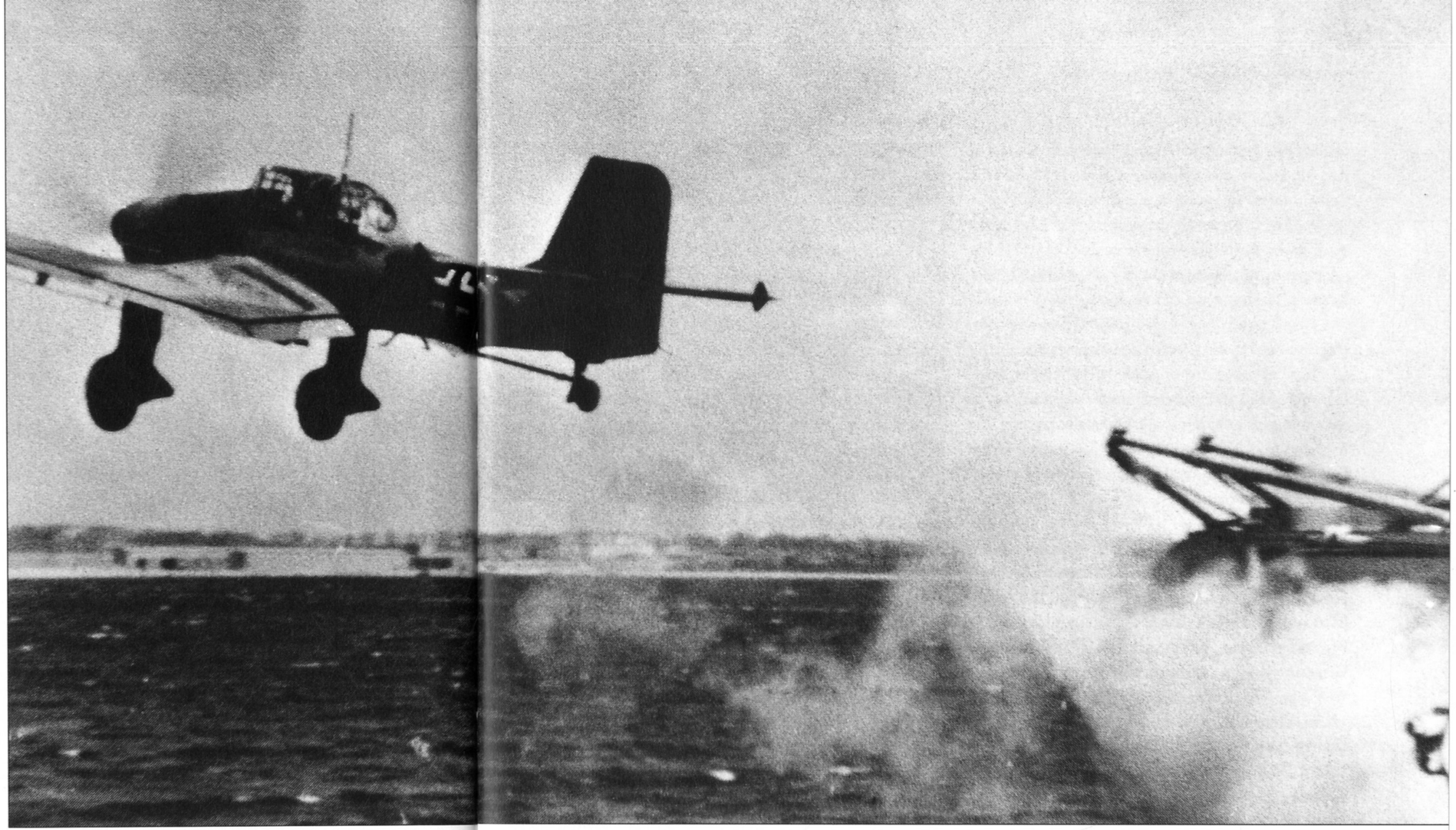
"Heavens, the fuel switch! As I reached forward with my left hand to switch it off, I pulled the stick lightly. A terrible impact, a splash, my old kite hit the ground skidding wildly, then finally came to a sudden halt. My head hit the instrument panel and everything went black."

As it turned out, Levay's gunner had only been stunned. Both he and the pilot got clear of the wreck and reached the German front-line positions safely.

(*Royal Air Force Flying Review*, April 1962)

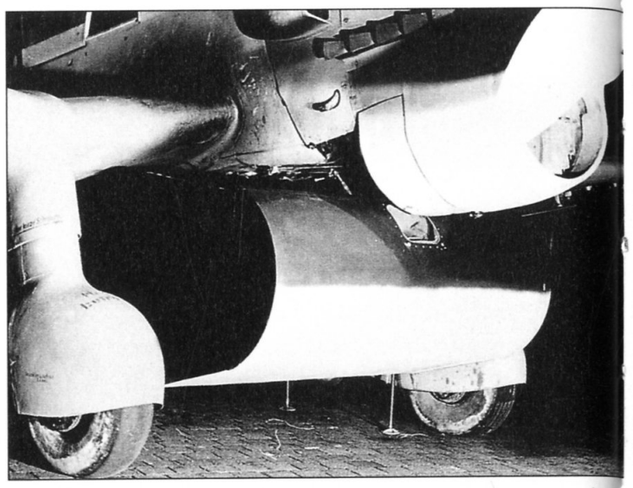
By 13 July 1944, the Soviet High Command had achieved its primary aim, and the German Army Group Centre had virtually ceased to exist. The German retreat continued throughout August, by which time the Russians had forced their way to the borders of East Prussia. The First and Second Byelorussian Fronts had already reached the River Bug in July and captured Lublin, subsequently launching a new thrust towards the Vistula and Warsaw. On 2 August, Rokossovsky's forces crossed the Vistula and headed for the Polish capital. Fierce fighting was taking place in Warsaw between the Polish Underground Army, which had been exhorted to rise up and fight, and the Germans. Suddenly, Rokossovsky's forces broke off contact with the retreating Germans and withdrew several miles, remaining immobile while the Germans crushed the Warsaw uprising with great ferocity. Only when the Underground Army had been eliminated and Warsaw lay in ruins did the Soviet advance resume.

While the Russians advanced to the Vistula and established a series of bridgeheads on the west bank of the river, Soviet forces were pushing the Germans



Above: A wasted resource – a Ju 87C being launched by catapult from the Kriegsmarine aircraft carrier *Graf Zeppelin*. The navalized version of the Stuka, the C variant, never entered service, chiefly because the *Graf Zeppelin* was never completed.

steadily back through Latvia and Estonia. By the end of the year, Estonia had been liberated completely and the German forces remaining in Latvia were penned up in the northwest corner of the country. They were still there when Germany surrendered in May 1945. In September, the Russians occupied Romania and Bulgaria. The following month, they captured Belgrade and moved northwest into Hungary to begin a winter offensive against the German and Hungarian armies – which were still offering stiff resistance. By mid-December, 180,000 German and Hungarian troops were besieged in Budapest. At the turn of the year, the front ran from Yugoslavia to the Baltic, cutting across Poland and Czechoslovakia and running along the border of East Prussia.



Above: A specialized collapsible container fitted to the underside of a Ju 87R. They were used to transport various materials between forward operating bases.

The end of the war

The stage was now set for the vast offensive of 1945. For the final thrust that would take them into the heart of Germany, the Russians had assembled nearly five million men, twice as many as the opposing Germans. A vast air umbrella over the offensive would be provided by the 17,000 combat aircraft of 13 air armies, outnumbering the Luftwaffe on the Eastern front by 10 to 1. The tank-busting Stukas of St.G 2 Immelmann were heavily involved in the German Army's fighting retreat in the summer of 1944: the two Romanian dive-bomber groups fought alongside them until 23 August, when King Michael I of Romania declared that his country was about to abandon the Axis cause and fight alongside the Allies (which, in practice, meant the Russians). The next day, the Romanian Government formally declared war on Germany and Hungary.

By this time, the Romanian dive-bomber groups were reduced to about 10 aircraft between them, but these continued to operate alongside the Russians until the end of the war. Elsewhere, surviving Stukas were formed into Nachtschlachtstaffeln, operating in a variety of roles under cover of darkness. During the Battle of the Ardennes from December 1944 to January 1945, they operated in a conventional bombing role and also dropped flares over Allied garrisons such as the besieged town of Bastogne. At least 14 were shot down by Royal Air Force (RAF) de Havilland Mosquito intruders, and others by the USAAF's Northrop P-61 Black Widow night fighters. Others still were caught in transit between airfields during daylight hours and destroyed by the Allied fighters that now roved freely across German skies. On 2 April 1945, for example, two Ju 87s were shot down near Stolzenau by Flying Officer C. J. Sheddan of No 486 Squadron RNZAF, flying a Hawker Tempest V.

Early in May 1945, Colonel Hans-Ulrich Rudel led the remnants of St.G 2 – three Ju 87G-1s and four Fw 190s – to a final landing at the US-occupied airfield at Kitzingen, in Austria. He ordered each pilot to wreck his aircraft by collapsing the undercarriage on landing. So, in this final act of defiance, the day of the Stuka came to an ignominious end. It was a far cry from the days of the Blitzkrieg, when the Stuka had been the world's leading ground-attack aircraft, and the most feared.

Glossary

Abschuss "shootdown" – an air victory.
Alarmstart scramble.
Ami slang for American.
Blitzkrieg "lightning war" – the highly mobile form of warfare developed by Germany and used with great effect by the Wehrmacht between 1939 and 1941. It was the first wide-scale use of combined-arms doctrine.
Dicke Autos "fat cars" – enemy heavy bombers.
Einsatzfruede love of combat.
Einsatzstaffel operational Staffel (of a training unit).
Endausbildungstaffel operational training squadron.
Endgültige Vernichtung final destruction of an already culled aircraft.
Ergänzungsgruppe (ErgGr) advanced training group.
Ergänzungsstaffel (ErgSt) advanced training squadron.
Erprobungsgruppe (EprGr) operational test group.
Erprobungsstaffel (EprSt) operational test squadron.
Fliegerdivision (FD) air division – a higher command containing several types of flying units.
Fliegerführer (Flifue) aircraft command/control unit, or it's commander. In the case of isolated theatres, the theatre air commander.
Fliegerkorps (FG) air corps – a higher command containing several Fliegerdivisonen.
Flugzeugführer pilot.
Freie Jagd "free hunt"– a fighter sweep without ground control.
Führer leader.
Führungsstaffel leader's squadron.
Führungsverband lead formation.
General der Jagdflieger (GdJ) General of the Fighter Arms; a staff position in the RLM. Werner Moelders and Adolf Galland were the most prominent holders of this position.
Geschwader (plural Geschwader) wing – the largest mobile, homogeneous Luftwaffe flying unit.
Geschwaderkommodore wing commodore – usually a major, oberstleutenant or oberst in rank.
Gruppe (plural Gruppen) group – basic Luftwaffe combat and administrative unit.
Gruppenkommandeur group commander – usually a hauptmann, major or oberstleutnant in rank.
Himmelfahrtskommando "mission to heaven" – suicide mission.
Holzauge "wooden eye" – the last airplane in a formation.
Horrido hunters' or pilots' cry of victory. St Horridus was the patron saint of hunters and fighter pilots.
Indianer "Indians" – enemy fighters.
Jabostaffel fighter-bomber squadron.
Jäger originally hunter, also fighter pilot.
Jägerschreck "fear of fighter" – a derogatory term coined in Göring's headquarters.
Jagdbomber (Jabo) fighter-bomber.
Jagddivision (JD) fighter division; could command one or more Jagdgeschwader.
Jagdflieger fighter pilots.
Jagdfliegerführer (Jafue) fighter command/control unit or it's commander. Tha Jafue originated as administrative units but evolved into operational control units during the war.
Jagdgeschwader (JG) fighter wing, commanding three or four Gruppen.
Jagdgruppe (JGr) fighter group, containing three or four Staffeln.
Jagdkorps fighter corps; commanded one or more Jagddivisionen.
Jagdschutz "fighter protection" – generally, a patrol of a section of front, rather than an escort mission.
Jagdstaffel fighter squadron, originally containing 12 aircraft (3 Schwaerme). Its authorized strength was increased to 16 in 1943.

Jagdverband (JV) fighter unit. The term was only used for JV 44, the Gruppe of jet fighters commanded by General Adolf Galland in 1945.
Jagdwaffe fighter arm or fighter force.
Kampfgeschwader (**KG**) bomber wing.
Kanalfront the (English) Channel front.
Kanalgeschwader the Geschwader serving on the English Channel (JG 2 and JG 26).
Kanaljäger fighter pilot(s) based near the English Channel.
Kapitän "captain" – a Staffel command position rather than a rank.
Katschmarek a slang term for a wingman – originally a derogatory term for a dim-witted infantry recruit.
Kette flight of three aircraft.
Kommandeur "commander" – a Gruppe command position rather than a rank.
Kommodore "commodore" – a Geschwader command position rather than a rank.
Luftflotte (**LF**) "air fleet" – corresponded to a numbered American Air Force.
Luftwaffe "air force" – refers to German Air Force.
Luftwaffenkommando (**Lkdo**) air command, a small or down-graded Luftflotte.
Nachtjagdkommando night fighting detatchment.
Nachwuchs "new growth" – a late-war replacement pilot.
Oberwerkmeister line chief.
Pulk combat box, an American heavy bomber formation.
Reichsluftfahrtministerium (**RLM**) German Air Minitry; Göring's headquarters, it controlled all aspects of German aviation.
Reichsverteidigung (**RVT**) organization responsible for the air defence of Germany.
Rotte tactical element of two aircraft.
Rottenflieger wingman, the second man in a Rotte.
Rottenführer leader of an element of two aircraft.
Schnellkampfgeschwader (**SKG**) fast bomber wing.
Schwarm flight of four aircraft (plural Schwaerme); all German fighter formations were made up of units of Schwaerme.
Schwarmführer flight leader.
Sitzkrieg "sitting war"– the "phony war" in Western Europe between September 1939 and April 1940.
Stab staff.
Stabsschwarm staff flight.
Staffel squadron.
Staffelführer squadron leader (temporary or probationary).
Staffelkapitän squadron leader – usually a leutnant, oberleutnant or hauptmann.
Stukageschwader (**Stg**) dive-bomber wing.
Valhalla a large formation of aircraft.
Zerstoerer "destroyer" (heavy fighter) – Bf 110 or Me 410 twin-engined fighter.
Zerstörergeschwader (**ZG**) heavy fighter wing.
Zerstörergruppe (**ZGr**) heavy fighter group.

Appendix 1

Composition of a Stukageschwader

The basic flying formation was the Staffel, which normally comprised nine aircraft operating in three flights (Ketten). It was commanded by either a hauptmann or oberleutnant, and was self-contained in that it had its own motor transport and a mobile repair shop. The number of flying personnel in a Stukastaffel was usually about 24 (12 pilots and 12 observers), and about 150 ground personnel.

Three Staffeln usually comprised a Gruppe, totalling 27 aircraft, this total being increased to 30 by a Stab (HQ) flight, which operated three more. The Gruppe commander, a hauptmann or major, carried the title of kommandeur. Under his command he had 72 aircrew and around 450 ground personnel.

Three Gruppen made up a Geschwader, with 90 aircraft plus its own Stab flight with 4, making a total of 94. The Geschwader commander, kmown as the kommodore, could be a major, oberstleutnant or oberst.

Given the circumstances under which they had to operate, the serviceability rate of the Stuka units was quite good, as will be seen from this breakdown of the strength of St.G 77 in June 1941 and May 1943 listed below. Deliveries of aircraft to frontline units remained adequate until the end of 1942, when Allied bombing and other factors combined to disrupt them.

Unit	Base	Aircraft type	Aircraft on charge	Aircraft serviceable
Russia, 22 June 1941				
Stab St.G 77	Biala Podlaska	Ju 87B	3	1
I/St.G 77	Biala Podlaska	Ju 87B	38	31
II/St.G 77	Woskrzenice	Ju 87D	39	27
III/St.G 77	Woskrzenice	Ju 87B	35	28
Russia, 17 May 1943				
Stab St.G 77	Various	Ju 88	6	6
I/St.G 77	Various	Ju 87D	39	33
II/St.G 77	Various	Ju 87D	39	30
III/St.G 77	Various	Ju 87D	39	24

Appendix 2

Stukas that never were: the Junkers Ju 187 and Henschel Hs 132

Although the Ju 87 Stuka performed well in Poland, Norway and France in 1939–40, where it was able to operate under a strong fighter umbrella, its unacceptable loss rate during the Battle of Britain made it clear that if the dive-bomber was to continue as a viable tactical support aircraft, a new, faster, better-armed and better-armoured replacement was needed. The result was a new design, the Junkers Ju 187, which was initiated in the spring of 1941. It retained some of the features of the earlier Ju 87, such as the cranked (gull) wing and two-man crew, but added a retractable landing gear. The aircraft was to be of all-metal construction, with slatted dive brakes fitted near the trailing edge of the landing flaps. The main landing gear was housed in a bulge at the junction of the wing where the angle of the wing changed, and retracted to the rear, rotating through 90 degrees to lie flat in its housing. The selected powerplant was to be the 1750hp Junkers Jumo 213A 12-cylinder, liquid-cooled engine, which was also used in the Fw 190D and Ju 88G-6. One of the most unusual features was the moveable vertical tail fin, which could be moved 180 degrees in flight in order to give the rear gunner a clear field of fire. The two-man crew sat back-to-back, as in the Ju 87, but in the Ju 187 they were to have the benefit of a pressurized cockpit. Gun armament was to consist of two forward-firing MG 151/20 cannon, with one MG 151 cannon and one MG 131 machine gun in a remotely controlled dorsal barbette. The bomb load comprised one 500kg (1102lb) bomb under the fuselage, and two 50kg (110lb) bombs under each wing on either side of the landing gear bulges.

Although wind-tunnel models and even a full-sized mock-up of the Ju 187 were built, the project was cancelled because the Ju 187's projected performance offered only a marginal increase over that of the Ju 87D, and there was also a growing realization that fighter-bombers such as the Fw 190F series could do the job as well as specialized dive-bombers.

Despite this, the notion of acquiring an advanced dive-bomber to replace the Ju 87 was far from dead, and it came to the forefront once more in February 1943, when the RLM issued a specification for a single-seat, anti-shipping aircraft to combat the anticipated Allied invasion of Europe. The original specification called for a piston-engined type, but it was soon realized that only a turbojet-powered machine could hope to match the proposed performance requirements. As precision level bombing by jet aircraft presented problems because of the lack of a suitable bomb sight to compensate for the aircraft's high speed, a dive-bombing capability was built into the specification.

In the spring of 1944 Henschel, having already begun wind tunnel testing with models, submitted a design for RLM approval under the designation Hs 132. The fuselage was of a circular cross-section, constructed entirely of metal, and the single BMW 003 jet engine was mounted on the fuselage top. The fuselage-mounted wings were mostly of wooden construction, a feature dictated by the lack of strategic metals, and had a slight taper on the leading and trailing edges. Due to the position of the engine, a twin fin and rudder configuration was chosen, to allow the jet to exhaust without interfering with the tail unit. A tricycle landing gear was to be used, with the nosewheel rotating 90 degrees to lie under the cockpit when retracted; the main gear retracted inwards.

For the Hs 132 to stand any chance of success in its proposed operations, it had to be capable of using very high speed to elude enemy defences, and this involved very high "g" forces – a load factor of 12 being considered necessary in contrast to the more usual factor of about 8 in the Ju 87. To enable pilots to withstand such high g forces, it was decided that a prone pilot position was essential, and one was incorporated in the aircraft's extensively glazed cockpit, which was faired flush with the rest of the fuselage, giving the Hs 132 a bullet-like appearance. The pilot's controls featured a spring-operated power rudder, since a pilot in the prone position could exert less pressure on the rudder controls. The prone-pilot position was extensively tested at Rechlin on the Berlin B-9, a twin-engined test aircraft built to investigate the effect of g forces on the human body.

The flight profile envisaged that the Hs 132 would begin its high-speed attack at a range outside the ships' field of fire. After reaching a speed of 910kmh (565mph) in a shallow dive, the pilot would then climb as he released his bomb. The bomb would be "tossed" at the target using a type of primitive computerized sight, which delayed construction of the aircraft because it was not ready in time. No dive brakes would be fitted, as steep diving angles on the target were not envisaged. A contract for six prototypes was approved in May 1944, and construction was started in March 1945. By this time the anti-ship requirement had long since vanished, and it was now envisaged that the aircraft would be used in an anti-tank role, in much the same way as the Stuka had been used on the Eastern Front.

Four versions of the Hs 132 were proposed, including the Hs 132D, which was to have an enlarged (9.1m/29.9ft) wing. The Hs 132V1 was nearly complete, with the fuselage completed at Henschel's Berlin-Schönefeld facility and the wings being finished at Henschel's French subsidiary. Although the Hs 132A was scheduled to have its first flight in June 1945, the wings and fuselage were never mated, and Russian forces captured the intact fuselage in May 1945.

For many years, an illustration purporting to be the only existing photograph of the Hs 132 has appeared in various aviation publications around the world. In fact, it is an artist's impression.

Appendix 3

Notable Stuka pilots

Heinz-Günter Amelung
After joining the Luftwaffe in 1936, he was commissioned as a leutnant on completion of his flying training and joined II/Stukageschwader 165 at Schweinfurt in January 1937. On 1 September 1940, he was appointed to command the 5th Staffel of II/Stukageschwader 77. On 1 April 1942 he was promoted to hauptmann, and on 5 July 1942 was awarded the Knight's Cross for his victories in Poland, France, the Balkans and Russia. At the end of the war he was a major at the Air Warfare Academy, Berlin-Gatow. In 1956, he joined the Bundeswehr and became an oberstleutnant in 1959. He died in December 1964.

Karl Angerstein
Born in 1890, Karl Angerstein was a career officer who joined the German Air Service in 1914 and who subsequently held various appointments, mostly with bomber units, in World War I. Afterwards, he held several senior posts with the Air Police, transferring to the Luftwaffe as a major in 1935. At the beginning of 1940, he was appointed Kommodore of Stukageschwader 3, a post he held until July, when he assumed command of Kampfgeschwader 1. In 1943, he was appointed to command I Fliegerkorps. At the end of the war, after holding various staff appointments, he was a generalleutnant and a holder of the Knight's Cross, awarded in November 1940. He was released from POW camp in 1947 and died in 1985.

Alwin Boerst
Joined the fledgling Luftwaffe as an unteroffizier in October 1935 and was commissioned as a leutnant in III/St.G 163 in September 1939. He flew 39 missions in the Polish campaign and 113 in the Battle of France. During operations in the Balkans and Crete, he sank one destroyer and damaged a second. At the beginning of the Soviet campaign he was a staffelkapitän in III/St.G 2. In the first months of the campaign, he destroyed a strategically important bridge over the Dnieper and knocked out over 80 enemy fighting vehicles. He was awarded the Knight's Cross in October 1941, after completing his 300th operational mission. In November 1942 he was awarded the Oak Leaves. In February 1943, now a hauptmann, he was given command of III/St.G 3. Badly wounded in the leg by flak in October 1943, he returned to action as commander of I/St.G 3 in 1944, completing his 1000th mission soon afterwards. On 30 March 1944, on his first sortie in a cannon-armed Ju 87G-1, he was shot down and killed near Iasi, Romania. He was posthumously awarded the Swords.

Helmut Bruck
Born on 15 February 1913. After completing his schooling, Bruck became a policeman before joining the new Luftwaffe in 1935. On completion of his training he was posted to Gruppe I/165, and in May 1939 was appointed commander of No 1 Staffel of St.G 77. In August 1940, after taking part in the Polish and French campaigns and the Battle of Britain, he became commander of I Gruppe, which he led in the Balkans campaign of April 1941. He was awarded the Knight's Cross in September 1941. Several times during the campaign in Russia he landed his aircraft behind enemy lines to rescue shot-down airmen. On 19 February 1943 he was awarded the Oak Leaves, and the next day he was given command of St.G 77. In November 1943 he was promoted to oberst-leutnant, and on 10 January 1944 he flew his 800th combat mission. He was promoted to oberst in June 1944 and continued to lead St.G 77 until January 1945, when he assumed command of Schulgeschwader 151. After the war, Helmut Bruck became a forester.

Oskar Dinort
As a leutnant in the Reichswehr, Oskar Dinort was a noted sailplane pilot, setting up an endurance record of 14 hours 43 minutes on 24 October 1929. After some years as a fighter pilot in the new Luftwaffe, he was promoted to major and given command of the first Stuka unit, I/St.G 165, which was redesignated I/St.G 2 in 1939. On 15 October 1939 Dinort was given command of Stukageschwader 2, which he continued to command until October 1941, when he handed over to Major Paul-Werner Hozzel. His distinguished leadership of St.G 2 "Immelmann" in the Polish and French campaigns, in the Battle of Britain and in Russia earned him the Knight's Cross with Oak Leaves. At the end of World War II he was a generalmajor, commanding the 3rd Fliegerschul-division. Born in 1901, Oskar Dinort died in 1965.

Bruno Dilley
Commissioned into the Luftwaffe in 1935, Bruno Dilley was promoted to oberleutnant in 1938 and given command of 3 Staffel of the Insterburg Gruppe of Stukageschwader 1. At the start of the Polish campaign, his Stuka flight attacked the bridges at Dirschau in the first bombing attack of World War II. He completed 24 operational missions over Poland and subsequently took part in the Norwegian and French campaigns and in the Battle of Britain. Early in 1941 he led St.G 1 in operations against Malta, and subsequently saw service in the Balkans and North Africa. After a spell in command of a flying school at Wertheim, he was posted to the Russian Front. In February 1942, he was shot down near Staraya Russa and survived a three-day trek through enemy territory, together with his observer, Oberfeldwebel Kather. In June 1942, after completing 325 war missions, Dilley was awarded the Knight's Cross and assumed command of I/St.G 1. In the winter of 1942–43 he survived being shot down on three occasions, and in January 1943, after 600 missions, he was awarded the Oak Leaves. At the end of World War II he was in command of the Metz Flying School. He joined the Bundesluftwaffe in 1956 and reached the rank of oberstleutnant. He died in August 1968, aged 55.

Heinz Edhofer
In 1942–43 Heinz Edhofer, then an unteroffizier, was a Stuka pilot with III/St.G 2 in Russia. In August 1943, he was awarded the German Cross in Gold. In 1944 he flew with 7 Staffel, Schlachtgeschwader 2, still on the Eastern Front. In November 1944, as an oberfeldwebel, he was awarded the Knight's Cross. Edhofer ended the war with 700 combat missions and a score of 84 tanks and one aircraft destroyed.

Walter Enneccerus
The man who was to become one of the Luftwaffe's leading Stuka virtuosos was born on 21 November 1911. Joining the Luftwaffe in 1935, he served initially with I/St.G 165 before being promoted to hauptmann and given command of II/St.G 2 in December 1939. Enneccerus fought in the Belgian and French campaigns of May–June 1940 and in the Battle of Britain, after which II/St.G 2 deployed to Trapani, Sicily, in December for operations against Malta and the British Mediterranean Fleet. On 10 January 1941, I/St.G 1 (Paul-Werner Hozzel) and Enneccerus' II/St.G 2 joined forces to inflict substantial damage on the aircraft carrier HMS *Illustrious* and light damage on the battleship HMS *Warspite*, and on the following day II/St.G 2 damaged the cruiser HMS *Southampton* so badly that she had to be abandoned. Enneccerus subsequently led his Stukas in North Africa, taking part in the assault on Tobruk. In April 1942 he served on the staff of Fliegerführer Afrika, and took part in further attacks on Malta before being appointed to command St.G 77 in October. He continued in command of the Geschwader until February 1943, when he handed over to Helmut Bruck. Enneccerus later served on the staffs of Fliegerführer West and Luftflotte 6.

In 1956 he joined the Federal German Luftwaffe, retiring as a generalmajor in 1967. He died at Troisdorf on 3 August 1971, after a long illness.

Siegfried Fischer
Joined the Luftwaffe in October 1939 and underwent dive-bomber training at Graz, Austria, after which he was assigned to Stukageschwader 1 as a gefreiter. He saw action over Malta and went on to complete 713 operational missions. He was shot down 12 times and badly wounded twice. In the final months of the war he flew anti-tank missions in West Prussia and Pomerania, destroying 80 Soviet tanks. At the end of the war he was in hospital in Zossen, where he was captured. He was released from Soviet captivity in September 1946.

Peter Gasmann
Born on 4 December 1910, he was commissioned from the ranks in the pre-war Luftwaffe. On 5 April 1941, he took command of III/St.G 1, and in May 1942, after destroying 24 tanks, 39 artillery pieces and 9 bridges, he was awarded the Knight's Cross. On 1 May 1944, as a major, he assumed command of Schlachtgeschwader 1. He died in Bonn on 6 September 1965.

Walter Hagen
Born on 16 March 1897, Walter Hagen served in a hussar regiment from 1915 to 1917, when he transferred to the Naval Air Service. After World War I he worked as a salesman for a time, then joined Junkers as a pilot in 1924. In 1930 he made the first catapult launch from a ship. Five years later he joined the new Luftwaffe and worked at the Air Ministry until 1938, when he was promoted to major and given command of Flugzeugtragergruppe I/186, which was intended to operate Ju 87s from the carrier *Graf Zeppelin*. He saw action with the group in Poland. On 18 November 1939 he was appointed commander of Stuka-geschwader 1, which he led in the battle of France, and continued in command until 30 March 1943, when he handed over to oberstleutnant Gustav Pressler. Hagen was appointed Fliegerführer 3 with the First German-Italian Tank Army in the Balkans, and commanded all Luftwaffe formations in eastern Serbia. At the end of the war he was a generalleutnant in command of the 17th Fliegerdivision.

Hagen was awarded the Knight's Cross on 21 July 1940 and the Oak Leaves on 17 February 1942. He died in Kiel, his home town, on 24 March 1963 after a long illness.

Erwin Hentschel
Hentschel joined Hans-Ulrich Rudel as the latter's observer in October 1941, and served with the renowned Stuka ace for the next two-and-a-half years, winning the Knight's Cross during this period. On 20 March 1944, Rudel was compelled to make a forced landing and he and Hentschel set off to walk to German lines. On the following day, Hentschel drowned while attempting to swim the freezing River Dniester. He had completed 1400 sorties.

Karl Henze
He joined the Luftwaffe in 1936 and trained as a dive-bomber pilot. During World War II he flew with Stukageschwader 77, seeing operational service over Poland, France, Britain, the Balkans and Russia. After 430 missions he was promoted to oberleutnant and given command of a Staffel in July 1942. He became commander of I/St.G 77 in February 1943 and led the Gruppe for the next two years, being awarded the Knight's Cross in May 1944. Karl Henze ended the war with 1100 operational sorties to his credit. He subsequently served in the Bundeswehr, retiring as an oberst in 1970.

Hubertus Hitschold
He joined the Reichswehr from high school in 1930, and learned to fly at the secret Liptesk flying school in the USSR. In 1935, now a leutnant, he joined the new Luftwaffe and was assigned to I/Stukagruppe 163 in Cottbus. In 1937 he was a staffelkapitän in I/St.G 2, and in October 1939 he assumed command of I/St.G 1. In July 1940, he was promoted to major and awarded the Knight's Cross for his leadership in the Battle of France. He subsequently fought over England, the Balkans, Crete and the USSR. On 22 June 1941, the first day of the campaign in Russia, he was shot down behind enemy lines and rescued by a fellow pilot, Leutnant Freitag, who landed his Stuka nearby to pick up Hitschold and his observer. On 29 December 1941, Hitschold was awarded the Oak Leaves. After a period in command of the Dive Bomber School at Wertheim he

returned to the Eastern Front to take command of Schlachtgeschwader 1, the first ground-attack unit to rearm with the Focke-Wulf Fw 190.

In June 1943, Hitschold handed over the Geschwader to Oberstleutnant Alfred Druschel, having been appointed Fliegerführer of Luftflotte 2 in Italy and Sardinia. Hitschold was later appointed General der Schlachtflieger at Luftwaffe High Command. At the end of the war he was a generalmajor.

In the post-war years Hubertus Hitschold lived by Lake Starnberg, where he died on 10 March 1966.

Günter Honnefeller
Completed his training as a dive-bomber pilot with I/St.G 77, and then flew 438 combat missions in Junkers Ju 87s before converting to the Fw 190. As a leutnant with 7 Staffel St.G 10 he completed further missions, and in October 1944 was awarded the Knight's Cross. He then assumed command of 7 Staffel St.G 10. By the end of the war, Honnefeller had completed 609 combat missions and had 10 kills to his credit.

Paul-Werner Hozzel
Born in Hamburg on 16 October 1910, Paul-Werner Hozzel served as an artillery officer before transferring to the Luftwaffe in 1935. In June 1939 he assumed command of I/St.G 1, and on 8 May 1940 he became the first Stuka pilot to be awarded the Knight's Cross in recognition of the group's anti-shipping activities. He led the group in the Battle of Britain, the Balkans, Crete and the Mediterranean theatre, relinquishing command in May 1941. In October of that year he was given command of St.G 2 in Russia, and was promoted to oberstleutnant. In February 1943, he took command of operational elements of St.G 1, 2 and 77, which he formed into the Gefechtsverband (Fighting Unit) *Hozzel*, which was used to support counterattacks against Soviet units. For these operations, Hozzel was awarded the Oak Leaves in April 1943.

Imprisoned by the Russians at the end of the war, Paul-Werner Hozzel returned to Germany 11 years later. In 1956 he joined the Bundeswehr, rising to the rank of brigadegeneral. He retired in 1971.

Georg Jauernik
Underwent training as a Stuka pilot at the beginning of World War II and then joined II/St.G 77, flying combat missions over Poland, France, England, the Balkans and the USSR. Promoted to stabsfeldwebel, he was awarded the Knight's Cross in November 1942. By the autumn of 1944, he had completed 1000 combat flights, and was given command of 6 Staffel, II/St.G 77, now flying Focke-Wulf Fw 190s. On 18 February 1945, at Sprottnau airfield, he walked into the rotating propeller of an Fw 190 and was killed.

Horst Kaubisch
Joined the Luftwaffe in 1936 and was assigned to Stukageschwader 77, in which he became adjutant and later staffelkapitän of 9/St.G 77. In June 1942 he was promoted to hauptmann, and was awarded the Knight's Cross in November after completing 500 flying operations. At the end of 1943 he was kommandeur of I Gruppe, Schlachtgeschwader 1, being promoted to major and awarded the Oak Leaves. He was killed during a mission on 12 February 1945.

Johann Klaus
Arrived on the Russian Front with II/St.G 1 in July 1942, and saw combat over Kharkov, Stalingrad, Kursk and Finland. He was promoted to oberleutnant in March 1944 and awarded the Knight's Cross. He was shot down by flak in October 1944 and taken prisoner by the Russians. Released in 1949, he later joined the Bundeswehr and retired with the rank of oberst.

Walther Krauss
Krauss transferred to the Luftwaffe from the infantry in 1938, and became a very successful reconnaissance pilot, for which he was awarded the Knight's Cross, before transferring to Stukas after the Battle of France. He became staffelkapitän and then kommandeur of III/St.G 2. On the night of 16/17 July 1943, during the Battle of Kursk, Walther Krauss was killed in a Soviet air attack. He was posthumously promoted to major and awarded the Oak Leaves.

Dr Ernst Kupfer
Joined the Luftwaffe in 1939, after spending 10 years as an infantry officer. He trained on Stukas and accompanied St.G 2 to France in September 1940. In the following month, now a hauptmann, he was given command of 7 Staffel, I/St.G 2. In May the following year, during operations over Crete, he sank a British cruiser. He subsequently saw active service in Russia, taking part in attacks on Soviet warships at Kronstadt. During these operations he sank a cruiser and badly damaged the battleship *Oktyabrskaya Revolutsiya*. On several occasions, his Stuka was damaged by flak and he only just managed to reach friendly territory. On the last occasion, he was seriously injured in a crash-landing and then spent six months in hospital, during which period he was awarded the Knight's Cross.

He returned to the Russian Front in April 1942, despite the advice of several doctors, and took command of II/St.G 2, completing his 500th combat mission on 30 October 1942. During this period he led the Gruppe in some notable actions, in one of which his Stukas broke up an attack on Kalach airstrip by Russian tanks. In January 1943 Kupfer was awarded the Oak Leaves, and on 1 March he was appointed kommodore of Stukageschwader 2. On the collapse of the German offensive at Kursk, he formed all available ground-attack units into Kampfverband *Kupfer*, which he led until September, when he was appointed Inspekteur der Schlachtflieger with the rank of oberstleutnant.

On 6 November 1944, he set out in a Heinkel He 111 to make a tour of ground-attack units based in Greece. The aircraft crashed in bad weather north of Salonika, and Kupfer was killed.

Friedrich Lang
Born on 12 January 1915. He studied physics and mathematics at university, and then aircraft construction at Breslau Technical High School. In 1935 he joined the infantry and then, having learned to fly privately in the meantime, he transferred to the Luftwaffe, eventually being accepted for flying training after being turned down several times. In January 1938 he was commissioned as a leutnant, and served as an air observer on various types of aircraft until July, when he was posted to Stukagruppe 163, when he began training on the Ju 87A and Hs 123. In 1939 his Gruppe was redesignated I/St.G 2. He saw action in Poland, Belgium, Holland and France, flying his personal Stuka coded T6+HH, but on 8 June 1940, during an attack on England, he was badly wounded and hospitalized until the end of August. Lang subsequently saw action in Greece and Crete before taking part in the Russian campaign, being awarded the Knight's Cross in November 1941. He reached the 600-mission total in August 1942, during the drive to Stalingrad, and received the Oak Leaves in November. At this time he was liaison officer at HQ Luftflotte 4. He returned to flying duties in March 1943 as commander of III/St.G 1, which began rearming with the Focke-Wulf Fw 190 in September.

On 7 March 1944 Lang flew his 1000th operational mission, a patrol over Vitebsk. In June he was rested, taking command of Schlacht-fliegerschule 101 at Wirschau, and in July he was awarded the Swords to his Knight's Cross. In February 1945, Lang took command of Schlachtgeschwader 2 from Hans-Ulrich Rudel, who had been wounded.

After the war Lang was a teacher, then a building engineer, before joining the Bundeswehr in 1956. He served until 1967, retiring as an oberst.

Fritz Neumüller
Joined the Luftwaffe in 1937, and flew with 4 Staffel St.G 77 in the Battle of France. After a brief spell as a flying instructor, he rejoined St.G 77 in Russia in the summer of 1941. During a mission soon afterwards, he had to make a forced landing 50km (30 miles) behind enemy lines; he and his observer were picked up by Oberleutnant Horst Schnuckel, who landed nearby. After 610 combat missions, Neumüller was promoted to leutnant and awarded the Knight's Cross on 4 May 1944. In the summer of 1944, he was leading 7 Staffel of III/Schlachtgeschwader 10, flying Fw 190s. He failed to return from a sortie over Bessarabia on 18 August 1944 and was posted missing.

Theodor Nordmann
Joined the Luftwaffe in 1937, and served as a reconnaissance pilot until March 1940, when he transferred to I/St.G 186. He flew 60 missions during the Battle of France with this unit, now redesignated III/St.G 1, and took part in operations over England. Nordmann served in North Africa (surviving a ditching in the Mediterranean, spending 28 hours in a dinghy before being rescued), Crete and Russia. He was awarded the Knight's Cross in September 1941. In late 1942 he was attached to the test centre at Rechlin, returning to the front in January 1943. In February, on completing his 700th combat mission, he received the Oak Leaves. In April, he was promoted to hauptmann and given command of II/St.G 3. In April 1944 he became a major; by this time his unit had received the Fw 190. In August 1944 Nordmann completed his 1111th combat sortie, and in the following month he was awarded the Swords to his Knight's Cross.

On 19 January 1945, Major Nordmann was killed in a mid-air collision with his wingman.

Hubert Pölz
Pölz had already learned to fly by the time he joined the Luftwaffe in 1938. He served with 6 Staffel St.G 2 in Poland, France and over England, later taking part in air attacks on Malta. Deployed to North Africa in support of the Afrika Korps, Pölz took part in many attacks on British warships, including the aircraft carrier HMS *Formidable*, and on 24 June 1941 he sank the sloop HMS *Auckland* off Tobruk. In May 1942 Leutnant Polz was given command of 6 Staffel St.G 3. He continued to operate in North Africa until the final battles in Tunisia, during which he was shot down by an American fighter. He managed to bale out, badly wounded in the leg, and was evacuated, spending four months in hospital.

On his return to combat he was assigned to the Russian Front, where he fought in all the major battles of 1943, latterly flying the Fw 190. He survived being shot down four times, and was wounded on three occasions. He was awarded the Knight's Cross in February 1944, and the Oak Leaves in November. At the end of the war he was a hauptmann, commanding I/Schlachtgeschwader 151 in northern Germany, with over 1000 war flights to his credit. In May 1945, he surrendered to British forces in Denmark.

In the 1950s, Hubert Pölz founded his own aviation firm. He disappeared without trace while swimming on holiday in Spain in 1992, being officially declared dead 10 years later.

Gustav Pressler
At the outbreak of World War II, Gustav Pressler was an oberleutnant and staffelkapitän of IV/StG.77, with which he fought in the Polish and French campaigns. In October 1941, as a hauptmann, he was given command of II/St.G 2, with which he experienced heavy fighting on the Eastern Front. On 4 February 1941 Pressler was awarded the Knight's Cross, and in January 1943, after completing 500 operational missions, he received the Oak Leaves. On 1 April 1943 he took over command of St.G 1, which was then rearming with Focke-Wulf Fw 190s, from Walter Hagen. In November 1944, after serving briefly on the German Military Mission in Sofia, Bulgaria, he assumed command of Schlachtgeschwader 104, which he led until the end of the war. Pressler joined the Bundeswehr in 1956, in which he served until 1965.

Wolfram von Richthofen
A cousin of World War I ace Manfred von Richthofen, Wolfram was born on 11 October 1895 in Barzdorf, Silesia. Serving initially with a hussar regiment in World War I, he saw action on both Eastern and Western Fronts before transferring to the Air Service. On 4 April 1918 he joined Jasta 11, Manfred's famous "flying circus". Shortly afterwards Manfred was killed. Wolfram ended the war with eight victories and was awarded the Iron Cross, 1st and 2nd Class. After the war he studied engineering until 1925, when he joined the Reichswehr. From 1929 to 1933 he was military attaché in Rome, after which he transferred to the Luftwaffe. During the Spanish Civil War, as a generalmajor, he commanded the Condor Legion, and in late 1939 as a generalleutnant, he was made commander of VIII Fliegerkorps, whose Stuka operations he directed in all subsequent campaigns until July 1942, when he was appointed to the command of Luftflotte 4. A year later he became a generalfeldmarschall and

was given command of Luftflotte 2 in the Mediterranean theatre, but in November 1944 he contracted a brain tumour and was transferred to the reserve. On 12 June 1945, he died while in captivity in an American prison camp at Bad Ischl, Austria.

Hans-Ulrich Rudel
The man who was destined to become the most famous Stuka pilot of all, Hans-Ulrich Rudel joined the Luftwaffe in 1936 and trained as a bomber pilot, although he spent most of the next three years as an observer. In 1941, he was posted to I/St.G 2 Immelmann and flew his first operational sorties on 22 June, the opening day of the German offensive in Russia. On 23 September, during an attack on the Soviet Baltic Fleet in Kronstadt, a 1000kg (2200lb) bomb dropped by Rudel blew the bows off the battleship *Marat*, which then sank. In subsequent attacks he also sank a Soviet cruiser and destroyer, and on 6 January 1942, after he had completed more than 400 operational missions, he was awarded the Knight's Cross.

After a break from operational flying Rudel was appointed Staffelkapitän of 9/St.G 2, which had now moved to the Caucasus. He flew his 500th mission in September 1942, and reached the 1000 mark on 10 February 1943. On 1 April he was promoted to the rank of hauptmann, and it was at this time, when St.G 2 began to receive the cannon-armed Ju 87G, which Rudel had tested at Rechlin during his absence from the front, that his tank-busting career really began. He also found the Ju 87G highly effective against amphibious craft, destroying 70 during the battle for the Kuban bridgehead. On 14 April, he was awarded the Oak Leaves to the Knight's Cross.

During the Battle of Kursk, which began on 5 July 1943, Rudel destroyed four Russian T-34 tanks, and by the end of the day his score had risen to 12. In September he was appointed to command III/St.G 2, and at the end of the following month he destroyed his 100th Russian tank. The award of the Swords to his Knight's Cross followed on 25 November, and promotion to major on 1 March 1944. On 26 March Rudel destroyed 17 enemy tanks, bringing his score to 202, and after he had destroyed his 301st tank, during his 2000th sortie on 1 June 1944, he was awarded the Diamonds to the Knight's Cross, the Pilot's Medal in Gold and the Mission Clasp in Gold and Diamonds. On 19 August 1944, Rudel was shot down and wounded, but he remained on operations and was appointed to the command of St.G 2 with the rank of oberstleutnant. On 29 December 1944, Adolf Hitler presented him with a unique award, the Golden Oakleaves.

In February 1945 Rudel flew his 2400th mission, and his tally of enemy tanks destroyed had reached 505. On 8 February he was shot down by flak near Lebus, and his right foot had to be amputated. Despite this injury, he continued to fly with an artificial limb (though his wound only partially healed), and destroyed 26 more tanks.

At the war's end Rudel surrendered his Geschwader to the Americans. Afterwards, he joined former members of the Focke-Wulf company in Argentina. He later returned to Austria, where he settled in Kufstein and worked as a ski instructor. He died in December 1982, aged 66.

Gunter Schwarzkopff
Schwarzkopff served in the infantry during World War I. After being badly wounded at Verdun, he transferred to the Air Service. He joined the Reichswehr after the armistice, and in 1933 served as a hauptmann in the Air Ministry, where he became involved in the development of the Stuka. Schwarzkopff flew with the Condor Legion in Spain and subsequently supervised the formation of the first Stuka units. Attached to Junkers, he led the Ju 87 evaluation programme, and in 1939 was appointed the first commander of St.G 77. In May 1940, now an oberst, he led the dive-bombing attacks on French positions on the Meuse. On the 14th, the day the river was crossed, he was shot down and killed. He was posthumously awarded the Knight's Cross in November 1940.

Ernst-Siegfried Steen
Joined the Luftwaffe in 1935 after training secretly at Lipetsk, in the USSR. As a leutnant, he flew with Stukageschwader 2 Immelmann in the Polish and French campaigns. He subsequently specialized in anti-shipping attacks, being credited with sinking 15,240 tonnes (15,000 tons) of British ships in the English Channel and with damaging a destroyer off Crete. In August he was given command of III/St.G 2. He was shot down and killed on 23 September 1941 during an attack on the Soviet cruiser *Kirov* in Kronstadt, together with Unteroffizier Alfred Scharnowski, who was normally Hans-Ulrich Rudel's observer. Steen was posthumously awarded the Knight's Cross.

Heinz Welzel
Originally a maritime pilot, he transferred to Stukas in 1942. He flew with 4 Staffel, St.G 77, operating over Stalingrad and the Crimea in 1942–43. He subsequently converted to the Fw 190, and on his first mission in one of these machines he shot down three enemy aircraft. He was shot down in July 1944 and badly wounded. Welzel was awarded the Knight's Cross in July 1944, and was an oberfeldwebel at the end of the war.

Johann Zemsky
Zemsky rose through the ranks in the artillery arm and was commissioned in 1936, transferring to the Luftwaffe two years later. During the first year of World War II he served as an instructor at the Insterburg Stukaschule, before being promoted to hauptmann and given command of II/St.G 1 in September 1940. In February 1940, after completing 300 missions, he was awarded the Knight's Cross, and in July 1942, over Stalingrad, his mission total reached 500. He was shot down and killed on 28 August 1942, during the course of his 601st mission, and was posthumously awarded the Oak Leaves to his Knight's Cross.

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