CROWOOD AVIATION SERIES

MESSERSCHMITT ME 262

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Dedication

For my father, who in 1945 received the attention of a Messerschmitt Me 262 and was spared to inspire me as a youth

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Contents

Chronology

October 1938, Acting on briefings from the RLM, Messerschmitt AG directs the Projects Bureau chief, Robert Lusser, to define optimum single or twin-engined configuration for jet design.

December 1938, Messerschmitt AG receives a contract from the RLM for development of a jet-propelled fighter capable of accepting any available propulsion unit.

4 January 1939, RLM completes an industry briefing paper on technical guidelines for high-speed fighter aircraft, and expresses a proposed maximum speed target of 560mph (900km/h).

1 April 1939, Designers at the Messerschmitt-Augsburg works begin conceptualization work on the high-speed jet aircraft P.1065, which will emerge as the Me 262.

7 June 1939, Preliminary outline of the P.1065 is described to the RLM; in September the various design teams begin work on detailed plans. Design of the Jumo 004 engine begins. A revised concept on the P.1065 is ready on 9 November.

19 December 1939, The RLM inspects the P.1065 airframe and cockpit mock-up and finds no major causes for concern.

31 January 1940, The RLM issues a secret order for twenty P.1065 trials aircraft with pressurized cockpits; on 1 March, it decides to equip them with BMW engines.

21 March 1940, Changes to the P.1065 give it a triangular fuselage cross-section and swept outer wings; engine attachment remains uncertain. Wind tunnel tests of various engine configurations proceed during June and July.

1 November 1940, Powerplants are situated in underslung pods. Design Proposal III forms the basis for manufacture. On 19 December Messerschmitt receives orders for fifteen pre-production aircraft.

18 April 1941, Piloted by Fritz Wendel, the Me 262 V1 makes its first flight, powered by a Junkers Jumo 210 piston engine installed temporarily in the nose. On 25 July the RLM modifies the contract and requests five trials and twenty pre-production aircraft.

26 September 1941, The RLM defines the need for a photo-reconnaissance version of the Me 262, without armament and powered by two Junkers engines. The design is handed to the RLM on 21 October.

25 March 1942, Fritz Wendel flies the V1 with two BMW turbojets plus a Jumo piston engine, but the jets fail immediately after takeoff. RLM cancels the twenty pre-production aircraft and limits to five the number of trials aircraft – until performance improves.

18 July 1942, The first flight of a Me 262 on pure jet power takes place at Leipheim, with Fritz Wendel at the controls of prototype V3. On 12 August the RLM orders five additional trials aircraft and adds twenty pre-production machines.

2 October 1942, The pre-production order expands from twenty to thirty airframes by the end of 1943, but Messerschmitt balks at this. On 2 December the RLM demands a production rate of twenty aircraft per month in 1944.

22 January 1943, Me 262 receives top-priority DE rating. By now the streamlined outer wing sections have been extended inward to the fuselage, giving the aircraft its enduring characteristic feature.

4 March 1943, The RLM finalizes specification for the Me 262 and incorporates the bomber role as mandatory in design engineering. Messerschmitt begins a major marketing' bid by having fighter chief Adolf Galland fly the type in May, and by preparing detailed proposals for reconnaissance, fighter-bomber and fast bomber roles. The detailed engineering proposals for these are completed during May and submitted on 11 September.

6 June 1943, Me 262 V5 makes the first flight with a tricycle undercarriage, which gives the aircraft its tail-high ground-sit appearance. On 25 July Gerd Lindner demonstrates the V4 to Goering; on 20 September Lindner takes the V3 to nearly 600mph (960km/h).

26 November 1943, Gerd Lindner displays the Me 262 to Hitler who, having heard it is being mooted as a bomber, seizes upon that role and presses for its introduction as a *Blitzbomber*. On 21 December the bomber chief Dietrich Peltz flies the Me 262.

25 February 1944, American air raids on the Augsburg and Regensburg factories emphasize the importance of dispersed production, now a priority for war-torn Germany. The first aircraft comes off the Leipheim production line on 28 March.

15 April 1944, The last prototype (V10), also the last Me 262 off the Augsburg-Haunstetten production line, takes to the air in a form modified for fighter-bomber trials. On 6 June the specification for the bomber version is completed; ironically, this is the day the Allies invade occupied Europe.

10 June 1944, E-Stelle Rechlin receives its first Me 262, and thus begins the Luftwaffe training programme for the revolutionary jet. The first bomber pilots begin conversion training at Lager Lechfeld on 20 June.

26 July 1944, The first air combat recorded by an Me 262 takes place when an aircraft of *EKdo 262* engages a Mosquito of No 544 Sqdn RAF.

September 1944, The Me 262 is released for combat operations, one month before *Kommando Nowotny* becomes operational.

November 1944, The first operation with rocket-firing Me 262s takes place. In December air-to-air bombing tests are conducted at Rechlin.

January 1945, Adolf Galland forms an élite fighting unit, *JV 44,* which begins operations during March.

February 1945, Production reaches a peak of 296 aircraft delivered by the Messerschmitt Augsburg and Regensburg complex of factories and facilities.

March 1945, Heavy Allied air raids pulverize Germany's remaining production facilities. Air superiority is almost exclusively in the hands of the British and American air forces.

April 1945, Production ceases, after only 101 aircraft are produced in the month. Combat operations focus on *JG 7* and *JV 44*: other units hand over their aircraft to keep these two operational.

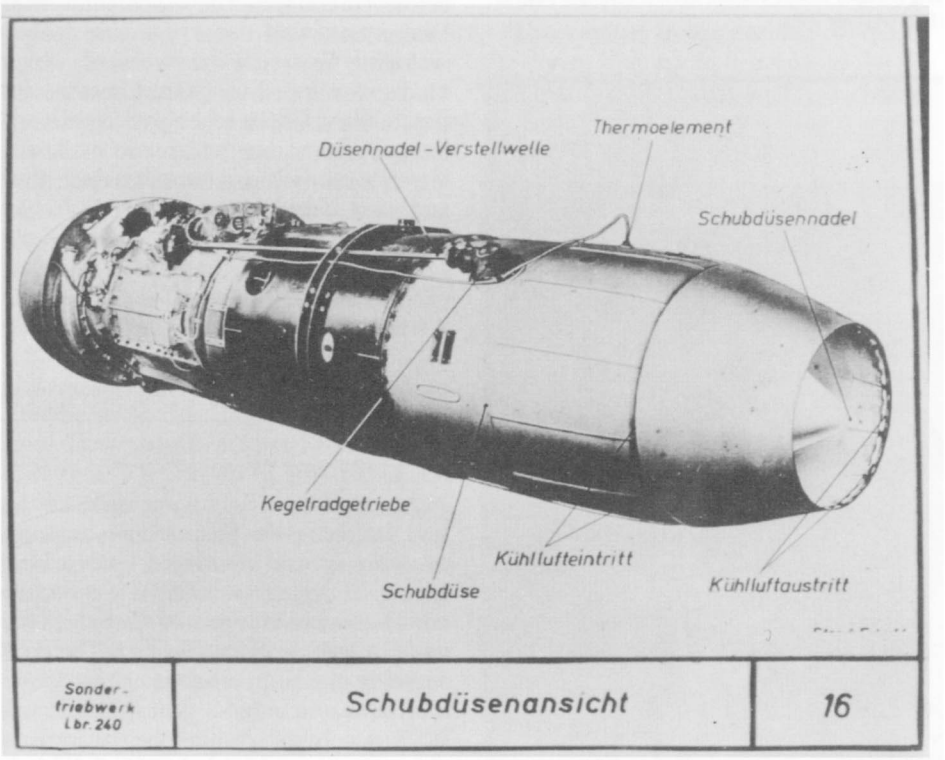
May 1945, World War II ends, and the Me 262 passes into history. It leaves a legacy of brilliant engineering design resulting in a thoroughly superior aircraft.

CHAPTER ONE

Origins

The origin of the Me 262 can be found in a technical requirement issued by the *Reichsluftfahrtministerium* (RLM; German Air Ministry) to the Messerschmitt company in October 1938, calling for definition of a two-engine jet aircraft at that time identified as Project P.1065. Or, more properly, it may be traced to a series of events that began on 3 March 1936, when Professor Pohl of the University of Göttingen wrote to Ernst Heinkel asking that his 24-year-old protégé, Hans-Joachim Pabst von Ohain, be given the chance to build a gas turbine engine. The concept of gas turbines was not new and Pabst von Ohain was not a designer; but as a theoretician he had been working on the concept of jet propulsion for three years and Professor Pohl thought it was time he had the resources of an aircraft company behind him. Fittingly, Ernst Heinkel had been the same age as Pabst von Ohain when, in September 1911, he had been taken on by the old aircraft firm of LVG and given his own chance to excel. Both men would go down in history for their pioneering work in aircraft and engines.

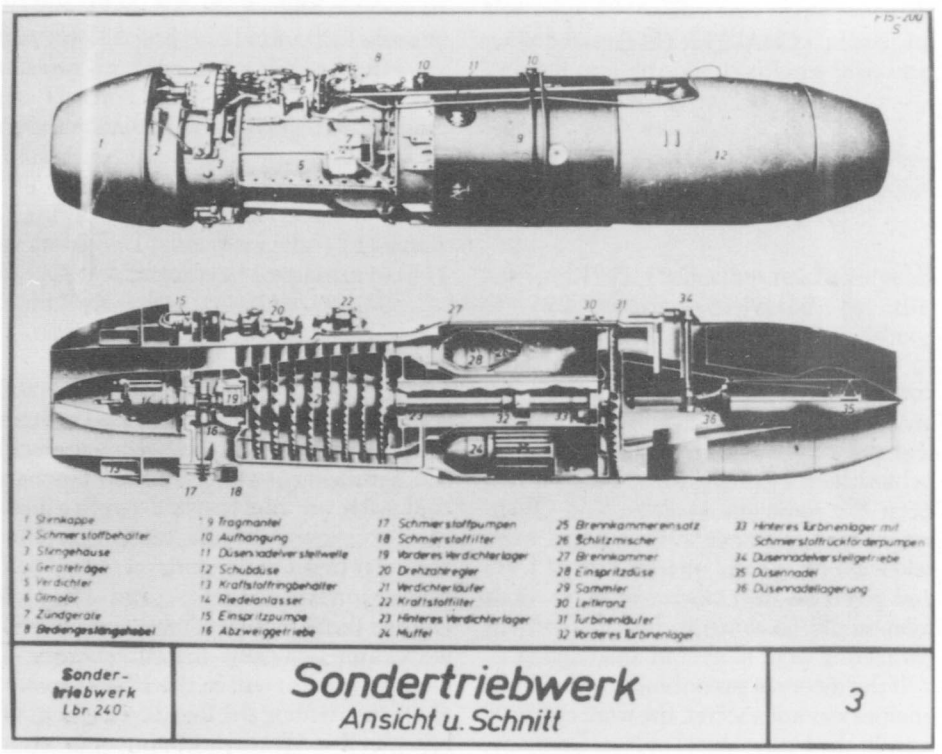
If the theory of gas turbines applied to jet engines was not a secret, the work certainly was. In the bizarre world of Nazi Germany, competition among industrialists was fierce and political control of new projects was hailed as a prerequisite for restoring Germany as a leading industrial nation. Ernst Heinkel knew that he would not receive official permission to spend a single *Reichsmark* on esoteric and highly theoretical development projects for an uproven tool with an unidentified application. Moreover, other manufacturers were only too eager to get their hands on radical and revolutionary concepts, and Heinkel realized the potential in Pabst von Ohain's work. Yet, ironically, the bureaucracy of German government in the 1930s was not alone in retarding the free development of advanced engineering concepts that would, within a decade, prove revolutionary.



Engines are frequently the means by which good aircraft are made great and it was around the jet powered reaction engine that the Me 262 was designed. This illustration is from a Junkers training manual.

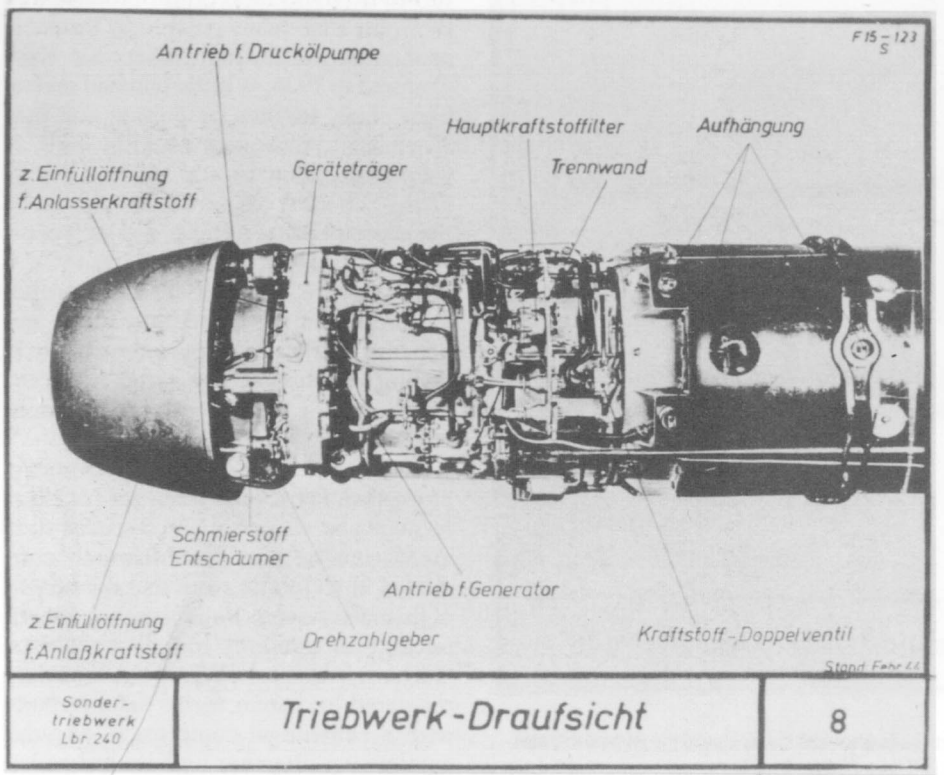
In Britain, also during March 1936, a young engineer named Frank Whittle had set up a private company (Power Jets Ltd) to build and test a gas turbine engine for aircraft; the RAF and leading firms had turned down his ideas on the grounds that they posed too many potentially insoluble problems. As a flight cadet at RAF Cranwell in 1928, Whittle had had several ideas about reaction propulsion and how an efficient powerplant could be built. A year later, when he was at the Central Flying School at Wittering, he conceived the marriage of gas turbines and jet propulsion, and registered the patent for a turbojet on 16 January 1930. For a further five years he struggled in vain to get approval for basic experimental work, during which time the original patent lapsed, leaving Whittle with little heart, or funds, to renew it.

Meanwhile development in Germany proceeded. Pabst von Ohain got his job at Heinkel and set up shop in a special shed at Marienehe airfield. Although conducted in secret, his work had the benefit of financial resources and most equipment needed to conduct breadboard tests. Within a few months Pabst von Ohain had registered his patent for an axial turbojet with a centrifugal compressor, annular combustion chamber and inward radial



A page from the engine maker's instruction book explains the working principles of the Jumo 004. Training in the mechanical detail of a jet engine was essential for would-be field engineers.

A photograph of the forward section of the Jumo 004 showing the axial turbine section. Several thousand such manuals and working drawings were supplied to Luftwaffe field engineer units.

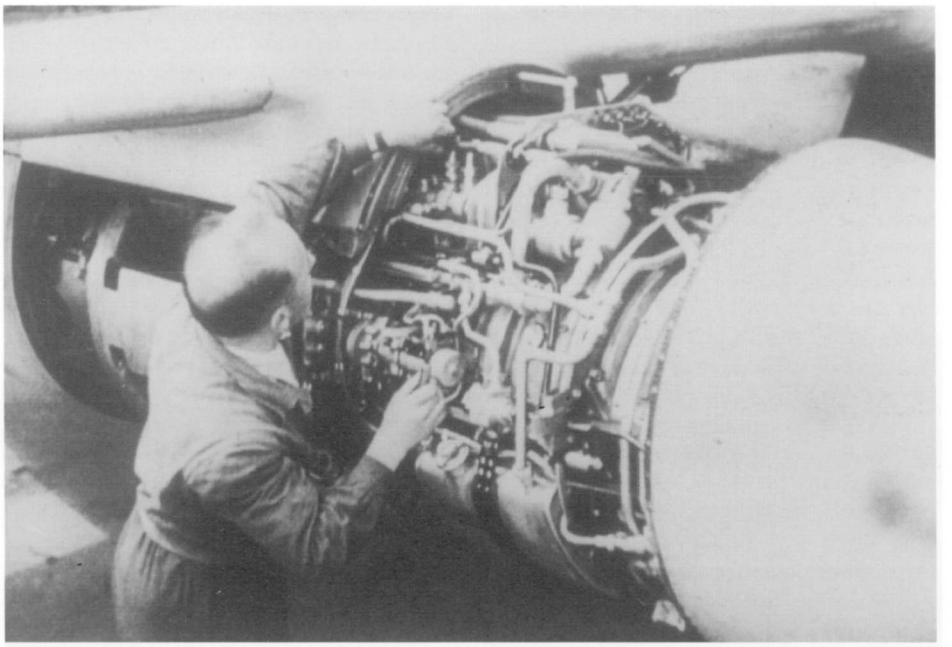


turbine. Just one month after Pabst von Ohain went to Heinkel, developments at Junkers began to shape the team that would provide a powerplant for the as yet undefined Me 262. The head of airframes at the Junkers Flugzeugwerke AG, Herbert Wagner, recognized the importance of engine performance and reliability to the effectiveness and efficiency of aircraft design. Concerned at the apparent lack of pace at the Junkers Motorenbau GmbH and the conservatism of its engineering head, Otto Mader, in April 1936 Wagner set up a special development centre at Magdeburg for the design of gas turbine engines.

Wagner was a highly political animal and knew that he had the kernel of a breakthrough when he devised a reaction motor that would give combat aircraft a performance edge. Dissatisfied with the plodding conservatism of the Junkers engine company under Otto Mader, Wagner got the resources he sought when the separate Junkers aircraft and engine companies merged in July 1936. He saw to it that Max Adolf Müller, an enthusiastic engineer, ran the project at Magdeburg. Mader knew nothing of the work done at Magdeburg, for despite amalgamation the two companies carried on very much as before. He continued development work at Dessau on a wide range of engine designs including free-piston gas turbines, which Mader developed in 1933. Elsewhere in the industry, BMW had a passing interest in gas turbines, but had yet to make the leap from turbosuperchargers, which they had been working on since 1934, to jet propulsion. Within three years they would be drawn into development of an axial flow engine, the 109-003, destined to become the first reaction motor for the prototype Me 262.

Germany's first jet engine

Pabst von Ohain was to give them all the lead, becoming the first German engineer to demonstrate a working gas turbine engine. In September 1937 he successfully ran his engine, designated HeS 1 (S for *strahl* or jet), on hydrogen fuel. The tests were five months too late to claim a world first, that accolade going to Frank Whittle's engine, which began its first series of tests on 12 April 1937. Pabst von Ohain's engine was crude and less controllable than Whittle's, but while work in



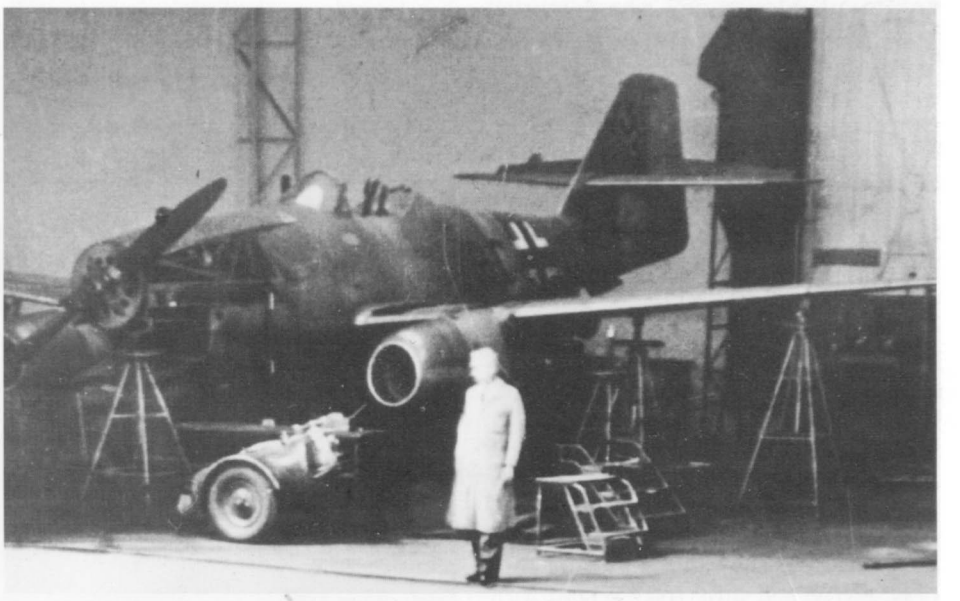
An engineer schooled in piston engines gets hands-on experience with the new generation jet. At one point the training of service engineers was a limiting constraint on operational deployment of the Me 262.

Britain was slow to gather momentum, developments in Germany accelerated. Pabst von Ohain continued to tinker with the HeS 1, which eventually gave a thrust of about 550lb (250kg), and began work on its successor, the HeS 2. This incorporated a flow divider which separated the gases, one stream passing into sixteen separate chambers divided by radial walls. Each chamber contained a vapour tube heated by hydrogen flame; once they were ignited and glowing the liquid petrol flow was turned on.

As built, the HeS 2 produced a thrust of only 200lb (90kg), instead of the 1,100lb (500kg) design rating, and the engine was rebuilt to accommodate a larger compressor and much bigger combustion chambers. As the HeS 3, it featured an axial flow impeller with a centrifugal compressor, a portion of air from which passed through a reverse-flow annular combustion chamber while the rest was mixed with combusted gases prior to entering the turbine assembly. The radial inflow turbine had the same shape as the compressor and gave the engine a bulky appearance because of the relative locations of the compressor and the combustion chamber. By March 1938 the HeS 3 was demonstrating stable performance and a greater degree of control than had been possible with the HeS 1. The HeS 3A was first run in January 1939 and produced a thrust of approximately 880lb (440kg) from an engine 4ft (1.2m) in diameter and weighing about 790lb (360kg).

This engine, it was decided, would be the design that would first take to the air, and Heinkel agreed to fund a derivative version, the HeS 3a, for air-tests beneath a specially adapted Heinkel He 118. In 1939 Heinkel was in the vanguard of research into reaction-powered flight, the only manufacturer in the world with parallel programmes for rocket- and jet-propelled aircraft. An instigator in the field, Heinkel was developing the world's first aircraft powered solely by a liquid-propellant rocket motor, the He 176. First steps on that road were taken in 1936, when a He 72 biplane trainer (at one time the German equivalent of the DH Tiger Moth) carried a Walter rocket motor into the air.

Designed by Heinkel to a requirement for a high-performance dive-bomber issued by the RLM in 1936, the He 118 was one of four designs submitted for flight evaluation by the Luftwaffe. First flown in mid-1937, the all-metal, low-wing monoplane was powered by a Rolls Royce Kestrel engine. Powered by a Daimler Benz DB 600 engine, the second prototype (D-OVIE) carried the HeS 3a turbojet slung beneath the fuselage. Flight tests began in May 1939, one month before the He 176 took to the air powered by a single liquid-propellant rocket motor. Before flight tests with the HeS 3a turbojet began several modifications, refinements and adjustments gave the engine a thrust of 990lb (450kg) at 11,000rpm. In flight, thrust levels dropped to 815lb (370kg) at 125mph (200km/h) and 760lb (345kg) at an air speed of 250mph (400km/h).



The sleek lines of the definitive Me 262 forward fuselage are marred by the Jumo 210G piston engine installed for early flight trials with the first prototype. Here, the nacelles await installation of the jet engines.

Nevertheless, as had been hoped, the HeS 3a formed the basis upon which the world's first aircraft designed solely for turbojet power would be built. In the build-up to full turbojet power the He 118 V2 was flown several times on turbojet power alone, its reciprocating engine being cut off for brief periods in flight.

The He178

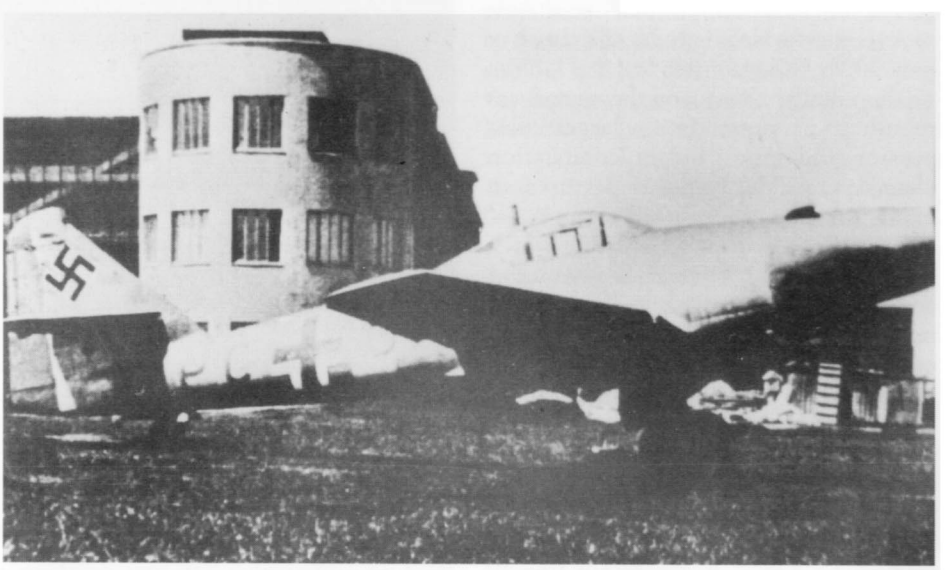
Heinkel wanted to show the potential of his engine by fitting it to a purpose-built aeroplane, and the airframe team designed the He 178 for that purpose. Specially built to carry the HeS 3b, a developed version of the motor used for the He 118 tests, the He 178 was a private venture built in secret by Heinkel at the Marienehe works. The RLM did not know of its existence until late 1938, when Heinkel told officials at the ministry that he was conducting research work on a revolutionary form of jet propulsion and was about to build an aeroplane which would be powered by it. There was little interest and he was given no encouragement. Early in 1939, while metal-cutters were building the He 178, Heinkel went a stage further and authorized Robert Lusser, head of the configuration and design bureau, to begin the detailed design of a jet-powered fighter designated He 180, later to become the He 280.

The RLM had given Heinkel a lukewarm reception because his company was an airframe design and manufacturing firm, and thus to be discouraged from getting into the engine business. But there was plenty of interest in the whole concept of rockets, jets and turbojets. No sooner had Heinkel put up a convincing case for a turbojet powered combat aircraft than the technical specifications department began discussions on potential applications with key airframe builders. It was in early 1938 that Messerschmitt had begun to look at the potential application of a jet engine, and that autumn it was approached by the RLM and asked to calculate the optimum power requirement for a gas turbine engine with potential for a jet-powered fighter. The company was given propulsion data calculated by BMW, which in September 1938 was encouraged by the RLM to get into the turbojet business. BMW had little track record with turbine engines but the Air Ministry wanted engine builders, rather than airframe manufacturers, to focus on these new technologies.

A key figure in these calculations was Waldemar Voigt, a brilliant young engineer who had joined Messerschmitt in 1933. It was Voigt's job to correlate existing work on gas turbine engines and translate technical performance figures into a formula for deriving optimum specifications for a jet-propelled aircraft. This was a new science to aerodynamicists, and sheer speed was only one of the potential benefits from gas turbines. But speed was a key aspect of any prospective design, and this imposed extra demands, for engineers now had to calculate what would happen in the transonic region where compressibility was, potentially, a major problem. The detail on how jet engines translated into powerplants for combat aircraft was provided by BMW and by the Bramo company, which, like BMW, had been approached by Hans Mauch of the RLM during September. Enthusiastic to consider any new development – since Ernst Udet was threatening to shut them down – they were not optimistic in their predictions about gas turbine power. BMW and Bramo cooperated, and in October 1938 their technical departments were working on the same problems. A merger in July 1939 put all Bramo's work into BMW, and it was from this base that Messerschmitt would receive its primary data on gas turbines.

At first the calculations at Messerschmitt were optimistic about the engineering development but conservative in engine specification. Voigt's team fixed on a total thrust of 1,350lb (612kg) for a single-seat fighter capable of 30-minute combat endurance at altitude. Voigt used criteria established for a wide range of earlier Messerschmitt aircraft designs and sought to integrate lift and drag coefficients with inert mass to produce a figure of efficiency both in aerodynamic design and performance. Because Voigt reasoned that both technology and manufacturing needs would be simplified through the use of smaller engines, he proposed a fighter with two powerplants, each producing a relatively modest 675lb (306kg) thrust. Voigt's mandate deliberately precluded configuration studies, but specified instead the theoretical mass, thrust and performance envelope for the engine and the aircraft, separately and together.

Meanwhile, Heinkel had completed the He 178 and it was about to make the world's first jet flight. The aircraft was a simple design, comprising wooden shoulder-wings of moderate dihedral and constant taper set on a duralumin monocoque fuselage of approximately circular cross-section, with a cockpit set well forward of the wing leading edge. The HeS 3b was placed inside and toward the rear of the centre-fuselage, the front in line with the trailing edge of the wing. Air for the engine was channelled from a nose intake via a duct curved to pass under the pilot's seat and below the fuel tank, which was located immediately to the rear of the



The first prototype (PC+UA) was tested at the Augsburg-Haunstetten facility and is seen here during flight trials.

A key figure in the development of the Me 262, Karl Bauer was a qualified instructor before he joined Messerschmitt and became chief test pilot in 1941. He survived the war and continued to fly until shortly before his death in 1963.

cockpit. The long, straight tailpipe passed over the retractable tail-wheel housing. The curved intake ducting would cause severe problems with engine efficiency and power levels, reducing thrust from the optimum achieved on bench tests.

Taxi trials with the He 178 began during the summer and the first tentative hop took place on 24 August 1939, with Flugkapitan Erich Warsitz at the controls. Using a diesel oil fuel known as 'J', the HeS 3b propelled the diminutive test bed into the air with a maximum takeoff thrust of 838lb (380kg) at 13,000rpm. This was the first time a jet-propelled aircraft became airborne, but the first official flight took place on 27 August when the test pilot circled the Marienehe airfield and performed simple manoeuvres, cut short when the landing gear refused to retract and a bird was sucked into the intake and cut off the engine – a problem many jet pilots of the future would encounter to their cost! Nevertheless, the flights were a success and it is ironic that they had been made possible through private effort and company funds without even the knowledge of the Nazi hierarchy.

Now that success had been achieved, Heinkel was keen to publicize his new product and lobbied the RLM for support. Again, interest was mediocre. There were other things to worry about in the autumn of 1939. Persistence paid off, however, and several senior Luftwaffe personnel, including Udet and Milch, were on hand to see a demonstration flight on 28 October. While presenting a novel spectacle, the aircraft was hardly stunning, its top speed being limited to 185mph (298km/h) by the restricted performance of its engine and the basic aerodynamics of the airframe. Heinkel had calculated a theoretical maximum speed of 435mph (700km/h). By this date, Heinkel had completed a second He 178. Whereas the V1 had a wing span of 23ft 8in (7.2m) and a wing area of 98sq ft (9.1m^2), the V2 had a span of 28ft 2½in (8.6m) and an area of 119sq ft (11.05m^2). The RLM noted the demonstration with interest devoid of enthusiasm, and Heinkel received little encouragement to continue with his work on turbojet-powered engines. Nevertheless, Heinkel was sufficiently encouraged to go on to greater things with his He 280 twin-jet fighter.

Development of the new engine

Heinkel knew that the new fighter would need more powerful and fully developed propulsion units, and in mid-1939 he set about the task of developing a more efficient engine. The opportunity for this came when the Junkers engine division of the newly amalgamated company took over the secret projects at Magdeburg, established in 1936 by Herbert Wagner, leaving Max Adolf Müller to join Heinkel at Marienehe during April 1939. Müller had been working on a small axial turbojet with five stages and a pressure ratio of 1:2.9 designated Jumo 109-006 (all reaction engines were prefixed with numerals 109). He brought the concept with him. The Junkers work had been going downhill ever since the Magdeburg team had switched to designing ducted fans driven by diesel engines. The upshot was that Heinkel got the 109-006, while Junkers concentrated on a more powerful motor designated 109-004, commissioned by the RLM during the summer of 1939. Otto Marder, who still conservatively controlled the Junkers engine works at Dessau, was opposed to the 109-004 programme and forced priority to remain on piston engines until Anselm Franz, who in August 1938 had been made responsible for all gas turbine work, had managed to assemble a team of about 500 people.

Back at Rostock, under Pabst von Ohain, engineers developed the HeS 3b into its definitive form as the HeS 6, which, with a thrust output of 990lb (450kg), got close to the design output for the original HeS 3 series. It was with this engine that the aircraft made its second flight, but it did little to push the He 178 faster through the air and the aircraft made few flights beyond the early months of 1940. Limited structurally and aerodynamically, the

Victim of a malfunction in the adjustment of the aircraft's tailplane incidence, test pilot Wilhelm Ostertag was to lose his life when the second Me 262 prototype crashed at Hiltenflingen.

Engineers and technicians at the Lechfeld test centre played a key role in getting Me 262 prototypes ready for flight and were an essential element in achieving successful tests.

maximum speed it ever reached was about 370mph (595km/h), but with an engine weight of 950lb (431kg) it was a poor candidate for development. However, circumstances conspired to help Heinkel along. With rapid success in its attack on Poland and a seeming hiatus in the declared war with Britain and France, there was time to consider technical developments to maintain Germany's edge over its enemies. At the end of 1939, Hans A. Mauch left the RLM, where he had been head of the reaction engine development department at the *Technische Amt*. He was replaced by the altogether more enthusiastic Helmut Schelp, who encouraged Heinkel to proceed with work on the He 280.

It was the HeS 6 that formed the basis for a new engine, known as the HeS 8, or the 109-001 under the new official designation system. This was the first engine designed with the physical proportions of an airframe in mind. It was integrated into the development programme of the He 280 and had to conform to the design requirements of that aircraft. Heinkel recognized the problems with the long contoured intake duct designed into the He 178 and determined to avoid that by giving the He 280 two engines attached externally. Designated HeS 8a, these engines would be carried in streamlined nacelles and their dimensions would be set by that requirement. The net result reduced the diameter of the HeS 8a so that it could be attached to the undersurfaces of the wings, and diameter came out at a modest 30½in (77cm) for a total engine weight of 835lb (378kg). Design thrust for the 109-001 was 1,060lb (480kg) but the engine was hard put to achieve a significant fraction of that. Meanwhile, the 109-006 axial turbojet recently brought to Heinkel from Junkers (designated HeS 30 at Heinkel) along with Adolf Müller gave greater promise. With a design thrust of 1,760lb (798kg) it was to be flight tested in the He 280 along with the 109-001.

Messerschmitt and turbojet development

By early 1940 there was an active and well supported turbojet development programme under way at several aircraft engine companies. Apart from the continuing work under Pabst von Ohain at Junkers and the increasingly competent work now progressing at BMW-Bramo, Daimler-Benz was active under Prof Karl Leist. In a programme authorized, albeit reluctantly, by *Dipl-Ing* Fritz Nallinger, work began on gas turbines during 1939. The company refused, however, to accept a government plan for Daimler-Benz to take over all gas turbine work at Heinkel and proposed its own advanced ducted fan concept. Designated 109-007, this had two contra-rotating spools with nine inner and eight outer interleaved compressor stages and four tubular combustion stages. The 109-007 had a design thrust of 3,090lb (1,400kg) at 560mph (900km/h), but development was slow and it would not run before June 1943. With the exception of von Ohain's HeS 8, all these turbojet

The Italian Contender

By 1940 the genie was out of the bottle. On 27 August, exactly one year after the first flight of the He 178, the second jet aircraft to take to the skies was flown at Taliedo airfield in Italy, with Mario De Bernardi at the controls. Designed by Secondo Campini and the Caproni company, the CC.2 evolved from research on jet engines carried out by S. Campini per Velivoli e Natani a Razione, a company formed by Campini in 1931. Campini designed a jet engine with a 900hp Isotta-Fraschini radial engine driving a ducted fan compressor in which air passed through a variable nozzle exit pipe into which fuel could be injected for combustion. The low-wing monoplane had a length of 41ft 6in (12.6m), a wing span of 48ft (14.6m) with an area of 388sq ft (36m²), and a maximum weight of 9,790lb (4,440kg). The aircraft had a top speed of 223mph (360km/h) and a ceiling of approximately 13,100ft (4,000m). Bearing the serial MM.487, the first aircraft was followed into the air by the second of its type, MM.488, on 30 April 1941. On 30 November 1941 De Bernardi and engineer Giovanni Pedace flew the first CC.2 from Taliedo to Guidonia, a distance of 168 miles (270km). It was destroyed in 1943 and the remains were taken to Britain the following year. The second CC.2 now resides in the Italian Air Museum at Vigna di Valle.

With several prototypes in the flight test programme, V3 was primarily assigned to aerodynamic and high speed trials. Note the He 177s in the background.

designs incorporated axial compressors.

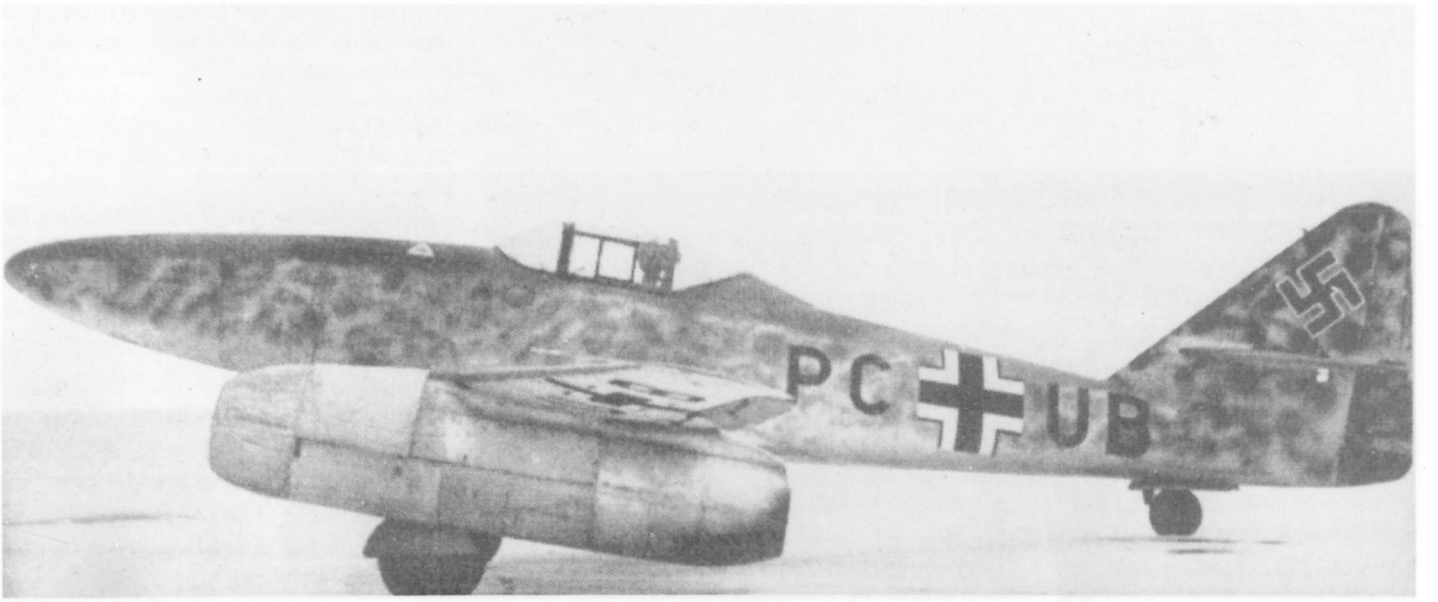
Meanwhile, work at Messerschmitt on a jet fighter design had been formalized through a series of developments originating at the RLM. As early as September 1938 the Ministry set up a series of secret meetings with agents and representatives of the German airframe and engine industries, to inform them of developments in new and exotic propulsion systems. But it was more than a briefing for prospective bidders. The RLM had already decided who it wanted to work on future projects and dictated that Messerschmitt and BMW were to cooperate in a 'South-German Development Initiative'. It was this directive that nudged Willi Messerschmitt into appointing Robert Lusser head of the jet aircraft project. Everything had changed within the space of a few months. Outwardly, as witnessed by those on the periphery, the Air Ministry was unimpressed with work conducted by Ohain and the Heinkel works. Inwardly, many were excited about the prospects of pushing on to the legendary 'sound barrier'.

Genesis of the P.1065

The following month, October 1938, the RLM initiated project studies for a prospective jet fighter and designated it P.1065, by which name it would be known until formalized as the Messerschmitt Me 262. It was within the auspices of these studies that Waldemar Voigt conceived the twin-engine aircraft utilizing a propulsion system with a thrust of 1,350lb (612kg). Even as Ernst Heinkel was developing the HeS 3 series motors and building the He 178, late in 1938, Messerschmitt received a contract from the RLM's department GL/C-E2/I for a jet fighter to be equipped with two turbojets, *Strahltriebwerke*, or TL, as they were called. At their BMW works in Munich, Dr Kurt Lohner and Dr Müller Berner began the design of a gas turbine designated F9225 TL. Early in 1939 BMW was formally requested to develop a gas turbine engine with a maximum diameter of 23.6in (60cm) and a thrust of 1,325lb (601kg); the company began work at its Berlin-Spandau factory on what would be designated the P.3302, eventually the BMW 109-003 engine.

Along with selected companies in the German aviation industry, on 4 January 1939 Messerschmitt received from the RLM a list of technical guidelines for a 'High-Speed Fighter with Jet Engines'. It specified in the broadest terms a single-seat fighter powered by jet engines with flexibility for incorporating different designs without major structural modifications. The airframe was to be a simplified all-metal structure for cheap assembly and easy maintenance, rugged and effective for a mission defined as 'high-speed fighter for use against aerial targets'. The aircraft was to have a maximum takeoff run of 1,970ft (600m), a maximum endurance

Closed-finger hand gestures typical of pilots everywhere describe critical moments during aerodynamic tests with the Me 262. Here, Heinz Hertilzius (right) clarifies a point for flight engineer Curt Zeiller.

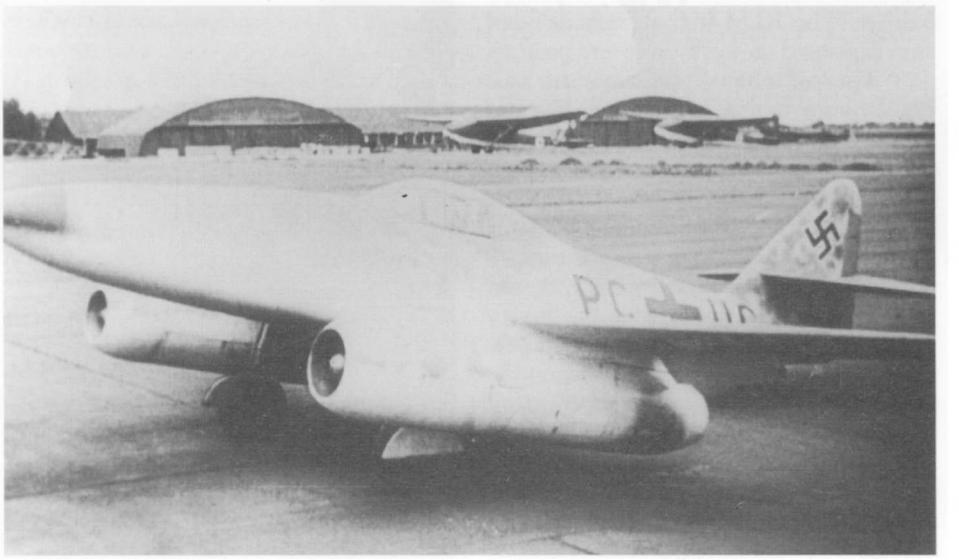


Second prototype V2 (PC+UB) was the third Me 262 to fly, on 1 October 1942

of one hour at 85 per cent power and an altitude of 21,325ft (6,500m), a maximum climb time of 8min 30sec to a height of 19,700ft (6,005m) and a maximum landing speed of 87mph (140km/h). Armament was to be carried in the nose and comprise four 7.9mm MG 17 machine guns with 800 rounds each and two 13mm Mg 131 machine guns with 400 rounds each, both operating through Revi C 12C gunsights.

The official start date for work on the P.1065 at Messerschmitt's Augsburg-Haunstetten facility was 1 April 1939, the day Waldemar Voigt replaced Robert Lusser as head of the Projekt Bureau, but that is an arbitrary date signalled by the drawing together of Messerschmitt's team for this important new project. It was to comprise Willi Messerschmitt himself, Waldemar Voigt, Wolfgang Degel, Karl Althoff and aerodynamicists Walter Eisenmann and Riclef Schomerus. They formed a 'committee' where each man had equal voice with the others, and in that way overcame a drastic shortfall in technical know-how on high-speed aerodynamics. A search of the literature revealed few clues to how an aeroplane would perform at speeds in excess of 450mph (725km/h; about 0.6 Mach), with a paucity of research data and no methods of discovering the behaviour of a body in the transonic regime. The very nature of this 'committee' allowed the project to maximize the creative intuition of the team as a whole.

What research data there was came from a small German wind tunnel capable of carrying out tests on aerofoils with a span of barely 1in (2.54cm) and a chord of 0.33in (0.84cm). There was insufficient information about the way air behaved around a fast-moving body and there were indications that slow drag divergence around 0.6 Mach might prove problematical, if not limiting. A report from the National Advisory Committee for Aeronautics (NACA) in the United States seemed to indicate boundary layer separation near the sound barrier. It all seemed to show effects from low Reynolds numbers in the tests, and as Waldemar Voigt was to reminisce some thirty five years later: 'A comparison of the German and NACA data supported our assessment of the Reynolds number effect and, thus, the set of lift, drag and moment curves on



Against a backdrop of Me 321 gliders, the sleek Me 262 V3 epitomizes the new age of jet aircraft. Few who saw the new aircraft failed to grasp the opportunities heralded by unprecedented power and speed, but the aircraft's poor acceleration at low speed was always a hazard for fighter pilots.

This beautifully restored Me 262 in the Deutsches Museum defines the clean and aerodynamically superior profile of the world's first operational combat jet. Donated by the Swiss Government in 1957, it is a suitable subject to represent the fine workmanship and detailed design.

which we finally settled was essentially a collection of guesstimates; assumptions indicating higher maximum speeds albeit aggravating our control force and structural load problems.'

Design work starts

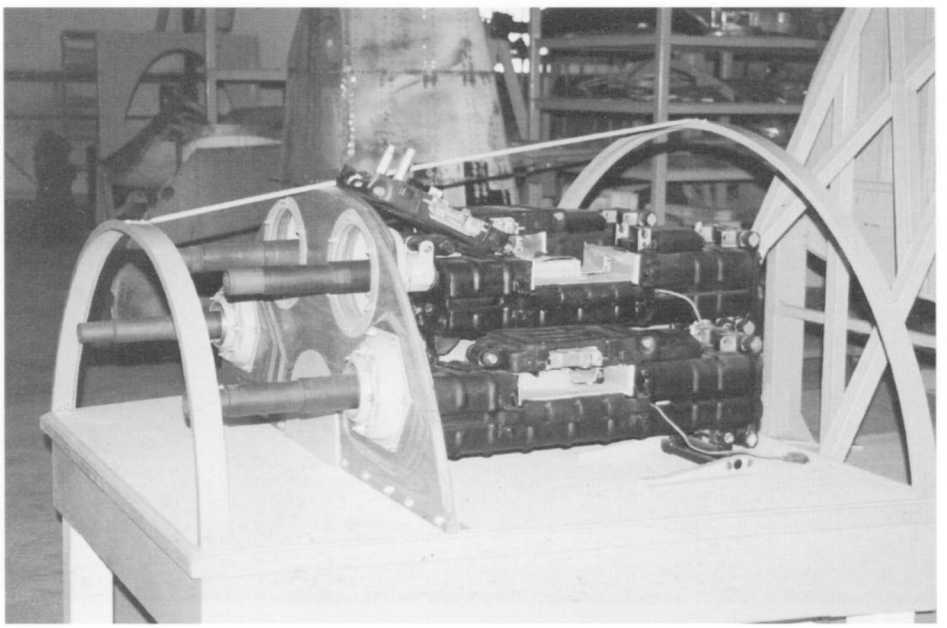
Conservatism was a prerequisite for success in areas where intuitive extrapolation would fill the void created by uncertainty. No-one knew exactly how local supersonic airflow would behave across the wings or fuselage, and there was no guide to precise measurement of aerodynamic loads or control force moments in the unexplored flight regime anticipated for P.1065. Wing shape would be all-important, and at this early stage the team favoured a straight wing of fixed taper on leading and trailing edges. As indicated earlier, the adoption of two 350lb (160kg) thrust engines seemed the right way to go when power output was low and manufacturing techniques for gas turbines were primitive. The RLM changed all that by stipulating an engine of 1,500lb (680kg) thrust, thus liberating the designer from constraints on one versus two engines per aircraft. The value of two engines for redundancy, and low power levels offering, presumably, greater reliability, was offset by the extra weight and structural compromise to accommodate two engines instead of one. At this stage in the design evolution the engines were buried in the wing roots.

The rearward retracting nose landing gear was the crucial last shift in major design features in a sequence of several modifications that included a fully swept wing leading edge and more effective horizontal stabilizer trim.

Messerschmitt himself had been unhappy with the twin-engine layout and the 'committee' moved to a single-engine design, but encountered equally daunting problems with intake duct length and a buried tailpipe extending along the inside of the rear fuselage. Such a design promised aerodynamic efficiency but poor engine performance; Heinkel's He 178 had the same problem, which compromised thrust and efficiency levels. The weight of the sheet metal ducting, boundary layer in the intake proper and greater internal wetted area made this a non-starter. The next stage in the design evolution was an attempt to solve these problems by moving the engine forward to reduce appreciably the length of the intake pipe, cutting off the fuselage at the point where the exhaust exited the engine. The nacelle thus formed for engine and cockpit would be secured to the tail unit by two booms attached to the inboard section of the rear wings, in much the manner adopted by De Havilland for the twin-boom Vampire designed in 1942.

This arrangement disturbed air flow over the whole structure and increased external wetted area in exactly the opposite way intended, so Messerschmitt devised a novel arrangement that would re-emerge five years later as the P.1101. To achieve a cleaner aerodynamic design and optimize engine efficiency, Messerschmitt selected the pod-and-boom concept, retaining the engine and cockpit nacelle with its short intake duct, but attaching a single boom above the engine exhaust path, on the end of which was mounted the conventional tail unit. With straight wings

and a tail wheel that brought the rear of the pod perilously close to the ground and directly in the path of the exhaust efflux, the design was further compromised by the main landing gear, for which there was little or no accommodation in the fuselage or inner wing structure. Nevertheless, the overall advantage in the pod-and-boom arrangement seemed to give it the edge.



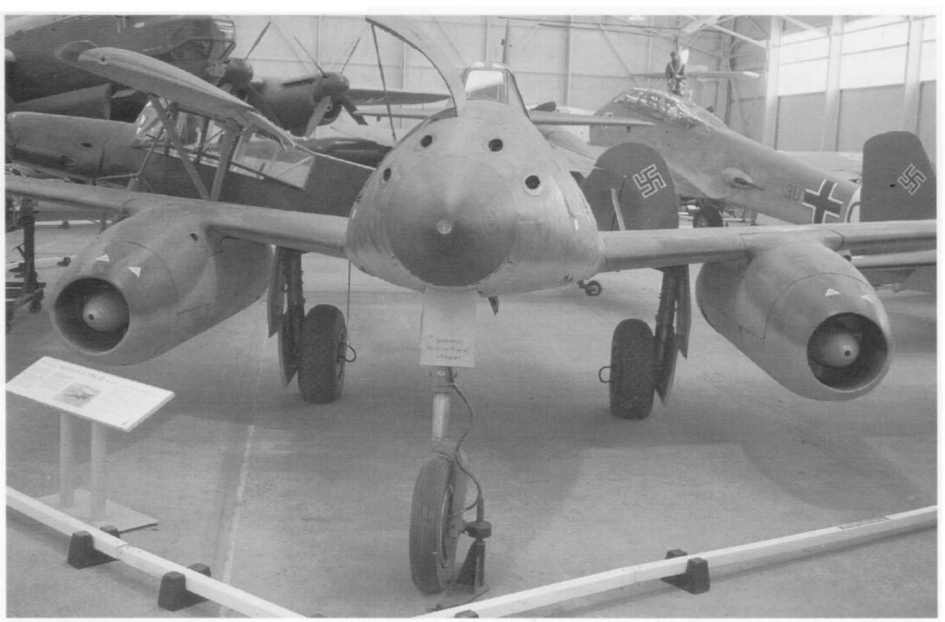
The standard gun armament of four Rheinmetall Borsig 30 mm MK 108 cannon with 100 rounds per gun for the upper pair and 80 rounds per gun for the lower pair is illustrated here on an engineering mock-up for the replica restoration project run by Herb Tischler.

Teething troubles

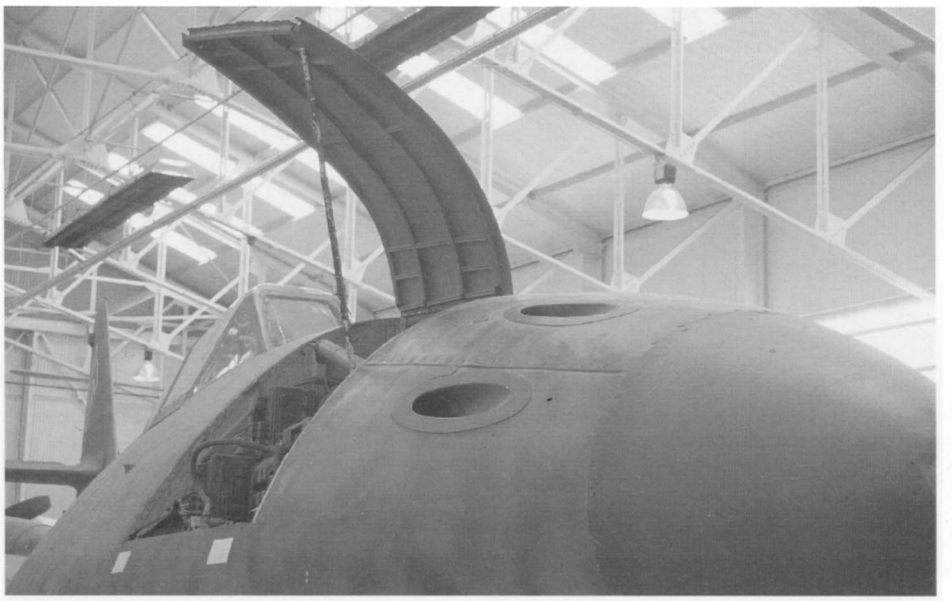
But there was a nagging concern about the powerplant. What, in 1938, had seemed to be an adequate power level when the first studies proposed an engine thrust of 1,350lb (612kg) was now on the margin for performance required by the RLM guidelines issued on 4 January 1939, while even the new RLM stipulation for an engine thrust of 1,500lb (680kg) was suspect. Of particular concern were the takeoff and climb characteristics, where maximum engine power would be essential. Accordingly, to provide adequate margin at a sufficiently early stage in the design evolution so as to avoid any significant delay in later development, the 'committee' reverted to a twin-engine concept with conventional fuselage and wings. But that brought its own unique set of problems. At first, they put the engines in slim pods buried in the wings at mid-span, much like the configuration finally selected for the Gloster Meteor when it was designed in 1941. But then, as engine diameter began to grow and the P.3302 put on weight, this became a problem. Before that issue assumed serious proportions there were further problems with the new configuration.

In the initial twin-engine design the airframe had a conventional low-wing layout. The main landing gear members were configured so that they retracted into the wing/fuselage junction, one retracting forward of the main spar and the other to the rear. The team looked at the forces and loads they would have to accommodate in the wing and fuselage interface and found that the undercarriage members precluded the accommodation of essential structural assemblies. Aerodynamic efficiency was high and the aircraft had reduced drag, but it would be difficult and complex to manufacture. The main undercarriage legs were unreasonably aft of the optimum position, which would make the aircraft liable to excessive pitch-over when the tail wheel lifted prior to takeoff. So the team adopted a mid-wing design with the main legs retracting into contoured sections of the lower fuselage, the wheel axles turning through 50 degrees relative to the oleos. But this undercarriage was more complex than the former and, potentially, had even more severe manufacturing problems. Moreover, the mid-wing design threatened excessive transonic interference drag from the separate structures in close proximity.

After almost two months of design changes and re-configured arrangements,



Messerschmitt favoured nose-mounted guns and the smooth, streamlined, contours of the Me 262 afforded unprecedented freedom to group the four cannon around the direct line of sight. This was an outstanding advantage for the fighter pilot.



Access to the cannon was from a large panel either side of the nose giving plenty of room for the armourers.

the engine problem loomed large. In reality, the engines always were to be the pacing item and, ultimately, the limiting factor in the aircraft's availability and performance capability respectively. But in May 1939 the BMW P.3302 was too fat and overweight. The Messerschmitt P.1065 'committee' had tentatively placed the engines at one-third span within the wing structure. That in itself brought problems because the main spar served to interrupt the optimum location of the engine. The design originally incorporated the engines in slim nacelles faired in to the underside of the wing, but as the girth of the engine grew it assumed a greater proportion of the wing's thickness. A solution was sought by separating compressor and turbine sections of the engine, placing the two component parts of the engine fore and aft of the spar. When Messerschmitt asked the RLM for permission to modify the engine design to accommodate this, it was emphatically denied.

The initial design is finalized

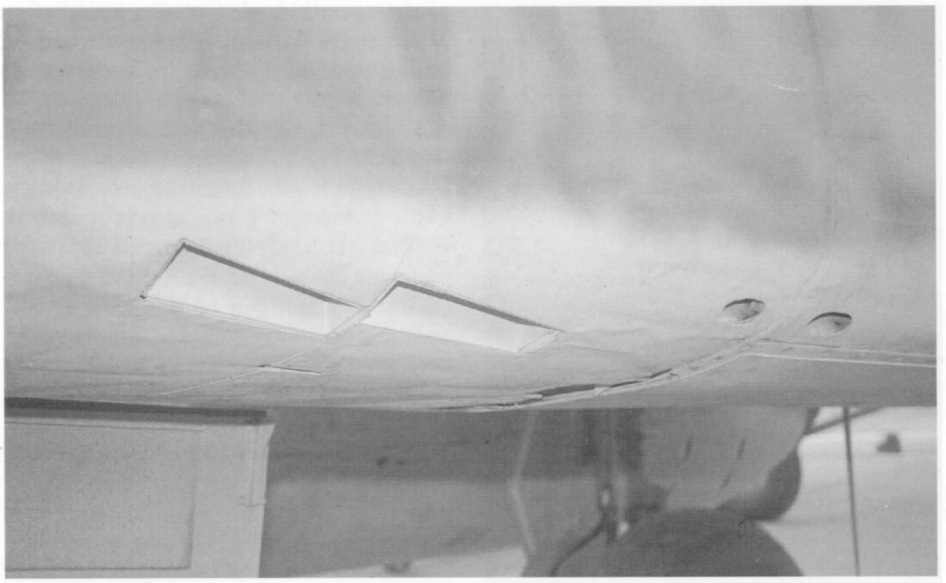
The ultimate solution transformed the aircraft into a low-wing design, with the two main undercarriage legs designed to fold inward, allowing their wheels to lie flat, side by side, with modest bulges on the upper surfaces where they partly protruded above the mould line. Aerodynamic considerations dictated a low thickness/chord ratio which kept the wing thin for optimum high-speed performance. To provide sufficient space for the wheel wells, it was decided to re-form the oval cross-section fuselage into a triangular shape with the apex on top. This broadened the lower sides of the fuselage where they met the wing, and had the added advantage of giving the pilot excellent visibility. It would be a characteristic identifying feature of the Me 262 from the time it first appeared in metal, and solved most of the outstanding design problems.

The P.1065 team retained the mid-wing conformation as an optional alternative when it submitted its design proposal to the RLM in June 1939. That configuration had a lower wetted area, but was more complex in design and manufacture. The low-wing design was favoured, however, because it was simpler, cheaper to build and easier to maintain. Ironically, the two BMW engines specified by the RLM and incorporated by Messerschmitt were deemed too powerful and were judged to put the design high up the drag divergence zone, which meant there was excess power beyond a critical maximum speed. As time would show, engine weight would go up and power output fall; thus, the initial choice was a prudent one. In selecting its recommended design configuration, Messerschmitt had a much heavier aeroplane than it had envisaged, but endurance was improved significantly. Given a design guideline for a one-hour endurance, at first Messerschmitt (and its looming competitor Heinkel) had only been able to achieve a projected combat endurance of 30 minutes, but the added power and potential of the P.1065 as designed raised that to the required duration.

Messerschmitt presented its first draft P.1065 proposal on 7 June 1939. The preferred design had a length of 27ft 3in (8.3m), a wing span of 30ft 10in (9.4m) with a wing area of 194sq ft (18m^2), and a height of 9ft (2.74m). The straight wing supported the two BMW turbojets which gave the P.1065 a calculated maximum speed of 522mph (840km/h), or 590mph (950km/h) at an emergency rating of 130 per cent thrust. The 'committee' had debated the advantages of a tricycle undercarriage, but the weight of a nosewheel and the volume taken up by a forward landing gear bay turned them against it, although this decision would be reversed after the first few flight tests. The aircraft had a design gross weight of 9,528lb (4,322kg). At standard landing weight, with ammunition and fuel of 7,045lb (3,196kg), the P.1065 would have a landing speed of 81mph (130km/h), or 102mph (164km/h) at maximum overload.

Armament

Armament in the initial design comprised two MG 151 Mauser cannon, a single 20mm gun with 200 rounds and a 15mm cannon with 400 rounds. The cannon had firing rates of 700rpm and 750rpm respectively. Contemporary fighters had an average closing speed of 150ft/sec (45m/sec) in a tail-end attack on a formation of bombers flying at 215mph (345km/h), giving six–eight seconds for concentrated firepower. At its calculated tail-end closing speed of up to 450ft/sec (135m/sec), a jet fighter in the dive would have only a second or two to aim and fire. At the firing rates for these cannon, a pilot would put no more than 50–100 shells on target during the pass time. Cannon offered a better chance of inflicting critical damage than the guideline combination of machine guns given to the company in January. In plain terms, the more metal per second on target the better, and Messerschmitt offered alternative weapons including an option on four 30mm cannon.



Spent ammunition cartridges were ejected downwards either side of the nose wheel bay.

The P.1065 takes shape

The German Air Ministry was pleased with what it saw, but knew, better than Messerschmitt, that the fighter's Achilles heel was, potentially, the BMW engine, growing ever larger and more problematical by the day. After three months of deliberation, the RLM decided on a dual-source development programme for the all-important powerplant. The way for this decision had been cleared when guidelines issued on 4 January 1939 stipulated that the new fighter must be capable of carrying any jet engine without major modification. Accordingly, Junkers received a formal contract during August for detailed design work on the 109–004 under the technical direction of Dr Anselm Franz. With a design thrust of 1,500lb (680kg), the Jumo 004 was authorized as an official engine development programme, but neither Franz nor his colleagues knew then that it was intended as a potential powerplant for the P.1065. In fact, at this time they were unaware of work at BMW on the 109-003. In testimony several decades later, Dr Franz would pay credit to the work of Frank Whittle, saying that his theoretical studies were known to them when they began work at Junkers on gas turbines, whereas they had yet to learn of Pabst von Ohain's engines.

In September detailed design on the P.1065 began. The first design drawings were completed the following month. On 9 November Messerschmitt completed the second, refined proposal and presented drawings to the RLM. There were few concerns at this stage except for the engines. The projected development schedule for the BMW 109-003 anticipated flight testing in a converted Bf 110 test bed to begin on 16 November, but in fact the team would wait twenty months before these tests could start. With certain knowledge of major delays to the engine programme, the RLM convened its technical evaluation board on 1 December 1939. During a conference at the Ministry building in Berlin, representatives from Messerschmitt, BMW and 'E-Stelle', the Rechlin flight test centre, met to discuss their respective parts in the programme. BMW told the meeting about a different engine, the P.3304, which it was placing under the control of *Ing* Hellmut Weinrich. That engine, utilizing a contra-rotating axial compressor, would prove difficult and would be abandoned during 1942.

On 19 December 1939 the RLM inspected a preliminary cockpit mock-up and a visual mock-up of the airframe. Exactly one month later it approved the first completed mock-up of the armour-plated cockpit. Meanwhile, Rechlin requested modifications to provide a parachute-braking system to reduce landing roll-out; two were ordered for early trials. By the end of January 1940 the definitive full-scale mock-up had been completed and passed by the RLM. It was a month in which crucial decisions were made about the future jet fighter programme for the Luftwaffe. As yet, and for some considerable time, the aircraft would be a highly secret venture: not until 1942, or even 1943, would senior leaders of the Luftwaffe fighter forces come to know of its existence. On the last day of January the RLM awarded a contract to Messerschmitt for twenty P.1065 trials aircraft, although it had yet to order metal cutting of prototypes. The historic decision to build what would emerge as the world's first operational jet fighter was enshrined in a document titled 'Preliminary Decision LC2 No.467/40(IIIc) Secret'.

During February recommendations were made by the Rechlin test centre, which would have the job of evaluating the aircraft and honing it into a production fighter, concerning internal equipment and radio systems. For added pilot protection, Rechlin had requested increased armour plate, making the cockpit a virtually bullet-proof tub. Consultation with the test centre added a pilot's perspective to the design philosophy, and a pressurized cockpit was stipulated along with ejection seats and air brakes. German research into escape systems for conventional piston-engined aircraft was incorporated into the jet fighter programme, for pilots escaping from aircraft moving at high speed could only do so in safety if hurled from the cockpit by a rocket-powered ejection system. In addition, the RLM wanted protected fuel tanks and dive brakes.

Requests and specification changes added to refinements evolving at the Messerschmitt works brought a re-design to the wing, first seen on 21 March 1940. With increased weight estimates on the BMW 109-003 engine, it was no longer possible to maintain the centre of gravity in the desired position. To compensate for this, the outer wing panels were swept from approximately 40 per cent span, giving a leading edge sweep of 19 degrees. The wing, which had a few degrees of sweep on the inner section, now had a span of 40ft 6in (12.34m) and the fuselage a length of 34ft 4in (10.46m), marking the third design specification. This configuration, known as Project Proposal II, was presented to the RLM on 15 May 1940. It incorporated several improvements in addition to the aforementioned changes.

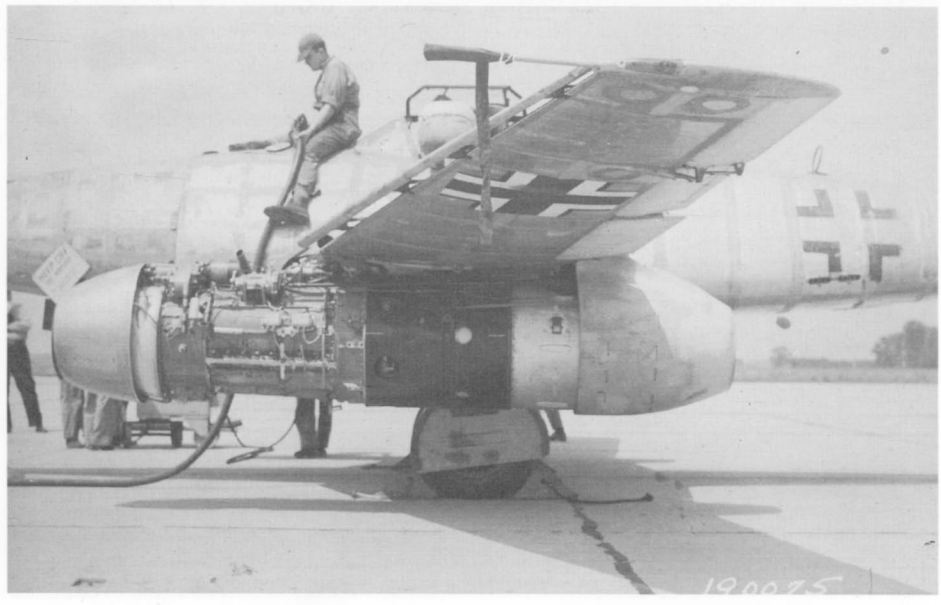
Born through expediency when engineers could not guarantee that the jet engine's girth would remain inside tolerances for a wing mounting, the underslung nacelle began a trend that would be adopted after the war.

Among these were a hinged nose section for easy access to the armament, which now comprised three massive Rheinmetall MK 108 30mm cannon.

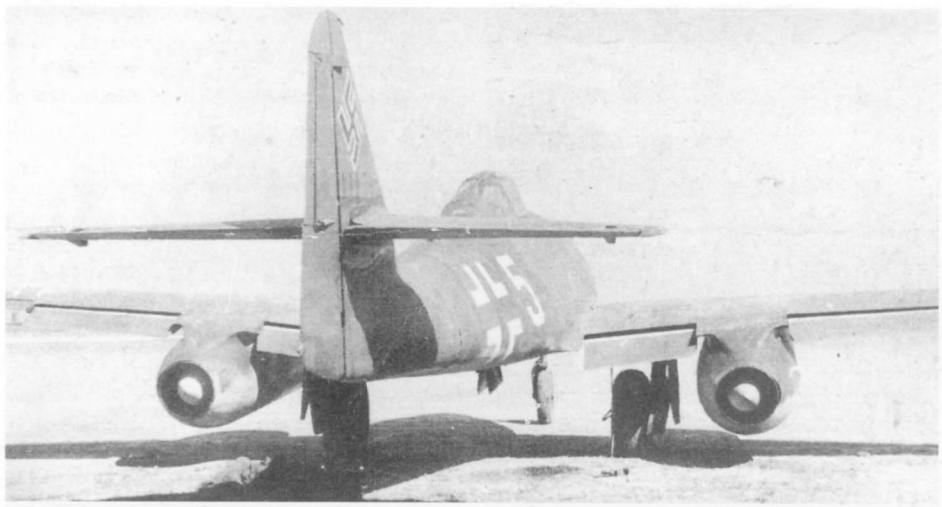
The new design was bigger than the initial proposal, which had itself been larger than preliminary sizing indicated earlier, but carried many of the characteristics that were distinctive visual features of the type. With a triangular cross-section fuselage of all-metal semi-monocoque construction and an all-metal wing, the P.1065 was distinctly futuristic even at this early stage, although it lacked the smooth lines of the definitive Me 262. The all-metal wing had a single I-section main spar which carried through the broad lower fuselage, giving a flat undersurface to the aircraft. With flush-riveted stressed skinning, the wing now carried the engines in underslung pods free from structural and size limitations imposed when the engines were integral with the wing. Wind tunnel tests performed on a wide range of wing/engine configurations during June and July confirmed this as an acceptable solution to broader girth imposed by the BMW 109-003. The wing also carried automatic leading edge slots and Frise-type ailerons on the outer trailing edge.

Despite these last minute changes, individual jigs and components for the V1 and V2 prototypes had been under way since January, and in August construction began on V3, V4 and V5. By October a firm commitment to underwing engine nacelles had been formalized on the design drawings, and Project Proposal III was signed off for manufacture on 1 November 1940. This cleared the way for a supplementary contract for an additional fifteen pre-production aircraft, but it had been a hard-fought struggle within the Messerschmitt 'committee', where Willi himself had found it very hard to resist the temptation to pull rank. The cranked-sweep wing, external engine nacelles and other subtle changes offended his desire for a clean aeroplane with smooth aerodynamic lines. But the logic of each decision spoke for itself and, to his credit, Willi Messerschmitt bowed to engineering logic. First and foremost, the aeroplane had to make sense as a quantity production fighter with efficient operational qualities and ease of handling.

The orders to start metal-cutting on the P.1065 were part of the preliminary agreement to build twenty test aircraft, and the first three prototypes had been ordered in March. It had been no mean task for proponents in the RLM, constantly working on the *Technische Amt* to convince them that reaction engines *per se* were equal to reciprocating engines as an acceptable means of moving aeroplanes around the sky. Since November 1939, when Udet and Milch had witnessed the flight of the He 178, the Ministry had been cool toward jet aircraft in general. But the weakening of what can only be described as abject cynicism not only opened the way for the P.1065, but also for the Heinkel He 280 which, by September 1940, was nearing completion at the Marienehe works. For the first time, beginning with the contract for the first three of twenty P.1065 airframes destined for BMW engines, Heinkel received support for its own, aesthetically simple design.



Access for maintenance was made easier by placing engines in underslung nacelles and putting them closer to the ground, which facilitated walk-round, hands-on contact with the various assemblies.



Inboard of the Frise-type ailerons, inner and outer flap sections flanked each engine exhaust mounting. The inboard section of each aileron carried a Flettner tab.

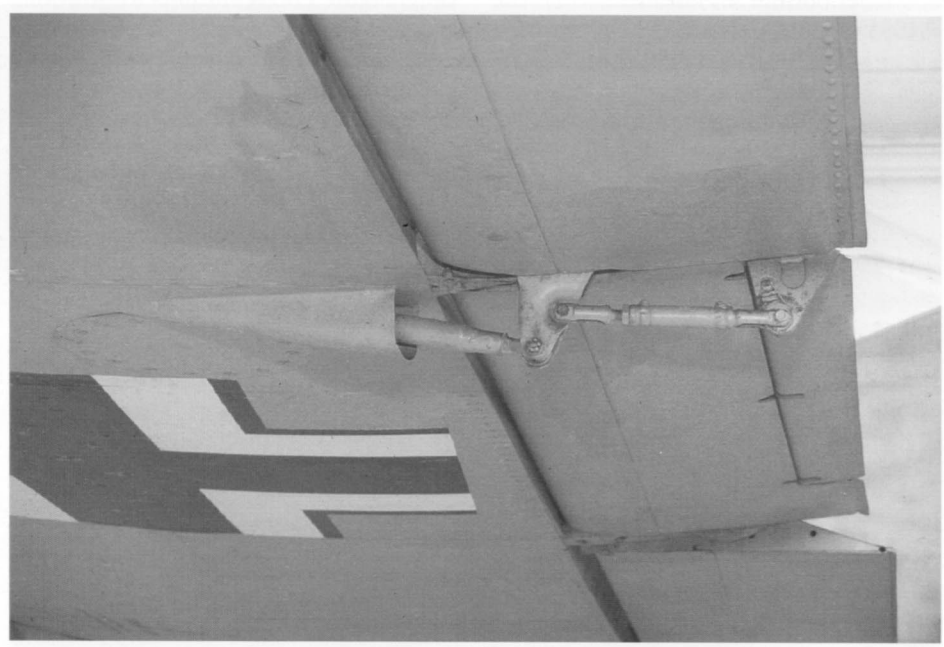
The He 280 flies

In September 1940 Heinkel had completed the first prototype He 280, the V1(DL+AS), and was already building the next two. Heinkel's progeny had been designed from the outset for the powerplant that was to take it into the air; thus, the integration process was much less painful than it proved to be at Messerschmitt. Opting from the beginning to put the two HeS 8a centrifugal turbojets in underwing pods, the design had a simplicity that incorporated progressive features not yet seen in its rival. The aircraft had a fully retractable tricycle landing gear, affording excellent visibility for taxiing and takeoff. An added advantage was that it placed the exhaust efflux well above the runway, thus leaving fewer tell-tale scorches for Allied photo-reconnaissance spotters! Of stressed skin, all-metal construction, the monocoque fuselage had an oval cross-section supporting a high horizontal tail with twin fins. The wing had a straight leading edge and a half-elliptical trailing edge sweeping forward to the tip. The engine nacelles were, sensibly, carried under the main spar outboard of the two hydraulically actuated main landing gear members, which retracted inwards. The nose leg retracted rearwards.

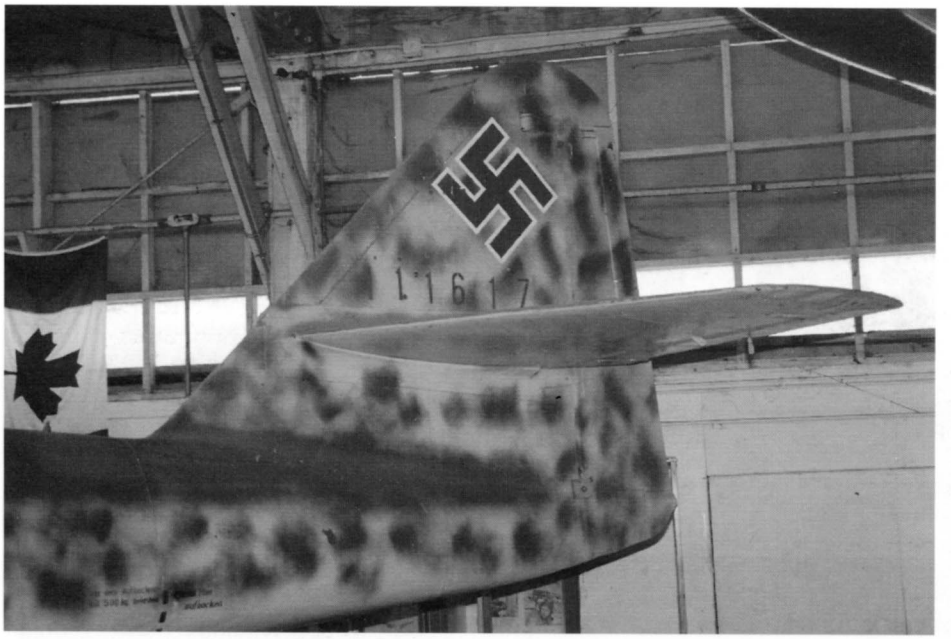
As effective as Junkers had been at pushing forward with their jet, here too the powerplant lagged behind the airframe. When the V1 was ready for flight, it had dummy nacelles and was towed by a Heinkel He 111H. Taking to the air in this fashion for the first time on 11 September 1940 from the Marienehe airfield, it had ballast in the nacelles and in the fuel tanks. Subsequent flights proved their worth in giving the pilots a feel for the aircraft in its design environment. From Rechlin it made a total of 41 gliding flights, during which the test pilot (a man named Bader!) successfully tested its unpowered handling characteristics. On 17 March 1941 it made its last glide before returning to Marienehe for installation of the HeS 8a centrifugal turbojets rated at 1,290lb (585kg) thrust. With a gross weight of 9,436lb (4,280kg), the He 280 was a little lighter than the P.1065, although, with a wing span of 39ft 4in (12m), a wing area of 231½sq ft (21.5m²) and a length of 33ft 5in (10.2m), it was almost exactly the same size.

Designated 109-001a in the nomenclature of the RLM, each HeS 8a turbojet had a thrust of 1,290lb (585kg). However, like the P.1065, the He 280 could be fitted with any of the gas turbines currently in development and would, in fact, be flown with the Jumo 004. During final preparations for the first powered flight of the He 280 V1, Heinkel was in the throes of taking over the Hirth engine company, a move encouraged by the RLM, to legitimize its role as an engine manufacturer. Heinkel had seized opportunities opened by its own pioneering work on gas turbines, and the Air Ministry had rewarded that effort by seeking to broaden its engineering base.

Hellmuth Hirth had made many innovative and lasting contributions to the design and engineering of reciprocating engines, his first product being marketed in 1923. With expansion and success the Hirth-Motoren GmbH was formed in 1931, but just seven years later, in June 1938, the founder died and the RLM moved quickly to allow Heinkel to acquire the company's facilities and engine assembly plant. Messerschmitt hotly contested the move, but from May 1941



Aileron trim tab.



The Me 262s tailplane adjustment mechanism located at the interface between vertical and horizontal components gave much cause for concern. Failure in early test flights resulted in the loss of several aircraft, leading to modifications.

the engine side of Heinkel was known as Heinkel-Hirth.

With the expanded resources, Heinkel began development of a new turbojet, the 109-011, incorporating a diagonal compressor and three axial stages, with sixteen annular combustors and a two-stage turbine incorporating advanced, hollow blades. It had a design thrust of 2,865lb (1,300kg). The development programme was managed by Pabst von Ohain. The first of ten engines ran in September 1943; then a Ju 88 operating as test bed took one into the air slung beneath the fuselage. So it was that, when the He 280 V1 received its two HeS 8a turbojets, the Heinkel company stood poised not only to achieve a world first by getting a jet-powered fighter into the air ahead of its main rival, but to build uniquely upon a private success story.

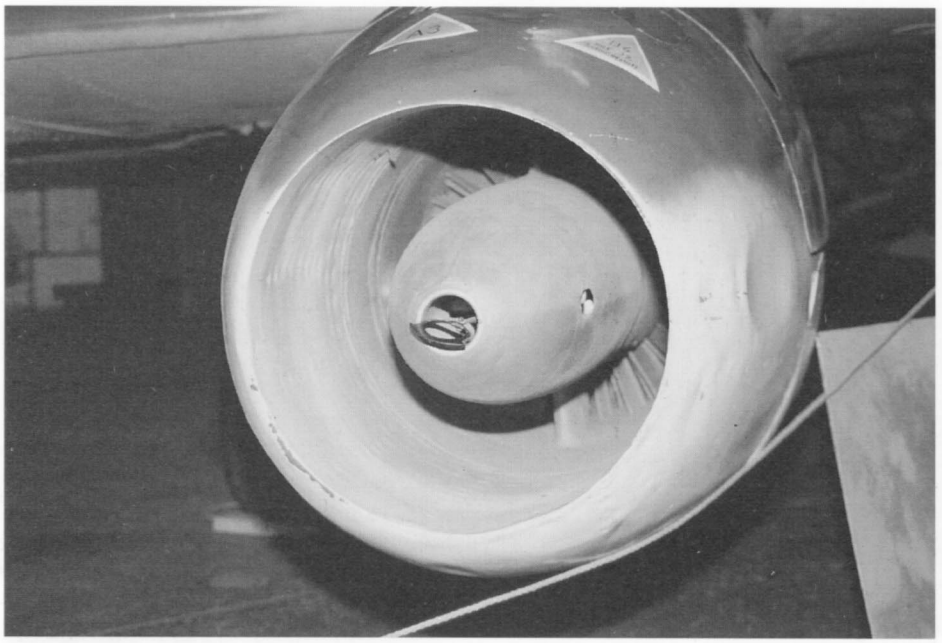
Heinkel test pilot Fritz Schafer was at the controls of the He 280 V1 when it made its first official flight on 2 April 1941 from the Marienehe airfield. Because the turbojets tended to leak fuel, which was inclined to pool in the bottom of the nacelles and create a potential fire hazard, the engine covers were removed and the 235 gal (1,160l) fuel tank was only one-third full. Shortly after takeoff, with the landing gear extended for the duration of the flight, the pilot slowly turned the aircraft over the Warnow Estuary and ran the full length of the airfield at slow speed and an altitude of approximately 900ft (275m), before turning again at the

Whittle's Triumph

On 8 April 1941, six days after the first official flight of the Heinkel He 280 V1, Britain's Gloster E.28/39 (W4041), powered by a Whittle engine with a thrust of 860lb (390kg), made a short hop at RAF Hucclecote, thus becoming the fourth jet aircraft to fly. Five weeks later, on 15 April 1941, it made its first official test flight at RAF Cranwell, almost twenty one months after the He 178 had made the world's first jet powered flight in Germany, and Britain became the third country to put a jet aircraft into the air. Development of the Gloster E.28/39 began on 3 February 1940 when Gloster was given a contract to design and build an aircraft which could test the Whittle W.1 gas turbine contracted to Power Jets in March 1938. The Air Ministry in London wanted the design 'based on the requirements for a fixed-gun interceptor fighter', and armament was to consist of four 0.303in Browning machine guns. Optimistically, the Ministry specification claimed 1,200lb (545kg) thrust for the W.1.

Of circular cross-section, the fuselage had a length of 25ft 3in (7.69m) and was of all-metal monocoque construction with a light alloy stressed skin. The engine, mounted behind the cockpit area, was fed through a straight intake duct from the nose inlet and would generate 860lb (390kg) thrust at 16,500rpm. With a span of 29ft (8.84m), the wings were of two-spar stressed skin construction, tapering in chord and thickness, with fabric covered ailerons and split flaps. The elevators and rudder had large surface areas to compensate for the absence of propeller slipstream at low air speed. An 81gal (368l) fuel tank was located between the cockpit and the engine. The aircraft had a height of 9ft 3in (2.82m), a wing area of 146½sq ft (13.6m²), and a maximum weight of 3,748lb (1,700kg).

The E.28/39 demonstrated a maximum speed of 466mph (750km/h) at 10,000ft (3.050m), with a service ceiling of 32,000ft (9,755m). Powered by the much-delayed Rover W.2B engine delivering 1,200lb (545kg) thrust, the second E.28/39 (W4046) flew for the first time on 1 March 1943. It was lost when it went into an inverted spin at 33,000ft (10,060m) during a test flight on 30 July 1943. The first prototype was retrofitted with the 1,760lb (800kg) thrust Power Jets W.2/500 turbojet, with which flight trials commenced in April 1944. By that time, however, the Gloster Meteor was about to enter service as Britain's first jet fighter. The first two Meteors were delivered to RAF Culmhead, where they joined No. 616 Sqdn, the first British jet fighter unit. Deployed at first against V-1 flying bombs, they were dispatched to continental Europe in January 1945 – but the Meteor never did get to tangle with the Me 262. The first prototype E.28/39 was retired during 1946 to permanent display at the Science Museum, London.



One of the more sensitive components of the radical new jet engine, the turbine blades, were prone to failure from poor manufacturing standards and damage through foreign object ingestion. The proximity of the intake to the ground exacerbated damage through stones pulled in by the action of the turbine. Visible in this view of the Chino museum Me 262 is the pull ring for the two-stroke Reidel starter motor housed in the intake fairing.

opposite end of the runway and returning to a perfect landing. Just three days later, at the Rechlin test centre, the V1 was demonstrated to Ernst Udet, *Dipl-Ing* Lucht of the RLM's engineering division and *Dipl-Ing* Eissenlohr, in charge of powerplants for the *Technische Amt*. Udet remained sceptical, but at that stage of his career he was a man defeated by the responsibilities of office. As head of production programmes he was greatly out of his depth, and before the end of the year he would put a gun to his head and shoot himself. His successor, Erhard Milch, was equally uncertain about the radical new powerplants, but by this time the programme had a momentum of its own.

In flight tests from Rechlin the He 280 clocked a top speed of 485mph (780km/h) at 19,685ft (6,000m), but engineers calculated that with potential for a thrust of 1,587lb (720kg) the Heinkel-Hirth 109-001a would give the aircraft a speed of 577mph (928km/h). But the engine was not up to it, and serious drawbacks frustrated attempts to get more power from the basic powerplant. It did eventually achieve a power output of 1,323lb (600kg), which gave the He 280 a maximum speed of 497mph (800km/h). Just one month after the V1 flew for the first time under its own power, the V2 was in the air, to be joined later by a further seven prototypes. The He 280 had yet one last 'first' to notch up. Re-engined with four Argus As 014 impulse ducts attached to the undersurface of the wings, it began flight trials on 13 January 1942, in tow from two Bf 110s. The V1 iced up and the pilot was forced to use the innovative compressed-air ejection seat, thereby becoming the first person to eject from an aeroplane in flight.

The Me 262 appears

While Heinkel was readying his first jet fighter for its inaugural flight, design teams at Messerschmitt's Augsburg works were completing the first P.1065 airframe, the V1. In February 1941 it had been given the type designation Me 262 by the RLM. Continued development problems with the BMW 003 engine reached a peak when bench tests showed a thrust level of only 570lb (258kg), compared to the design requirement of 1,500lb (680kg) static thrust, converting to 1,320lb (598kg) thrust at 560mph (900km/h). This discouraging result stimulated thoughts about alternative means of testing the airframe in flight. Since mid-1939, Junkers had been working on a parallel development, with its 004 engine under the direction of Dr Anselm Franz. In November 1940 it was ready for test, and it was hoped that this powerplant might power the Me 262 on its first flight. Contrary to expectations, it encountered serious problems. Designed conservatively with minimum-risk technology, it proved to be equally reluctant to perform as its rival, and the development schedule slipped in proportion to the projected power estimates.

By February 1941 the RLM had approved a plan by Messerschmitt to complete the V1 with two Walter HWK R II-203b rocket motors, instead of the two BMW 003 powerplants as planned. At the very least, these could give the Me 262 V1 a very few minutes' flying time during which the aerodynamics could be evaluated. Willi Messerschmitt and his entire Me 262 design team were well aware of the progress being made at Heinkel, and the apparent ease and speed with which they had developed both engine and airframe for the He 280. Everyone knew that the apparent advantage in having official approval bestowed upon the Me 262 could evaporate in the exhaust of a more promising design. When the *Technische Amt* of the RLM considered the rocket-power plan, however, they were concerned at the risk this would place upon the entire development programme.

The R II-203b rocket motors put out a thrust of 1,653lb (750kg) and had been designed by Prof Hellmuth Walter for assisting conventional aircraft into the air. They would power the initial version of the Me 163 rocket fighter, but they operated on exotic and dangerous fuels, relying on the hypergolic (spontaneous) combustion of *T-stoff* (80 per cent hydrogen peroxide with oxyquinoline or phosphate stabilizer) and *Z-stoff* (a mixture of calcium permanganate solution). The prototype Me 163A was about to begin a series of unpowered glide trials and there were severe misgivings over the instability of the propellants for this engine. So much so that plans were already being made to build the definitive production variant, the Me 163B, with a much more powerful engine utilizing moderately less unstable propellants. Not until July 1941 would the Me 163A fly with its R II-203b, and no-one at the RLM wanted both that programme and the Me 262 to be vulnerable to the exigencies of

this dangerous motor. Moreover, the new schedules for the BMW 003 indicated that it would be ready for flight trials no later than the Walter motors could be incorporated, thus offering complexity rather than advantage.

Piston-engined testing

Permission to install the rocket motors was denied, but Messerschmitt was forced to seek an alternative solution when the revised BMW 003 schedule was rewritten once more. It was found in the Junkers Jumo 210G twelve-cylinder, liquid-cooled, inverted-V engine, producing 730hp, which the team selected to power the V1 on initial aerodynamic tests. During the first quarter of 1941 the V1 airframe was completed and the Jumo 210G installed in its nose. The V1 (*werke nummer* 262 000001, and bearing the identification code PC + UA on each side of the fuselage) began taxi trials on 17 April 1941. The unceremonious first flight took place from Augsburg next day, with test pilot Fritz Wendel at the controls. Preparations took up most of the day, and the sun had just gone down before the attempt was made. All early flights would be made in fading light or the dim twilight of near dark, to prevent prying eyes, on the ground or high in the air, from getting sight of Germany's secret aeroplane.

Severely underpowered, the throbbing engine slowly dragged the sleek airframe along the runway, the pilot taking every inch of concrete to get the aircraft into the air. The incongruity of the bizarre

Transatlantic Challenge

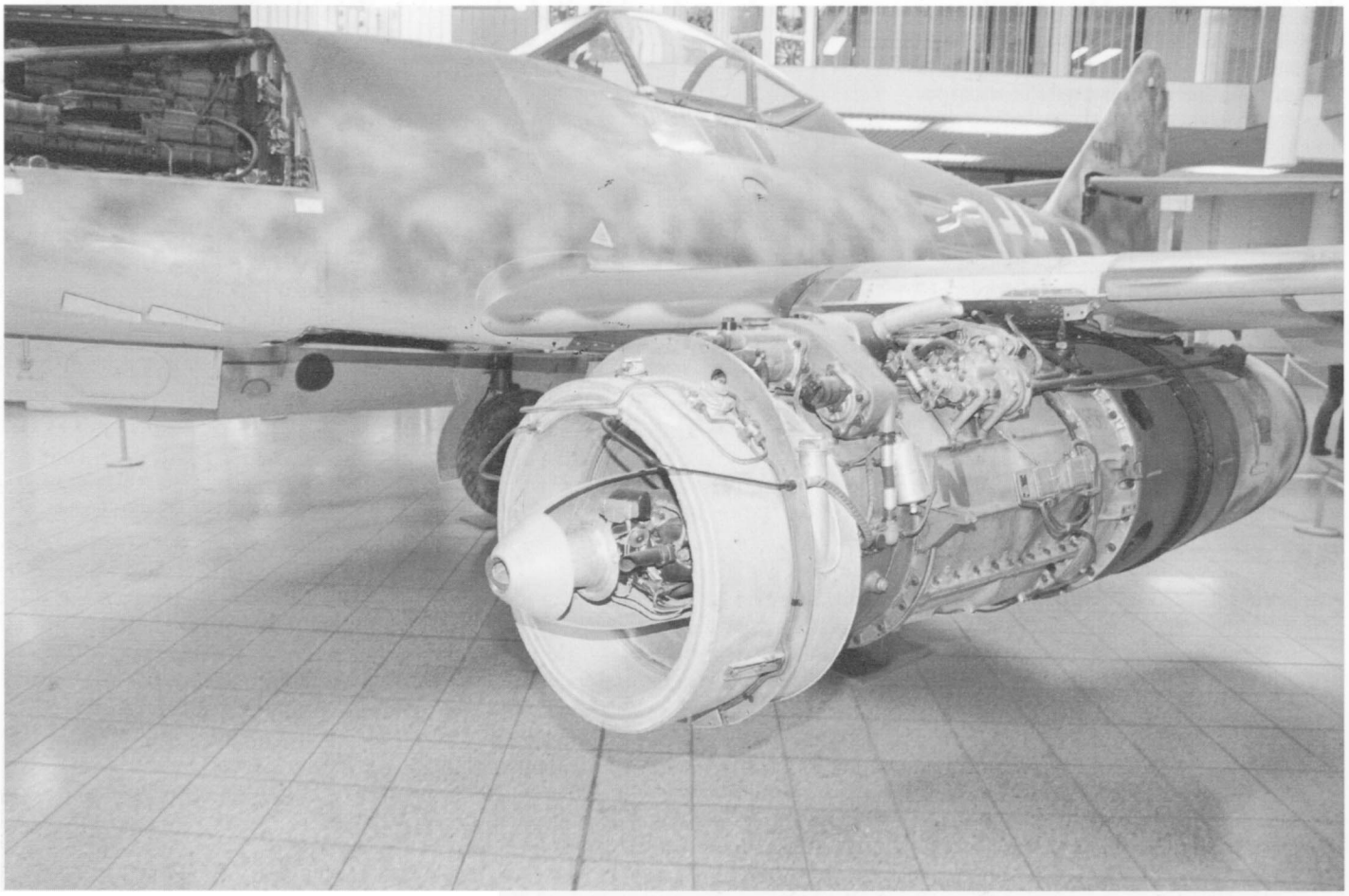
America lagged behind Germany, Italy and Britain in flying jet aeroplanes, and took its lead from the Gloster E.28/39. Before that diminutive Whittle-powered jet had even been designed, however, a brilliant young engineer with Lockheed, Clarence L. 'Kelly' Johnson, had been working since 1939 on ideas for a jet-powered combat aircraft. Johnson, Hall L. Hibbard and Nathan Price designed a jet engine designated L-1000 and an airframe, Model L-133, and took the secret proposal to the US Army Air Corps. The government was interested in the jet as a potential research project for calmer times but, with war brewing in Europe, it saw no need to provide funds for research. As time would show, a start in 1939 could have given the Americans a jet-powered fighter before anyone else, but at the time the project was seen as an unacceptable demand on resources vital for more conventional and predictable programmes.

However, while Messerschmitt was testing the aerodynamic flying characteristics of the propeller-powered Me 262 V1 and conducting the first Jumo-powered all-jet trials with the V3, Maj-Gen Henry H. 'Hap' Arnold happened upon the Gloster-Whittle E.28/39 on 7 March 1941, during a visit to England, where he saw work to date on the British jet prototype and was astounded at the level of progress achieved in so short a time. The Americans knew of the Whittle research but had not realized the speed of its development. Arnold was a strong advocate of jet power, and on 25 February 1941 he had written to Dr Vannevar Bush, chairman of the National Advisory Committee for Aeronautics (NACA), urging a research programme. NACA reacted by immediately setting up a special subcommittee on jet propulsion, chaired by William F. Durand, which, at Arnold's insistence, would not include members of the aero-engine manufacturing industry for fear they would rubbish the work to preserve lucrative orders for conventional engines.

Arnold returned to America with agreement from Britain that the Whittle engine could be copied and built by the General Electric Company. GEC assigned D. Roy Shoults to work with Col A. J. Lyon, USAAC, in London to obtain assistance from Power Jets. On 1 October 1941 the only bench-running Whittle W.1X at Power Jets, with a complete set of blueprints for the W.2B, was sent to Bolling Field in America, where it arrived three days later. The copy of the W.1X, redesignated GE Type I, made its first bench run on 18 April 1942, exactly one year after the first flight of the Me 262 V1. Problems with overheating were solved when Frank Whittle visited Bolling Field two months later and suggested modifications, from which evolved the 1,250lb (570kg) thrust type IA.

Meanwhile, on 4 September 1941, Bell Aircraft Corporation was contracted to build an airframe for the Type IA. In an attempt to disguise the work, it was given the misleading designation XP-59A. The existing XP-59, under way as a two-seat development of the XP-52 fighter project, was left to wither and die, while the completely different XP-59A went ahead as though it were a variant of the former. Three prototypes were to be built, and within three months the company had prepared the outline design of a twin-engine, cantilevered mid-wing monoplane, with a conventional tail and a tricycle undercarriage. The two powerplants were located side-by-side in the undershoulder of the wing/fuselage join, with straight-through intake and exhaust ducts. Approval to build was granted on 9 January, and a further ten pre-production aircraft were ordered in March.

On 2 October 1942, the day after the third Me 262 prototype (V2) took to the skies for the first time at Lechfeld, Germany, the first XP-59A became airborne at Muroc Dry Lake, California, the first American aircraft to fly on jet power. It had a length of 38ft 2in (11.63m), a wing span of 45ft 6in (13.87m), a wing area of 386sq ft (35.9m^2) and a gross weight of 12,562lb (5,698kg). The XP-59A was dramatically underpowered and could achieve a speed of only 404mph (650km/h), although it had a maximum altitude of 45,756ft (13,950m). From the beginning troubles beset the XP-59A. Its engines were continually overheating, but test flights ironed out these ills and several modifications were made to keep the programme going. By the end of 1942 it was apparent that, despite a brilliant engineering job from Bell, the aircraft would never make it as a fighter. The project was relinquished in favour of the P-80 from Lockheed, with another British engine as a give-away. But that is another story.



Very few aircraft offered the ease of access to systems and structure provided by the Me 262. It was possible to service the engine *in situ* and very few jobs short of a major overhaul required the engine to be removed from its wing mounting. Different materials for compressor and combustion sections are seen here clearly with the (respective) light and dark finish.

makeshift assembly belied the role it would play within three years, yet few who looked on could hide their pride at finally getting the Me 262 into the air, albeit sluggishly. There was no attempt to conduct measurements, other than to record basic details about handling. Yet even on this first flight, where the V1 achieved a speed of 261mph (420km/h), good aerodynamic characteristics were evident. The aircraft handled well, and although there was the usual run of minor items of note the flight went well and proved satisfactory, more than vindicating the work and effort of the design team.

In the year before jet engines could be installed, Fritz Wendel would be joined by Karl Bauer and Lukas Schmid in testing the low-speed handling characteristics, while other test pilots from the Rechlin centre would fly the aircraft from time to time and add their own evaluation. The first flight had lasted barely eighteen minutes, but the second, on 21 April, lasted thirty one minutes, and thereafter test flights lasted on average twenty five to forty minutes. While Fritz Wendel and Karl Bauer progressed with test flying the V1, work continued on the second prototype, the V2, which would be the third machine to fly, and the V3, which was the first to achieve powered flight by jet power alone. But that day was some way off as the pilots explored aspects of the aeroplane's low-speed envelope. As summer progressed the aircraft was put through a series of speed dives, severe buffeting and elevator oscillations becoming evident above 335mph (540km/h). Changes were made to cure this tendency, and tests continued until the aircraft was withdrawn from trials on 5 August 1941 after its twenty third flight.

Jet propulsion – an inauspicious start

Messerschmitt had been informed that work on the BMW 003 was picking up lost time, and the first flight-rated engine was delivered to Augsburg in November 1941, albeit without items essential for satisfactory operation. These were *Sondertriebwerke*, or 'special power' units, which had been put together to test the aeroplane at higher speeds than those attainable from the Jumo 210G and to prove the compatibility of the design configuration. Messerschmitt decided to fit the new engines to the V1, retaining the nose-mounted piston engine as a precaution, but the test programme leading to flight was cautious and conservative. Meanwhile, Junkers had progressed with their 109-004, which on 6 August 1941 ran at 9,000rpm, producing a thrust of 1,320lb (598kg), on its test bench at the Dessau factory. On Christmas Eve it completed ten hours of successful test running and crossed a major development milestone. The second engine, meanwhile,

was showing temperamental characteristics, and this delayed the programme for several weeks. Not before spring 1942 would the Jumo 109–004 be ready for flight tests in a specially adapted Bf 110.

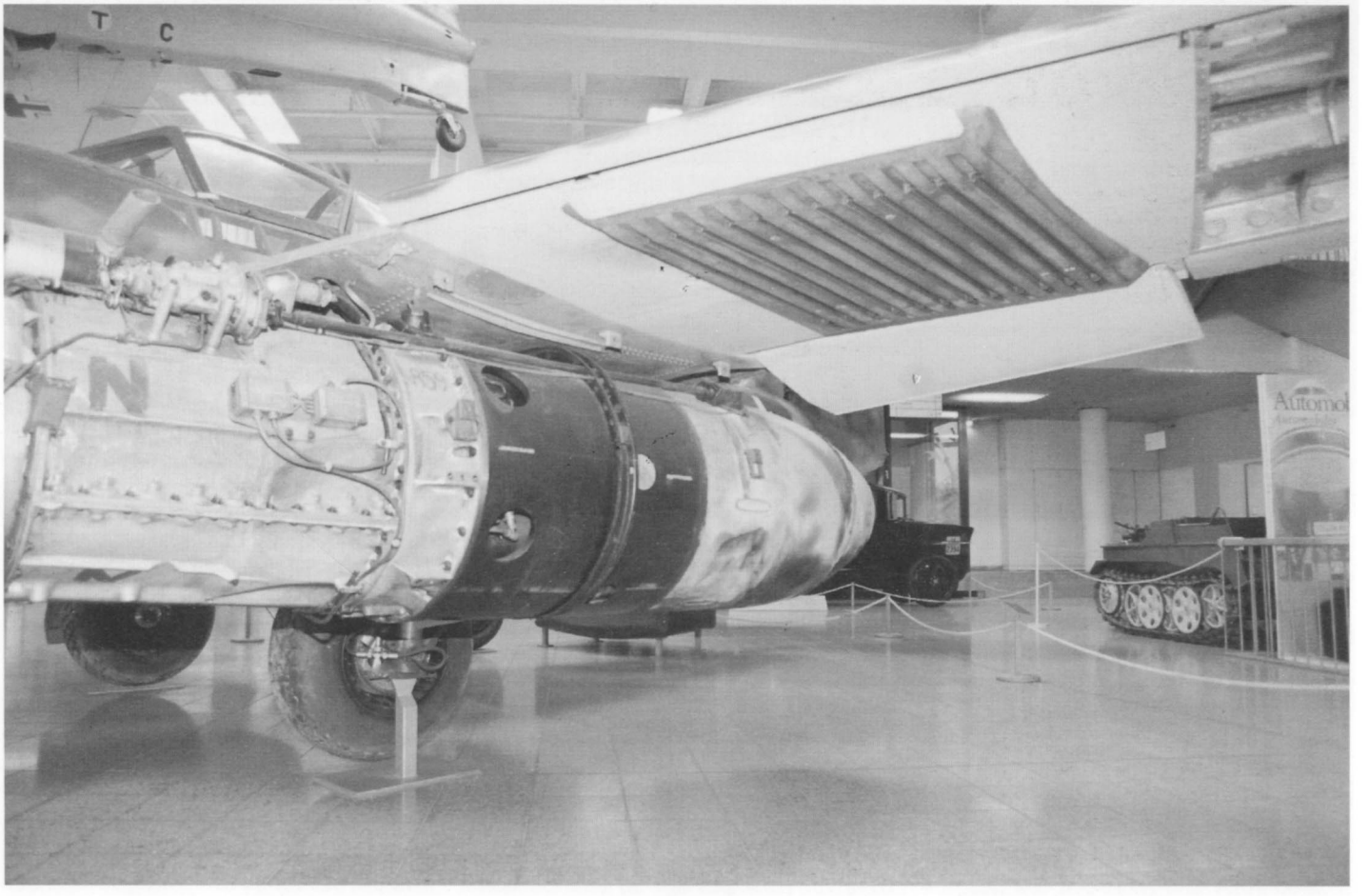
Meanwhile, work on attaching two BMW 003 turbojet engines to the Me 262 V1 and its Jumo piston engine began on 1 February 1942, and the aeroplane was made ready for the first flight with jet engines. Static tests were completed, and on 25 March 1942 Fritz Wendel took off on the power of the two turbojets and the single piston engine. Despite the supplementary 730hp, Wendel only just managed to clear the boundary hedge and climb slowly to 165ft (50m) before, suddenly and without warning, the port engine flamed out, followed seconds later by the starboard engine. With the added weight of the turbojet motors, the single piston engine was struggling to keep the aircraft in the air, and Wendel had difficulty in bringing it round for an approach and landing just five minutes after takeoff. It was clear that turbulent air from the propeller wash would preclude the smooth flow of laminar air into the engine intakes, and that the combination of reciprocating engine and gas turbines, albeit only for tests, was incompatible.

When mechanics removed the two BMW engines they found that compressor blades in both had broken at temperatures and rpm no higher than those reached in successful bench tests at the factory. The cause of the failure was not immediately apparent and considerable testing had to be conducted before the weaknesses in these components were recognized. It was to be some time before the engine reappeared in re-designed form as the BMW 109-003A. Flight tests with that unit would not start before October 1943, and then from a specially modified Junkers Ju 88A-5. The engine would be carried in a pod beneath the forward fuselage and to port of the centre line, adjacent the ventral gondola, which was offset to starboard on all Ju 88s.

Development of the Jumo-powered Me 262

The failure of the first attempt at getting jet engines into the air from underslung nacelles on the V1 sounded the death-knell for BMW's hopes of having its powerplant assigned to quantity production for this aeroplane. Ironically, it was Junkers that now stepped forward and used the hiatus to demonstrate the viability of its Jumo 004, and Messerschmitt made plans to have the third prototype, the V3, fitted with these engines. In the meantime, balked by the total failure of the BMW turbojets in their first flight test, the RLM on 29 May 1942 cut construction contracts to just five prototype airframes. A decision as to resumption of the twenty pre-production aircraft and a commitment to

Late in the war some Me 262 fighters would be equipped with twelve R4M solid propellant air-to-air rockets attached to wood racks under each wing. Fired electrically, they were devastating in their effect but slow velocities rendered them susceptible to ballistic drift.



production would only be made after successful demonstration flight on jet power alone – whether that be with BMW or Jumo engines.

Work on the V3 prototype (PC + UC) had begun in August 1940. Plans were made to conduct flight tests with turbojets from the airfield at Leipheim, where there was a 3,600ft (1,100m) runway, the same length as at Augsburg but with the advantage of a tarmac surface. With an all-up weight of 11,000lb (4,990kg), it was calculated that the V3 should unstick at around 112mph (180km/h), for which the Leipheim facilities were judged more than adequate. When the pre-production Jumo 004A-0 engines arrived in early July they were fitted to modified nacelles. Compared to the BMW 003, the Jumo turbojet was fatter and longer, which necessitated a larger and longer pod than had been utilized with the hybrid propulsion mix on the V1 prototype. To compensate, the V3 had increased vertical tail area. But there was still much concern about the engines. When these arrived, they came with a critical report of reliability, so over the next three weeks extra bench-runs were performed and specially converted Bf 110s carried test engines in flight trials. In all, by the time V3 was ready for the first all-jet Me 262 flight, an extra fifty hours in test had been completed.

Threats to the Me 262

The first all-jet flight with the Me 262 was important for several reasons, not least the increasing effectiveness of Heinkel's jet fighter programme. Following the flight of He 280 V1 on 2 April 1941, and that of the V2 the following month, Heinkel had the third prototype ready for flight trials by July. In the meantime, the RLM issued a contract for a further six pre-production machines, but problems with the Heinkel-Hirth 001 turbojet struck. Shortly after takeoff during a routine test flight a turbine blade sheared, causing intense vibration, and long tongues of flame shot from the back of the starboard engine nacelle. Test pilot Fritz Schafer kept control of the aeroplane and brought it back for an emergency, wheels-up landing. There was little damage to the airframe, but fears about the engine grew and engineers were unable to achieve the design thrust for this powerplant.

Nevertheless, Heinkel knew he had a good aeroplane, potentially a successful fighter, and grew increasingly frustrated over the apathetic attitude of the RLM. During spring 1942 he staged a demonstration to show the worth of his progeny. He had a Focke-Wulf Fw 190A sent over from a nearby Arado factory at Warnemünde, against which he pitted the jet. The Fw 190A was thoroughly trounced in a mock dog-fight, which proved Heinkel's point. Nudged further toward accepting the inevitable, the RLM awarded Heinkel a contract for thirteen pre-production He 280A-0 types which would move the project a stage further toward production of a front-line fighter. Armament at this juncture was to comprise three 20mm MG 151 cannon in the nose, but this was later doubled. The pre-production series was to have incorporated a single tail fin and rudder assembly to solve the flutter problem inherent in the twin-fin configuration. During summer 1942 the He 280 test programme moved from Marienehe to Schwechat, where preparations would get under way for flight trials powered by Junkers Jumo 004 turbojets.

Another spur to Messerschmitt to achieve an early success with the Me 262 was the progress being made by Heinkel in turbojet engineering. The powerful Heinkel-Hirth 109-011 (HeS 11) engine had been funded with a view to its replacing the BMW 109-003 and the Jumo 109-004. It was, in fact, because of a determination to smooth development work and alleviate an acute shortage of skilled labour that the RLM had masterminded the integration of Hirth with Heinkel. Pabst von Ohain continued to work on the 109-011 at Rostock, and when Müller was moved to Stuttgart to continue development of the 109-006 (HeS 30) he had full access to all the resources of that facility. While problems began to stifle the HeS 8a programme, progress was swift on the 109-011, and a bench run of the 109–006 demonstrated a static thrust of 1,985lb (900kg). In further efforts to consolidate development and rationalize resources, Pabst von Ohain's 109-011 would move to Stuttgart when Müller left Heinkel in the autumn of 1942. In a decision of monumental stupidity, Müller's powerful 109-006 was aban-

The relatively small frontal area made the Me 262 difficult to see in a head-on attack, but without a propeller in front the pilot had an excellent field of view.

doned in favour of continued development of the 109-011. But all this lay ahead as Messerschmitt viewed the competition.

Messerschmitt in trouble

The third reason for Messerschmitt to get a good inaugural jet flight with the Me 262 was to preserve its reputation as a highly competent design and engineering company. Deep enmity between Willi Messerschmitt and Erhard Milch, deputy to Hermann Goering and now, since Udet's November 1941 suicide, in charge of aircraft production, gave Messerschmitt continual suspicion that he would again suffer at the hands of this ruthless and energetic leader. Reason for concern stemmed from enduring problems with another Messerschmitt product, the Me 210, which brought accusations from some elements in the RLM that the company had lost its grip and was over-stretched in trying to run jet and rocket propelled projects as well as a full and expanding production schedule for conventional aircraft.

Fritz Wendel familiarizes himself with cockpit procedures prior to the first flight of the Me 262 on 18 July 1942 as the third prototype taxies to the runway at Leipheim.

The Me 210 had been specified as a multi-purpose combat aircraft capable of performing ground attack, dive bombing, fast reconnaissance and heavy fighter roles. Ordered by the *Technische Amt* as a replacement, with superior capabilities, for the Bf 110, the Me 210 was designed along conservative lines but with innovative features, including electrically powered, remotely controlled gun barbettes in the fuselage to protect the aircraft against attack from the rear. From the date of its first flight on 5 September 1939 the aircraft displayed poor handling characteristics, which were compounded by design problems and unsavoury responses in the air. The aircraft was essentially unstable, prone to stall, would throw itself into a vicious spin, and suffered tailplane buffeting and elevon flutter. One year to the day after its first flight, Fritz Wendel, who had replaced Kurt Wurster as Messerschmitt's chief test pilot, almost lost his life when the tailplane broke and he had to bail out over the Siebentischwald.

Anticipating a large production run with deliveries beginning in the middle of 1941, the *Generalluftzeugmeisteramt* (Director-General of Luftwaffe Equipment) had begun to phase down the Bf 110 production line in anticipation of the Me 210. The Augsburg and Regensburg factories began to tool up for the Me 210, and the MIAG plant at Brunswick commenced conversion to production of the new aircraft. In haste, Messerschmitt made temporary alterations to the Me 210, but the alarming reports made by service pilots toward the end of 1941 attracted an official inquiry. At the end of January 1942 a specially appointed commission ruled the aircraft unsafe and it was withdrawn, the Bf 110 production line being opened again to fill the gap. Incensed, Goering and Milch counted the cost of 600 aircraft that would have been produced had the Me 210 been as satisfactory as claimed by the company. Moreover, Messerschmitt suffered financially, losing 30 million *Reichsmarks*.

Yet another element threatened Messerschmitt and, indirectly, the entire Me 262 programme: the appointment on 8 February 1942 of Albert Speer as Minister of Armaments and War Production. The successor to Dr Fritz Todt, who had been head of the armaments and munitions industry since February 1940, Albert Speer was both an intellectual and a brilliant organizer, who would dispassionately consider the criteria essential for efficient management of Germany's multifarious weapons programmes. He was yet to acquire responsibility for aircraft production, but his place as controller of German war materials gave him tacit control of its resources and he was implicitly involved with its expansion from the day of his appointment.

Inept as a manager and out of his depth, Udet had been unable to separate good developments from bad and had clung to traditional beliefs, unable to realize the changing aims of Germany's war effort. Together, Milch and Speer would organize the production programme into a total war effort and, working with Fritz Sauckel who on 21 March 1942 was made responsible for labour, would coordinate foreign workers in the production line activity. Speer owed no favours and sought none. In making his clinical decisions he had the German war effort at heart and would judge each weapons programme on its merit as part of an integrated whole. Messerschmitt knew the old order was changing, but not fast enough to save his own head.

As problems with the powerplants for the Me 262 kept the aeroplane grounded, and the Me 262 V1 demonstrated the unreliability of the BMW 003 turbojet engine, senior leaders began to turn their backs on Messerschmitt. Having already cost thirty six lives in crashes that could have been prevented by better handling characteristics, the Messerschmitt Me 321 heavy glider was cited as a further example of the company's ineptitude. The powered version, designated Me 323, was equally suspect, but in March and April 1942 it

was judged that it was an acceptable flying machine and could continue in production. However, Milch saw an opportunity to settle old scores. On 14 April *Dipl-Ing* Lucht, the Luftwaffe's chief of engineering, told Milch of his continual frustration at the unceasing flow of amendments and changes demanded by the Messerschmitt factories, which compromised production and increased costs.

Resolving to do something about the situation, Milch told Lucht that he was seriously considering having Messerschmitt removed as chairman and managing director of the company. He contacted F. W.Seiler, deputy to Willi Messerschmitt, to convey that fact, Milch ordered Lucht to Augsburg for an 'inspection' of the company and its projects, whereupon Lucht telephoned the Messerschmitt works to arrange for a fly-in visit on April 19, five days hence. Seiler told Willi Messerschmitt what Milch had threatened and a special meeting was called for April 17, at which the company head would meet with the Shareholders' Committee, represented by its chairman Theo Croneiss, to discuss options.

Clearly, the entire company was threatened and something had to be done. Willi Messerschmitt knew the stakes were high. Milch had taken him and the BFW company to bankruptcy in 1929 when, as head of the airline Deutsche Luft Hansa (DLH; not to be confused with Deutsche Lufthansa), Milch had cancelled an order for M-20b transport aircraft. Through the official receiver, Messerschmitt had forced Milch to pay for the airliners, thereby allowing reconstitution of the BFW company, but now Willi felt that pay-back time had arrived.

Flaps are set at 20 degrees as the engines continue to run up and ground crew pull back from the Me 262 as final preparations for takeoff are completed.

With engines running up to full throttle, Wendel creates a smoke and steam screen from engine exhaust and wet runway as he checks rpm levels before accelerating for the first all-jet takeoff.

When the meeting at Messerschmitt opened on 17 April, acrimony and accusations flew between Willi Messerschmitt, Croneiss and Seiler. There was no consensus and little progress was made other than to agree that the only thing they could do was to get Milch to change his mind. Willi Messerschmitt was personally wedded to his company and it was not a propitious time for the tiller to change hands. It was ironic that a manufacturer with such influence and so respected among the wider ranks of the RLM should provoke such extreme dislike from a few old enemies. Only the previous year he had garnered support for his 'Amerika Bomber', the technically advanced Me 264 which, even from its blue-prints, had seen off opponents as a possible means of delivering a 4,000lb (1,800kg) bomb load on New York; when America entered the war in December 1941 it had given a prophetic tone to Messerschmitt's proposal.

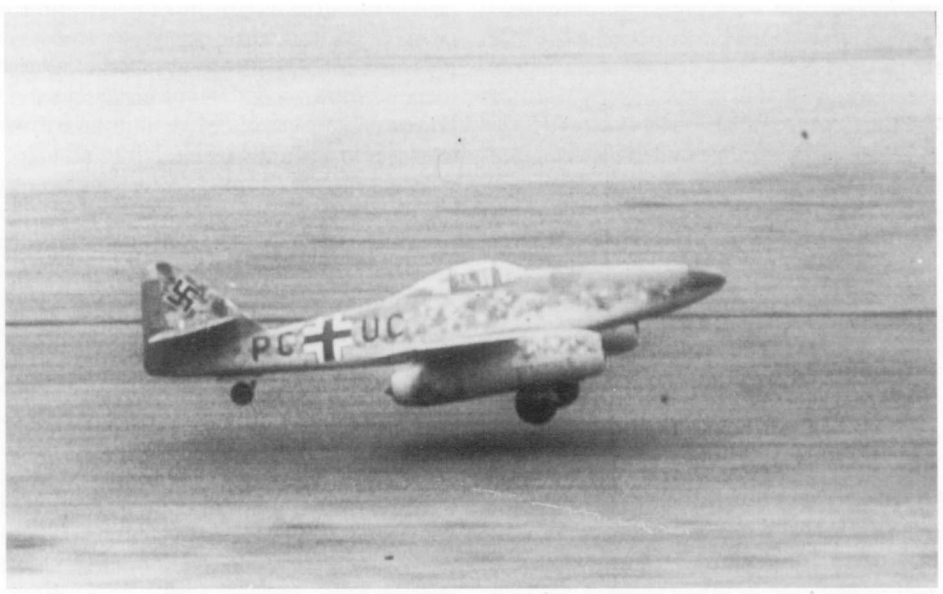
There was also the Me 309, which had been a private initiative from the Messerschmitt works to incorporate such new technological developments as pressurized cockpit, tricycle undercarriage and a variable geometry radiator into a new fighter design. Responding to lessons learned during the Battle of Britain, Messerschmitt designed the Me 309 to have 85 per cent more range and 25 per

cent greater speed than the Bf 109F and the Fw 190A, with internal fuel tanks providing a range of 870 miles (1,400km). The Luftwaffe had not been keen on the idea, especially as the Bf 109 was proving so adaptable, but Messerschmitt got permission to build a prototype, which was being made ready for its first flight along with the jet-powered Me 262. So times were critical for the Messerschmitt works, and the troublesome Me 163 rocket interceptor programme added complexity to a development programme which some said stretched even Messerschmitt too thin. There had been nothing contrived about hurrying preparations for the first flight of the all-jet Me 262, or the effort needed to ready the prototype Me 309 for its first flight, but success with both would be crucial for continued support of the company as an aeroplane design, development and manufacturing base. As for Willi Messerschmitt, even the V3 flight could not save his corporate life, for that matter had already been settled in the mind of Erhard Milch.

With rpm at 9,000 and the engines running smoothly Wendel guns the V3 prototype and it starts to accelerate under all-jet power.

First flight

18 July was a busy day for Messerschmitt test pilots. Fritz Wendel was to fly the jet powered Me 262 for the first time; Karl Bauer would take up the more conventional Me 309, powered by a 1,750hp Daimler-Benz DB 603A-1 engine. Preparations for the flight of Me 262 V3 began early at the Leipheim airfield. It was a time-consuming process, but it was still early when Wendel climbed aboard the sleek looking aeroplane and strapped himself in. The engines seemed to be working well for what was to be a double-first: the first flight of the third prototype, and the first flight under jet power alone. Under a dull and overcast sky, the turbines whined and gave out a rasping growl as they gathered rpm. Winding them up to takeoff power, Wendel slowly pushed forward the throttle, which controlled the flow of fuel into the engine, and accelerated down the tarmac runway. After 2,600ft (790m) the V3 was at rotation speed, but Wendel found the elevator control totally ineffective. He immediately pulled back on the throttle and spooled down, coming to a stop 3,600ft (1,100m) from his starting point at the other end of the runway.



Wendel gets the prototype Me 262 unstuck from Leipheim's concrete runway.

Out went the recovery tractor and the V3 with Wendel still inside was dragged back up the runway. It was clear what had happened. Devoid for the first time of the propeller wash that had given the elevators grip, the incidence angle of the Me 262 as it rolled down the runway blanketed the control surfaces from free air. After a few minutes deliberation, Kurt Zeiller, a member of the test team, suggested that if Wendel gently dabbed the brakes at 112mph (180km/h) – the projected rotation speed – the nose would dip, thus raising the tail and giving the aircraft flight. Wendel agreed to try that method and, at 8.40am, accelerated down the runway for the second time that morning. At the precise spot where earlier he had pushed forward on the stick he repeated the process, stabbed the brake, and felt the aircraft rotate and lift into the air almost at the same time. For the first time, the Me 262 was flying through the air propelled by jet power alone.

It was a completely new experience. No

As Wendel increases speed the aesthetically streamlined Me 262 climbs steadily into the air on the first of two test flight this day.

torque, vibration or throbbing roar of a piston engine: only a smooth, high-pitched, whine from the two Jumo 004A-0 engines as the V3 shot forward into the air. Accelerating slowly at first, for he was well briefed on the dangers of giving the turbine too fast a fuel flow, Wendel remained in the air for twelve minutes, performing very simple wide turns and relatively slow fly-bys. As he landed he already knew that this was a remarkable aeroplane, one that would herald a new age of fast, jet-powered combat aircraft. 'Seldom have I been so enthusiastic during my first flight with a new aircraft as I was with the Me 262,' he said later. Engineers scrambled over the V3 preparing it for a second flight that day. At 12.05pm Wendel was back in the air for a flight that lasted thirteen minutes, in which the Me 262 achieved an estimated maximum speed of 445mph (716km/h) and an altitude of 11,500ft (3,500m). This time Wendel tried some banks, discovering that air flow broke away prematurely from the wing mid-section, but that the basic aerodynamics, plus jet power, were about right for the design and the aircraft's role.

When the aircraft returned at the end of that flight its pilot, with the team of engineers that had brought Messerschmitt this much needed boost, evaluated every aspect of the aircraft's performance and planned changes that would refine its handling. The mid-way airflow problem would be solved by adding an extension to the leading edge of the inboard wing, maintaining the angle of sweep on the outboard leading edge right up to the fuselage. At the same time the thickness of the wing was increased slightly, so as to maintain the original thickness/chord ratio, giving the Me 262 its definitive, and very pleasing, planview. Later that day Karl Bauer flew the Me 309 for the first time. The test was cut short only seven minutes after takeoff when radiator coolant temperatures soared to 257°F (125°C), ironically due to airflow deflected away from the radiator bath by sluggish nosewheel retraction. This was enough to cloud the day for the Me 309 team and to cast another shadow over Messerschmitt's attempt to demonstrate success. However, the successful flight of the jet-powered Me 262, coming fifteen months after the airframe first felt the atmosphere, was what the company needed.

Messerschmitt resigns

One day later, on 19 April, Lucht arrived to 'inspect' the company's activity and deliver the *coup de grâce*. Later, he would claim that high tension was in the air when he arrived and that Willi seemed distant, resigned to his fate. Milch would not listen to appeals from the company board or its caucus of shareholders. Willi had to go: he resigned as chairman and managing director, leaving Croneiss and Seiler to sort out the company. Milch threatened to turn it over to a government-appointed official, and that threat mobilized management into a major review of all programmes, an attempt to resolve outstanding technical problems in development projects and to address Berlin's concern about the way Messerschmitt managed its affairs. Willi, meanwhile, was confined to his design and engineering department, where many an engineer would call by for advice and help. As for the Me 309, Willi's personal triumph over bureaucratic indifference, it never entered service, although the V3 prototype was used to test cockpit pressurization and pilot ejection systems for the Me 262.

Flight testing continues

Ten days after its first flight, the Me 262 V3 was back in the air again with added wing section, giving it a constant leading edge sweep and an altogether more streamlined appearance. This and the next three flights, two at Leipheim and two at

V3 taxies to a halt after the first all-jet flight. Note the camouflage which even at this early date was a prerequisite for optimum security.

Augsburg, were made by Wendel in basic evaluation of the aircraft for flying and handling characteristics. By 11 August, the V3 had made six flights totalling fifty seven minutes, during which valuable lessons had been learned. Although the aircraft was easier to fly than a Bf 109, and had virtually no perceptible vibration, high landing speeds put a lot of stress on the tyres, each pair being good for only eight flights. The prototypes had no landing gear uplock system, the wheels resting on the closed doors, and lacked a fire suppression system. The biggest problem lay with the turbojets themselves, which were experimental and not fit for operational use.

While some steps were taken in the production version for carbon-tetrachloride in the nacelles and fuel tanks to minimize fire hazard, there was nothing that could be done about the engines, which would continue to be the weak point of the overall programme. The test programme showed how sensitive were the engines to throttle settings, which would control fuel flow below 6,000rpm; flow was adjusted automatically at high rpm. If advanced too quickly, the turbines would burn out and, frequently, cause a fire. Most non-combat losses would be caused by failed or malfunctioning engines. Other problems of a structural or aerodynamic nature could be solved more readily. Engineers put in hand a redesign of the landing gear, giving the Me 262 a tricycle configuration and effectively solving the problems experienced by Wendel on takeoff. It would, however, be a year before the Me 262 got its nose wheel. Other, less obvious, refinements would continue to keep the engineers and the drawing office busy for the next two years.

In the meantime there was more testing to be done. After the sixth flight of the V3 prototype on 11 August, its third from Augsburg, test pilot Heinrich Beauvais from the *E-stelle* at Rechlin climbed in for his first experience of the new jet. The weather was unusually hot and dry, and the heavy Bavarian air hung dense across Rechlin as the Me 262 accelerated down the runway. Wendel had instructed Beauvais, a skilled and experienced pilot, in the vagaries of the Jumo 004A-0 engines, and now stationed himself at the appropriate place, 2,870ft (875m) down the runway, where the Rechlin test pilot should unstick and take off. As he watched he could see the aeroplane was accelerating too slowly. It passed the spot where Wendel stood, marking the place that Beauvais was to have gently touched the brakes, and went on for a further 360ft (110m) before Beauvais decided it was now or never. But no sooner had he dabbed the brakes and raised the tail than it fell back

What the British Knew

In 1939 a disillusioned employee at the Heinkel works escaped to Britain and was interrogated by officials from the Air Intelligence Branch (AI) of the Air Ministry. AI gleaned the first details of development work on the He 280 and on the emphasis Germany placed on rocket and jet engine research. Although the escapee did not know of the He 178 precursor, this was the first time British intelligence had any detail on developments in the field of jet propulsion conducted in German research institutes. In April 1940, AI received intelligence reports from friendly sources in Germany that the He 280 was under active development and that it was being test flown (at that time it was not; not until September did tow-tests of the unpowered prototype begin). There was no correlation between that piece of intelligence and the decision to order development of a Whittle flight engine and design of the E.28/39 airframe that month.

For more than two years there were no further significant pieces of information; only scraps of intelligence that received little credence in an intelligence community blissfully ignorant of front-line technology and engineering possibilities. Even among the scientists unreality permeated debate about pending capabilities within the constraints of known physical laws. Winston Churchill's scientific adviser, Prof Lindemann, refused to believe the Germans could possibly build rockets, claiming that intelligence photographs showing 'sausages with fins' at a research site called Peenemünde were, in fact, inflatable dummies. The first photographic-reconnaissance pictures of activity at Heinkel on the He 280 were received from the RAF in May 1942. In November that year AI received word that both Heinkel and Messerschmitt were dabbling in rocket-powered aeroplane projects, but judged that because there was no indication of a crash programme there was no priority effort under way. Consequently, work on British jet engine and aircraft development was, according to a British intelligence survey, conducted 'at a more leisurely pace'.

to the runway. There was nothing for it but to stop and try again.

On the second attempt Beauvais carefully watched the speed as he passed his markers and realized he was still too slow. Perhaps he had been too timid with the throttle, perhaps a little too gentle with the brakes; whatever the cause, it seemed there was just insufficient power to do the job within the distance required. After these throttle and brake deliberations he made one last effort, shooting down the runway noticeably faster – but not quite fast enough. Beauvais could not get the aircraft to fly before he had reached the end of the concrete strip and crossed the perimeter. Reluctant and sluggish, the tail wallowed as it raised from the runway. Beauvais, way beyond the point of no return, pulled back on the stick as he nudged forward the throttle to give the Jumo engines that extra margin of power. Only just airborne in the hot air, the wings sliced through corn in the adjacent field until the starboard wing-tip struck a manure dump, causing the V3 to ground loop. It was all over in moments, as the second of only two Me 262s collapsed in a cloud of smoke and debris. Beauvais avoided serious injury and the aircraft did not catch fire: an amazing escape in the circumstances.

Now it was back to the piston-engined V1 until repairs could get V3 back in the air or until the V2 was ready for its Jumo 004A-0 engines. The second prototype, the third to fly, was in the air for the first time on 1 October 1942. Powered by two Jumo 004A-0 turbojets, the Me 262 V2 remained in the air for twenty minutes, opening the way for Heinrich Beauvais to make his first jet-powered flight – without hitting a dung heap! – later in the day. Exuberance got the better of him and he performed a slow roll, for which he received a formal reprimand. During later test flights vibration was noted in the outer wing panels and stiffening was added in a successful attempt to prevent this. By the end of the year the programme was on track, with one jet-powered aircraft and a second (V1) restricted to basic aerodynamic tests with a reciprocating Jumo 210G. The V3 would not fly again until March 1943, followed by the V4 two months after that and V5 in June 1943.

Plans had already been made to extend the test programme. Recanting on its earlier embargo following the failure of he two BMW 003 engines on 25 March 1942, *E-Stelle* authorized a further five prototypes (V6–V10) and ten pre-production aircraft on 12 August. (The five prototypes would be completed as pre-production aircraft bearing 'V' numbers.) Other decisions were formalized: tricycle landing gear; pressurized cockpit; armour for pilot and fuel tanks; the fitting of dive brakes; and one MK 108 cannon and two MG 151 machine guns in place of the three MG 151 postulated earlier. On 2 October 1942, *E-Stelle* ordered an additional fifteen pre-production aircraft, but Messerschmitt protested when the RLM stipulated delivery by the end of 1943. On 20 November, responding to requests from the Air Ministry, the company prepared a brief specification sheet detailing performance that could be expected from a definitive production aircraft. Yet, for all the Ministry's new-found enthusiasm for getting more Me 262s into the test programme, the *Generalluftzeugmeister* (Air Inspector General) Erhard Milch was reluctant to order the jet into production.

Looking uncharacteristically tail-heavy, the third Me 262 prototype (PC+UC) was the first to fly with all-jet propulsion, one of four aircraft to have a tail-wheel.

CHAPTER TWO

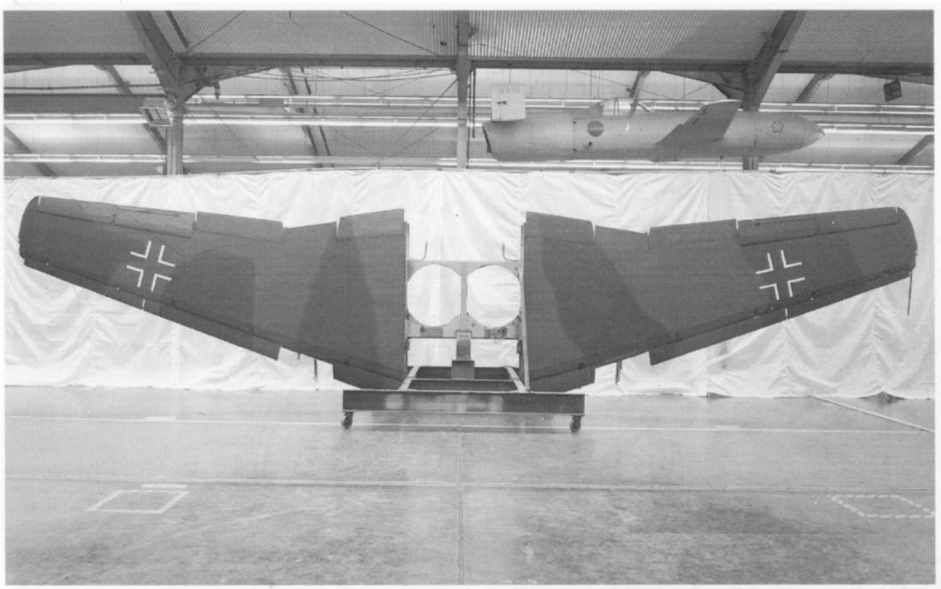
Development

By the end of 1942 many problems demanded the attention of the Luftwaffe and its long supply chain, involving Albert Speer's office and a burgeoning work force. The war had changed in the past year. The German Army had experienced its first serious defeats in the East, the British had pushed Rommel's desert forces back from El Alamein, and an Allied landing in North-West Africa had prepared the way for an assault on Germany through the soft underbelly of Europe. Germany's air warfare priorities had changed, too: an increasing demand for fighters was now being met by an expanded production programme. With Udet dead, his successors had a better grip on manufacturing and planning, and with Speer at the head of the supply chain the German armed forces were guaranteed a better delivery schedule. But 1942 was also the year in which American Forces arrived in Britain. Although they had yet to make their presence felt, the Luftwaffe knew that once the might of US production-line efficiency reached a full war-footing, the aerial armadas sent by the Luftwaffe to blitz Warsaw, Rotterdam and London would be dwarfed by the magnitude of the assault they themselves might expect.

If none of these matters was the first concern of the relatively small group poring over the development of the Me 262, they were very much a matter of daily debate among the Luftwaffe high command and in the corridors of the Speer ministry. It was, in fact, the worsening strategic position that spurred elements in the RLM to demand unrealistic production quotas from the Messerschmitt works in December 1942. To some extent, because of the need to consolidate production and increase delivery rates, it was a bad time for introducing a completely new concept in combat aviation. During 1942 the Luftwaffe received twice as many fighters as it had in 1940. Its share of total output from the aircraft factories increased from 32 per cent to 44 per cent in the same period. Yet while there was a need for quantity production to counter increased air threats and challenges to the greater German empire, there was an equal need for qualitative improvements. Only the jet aircraft could provide these with sufficient margin to break the increasing ascendancy of enemy aircraft types. In that regard, the jet fighter was a timely concept and one that could not wait.

Thus, with emphasis on increased production and major expansion in the Luftwaffe inventory of front-line combat aircraft, there was an increasing awareness that radical wonder-weapons were not such a bad idea after all. From an aura of complacency, the German Air Ministry was rapidly shifting its position to one in which it sought solutions through development and production of jet and rocket powered aircraft. But the Nazis had created a state in which dictatorial power started at the top and ran all the way down to the lowest levels. To understand the Germans' ambivalent attitude toward science and technology – vital factors in understanding why progress with jet aircraft was not as rapid in Germany as in Britain or America – it is essential to recognize the one (science) as inherently sceptical and critical, and the other (National Socialism) as imposing new values demanding rigid conformity and authoritarian control. The two are almost mutually exclusive and, while National Socialists realized that science and technology could not be ignored, Nazis as a group found that science and ideology made strange bedfellows.

Nazi Germany had made a determined effort to set aside all otherwise rational priorities for a modern industrial nation,



The wing shape of the Me 262 evolved through a series of changes into the definitive form shown here. The original wing design had less sweep on the section inboard of the engines and was built up on a single spar with half and full chord ribs.

Presented with a branch from a fir tree in acknowledgement of his first flight in the Me 262, test pilot Ernst Worner is seen here in the presence of Gerd Lindner (left).

Gerd Lindner does a spot of first aid on a mechanic injured when he walked into the wing of a Me 262. It would be Lindner's lot to demonstrate the Me 262 to Goering and other high ranking Luftwaffe officials.

allowing ideological strictures to override a measured balance of scientific research and development. The Nuremberg race laws of 1935 increased discrimination against non-Aryans: as a result, Germany lost 25 per cent of its scientists because they were Jewish. To some (Aryan) Germans this seemed counter-productive, and it was for this reason that certain individuals strained against the system in bringing to advanced development many weapons that should not have been incorporated on strictly National Socialist principles of technical and industrial mobilization. Nazi leaders suspected scientists and theoretical engineers on the basis that their ethos ran counter to a rigid adherence to an authoritarian control that is the antithesis of intellectual thought and discovery. Many Nazis found it difficult to accept that intellect may be driven primarily by a desire to unravel the secrets of physics and chemistry; thus, in a weird and wonderful way, the jet engine became the embodiment of an alien concept.

There were other reasons why Germany failed to maximize its lead in jet fighter design, and why it dithered between 1942 and early 1944. Unlike in Britain and America, persuasive powers and powerful arguments from the aircraft industry could do little to alter the decisions made at national government level. And fewer people wanted the jets than those who did not – not least among the latter being the manufacturers left out of the race. Moreover, if Adolf Hitler did not like an idea it died with his denial. Or, at least, in theory and according to Nazi ideology. In fact, there were a sufficient number of persons who could clearly see the immense advantage in jet power to keep it alive. These people were tolerated by the state, but they were not trusted, for the reasons explained above, and they had little influence in a world where whims and fantasies held equal sway. It was for all these reasons that Germany failed to put its political will behind the development of an atomic bomb (that Jewish weapon, according to Himmler), to the eternal gratitude of the civilized world.

The 'Vulcan' plan

Towards the end of 1942, in a fit of enthusiastic support, elements in the RLM responsible for monitoring reaction propulsion development briefed Erhard

A potential source of problems with an already troublesome engine design, the Reidel starter motor housing, is clearly seen in the intake nozzle of the Jumo 004 engine nacelle. Also visible are the conveniently placed footholds for access to the top of the wing and the leading edge slat.

Milch specifically on the new generation of warplanes. They were convinced that convention and ideology must have no place in the decisions now called for – and they were right. In the year since he took responsibility for disposition of forces and aircraft production, Milch had warmed to the idea of jet-powered aircraft, which increasingly appealed to him as tests demonstrated existing designs to be viable projects. Under Order No.480, dated 10 December 1942, Milch appealed for a high-priority development and production programme involving several new aircraft, including the Me 163 rocket interceptor, the He 280 and Me 262 jet-propelled fighters, the Arado Ar 234 jet-powered bomber and the Me 328 pulse-jet interceptor.

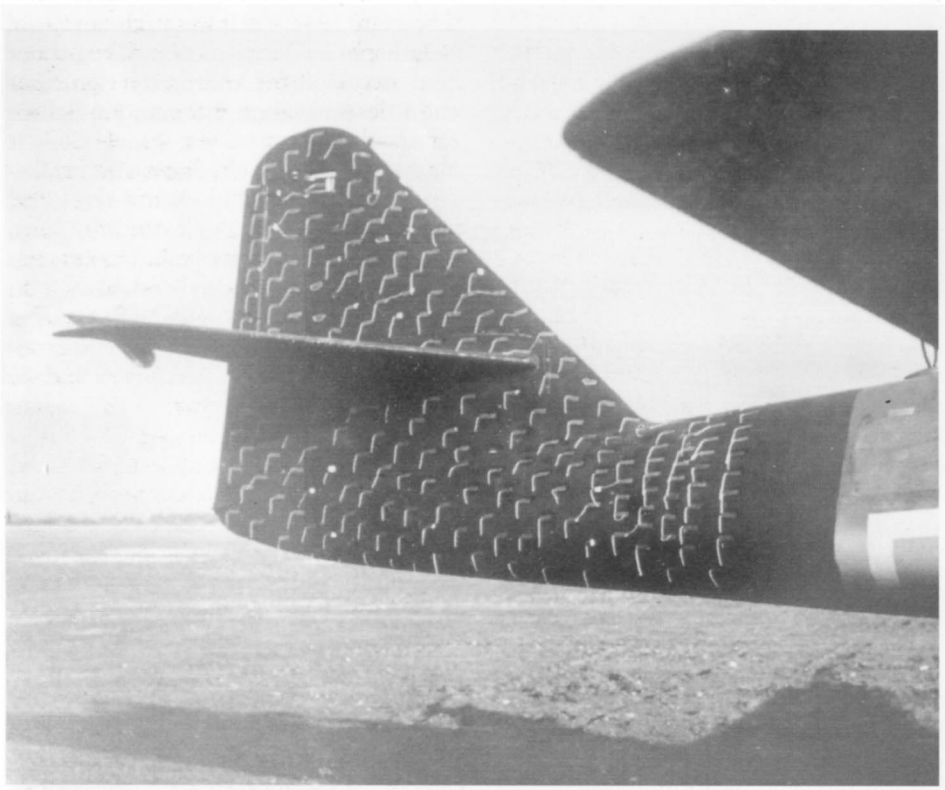
Given the code-name Vulcan, the plan envisaged a nucleus of advanced projects the RLM desired to introduce rapidly during 1943, supplementing existing production lines which were to shift quickly to mass production of the new types. The Messerschmitt company had already expressed its concern about excessive demands made by the RLM, regarding these as another way in which the state was interfering to the detriment of the project. Earlier, Willi Messerschmitt had resisted suggestions to give the aeroplane a tricycle undercarriage, saying it would delay quantity production and service introduction. The Vulcan plan was rejected, and would quietly die as other, more pressing, matters prevailed. Nevertheless, it focused attention on the need for essential raw materials and for the people needed to convert good designs and innovative ideas into operational hardware. Its positive effect was to give the Me 262 a DE level priority rating for vital resources and equipment deliveries. That priority would cover provision of raw materials and their delivery to the contractor.

The Luftwaffe and Germany's military difficulties

Yet still there was a conflict within the Air Ministry. The Luftwaffe had been losing credibility, for the miracles performed in *Blitzkrieg* campaigns in Western Europe in 1940 and in Russia in 1941 were not repeated in 1942 – and those with foresight saw the situation worsening. Weapons like the Me 262 had a significant role to play, in that they could restore the awesome capabilities of the 1939 Luftwaffe, and there were a few in the RLM who saw that as a fact – even as the year turned after Christmas 1942. Yet it was in these crucial months, when decisions were taken about test, development and production, that the first-generation German jet fighter failed to benefit from the strong lobby it might have had if the Luftwaffe's infrastructure had been like that of the Royal Air Force in Britain. Unlike the RAF, with its separate operational Commands (Bomber, Fighter, Coastal) established on 14 July 1936, the Luftwaffe had a series of *Luftflotten* (Air Fleets), each with a distributive spread of aircraft types for specific roles.

In the Luftwaffe's set up, the fighters were there to protect the dive bombers and medium, conventional bombers, and to defend the means of attack rather than oppose the means of defence. Accordingly, the offensive role had been prioritized, so that the bomber crews were considered an élite group and were given a tougher and more extensive training programme than fighter pilots. These factors, since frequently disregarded, were important criteria in establishing the relative importance of aircraft types. Because bombers flew great distances, they were crewed by men trained in navigation and in the tech-

A fine view of the Me 262 in a low altitude, high-speed, fly past during tests. The aircraft had good acceleration at high speed and was unbeatable above 300kts, but paid for this with sluggish performance at lower speeds. This particular shot was taken during Allied flight trials after the war.



Tail tuff defines flow patterns around the rear fuselage and vertical fin and rudder of the Me 262.

nically demanding duties of bomb-aiming and communications and flight-path aids, none of which were thought to be the concern of fighter pilots. Specifications for fighters were lax on range requirements, for the RLM envisaged fighters as operating from forward bases close to the battle, clearing the skies and protecting the bombers.

The concept of, for instance, the long-range escort fighter was unknown to the Luftwaffe. Many senior commanders refused to believe that a single-seat fighter that could stay with the bombers all the way to their target and back could be built. Goering told Hitler that such an aeroplane was technically impossible, until the American P-51D Mustang appeared in 1943 and did precisely that. For far too long the fighter was seen by the RLM as a defensive machine that would operate over a relatively short range and be subservient both to the bombers and to the ground support needs of the Army. The Nazi leadership regarded the Luftwaffe as an overrated force, and Goering's increasing detachment from the core of decision-making left him and the force he had created out on a limb. Goering had been blamed for the 'débâcle' over Dunkirk, the failure of the Luftwaffe to defeat RAF Fighter Command, and the increasing aerial bombardment to which Germany's towns and cities were exposed at the hands of RAF Bomber Command and the US Army Air Forces.

The multi-role Me 262

This complex set of differing priorities, attitudes and air power philosophies between the Luftwaffe, the RLM and the Nazi leadership led to a set of divergent roles and duties being perceived for the Me 262. It is a monumental myth of astonishing durability that Adolf Hitler was primarily responsible for delaying the Me 262, and for ordering it as a bomber rather than as the fighter the design and manufacturing teams had intended it to be. In fact, Messerschmitt had never been so rigid as to believe the Me 262 was primarily a fighter, and both Willi Messerschmitt and the company played a significant part in encouraging the belief that it was a multi-purpose aeroplane, capable of carrying a significant bomb load, a fast photo-reconnaissance platform or a high-speed interceptor. When the founder left as

chairman and managing director, his company continued to represent the aircraft as a multi-purpose weapon – and it was wise and prudent to do so.

For one thing, the Allied aircraft that most impressed the Germans was the very fast De Havilland Mosquito, which appeared in action first as a reconnaissance aircraft during September 1941, as a night fighter in April 1942, and as a bomber just one month later. The fighter pilots Messerschmitt knew so well would enthuse over the possibilities inherent in a direct, straight-line speed advantage in military operations, and would cite the Mosquito as a prime example of the type of aircraft they badly needed. At the end of the war all German pilots lauded the Mosquito and characterized it as one of the most difficult Allied aircraft to engage. Paradoxically, it was those self-same fighter pilots who, towards the end of the war, would lambaste the regime for not giving them enough fighters to do the job, but in 1942 the message the planemakers got from the Ministry was one that encouraged multi-role combat aircraft. Although elements in the RLM liked the multi-role idea, it was only later that this was put to Goering, and eventually to Hitler. True to form, Hitler seized on the idea and represented it as his own. The men who were to fly the Me 262 in combat were in the dark as to the true source of the idea.

Messerschmitt knew the powerful arguments in favour of commonality on the production line, and believed that his revolutionary aeroplane would stand a better chance if it was seen from the outset as a powerful weapon suited to separate roles and duties in the Luftwaffe. This idea was sparked by sympathetic elements in the RLM, who on 26 September 1941 asked the designers to come up with a stripped-down photo-reconnaissance version, with extended range and equipped with Junkers engines. The reputation of the Mosquito as a virtually unstoppable camera platform led the RLM to seek that capability from the basic Me 262 airframe. Given a priority mandate, and seeing in it a possible increase in development funds for the new aeroplane, on 21 October Messerschmitt produced a brochure describing to the Ministry what capabilities the aircraft would have in the photo-reconnaissance role. The company then received approval to build a mockup and demonstrate the relative location of equipment.

Between 5 February and 6 March 1942 the reconnaissance mockup was inspected. The visiting officials were impressed with the aircraft's capabilities in that role. Very soon, on 26 March, they presented Messerschmitt with a list of changes they wanted and, when revisiting the mockup, recommended various modifications that resulted in a rebuild. The reconnaissance version was given priority as a role development to be authorized after the first all-jet flight demonstration, but this did not happen as planned. There would be other priorities and diverse roles for the aeroplane, not least of which was to carry a modest bomb load. Advocates at the RLM and profit-makers at Messerschmitt saw in the Me 262 an aeroplane akin to the Mosquito, and began subtle efforts to market it as such in the year ahead. At the end of 1942 and in early 1943 they convinced the RLM that the aeroplane would double as a high-speed interceptor (no one really thought of it as a fighter in the classic sense) and as a high-speed ground attack aeroplane.

Nose gear failures were not uncommon and, due to engineering layout, frequently led to serious damage. In this incident an early pre-production aircraft has lost both engines after nosing into soft ground.

Testing continues

During January 1943 the V2 prototype received its inboard leading-edge wing fillet. Flight tests took place with the new swept wing shape at Lechfeld, but in February severe vibration was noted in the outer wing panels and the aircraft was temporarily restricted to a maximum speed of 430mph (690km/h). By April, engineers had discovered the cause of the problem and a design change in the interior structure of the wing restored the Me 262 to flights at more than 500mph (800km/h). Later, designers would muse over the happenstance way the futuristic wing shape had evolved, and gain amusement from tales of advanced German wind-tunnel research for trans-sonic flight! The V2 was joined on 2 March by the re-engined V1 prototype, which now had its Jumo 210G removed from the nose and its two BMW turbojets replaced by Jumo 004A engines for its first all-jet flight. Over the next several months, as the flight test programme evolved, several more changes were made to the first prototype, including a pressurized cockpit and a trio of 15mm MG 151 Mauser cannon in the nose.

But not everything was moving ahead as planned, and the vagaries of winter weather conspired to delay tests. In January 1943 Messerschmitt had planned to drop a test model of the Me 262 fuselage from an altitude of 19,700ft (16,000m) over the Müritzsee, a large lake adjacent to Rechlin, to measure flutter resistance on

the tail. To carry the fuselage, it was planned to use one of the early Me 323 six-engined troop transports adapted from the Me 321 *Gigant* glider. The Müritzsee was frozen over, so the test team moved to a large lake called the Chiemsee, situated near the Augsburg Messerschmitt works and about mid-way between Munich and Salzburg. Finally, on 11 February, all was ready and the giant, high-wing transport lumbered into the air carrying the slender, porpoise-shaped fuselage of the Me 262. Long before the days of radio-telemetry, instruments on board the test section recorded the behaviour of the tail. At the desired altitude the *Gigant* released its load, which fell toward the lake. To this point everything had gone well, but the recovery equipment failed to deploy properly and the fuselage was lost in the deep waters of the Chiemsee.

Despite minor setbacks, the test programme continued apace. March was a crucial month in the orientation of the entire programme. By this date, Hitler, who had been kept informed about work on both the airframe and the engine, began to take an interest, but to secure enthusiastic support from the Führer the multi-role applications were stressed. Not only could the aircraft intercept enemy bombers intruding into German airspace, he was told, it could also be used to carry bombs in an offensive role. This appealed to Hitler, who loathed the concept of retrenchment and defensive tactics. Just how much progress was achieved with the Me 262 by presenting it in this way no one can know, but a large body of evidence suggests that Hitler may never have allowed the project to continue if the aeroplane had been incapable of operating in any other role than that of an interceptor. Hitler not only accepted the aircraft as a fast, medium bomber as well as an interceptor, he also specifically directed it to be developed as a bomber. Accordingly, and in concert with its presentation of the aircraft, the RLM and *E-Stelle* at Rechlin formed a definitive specification for production aircraft.

Protected from ingestion damage by a wire screen over the Jumo 004 intake, the engines on this Me 262 are about to be started as the pilot discusses final checks with Curt Zeiller.

Plans for production

On 4 March the manufacturing plan for the Me 262 was finalized. The aircraft was to be built from the outset to carry a 1,100lb (500kg) bomb, with aiming equipment comprising a standard reflector gunsight on an adjustable mount in the cockpit. Armament was mooted as either a phenomenal battery of six 30mm MK 108 cannon, or four MK 108 plus two 20mm MG 151/20 Mauser cannon. With such a high closing speed, machine guns would be useless for the fleeting seconds of time the pilot would hold aim on the target. Ejection seats were to be dispensed with on production aircraft, and heavier main wheels were proposed for the initial version. This manufacturing plan set the seal on the definitive production version, but during the next two weeks detailed examination of the drawings and the jig requirements indicated that a phased introduction of improvements was to be preferred. In that way the aircraft would

Stripped of engines and nose leg, this Me 262 had a final resting place in the scrapyard. Note the generous access door in the forward fuselage aft of the four cannon ports.

stand a better chance of getting into operational use in good time. The two people responsible for this idea were *Dipl-Ing* Wolfgang Degel and *Dipl-Ing* Waldemar Voigt.

Under the phasing plan, the first stage model would have three 20mm MG 151/20 cannon in the nose with 300 rounds of ammunition. Fuel would be contained in two 198gal (900l) tanks. The aircraft would have a maximum takeoff weight of 12,127lb (5,500kg). Under this plan the initial production version would be kitted out as a fighter, and because its weight would be less than that of more developed versions it would have the smaller, 30 1/3 in x 14½in (77 x 37cm), main wheels produced for the prototypes. It had been planned to supplement takeoff thrust by fitting two rocket packs to the fuselage, but these were dispensed with for the initial version, as were the ejection seat, the pressurized cockpit and the speed brakes.

The second-stage development model would equip production aircraft as fighter-bombers, for which a variety of armament was cited. Initially, the type would have three MG 151/20 in the nose and two MK 108 in the wings, or in pods attached to the wings. Later, the Me 262 would have a modified nose armament bay carrying either four MK 108 or a combination of two 30mm Rheinmetall MK 103 cannon and a single 20mm MG 151/20. The original fuel tanks would be given added protection and supplemented by the addition of a 66gal (300l) unprotected tank. The type specification for this second-phase fighter-bomber stipulated capability for carrying a single SC 500 (1,100lb; 500kg) bomb or two SC 250 (550lb; 250kg) bombs. In an extension of the role, the specification also identified provision for a XBT700 torpedo, but with two guns removed from the aircraft's nose armament suite.

With a normal takeoff weight of 13,230lb (6,000kg), or an overloaded weight of 15,655lb (7,100kg), the fighter-bomber variant was projected to have the larger, 33in x 11 2/3in (84 x 30cm), main landing wheels and a standard, 26 in x 6 1/3 in (66 x 16cm), nose wheel. In addition, the aircraft would have leading edge slats along the entire span, and provision for rocket-assisted takeoff. The ejection seat, pressurized cockpit and speed brakes were not proposed for this version. The documents identifying the characteristics of this model provided, for the first time, preliminary performance figures based on actual flight tests. These indicated a potential maximum speed of more than 510mph (820km/h) at sea level and more than 530mph (850km/h) at optimum altitude of almost 19,700ft (6,000m). When compared to a top sea-level speed of around 310–320mph (500–515km/h) for the Fw 190A and the Bf 109G, these figures were outstanding. At optimum altitude, the Me 262 was around 140mph (225km/h) faster than any other German fighter operating on maximum power without boost, or 100mph (160km/h) faster than a fighter with boost such as that provided with the BMW 801D-2 for the Fw 190A-3.

The He 280 is dropped

Two days after the presentation of the fighter-bomber proposal on 25 March, the RLM dropped the Heinkel He 280 from its short-list of Vulcan types for development and production. The reasons were manifold. In June 1942 the He 280 V1 had been re-engined with the Jumo 004A and its loaded weight increased to 11,475lb (5,205kg). However, its maximum speed was below that of the Me 262 and, although the new engines gave it a top run of 490mph (790km/h), performance was in some cases markedly inferior. The V4 prototype, meanwhile, had been completed with two BMW 003A-0 turbojet engines of 1,675lb (760kg) thrust. The production specification was met for the first time by the V5, powered by two Heinkel-Hirth 001 turbojets. With an empty weight of 6,735lb (3,055kg) and a loaded weight of 9,480lb (4,300kg), the V5 was representative of the He 280A-1 series which Heinkel wished to add to the production line to follow the thirteen He 280A-0 types ordered by the RLM in the spring of 1942. The V5 was flight tested, performance figures claimed by Heinkel including a top speed of 509mph (819km/h) at 19,700ft (6,000m), a range of 405miles (650km) and a climb rate of 3,740ft/min (1,140m/min), a little less than that of the Me 262.

With two Jumo 004 engines, the He 280 V6 was completed with yet another engine type and was sent to Rechlin in early 1943 for extensive flight trials. Like Messerschmitt, Heinkel was very much aware that the Air Ministry and the Luftwaffe command wanted a multi-purpose aircraft, so the V6 was presented as the first in a series of variants that could meet requirements better than the competition. It was at this point that Heinkel's protégé became a real challenge to the Me 262, and deft marketing caused a spurt of

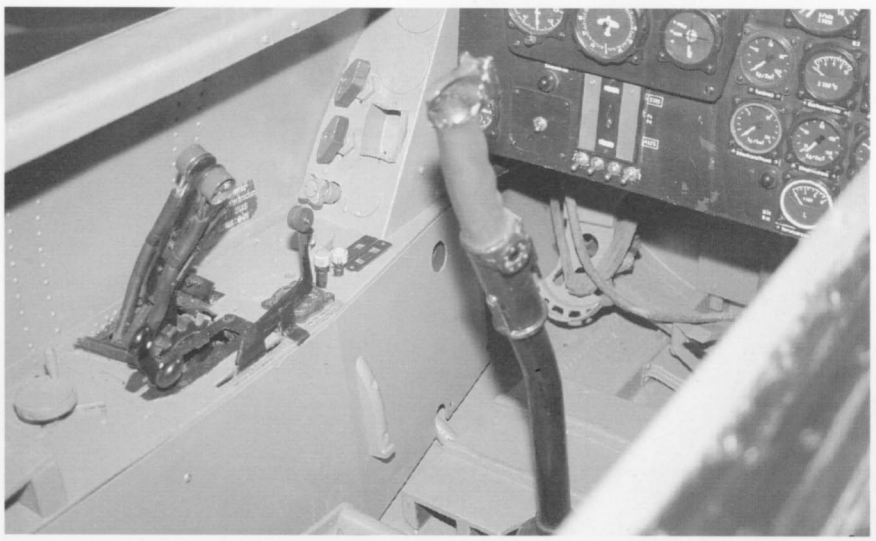
The early design of canopy and frame arrangement incorporated considerable ironwork and is a far cry from the full blown canopies of the 1990s. Note the small side hatch on the port side between vertical frames. The cockpit configuration was designed to support an ejection seat.

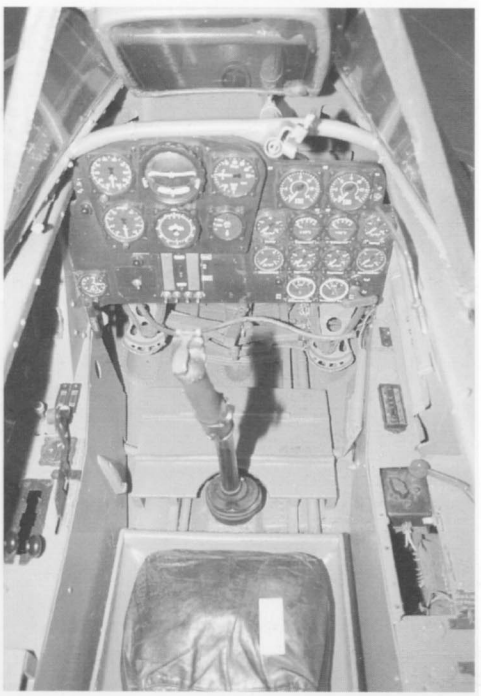
enthusiasm for the He 280. With full armament, and a proposal that the nose battery of three 20mm MG 151 cannon could be doubled in number, the V6 was put through its paces. While the Rechlin test pilots put the aircraft under full performance evaluation, the Heinkel company sent a proposition to the *Technische Amt* for a He 280B-1 fighter-bomber variant with two Jumo 004B engines of 1,985lb (900kg) thrust giving a maximum speed of 547mph (880km/h). Development of the type was to include a change in the design of the tail, replacing the twin-fin arrangement with a single fin and rudder.

By January 1943 the He 280 was favoured over the Me 262. The *Generalluftzeugmeister-Amt* (Department of the Chief of Aircraft Procurement and Supply) had shed its reservations about full-scale production for jet-powered aircraft, and reversed its decision by starting negotiations for a production run of 300 He 280B-1 fighter-bombers. Because Heinkel was fully committed to full-scale production of its other types, discussions began with the Siebel company for licensed production of the jet. Siebel Flugzeugwerke KG had arisen from the very successful light aircraft business run by *Dr-Ing* Hanns Klemm. As a substantial shareholder and with his appointment to the post of Director-General in 1937, Fritz W. Siebel was in a position to effect a name change from the company's original title of Leichtflugzeugwerke Klemm GmbH. The company retained a commanding lead in light aircraft, but when its competing design for a light communications aircraft lost to Fieseler's Fi 156 *Storch*, Siebel's primary function became that of building existing designs under licence. It seemed the perfect choice for the He 280 order, but the company was fully committed to conventional aircraft types. A suitable source of production could not be found.

It is impossible today to know for certain whether Heinkel responded to Messerschmitt's efforts at marketing the Me 262 as a multi-role aircraft, or vice versa. Suffice it to say that, largely in response to rumours of negotiations for the 300 He 280B-1 (to which the Messerschmitt people had been made privy), the Me 262 was 'sold' on 25 March 1943 as a revolutionary new concept applicable to both fighter and fighter-bomber roles. In a detailed analysis of relative performance, many aspects of the two aircraft were compared. It had not been the intention of the RLM to deliberately pitch these two giants against each other, but the pace of development and flight testing made it imperative to reach a decision one way or the other. Not for the last time, the company that had done all the pioneering work lost out to the one that could not only come up with a marginally better product but also could deliver in volume.

For two days the RLM ruminated on the relative merits of the He 280 and the Me 262, before deciding that, with equal powerplants, the Me 262 would have an edge over the He 280. Along with the bigger and better resources of the Messerschmitt company, this tipped the balance. On 27 March the Heinkel company was informed by the *Technische Amt* that it was to stop development work on its jet, although permission was given for completion and flight testing of three prototypes then under construction. There was no concomitant decision to order large-scale production of the Me 262, but





The instrument panel layout has the standard flight instruments on the left and the all-important engine guages on the right. Throttles and engine start were on the left hand console but required two hands and sloppy co-ordination could lead to flameouts or stalling. The consequences of this were to render the engine inoperable until it cooled.

for the first time since design work started in 1938, the Messerschmitt jet now had no competitor.

The He 280 V7 was completed, and began glide trials on 19 April 1943. In November it received two Heinkel-Hirth 001 turbojets and it was flown until February 1944, when it suffered engine failure, the airframe being relegated to a series of glide trials. The V8 was fitted with a 'Vee' tail arrangement and test-flown in this configuration for the first time on 19 July 1943, powered by two Jumo 004 engines. The maximum speed that could be achieved in this arrangement was 435mph (700km/h), attained on 30 August, but after its tenth test flight on 10 September 1943 its engines were removed. Flight tests resumed in November 1944, when it joined the V7 in glide tests. In this programme, a He 111H tug hauled the aircraft to an altitude anywhere between 2,300ft (700m) and 6,500ft (1,980m) before release. From the outset the V7 and the V8 were assigned parallel test programmes in similar flight profiles, evaluating the relative handling and performance values for twin-fin and 'Vee' tail designs.

The V9 was completed in August 1943 and, powered by two BMW 003A-1 engines, took over from the V4 which had been heavily involved in the development testing of that engine. In May 1944 these engines were replaced with BMW 003E types and the test programme shifted from Rechlin to the Heinkel works at Schwechat, where most He 280 development flying had taken place since summer 1942. There was a plan to instal HeS 11 (109-011) powerplants of 2,425lb (1,100kg) thrust in the V7 and V8 prototypes, but lack of engine availability prevented this. In the last year of the war the V6 prototype was re-configured with a single fin and rudder, but never made a flight in that configuration. So ended the Heinkel He 280, along with the aspirations of the Heinkel workers who had done so much to prove the worth of turbojet propulsion for combat aircraft.

Engine problems

But if Messerschmitt now envisaged a clear run for its progeny, there were no easy pickings in the spring of 1943, when threats to German military supremacy were increasing at an alarming rate and demands upon the German war machine were dramatically increased. The British were about to expel Rommel from North Africa, the Russians were launching a series of successful offensives, and RAF Bomber Command was now mounting more than 5,000 sorties each month, compared to an average 2,500 sorties per month in 1942. Messerschmitt knew that the multi-role nature of the Me 262 could not only give it priority in aircraft production, but also result in a major production order as applicable to reconnaissance and fighter-bomber roles as that of interceptor, for which the aircraft had originally been designed. Yet, ironically, having persuaded the RLM against a single-role jet in favour of diverse applications, the company was now to suffer interference from the Nazi leadership, not least Adolf Hitler himself, in its plans to get the Me 262 into production. But not quite yet.

In developing the Me 262, Messerschmitt was severely handicapped by the flagging development of the Junkers gas-turbine engines. In spring 1943 the inability of the powerplant to perform as expected seriously compromised the prospect of getting the aircraft into operational use. With hindsight, it is easy to blame officialdom, centralized planning or the idiosyncracies of key personnel at the RLM or Luftwaffe for not having had the foresight or temerity to put the aircraft on a faster track. The fact is that not only was the airframe builder probing new corners of

Preserved at the Deutsches Museum, the magnificently restored Me 262-1b, wk/nr 500071, is surmounted by its radical contemporary, the rocket powered Me 163, in a display of revolutionary change in fighter design.

the aerodynamic envelope, the powerplant designers also were forging new tools in a previously uncharted area. The paucity of engines, the enormous technical and engineering problems associated with getting the Jumo 004 developed as a production-line item, and delays in manufacturing and tooling for hardware contributed to delay. It was a problem that affected the range of jet aircraft in development with German industry, not least the Arado Ar 234 bomber.

In October 1940, at the behest of the RLM, Arado had begun detailed design of a jet-powered reconnaissance-bomber aircraft capable of carrying either the BMW or Junkers turbojets. By early 1941 it had produced a number of alternative designs. The RLM chose a relatively conservative one, the E 370, and selected from a range of landing gear a rather unorthodox arrangement of jettisonable takeoff trolley and extendable centre-fuselage landing skids with outriggers. Cleared for construction in March 1941, the V1 prototype was ready by the end of the year, but Junkers could not promise powerplants for at least twelve months. Even at this early date, Messerschmitt had priority on flight-rated Jumo 004 turbojets, the engine type with which the Ar 234 was now to be powered. The Arado company debated retrofitting its V1 with piston engines, but decided against that. Not until February 1943 were Jumo 004 engines available; and even then were cleared only for static test. Not until 30 July 1943 would the prototype Ar 234 take to the skies in the hands of Flugkapitan Selle.

Späte and Galland evaluate the Me 262

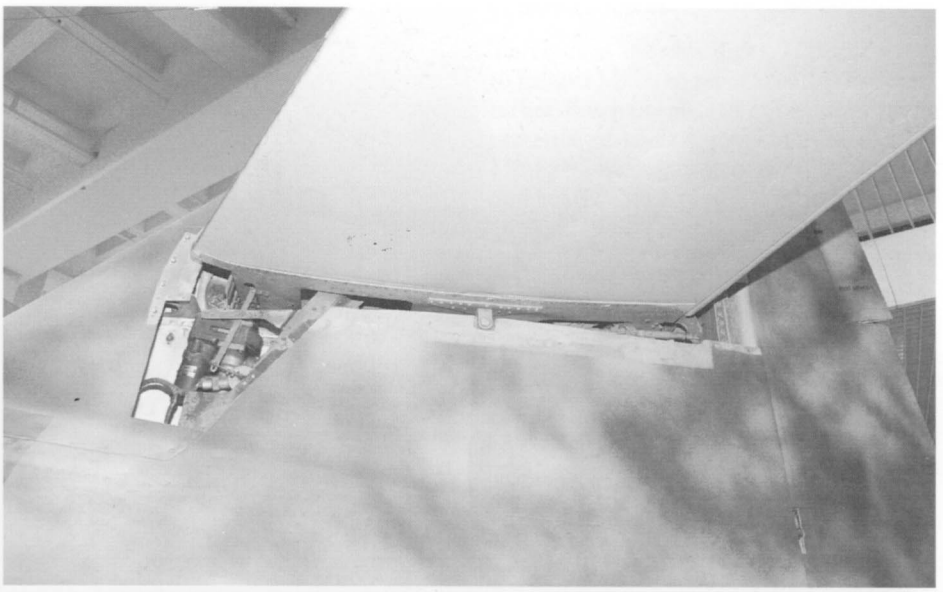
Notwithstanding serious delays with engine development, the Me 262 programme began to pick up during spring 1943, when additional aircraft became available for test and service pilots began to fly the prototypes on evaluation. After its re-build following the encounter with a pile of manure on 11 August 1942 (described in Chapter 1), during which it suffered 70 per cent damage, the prototype V3 had been taken back into the air at Lechfeld on 20 March for a 25-minute flight. This brought to three the number of prototype Me 262s available for flight tests, V1 having made its first all-jet flight on 2 March 1943. Since making its decision to abandon the He 280, and receiving the detailed production specification for both fighter and bomber versions of the Me 262, the RLM had increased its attention to the operational capabilities of the aircraft. It wanted the opinion of pilots who could evaluate the new jet against other high-

performance types then being nursed into the pre-production phase.

The ideal person to conduct that evaluation was Wolfgang Späte who, in July 1942, had been made commander of *Erprobungskommando 16* (Test Unit 16), which was performing a similar evaluation of the rocket-powered Me 163. With the approval of the RLM and the sanction of the *Luftwaffengeneralstab* (Luftwaffe Air Staff), Späte was assigned to fly the Me 262 at Lechfeld. Born in Dresden on 8 September 1911, *Hauptmann* (Captain) Späte had been a successful glider pilot before the war, taking part in many notable competitions in the Rhön mountains, before he became a test pilot for the glider pilot research establishment at Darmstadt. Späte received his pilot's licence for powered aircraft in 1937 and during the early months of the war flew as a reconnaissance pilot, before transferring to 5./JG 54 to fly fighters on the Eastern Front from 1 January 1941. By the end of the year he was promoted to *Staffelkapitan*, and on 5 October 1941, with the rank of *Oberleutnant*, was awarded the Knight's Cross for having scored forty five air combat kills. His score increased rapidly, and on 23 April 1942, with a kill record of 72, he was awarded Oak Leaves, joining *Erpr. Kdo 16* three months later.

Späte took to the air in the Me 262 V3 on 17 April 1943, and was immediately impressed by its versatility and good handling characteristics. After getting the general feel of the aircraft, he took it up again for a more rigorous set of manoeuvres. One involved a steep banking turn at 9,840ft (3,000m), during which he throttled back the two Jumo engines. Unknown to him at the time, the turn induced a measure of sideslip which upset the flow of air into the intakes, causing a flameout in both engines. When Späte had throttled back, the turbines were virtually free-wheeling: air striking the blades at an angle induced a profound braking effect which caused the flameout. Without power, and with little energy left due to the turn, the prototype lost height rapidly. As he wrestled with the aircraft to keep it in a shallow dive, Späte made several attempts to re-start the engines, but only when the V3 had fallen to an altitude of 4,900ft (1,500m) did the starboard engine splutter into life, followed by the port engine at a mere 1,500ft (460m).

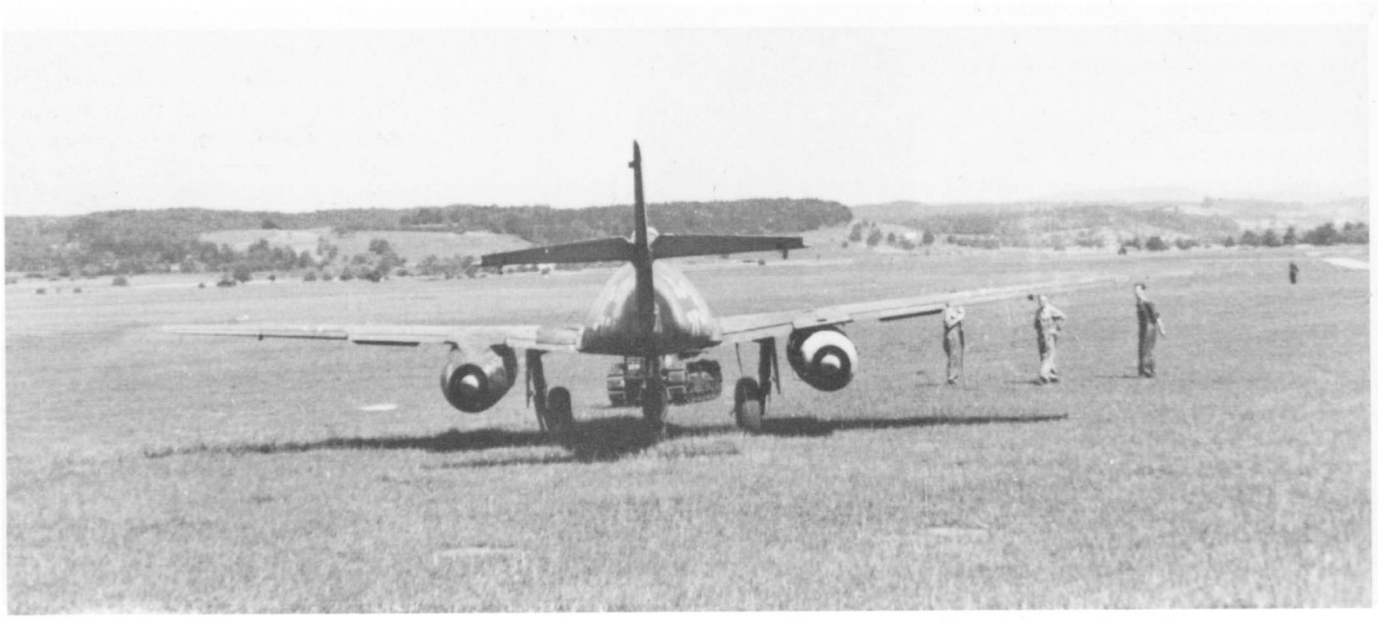
Späte brought the V3 in to a safe landing and went away with a good impression of his two flights, the flameout notwithstanding. For the rest of the day and next morning the V3's two turbojets were thoroughly overhauled and reinstalled. Engines were precious commodities. Later in the morning of the next day, 18 April, Willi Ostertag took up the V2 prototype for an extended flight test over Hiltenfingen, near Schwabmünchen south-west of Augsburg. Ostertag was an assistant of Fritz Wendel and knew the aeroplane well, but on this occasion he was a victim of technical failure. The tailplane incidence adjustment mechanism broke, pitching the prototype into a vertical dive from 1,600ft (490m). The aircraft, on its forty-eighth flight, was destroyed and the pilot killed. Now there were only two prototypes. The fault was diagnosed and minor redesign effected, but the incidence adjuster would continue to plague the Me 262, causing several more fatalities before a major redesign cured the problem once and for all.



Flight trials eliminated flaws in the tailplane incidence adjustment mechanism which brought several aircraft to grief including that flown by test pilot Willi Ostertag, who was killed due to the flawed design.

Together, the problems of flameout and incidence adjustment mechanism highlighted the potential dangers facing unwary pilots flying the new jet aircraft, and for a while it seemed they might be connected. There was good reason to think so. It had been noted that in Ostertag's crash one of the turbojets had flamed out close to the ground after the aircraft entered its dive. Could this have caused the crash by depriving the pilot of sufficient power to pull out of the dive? This could not have been the case in the V2 crash, because there the pilot was too low to recover; but would a tendency to flameout cause other crashes? Over the next several months and throughout 1944, close attention to flameout problems revealed a cause. The *zwiebel* (onion), or exhaust cone, which pilots had to adjust manually to compensate for changes in pressure, altitude and engine temperature, could become detached under stress, completely blocking the nacelle outlet through which the combusted gases were ejected. This caused a flameout, giving the aircraft pronounced yaw under the influence of asymmetric drag and bringing the tailplane into the airflow shadow of the thick mid-fuselage. Thus rendered ineffective, the tailplane became useless, causing the aircraft to tumble out of control. They were, in fact, two separate problems – but the incidents of April 1943 indicated a third factor, apart from flameout and trouble with the incidence adjustment mechanism, that could cause serious problems in the future. Neither event did anything to cloud Späte's positive judgement on the type.

In the meantime, the fourth prototype had been completed and was in the final stages of preparation for its first flight. Begun in August 1940, the V4 was in the final assembly stage by February 1942. It received two Jumo 004A engines, with



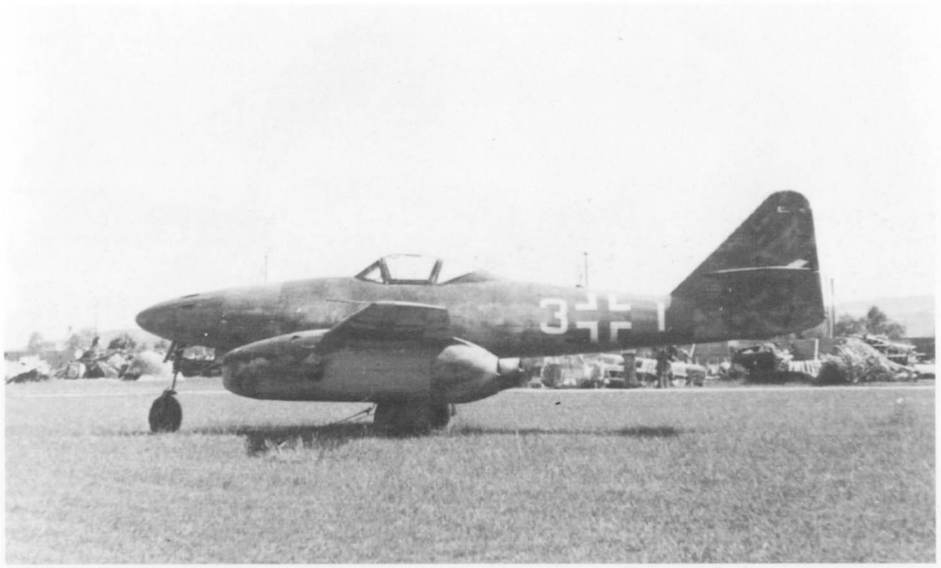
Intelligence information about the new jets was slow in coming to the Allies but, late in the day, several aircraft fell into neutral hands. Flown by Hans-Guido Mutke, this Me 262A-1b from *JG 7* landed in Switzerland on 25 April 1945.

which it was equipped when it took to the air at Augsburg for the first time on 15 May 1943, bearing the identifying code letters PC + UD and piloted by Fritz Wendel. The aircraft was delivered to Lechfeld for integration into the test programme. V4 was the last of the prototypes to be fitted with conventional landing gear. From V5 onward the aircraft were fitted with pilot-friendly tricycle gear, which greatly improved forward visibility during taxiing, simplifying both takeoff and landing.

Enter Galland

Mightily impressed with the aircraft after flying it twice in April, *Hptmn* Späte reported to Adolf Galland, *General der Jagdflieger* (General of Fighter Pilots), that the Me 262 was a radical improvement on existing fighter designs and would be a great asset to operational Luftwaffe units in the field. Galland had known about the Me 262 programme for about a year, receiving information about this and other development programmes a few months after he took over as head of fighter forces from Werner Mölders (who was killed in a flying accident while hurrying to Udet's funeral in November 1941). It was Galland's job to organize the way in which the fighter forces in the various *Luftflotten* operated, and to make recommendations on equipment and aircraft types. Milch also agreed that the type should receive increased evaluation from service pilots, who would critically assess it dispassionately and without prejudice.

Probably more conservative in outlook than many of his contemporaries, Galland was not averse to new technology, but distrusted the 'buy new' mentality and resisted any temptation to be seduced by technology and advanced design concepts. He would recommend the abandonment of several types hailed by industry as 'wonder-weapons' to win the war, and would instead advocate consolidation around a few proven types. But Galland had his mind on other things when Späte made his two flights in V3: he was in the



Retained and closely examined by the Swiss authorities, Mutke's jet (werke/nr 500071) became the subject of a detailed report on the type. Eventually, on 30 August 1957, it was handed back to the Germans; it now resides in the Deutsches Museum.

Mediterranean, organizing the Luftwaffe's evacuation from Tunisia. When he returned he found a message from Erhard Milch ordering him to Lechfeld, where he was to try the Me 262 for himself. All he had heard about the top-secret project could not have prepared him for what he saw when he arrived on the morning of 22 May. The gleaming metallic shape of the sleek jet was striking. Galland was briefed for ten minutes on the vagaries of its operation before he climbed into V3, which had been specially prepared for him and given a nine-minute test flight.

Unschooled in the dynamics of reaction thrust, Galland wanted to know the equivalent horsepower of the combined thrust from the two Jumo 004A engines. Slide rules and pencils quickly provided the answer: almost 70,000hp! Suitably impressed and eager to test it for himself, Galland climbed into the cockpit and went through preliminary checks. The first engine started with a crackle which progressed to a comforting roar, but when technicians started the second engine it burst into flames, as a tongue of fire licked from the exhaust and ignited pools of fuel. Quickly getting out of the cockpit, with energetic encouragement from the ground crew, the unruffled Galland was led to the second aircraft, the V4 prototype, in which he conducted his first jet flight. Taxiing out to the runway, the view forward was obscured by the high, extended nose, and along the runway he strained to keep the aircraft straight. Within minutes he was racing along the runway, passed the line which indicated where to dab the brakes, and took off.

Within a matter of minutes Galland had the feel of the aircraft with sufficient confidence to put the jet through its paces in a simulation of the role for which it was designed. In the distance he spotted another Messerschmitt aircraft on test that day, the first prototype of the giant Me 264 intercontinental bomber designed to strike at New York and return to Germany without landing. First flown in December 1942, the four-engined Me 264 V1 provided exactly the right kind of target. Galland aimed the Me 262 and made a high-speed pass, albeit with due awareness that in attempting to demonstrate its true potential he might write off an important national asset. It proved to him that the jet fighter was indeed an admirable interceptor! Totally focused on organizing, and personally committed to expanding, the fighter forces he led, Galland was an instant convert, sold completely on getting the jet into operational service as quickly as possible. Of his first experience in the air at the throttles of a jet aircraft, he would say it was 'as if angels were pushing me', and declare it the 'greatest day of my life'.

Galland's report

Three days after his flight, Galland wrote to Erhard Milch to report that, as ordered, he had flown the aircraft at Lechfeld 'in the presence of several gentlemen of the Air Ministry'. In fact, he had met the test pilots and been given a personal introduction to the aircraft by Willi Messerschmitt himself. He then gave his impressions of the aircraft in four specific points:

1. The aircraft is a big gain which will guarantee us an unbelievable advantage during operations, presuming the enemy (will) continue flying with piston-engined aircraft.
2. From the pilot's point of view, the flight performance of the aircraft produces quite an impression.
3. The engines convince the pilot, except in takeoffs and landings.
4. The aircraft will give us revolutionary new tactical opportunities.

Galland had been impressed with the smoothness of the flight and lack of torque, the obvious advantage in not having a propeller thrashing around in the line of fire, and in the way the aircraft could dart in and out of the radius of defensive fire from a bomber's guns. Speed was the key to the aircraft's advantage, and it was clearly a generation ahead of anything flown by the enemy. In supporting the aircraft, Galland asked Milch to consider the following:

> We do have the Fw 190D under development, which can be considered nearly equal to the Me 209 in its performance. Both aircraft types, however, will not be able to considerably surpass hostile aircraft, certainly not at high altitude. It can only be taken for granted that with regard to the armament and the speed, further progress can be achieved. Therefore I do suggest: a) to stop Me 209 production; b) to concentrate total fighter production capacity on Fw 190s with BMW 801, DB 603 or Jumo 213 engines; c) to have those development – and production – capacities that will become available then immediately transferred to the Me 262 programme.

For all his enthusiasm, Galland was well aware that the aircraft was not yet in a fit state for volume production and service use, while the imprecise way the engines sometimes performed gave him cause for

A combat-ready Me 262 is towed to the flight line.

concern. By the time Galland flew the V4 and Milch received his report, the aircraft had been formally documented in 'Project Submission IV', which identified the way in which it could be put into series production as both a fighter and a fighter-bomber. Essentially, in the plan mooted on 25 March and presented to the RLM, Althoff, Degel and Voigt incorporated strong recommendations for reconnaissance and bomber variants. This plan formed the basis for a production decision and a commitment to variant development, based on the Messerschmitt figures. The competing projects for a production decision included the Me 209, referred to in Galland's report, and advanced derivative versions of the Fw 190.

The Me 209 fighter candidate evolved from the aircraft built by Messerschmitt as a contender for the world air speed record in 1939. Ostensibly a Bf 109, but actually a specially built aircraft with no direct resemblance to the famous fighter, it was

At Lager Lechfeld airfield, a Me 262A-1a of *III./EJG 2* in pre-takeoff checks. Commanded first by Hptmn Georg-Peter Eder and led by pilots from the experimental *Ekdo 262*, this training unit inducted pilots to the new age of jet air combat.

Crucial to the introduction of the Me 262 to combat service, General der Jagdflieger Adolf Galland was an early convert to the tremendous potential in this aircraft.

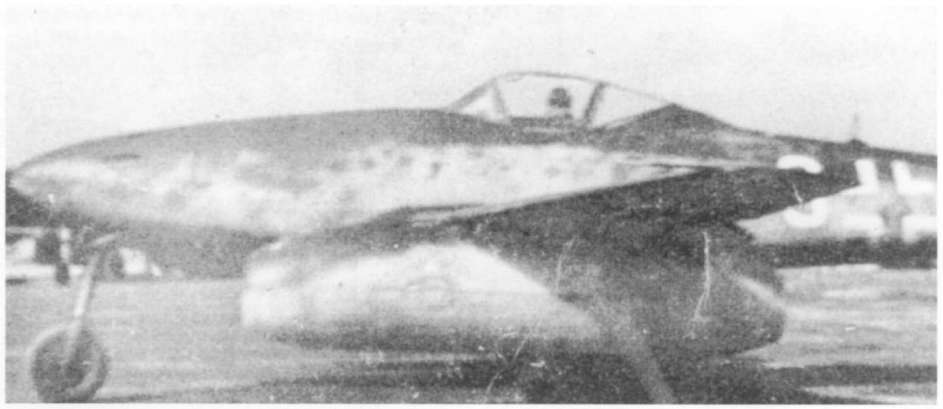
the product of a propaganda exercise. When Messerschmitt determined to provide a successor to the Bf 109, they received permission to transfer the Me 209 designation to the new project. It was not a successful concept, however, and Galland argued long and hard to have it abandoned. The Me 262 gave him just the leverage to extend that argument.

On 28 March, just three days after Galland's report reached Milch, the RLM decided upon the standard specification for the first 100 production series aircraft. The pace of preparations for full-scale production began to quicken. At a special *Generalluftzeugmeister-Besprechung* (Chief of Procurement and Supply Conference) held on 2 June, it was agreed to release the design and to authorize series production. But the worsening materials and supply situation, and increasing demands upon the overall munitions industry, would delay full-scale production for ten crucial months, and not until June 1944 would the Jumo 004 engine enter the production line. Nevertheless, on the day full-scale production was ordered, *Oberst* (Colonel) Hans Henning von Barsewich, *General der Aufklärungsflieger* (Inspector General of the Reconnaissance Arm) asked Messerschmitt to produce engineering drawings for the reconnaissance version of the Me 262. But there was still much development work to be done, for which other aircraft were pressed into service.

Further development

Development of the ejection seat went ahead despite continual postponements in its introduction to the planned Me 262 production line. For tests on ejection seat design, the Me 309 V3 was drafted into the programme. To evaluate the new tricycle landing gear arrangement, a Bf 109 test aircraft, V23, was taken from the Me 309 development programme and adapted for the purpose. On 6 June the fifth prototype, the V5, bearing the identity code PC + UE, took off for the first time, powered by two Jumo 004A-0 engines. As the first Me 262 prototype to be equipped with a tricycle undercarriage, the aircraft pioneered the definitive arrangement for production aircraft. The nose leg was not retractable on the V5, and initial tests carried out by Karl Bauer were disappointing, in that it took as great a length of runway to get the aircraft airborne as it had with conventional landing gear.

To assist with takeoff the V5 was fitted with two solid propellant Borsig RI-502 rockets, providing a thrust of 1,100lb (500kg) for six seconds. They were attached beneath the fuselage on either side of the centreline, immediately aft of the centre of gravity. When they ignited at a speed of 100mph (160km/h), the aircraft's nose lifted immediately, and



Although of poor quality, this photograph is reputed to show General Galland taxying the Me 262.

Bauer had to force it down until flying speed was reached. Even at that point the V5 wanted to leap nose-high, so corrections were made in later tests by moving the rocket thrust line downward, reducing the takeoff run by 800ft (240m). Later, when rocket motors of 2,205lb (1,000kg) thrust were attached, the Me 262 could get airborne within 1,320ft (400m). The V5 prototype had a relatively short life as a test bed for Me 262 development. On 4 August 1943, while taxiing at Lechfeld after its seventy-fourth flight, the nose wheel leg failed causing such extensive nose damage that the aircraft did not return to flight status until January 1944. Shortly thereafter, on 1 February 1944, with Werner Thierfelder at the controls, V5 crash-landed at Lechfeld when a tyre blew. The aircraft was not repaired before the end of the war.

Throughout the latter part of 1942 and the first half of 1943 strenuous efforts were made to develop a pressurized suit for high-altitude flights in the Me 262. At the behest of *E-Stelle*, Messerschmitt supported work on a suit that was tested by Gerd Lindner on 12 June 1943, when he found it completely unsuitable for stratospheric flight. Looking for all the world like the space suit from a Hollywood 'B' movie, it was made of thick rubber and consisted of an upper torso section with a neck ring, connected by a zipper to the integral trousers and boots. Heavy and unwieldy, it severely restricted the pilot's ability to fly the aircraft: Lindner likened it to a 'medieval torture rack'.

By mid-1943, when the suit was tested, the V1 prototype was back in the flight test programme, having been re-equipped with Jumo 004 turbojets. Since it had been decided to equip this aircraft with a pressurized cockpit for high altitude tests, the suit was abandoned. *E-Stelle* wanted information about the high altitude performance of the Junkers engines and thus was concerned about the lack of progress of suit development. The V1 prototype was successfully modified by 19 July, and completed its first flight with two Jumo 004A engines, carrying three MG 151 cannon in the nose.

During the summer Junkers completed the first Jumo 004B-0 pre-production engines and delivered them to Messerschmitt for flight evaluation. The B-series engines delivered 1,980lb (900kg) of thrust and weighed 200lb (90kg) less than the A-series. Moreover, refinements in the design of the nacelles introduced a new low-drag shape which was applied to the V6 prototype, the first in the pre-production series, along with the addition of external elevator balances. Gun ports were fitted, but no armament was carried. The most notable feature of this aircraft was a fully retractable, hydraulically-operated, tricycle landing gear (the nose leg on the V5 was not retractable) which had an extension strut operated by compressed air. The main landing legs were lowered by gravity and had no uplock system, the wheels resting on the closed doors.

While all this was going on, and the V6 was being prepared for its first flight, senior Luftwaffe officials began to give the Me 262 programme serious attention. On 25 July 1943, test pilot Gerd Lindner gave a demonstration of the aircraft's performance to *Reichsmarschall* Hermann Goering, who had received a verbal account of what the aircraft was like to fly from Adolf Galland on 26 May, the day after Galland submitted his report to Milch. The flight demonstration with the V4 prototype took place at Rechlin. Goering was greatly impressed, seeing in it a splendid multi-role aircraft and one he knew would equally impress the Führer. Goering's credibility had been slipping of late and the fatuous head of Germany's Luftwaffe thought to win back favoured status from Hitler by pulling an ace from the pack.

Next day, Lindner was flying the V4 back to Lager Lechfeld when he crashed while attempting a landing at Schkeuditz en route. The aircraft suffered 60 per cent damage and was written off, but Lindner escaped without injury. Just nine days later, on 4 August, the V5 prototype suffered its taxiing accident at Lechfeld. Now there were only two Me 262s in the programme. It would be more than two months before V6 joined them, but much valuable work was done in that period. On 11 August the V1 was fitted with the leading edge wing fillet, giving it the same constant sweep from root to tip. In extensive flight tests carried out during the summer and autumn, the aircraft displayed, like the V2 before it, greatly improved landing, takeoff and low-speed handling characteristics. By the end of the month the Messerschmitt team felt they had enough information to prepare a definitive list of aircraft variants which could, with little engineering difficulty, be developed for operational use. At the same time, the full engineering specification and detailed drawing sets for the production fighter, the Me 262A-1, were completed.

The project specification

Dated 11 September 1943, the project specification was one of the more important documents in the towering piles of paperwork associated with the Me 262. It provided a full range of possible variants, proposing roles and operational duties above and beyond those envisaged in 1938, when the RLM involved the company in *Projekt 1065*. There is no more convincing evidence for the pro-active way the company wanted the aircraft developed for a wide range of roles than this specification – which predates any significant comment from Adolf Hitler about the way the Me 262 should be used. All versions were to be fitted with a pair of Jumo 004C turbojet engines. Two reconnaissance versions

The Allied Adversary

While the Me 262 was in its final development and production stages, there was only one credible opponent for the German jet. This was Britain's Gloster Meteor, which was in some ways superior to the Axis fighter. Originally named Thunderbolt, the Gloster Meteor was designed to specification F.9/40, which consisted of an order from the Ministry of Aircraft Production for 12 'Gloster-Whittle aeroplanes'. Issued on 7 February 1941, the order came more than three months before the first flight of Britain's first jet aircraft, the Gloster E.28/39, and included a production option for sufficient jigs and tools to support a production run of eighty aircraft per month. Tardy in the formative stages, government support for British jet-propelled military aircraft became robust when the idea that a new age of air power was about to dawn finally penetrated. In contrast to the lumbering decision-making and flawed resource and production process in Germany, Britain seized the opportunity to give the RAF a completely new capability.

Work on jet projects at Gloster really began through the personal friendship of Frank Whittle and George Carter, who in 1937 joined the firm as its chief designer. From the outset, Carter's design team adopted a different approach to that pursued by the Messerschmitt company. They began with a clean slate, with orders to use the Whittle W.2 engine, developed from the W.1 built for the E.28/39, designed by Power Jets and built by Rover. Like its German counterpart, the Meteor suffered from prolonged engine development processes, exacerbated by interference from a government reluctant to allow Power Jets to grow as an independent engine producer. As soon as jet engines were accepted as the propulsion units of the future, the existing engine builders sought control over the manufacturing end, if not the design as well, and when Rover was contracted to build the new engine this added complexity and separated authority over final design. Rover interfered with the Power Jets design and made modifications from which the engine emerged as the W.2B. Not until June 1942 did Gloster receive engines and then only for ground running purposes.

Personal animosity, pique, and an inability on the part of Rover to get on with Frank Whittle and Power Jets was responsible for a delay of at least one year in development of the W.2B. At last, Rolls Royce cut a deal with Rover over lunch at a hotel in Clitheroe in November, 1942, giving Rover the tank engine plant at Nottingham in return for the jet engine work with Power Jets. In December the engine, by now designated W.2B/23, had clocked only twenty four hours' running time; one month later, in the hands of Rolls Royce, it reached 400 hours' bench time. With Whittle's concurrence, the 1,600lb (725kg) thrust engine became the Rolls Royce B.23; later, in production, the Welland 1. In the meantime, so worrying had been the problems with Rover and the W.2B that the Ministry of Aircraft Production had turned to an alternative powerplant from De Havilland. Called the H.1, later known as Goblin, the engine was of the conservative centrifugal type, with a high design specification of 3,000lb (1,360kg) thrust.

Development of the H.1 had begun in January 1941, when Sir Henry Tizard asked De Havilland to design a fighter and a jet engine to power it. The fighter would become the Vampire. Named after its designer, Frank B. Halford, the H.1 began bench tests on 13 April 1942 and demonstrated a 3,010lb (1,365kg) thrust level in June. It was the first British jet engine ordered into production, and it was with the H.1 powerplant that the first Meteor, the fifth prototype, took to the air on 5 March 1943. In addition to Power Jets, Rolls Royce and De Havilland, there was another company in the business of turbojet engines: Metrovick (Metropolitan Vickers Electrical Company), which had been developing its F.2 axial turbojet since July 1940. The first bench run took place in December 1941, and it was with two of these 1,800lb (815kg) thrust engines that the third Meteor prototype took to the air on 13 November 1943, as the first axial turbojet engines to fly outside Germany. The first W.2B-powered Meteor flew for the first time in the fourth prototype on 12 June 1943, and it was an engine of this generic design, producing 1,700lb (770kg) thrust, that would power the F.1.

Early marks of Meteor had a maximum speed of 415mph (667km/h) at 10,000ft (3,050m) and a climb time of fifteen minutes to 30,000ft (9,150m). It was this type that entered service with RAF's No. 616 Sqdn in July 1944. Later, post-war versions of the aircraft would benefit from the 3,500lb (1,590kg) thrust Rolls Royce Derwent, providing a top speed of 580mph (930km/h) at 10,000ft (3,050m). It was in the Meteor of this type that the RAF High-Speed Flight achieved a world speed record of 606mph (975km/h) on 7 November 1945, and raised this to 616mph (991km/h) on 7 September 1946. Compared to the Jumo 004, even the W.2B was superior in operation and servicing, providing less trouble for the pilot and significantly fewer problems for maintenance staff. Overall, however, had it not been for the intervention of Rolls Royce in taking over the engine development programme at the end of 1942 it is doubtful that the Meteor would have become operational with the RAF before the end of the war.

For its part, De Havilland did well with the Vampire and its remarkable Goblin engine. With a flight rated thrust level of 2,700lb (1,225kg), a single Goblin powered the prototype Vampire on its first flight on 20 September 1943. Later versions of the same engine would produce 3,100lb (1,405kg) thrust for the initial production version of the aircraft when it joined RAF No. 247 Sqdn in April 1946 as Britain's second operational jet fighter. Its design provided the ancestral configuration for derivatives and developments culminating in the Sea Vixen, powered by two 10,000lb (4,540kg) thrust Rolls Royce Avons, that would remain in service with the Fleet Air Arm until 1974. The Goblin has two other footnotes in history: an early Goblin powered the prototype Lockheed P-80 Shooting Star on its first flight on 8 January 1944, and a derivative of the Goblin, the 5,000lb (2,270kg) thrust Ghost engine, was the first turbojet to receive certification for civil aviation when it was selected to power the Comet airliner.

With Willy Messerschmitt to his left, Galland enthuses over the performance of the Me 262 during an August 1943 visit to check progress with development and test.

were proposed, one with two RB 75/30 cameras and a second with two RB 75/30 and one RM30/30. High-Speed Bomber I, the first of two optional bombers, would have provision for one 2,220lb (1,000kg) bomb or two 1,100lb (500kg) bombs. High-Speed bomber II would carry a similar load, but have different internal equipment.

Three interceptor versions were proposed. Interceptor I would carry six 30mm MK 108 Rheinmetall-Borsig cannon, and have supplementary power from one HWK RII/211 rocket motor. Interceptor II would be fitted with two BMW 003R engines, while Interceptor III would be powered by two HWK RII/211 rocket motors; both would carry six MK 108 cannon. Finally, a two-seat training aircraft would be powered by a pair of Jumo 004C or 004B-2 engines, and carry two or four cannon. On 3 August 1943, in what amounts to the birth of the world's first jet trainer, Degel and Althoff defined the specification for the two-seat trainer and instructed the design bureau to begin work on its detailed design.

This was an important time for jet aircraft development internationally. In Britain the Gloster Meteor had begun flight trials and the De Havilland DH 100 Vampire was about to make its first flight. In America the Bell XP-59A had already begun flight trials, while Lockheed was designing the prototype P-80 Shooting Star. Three of the four Allied jet fighters in development would be in service by 1946.

On 20 September 1943, the day that Geoffrey de Havilland, Jr, son of the British aeroplane builder, flew the Vampire for the first time, Gerd Lindner in the V3 achieved a speed of 596mph (960km/h) at an altitude of 16,400ft (5,000m) during a flight test over Lager Lechfeld. Four weeks later, on 17 October, Lindner took the V6 prototype (VI + AA) into the air for the first time from Lechfeld, its Jumo 004B-0 engines performing well. But not everything went as, or better than, planned. On 23 October the Me 323 prototype assigned to drop the Me 262 fuselage dedicated to flutter tests once again released its load, this time over Lake Constance. Again the recovery system failed: the shattered remains of the structure sank to the bottom, where, presumably, they rest today.

Hitler becomes involved

The late months of 1943 saw increasing interest in the jet aircraft by the Nazi hierarchy – and the plans made for acceptance of the Me 262 were to backfire on Messerschmitt. Throughout Germany it was known as a company that had an unusually high investment in future projects. This rankled senior Nazis: Dr Goebbels, minister for propaganda, once remarked that there were more people working in the design bureau than in the assembly shops. At the beginning of the year Goebbels had ranted and raged before a packed audience at the Sportpalast in

Surrounded by officials from the German Air Ministry and the Messerschmitt test facility, Galland gathers opinion on pre-deployment activity. Crucial to convincing munitions minister Albert Speer that the aircraft should take priority, Galland cleared barriers for service introduction.

An in-flight shot showing the Me 262A-1a piloted by Hans Fay used for company work. Bearing *werke/nr* 111711, it was subsequently used by the Americans for flight trials and performance analysis.

Berlin, asking 'Do you want total war?', and received a deafening affirmation that they did. The call had gone out throughout Germany, and as the Allied air offensive grew and American air forces became ever larger, German industry rallied and made remarkable progress in expanding production while retaining its development and design offices.

Personally committed to the Nazi cause, Willi Messerschmitt had made a radio broadcast to the German people on 5 February, proclaiming the work ethic: 'We all serve a cause which is greater than is visible in our work. Even if we have to think in the first instance of the needs of the moment, something nobler always accompanies us: the belief in an eternal Germany, which remains the ultimate meaning of our labour.' Yet for all such commitment, many people were concerned that Messerschmitt was forever seeking bigger and bolder challenges, and feared that he had lost the ability to balance the needs of large-scale production with those of research and development. This patently was not the case, as witness the astonishing expansion in the production of conventional aircraft and the commitment to getting them into service, but it was nevertheless a perception that worked against the company – and one that Reichsmarschall Goering himself was only too keen to foster.

On 18 March 1943, in the wake of increased air raids and the expanding role of US air power, leading aviation industrialists and senior Luftwaffe generals were summoned to Goering's magnificent estate at Karinhall, north of Berlin. Goering, who was being blamed by Hitler for the increased air raids, railed at his guests in an abusive, insulting speech lasting five hours. Industry, he roared, was to blame for not producing enough aircraft; manufacturers had not come up with the right designs for the Luftwaffe; the Air Ministry had mismanaged resources and had blatantly ignored his orders. Nothing, it seemed, was his fault: as Hitler was to claim just before he put a gun to his head more than two years later, everyone around him – the nation itself – had let him down. What little influence Goering still had with Hitler had been used to turn the Führer against the manufacturers and against their supporters within the Luftwaffe. It was yet another example of Hitler doing as he was told by way of suggestion, while claiming it as his own inspiration.

However, concerned at the way the Luftwaffe was being led, Hitler called a meeting with the leading aviation manufacturers: Messerschmitt, Heinkel, Dornier, Focke-Wulf, Arado, Henschel, Blohm und Voss and Junkers. They met on 27 June at his mountain retreat on the Obersalzberg and one by one were given an audience with Hitler. During these confidential meetings they were asked to speak frankly about their concerns and about the way their work had been controlled through RLM and Luftwaffe channels. It was one of the rare opportunities that Hitler allowed for full and frank discussion to air grievances and expose improper use of authority. It took place at a time when Hitler was free of the increasing mental

Designated as the replacement V5 prototype when the first was written off in February 1944, V 167 made more than 300 flights on stability tests and the aircraft was eventually used for trials with a new landing gear yoke.

Pulse-Jet Sprinter

One of the more bizarre applications of jet power to German aircraft designs during World War II came from the Messerschmitt company when, in July 1941, it conducted a series of design studies for an air-launched parasite fighter. Under *Projekt 1079*, the studies examined the possibility of using Argus pulse-jet power units of the type being developed for the Fi-103 flying bomb (or V1 as it would come to be known). This was the first application of such units to manned aircraft. Work was carried out in collaboration with the *Deutschen Forschungsinstitut für Segelflug* (DFS) to produce a proposal for the RLM-designated *Projekt 1079/17*. In early 1942 it was given the type designation Me 328, and mission concepts began to evolve around the use of a tiny aircraft towed behind a larger aircraft, whence it would detach for fighter escort duty. It was designed for a one-way mission: the pilot was expected to escape by parachute, or he might glide the aircraft back into friendly territory.

The Argus-Motoren-Gesellschaft began development work on pulse jets in 1939 at the request of the RLM. Early conceptual work on the pulse jet had been conducted in Germany by Paul Schmidt, a fluid dynamicist, who in 1928 worked up the technical requirements for such a motor. Six years later he proposed a vertical-takeoff aircraft powered by pulse-jets, but the idea was rejected. When Schmidt applied his idea to the concept of a pilotless flying bomb, however, he was encouraged by the RLM and by other notable scientists and engineers, including Walter Dornberger and Wernher von Braun. By 1940 he had produced working pulse jets producing up to 1,100lb (500kg) of thrust; within two years these had been stretched to produce a thrust of 1,650lb (750kg). Schmidt was left on the margin in his research and development work, and it was Argus that took the idea and transformed it into a working motor for the Fi 103. The Argus As 014 engine was selected for the Me 328.

The basic idea was to have the aircraft towed by a solid bar, or *Deichselschapp*, behind a He 177 or Me 264 heavy bomber, and then released to do combat. On 31 March 1942, Messerschmitt presented the RLM with no fewer than six versions of the aircraft, providing a variety of roles from interceptor to dive bomber, the latter purporting to be capable of carrying a 3,086lb (1,400kg) SD 1400 bomb. By the beginning of 1943, when the Reich was under increasing threat, ideas that would hitherto have been weeded out suddenly seemed to offer a solution to the expanding air menace. The Luftwaffe envisaged the use of the Me 328 in coastal defence, for high-speed, short-range intercepts and as emergency fighters launched on warning of attack by Allied aircraft. It was the looming threat of Allied invasion forces landing on the Atlantic coast of continental Europe that stimulated the RLM into action.

In March 1943 development got under way in earnest, and three prototypes were constructed at the DFS works, with wooden wings and steel fuselage sections supporting standard Bf 109 tailplanes. Messerschmitt worked up a production programme that would require only 4,500 man-hours per aircraft. Built entirely of wood, the definitive Me 328 was required to be available in large numbers and at relatively low cost – for it would fly only one sortie! The Augsburg wind tunnel was used to conduct aerodynamic tests and for analysis of optimum siting for the Argus pulse jets. Early flight trials with prototypes used 660lb (300kg) thrust motors attached to aircraft towed into the air behind a Dornier Do 217E. When tests began in early 1944 the Me 328A fighter version had been abandoned in favour of the Me 328B high-speed bomber.

With a length of 22ft 5in (6.83m) and a wing span of 28ft 2in (8.58m), the Me 328B was to have been powered by two 660lb (300kg) thrust Argus As 014 jets, providing a maximum dive speed of 434mph (698km/h), or 330mph (530km/h) with a 2,205lb (1,000kg) bomb. Throughout the first half of 1944 tests went ahead, but the difficulties of using pulse-jet propulsion for high-speed missions were insoluble, so the project metamorphozed into a piloted glider missile. Carried to the vicinity of the target by another aircraft, the Me 328 would be released and dive toward its objective at a maximum speed of 445mph (716km/h). The pilot was supposed to bale out at the last moment. The entire concept was abandoned late in the year, no doubt to the relief of candidate pilots, when conventional high-capacity bombs carried by specially-adapted Fw 190 types were considered a better prospect for success.

and physical disabilities that by mid-1944 would render him clinically insane. At this time he suspected that plots were being made, and hoped to uncover them by listening to the industrialists without the intimidating presences of Goering or Milch.

When Willi Messerschmitt had his meeting with Hitler he spent a full hour describing to the Führer his concern about decisions made in the preceding month concerning the range of his aircraft designs and also production quota planning, which assigned orders for both conventional and jet aircraft. After flying the Me 262 on 22 May, Galland had telephoned Milch from Lechfeld to proclaim how remarkable was the aircraft he had just flown. Along with the suggestion that the Me 209 should be abandoned, he recommended that the Bf 109 and Fw 190 should receive no greater priority than they had at present. This would, said Galland, leave the way clear in 1944 for large-scale production from the Me 262 line. On the day Galland sent Milch his typed report (25 May; quoted earlier) Goering consented to that move; the *Generalluftzeugmeister-Besprechung* of 2 June, making the commitment to series production of the Me 262, resulted from that decision. Implicit within the planning and production decision was a switch away from the Bf 109, and it was this that Messerschmitt complained about.

Hitler was sympathetic to Messerschmitt, and in early August decided that work on the Me 209 should continue as a hedge against slow service introduction of the Me 262. This was, in reality, unrealistic: it underlines the way in which Hitler was increasingly unable to tackle complex and pressing problems in weapons development and production. The fall of Stalingrad in January 1943 and the loss of North Africa in May had a profound and lasting effect on Hitler. He now suffered from a tremor in the left arm and leg and dragged his foot when walking; his skin

Of weak design, the forward landing gear leg was prone to collapse and many aircraft were lost as a result of a heavy slap-down on landing, some aircraft cartwheeling when taking off from rutted runways.

became pale and blotchy and his spinal scoliosis became more pronounced. At some time during the late spring or summer he had a mild heart attack, and it was in this period that he became chronically addicted to morphine, administered by his physician Dr Theodor Morell. It is against this background that Hitler's decisions and judgements should be assessed. Moreover, having rashly assumed the mantle of total responsibility for the overall direction of land, sea and air forces, he was beset by conflicting lobbies.

Operation 'Juggler'

Even as the above decisions were being made, another event was gestating that would shake the entire German aircraft industry and restructure the evolution of the Me 262 programme during the twenty months remaining in the European war. Added to Hitler's worsening medical condition and his inability to handle complex problems, it was to prove decisive in the role and deployment of the jet aircraft – and it was dictated by the Americans. The event was Operation 'Juggler', involving a very heavy air raid on the giant Messerschmitt aircraft production and assembly plants at Regensburg and Wiener Neustadt. The decision to make a devastating Anglo-American air offensive against Germany had been made when Churchill and Roosevelt met at Casablanca in January 1943. It was to be an unrestrained assault on Germany in an attempt to batter the country to its knees prior to an Allied invasion of the Continent.

Early in 1943 raids had been stepped up on factories and production facilities in north and west Germany. But 48 per cent of all fighters were built in the Regensburg-

The oleo function of the landing gear was changed when aircraft were adapted for bomb-carrying purposes and greater stress was placed on an already marginal design. Several changes were made as a result of increased loads to bomber and two-seat trainer and night fighter variants.

Intelligence Gathering

Intelligence about the development of jet propulsion in Germany during 1943 and 1944 was scanty and frequently wide of the mark. The British and American intelligence services had several means of gathering information on jet engines and jet-powered aircraft. They carried out extensive photo-reconnaissance surveys of known test stations such as Rechlin, and of the dedicated airfields of the major manufacturers; they intercepted and deciphered coded radio messages; they received vital information from partisans and sympathizers in occupied Europe; and they had agents in Germany who spied on secret installations and aircraft manufacturers.

It is a tribute to the effectiveness of German secrecy that very little information about jet propulsion projects and other weapon systems leaked before the operational deployment of the Me 262. Since the first Allied photo-reconnaissance shots of the He 280, spotted at Heinkel's Rostock factory in May 1942, several separate leads had focused attention on jet and rocket aircraft programmes. The first comprehensive report on German developments in these fields was completed on 19 July 1943 by the Air Intelligence (AI) Branch of the Air Ministry. Most intelligence appeared to indicate that jet research was ahead of rocket research, and that Heinkel was the primary manufacturer for the new weapons the Allies expected to encounter in the air. Moreover, when a PR aircraft took pictures of the Peenemünde Baltic research station, showing four Me 163 rocket aircraft in the open, they were identified as pilotless jet-propelled types.

The British Air Attaché in Berne was able to report that the He 280 was powered by two BMW 003 turbojets. One of the more intriguing reports came from a prisoner-of-war (POW) who reported a lecture given by Galland at Caen toward the end of May 1943. In this it was stated that jet fighters would be in mass production by 1944 and that Germany had in development a rocket-propelled flying wing. This caused confusion in interpretation of the Peenemünde picture; more puzzlement was caused by further quotes from Galland's lecture, in which he mentioned a rocket-powered bomber capable of reaching New York. Subsequently, this was interpreted as referring to the jet-powered Junkers Ju 287, then being built as a long-range heavy bomber with up to six 1,760lb (800kg) BMW 003A-1 turbojets.

It was the Air Attaché in Berne, however, who gave word of the Me 262 in May 1943, reporting on its powerplant and speed. Two months later, a POW confirmed the existence of the aircraft, reporting that it had flown at 600mph (965km/h) and that it was being developed at the Messerschmitt works at Augsburg. Only then did AI link the He 280 and Me 262 as parallel developments. What AI did not know was that the former had, by that time, been dropped in favour of the latter. But Air Intelligence came to valid conclusions when its report concluded that at least one type of jet-powered fighter would enter operational service with the Luftwaffe during 1944. It was this prediction, in the report of 19 July 1943, that caused the British Cabinet severe concern and encouraged a speed-up in the development of jet-engine work in general and the Gloster Meteor in particular. Churchill now took a personal interest in the jet-engine work: on 6 October 1943 he minuted the Chief of the Air Staff, Air Chief Marshal Sir Charles F. A. Portal, 'Recent evidence shows that the Germans are working hard on jet-propelled aircraft, and accentuates the need for the utmost pressure to be put on their development here.'

Wiener Neustadt facilities, and people there felt relatively safe. They were on the eastern side of Germany, at the limit of range for the heavily-loaded bombers. However, the Americans planned to carry out a massive air raid on the Augsburg area from England, with their aircraft flying on to bases in North Africa, while aircraft from North Africa hit Wiener-Neustadt and returned to their original airfields: a major assault involving combined operations between the US 8th and 9th Air Forces on two continents.

Recognizing that the Germans would probably not be expecting such a massive raid so far from English bases, the Americans decided that the attacks should be made simultaneously to maximize the element of surprise. Attacks on German fighter factories were a priority, for losses among the daylight raiders had been high, since Allied bombers then had no fighter protection in the target area. In the first half of 1943 aircraft losses in the 8th Air Force had risen from 13 per cent of strength to 21 per cent, while crew losses had increased from 21 per cent to a staggering 38 per cent. From the Allied viewpoint, German fighter production was a direct threat to the continuation of the American daylight bomber offensive, and the Germans suspected as much.

The raid was scheduled for 7 August, but poor weather conditions over north-western Europe prevented the aircraft from taking off. Now, instead of a combined operation, it was decided to separate the two raids. The attack on Wiener-Neustadt took place on 13 August, when sixty five B-17s and B-24s of the 9th AF flew 1,200 miles (1,930km) from airfields near Benghazi. It was the first raid on German soil from North Africa. The lead bombers reported no anti-aircraft fire or enemy fighters. During the entire raid only one bomb group reported the presence of a few Bf 109s and Fw 190s, and only two aircraft were lost. Damage to the target was extensive but not as severe as had been hoped. However, production of single-engine fighters at Wiener-Neustadt fell from 270 in July 19 to 184 in August, and by October production had climbed back to only 218.

Between cancelling the combined raid and executing the attack on Regensburg the Allied command made another planning change, combining the assault with a raid on the Schweinfurt ball bearing works. Using special long-range tanks, the bombers would hit the factories and then fly on to North Africa as originally planned. Anticipating a major air battle as the formations of B-17s penetrated deep into German airspace, eighteen squadrons of P-47s and sixteen squadrons of RAF Spitfires, equipped with scarce belly tanks, were to escort the bombers as far as possible, while medium bombers hit

airfields in France and the Low Countries to pin down fighter opposition. Weather permitted the dual raid to take place on 17 August, when 230 B-17s set out for Schweinfurt and 146 B-17s departed for Regensburg, protected by 240 P-47s and almost as many Spitfires. More than 100 B-26s were sent to attack the fighter airfields. Opposition was stiff, intense and continuous.

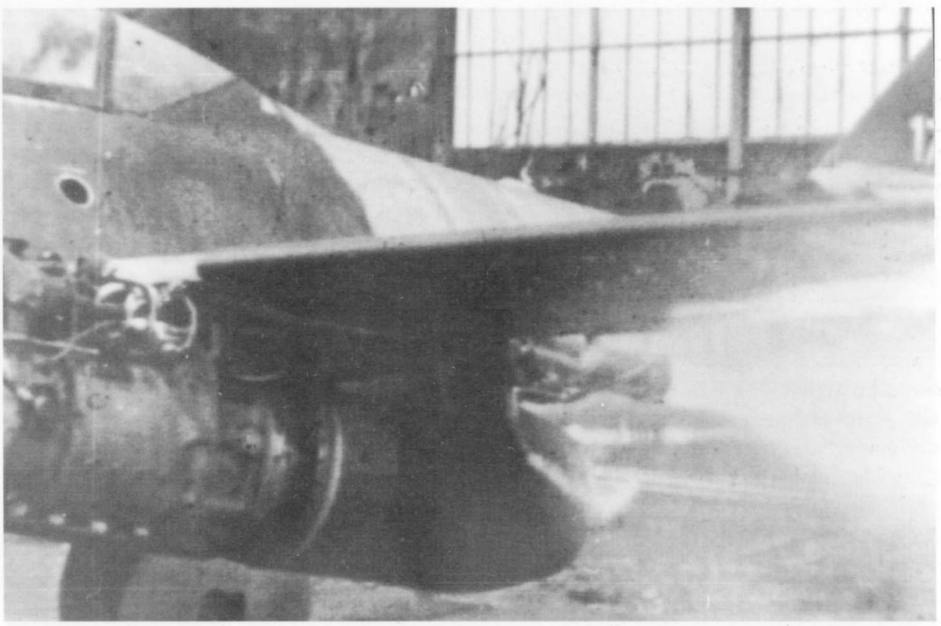
The Luftwaffe fighter forces used every tactic and weapon at their disposal, some units attacking in vertical formations, striking at the bombers' underbellies. Others came in groups, *Rotten* and *Schwärme*, diving vertically on to the B-17s. Even parachute bombs were used in an attempt to disperse the bombers' protective formations. It was the most intensive air battle experienced to date by the 8th Air Force, yet 126 aircraft laid a carpet of high explosive and incendiary bombs from an altitude of 18,000ft (5,500m), damaging every important building in the target area and destroying around 400 aircraft, as well as production plant and equipment. Gone now were the tooling and jigs assembled for the Me 262 production authorized only two months before.

The Regensburg raiders flew across the Alps and over the Mediterranean to land in North Africa. But even as the dust they had raised settled on the devastated factories, the Germans decided to disperse the production lines planned for the new jets to the countryside, in camouflaged assembly areas fed by several hundred separate tool and plant facilities. They could not gamble on the main Augsburg works surviving, for further raids were expected any day. Thus, the operational future of the Me 262 depended entirely upon the dispersal of production. No country's aviation industry had ever attempted such a move, which was unparalleled in its scope and magnitude. Nevertheless, the escalating air raids and the destruction of key German munitions plants infuriated Hitler into making a mistake. In ordering a bombing offensive of his own as reprisal for the Allied attacks, he threw away months of hard work in adopting an idea that he had not originally conceived: that the Me 262 could be more than just a fighter, or even a fighter-bomber, but rather a fully-fledged *Schnellbomber*, a fast, strategic bomber.

Prototype V074 was used for tests with the BMW 003A-1 jet engine incorporating a BMQW 109-718 liquid fuel rocket motor. The hybrid engine combination was to have powered the Me 262C-1b, or *Heimatschutzer II*, interceptor.

The *Schnellbomber* decision

Reacting to the raids, Hitler demanded rapid solutions, communicating his desire to hit back hard at the enemy throughout the Luftwaffe and the aviation industry. Because of this, the bomber fraternity in the Luftwaffe, lately so maligned and relegated to secondary duties, regained their preeminent place in the hierarchy and, in so doing, threatened the position of the fighter arm. Hitler demanded a new and



The combined jet/rocket engine on V074 is fired on tests with a new heat protecting paint applied to the rear fuselage. Acceleration with the hybrid powerplant was a significant improvement and rocket motor tests such as this did much to stimulate post-war interest among the Allies in rocket-propelled fighters.

The effects of air raids which appeared dramatic from high altitude frequently failed to achieve desired results but in their assault on German fighter production, American daylight bombers decimated the factories and forced production to dispersed facilities and underground locations.

devastating attack from the air, to cripple the enemy and destroy his invasion chances. In response to this demand, several manufacturers went to Hitler to offer their products and to suggest new aircraft that would do the job.

On 7 September, Messerschmitt met Hitler and enthused him with talk of advanced versions of the Me 262 fully capable of operating as the *Schnellbomber* he sought. Messerschmitt described the enormous technical lead held by the Me 262 and claimed that in the basic and proven design Hitler already had the bomber he wanted: all he needed to do was order it into production as such. From many discussions with leading fighter and bomber pilots, Messerschmitt knew that Goering traditionally backed the fighter pilots; after all, he had put his protégés Mölders and Galland in the highest positions in the fighter arm. He knew that Goering was falling from favour with Hitler and thus was seeking means by which he could once more ingratiate himself with the Führer. Messerschmitt helped to use these facts in order to win for the Me 262 the support he felt it needed.

Messerschmitt was playing a shrewd game. By appealing to Hitler to back the Me 262 as a bomber he was, at one stroke, protecting his aircraft from cancellation if Hitler demanded priority for bombers and at the same time currying favour with the Führer by seeming to offer him a way out of his dilemma. Messerschmitt who still had a score to settle with Milch, knew that Hitler suspected Goering and Milch of negligence and incompetence. While with Hitler, Messerschmitt also suggested monthly meetings between leading aircraft manufacturers and senior members of the Luftwaffe to discuss development, production and type selection along more cooperative lines. In that way, he said, no one individual could manoeuvre himself into an advantage at the expense of the project – and the State.

Five weeks later, on 14 October, Messerschmitt attended a conference

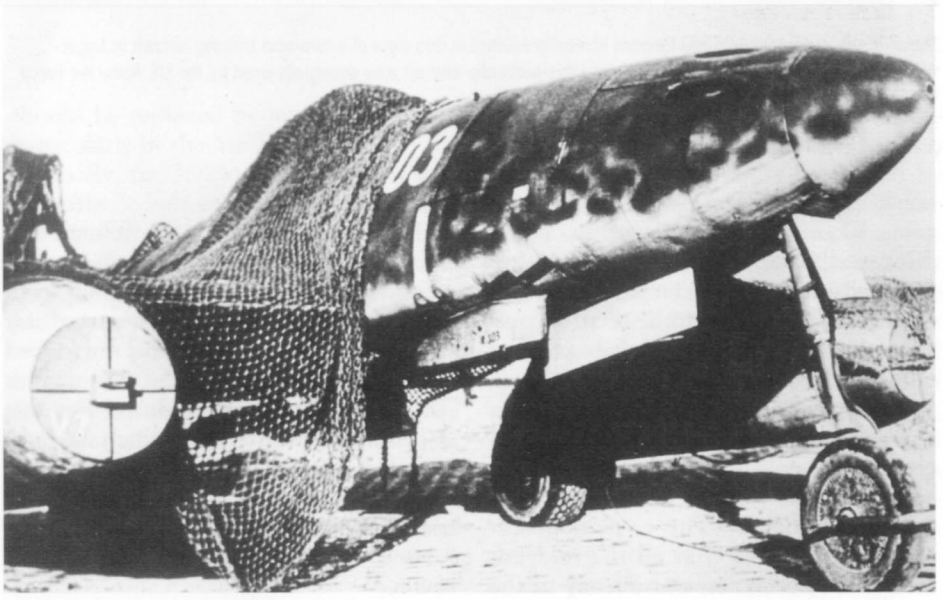
hosted by Goering at Berchtesgaden, where decisions were to be made about a long-range strategic bomber. Goering had picked up on Hitler's rhetorical rantings about reprisal bombing and sought an aircraft that could carry out that task. As a specific reprisal against the Americans, it had to be able to bomb New York. Messerschmitt proposed the giant Me 264 (which was of course designed for that purpose), the aircraft that Galland had buzzed during his first flight in the Me 262 on 22 May. But by this time Hitler had reinstated the Me 209 project and Goering, fearing that three development projects were too much for one company, rejected the Me 264 on the grounds that it would be competing with other work and might suffer as a consequence. But the Me 209 project was short-lived. During November, seeing in the Me 262 a means by which he could cancel the more conventional Me 209, Milch persuaded Goering to rescind Hitler's order for its production.

Hitler, keeping abreast of these developments, saw in Goering's emphasis on a major strategic bomber programme a misdirection of his intentions. Hitler wanted a *Schnellbomber* capable of hitting the invasion hordes he was sure were coming. Messerschmitt's behind-the-scenes manoeuvring had given the Führer ideas about the Me 262 and, without discussing with Goering the briefings he had received from Messerschmitt, he put forward Messerschmitt's arguments as though they were his own. But, notwithstanding the enthusiasm engendered by Messerschmitt and other leading plane-makers, Hitler was cautious about the new jet. This was apparent to Milch and Goering, and they too urged caution about wholesale replacement of conventional fighters with jet-powered Me 262s. There was good reason for concern. The heavy Allied bombing raids were taking their toll of conventional aircraft production, leaving little time and fewer resources for the machinery, tools and jigs needed for the Me 262 production line.

Frustration over the success of Allied bombing, which had at first induced Goering to accuse his fighter pilots of cowardice, now led the *Reichsmarschall* to back expanded fighter production at the cost of bombers. The time when he had abandoned his young fighter pilots in disgust because they had let the bombers through was over. Now he looked more favourably on one of the last remaining groups he could call upon for loyalty and some measure of respect. Lobbied by Galland and other exponents of fighter tactics, Goering now favoured increased fighter output and sided with Messerschmitt when the latter appealed to him for help with getting production under way on the Me 262. Goering went to Hitler who, already successfully sold on the idea, reiterated his desire for a force of fast bombers to conduct reprisal raids on the enemy. Fearing the wrath of his master, Goering resorted to ambiguity: he promised to do what he could to get the Me 262 operational as a defence fighter, while at the same time moving the programme toward production of the bomber version.

Matters came to a head on 2 November 1943, when two important things happened. To help steer the Me 262 through development and into the production phase a special commission was set up under *Oberst* Petersen from the RLM's *Technische Amt*. It was to include Dr Werner from the Industry Council, Dr Frydag from the Council's Main Committee for Airframes, Willi Messerschmitt and three directors from Junkers (Hentzen, Cambels and Franz). In addition, there were five people from the Luftwaffe Engineering Branch and from the *Technische Amt*: *Generalleutnant* Sellschopp, *Generalleutnant* Mahnke, *Oberst* Alpers, *Major* Kneymeyer, and *Hauptmann* Kaufmann. It was an important team which would operate well until the end of the war. The most useful thing it did was to organize the efficient delivery of raw materials, plant and machinery and the distribution of these items to the dispersed production facilities set up during the winter and spring of 1943–44.

The other event of 2 November was a visit by Goering to the Augsburg facilities, where he met the Messerschmitt team and had talks with Milch, Galland and Vorwald, the chief of the *Technische Amt*. Unaware that Messerschmitt had been planning the diversified roles of the Me 262 for two years, and that he had been pressing Hitler to approve its development as a *Schnellbomber* for more than two months, Goering broached the subject of its application as a fighter-bomber as he was walking around the works. Not suspecting that Messerschmitt had engineered the aircraft's diversified role all along, Goering believed he was doing his Führer's bidding. Nonchalantly, as if taken off guard, Messerschmitt told the *Reichsmarschall* that it would be a relatively simple matter to convert the aircraft into a



Camouflage nets on parked test aircraft became increasingly important as the Allied air forces pressed home their remorseless assault on German production centres. Test schedules were frequently modified in efforts to avoid encounters with Allied aircraft. V303 was used for bomb tests.

Detail of the canopy handle and forward screen is evident in this view of a two-seat training aircraft at Lager-Lechfeld airfield. Piloted by Ludwig Hofman, this particular aircraft was eventually used by the US Army Air Force for a series of post-war trials.

bomb-carrier. He was playing a balancing game. Goering himself was an ex-fighter pilot and *General der Jagdflieger* Adolf Galland was in the accompanying group. Goering did not wish to be seen encouraging the Me 262's use as a bomber for fear of losing the support of the fighter lobby.

Goering pressed Messerschmitt further and was told that it would take 'only a couple of weeks' to have a production Me 262A-1a fighter converted to a fighter-bomber. The planemaker reminded Goering that all the relevant technical information was already in the appendixes attached to the construction and assembly plans, for Messerschmitt had insisted that the capability to operate the aircraft as a fighter-bomber be built in to production drawings from the outset. Of course, the *Reichsmarschall* had not looked at the documents; indeed, it was not his personal responsibility to do so. But this does indicate the extent to which the individuals in this story were largely unaware of the actions of the others. Goering was toadying to Hitler's bidding; the Führer himself was acting on ideas from a third source.

Although it is out of sequence to the events that would immediately follow, it is worth noting here that further evidence of Hitler's intention to have the Me 262 produced as both fighter and fighter-bomber is contained in his telegram to Goering, signed by a Luftwaffe aide, dated 5 December 1943. In it, he reaffirms the 'tremendous importance of the production of jet propelled aircraft as fighter-bombers', but goes on to add in balance that 'The Führer feels that a delay in our jet fighter programme would be tantamount to irresponsible negligence.'

Only those left alive after the war could so arrange the facts that they excused their own, flawed actions and saved their reputations. For decades after the war it would be said that Hitler intervened in the development of the Me 262 and ruined its chances as a fighter by delaying full operational deployment in its designed role. Misled by their German sources, eminent aviation historians have followed this line throughout the post-war period – but the evidence is clear that the story is a very different one to that told for so long. It is important to recognize the part played by Willi Messerschmitt, the brilliant aeroplane designer and businessman who knew how to play the Nazis at their own game. Perpetuated by a vociferous fighter lobby incensed at the use of 'their' Me 262 for any other purpose, the story exposes all the inadequacies of that totalitarian regime.

After Goering's visit to the Augsburg works and the setting up of the special commission under *Oberst* Petersen, production activity began to accelerate. But no sooner had the authorities' clearances been given than they began to result in a bottleneck at Messerschmitt. On 12 November, Milch consulted Vorwald about the large numbers of workers demanded by the planners. Moreover, Messerschmitt was in no fit state to honour the production pledges, while the visit by Goering to Augsburg ten days before revealed serious delays in bringing prototypes and pre-production aircraft to flight trials. Vorwald was supremely confident that everything would be all right, but his optimism was not justified. Dr Anlsem Franz, director of the Jumo 004 development programme, admitted that the engine was in no fit state for production and that much work needed to be done to bring it to that state.

A more realistic appraisal of the production problem was given by Siegfried

The definitive first-generation jet fighter, a Me 262A-1a of JG 7 stands in freshly applied camouflage and unit markings applied by the US National Air and Space Museum, Washington, D.C., long after the war.

Kneymeyer, who had firsthand experience of the problems faced by the Luftwaffe in the field. He was concerned at the diversification of roles forced upon the Luftwaffe by Messerschmitt's insistence on promoting the multi-role capabilities of the Me 262 (although Kneymeyer did not know the extent to which Messerschmitt had stage-managed events). He was concerned at the way production of the Me 262 was being compromised by the insistence on dual roles. Kneymeyer went further by proposing that the entire range of aircraft production in Germany should be transformed. All piston-engined aircraft should be replaced by jets, he said, and particularly by the Me 262.

Finally, on 26 November, Hitler and Goering were given a well-rehearsed display of the Me 262 at Insterburg in East Prussia. Two aircraft had been pulled from the bustling flight test and development programme, prototypes V4 and V6, along with test pilots Karl Bauer and Gerd Lindner. When Bauer got into V4 and attempted a display, a flameout grounded his aircraft, but Lindner took off in the V6 and gave a dazzling display of the aircraft's speed and potential. Content that he had managed to get full-scale approval and priority status for the Me 262, Messerschmitt had backed away from lobbying on operational roles. Greatly impressed by what he saw that day, Hitler asked the technical staff accompanying the two prototypes whether the Me 262 was ready to carry bombs. Their answer echoed the words of Willi Messerschmitt at his meeting with Hitler on 7 September, and the Führer went away satisfied that he had not been deceived. His *Schnellbomber* was, in fact, the *Blitzbomber* for both reprisal attacks and bombing runs on the invasion beaches.

CHAPTER THREE

Into Service

At a stroke, on 26 November 1943, Adolf Hitler decided the fate of the Me 262. It would be his wonder-weapon of the new *Blitz*, and only secondarily an interceptor-cum-dogfighter for Germany's defence. The decision, two years in the making, had been masterminded by Willi Messerschmitt, tactician and businessman who, ousted by Milch, had returned to defeat his adversary. Now it was time to put the jet into production; a time of struggle to balance limited resources the demand for which grew ever greater as Germany's position worsened. There were serious problems with engine production, but Junkers was working hard to put the Jumo 004 on a production footing. The first half of 1944 would see a concerted effort to ready the production B-series engine for large-scale delivery, but not until July would it finally be available to Messerschmitt in the quantities needed to match airframe schedules.

On 20 December 1943 Gerd Lindner took the V7 prototype into the air for the first time. It was powered by two Jumo 004B-1 engines, featuring the same design and specification as the B-0, but with the capacity to accept improved engineering and checkout. In the re-engineered configuration in which test flights began on 11 April 1944, the aircraft had a fully-blown canopy for the first time; this replaced the framed canopy fitted to the first six prototypes, and gave clearer vision. The V7 also had a pressurized cockpit with a rubber seal which maintained a 1:2 pressure ratio, ensuring an atmospheric altitude of (theoretically) 19,700ft (6,000m) at 39,400ft (12,000m) above sea level. It also had an internal shimmy brake. V7 was the third prototype to have a tricycle undercarriage, it's predecessor, V6, having been used to test that gear. To determine the effectiveness of the nose-wheel assembly as an air brake. Gerd Lindner tested the gear on V6, lowering the nose leg at a speed of 340mph (550km/h). A violent change in trim pushed the nose down, but subsequent tests established a safe top speed of 310mph (500km/h) for extending the nose leg. In further end-of-year tests, the V3 prototype was given a canopy fairing extending back as far as the vertical fin. This was an attempt to reduce drag, but its effect was minimal.

Ekdo.262: the Me 262 test unit

Perhaps more significant was the decision to form a test detachment, or operational training unit. It was provisionally set up in December 1943, without aircraft, equipment or, at first, personnel. Like so many military units, in spite of a defined date of formation, *Erprobungskommando 262* (*Ekdo. 262*) at first existed only on paper. Commanded from 9 December by *Hptmn* Werner Thierfelder from *Zerstörergeschwader* ZG 26 'Horst Wessel', it had no prospect of getting any aircraft for several months. Thierfelder, South African of German extraction, was nevertheless kept busy by the necessity to create an infrastructure that would facilitate a smooth transition from piston engines to jets. ZG 26, first formed in May 1939, had phased out in April 1942 and reformed in July 1943. At first *Ekdo. 262* used Messerschmitt test pilots while developing operational tactics, but this would not begin until late June 1944, when the first interceptions were conducted against Mosquitos. Thierfelder got his first opportunity to fly the Me 262 when he took the V6 prototype into the air on 21 December 1943.

A key member of the flight test team for early Me 262 prototypes, Wilhelm Ostertag climbs out of the cockpit after one of many flights he performed in extensive aerodynamic and controls testing. On 18 April 1943 he became the first fatality of the programme when he lost his life as the second prototype (PC+UB) dived into the ground near Hiltenfingen.

The conventional production flow was broken with delivery of the next three pre-production aircraft. While V8 and V10 lingered in assembly, V9 (VI + AD) was delivered and flying by 19 January 1944. It was intended as a test bed for communications equipment and auxiliary devices under development by independent research institutes. Efforts were being made to produce an effective homing system for interception, involving the testing of electro-acoustical devices in V9 during the spring and summer. The equipment consisted of a relatively crude in-flight aircraft detection system based on nose-mounted sensors; it was intended to pick up the vibrations caused by thrashing propellors, and thus guide the Me 262 to its target. In tests a Me 410 provided the source of the vibrations. However, little progress was made toward a definitive, operational system, and in September V9 was turned over to the development

Test pilots take a well earned, but brief, rest from the busy Me 262 test schedule. Karl Bauer (hatted) is flanked by Gerd Lindner (left) and Ernst Tesch (right).

bureau for conversion into the HG 1 high-performance test bed.

Meanwhile, in January 1944, the first test pilots reached *Ekdo. 262* – still with little hope of receiving any aircraft for several months. After extensive tests by the *Technische Amt*, Junkers was given licence to produce the Jumo 004B-1 engine in quantity. But the technical refinements necessary for reliable operation in the field were still being made, and the quantity production so desperately needed failed to take place. Airframe production was under way with the 'S' series, and the first of these would fly in March, but there was a drastic shortage of engines. The difficulties in translating such a revolutionary new engine concept into a safe, reliable powerplant for service use were immense. Technicians and mechanics with very little experience in handling jet engines were responsible at unit level for day-to-day maintenance of the Jumo 004, and making the engineering sufficiently robust to survive such handling was as much a part of the job as producing a working product. The first production Jumo 004B-1 was delivered to Messerschmitt during February.

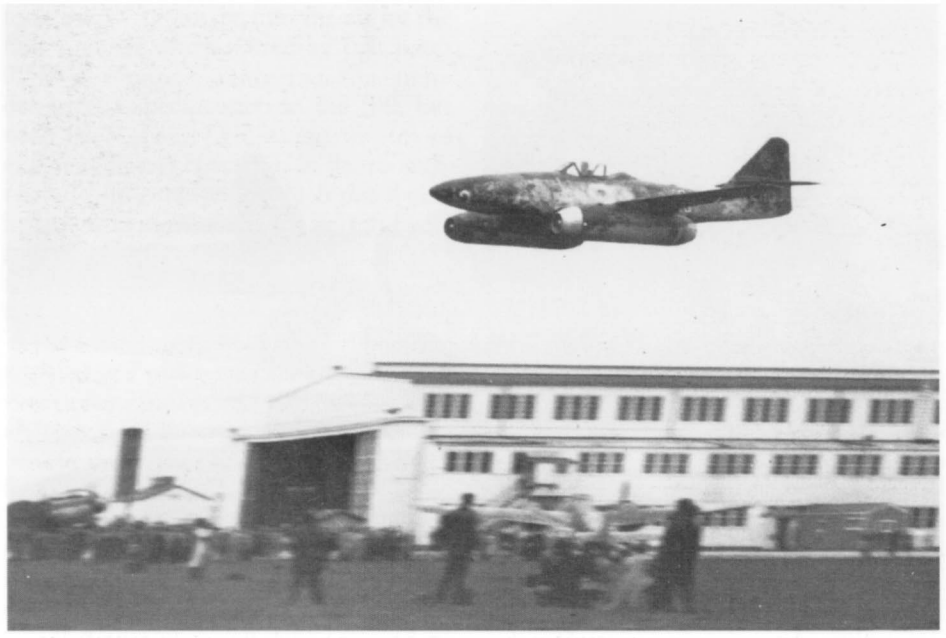
Operation 'Argument' targets aircraft plants

Then, on 25 February, the Americans struck again. Under the general code name 'Argument', a series of daylight precision bombing raids had been planned from November 1943 for late February, with the aim of totally disrupting Luftwaffe fighter production. In a series of strategic operations beginning on 20 February, in what would be immortalized as 'Big Week', the largest manifestation of American air power to date focused on a single target: the factories and associated production facilities for the Bf 109, Me 110, Ju 88, Ju 188 and Fw 190. In night raids, RAF Bomber Command hit the big cities that were centres of the aircraft industry. The weather was kind to the Allies: on the first day, almost 1,000 B-17s and B-24s were sent to the Brunswick-Leipzig region and to Posen and Tutow. Once again the Schweinfurt ball-bearing works came in for attention, and on 25 February, with clear skies right across Europe, bombers from the 15th Air Force struck the Messerschmitt plant at Regensburg-Prufening, while the 8th Air Force hit both Regensburg and its parent plant at Augsburg.

The assault on Regensburg was important to the production of the Me 262, because it triggered a major shift from centralized production to dispersed assembly, with feeder-lines distributed throughout the countryside. The objective of the Regensburg raiders was to strike at the heart of the Bf 109 production centre; crews were ordered to fly a reduced bombing altitude to ensure as high a degree of accuracy as possible. Many buildings were completely destroyed; almost nothing escaped unscathed. Records from the Regensburg plant show a fall in production from 435 aircraft in January to 135 in March; not until June did output return to former levels. At Augsburg, more than 500 tons (510t) of high explosive toppled thirty buildings, cutting production by 35 per cent and destroying almost 30 per cent of machine tools and 70 per cent of materials stored at the factory for processing. Yet for all the damage, the reduction in

As the war turned increasingly against Germany, resources were scarce and camouflage schemes became less than standard. This aircraft shows evidence of two changes, the first when a mottle daub was applied to the fuselage sides and the second when the mottle was extended down the sides of the nacelles.

First off the Leipheim production facility, Me 262 V7 came to grief on 21 February 1944 and suffered minor damage. On 19 May that year it took Hans Flachs to his death when it crashed at Lager-Lechfeld.



Cutting a clean swath through the air in a high speed flyby, the Me 262 presents a distinctive profile.

production quotas was not as great as had been expected by Allied intelligence authorities, who had yet to learn the extent of the dispersal scheme begun after the Regensburg raid on 17 August 1943.

Overall, the German aircraft industry continued to outstrip the ability of the Allied air forces to bring it to its knees. In the second half of 1943 German factories produced an average monthly quota of 851 aircraft, against 645 expected by the Allies. In the first half of 1944, in a period when there was a determined effort by the Allies to cut production, monthly output averaged 1,581, against an anticipated 655. German ingenuity and adaptability resisted efforts to stem the flow of aircraft, by now predominantly fighters. It is interesting to note, however, that the increased size and frequency of the Allied air raids was wearing down the German fighter forces to such an extent that expanded production quotas did not result in a larger fighter arm. From January to March 1944 German fighter aircraft losses increased from 30 per cent of strength to a staggering 56 per cent, with pilot losses increasing from 12 per cent to 22 per cent over the same period. The raids that were intended to weaken the German fighter forces thus had a greater effect in the air, through German combat losses, than they had in stemming production on the ground. The net effect was that the strength of German fighter forces changed little from mid-1943 to mid-1944, seesawing between 1,500 and 1,750 month by month.

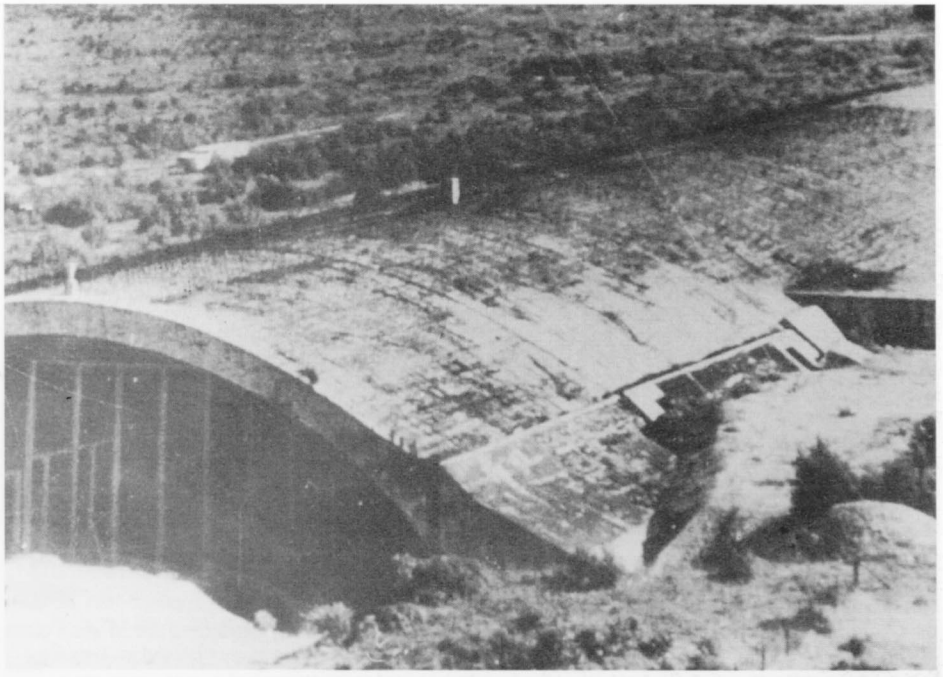
Production facilities dispersed

The Augsburg and Regensburg raids caused the Me 262 programme to move away from the main Augsburg works, where final assembly was to take place, out to Leipheim airfield. Wings and forward fuselage sections were still produced at Augsburg, but the main fuselage and tail sections came from the dispersed sites set up during early winter. Because Leipheim's hangars were busy with maintenance and conversion on the Me 323 transport aircraft, the Me 262s had to be assembled in specially prepared revetments outside. This measure was only an immediate reaction to the raids; what had begun late the previous year was a well-orchestrated plan for decentralizing aircraft manufacture.

In 1943 Hitler had ordered a study of how the effects of Allied bombing on aircraft production might be mitigated.

Three stages towards this aim were defined. First, decentralization and dispersal to remote rural areas, a move from urban sites into camouflaged units. Second, the shift of production from large factories to mines and tunnels where slave labour would be used on assembly lines in cramped and uncomfortable surroundings. Third, the construction of six very large, heavily protected bunkers, impervious to the biggest bombs, where large-scale production could go ahead.

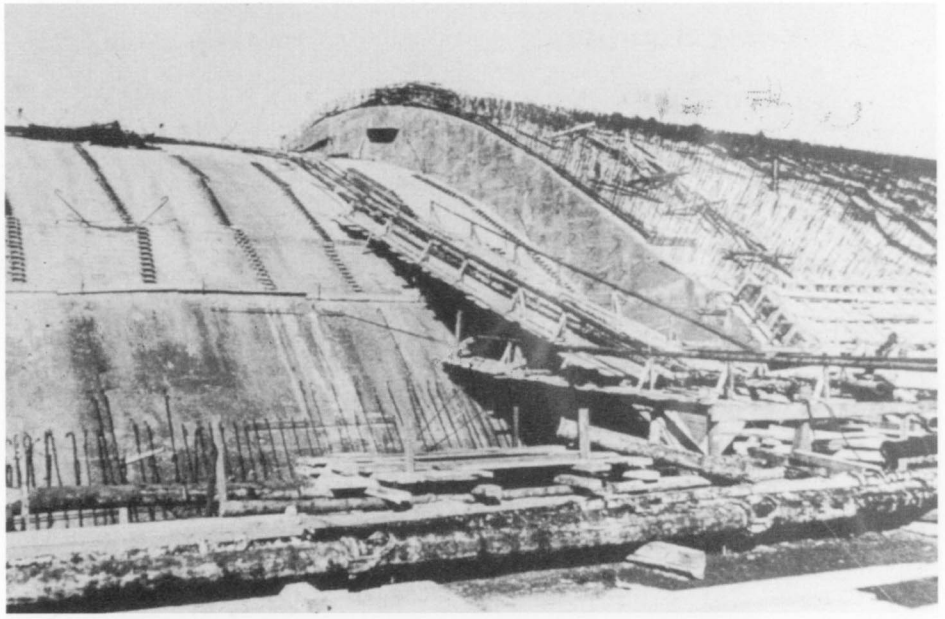
Factories and production facilities operated by the top twenty seven German aircraft firms and ancillary equipment suppliers were broken down into approximately 700 units, and dispersed throughout south-eastern Germany, in forests, alongside autobahns and on hills and mountain slopes. A further 300 firms involved in component supply were in the process of being relocated to mines and tunnels in cliffs and wooded areas. Conditions in such areas were often poor: damp was a problem and transport difficulties hampered both production and supply. Small manufacturing plants and supply dumps were distributed all across the region, extending far into Austria and Bohemia, and placed in the most unlikely locations, natural and manmade – but, wherever possible, near main roads or rail links. One such facility for the Me 262 was the *Kuno 1* forest site near Leipheim airfield, work on which began early in March 1944.



Dispersed production in response to increased Allied bombing raids was only part of the answer to reduced factory space and at Landsberg work on 'Weingut II', a massive bunker, was well underway when the war ended.

Kuno 1 took in components and sub-assemblies from elsewhere and made them into complete aircraft. Wing assemblies, moved away from Augsburg where they had been put together until February, were delivered by road from a specially converted autobahn tunnel near Stuttgart. Built on two levels, the tunnel was an ideal bomb-proof facility, in this case with adequate light and fresh air. Open at both ends, it had camouflaged entrances and roadways; vehicles were parked in buildings which merged with the scenery. Fuselage sections came from a dispersed manufacturing plant at Oberzell near Passau and from a factory in the Hagelstadt forest. Forward fuselage sections were produced nearby, at a site close to Günzburg. Typical of other locations for different parts were Wasserburg, where landing flaps were fabricated, and Lauingen, which produced engine cowlings.

The main *Kuno 1* Me 262 facility was situated in a forest clearing near the 102-kilometre (63-mile) point on the Munich–Stuttgart autobahn, a road which had a straight 6,560ft (2,000m) stretch with a central lane in green concrete extending back toward Munich. The facility's main assembly area was set on a large concrete base supporting a heated tent; camouflage netting blended it into the surrounding trees. The facility also included a firing range, engine test stands and buildings where tools, machines and equipment were housed. Barracks made of wood and steel were dispersed among the pine trees. The entire site was invisible from the air. After assembly, finished aircraft were taken for engine tests, bore-sight alignment for the guns, test firing and compass adjustment before they were moved to the autobahn. From there they were flown off along the straight section of the autobahn to nearby airfields, where they were checked out and delivered to the Luftwaffe.



About 0.5km in length, 'Weingut II' was designed to produce several hundred fighters a month and rail links were built for delivery of materials. A force of several hundred German workers supplemented by many more slave labourers toiled to build the facility which remained unfinished at the war's end. It is estimated that up to 20,000 people died building the bunker.

The Leipheim facilities came under attack in a raid on 24 April 1944. A large number of aircraft, including fifty three Me 262s from *Kuno I*, were destroyed as they waited in front of the hangars to be delivered. During the summer a second facility, *Kuno II*, was begun some twelve miles (20km) along the autobahn in the direction of Munich. This operated in the same way as *Kuno I*. Another factory had already been set up in the Schwäbisch Hall forest region, beginning deliveries in May 1944. Near Regensburg, another assembly plant was set up at Obertraubling: Me 262s were rolling out from there by the end of the year. By this time a third site had arisen, the Neuberg an der Donau facility, which vied with the Obertraubling plant in production delivery. Away from the dispersed production sites, several airfields were to be used for test flying and post-delivery checkout, including Leipheim, Memmingen, Swäbisch Hall, Neuberg an der Donau, Obertraubling, Brandenburg-Briescht (which also had assembly halls camouflaged to resemble ordinary buildings), and even a stretch of the Munich–Stuttgart autobahn for a brief period during the year.

Dispersal from the Augsburg Messerschmitt works involved not only the production and assembly lines but also the drawing and technical offices crucial to manufacture; facilities that had, in fact, been used to assemble two of the prototypes. From October 1943 these had been systematically moved from Augsburg to a complex on the eastern outskirts of Oberammergau. By March 1944 only the wind tunnel remained at Augsburg, while the new site accommodated jigs, tools and a staff of 2,000 people, including Willi Messerschmitt himself. Only seven miles (11km) west of Augsburg, the Horgau facility had been set up to assemble nose sections, wing panels and tail units. There, 845 people worked a two-shift rota, putting together the components and subassemblies that were then taken to another facility nearby for final assembly.

As good as these dispersed facilities were, there was concern about the escalating threat to transport and supply routes. Roads were under increasing attack, and as intelligence information about the dispersed sites began to leak to the Allies those sites became targets for air raids. On 18 November 1944 the *Kuno I* site was bombed, but suffered only minor damage. Nevertheless, dispersion had resulted in a vulnerable network that relied too heavily on the prompt delivery of components and subassemblies. The only real solution was to house all facilities in the reinforced-concrete bunker structures envisaged in the report to Hitler in mid-1943. In early March 1944 work began on a massive bomb-proof Me 262 factory near Kaufering in the Egling Forest. Situated near Landsberg am Lech, not far from the Lager Lechfeld airfield, it was designed to offer complete protection for a work force of thousands producing up to 1,200 jets a month.

Giant assembly plants planned

The programme to build six giant assembly plants was controlled by the *Jagerstab*, formed within the *Reichskriegministerium*

Manufacturing and Assembly

Little change was necessary to the basic Me 262A-1a *Schwalbe* to produce the Me 262A-2a *Sturmvogel* fighter-bomber. The latter was equipped with bomb-fusing facilities and had shackles for a standard bomb carrier beneath its forward fuselage, but was identical in all other respects to the late pre-production Me 262A-0 type. In many respects the Me 262 was relatively easy to put into large-scale production, as is evidenced by the high quality of parts and assemblies considering the unusual circumstances of its assembly. The manufacturing design had given little attention to the use of exotic materials, so no high-strength alloys were to be found on the aircraft. Nor was there a conscious effort to reduce weight, the flush-riveted structure being fabricated for simplicity in assembly. Cogniscent of the industry's shortage of jigs and specialized alignment tools, engineers provided self-aligning bushes for reaming close-fit bolt holes. This enabled many more aircraft to be produced than if standard manufacturing tools had been necessary.

Simplicity was a feature of the cantilever, single-spar, stressed-skin wing, and with the exception of the undercarriage wells the entire structure was a torsion box. Skins were 0.04–0.12in (1–3mm) thick from tip to root, and all skins more than 0.08in (2mm) thick were machine countersunk. Because low wing skins were not designed for torsion loads, they were made up from panels permanently screwed in position, and the entire wing assembly was built over-strength. Attached to the fuselage from below by two 0.78in (20mm) bolts and forty-two 0.3in (8mm) bolts at four points, the wing supported full span automatic leading edge slots, manufactured from sheet steel and divided into three sections on each wing, one inboard of the engine nacelle and two outboard. These were not interconnected. They were designed to open at 280mph (450km/h) in a turn or climb and at 185mph (300km/h) in a shallow dive. Never truly satisfactory in operation, the outer sections would open about 1in (25mm), which increased drag. The wing trailing edge carried two flaps, one inboard and one outboard of the nacelle, with a maximum deflection of 60 degrees. Consisting of two parts screwed together at the actuator shaft, the Frise-type ailerons were attached at three points and carried a Flettner-type tab. Each of the two Junkers Jumo 004B engines was attached to the wing by three suspension points.

With an almost triangular cross-section with rounded corners, the stressed-skin fuselage assembly was built up from four sub-assemblies. The forward three were fabricated as a single unit, with the rear fuselage and tail unit attached to the main body of the aeroplane by sixteen bolts. The nose section contained the guns, ammunition and cartridge ejector chutes, together with the forward landing gear leg and bay, and was attached at four points. The centre section contained the cockpit, and housed the forward main and auxiliary fuel tanks. Shaped to conform to the fuselage cross-section, the forward main armoured tank had a capacity of 198gal (900l) and was located immediately forward of the cockpit and behind the gun bay. The forward auxiliary tank, with a capacity of 37gal (168l), was set across the fuselage aft of the main tank and below the cockpit floor, near the pilot's legs and the instrument panel but forward of the main landing gear bays.

The rear fuselage section housed the aft main armoured fuel tank, holding 198gal (900l), and conformed to the fuselage shape, filling the space approximately between the rear of the cockpit seat and the rear of the canopy. Immediately behind it was the aft auxiliary tank, with a capacity of 132gal (600l), above which was located the FuG 16zy ultra-short wave radio-telephone (R/T) set. This was later replaced by the Fug 15 R/T. A FuG 25a identification loop antenna was mounted on top of the fuselage, both to prevent ground fire from friendly AA batteries and to give ground controllers a direction indicator. The automatic compass was positioned behind the aft auxiliary fuel tank. The tail unit incorporated a vertical fin and rudder with mass balance and Flettner-geared trim tab, with single-section elevators and Flettner-type servo tabs. The nose and main landing gear oleo legs were manufactured from seamless drawn tubing with fittings welded. None of the fuselage assemblies was heat treated, because of the use of low carbon steels. Compared with the time taken to produce machined forgings, this contributed to a significant reduction in man-hours.

During flight tests, ballooning of the fabric covering the elevators had occurred at speeds between 530mph (850km/h) and 570mph (920km/h) at altitudes of between 3,300ft (1,000m) and 6,500ft (1,980m), tending to push the nose down. The fabric had actually burst on five occasions, but without loss of the aircraft. Production aircraft carried metal-skinned elevators, which solved the problem. Snaking at high speed, caused by induced rudder oscillation, was counteracted to some degree by thickening the trailing edge of fin and rudder, but the Germans never progressed as far as the British did after the war, when they solved the same problem on the Meteor by auto-stabilization. In all, the Me 262 took about 9,500 man-hours to manufacture, considerably more than the target 6,000 man-hours. This extended manufacturing time was due solely to transport and supply problems. The compromise made in engineering to achieve a simple airframe that was easy to build and put into service carried a price. Simplicity led to varying characteristics between individual aircraft: noticeable variations included differences in the onset of aileron oscillation around Mach 0.8, and the nose-down pitch moment at high speed.

on 1 March 1944 under the leadership of Otto Sauer. Under the code name *Weingut II*, the facility was to comprise a partly buried assembly area beneath an arched roof of semi-circular cross-section. In all, the structure would have a length of 1,310ft (400m), a width at ground level of 279ft (85m) and a height above ground of 85ft (26m). Its total height, from the lowest level of the semi-buried bunker, was 151ft (46m). Beneath the arched roof there were to be five floors, each protected by ceilings 18ft (5.5m) thick, with 1.5in (3.8cm) armour plating. The arched roof, between 10ft (3m) and 59ft (18m) thick, consisted of several individual layers of reinforced materials and concrete. The entire structure would have withstood multiple hits with 22,000lb (9,980kg) Tallboy bombs, then the largest in use. Targeting it would have been difficult: looking rather like a giant, half-buried Nissen hut, it was to have been covered with earth and humus, so that under a protective shroud of the local flora it would have the appearance of a gently sloping hill.

Inside, each of the five floors was to be

'Weingut II' was abandoned for several years after the war but has been used since the mid-1960s by the reconstituted Luftwaffe as a massive storage facility for electronic equipment and medical supplies.

dedicated to a particular task in the assembly phase. The four lower floors were given over to integration of subassemblies and the completion of the aircraft: the two lowest floors committed to mechanical processes, and the next two housing several hundred workers, some skilled, for final assembly. Each aircraft would move up vertical elevators to the floor above. The top floor, directly beneath the curved ceiling, was a runway from which completed Me 262s would be hurled through an exit under the power of rocket-assist motors. With minimum fuel on board, the Me 262s would then fly to Lechfeld, Penzing or Memmingen, where they would be given a thorough checkout prior to operational deployment.

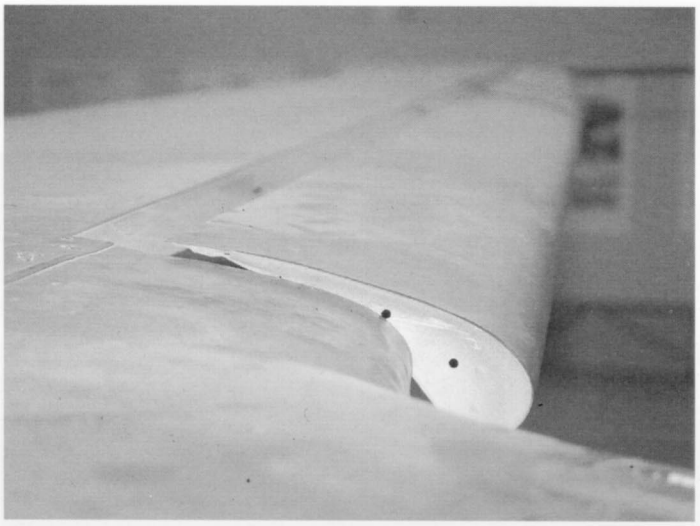
To build *Weingut II*, up to 30,000 people were put to work at the construction site, as many as half of them slave labourers from Eastern Europe. Most were moved from the Dachau concentration camp, about thirtyseven miles (60km) from Landsberg, into eleven specially constructed camps within five miles (8km) of the site. Every day they were made to walk to work, spend fourteen hours on one of two shifts, and walk back. Conditions were poor; there was little food or proper clothing. Under these rigorous conditions most died within a few months. In all, before the end of the war 10,000–20,000 Jews and other prisoners were to die attempting the construction of *Weingut II*. Although it was not completed before the end of the war the essential structure still exists: it is used today by the German military as a storage depot for high-tech electronic equipment and pharmaceuticals.

None of the six semi-underground Me 262 assembly facilities became operational, but one central underground site did produce some aircraft. This was Factory A of the Reichsmarschall Hermann Goering Factory, or *Reimahg* in military shorthand, where construction began in April 1944. Administered by the AGO-Flugzeugwerke GmbH of Oschersleben, it made use of underground galleries in the district of Kahla, previously used for china-clay making. Linked by tunnels, the galleries opened into a large hall served by a sloping taxiway. Aircraft completed in the galleries were hauled up the slope by winches and delivered to a mountain ridge some 3,940ft (1,200m) long. Here, engine and firing tests were conducted; then, after compass calibration, the Me 262s were flown off with the help of rocket packs. Pilots flew the aircraft straight from the ridge to the airfield at Zerbst, eighty one miles (130km) to the northeast. The facility managed to produce twenty seven aircraft before it was overrun by an American Army unit; a further five were assembled from parts found in the galleries.

Tests move to Lager-Lechfeld

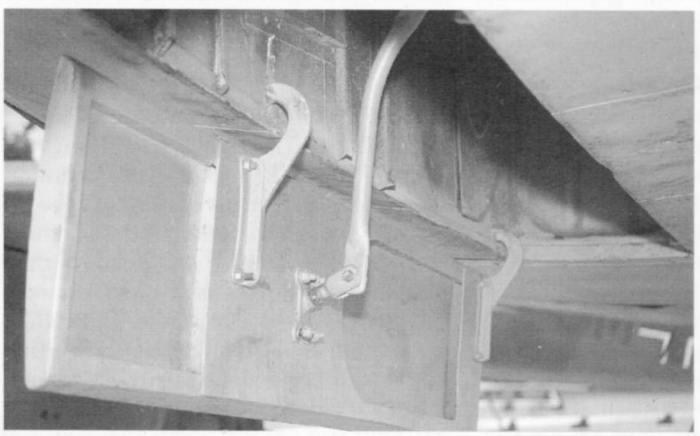
All this lay ahead when the raid of 25 February 1944 changed the production philosophy of the Messerschmitt teams working on Me 262 development. The most immediate effect was to move the Me 262 test department about twelve miles (20km) from Haunstetten to Lager Lechfeld. The engineers travelled there in an Opel P4 automobile – and because the Me 262 was still a secret government project, the code name Lechfeld Auto Requirements was used in the paperwork that attended every use of the car for travel back and forth between the control tower at the airfield, where the engineers were housed, and the main works. This was only the first of several moves they made: raids destroyed first the tower, then the commander's office which they occupied.

The effects of the air raids were not limited to production management, test

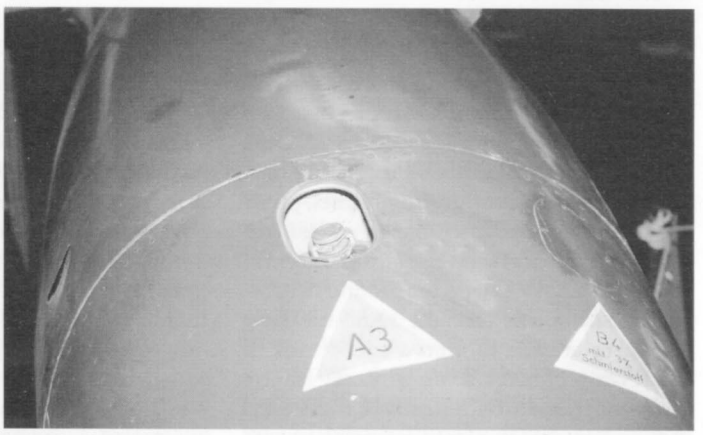


(Left) In common with other Messerschmitt designs, Handley Page-inspired leading edge slats were installed to help low speed handling. These were spring loaded to extend at low speed and would be held in place at high speed by the airflow.

(Right and below) The robust main gear retracted inwards, rather than outwards as on the Bf 109, giving a wider track and greater stability on the ground. Once retracted, the wheels lay under the pilot's seat and the wells were covered by small doors.



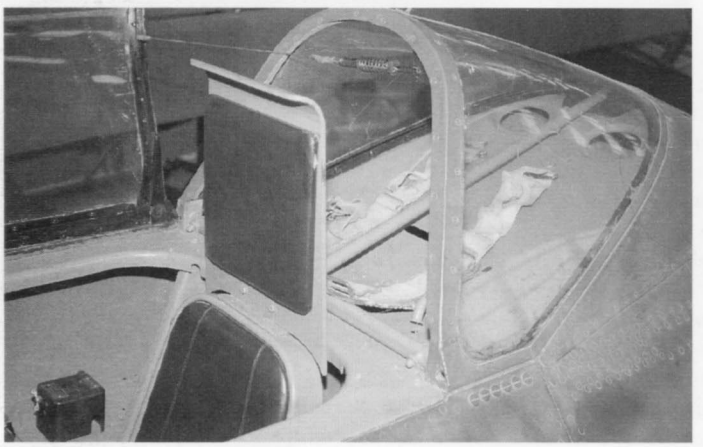
The nose gear retracted rearwards into a bay beneath the guns and in front of the forward fuel tank to be contained by a sideways opening door.



Fuel and oil for the two-stroke starter motor was contained in small tanks in the forward part of the nacelle, above the engine.

(Right) Protecting the pilot in front was a thick bullet-proof glass screen.

(Below) In common with other Luftwaffe types, the Me 262 had an armour plate protecting the back of the pilot's head which also acted as a headrest.



(Left) The production canopy was a sideways opening perspex bubble that gave good all round visibility and was a great improvement on earlier types such as the Bf 109.

schedules and dislocated work places. Much instrumentation had been destroyed by bombs, so the engineers had to fall back on more primitive methods of mensuration. Instead of recording flight tests, pilots were asked to read instruments and gauges in the cockpit and send the information via radio to a mobile cab on the ground nearby. The problem was that the radio frequencies were crowded: often a cacophony of irrelevant chatter from aircraft in the neighbourhood would frustrate the efforts of the engineers to record information in a clear and precise fashion! There was still much to do before the aircraft would be ready for operational deployment.

By the end of February armament tests were well under way. Various arrangements had been mooted, but a nose bay carrying four 30mm MK 108 cannon with electro-pneumatic cocking and electrical firing was selected for the initial production version. On 16 February the firing trials were observed by *E-Stelle* representatives and by officials from the RLM. In early March the V8 prototype (VI + AC) was completed and fitted out with its quartet of cannon – the first Me 262 to carry guns with a standard Revi 16B gun sight in the cockpit. During final preparations for flying trials another prototype was lost on 9 March: the V6 crashed on its twenty seventh flight, destroying the aircraft and killing pilot Kurt Schmidt. Little more than two weeks earlier the V7 prototype had suffered a minor accident, and was now being modified with a pressurized cockpit and clear canopy. Three weeks before that, the V5 had the nose wheel failure (described above) that would put it out of action for the rest of the war.

Standard camouflage patterns on this Me 262A-1a, *werke/nr* 110813, show divisions between colours. Note the wraparound upper wing colour scheme to the underside of the wing leading edge.

The jet receives its armament

Now only four prototypes were flying (V1, V3, V7 and V9), but on 18 March the V8 took to the air with its four cannon and two Jumo 004B-1 turbojets. This was the first time the Me 262 had fired guns in the air, and during the ensuing evaluation some problems arose over firing in the turn. It was found that lateral forces tore the ammunition belts; the cure was a redesign of the feeder mechanism in the nose section. The two upper cannon had 100 rounds per gun; the lower two 80 rounds each. In tests the guns performed well, fire from the four cannon being set to converge at 1,200-1,500ft (365-460m). Pilots found the Me 262 an excellent gun platform, and when it came to air combat the smoothness of jet flight contributed to the general improvement in this aircraft over piston-engine types. For the first time, the advantages of closely-grouped forward-firing guns clustered close to the aircraft's centreline could be had without the complexity and weight of a synchronizing gear. Appropriately, after about one month of gun tests, the V8 prototype was the first aircraft to go to *Ekdo. 262*, now called *Erprobungskommando Thierfelder* after its commanding officer.

One day after V8 took off for the first time, the V7 prototype crashed at Lager Lechfeld on its thirty first flight, killing its 24-year-old pilot *Uffz* Hans Flachs. Eyewitnesses said that after a fifteen-minute flight Flachs jettisoned the canopy; then the aircraft began a roll to the right, stalled and went into the ground at an angle of about 45 degrees. The prototype had completed thirteen hours flying time in the three months it had been in the test programme. *Uffz* Flachs, an up-and-coming test pilot of whom much was expected, had been seconded to the programme from *Ekdo. 262*. The training unit had responsibility not only for preparing pilots to convert to the jet and introduce it into operational service, but also for monitoring developments in Allied air combat methods and recommending changes accordingly. One result of such reports was an increase in armour protection to better resist the Allied weapons the Me 262 would encounter: a memorandum to this effect was issued on 22 March.

The next aircraft delivered was the first of the S series pre-production types to be completed on the Leipheim production line; the second in the assigned nomenclature. With metal-skinned aerodynamic surfaces and external antennae, Me 262 S2 (VI + AG) made its first flight on 28 March 1944. Prototype losses to date had prevented many tests being made as scheduled, so S2 went straight into the trials programme as a development aircraft. This pattern was repeated among the fifteen 'S' series pre-production aircraft. This had led to some confusion, causing many historians to specify two aircraft that never existed: V11 and V12. These were, in fact, S1 (VI + AF) and S2 (VI + AG), the first two pre-production machines. It was S2 that on 25 June 1944 achieved a speed of 624mph (1,004km/h) in a dive from almost 23,000ft (7,000m). The last of the ten fully-fledged prototypes, and the last to be built at the Augsburg-Haunstetten works, V10 (VI + AE), was delivered on 15 April 1944, with a specific set of tasks to perform within the flight test programme. Because of reported high stick-forces at high speed, which became unacceptable at the top end of the aircraft's performance envelope, V10 was configured initially to solve that problem.

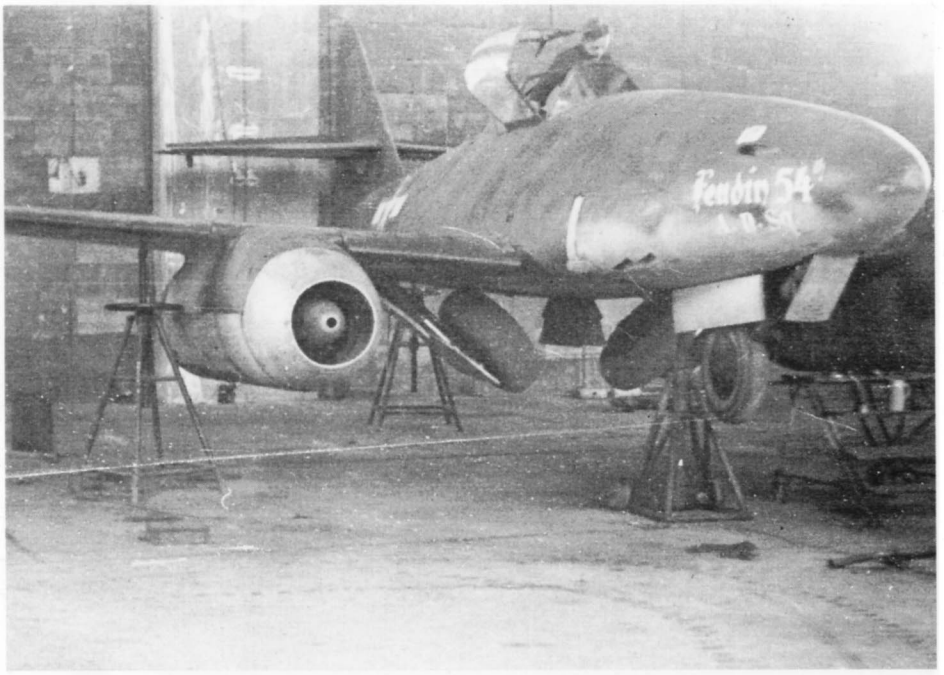
Earlier prototypes had been fitted with ailerons with a rounded, raised, nose and a hinge set well back from the front. When high-stick forces were first experienced, engineers modified the ailerons first by increasing and then by decreasing the thickness of the nose profile, but to no avail. A different aileron shape was tried, with a blunter nose and the hinge set farther back, but this too failed to improve matters. The aileron gap was reduced, then increased, and geared tabs attached. Still the stick forces were too high, so it was decided to tackle the problem from the cockpit instead of the wing. The V10 was fitted with a geared control column consisting of an outer sleeve fixed to the floor and a main column capable of sliding up and down within the sleeve. The aileron cables were attached to the lower section of the stick, which was raised or lowered as

required by means of a handcrank mounted to the side of the sleeve. By increasing the leverage, the forces at the stick reduced; in this way the aileron sweep was reduced from 22 degrees to 18 degrees.

The fighter-bomber role

There was a further task for V10. It was the first Me 262 to be modified for the fighter-bomber role so energetically marketed by Messerschmitt and now so eagerly advocated by senior Luftwaffe officers and national leaders. Events had moved rapidly to cast the Me 262 in that part, and, as stated earlier, much distortion in recent histories concerning its fighter-bomber role stems from a reliance on opinion expressed by the fighter fraternity. In fact, preparations for introducing the Me 262A-2a *Sturmvogel* fighter-bombers were on a par with those for the Me 262A-1a *Schwalbe* fighter aircraft, and it was a *Kampfgeschwader*, KG 51, that became the first unit to form an Me 262 *Geschwaderstab*. As eager as their fighter pilot counterparts to get to grips with the enemy in the new jets, the bomber pilots staked a claim on the Me 262 from the outset. The aeroplane's design team had wooed the bomber lobby quietly and effectively; now they were to seize their opportunity.

General der Kampfflieger Dietrich Peltz had first flown the Me 262 on 20 December 1943, shortly after Werner Thierfelder had taken command of the first training unit, *Ekdo. 262*, set up by *General der Jagdflieger, Adolf Galland*. Most histories state that the first Me 262 fighter-bomber unit came into existence in June 1944, six months after Galland established *Ekdo. 262* for fighter pilot training. In fact, KG 51's Me 262 *Geschwaderstab* formally came into existence on 25 February, along with *I* and *II Gruppen*. Commanded by *Obstlt* Wolf-Dietrich Meister, the Me 262 *Geschwaderstab* was based at Rheine, and began sending pilots to *Erprobungskommando Schenk* for conversion training on 20 June 1944. At that time under the command of Major Wolfgang Schenk, *Ekdo. Schenk* was based at Lager Lechfeld, where it would train pilots in production Me 262A-2a types. Great difficulties were experienced in getting the pilots accustomed to the aircraft, and it would be three months before the first *Gruppe* of JG 51 become operational.



Undercarriage tests on a captured Me 262 show the door closure sequence and display the revised canopy shape used in later models.

Development of the fighter-bomber variant of the Me 262 called for extensive trials with prototype V10, in a variety of operating modes and with a wide range of standard Luftwaffe racks and bombs. It was flown with a bomb for the first time on 27 May 1944, when it took off with a 551lb (250kg) bomb. This event came two days after a meeting at Obersalzburg between Hitler, Goering, Saur, Milch and leaders of the aviation industry. There, after hearing that the initial production types would be delivered as fighters, Hitler demanded that the Me 262 be produced and operated as a blitz-bomber. The development of bomb-carrying aircraft was already well in hand, and Milch's apologetic reference to the aircraft's original concept, as a high-speed fighter, did little to enhance his reputation with the Führer. Hitler angrily insisted that the aircraft must be prepared and deployed as the fighter-bomber he had always wanted it to be (*sic*!).

Tests with the V10 involved two carriers

Cables attached to the main landing gear legs connect this Me 262 to the *Kettenkrad* tractor while a ground crewman turns and locks the nose leg before attaching a tow boom.

and several different bomb types. One of two carriers could be used, either the standard ETC 504 or the *Wikingrschiff* type, and a wide variety of bombs. The Me 262A-2a could carry either one 2,205lb (1,000kg) SB 1000, SD 1000 or PC 1000; two 1,102lb (500kg) SC 500 or SD 500; or two 551lb (250kg) SC 250 or SD250 bombs. Most loads mixed one 1,102lb (500kg) bomb with two 551lb (250kg) bombs, but another method was tested and nearly took the life of Gerd Lindner. It involved a towed bomb attached to the rear fuselage by a pole 13ft (4m) long and 4in (10cm) in diameter. Secured to the Me 262 at one end by way of a swivel joint that allowed up-and-down or side-to-side movement, it had at its other end a 2,205lb (1,000kg) bomb mounted beneath a wooden wing from the Fi 103 flying-bomb programme to give it lift. On the runway, the bomb was supported by a pair of wheels on a jettisonable dolley, which was released by the pilot triggering explosive bolts once the assembly became airborne. The premise behind this concept was that a large bomb could thus be carried aloft without modification to the aircraft's undercarriage, and without the need for extended takeoff distance. If the scheme worked, there were plans to carry a BT 700 bomb-torpedo, and even a 198gal (900l) fuel tank.

The first tests of this so-called *Deichselschlepp* concept were conducted by Gerd Lindner in the V10 prototype on 30 October, when the bar-and-wings assembly was towed into the air. On 18 November Lindner carried up a SC500 bomb, and three days later lifted a SC 1000 bomb, but there were problems from the outset. The wing on the bomb support frame had too high a lift coefficient; as a result, the entire assembly was likely to porpoise. With the bomb in tow, the speed of the aircraft fell to a maximum 320-330mph (515-530km/h). The bombing method required the Me 262 to enter a shallow dive and align with the target through the standard Revi 16B gun sight. At the appropriate point in the dive the bomb was released from the carrier, after which the wing and tow bar were jettisoned by the pilot. On one test the tow-bar pivot broke loose from the rear of the aircraft during a tight turn; on another occasion Lindner had to return with the bomb still attached because the explosive bolts failed to fire. Worst of all, during trials with a pre-production aircraft in February 1945, Lindner had to bail out when the porpoising effect became uncontrollable. Not before time, the concept was abandoned as unworkable.

An excellent view of the forward fuselage removed from the mid fuselage section revealing the undercarriage and gun bays.

The Führer demands a fighter-bomber

That the bomb-carrying capability of the Me 262 was important to Hitler is not in doubt. But lobbying by the bomber pilots gave them increasing influence with Hitler, and made them more powerful. Hitler had seen Goering as a channel for the opinions of fighter pilots, a group increasingly out of favour with the Führer because of their inability to stem the increased aerial assaults on German cities and factories. But now Goering turned his back on the fighter pilots and curried favour with Hitler by moving closer to the bomber men. That pact was consummated four days after Hitler's demand at the Obersalzburg conference for the Me 262 to be a blitz-bomber. Hitler ordered Goering to settle the arguments once and for all; he did not want bickering between fighter pilots and bomber pilots to continue, and was infuriated by the way in which the rival parties seemed ready to disregard, or delay, his edict that the Me 262 appear first as a fighter-bomber and only secondarily as a fighter.

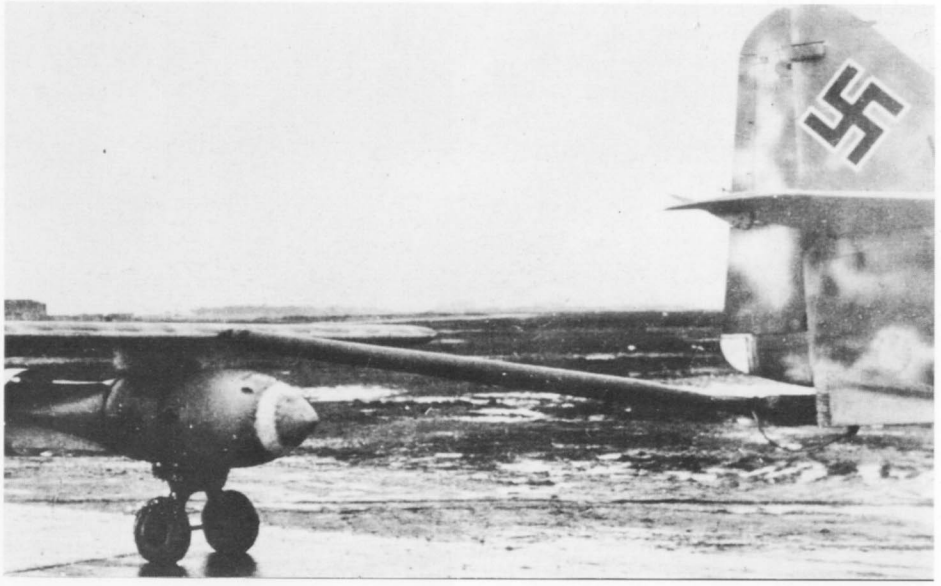
Accordingly, on 29 May, Goering gathered together *Genobst* Günther Korten, the Luftwaffe Chief of Staff, *Obst* Walter Marienfeld, acting *General der Kampfflieger*, General Bodenschatz, Galland, Messerschmitt, Thierfelder, and *Obst* Edgar Petersen and *Major* Otto Behrens from *E-Stelle* at Rechlin. Goering did not really make explicit Hitler's reasons for wanting the aircraft regarded as a high-speed bomber, which were that the Führer saw it as an important weapon with which to strike at the masses of Allied men and material that would, he believed, soon be pouring ashore on mainland Europe. Goering simply explained that it was a direct Führer order that was to be obeyed to the letter, and that henceforth the Me 262's introduction to Luftwaffe operations and its tactical development were to be entrusted to the *General der Kampfflieger*. Goering tried hard to placate the rising anger that showed in Galland's face as he saw his dream *Schwalbe* fighter being supplanted by the *Sturmvogel* bomber but the intention was clear: Hitler had now resolved to have the aircraft primarily assigned to fighter-bomber duties. Nevertheless, the fighter role was not be abandoned.

Just nine days later, on 7 June, Hitler met with Otto Sauer, who was by now dedicated to getting the Me 262 into full production as quickly as possible. Hitler

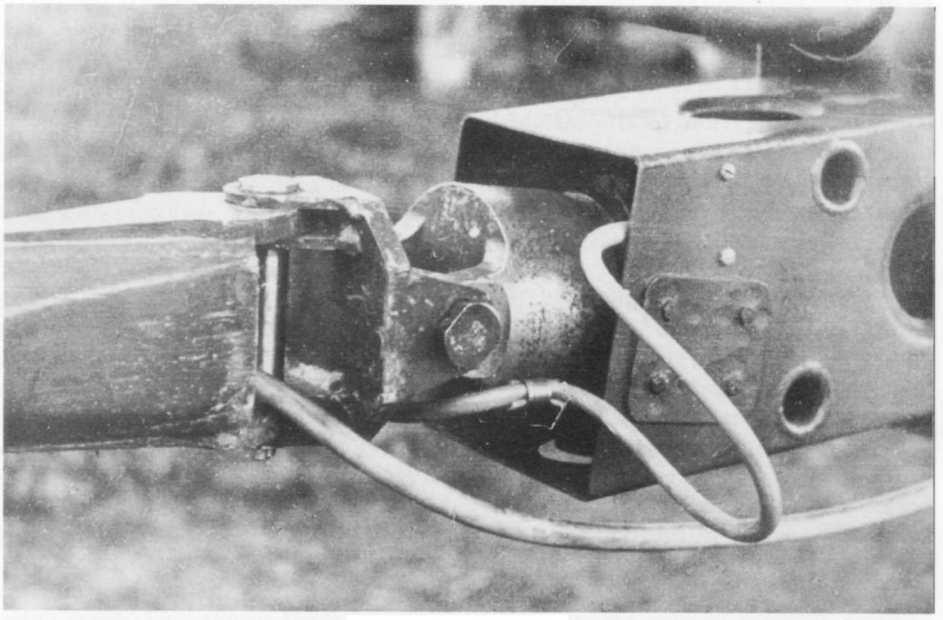
The Office (cockpit)

The cockpit and instrument layout for the Me 262 was a standard mid-1940s German design, functional and easy to work with in spite of its comparative complexity. The main display comprised two sets of instruments: one, to the left of centre, for flying the aeroplane; the other, to the right and slightly below, for monitoring the engines. A panel down the left side of the cockpit provided throttle, fuel cocks, electrically driven tailplane adjustment, wheel for rudder trim, contact switches for the landing gear, and oxygen valves and switches. The right side of the cockpit carried the switchboard, communications selectors, starting switches and a variety of supplementary controls.

From the outset the cockpit had been designed for pressurization. The barrel-shaped structure was set high up on the fuselage mid-section, affording good visibility all round and below and behind the wing. The canopy comprised fixed forward and rear sections, with a hinged centre section opening to allow access from the port side of the fuselage. Protection for the pilot was afforded by a 3.5in (90mm) bullet-resistant windscreen and 0.6in (15mm) armour plating in front and to the rear, as a head plate on top of the seat back and curved slightly at the top. The bar-mounted Revi 16B gun sight was standard for both fighter and fighter-bomber versions. The seat was adjustable from levers in front and below. Rudder pedals incorporating adjustable toe straps were standard pattern. Brakes on the two main wheels were operated by pedals, standard on German aircraft, with the nose-wheel brake operated by a hand lever located on the left side of the cockpit, activating a pump.



The Me 262 V10 prototype was used in flight tests of the so-called *Deichselschlepp* towed-bomb concept in which a single SC1000 bomb was attached to the rear fuselage by a bar.

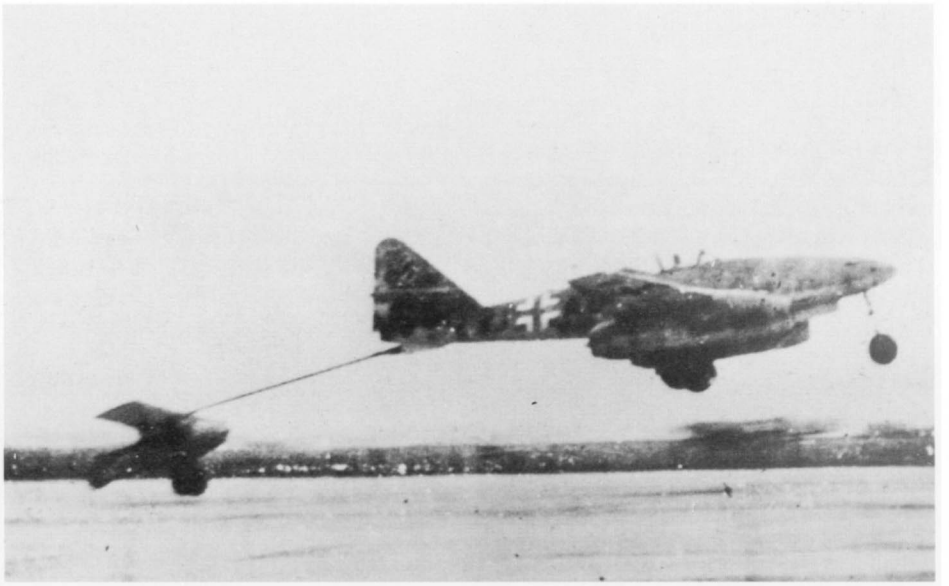


A close-up of the boom coupling connecting the 4m long, 10cm diameter, boom to the tail of Me 262 V10 just beneath the rudder.

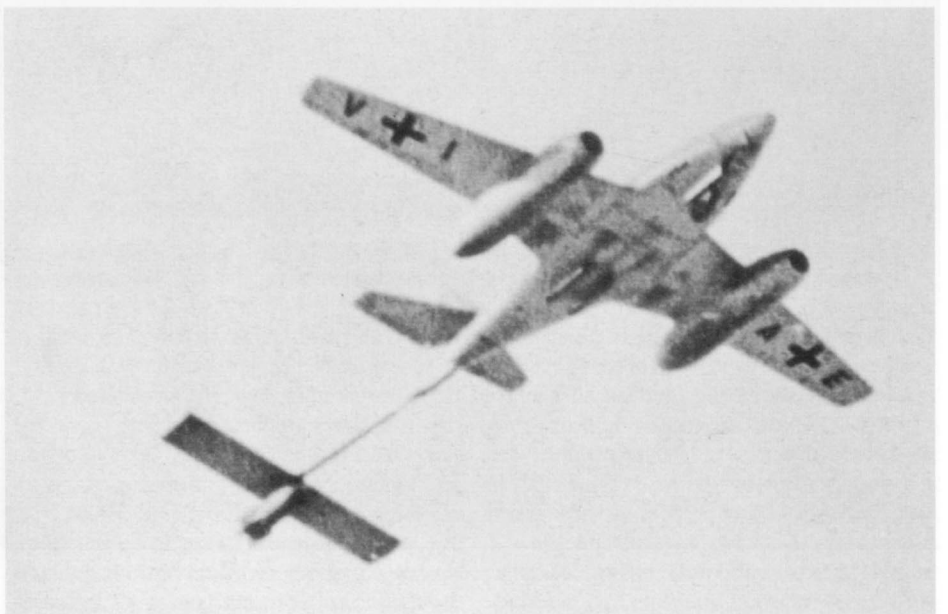
told Sauer that he wanted the development and test programme to give priority to the fighter-bomber role – but the fighter version was to remain as a parallel programme. Next day, in a *Führer-befehl*, Hitler stated precisely that work on the fighter was to continue, but that 'under no circumstances is bomber production to be delayed while awaiting the results of such tests'. He added that once the tests had been concluded 'there is no reason why production capacity cannot be divided between the two models'.

The truth about Hitler's intervention.

Much has been made of this order. It has been regarded as the second, and possibly the more important, intervention by Hitler in directing the application and role of the Me 262. In truth, all the work necessary to equip the aircraft as a fighter-bomber had been completed by this date, and it was now better able to carry out those duties than those of a fighter. When it operated as a bomber, pilots needed less training than fighter pilots. None of the delays caused by political dithering, uncertainties or mismanagement was as great as that caused by a protracted delivery of prototypes of the ailing engine. And none of the role changes fought over by fighter and bomber lobbies did anything to delay the



Lift for the bomb carrier is provided by the adapted wing of a V-1 flying bomb. After releasing the bomb the carrier and tow bar were to have been jettisoned, but the system was never put into operational use.



Oscillations and pitching were a serious threat to the stability of the bomb-towed combination and on one occasion the disengagement mechanism failed to work, forcing the pilot to land with it still attached.

Me 262's service introduction. In reality the major delay was caused by the production line model of the Jumo 004B engine, which was taking far longer to become available to service units. The engine was proving very difficult to configure for operational duty and would continue to bug the programme for the rest of the war. Finally, in June 1944, the Jumo 004B was 'frozen' and was given over to production lines that would, at last, deliver powerplants for the pre-production and production airframes which were finally becoming available.

Four days after Me 262 V10 made its first flight, S1 took to the air on 19 April 1944, configured for aerodynamic tests. S1, sometimes referred to as the V11, was damaged during the month, but three more Me 262 pre-production aircraft – S3 (VI + AH); S5 (VI + AJ); S6 (VI – AK) – had been delivered in addition to the S1 already mentioned. During the month, a further eleven production Me 262A-1as were delivered by the Augsburg complex of dispersed factories, which included Leipheim, Kuno and Swäbisch Hall. The following month saw delivery of six pre-production aircraft: S4 (VI + AI) and S7 to S11 (VI + AL to VI + AQ). From a staggered start, production deliveries to the Luftwaffe gradually increased, including twenty eight in June and fifty eight in July. But such levels imposed stress on the Junkers production facilities, and only fifteen aircraft could be delivered in August, because engines were simply not available. The situation would improve from September, particularly when the Regensburg complex of dispersed facilities, including the Obertraubling and Neuberg an der Donau plants, began to deliver.

Training the jet pilots

The first aircraft to go to *E-Stelle* at Rechlin was delivered on 10 June 1944, this date marking the introduction of the Me 262 into Luftwaffe operations. Within the next month the unit would get thirteen Me 262s, but testing was delayed by about one month due to problems with the landing gear. Intensive efforts in flying training marked the next several weeks: by September, pilots at Rechlin had accumulated 350 hours flying time on the aircraft in more than 800 flights. Pilots agreed that the Me 262 was not difficult to fly; the general consensus was that it was easier than the Bf 109G. Like any new aircraft it had its irritating idiosyncrasies, and some pilots schooled on propeller-driven aeroplanes were hard pressed to adapt to the new way of flying. It was *Ekdo. 262* that would carry out most of the training and would introduce the new aeroplane into operational service.

Erprobungskommando 262 had received its first aircraft, the prototype V8, in April when a number of pilots from *III/ZG 26* had traded their Bf 110s for Me 262s there. The unit had a *Stab* and two *Staffeln*, with *8. Staffel* based at Leipheim and *9. Staffel* at Swäbisch Hall, from 17 May. Elements were also dispersed to Rechlin-Larz and Erfurt-Bindersleben. It would fall to *Ekdo. 262* to engage in the first combat dogfights, but its main role was to develop training methods and operational tactics. Initial orientation training was carried out in the Bf 110 and the Me 410. These aircraft were flown at fixed throttles in what constituted

Firing Up

The Junkers Jumo 004B-1 that first powered the V6 prototype and was used in production Me 262s incorporated a small Riedel air-cooled, two-stroke, starter motor with its own reservoir containing 3.7gal (17l) of B4 fuel, an 87-octane petrol with a 5 per cent mixture of lubricating oil. J2 diesel fuel was used in the engine proper. With the exception of the starter motor's reservoir, all fuel was carried in two main and two auxiliary tanks situated in the fuselage centre-section. Starting the engine was a two-handed job. To begin the process, the right hand depressed the starter lever for four seconds, before pulling it up to fire the starter motor. This lever was held up until the engine spun up to 2,000rpm, but as the revs climbed beyond 800rpm the left hand was used to depress a firing button on the throttle. This injected fuel into the engine; under normal circumstances, the fuel was ignited by two double-spark ignition coils in each engine, but it was necessary to keep the button depressed until the engine had a speed of 2,500rpm. However, at 2,000rpm the throttle was advanced slowly to the first detent position, at which stage the engine would run continuously. The starter motor lever was then released.

Immediately the starter lever was dropped, the fuel cock on the opposite side of the cockpit near the throttle handle had to be opened. Then the rev counter button was depressed until a speed of 3,000rpm registered. At that speed, the left hand released the throttle, leaving the engine to run while the whole procedure was repeated with the other engine. The jet pipe had a limiting temperature of 1,200°F (650°C), and gentle movement of the throttle was essential to ensure this limit was not exceeded – with disastrous results! At 6,000rpm, however, the governor cut in and the throttle could be handled without regard to the true advance or retard of the rpm rate, which was now automatically controlled.

Full power was achieved at 8,700rpm. Fuel was supplied to the engines by two electric pumps per tank, with electrical fuel-quantity monitoring and a low-fuel warning at the 55gal(250l) level. In flight, the engines sometimes behaved erratically; then the fuel pumps had to be switched on, and at altitude in excess of 29,530ft (9,000m) it was necessary to keep the revs above 6,000rpm to avoid a flameout. Re-start could not be attempted above 13,125ft (4,000m). With a maximum static thrust of 1,984lb (900kg), the Jumo 004B provided 1,896lb (860kg) of thrust at 273mph (440km/h) at sea level; 1,300lb (590kg) at 273mph (440km/h) at 8,200ft (2,500m); 1,600lb (725kg) at 559mph (900km/h) at 8,200ft (2,500m); 573lb (260kg) at 534mph (860km/h) at 36,090ft (11,000m); and 715lb (325kg) at 559mph (900km/h) at 36,090ft (11,000m). These optimized thrust ratings were, however, variable according to changes in the air temperature. Thrust could vary by almost as much as 30 per cent between winter and summer.

Development of the Jumo 004 engine saw improvements which brought greater reliability and operational flexibility. The basic engine had eight compressor stages, each of which had forty solid steel, heat-resisting turbine blades. The developed 'B' series engine, the B4, had hollow, air-cooled turbine blades. With greater durability, the engine had a longer operating life, albeit with only twenty-five hours between major services. This level of servicing would not have been acceptable in an Allied air force: only the desperate plight of the Third Reich could call for the acceptance of such an inefficient propulsion for production-line manufacture. The B4 was installed in the S2 pre-production aircraft, where life was traded for performance and thrust was increased to 2,205lb (1,000kg), an increase of 11 per cent. To the end, however, flameouts were a serious problem and compressor stall at high speed was common; an altitude limit of 26,240ft (8,000m) was frequently imposed. Despite this, one Me 262 was gingerly taken up to an altitude of 41,650ft (12,700m). At the end of the war Junkers was working on a duplex ignition system and improved compressors, but these advantages did not reach production engines.

Throughout most of 1944 engine production was fraught with problems. Introduced largely because of pressure from men like Munitions Minister Albert Speer and production supervisor Karl Saur, the Jumo 004 was never built in the numbers anticipated; constant delays and bottlenecks in production contributed to the inability of the manufacturer to keep up with the output of the airframe builders. Most of the time, aircraft were stacked up awaiting powerplants that were either late or simply not delivered, and further delays were caused when Allied air raids forced Junkers to disperse production and, eventually, build its factories underground. Nevertheless, development continued apace and improvements were made.

a preliminary course of twenty flying hours. The throttles in the Me 262 were not used at altitude, so the preliminary course helped pilots familiarize themselves with what was a new routine for piston-engine crew and allowed them to rehearse corrective procedures for a jet in trouble. Next came the first experience of the Me 262 in flight.

The jet course began with thirty minutes of circuit flying, followed by an evaluation and then a further thirty minutes in the air. The next phase involved one hour of aerobatics, calling for careful throttling of the troublesome engines, another review of flying procedures, and one hour of more aerobatics designed to further transition to the next phase. This took the pilot on a series of high-altitude flights, lasting one hour, to a maximum 30,000ft (9,150m) which was about as high as the Me 262 could be flown without the risk of flameout through oxygen starvation. Next came one hour of cross-country navigation at altitudes of 12,000–15,000ft (3,660–4,570m) and one hour of element flying in a *Rotte* pair. After familiarization with this routine, the process was repeated for a further one hour. The final stage was a session of gunnery practice in which the pilot flew his aeroplane against static ground targets. This programme of pilot familiarization and training was the bare minimum essential for survival: it was not directed at tactical or operational requirements. Those would have to come in the field, when pilots were assigned to individual units.

Most pilots seconded to *Ekdo. 262* had flown twin-engined types, and so found it easier to convert to the jet than fighter pilots familiar only with single-engined Bf 109 or Fw 190 types. Of the first fourteen pilots to check in at *Ekdo. 262*, only ten were to remain with the unit; two of them would command the two Staffeln (*Oblt* Hans-Günter Müller and *Oblt* Paul Bley). At this early stage of the aircraft's intro-

A fine shot of Me 262A-1a werke/nr 110813 deployed initially with III./EJG 2 and then with KG(J) 51. Note the spent cannon shell ejector 'chutes immediately above the bomb pylon and the gun camera port in the extreme nose.

duction to service, the engines were good for a mere ten hours flying time between major overhaul, an intolerable period for any other combat aircraft of the day. Although this would increase to some twenty five hours by the end of the war, the engine's limited endurance posed a serious problem for proper training and adequate aircraft availability. Moreover, some pre-production and early-production aircraft were assigned to various test detachments (a few were seconded to the research station at Peenemünde), thus depleting the overall inventory.

The Me 262 bomber units

Parallel to *Ekdo. 262*, the first operational bomber unit to receive the Me 262, *III/KG(J)51*, was directed on 2 June 1944 to move to Lechfeld, where it would pick up the aircraft and begin the training and conversion programme. As aircraft became available, other *Gruppen* would convert, but the process would be slow, led first by the engine supply rate and then by the ability of the dispersed factories to assemble the airframes. Not until 20 June would *III Gruppe* get to Lechfeld and thence, under the command of *Hptmn* Schenk, to Leipheim. *I Gruppe* received its aircraft in August, followed by *IV Gruppe*, at Munich-Riem, in the same month, and *II Gruppe*, from Rheine-Hopstein, in October 1944. Training on the Me 262A-2a fighter-bomber imposed special requirements – and training was made more difficult by so many aircraft being diverted for trials or equipment tests. Even at the end of the year about thirty five aircraft were tied up on such duties.

External modifications to the aircraft were relatively simple. An additional 130gal (590l) fuel tank was fitted behind the rear main tank, and two MK 108 cannon were removed from the nose gun bay to compensate for the two bombs usually carried under the forward fuselage. The net effect of these changes was to add about 717lb (325kg) in takeoff weight. The pilot was required to select the rearmost fuel tank first, to achieve the correct balance as quickly as possible. If the Me 262 were to be attacked shortly after takeoff, and the bombs jettisoned, the aircraft would become tail heavy, calling for almost superhuman strength to control and avert a severe nose-up kick. In his enthusiasm to sell the Me 262 as a bomber *and* a fighter, Messerschmitt had over-stretched the product of his design: it would not be the last time a manufacturer would do that! From mid-June strenuous efforts were made to complete development testing for the fighter-bomber role. The V10 continued to be used for evaluating new pieces of equipment, along with some pre-production and production aircraft assigned to Rechlin. Among the devices tested was a new bombing calculator, the TSA 2A, produced by Zeiss.

The Word Is Out

By the beginning of 1944 the Allies, principally the British, had gathered so much intelligence information about the Me 262, and were now hearing so little about the He 280, that they rightly concluded that the Messerschmitt design had been given precedence on production quotas. The Air Intelligence (AI) branch of the Air Ministry knew a good deal about the performance of the Me 262 and its operational capabilities. From known figures on the length of its takeoff run, for instance, they were able to establish which airfields would be capable of operating the aircraft. Wherever possible those airfields were kept under photographic-reconnaissance (PR) surveillance for signs of activity indicating deployment of the Me 262.

Late in 1943 an Allied agent received data on the jet engine from an informer at Junkers, who provided information about interior design, right down to the shape of the turbine blades and the material they were made from. During January 1944 a PR aircraft photographed a Me 262 at Augsburg, and another at Leipheim for the first time, and on 7 February decoded 'Enigma' traffic revealed that the German Army was moving specialists back from the East to help with the jet production programme. By the beginning of March AI had a detailed dossier on the aircraft, and forecast that it would begin operational duty within six months. But still the belief persisted that the He 280 would eventually appear in service, and when Allied pilots were given cursory details of the German jet aircraft they immediately began to report bogus sightings. From May the Allies required a gun-camera image to confirm every report of the type.

Beginning in April, PR aircraft visited Lager-Lechfeld every few days to build a chronology of events as the aircraft neared its operational début. The spy-planes saw increasing numbers of Me 262s as deliveries began. In May the German 'Enigma' codes, now being liberally broken at decoding centres in England, indicated the existence of *Ekdo. 262* for the first time. In the answer to a request from *Luftflotte 3*, 'Enigma' revealed the fuel capacity of the aircraft and that it needed a runway with a length of 4,500ft (1,370m). Interestingly, the Allies were able to eavesdrop on information denied to the pilots and personnel of the Luftwaffe units that would soon operate the Me 262, intercepting and decoding high-level debate about the desirability of restricting the aircraft's role to one of reconnaissance until it proved itself in combat. In fact, it was to be deployed as a fighter or a fighter-bomber from the outset, and in August the Allies decoded messages proving it had already become operational in those roles.

In September and October 'Enigma' codebreaking helped the Allies track the activities of *Ekdo. 262* and gave them advance notice of the imminent movement of several Me 262s to a base in Holland under *III/JG 6*. Unwittingly, Allied codebreakers were monitoring the German fighter units' struggle to get the aircraft and operate it as an interceptor. Information about scheduled production quotas came from decoded signals from the Japanese Naval Mission in Berlin in July 1944. These revealed that the Luftwaffe expected to receive 300 Me 262s by September and 1,000 per month from January 1945. It was this information that led the Americans to give high priority (second only to attacks on oil fields) to raids on jet airframe and engine plants. The revised figures for jet aircraft production indicated in early December that the Luftwaffe would have several hundred jet and rocket fighter aircraft by April 1945. By December 1944 the secret was well and truly out: all that remained for AI to do was closely to monitor 'Enigma' traffic and attempt to second-guess the Luftwaffe on just how many fighters would actually be delivered.

Testing was essential, but production quotas were the main focus of attention during the summer of 1944. No jet fighters had been available to repulse the Allied landings at dawn on 6 June, and Hitler was enraged. When the *Jagerstab* met on 22 June to review progress on the production schedule, Saur was unable to explain logically why large numbers of jet aircraft were not yet entering service. Saur had been particularly obnoxious to the suppliers, lambasting Messerschmitt and Junkers for slack performance, when in reality he had promised Speer and the Luftwaffe an impossible delivery plan. Now he admitted that:

> We deserve to be severely reproached. In [autumn] of last year we made promises based on wishful thinking [and] assumed that we would have a good number of test machines available by January and February [1944]. We thought we would produce 30–40 by March, 60 per month by May and 75–80 a month some time after that. Now, in June, we do not have a single operational aircraft. We have no one to blame but ourselves and we were clearly incapable of focusing efforts with the necessary determination and energy.

Saur heaped blame upon the industry and upon those he said had let down the goals of the war machine, claiming that 'this aircraft has been attended by mysterious plots and this kind of thing must come to an end. I will not let myself be lied to any longer!' In reality, Saur should never have been put in charge of Me 262 production. He had no technical knowledge, and no understanding of the aviation industry or of what it took to get a completely new, revolutionary aircraft off the test stands and into combat service.

After Saur sat down, the *Jagerstab* reviewed the programme and decided upon a new production schedule. There were to be sixty aircraft produced in July, 100 in August, 150 in September, 225 in October, 325 in November and 500 in December 1944. Even these figures were impossible to honour. In fact, all projections sent to Hitler were unrealistic; they were drawn up by men who were afraid to offend the Führer, and thus sent the figures he wanted to see. Saur was a major actor in that charade; he was a man who would conspire with others to undermine Albert Speer's standing with Hitler, and the man whom Hitler appointed to succeed Speer in the closing weeks of war.

High-speed testing

The time-consuming work of testing and more testing continued. On 6 July Gerd Lindner achieved a speed of 624mph (1,005km/h) in the specially modified Me 262 S2, with its flattened, low-drag canopy. Assigned to Mach limiting tests,

this aircraft demonstrated a maximum level speed of 578mph (930km/h) with specially modified Jumo 004B-4 engines. To get the Mach limit, engineers set and fixed the elevator trim: the aircraft was put into a shallow dive of 20–25 degrees from about 26,250ft (8,000m) to 19,700ft (6,000m) at which point it reached 0.83 Mach. Higher than that a severe buffeting set in from the top rear fuselage and the nose became heavier until a stick force of 100lb (45kg) was needed to hold the angle of dive to the limit of 0.86 Mach. On the basis of these extensive high-speed tests, most of which were carried out on the V10 prototype, pilots were limited to a maximum 596mph (960km/h) below 26,250ft (8,000m), and 560mph (900km/h) above that altitude. However, the aircraft remained under full control to a maximum 0.84 Mach; in this regard it was considered better than any contemporary jet fighter on either side.

By early July, *Ekdo. 262* was active over the front, testing its aircraft against Allied air targets and developing combat tactics. But its enthusiastic, highly capable commander was not to see the aircraft achieve its first kill. On 18 July, *Hptmn* Werner Thierfelder was killed when his aircraft, a production model, crashed near Landsberg, becoming uncontrollable because of engine failure. Inspection revealed separation of the turbine stator rings. Thierfelder had twenty seven air victories, most been achieved on the Eastern Front, and a further forty one ground kills and had received the Knight's Cross on 10 October 1941. On 5 August he was replaced by *Hptm* Horst Geyer. The day after Thierfelder's death, American bombers returned to Leipheim, destroying seven aircraft and damaging three.

Ground crew struggle to attach bombs to the forward fuselage pylons in the winter snow of early 1945.

The jet enters combat

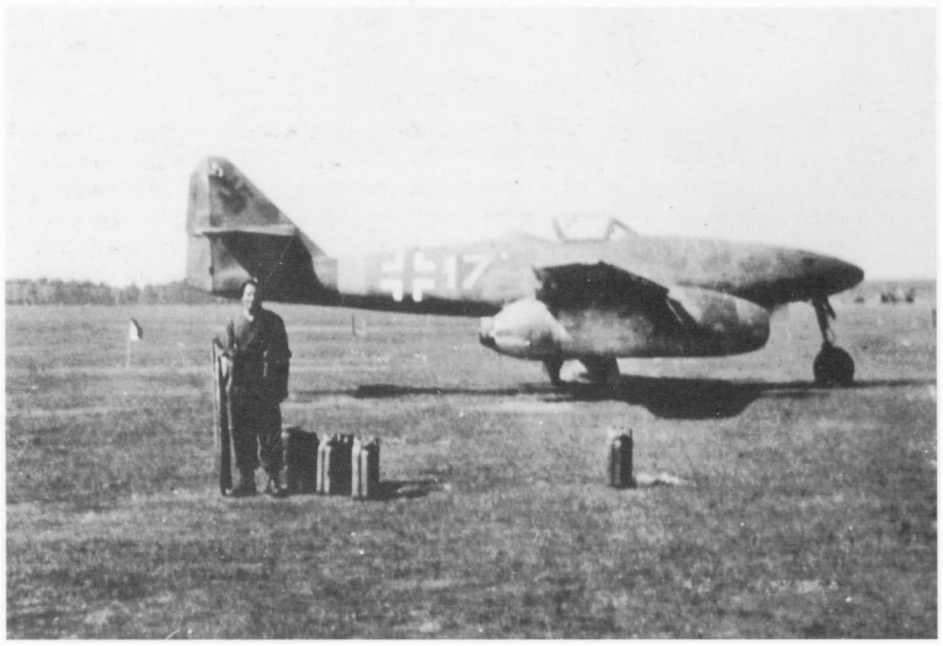
The air combat début of the Me 262 came on Wednesday, 26 July 1944, when *Lt* Alfred Schreiber tangled with a Mosquito of No. 544 Sqdn based at RAF Benson, Oxfordshire, flown by Flt Lt A.E. Wall and Plt Off A.S. Lobban. The Mosquito was on a sortie to Munich; it was at 29,000ft (8,840m) in the target area when Flt Lt Wall sighted a German aircraft approaching fast from the rear. Gating the throttles, he assumed that, as was usual in a speedy Mosquito, he would slowly pull away from his pursuer – but he was alarmed to see the German aircraft gaining rapidly. Soon it overtook the Mosquito, and Wall recognized it as one of the new jets he had heard about. As the Me 262 turned to run in for an attack, Wall turned to starboard, but the German fighter was on his tail about one mile away and, again, closing fast. At about 2,400ft (730m), the Me 262 opened fire on the Mosquito. Wall broke away: the jet, unable to turn as tightly as the twin-engine bomber, screamed past.

Four times more *Lt* Schreiber repeated the attack manoeuvre – and four times Wall evaded him. But although the Mosquito was able to out-turn the jet every time, Wall decided he was in a losing game. Nevertheless, as he related afterwards, it was an interesting, albeit unnerving, experience to tease out the jet's limitations. Seeking sanctuary in cumulus cloud, Wall dived for cover, emerging several minutes later to find the sky deserted. During his violent evasive tactics, a side door on the Mosquito had come off and had damaged the tail; so, discretion to the fore, Wall headed for the nearest friendly airfield, landing at Fermo in Italy. The Mosquito was damaged but flyable: certainly not destroyed, as claimed by the Me 262 pilot. However, *Lt* Schreiber, a skilful pilot, would claim several aircraft before colliding with a Spitfire on 29 October, when he was with *Kommando Nowotny*.

Elsewhere, nine Me 262A-2A fighter-bombers from *3./KG(J) 51*, known as *Kommando Schenk* after its commanding officer, were making their operational début on the Allied beachheads in France, after being sent to Châteaudun on 27 July. Hitler had wanted the fighter-bombers available in large numbers to hit the British and Americans as they came ashore on mainland Europe, but Saur's unfulfilled production promises had denied the Führer the wonder-weapon with which he hoped to smash the Allied offensive. As it turned out, the Me 262s' meagre efforts to influence events in western France were limited by the necessity for the jets to remain above 13,000ft (3,960m) thus avoiding detection which would inform the Allies that the Luftwaffe had begun operational deployment of the Me 262 as a fighter-bomber – which, in fact, it had not. These excursions to the front lasted little more than one month; on 5 September *3./KG(J) 51* reported back to *I Gruppe*, commanded by *Maj* Heinz Unrau, at Rheine.

Duel with a Mosquito

During August *Ekdo. 262* kept busy working the aircraft up to operational status. In this period several encounters were made and claims were logged. On 2



An incongruous reminder of one reason for Germany's military downfall – the lack of fuel – but one which was avoided for jets by the relatively abundant sources of low-grade fuel used by the Me 262.

August *Lt* Shreiber reported success against a photographic-reconnaissance Spitfire; six days later *Lt* Joachim Weber tangled with a Mosquito. On 15 August a Mosquito from No. 60 Sqdn, South African Air Force, flew a circuitous course from San Severo in Italy to Leipheim, where it intended to photograph the airfield for a progress report on jet fighter activity. Flown by Capt Saloman Pienaar and Lt Archibald Lockhart-Ross, the aircraft was attacked by an aggressive pilot flying a lone Me 262. In a fast pass he hit the Mosquito's port wing, destroying the aileron; in the ensuing tangle one engine was damaged, making the aircraft difficult to control. Twisting and turning, the Mosquito pilot fought off almost a dozen attacks. After thirty minutes the Mosquito sought cover in cloud, but emerged only to be attacked again. At last, low on fuel, the Me 262 broke away, leaving the Mosquito to struggle home with one engine stuck at full throttle. Nevertheless, it was able to reach San Severo with film proof that the Me 262 was being operated as a fighter.

In a more significant encounter, one for which the Luftwaffe *Jagdfliegern* had long hoped to use the prized Me 262, *Fw* Helmut Lennartz shot down a lone B-17 near Stuttgart, on the same day that the Mosquito battled for survival over Leipheim. The warning reached Lechfeld at 12.54pm that an Allied four-engine bomber was in the vicinity. *Fw* Lennartz scrambled with *Ofw* Kreutzberg as his wingman. At this stage aircraft were still flown in the standard *Rotten* pair established as a fighting duo by the dictat, years earlier, of Werner Mölders. Closing on his target with ease, Lennartz fired off a burst from his 30mm cannon, reporting later that he had literally sliced off the B-17's port wing, after which it tumbled away and hit the ground. Before the end of August *Ekdo. 262* reported five more engagements and made three kill claims: for a P-38, a Spitfire and a Mosquito. In the last week of the month *3./KG(J) 51* received reinforcements in France. So heavy was the attrition that only five out of nine aircraft arrived: two crashed attempting takeoff from Lechfeld; one crashed lifting out of Swäbisch Hall en route; and another force-landed with technical problems.

The first jet lost in combat

The overdue encounter between a jet-powered Me 262 and a piston-engined fighter took place on the evening of 28 August; a meeting that was to bring about the first loss of a German jet in combat. The event began when eight P-47s of the 78th Fighter Group, US 8th Air Force, based at Duxford, England, were at 11,000ft (3,350m), flying top cover for ground-attack aircraft in the Termonde (Dendermonde) region of Belgium.

Spotting a fast-moving aeroplane close to the ground, their leader, Maj Joe Myers, and his wingman Lt Manfred Coy, went into a 45-degree dive to investigate. Myers reached a reported speed of 450mph (725km/h) as he overhauled what turned out to be a Me 262. The jet was piloted by *Obfw* Hieronymous Lauer, who was expecting easy pickings from the low-flying strafers that Maj Myers' boys were out to protect. Lauer spotted the P-47s while he was still out of range, and made a series of flat turns in an attempt to evade his pursuers: close to the ground, the Me 262 was highly vulnerable. Before he had a chance to fire, the Me 262's wing clipped the ground and the aircraft slewed round and crash-landed, slithering to a stop as the pilot tumbled out and ran for cover. At that instant Myers and Coy opened fire on the stricken jet to complete its destruction; other P-47s soon joined in to savage the prey. Lauer, meanwhile, watched the action from the cover of some trees, recalling later that he thought the aircraft were Spitfires. Lt Coy fired on Lauer as he tried to escape and later reported having killed him. This was not the case: the young German returned to fly many more hours in the Me 262.

Once again the role of the Me 262 became a bone of contention, when the new Chief of the Luftwaffe General Staff, *Genlt* Werner Kreipe, pressed for the introduction of the Me 262 as a day fighter, to repel Allied air power during the day and for Reich defence in general. Hitler was furious, still seeing the blitzbomber role as a priority, but on 30 August he relented to the extent of authorizing 5 per cent of Me 262 production to be of the Me 262A-1a *Schwalbe* fighter, the rest being Me 262A-2a *Sturmvogel* fighter-bombers. But this did not satisfy Kreipe, and in a furious argument with Hitler on 19 September he handed in his resignation, his place being taken (but not until November) by *Gen* Karl Koller. The two-month command-hiatus did nothing to help the Luftwaffe, or the cause of the fighter lobby. Goering was now completely out of favour and met with Hitler only when summoned; thus there was now no Luftwaffe representation at Führer conferences.

Deployment continued to speed up,

Walter Nowotny

Born on 7 December 1920, at Gmünd in Austria, Walter Nowotny was a fitting choice to lead the first Luftwaffe jet fighter unit into combat. He was a much-decorated ace with a high reputation for bravery, sound leadership and a level head – rare combinations in a fighter pilot. Nowotny joined the Luftwaffe in October 1939 and, despite the war, completed the thorough training programme instituted in 1935 to graduate as *Leutnant*, joining *9./JG 54* on 19 July 1941. His first three kills were against Russian I-153 fighters, but a ditching in the Baltic left him paddling for the shore for three days, with nothing but his hands. On 4 August 1942, in a brilliant display of aerial combat, he shot down seven Russian aircraft, bringing his score to fifty four, and on 4 September was awarded the Knight's Cross after his fifty sixth kill. One month later he assumed command of *9./JG 54*. For a while his scoring rate slackened, but in June 1943 he shot down forty-one enemy aircraft, ten of the kills achieved in one day, notching up his hundredth victory on 15 June.

From that date Nowotny's scoring rate accelerated mightily. Forty nine kills were logged in August 1943, with nine on 13 August and seven on 21 August. Nowotny's 150th victim was bagged on 18 August, and in the following month he scored a further forty five victories, of which ten were achieved on the first day of the month. On 4 September, when his score stood at 200, he was awarded the Oak Leaves to his Knight's Cross, and on 22 September, after his 218th kill, the Swords. Following a three-week hiatus, he resumed scoring on 5 October and shot down thirty two Russian aircraft within ten days, reaching a total of 250 kills on 14 October. For a while he was the leading German fighter ace of all time; his 250 victories had been achieved during 442 sorties.

From 21 August 1943 Nowotny commanded *I/JG 54*. On 19 October he was awarded the Diamonds, one of only seven Luftwaffe fighter pilots to be so highly decorated. On 15 November 1943 he scored his 255th victory – his last on the Eastern Front – and was returned to Germany, where he spent five months in command of a training school in France. In July 1944 he began training pilots for operational duty on the Me 262, and was named commander of *Kommando Nowotny*, the first Luftwaffe jet fighter training unit. When he was killed on 8 November 1944 after a combat near Achmer, his total score stood at 258 confirmed and 22 unconfirmed. Galland, who thought very highly of Nowotny, praised his maturity, intelligence and remarkable skills as a fighter pilot. Only twenty three years old when he was killed, Nowotny was Germany's fifth highest-scoring ace, and achieved more in a shorter time than any other fighter pilot.

with bomber units becoming operational in the Low Countries when *3./KG(J) 51* joined *I Gruppe* at Vikel and Eindhoven in Holland. Consolidated, the two groups could now attack British positions close to Antwerp and Louvain. At the end of August the operational training unit for the *Geschwader*, *IV(Erganzung)/KG(J) 51*, was moved to Munich-Riem, where it would remain until April 1945. In the war's closing weeks it moved again, to Neuberg an der Donau in Bavaria, where it would finally be found by the Americans along with fifty wrecked Me 262s, all with their nose-wheel legs smashed – the favoured method for disabling the jet. Meanwhile, *Ekdo. 262* continued to tangle with Allied aircraft, all the while gaining experience in operating the aircraft and tackling piston-engined fighters, where the imbalance in sheer speed was not always an advantage. For much of August, *Ekdo. 262* rarely had more than fifteen aircraft, of which only four were in the air at any one time, a situation dictated by slow delivery rates and the ever-present engine problems.

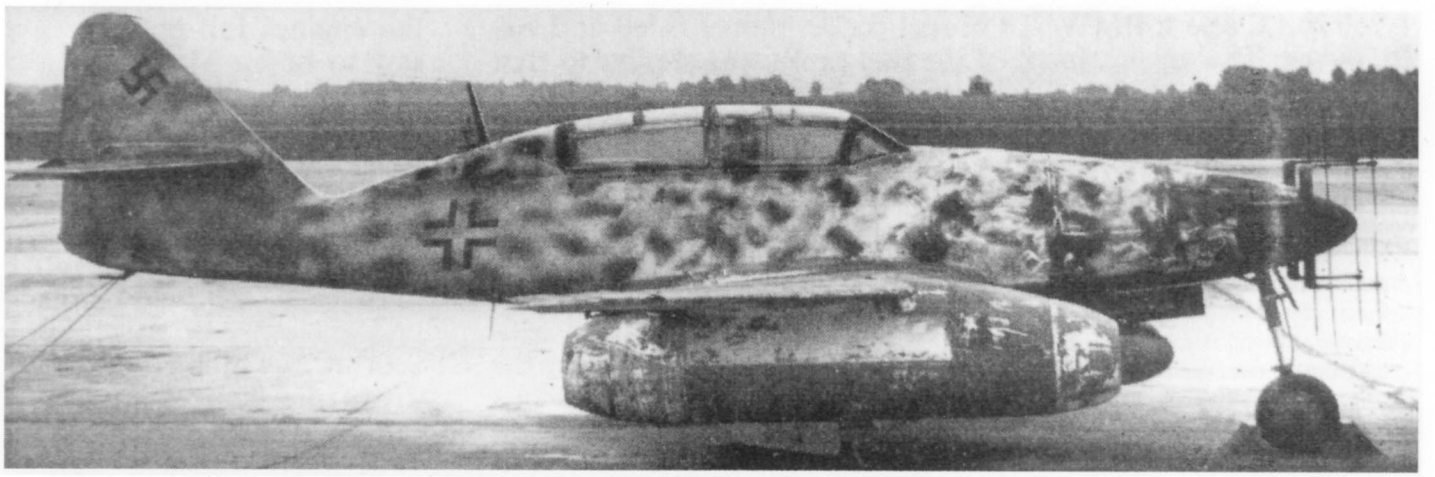
During September *Ekdo. 262* pilots claimed five kills, comprising three Mosquitos, a P-51 and a Spitfire. The Americans claimed one Me 262 damaged during a fight on 13 September, when a P-51 of the 364th Fighter Group flown by Lt 'Johnnie' Walker attacked a lone jet flying south near Stralsund. The RAF's first encounter to result in a damaged German jet occurred on 28 September, when Spitfires from No. 416 (RCAF) Sqdn, on patrol in the Nijmegen area, sighted a lone Me 262 some ten miles (16km) south of the town, at an altitude of 13,000ft (3,960m). Spotting the Spitfires, the jet pilot dived, but was pursued by Flt Lt J.B. McColl, who began his attack at 1,800ft (550m) and pressed it home to a range of 600ft (180m). McColl could see his fire bouncing off the Me 262, but the jet's pilot was not spoiling for a fight. Having led the Spitfire closer to the ground, he merely opened his throttles and climbed away.

Two days later, two Spitfires from No. 441 (RCAF) Sqdn came upon a pair of Me 262A-2a fighter-bombers at 9,000ft (2,750m) as they began a shallow dive on Allied positions below. One of the jets had a single 1,000lb (450kg) bomb on one of two underfuselage pylons. The Me 262 without a bomb disappeared into cloud, but Flt Lt R.G. Lake, who already had five aircraft damaged or destroyed to his credit, got to within 450ft (140m) of the other and opened fire, whereupon a panel was seen to fly off. The jet responded by climbing away faster than the Spitfire could match.

Galland's deployment plans

General der Jagdflieger Adolf Galland played a vital part in easing the Me 262 into service. It was his decision to appoint skilled fighter pilots who already commanded combat units to head the operational jet fighter units. He had to argue with the General Staff over deployment of the aircraft. Realizing that it would take time to get Me 262 units worked up with their aircraft, he wanted them to be deployed first in the defence of Germany, operating out of Lechfeld, where they would not be harried in the way they would farther west. That was not to be: Galland was overruled.

Deployment of the fighter began on 26 September 1944, when *Maj* Walter Nowotny, an ace with 255 kills to his credit from the Eastern Front, was ordered to form a test unit which, from the outset, was known as *Kommando Nowotny*. It formed from elements of *Ekdo. 262*, drawing some of its pilots from that unit and some from *III/ZG 26*. Based at Achmer, *Kommando Nowotny* was an élite organization. Its commanding officer had a flair for getting



Adaptation of the single-seat Me 262 fighter into two-seat trainer and night-fighter versions necessitated the addition of a second seat in the forward section of the rear fuselage, as seen here.

the right people on his side, and Galland was full of admiration for his skill in setting up the unit's equipment and aircraft. Nowotny's talents extended beyond the relatively cloistered world of the Luftwaffe, and were well displayed when he convinced the Gauleiter of Osnabrück to give him a substantial work force to prepare and extend the runways at Achmer and Hesepe.

'Kommando Nowotny' becomes operational

Despite the volume of work needed to get it up and running with only a few of its paper inventory of aircraft on hand, *Kommando Nowotny* was declared operational on 3 October. Nowotny put *Lt* Preusker in control of fighter operations. Both men were concerned about the aircraft's vulnerability during the early moments of its flight. The Allies were firmly established on the continent and had already pushed as far as the German border, so their flying time to Osnabrück could be measured in minutes. In discussions with Galland, a solution to the Me 262's vulnerability was offered and approved. Units of Fw 190D fighters would fly cover during the takeoff and landing phases, and a special flak corridor several miles in length would be set up to protect the aircraft from marauding Allied fighters until they reached their optimized performance band above 200mph (320km/h).

On 27 September, the day after *Kommando Nowotny* was formed, elements of *Ekdo. 262* not involved in the new test unit moved to Lechfeld, where they formed *III/(Erganzungsgruppe) JG 2*. Its first commanding officer was *Hptmn* Georg-Peter Eder. When *Kommando Nowotny*, later dissolved and became *JG 7*, a few pilots from it joined this unit. By the beginning of October *Kommando Nowotny* had about twenty five Me 262s against a projected strength of forty – but this was enough to schedule operations. Although isolated encounters had taken place in preceding days, the first formal operation began on 7 October, when five Me 262s – the largest force yet mustered – took off to attack massed formations of American heavy bombers heading for the oil fields. Without their Fw 190D cover, which would not be in place for another week, the jets proved vulnerable to P-51s of the 361st Fighter Group which were prowling the area looking for slow-flying prey. They found it in the five Me 262s. As the first pair were taking off, Lt Urban Drew dived straight down on them and shot down both. Later a third Me 262 was shot down, while the jets claimed three bombers. It was an inauspicious beginning.

Allied counter-measures

The Americans had begun to get the measure of the Me 262, and on 10 October held a meeting to evaluate encounters to date and to decide on the best tactics to use against the jets. In a meeting with RAF pilots at Debden, England, American leaders practised a variety of evasive tactics, using five Meteor Mk.1s. Two days later, the Meteors made mock attacks in the style of Me 262s over England on 140 B-24s escorted by P-51s and P-47s. It was agreed that the best chance for a piston-engined fighter against a Me 262 came when diving from above. The only other instances where conventional fighters had the better of the jets was during the jets' takeoff or landing, or when they were low on fuel with dry tanks. The Allies were becoming determined in their resolve to counter the German effort.

Protection for the Me 262s during the critical takeoff and landing phases was now crucial to their survival. The Fw 190D aircraft assigned to fly top cover for *Kommando Nowotny*, comprising *9.* and *10. Staffeln* of *JG 54*, were ready by 12 October at Achmer and Hesepe. Three days later, six cover fighters from *9./JG 54* took off from Hesepe to take up station, two flying low over the airfield and four at 6,000ft (1,830m). The patrol was expected to last only six minutes, while the jets took off and climbed. Suddenly some forty P-51s were reported south of Osnabrück, heading for the Fw 190s. The P-51s, from the 78th Fighter Group at Duxford, came over the airfield at height. When the Fw 190Ds saw the size of the incoming formation and realized that they were heavily outnumbered, they elected to get down on to the ground as fast as possible. As the first German fighters were making their final turn in toward landing, the Mustangs jumped them and all the Fw 190s were

A captured two-seat Me 262 repainted with RAF insignia over standard late-war camouflage. Note the forward landing gear yoke and tow bar.

quickly embroiled in a fierce dogfight. Five were shot down, only one pilot surviving; the sixth Fw 190 managed to escape to Münster-Handorf. Later in the day four more Fw 190Ds were shot down, with the loss of two pilots.

The Me 262s use air-to-air missiles

For the next two weeks there was no contact between *Kommando Nowotny* and the Allied air forces. Then, on 28 October, the German unit reported downing a P-38 and a P-51, although US sources reported no losses that day. Next day the unit claimed four aircraft, two of which went to *Lt* Schreiber, who shot down one and inadvertently rammed another before baling out! This brought Schreiber's kills in the Me 262 to five, making him the first jet air ace. Encounters became frequent, but the German pilots' claims were made with wanton enthusiasm, and did not measure up to reported enemy losses. Indecisive encounters continued until 2 November, when the aircraft of *Kommando Nowotny* used air-to-air rockets for the first time. A tube ejector was fitted to each of the two forward fuselage mounting points for bombs. Each tube carried a single 210mm rocket. Six Me 262s equipped with these makeshift devices attacked a force of B-24s and their escort of P-47s near Minden. The Allied aircraft were totally surprised by the simultaneous attack of all six Me 262s, which fired their rockets in salvo toward the bombers. The US 392nd Bomb Group soon responded in kind by fitting rear-facing anti-tank bazookas to its aircraft, but these unauthorized devices were never effective.

Galland visited *Kommando Nowotny* at Achmer to check on its activities and discuss problems and plans with its commanding officer. On 7 November he spent more than one hour discussing unit operations, directives and tactics. Early next morning the raid sirens blared and *Maj* Nowotny prepared to take off with wingman *Oblt* Wegmann. At Hesepe, *Lt* Franz Schall, who had already made 120 kills (three flying the Me 262), and *Fw* Buttner took to their aircraft as well. Before the jets took off the Fw 190Ds were aloft to fend off the P-51s. As the bombers turned back from their target the jets

pounced. Schall shot down two P-47s from the 359th Fighter Group before he and Nowotny attacked the bombers near Quakenbrück. Hit by fire from a P-51 of the 357th Fighter Group, and already in difficulty with engine trouble, Schall took to the silk and escaped his doomed aircraft.

The death of Nowotny

Meanwhile Nowotny had intercepted and downed a B-24, before sending a radio message informing base that he had an engine failure and was therefore returning. On hearing this news, Galland left the control tower and stood on the airfield, where he heard the sound of gunfire. Unseen by Galland, *Maj* Nowotny was jumped over Dummer Lake by a P-51 piloted by Lt R.W. Stephens of the 364th Fighter Group. The first seen by the watchers on the airfield of aircraft's fate was when a lone Me 262, Walter Nowotny's plane, flew vertically down through the low cloud base, hitting the ground with a massive explosion less than one mile from the base. Galland appointed *Hptmn* Georg-Peter Eder as the new commander of *Kommando Nowotny* on the spot. Eder's tenure was short-lived. Three days later the unit was stood down and merged into *III/EJG 2*; three days after that it moved back to Lechfeld. In its period of operational flying the unit had claimed twenty-two enemy aircraft for the loss of twenty-six of its own; although of these eight were lost through accident and five in forced landings following air combat.

After *Kommando Nowotny* was withdrawn from operations there was a brief gap in Me 262 activity. On 18 November the USAAF organized a hunting trip. In the course of a sweep against several targets, 355 P-47s and P-51s visited the airfield at Lager-Lechfeld and strafed twenty jets parked there, destroying at least fourteen. Although it was a matter of utmost confidentiality within the Luftwaffe, the Allies were aware through decoded signal traffic that a reorganization of Me 262 day fighter activity was underway. The first fully fledged air defence unit, dedicated to protecting Germany from daylight raids, and the first all-jet fighter unit, was being set up as *JG 7*. The origins of the decision, with its apparent reversal of policy concerning the fighter-bomber priority, lie in an interrogation report from *Auswertestelle West*, the *Dulag Luft* (air force POW camp) responsible for prisoners of war and their interrogation. Referring to the activities of the Me 262A-2a units, one captured American pilot had expressed his contempt for an air force that could use such a brilliant design as the Me 262 for bombing duties. He said that the 'American Air Force was living in fear of the day when the Me 262 would appear as a fighter'.

For those aircraft that managed to survive the rigours of the war's end, exterior skins were frequently a mix of original and replacement panels. Note the changes in colour on this captured aircraft around the forward fuselage and forward nacelle sections, indicative of changeouts.

The fighter role re-emphasized

This report was used by the pro-fighter lobby to enforce their view. It was widely circulated, so much so that *Reichsführer* SS Heinrich Himmler saw it and virtually ordered Goering to accelerate the introduction of the Me 262 as a fully fledged fighter, with the establishment of major operational units flying the type. Himmler was playing a dangerous game; he had already seized the initiative in several areas where others feared to tread. Openly hostile to Goering, he sought every means possible to wrest control of the Luftwaffe from the bloated Reichsmarschall: a further step in his power-play to seize control of the Reich. Goering, out of favour with Hitler and now fearing he was in danger of being removed forcibly by Himmler, commanded Galland to form a dedicated fighter unit. Himmler, meanwhile, convinced Hitler that the aircraft should be used as a fighter. On 4 November the Führer agreed to that, with the proviso that the aircraft was equipped to carry at least one 551lb (250kg) bomb should the need arise. So it was that the Luftwaffe was to get its first operational, all-jet, fighter *geschwader*.

The last victory for *Kommando Nowotny* was scored on 9 November, when *Hptmn* Eder (its new commander) shot down two P-51s of the 20th Fighter Group. Two days later, as commander of the newly-formed *III/EJG 2*, he claimed three more, although the Americans recorded no losses. On 23 November *Hptmn* Eder shot down three B-17s, thereafter retiring from operational flying to concentrate on training activities. Meanwhile the first operational, all-jet, fighter unit was formed as *JG 7* for the express purpose of 'Reich' defence. It scored its first victory on 23 November, when *Lt* Weber bagged a P-51.

JG 7: the first all-jet fighter unit

The *JG 7 Geschwaderstab* had been formed in August 1944, when it was planned to incorporate elements of *KG 1 Hindenburg* and *JG 3 Udet*, equipped with Bf 109G fighters. *III Gruppe* formed on 19 November at Lager-Lechfeld under *Maj* Hohagen; it comprised three *Staffeln* : *9. Staffel* at Parchim under *Hptmn* Eder; *10. Staffel* at Oranienburg under *Oblt* Schall; and *11. Staffel* at Brandenburg-

For the Allies, Germany's jet engine industry was a prize worth picking over. Much of the jet propulsion technology was as advanced in Britain and America but a liberal supply of engines was retrieved for examination and many remain in flying schools and aeronautical universities today.

Briest. From the outset build-up was slow: two months after their formation *Geschwaderstab* and *III Gruppe* had only nineteen fighters, and when eventually they reached establishment strength of forty five aircraft there were rarely more than thirty serviceable at any one time. *JG 7*, formed on 27 November from elements of *II/JG 3*, was commanded by *Maj* Weissenberger and was based at Kaltenkirchen. The *Gruppe* suffered from tardy deliveries and low priority and did not achieve full operational strength until April 1945. Commanded by *Maj* Hermann Staiger, *II/JG 7* did not form until 12 January 1945, from elements of *IV/KG 54*.

The fighter-bomber units, meanwhile, were making a creditable showing; their sorties were frequent and sometimes bloody. One RAF pilot, Lt Wilson of No. 400 (RCAF) Sqdn got the shock of his life on 15 October when he was suddenly jumped by twenty four Me 262s at 28,000ft (8,530m) near Nijmegen. During September and early October, *KG 54 Totenkopf* was re-equipped with the Me 262A-2a and was redesignated *KG(J) 54*. Previously equipped with Ju 88s, *KG 54* had begun life in May 1939, when it was formed from elements of *KG 254* (itself extending back to 1936). The *Stab* and *I Gruppe* were at Giebelstadt, and *II Gruppe* was at Neuberg, but the units did not receive their first aircraft until November and *KG 54* did not become operational until January 1945. Led by *Geschwaderkommodore Obstlt* Baron Volprecht Riedsel Freiherr zu Eisenbach, *KG(J) 54* had continued difficulty in getting the aircraft assigned to it. It would see service on the Eastern Front with *I Gruppe*, moving into Czechoslovakia on 11 April 1945, while *II* and *III Gruppe* remained in Germany.

A potential night-fighter

By late 1944 Germany's situation was desperate. Vast formations of Allied bombers were pounding its cities and great industrial heartland by night, and its factories, marshalling yards and communication centres by day. In an attempt to stem the increasingly intense night bombardment, tests were conducted in October to evaluate the potential of the Me 262 as a night fighter. At the Rechlin test centre a specially adapted Me 262A-1a was fitted with a FuG 220 (Lichtenstein SN-2) intercept radar, with a four-pole *Hirschgeweih* (Stag's antlers) antenna array. The tests were conducted by *Obst* Hajo Herrmann and *Oblt* Behrens, and the results were so promising that a test unit was formed to pursue the trials operationally. Equipped with standard Me 262A-1a fighters, *Ekdo. Welter*, named after its commanding officer *Oblt* Kurt Welter, formed on 2 December. From 28 February 1945 it would be designated *10./NJG II* (*Kommando Welter*). The unit scored its first night victory on 12 December 1944. The *Staffel* was officially operational from 17 December.

Also in December, a test unit was formed under *Maj* Gerhard Stamp for the purpose of evaluating a new form of attack. Known as *Kommando Stamp*, the unit attempted to destroy four-engined bombers by dropping bombs on them from above. Each of the unit's Me 262A-2a fighter-bombers carried an AB 500 (1,102lb;500kg) or SC 250 (551lb; 250kg) bomb. Several sorties were made and some successes reported. Tests at Rechlin continued almost to the end of the war, involving special barometric, acoustic and remote-control fuses. Bomb aiming against aerial targets was done through the standard Revi 16B sight. In January 1945 Dr Kortum of the Zeiss Corporation developed a device that was intended to give the pilot indications of relative speed, altitude and ballistic figures, thus enabling him to aim his bombs more accurately. This *Gegner-Pfeil-Visier* – flight path pointer; GPV 1, – was used several times by *Kommando Stamp*, but without significant results. Yet for all the unsuccessful schemes associated with the Me 262 programme, there were several good ones – and as the New Year of 1945 approached, new types of aircraft and better weapons were in the offing.

CHAPTER FOUR

The Beginning of the End

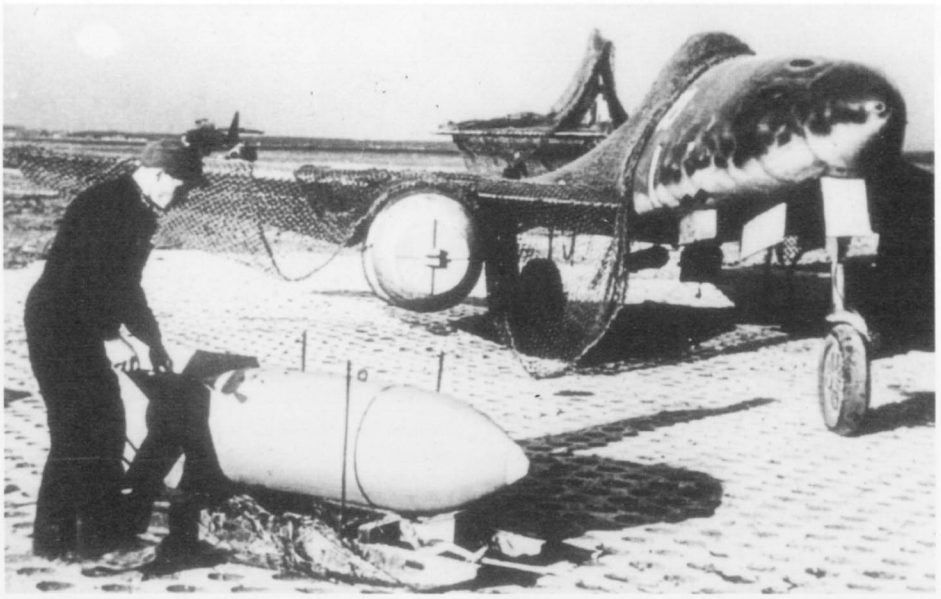
The Allied armies had hoped to win the war by Christmas 1944, but had anticipated a victory too far. For Germany, the situation on the ground was hopeless and in the air it was disastrous. Too late, its leaders had realized their dire need for large numbers of defensive fighters. The combined production capacity of British and American aircraft factories was overwhelming German air power: through sheer weight of numbers, the tide had turned decisively in favour of the Allies. German fighter output had now been a priority for more than one year, and deliveries in 1944 had reached 31,000 aircraft, more than in all the previous war years combined. But losses too had reached a record level: more than 27,000 aircraft had been destroyed in1944, again a total greater than in all previous years. Almost the entire German aircraft industry was now manufacturing fighters. In 1942 fighters had accounted for about 44 per cent of all aircraft production; in 1943 the proportion rose to 57 per cent; in 1944 it reached a staggering 76 per cent. Bomber production had all but ceased, while the need for training aircraft expanded along with the demand for more pilots.

By late 1944 the situation facing *General der Jagdflieger* Adolf Galland was critical. Only through ingenious planning and innovative weaponry could his fighter forces counter the vast numbers of Allied aircraft now free-ranging over Germany. The Allies, their bombers now under the protection of long-range escort fighters like the P-51D, with more fighters dedicated to low-level, often launched several hundred aircraft in a single sweep. Because the Me 262 was seen as a vital tool for blunting that assault, its production quotas were set without regard to the realities of the delivery chain. Bottlenecks were forming, satellite assembly shops were not producing their quotas, and the lack of adequate transport was becoming a serious problem. To fill the demand for more aircraft, Saur had begun a mass transfer of labour from concentration camps; he was also negotiating with the SS for slave labourers to be sent from the death camps. Emaciated through lack of food and devoid of energy, such workers were next to useless; their employment simply satisfied the German predilection for neat accounting. The workers who now predominated in the workshops and on the assembly lines in well-hidden mine shafts were dying men without hope.

Field servicing trolleys stand by this Me 262. For all its radical concept, the fighter was relatively easy to maintain and put in the air. Messerschmitt paid particular attention from the outset to production and in-service maintenance needs.

A shortage of aircraft – and fuel

At the front end of the chain, Luftwaffe units sought aircraft wherever they could find them. But if aircraft were slow in coming from the dispersed factories, the acquisition of targets was proving difficult as well. Fuel shortages were increasing, and not only because of Allied bombing effects. The German High Command was planning a major assault in a desperate attempt to break through to the Channel. This major campaign was to be directed against the unsuspecting Americans, who would take the brunt of an attack through the Ardennes in what is known to history as the 'Battle of the Bulge'. Galland, knowing nothing of this plan, worked to his own agenda. He aimed to build a reserve of fighters in Germany for a series of massive blows at the daylight bomber formations. Only in this way, he reasoned, could the Allies be made to suffer on such a colossal scale that they would divert their attentions from marshalling yards and communications centres, and instead resume their attacks on aircraft factories which, being dispersed, stood a better chance of survival. Thus, Galland believed, the German Army could turn its



Inducted to the test programme for bomb-carrying Me 262 derivatives, V303 is about to receive two SC500 bombs on forward under-fuselage pylons.

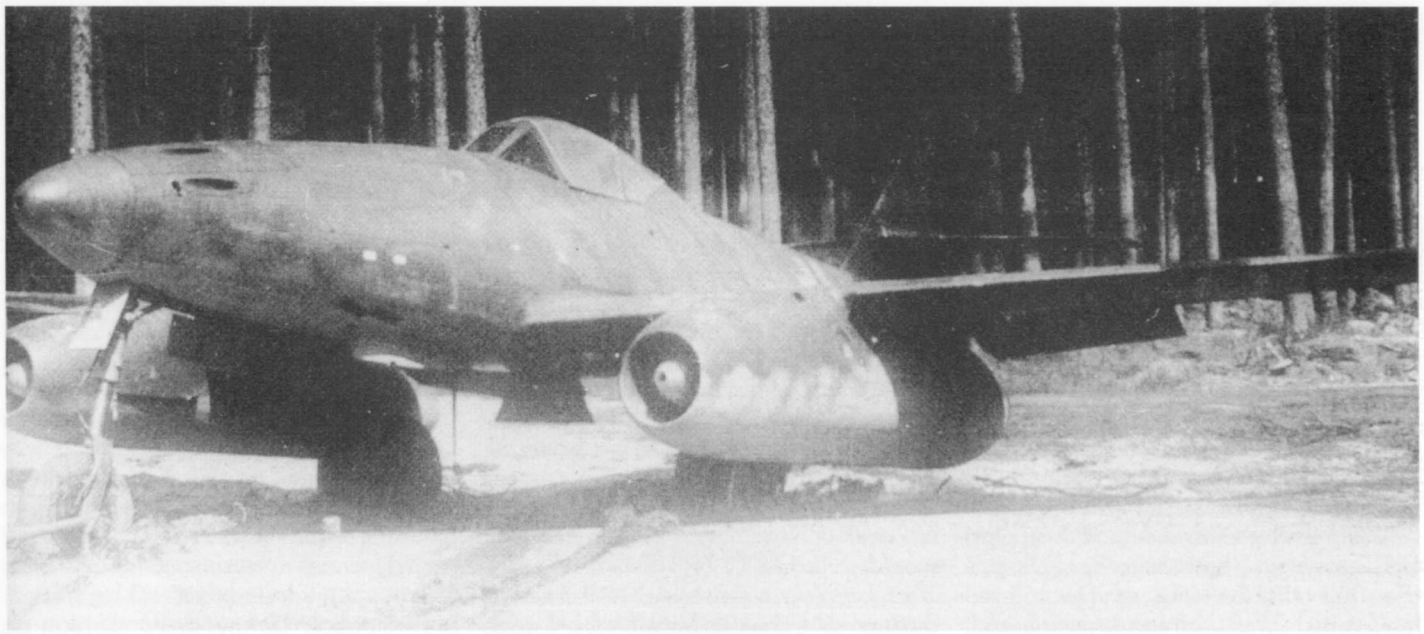
attention from the Western Front and instead concentrate on holding the Russians at bay while a compromise was reached with the British and the Americans.

It was an unreal idea, hatched from the fantasy that the Americans would decide to save Germany from the Slav hordes, and would fight shoulder-to-shoulder with the German armed forces in the defence of Western Europe. It was not an uncommon belief among Germans at that time, but they failed to appreciate the Allies' point of view. The Allied peoples had seen enough of war: they would not countenance another bitter struggle, especially one against a former ally whose workers and soldiers had toiled heroically to stem the tide of Fascism and against whom they held merely a difference in political ideology. (In the Cold War years, of course, the German hope was fulfilled, when the Western powers, including the German Federal Republic, stood together against the communist menace. One of Germany's greatest air aces of World War II Johannes Steinhoff, would command all air forces in Europe in that very different struggle.) But in late 1944 Galland was committed to his 'Big Blow', assembling his aircraft and pilots accordingly. Only at the eleventh hour was he told that these resources would be used in a massive ground assault through the Ardennes, and that there would be no attack on the bombers.

The photo-reconnaissance role

Intelligence about Allied activity was now needed more than ever, on a broad front as well as through the Ardennes, so the Me 262 was drafted into that role as well. Special reconnaissance derivatives of the fighter were developed in the closing weeks of 1944, and in November *Sonderkommando Braunegg* was formed at Herzogenaurach under *Oberstlt* Braunegg. It flew the Me 262A-1a/U3, along with some unmodified Me 262A-1as. The reconnaissance model had either two RB 20/30 cameras, or one RB 20/30 and one RB 75/30 mounted on either side of the

Toward the end of the war many dispersed airfields adopted makeshift facilities and rapid Allied advances continually threatened fixed airfields. Many Me 262s were found abandoned in fields and near forests.



Flying the *Schwalbe*

In several ways the Me 262 was easier to fly than the Bf 109, suffering none of the idiosyncrasies of propeller-driven aeroplanes. It was, however, not without vices, and could give an unwary pilot serious trouble. Its most serious drawback was the unpredictable Junkers Jumo 004B powerplant, which was not always reliable and had a mere ten hours between overhaul and a projected life of only twenty five hours – the latter being rarely achieved! Its most threatening characteristic was its high stall speed, which necessitated high takeoff and landing speeds. A single engine failure at anything below 180mph (290km/h) was potentially fatal; in the two-seat training and night-fighter models extra weight made these problems worse. Accident rates were high, particularly so with the heavier variants.

After engine start (*see* 'The Office' on p. 74) it required a gentle touch to move the aeroplane safely off the apron and on to the runway; the temperamental engines were averse to sudden throttle movements and it was not unknown for the jet pipe to melt. The most noticeable asset of the Me 262 cockpit was all-round visibility, which exceeded that of any other German aircraft and was in remarkable contrast to visibility in the Bf 109 and the Fw 190, from which many Me 262 pilots came. It took some effort for the pilot to adapt to the extra height above ground, but this height contributed to a full 360-degree view. With the engines at 8,700 rpm on the brakes, the pilot performed a quick check, including the all-important fuel pressure, burner chamber pressure and pipe temperature. Any fluctuation in fuel pressure of more than 2–3 per cent meant that takeoff was aborted.

A disconcerting feature of takeoff at full throttle was a noxious cloud of smoke and fumes flowing into the cockpit even before the canopy was shut. Acceleration was slow and the aeroplane felt over-weight and under-powered. At 100mph (160km/h) the nosewheel was gently raised from the runway; at 124mph (200km/h) the aeroplane lifted away. On getting airborne, flap deflection was reduced by 10 degrees and the landing gear retracted, while the nose was pushed gently forward to gain speed. At 180mph (290km/h), when a single engine failure was just tolerable, the flaps could be fully retracted. If an engine did cut out, the aircraft would enter a violent diving turn: the only escape lay in applying full rudder and backward pressure on the stick to maintain a nose-high attitude, all within two seconds.

Above a speed of about 185mph (300km/h) the aircraft began to take on a life of its own, acceleration being crisp and the engine responding smoothly to geared throttle commands. The aerodynamics were at their best, and the engine in the optimum band of its power/performance curve, at higher speed. Above about 13,000ft (3,960m), however, the fuel pumps had to be switched on to prevent starvation, and at altitudes higher than 29,500ft (9,000m) it was unwise to cut engine speed below 6,000rpm for fear of flameout. Since it was unwise to attempt engine re-start below 13,000ft (3,960m), disregard of this rule might exact a severe price. For speed, the aircraft was clearly in a class of its own – but not without caveat. Luftwaffe pilots were told not to exceed 596mph (960km/h) under any circumstances, and to keep the speed below 560mph (900km/h) at altitudes in excess of 26,250ft (8,000m). It was also advisable to trim the elevators so that a positive stick-forward motion was required to enter a dive.

One important attribute of the Me 262 was its broad tactical performance envelope within its overall performance frame. Although it had a critical Mach number of 0.83, the aircraft preserved good handling and control response up to Mach 0.82, ensuring that it had a wide speed margin over any operational Allied fighter. Against the Meteor Mk.1, 2 and 3 (1944–45), the Me 262 was 110mph (177km/h) faster at 10,000ft (3,050m); not until 1948 would Gloster produce a Meteor variant (Mk.8) as fast. Like other jets of its day, however, the Me 262 suffered from imprecise knowledge of transonic aerodynamics and, like its Allied contemporaries, experienced marked porpoising at high speed because of insufficient fin area. Attempts to cure this by reducing the height of the fin and rudder increased single-engine safety speed by 20mph (32km/h), so the standard tail was reinstated.

Those who flew the Me 262 recognized, in its positive handling characteristics and its responsiveness optimized for a variety of roles, including interception and ground attack, the diversity intended by its maker from its inception. Although relatively unreliable engine performance and single-engine speed penalties provided problems for the unwary, the Me 262 was generally pleasant to fly and had many sound attributes not seen in later aircraft. On the approach it paid to lower the landing gear at 250mph (400km/h), although it was safe to do so up to 310mph (500km/h), and to drop the flaps to 20 degrees while opening up the throttle to about 6,500rpm. On final approach, full flap at 155mph (250km/h) would check the speed to 125mph (200km/h) for let down. The landing run was long and the brakes never seemed quite to operate as well as they should, but the aeroplane was a winner. Still, it could have been made all the better by reliable engines with more power and longer life. Only then would pilots have been fully imbued with the confidence they needed to get the best from the Me 262.

nose-wheel bay. Consisting of two *Staffeln*, the *Gruppe* formed the *Stab* and one *Staffel* of *Nahaufklärungsgruppe NAGr 6* in March 1945. In the initial weeks of operation it was based at Münster, but from early February it would move around southeast Germany, ending up at Lager-Lechfeld. In the first three weeks of December, however, the weather was appalling and very few aircraft could fly. Individual Me 262s were able to conduct reconnaissance flights, but little activity was possible until 23 December.

Such inactivity was in contrast to the last week of November, when *III/JG 7* had scored well. On 24 November, one day after *Lt* Weber downed his P-51, *Fw* Buttner shot down a Lockheed F-5 (the photo-reconnaissance version of the P-38 Lightning) while *Lt* Gobel bagged a P-51. On the same day *Maj* Rudi Sinner, the new *Gruppenkommandeur* of *III/JG 7*, shot down a P-38, as did *Obfw* Baudech. The following day *1 Staffel* of *KG(J) 51* lost a jet when *Hptmn* Rosch was shot out of the sky by anti-aircraft fire while attacking ground positions near Helmond. Retribution in

Beautifully preserved in the Deutsches Museum, a *Kettenkrad* tractor used at Me 262 airfields for moving the aircraft around. With extraordinary pulling power for its size, the tracked vehicle was adapted for many informal uses and on one occasion during an air raid doubled as an open top ambulance when collecting an injured Adolf Galland from his crashed aircraft.

kind was delivered by *III/JG 7* on 26 November, when two P-38s and an RAF Mosquito were shot down by *Maj* Sinner, *Obfw* Buchner, *Lt* Müller and *Obfw* Lennartz. These kills were targets of opportunity. Buchner was in the air on a test flight when the Stuttgart controller advised him of a blip appearing near Augsburg. From 24,000ft (7,300m) Buchner spotted a lone P-38 (an F-5 reconnaissance aircraft) flying fast and low. This easy prey was hit so fast that its pilot thought he had been struck by flak.

Sinner's kill was the reward for persistence. After attacking what he thought was a lone F-5, he was jumped by its escort of three P-38Js and forced to break away, almost losing contact in the process. Returning from below with a gated throttle, he shot down an escort fighter and returned home. Müller's Mosquito was an aircraft from No. 60 Sqdn, South African Air Force, which took shells and shed smoke from one engine. Convinced that it was doomed, Müller circled for a while as it slowly lost height into cloud; in fact, the Mosquito's pilot nursed it back to Italy and made a forced landing at Fano. Next day, 27 November, *Obfw* Lennartz got the better of a photo-reconnaissance Spitfire from No. 683 Sqdn, RAF, while on a routine assignment near Stuttgart. A Me 262 from *2./KG(J) 51* was shot down by ground fire near Helmond the following day. Apart from a P-38 shot down by *Lt* Weber on 2 December, and the first night victory scored by *Oblt* Welter of *10.NJG 11*, there were to be no more claims for almost a month.

Too many accidental losses

Losses, however, continued: twenty one jet aircraft were destroyed during November, in comparison with twenty nine claims by Me 262 pilots. By the end of the month, seventy one Me 262s had been destroyed, on the ground or in the air, since the loss of V7 at *Ekdo.262* on 19 May 1944. Of that total, thirty six losses were not attributable to combat, although ten of them were the jets destroyed in the bombing raid on Leipheim on 19 July. By the end of November, Me 262 pilots had claimed fifty two Allied aircraft in combat since the jet's first victory on 26 July 1944. Pilots were still having some problems with the aircraft, for the need to rush the type into service prevented corrective measures being applied before combat use. Nose-wheel legs were vulnerable to hard landings; tyres were causing problems, for high landing speeds on concrete runways ripped tyres or caused blowouts. The landing approach called for a difficult balance between airframe and engine. Test

Adolf Galland

Born on 19 March 1912 to a family of *émigré* Hugeneots settled in Germany since the eighteenth century, Adolf Galland manifested an aptitude for flying in his youth, frequently excelling in glider contests. After qualifying as an airline pilot in 1932, he joined the 'black' Luftwaffe in the following year, spending two months on a course in Italy, where he taught the Italians as much as he learned about aerobatics and ground strafing. In 1935 he became a member of the new Luftwaffe and joined *JG 2* 'Richthofen' before volunteering for duty in Spain with the Condor Legion. There he flew Hs 123 ground-attack aircraft with great success, writing the rule book on strafing and support for ground troops. When he returned to Germany in mid-1938 after a year with the Legion, he helped set up a fighter *Gruppe*. He then joined LG2, equipped with Hs 51 biplanes, with which he participated in the assault on Poland in September 1939.

Before the end of that year Galland had been transferred to *JG 27*, where he spent the 'Phoney War' until the Germans attacked France and the Low Countries in May 1940. From July 1940 Galland served with *JG 26* as *II Gruppe Kommandeur*, flying Bf 109Es, and from late August led *JG 26* in battle. By December 1941 he had logged ninety four official victories and had been promoted to *Oberst*. As a legendary figure of the Battle of Britain he had become a well-known pilot to Germans and British alike: he entertained Douglas Bader and later Bob Stanford-Tuck when they were shot down over France. He was awarded the Knight's Cross in August 1940, receiving the Oak Leaves in September of that year and the Swords in June 1941.

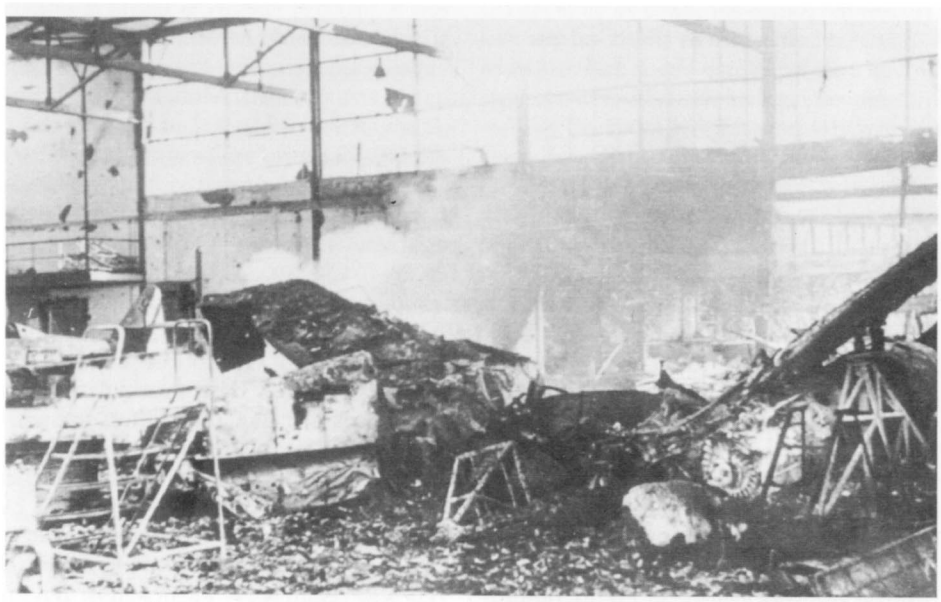
In December 1941 Galland was promoted to *General der Jagdflieger* (General of the Fighter Arm), and two months later organized air cover for the famous escape of the battleships *Scharnhorst* and *Gneisenau* from Brest to German ports via the English Channel. Galland was instrumental in developing an élite spirit in *JG 26*, and expected his pilots to follow a rigorous code of conduct which he personally exemplified. He would not tolerate fighter pilots who fought defensively and demanded total commitment to the task. He maintained close contact with his men and supported their cause up to the higher echelons of Luftwaffe command. In November 1942 he was promoted *Generalmajor*, the youngest German officer of that rank, and in November 1945 rose to *Generalleutnant*.

Increasingly blamed by Goering for the Allied air raids on Germany, Galland fell from favour in late 1944 and was removed from his command of the fighter arm in December that year. This sparked a revolt of senior fighter officers in January 1945, and Galland was given command of an élite Me 262 jet fighter formation. He called it *JV 44*, but others knew it as *Jagdverband Galland*. He was shot down on 25 April 1945, and tried unsuccessfully to turn his unit over to the Americans for what he believed was an impending fight with the Soviet Union. Galland was required to submit to Allied interrogation for two years, during which time he wrote a full account of Luftwaffe fighter activities. In 1947 he joined Kurt Tank, formerly designer for Focke Wulf, in South America, where he helped build up the Argentine fighter arm. In 1955 he returned to Germany to become a businessman and consultant. Galland died in 1996 at his home high above the Rhine near Oberwinter, not far from Remagen.

pilot Gerd Lindner told his Allied interrogators after the war that he recommended coming in high and sideslipping onto the runway, shedding excess energy in the process, rather than trusting to the engine to provide smooth, consistent power all the way down.

The Battle of the Bulge: Operation *Bodenplatte*

The foul weather that had kept the Me 262s at home for the first three weeks of December finally lifted sufficiently for the Battle of the Bulge to begin. A massive artillery barrage opened along a broad front before dawn on 16 December. The aircraft that Galland had assembled for a major operation against Allied bombers were now committed to this desperate counter-offensive. Of 2,460 aircraft assembled for



An attack on Lager Lechfeld leaves a swath of destruction through a hangar which contained the first Me 262 prototype.

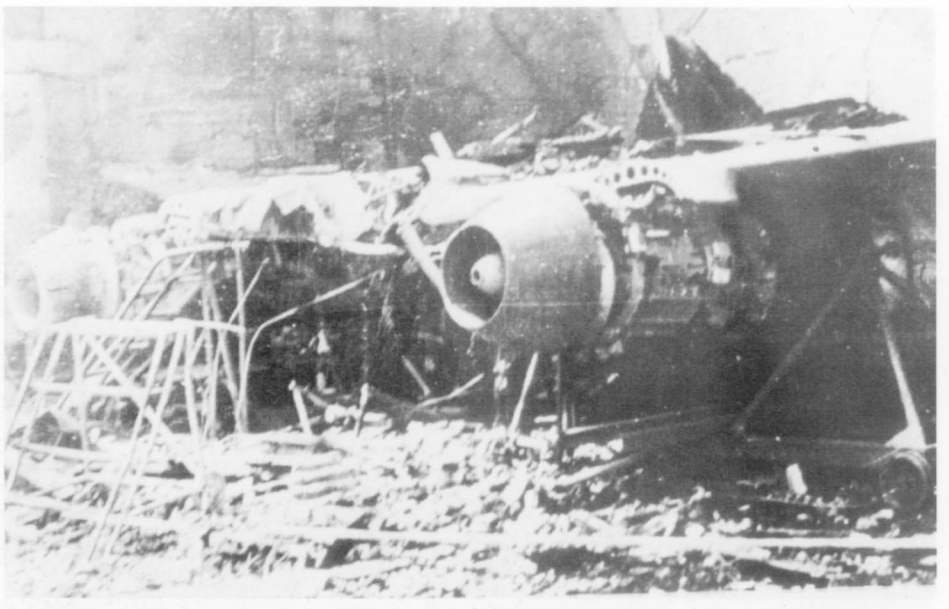
the assault, nearly 1,800 were single-engined fighters. Many of the pilots had expected to be operational in the air defence of Germany, and were ill-prepared for low altitude dog-fights launched from makeshift fields against fighters and ground-attack aircraft, a rough-and-tumble battle over a fog-shrouded, unfamiliar landscape. Very few Me 262s were at first involved in Operation *Bodenplatte* (Baseplate), which sought to destroy the core of Allied air power, take control of the skies and provide cover for the Panzer brigades in their headlong rush to the Channel. But although the weather had improved sufficiently to permit the opening of the ground war, heavy cloud and fog kept the Luftwaffe grounded.

The weather had, of course, a similar effect on Allied aircraft, and for a while it provided the *Wehrmacht*'s best hedge against massive aerial retaliation. The period of respite ended on 22 December, when the fog, mist and rain began to lift sufficiently to allow strikes by Allied ground-attack aircraft. Now, too, the Me 262s began to make themselves felt, and the losses they inflicted on Allied photo-reconnaissance aircraft prompted the provision of escorts on these important operations, so that the jets would now also have armed fighters to contend with. The main force of aircraft assembled for *Bodenplatte* was still held back. On the ground the Allies had been caught by surprise, and the mass assault by German armour without prior warning cut deep into Allied lines. The objective was to take Antwerp in a broad thrust west and north, but as the month ebbed away Allied resistance stiffened. The Panzers failed to make it across the Meuse; their momentum dissipated and they began to fall back. Overstretched supply lines, virtually no air cover and increased opposition from Allied air power broke the German offensive. American ground troops consolidated and pushed back the spent force.

Throughout December there had been a steady attrition of Me 262s. Eighteen aircraft were lost, against claims by Allied pilots that they had shot down sixteen jets. However, eight Me 262s were lost as a result of accident or technical failure; only ten were destroyed in combat or other operations. These figures should be kept in perspective. In war, for every aircraft lost on operations another is lost to accidents or technical problems. Losses during the last month of 1944 began on 2 December, when a Me 262A-2a crashed during a training flight south of Gerolzhofen, killing the pilot, *Obgfr* Hajo Mentzel. The next day *Ofw* Karl-Heinz Petersen was killed when his fighter-bomber crashed near Burgsteinfurt. *Oblt* Joachim Valet was caught by Tempests of No. 80 Sqdn, 2nd TAF, while flying an armed reconnaissance near the Rhine. All three aircraft lost belonged to *I/KG(J) 51*. On 6 December a Me 262A-1a piloted by *Uffz* Friedrich Renner of *10./JG 7* was lost when his aircraft crashed at Osnabrück, and the same fate befell *Hptmn* Hellmut Brocke of *4./KG(J) 51* the following day, when his Me 262A-2a went into the ground near Swäbisch Hall. Two days later, on 9 December, *Stfw* Hans Zander, also of *4./KG(J) 51*, died when he was jumped by Lt Harry L. Edwards of the 365th Fighter Group, just north of the place where Brocke had gone in.

Incessant air raids destroyed the bulk of fixed factory fighter aircraft production facilities and forced abandonment of the traditional ways of building aircraft. Surprisingly, however, many of the test stations remain intact.

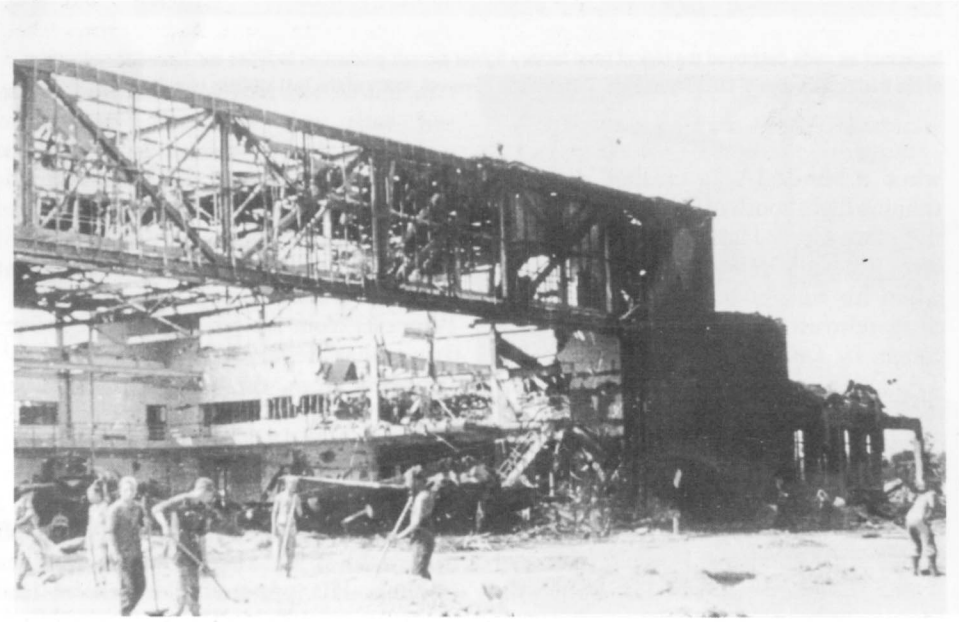
On 10 December *1./KG(J) 51* lost two more aircraft. During the afternoon Tempests from No.56 Sqdn, RAF, were flying near Bevergern when they were attacked from the rear by two Me 262A-2a fighter-bombers. A Tempest flown by Flt Sgt L. Jackson turned on the jet flown by *Lt* Walter Roth, which broke off. Jackson rolled off to starboard and dived after the Me 262, reaching 420mph (675km/h) as he closed to within 1,600ft (490m). His opponent slowed as he weaved to avoid a hit; Jackson opened fire from 1,800ft (550m) and observed hits on the jet's starboard side. The Tempest tried to keep up with the Me 262 as it headed



Smashed test rigs and assembly stands are all that is left after the raid on Lager Lechfeld with many aircraft written off and reduced to scrap.

for cloud cover, but with smoke streaming from its engine the jet was already doomed. Its wounded pilot brought the Me 262 down to a crash landing nearby. Another aircraft from the same unit was lost on this day, when *Fw* Herbert Lenke failed to survive an AA barrage near Aachen, while *Oblt* Benno Weiss of *2./KG(J) 54* died when his Me 262A-2a crashed after a high-altitude test flight over Fahrenbach-Baden. Two days later *Ofw* Hans Kohler of *I/KG(J) 51* was shot down and killed when his aircraft, a Me 262A-2a, was hit by flak near Aachen, and on 15 December *Uffz* Wilhelm Schneller of *I/JG 7* died when his aircraft crashed near Schwabstadt.

Two days later, on 17 December, Wg Cdr J. B. Wray had just taken off at the head of five Tempest squadrons in 122 Wing, to formate with two Canadian Wings with Spitfires, when his flight was advised that two jets had been sighted near Weert in the Eindhoven area. The German aircraft were soon spotted at 2,000ft (610m) and Wray, some 500ft (150m) lower, went in pursuit. Wray and his wingman targeted separate aircraft. Wray fastened on to his as it entered a shallow dive. With Wray at full throttle and flat out at 450mph (725km/h), the German jet was slowly pulling away. Fearing he would lose his quarry in the worsening light, Wray opened fire at a range of approximately 1,800ft (550m). The Me 262 did nothing in response except enter a gentle turn as it got closer to the ground. Wray decided to follow it down; as he did so, the jet's pilot, *Lt* Wolfgang Lubking of *II/KG(J) 51*, began to weave his aircraft violently. Now at very low level, the jet lost forward speed; Wray closed to within 900ft (275m) in anticipation of opening fire, as the two aircraft flew fast toward the banks of the Rhine. Before Wray could fire,the Me 262 clipped a building and pitched into the river. With AA opening up, Wray pulled away and gained altitude. No other major engagements took place that day, although three Me 262s were sighted by Typhoons from No.430 (RCAF) Sqdn.



Surprisingly, with several hundred workers drafted to clear up the rubble, Messerschmitt test activity was back in operation within a few days. The resilience of the German aircraft industry to regroup from seeming destruction became legendary.

Unjustified claims of kills

The hiatus of almost one month in kill claims made by Me 262 pilots ended on 23 December, when *III/JG 7* reopened its scoring by claiming three victories – although only one was certain. Events began when two Lockheed F-5 photo-reconnaissance machines from the 7th Photo Reconnaissance Group, accompanied by P-51s from the 353rd Fighter Group, were attacked by Me 262s near Magdeburg. One F-5 was shot down immediately by *Ofw* Buttner, but then the P-51s turned on to the jets and pursued them as they dived. Aircraft flown by Capt H. D. Stump and Lt S. E. Stevenson each claimed hits on jets, but when the German aircraft landed there was no damage on either. Instead, the two Me 262 pilots, *Ofw* Buttner and his wingman *Fw* Bockel, each claimed they had shot down a P-51. No aircraft were lost by the 353rd Fighter Group on that day, and only one P-51 went missing, when Flt Lt

It was against aircraft such as this B-17G that the Me 262 was pitted while Allied fighters strove to tempt them away to one-on-one combat. The overwhelming might of Allied air power was unstoppable, however, and the several hundred Me 262s declared operational had little chance to turn the tide.

Buckle went down during a sortie to Arnhem. In the maelstrom of air combat in the war-torn skies of north-west Europe, it was easy for the human mind to misinterpret reality.

Bodenplatte operations continue

On Christmas Eve the weather improved, low cloud dispersed, and the Luftwaffe was ordered on to the offensive. It was not the *Bodenplatte* operation originally planned as part of the Ardennes offensive, but an essential element in the land battle which still saw German hopes that the *Wehrmacht* would cleave through Allied occupation forces in the Low Countries and establish a salient to Antwerp. But by now the German advance had all but halted, and there were fears that the enemy was regrouping. Now Arado Ar 234 jet-powered bombers carrying 1,100lb (500kg) bombs made their operational début in the bombing role. Me 262A-2as from *III/KG(J) 51* flew sorties against American ground targets, but only one aircraft was lost, along with its pilot *Uffz* Axel von Zimmermann. The Arado bombers had a better day, flying repeated sorties without recorded loss. But the better weather had brought out the Allied air forces as well, and eleven German airfields were hit with varying levels of damage. At the end of the day the Luftwaffe had lost eighty five pilots, with twenty one wounded.

Christmas Day brought no respite; indeed, it saw a major offensive by the Americans, who now were becoming aware that the new jets could be defeated – although certainly not without difficulty. As the Luftwaffe pressed home nuisance raids and ground attacks on Allied positions, standing patrols of Allied aircraft cruised at various altitudes, ready to pounce on their prey. The incoming jets approached at maximum speed (which was almost 40mph (65km/h) slower for the fighter-bombers than the fighters) and made their bombing runs in a 30 degree dive at 530–560mph (850–900km/h), levelling off at 3,000–3,500ft (900–1050m) to release their load. Frenzied air activity attended these events, as the Allied fighters jostled to get into attack position and bounce the jets. Many encounters and engagements ensued, but most were indecisive, or at best an illustration of how difficult it is to jump a faster aircraft. Slowly but surely, however, Allied pilots were learning how to get the better of the Me 262. At top speed the jet could only make long, sweeping turns; if it jinked or weaved a path it would slow appreciably, so in a tight dogfight the propeller-driven fighter had the advantage. In reality, the Me 262 was a high-speed interceptor of unrivalled superiority, and an excellent ground-attack and strike aircraft, as low loss rates in those roles testified.

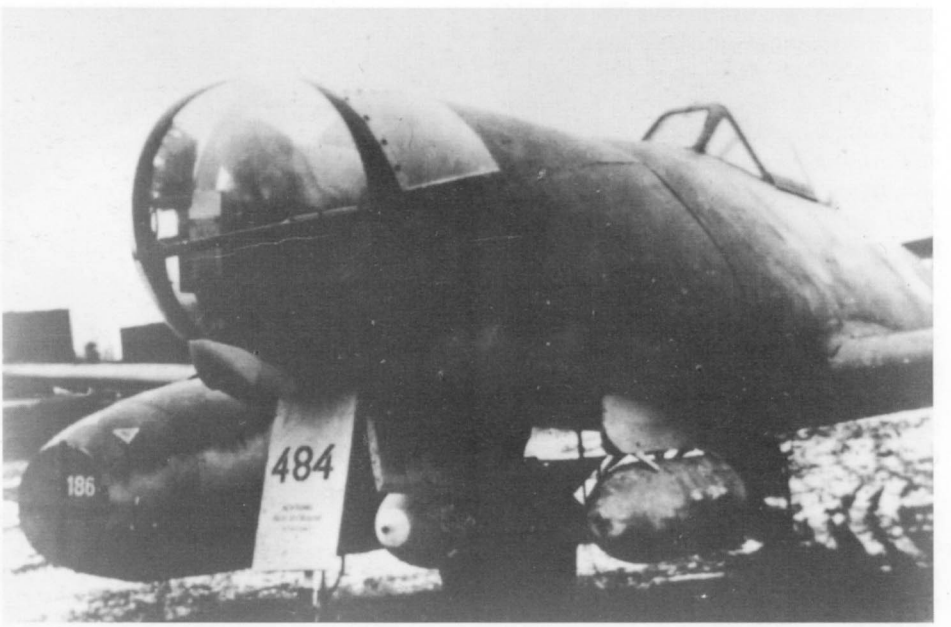
A view to a kill

The flurry of activity on 25 December resulted in the loss of two Me 262A-2a fighter-bombers. One was sent down in spectacular fashion in front of an unusually large audience. The drama began when Flt Lt J.J. Boyle of No.411 Sqdn, 2nd TAF, was forced to turn back from an attack on German fighters milling around the American positions at Bastogne. His wingman reported engine trouble, and since an ailing aeroplane was not allowed to return to base alone Boyle had to accompany him. As they approached their base at Heesch, irritated by having to miss a good

scrap, Boyle realized they were too high and bunted aggressively to vent his temper. Diving at maximum speed, exceeding 500mph (805km/h) on the way, he suddenly caught sight of a Me 262. He turned tightly on to it, firing as he panned across its port engine. Immediately, the engine began to smoke, and soon black clouds were billowing from the nacelle. With only one engine, and keeping the rudder at 30 degrees to compensate, *Oblt* Hans-Georg Lamie of *I/KG(J) 51* dived for the ground in an unsuccessful attempt to escape. Boyle got in several more hits just as he came into view of his airfield, where half the Wing's personnel were lining up for their turkey dinner! Hearing gunfire they hit the ground, but peered skyward to watch the action. The doomed jet was now close to the ground, straining to stay airborne as its speed fell away. The wallowing aircraft hit some trees and fell flat to the ground, expending kinetic energy by cartwheeling along and breaking apart from nose to tail, gouging giant furrows several hundred yards long. Circling the wreckage, Boyle acknowledged waves from Dutch workers in the fields below who, like most of the airmen at Heesch, had seen it all.

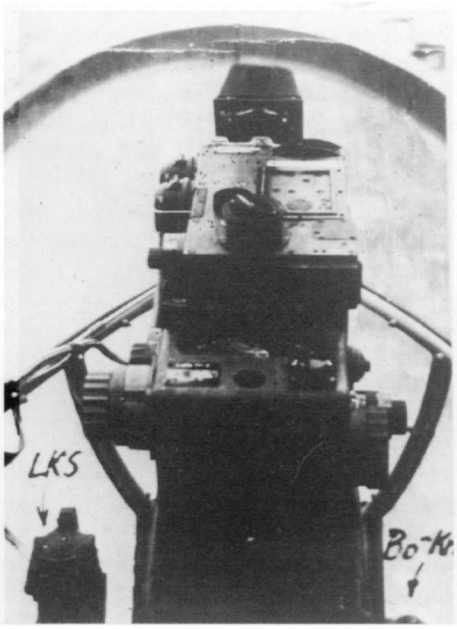
Three hours later Sqdn Ldr J.E. Collier from No.403 (RCAF) Sqdn was leading a flight of four Spitfires when three aircraft were spotted 2,000ft (610m) above, flying relatively slowly in a *kette* of three. Climbing to investigate, the Spitfires approached from directly below, recognizing the dolphin-like outline of fuselage and wings that characterized the Me 262. Completely unobserved, Collier drew up to within little more than 200ft (60m) of the lead aircraft before he fired, hitting the starboard turbojet nacelle. It immediately burst into flames; the Me 262's two wingmen split and dived, accelerating away. Collier followed the doomed jet down and watched the pilot, *Fw* Hans Meyer, jump. His parachute failed to open. Such were the events of Christmas Day 1944 for Me 262 pilots. In the six days remaining of 1944, two more jets would be lost, while others would claim two kills.

On Boxing Day afternoon Flt Lt E.G. Ireland of No.411 (RCAF) was on a sweep in the vicinity of Jülich, leading blue section, when an aircraft approaching from the port wing cut across his flight path. As it turned and closed it was easily identifiable as a Me 262, and Ireland gave it a good long burst from as close as 1,100ft (335m). Black smoke issued from its port engine nacelle and the jet began to slow, but although Ireland emptied his magazines into the jet it sped off, and he broke away. There is no record of a lost or damaged Me 262 on this day, but it is possible it was damaged; the accurate keeping of records on every aspect of aircraft engineering and maintenance was not a priority for the Luftwaffe. Next day, on a sortie to Rheine, Spitfires of No.442 (RCAF) Sqdn caught and mauled a Me 262 from *II/KG(J) 51* piloted by *Fw* Walter Wehking. It came



Carrying a second crewmember in a modified airframe, Me 262A-2a/U2 *werke/nr* 110484 was tested by Bauer and Lindner as a two-man bomber. Armament was removed and the metal nose section was replaced by a wooden section, but the aircraft came too late to offer advantages when fighters became top priority.

A second Me 262A-2a/U2, *werke/nr* 110555, was adapted as a fast two-man bomber. The second crewmember was to have lain prone and used a *Lofte* 7H bomb sight.



The bombardier's view through the forward glazing on one of the two Me 262A-2a/U2 is dominated by the *Lofte* 7H sighting mechanism.

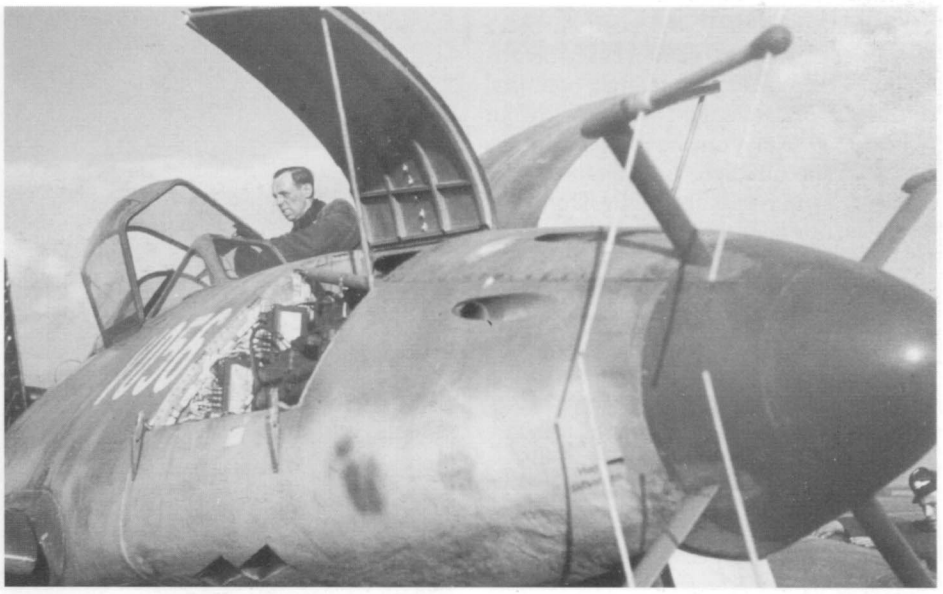
Prototype veteran V056 provided flight test engineers with a wealth of aerodynamic and directional stability information before it was adopted as the workhorse for tests of the two-seat night fighter version equipped with radar.

down near Bunde with its pilot badly injured.

Preparations for the defence of the Reich

On 29 December a Me 262A-2a piloted by *Lt* Wolfgang Oswald of *I/KG(J) 54* was brought down by anti-aircraft fire during a combat sortie, but *Obfw* Buttner got a Mosquito of No.544 Sqdn, RAF, piloted by Flt Lt Olson. On New Year's Eve, *Fw* Baudach got another Mosquito, from No.464 Sqdn, RAF, piloted by W/Off Bradley, while Capt A.J. Hawkins of the 339th Fighter Group put lead into a Me 262 loitering too long near Hamburg. Much reconnaissance work was going on as each side tried to second-guess the other. In the final days of the year, camera-carrying Me 262s of *Kommando Braunegg* were out over airfields in Holland and northern France to take stock of the Allied situation. The massive German air offensive planned for the Ardennes was about to take place – two weeks too late. But even as the Luftwaffe was trying to buy back time for the retreating German army in Belgium, the air defence of Germany's industrial centres was taking on new importance. Toward the end of the year a number of small *Industrie Schutzstaffeln* (ISS) units began to appear as point defence forces, equipped with a few Me 262s. But it was too little and too late. Plans for rocket-boosted Me 262C-1as for the air defence role would be overtaken by the tide of war.

Yet even amid the chaos of preparations for the battle of Germany itself, now surely only weeks away, production quotas were increasing and the number of aircraft reaching the field units grew likewise. With increasing frequency Allied pilots reported the sighting of large groups of



The prototype Me 262B-2a night fighter version reveals the copious cannon access bay, gun ports and ejector chutes. The generous access afforded equipment located in the nose was welcomed by ground crew used to the cramped forward fuselage of the conventional, piston engined, fighter.

Battered engine panels and crumpled forward fuselage skins testify to the extensive use of V056 on numerous test flights. Note the leading edge slats.

Me 262 in the skies over Europe: on 31 December, a 9th Air Force pilot reported a gaggle of twenty four jet fighters southwest of Trier. Deliveries in the last three months of the year had been creditably up on the preceding three months. With 108 aircraft delivered in October, 87 in November and 108 in December, the total for 1944 ran to 578 aircraft, of which 49 had been produced by the Regensburg assembly plants since September. With improved production of Jumo 004B engines, there was every prospect of increased availability. The mighty performance potential of the Me 262 gave the Nazi hierarchy an opportunity to play one last card. If the jets could wreak sufficient havoc among the massed formations of American day bombers, this might force a reduction in air raids and give the Germans leverage for negotiations. Few Germans believed that the war's end necessarily meant the full and unconditional surrender of the nation's armed forces: but then, very few had been listening to the BBC.

Bomber pilots and fighter units

It was this hope that spurred on a new commitment to give exclusive priority to increased fighter production. The bomber units, now denuded of their aircraft, were, said Nazi planners, now to be reassigned as fighter units. The bomber pilots themselves had long wanted a role in the fighter units, and since the collapse of their effort had sought assignment to night-fighter units employing two-seat aircraft. The Me 262B-1a/U1 had been developed for just that purpose; it was a night-fighter adaptation from the two-seat trainer. Dramatic changes were taking place in the upper echelons of Luftwaffe command. Goering had long since lost any influence with Hitler and the senior Nazi leaders; similarly, the Luftwaffe had lost most of its dignity and respect, having virtually no representation at staff and planning conferences conducted by Hitler or Himmler. Now the SS sought to take advantage of the crumbling reputation of Hermann Goering, while senior Luftwaffe officers loyal to Party and State tried to win for themselves greater control during the final hours of the 'thousand-year Reich.'

The bomber pilot Dieter Peltz had conceived and planned Operation *Bodenplatte*, working to undermine the plans of *General der Jagdflieger* Adolf Galland – an action that in any normal country would have been judged an act of treason. But because Goering was no longer interested in anything other than the safety of his own skin, the disastrous attack would take place with the sacrifice of pilots trained for a very different operation. In the week before *Bodenplatte* was unleashed, Goering told Galland that he would have to go. *Obst* Gordon Gollob (actually MacGollob; he was of Scottish descent) had worked cunningly to oust Galland, and had won some support by collaborating nefariously with the SS – Himmler's élite that now sought direct control of the jet aircraft, with the *Reichsführer* SS envisaging himself at the

Holding a spent cartridge ejector chute, an armourer services the weapons bay on V056. The blanked-off gun camera port is clearly visible in the extreme nose.

Christmas 1944 and a flightline of Me 262s from *Ekdo. 262* seen at Lager Lechfeld will become a rare sight within weeks as Allies press ever closer on the German interior and aircraft are dispersed for safety.

head of a new, revitalized assault on Germany's enemies. As he worked to further Himmler's ambition, Gollob won the confidences of Galland's hitherto loyal following, undermined his authority, and now, at last (in January 1945), brought about the end of his appointment as *General der Jagdflieger*.

The bomber units that were, on paper at least, to form the spearhead of *Bodenplatte* and see the expansion of the operational deployment of the Me 262 included two *Erganzungsgruppen*, *I* and *II(ERG)/KG(J)*. These were established specifically to train bomber pilots on the Me 262 and the Ar 234, which were to be supplied to the new *Kampfgeschwadern*. *I Gruppe* was to be located at Pilsen and *II Gruppe* at Neuberg. The move was forced to some extent by an increasing shortage of high-octane fuel which made it virtually impossible to operate the larger, piston-engined aircraft. It was also founded on the rational need – recognized too late – to counter the Allied air offensive by direct attack on the bombers and destruction of their escort fighters. New jet units would include *KG(J) 6* at Prague-Ruzyne; *KG(J) 27* at Marchtrenk; *KG(J) 30* at Smirschitz; *KG(J) 54* at Giebelstadt; and *KG(J) 55* at Landau. Of these, only *KG(J) 6* and *KG(J) 54* would be established; the others got no equipment.

By early 1945 many aircraft were operating from autobahns and stretches of closed road adjacent to the dispersed assembly facilities where aircraft were put together from components made all across the Bavarian region.

Many Me 262 units had expected the *Bodenplatte* operation, designed to destroy Allied airfields in Holland, Belgium and northern France, to be declared redundant in the wake of the thwarting of the German offensive through the Ardennes. That was not the case. On New Year's Eve 1944, orders were issued to implement *Bodenplatte* before dawn on New Year's Day. Thus, the Luftwaffe's last major offen-

A Me 262A-2a *Sturmvogel* stands ready for Operation *Bodenplatte* in the Ardennes region during late December 1944. Too late to attack invasion beaches on the Normandy beaches, because of bad weather the jet had also been unable to hit American forces in the Bulge.

sive was made on 1 January 1945, when more than 800 aircraft, mostly Bf 109s and Fw 190s, struck airfields right across the Allied-held areas of Belgium and the Low Countries. Galland later defined the action as an act of ultimate treason by the Nazi hierarchy. What he meant by that is apparent from its results. On 1 January the Allies lost about 144 aircraft with a further 62 damaged. The Luftwaffe, on the other hand, suffered around 30 per cent casualties, losing approximately 300 aircraft along with 237 pilots, including experienced senior *Staffel*, *Gruppe* and *Geschwader* leaders. This put the Luftwaffe's fighter force at its lowest level since 1939; while the large number of aircraft lost removed a major component of the defence of the Reich.

As for the Me 262s that day, twenty one aircraft of *I/KG(J) 51* hit airfields at

An impressive lineup of single-seat fighters and fighter-bombers led by the definitive operational development, the two-seat trainer version.

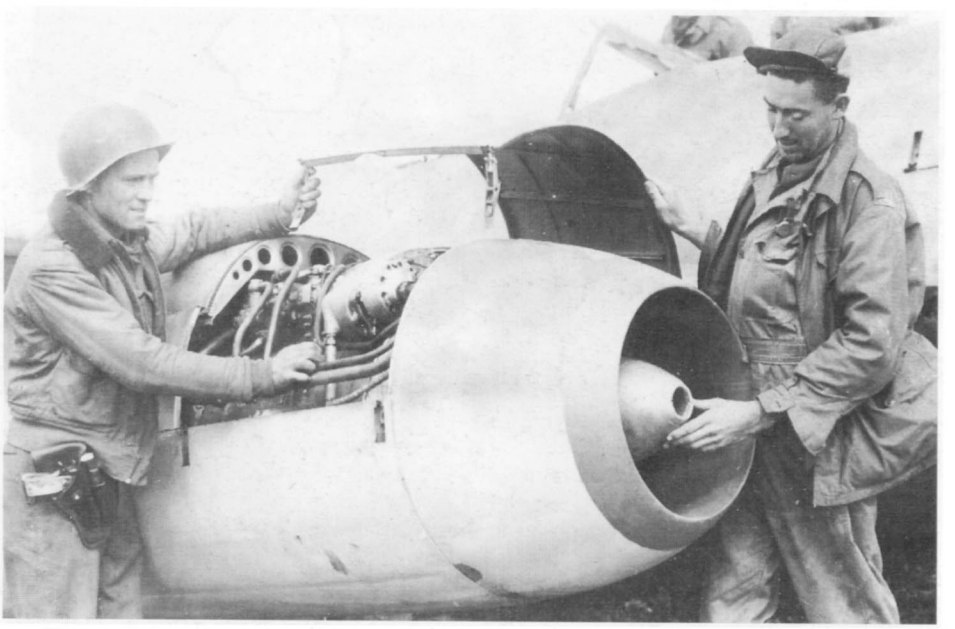
Captured by American troops, this two-seat trainer is being slowly towed away for inspection and test flight.

Eindhoven and Hertogenbosch in Holland. The jets opened the way for piston-engined fighters to follow and continue the attack. This was the largest combined operation involving jets and piston-engined fighters, and saw the greatest number of Me 262s deployed on a single operation to date. An Allied claim that two Me 262s of *I/KG(J) 51* were shot down by anti-aircraft fire was false, but one was pursued by Spitfires of No.401 (RCAF) Sqdn, leading to a near-fatal encounter involving Flt Sgt A. K. Woodhill. This pilot sighted an Me 262 flying about 7,000ft (2,150m) below him, moving fast across the countryside near Rheine. In an attacking dive, Woodhill gained on the Me 262 and, closing to within 1,400ft (430m), fired at the unsuspecting aircraft from behind. Hits were observed on the fuselage and along the port wing, but Woodhill's cannon jammed and he broke off. The Me 262 escaped with light damage.

In two other engagements No. 442 (RCAF) Sqdn encountered jets. The first was jumped by Flt Lt J.P. Lumsden at 1,800ft (550m) near Wesel. Lumsden scored hits on its tail before it escaped into cloud. The second was encountered by four Spitfires which were attacked head-on by a lone jet. All four Allied pilots opened fire but none was able to confirm a hit, although the aircraft appeared to trail smoke as it sped off. The pilots reported that this second aircraft carried standard Luftwaffe markings on wings and tail, but US insignia on its fuselage!

During the afternoon an American heavy-bomber raid on Magdeburg drew up Me 262s of *1./JG 7* to tangle with its escorting P-51s of the 20th Fighter Group. Flying in excess of 30,000ft (9,150m), a *Ketten* of two jet fighters sliced through the bomber box. They were immediately pursued by P-51s of the 55th Fighter Squadron, which got in quick shots as the jets flashed past. Capt William Hurst saw strikes on his target, but it was quickly away and gone. Another section of P-51s from the same squadron were 4,000ft (1,220m) lower when they were hit by the Me 262s, but again the jets were gone in a flash. In a slicing blow, or slash attack, from anywhere between the ten o'clock and two o'clock positions, the closing speed of the aircraft was in excess of 800mph (1,290km/h) (or 1,173ft/sec; 358m/sec) giving the pilot only three seconds to get a hit. Nevertheless, in that brief moment a P-51 flown by Lt T.J. Moody was hit and damaged.

Nearby, pilots from the 4th Fighter Group were flying cover for the bombers as they turned from their targets and regrouped, as best they could, for the return to base. Shortly after noon Lt F. Young shot down a relatively slow-flying jet belonging to *III/JG 7* near Ülzen. Its pilot parachuted to safety. Lt Donald Pierine got another Me 262, from *9./JG 7*, piloted by *Lt* Heinrich Lonnecker. A third Me 262 was lost that day when *Uffz* Detjens crash-landed his aircraft near



American troops examine the Riedel starter motor and compressor area of the Jumo 004 on a captured Me 262. Note the upper nacelle panel quick release levers.

Fitted with a 50mm Rheinmetall-Mauser MK 214A cannon, Me 262A-1a/U4 (*werke/nr* 111899) is seen in the checkout bay prior to in-flight firing tests. Tests were also conducted with Me 262A-1a *werke/nr* 170083.

Fassberg after a dogfight. Meanwhile, near Parchim, 9 *Staffel* exacted retribution when *Hptmn* Eder got two B-17s.

With the New Year came a marked increase in the number of jet aircraft seen by Allied pilots on routine operations, but relatively few engagements were reported. In addition to the two bombers destroyed by Eder on 1 January, only five more kills were claimed by Me 262 pilots during the month. These came on the nights of 2, 5 and 10 January: *Oblt* Welter of *10./NJG 11* claimed a single Mosquito on each occasion with his night fighter. Single kills were made on 14 and 17 January. The engagement of 14 January followed a day when *Uffz* Alfred Farber of *I/KG(J) 51* was shot down and killed shortly after takeoff from Giebelstadt. Surprised by Lt Walter J. Konantz in his P-51 from the 55th Fighter Group, the Me 262 was hit during its vulnerable period, while close to the ground and at relatively low speed. On 14 January the US 8th AF sent more than 800 heavy bombers, protected by close on 800 P-51s and P-47s, on a daylight raid against oil refineries and processing plants across north-western Germany. American pilots and air crew estimated that a total of some 350 Luftwaffe fighters took to the sky in combat that day. Among them were some Me 262s. The German tactics were that the Me 262s should attack the escorts, while the Fw 190Ds burrowed in among the bombers and shot them down. Flying lead escort for B-24s from 2nd Air Division, Lts B.J. Murray, John W. Rohrs and George J. Rosen, flying P-51s from the 353rd Fighter Group, were with their charges near Wittstock when they spotted two Me 262s flying north at about 10,000ft (3,050m). Using their height to gain speed, the P-51s hit 500mph (805km/h) as they intercepted their quarry. Murray got the left-hand Me 262, flown by *Uffz* Detjens from *9./JG 7*. He raked its side, hitting the engine nacelle and piercing it from one end to the other. The jet was doomed and its pilot baled out (for the second time that month).

The second jet was pursued by Lts Rohrs and Rosen, but they were gaining on it only slowly until Lt Murray, fresh from his first kill of the day, joined in the chase, pressing hard upon the hot exhaust pipes of the fleeing jet. In anything other than a straight, high-speed run, the Me 262 was vulnerable to a P-51, as *Fw* Heinz Wurm well knew as he tried frantically to escape the three pursuing fighters. But they had him without needing to fire a shot: unnerved by his plight, Wurm misjudged his height, struck the ground and paid for the error with his life. Elsewhere, at the same time, Lts M.E. Arnold and G.E. Markham damaged another Me 262 not far from Hanover, while Maj D.S. Cramer of the 55th Fighter Group damaged another jet as it was wallowing around over the airfield at Parchim. Another incident involving Me 262s took place when a squadron of P-51s from the 359th Fighter Group jumped two jets, but without result.

The massive 50mm MK 214A cannon replaced the four 30mm MK 108 cannon usually fitted to the forward fuselage. The MK 214A gave trouble during flight tests and frequently jammed. Note the bulbous fairing which distorts the clean lines of the fuselage nose.

The Allies assert air superiority

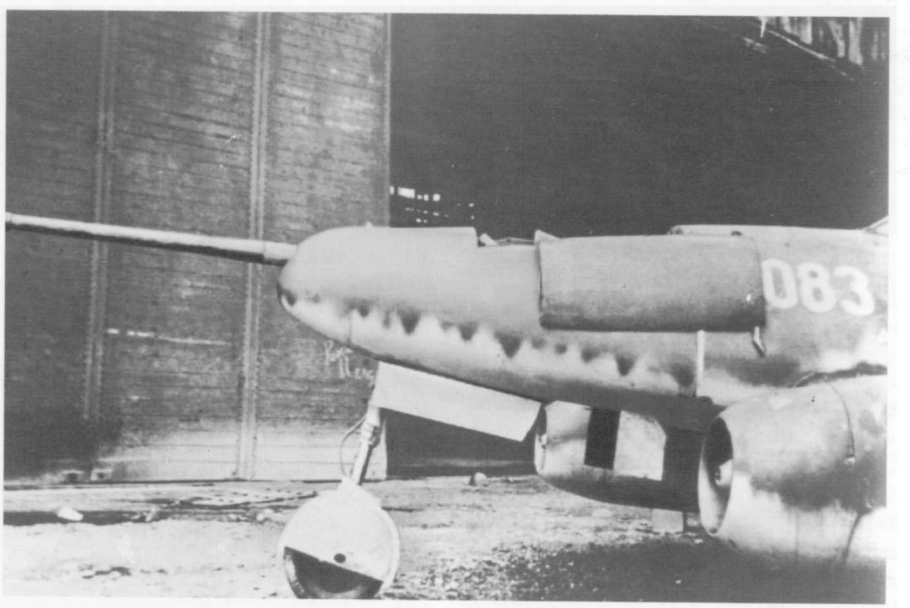
Over Bastogne, two P-51s from the 10th Photographic Reconnaissance Group,

flown by Lts M.V. Logothetis and C.G. Franklin, were attacked without warning by a lone Me 262. As it sped by the jet was engaged and Franklin got a hit; Logothetis pursued the ailing fighter firing frequently, and bits of the Me 262 flew off in all directions. The RAF also claimed a jet: Capt K. Bolsted of No 332 (Norwegian) Sqdn pounced on a Me 262A-2a of *6./KG(J) 51* just as it was about to land at Rheine, sending it spinning into the ground and killing its pilot. Another German pilot killed was *Lt* Oswald von Ritter-Rittershain, whose aircraft was hit by anti-aircraft fire near Dettweiler (Dettwiller). The only victory claimed by Me 262 units on 14 January was a single B-17 knocked down by *Hptmn* Eder of *III/JG 7*. Altogether, on this day six Me 262s were lost and several damaged. It was a measure of the air superiority now flaunted by the Allied air forces that of 1,600 British and American aircraft sent over north-west German targets, only seven bombers and eleven fighters were lost. Estimates vary, but most authorities agree that the Luftwaffe lost some 300 aircraft. As for the rest of the month, *Hptmn* Eder of *9./JG 7* was the only claimant: he shot down a B-17 from the 351st Bomb Group on 17 January.

In the second half of January 1945 the intensity of Allied air activity increasingly revealed Germany's lack of qualified, experienced fighter leaders. Conversion courses had been shortened, and pilots with all too little flying time on piston-engined aircraft were now being posted to Me 262 units. So great were German desires for an expanding jet fighter force that completely unrealistic demands were made for more pilots. Units that had been ordered into being existed only with paper strengths, bearing no relationship to the real situation.

On 15 January a lone Me 262 was attacked as it strafed Schongau airfield, and Lt R.P. Winks of the 357th Fighter Group brought it down close to the airfield's perimeter track. Another jet, from *III/JG 7*, was damaged on 19 January when its undercarriage buckled on landing. Next day the 357th Fighter Group bagged another two aircraft, this time over the Munich area. Lt Dale E. Karger received a radio report of two Me 262s flying at about 9,000ft (2,745m) above him, and descending at full throttle toward the east. With his wingman, Karger sped off in pursuit. The jets were pulling away, but one of them began an extended turn to the left; the two P-51s pulled round and headed north hoping to cut them off. Unaware of the P-51s, the Me 262, piloted by *Uffz* Heinz Kuhn of *III/JG 7*, turned through 180 degrees until it was heading due west. As he had planned, Karger intercepted it as it crossed ahead of him. He pulled his P-51 round and got a lead angle on the fast-moving jet. Squeezing the gun button, Karger got in a good shot at maximum range and saw pieces of the aircraft falling away. Seconds later its canopy came off and its pilot baled out at 3,000ft (915m). Kuhn died when his parachute failed to open as he fell to earth near Ingolstadt. At the same time on that day, Lt Roland R. Wright was flying low in search of easy prey. He found it in the shape of a Me 262A-1a of *10./EJG 2*,

Me 262A-1a/U4 with its 50mm cannon makes an impressive picture but gave little hope for success in trials that were to reveal serious deficiencies with the concept. Although displaying a high muzzle velocity, the gun was difficult to use, unreliable and degraded the primary advantage of the Me 262 – speed. The concept was not liked by Galland and other top scoring aces, who preferred a multi-cannon arrangement blended into a streamlined shape to optimise combat capability.

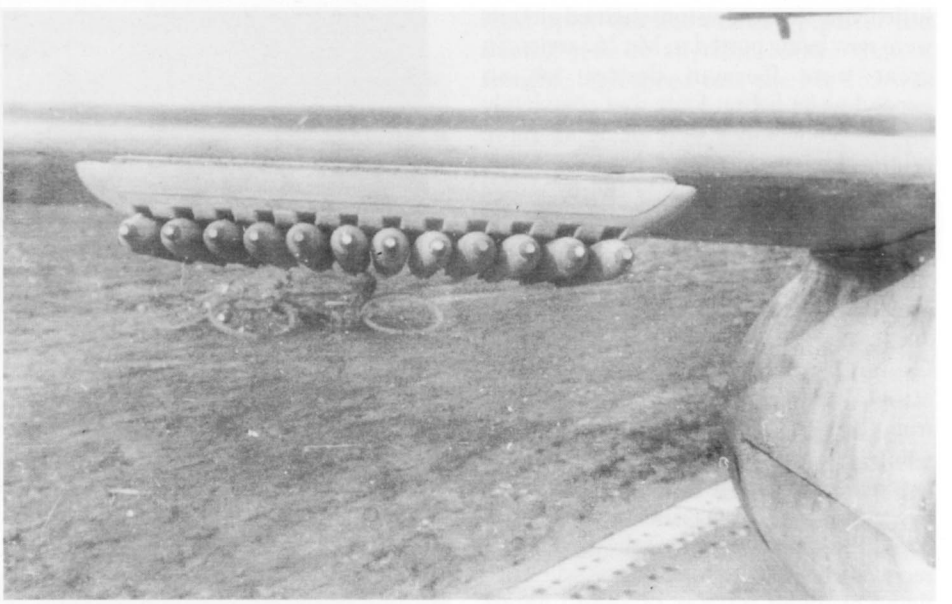


One of two aircraft modified to take the 50mm cannon, aircraft 170083 is seen here after capture by the Americans. Note the removal of the swastika and the application of the 'stars and bars' to the fuselage and (unseen) appropriate wing surfaces as per US regulations.

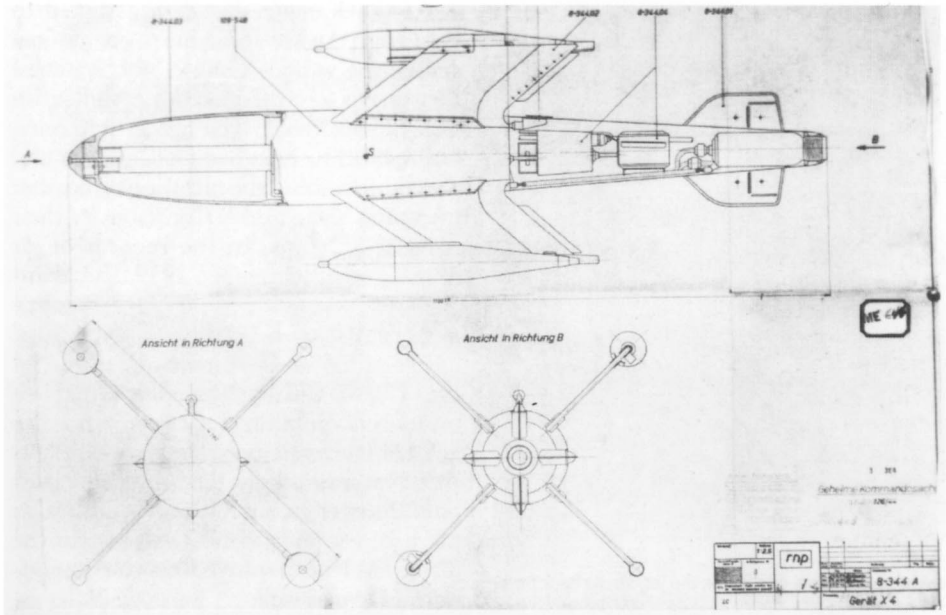
flown by *Uffz* Karl Hartung, as it turned in to its final landing run at Lager-Lechfeld. In an attack lasting only seconds, Wright shot it down less than one mile east of Augsburg, killing the pilot.

Jets versus piston-engined fighters

The disparity in performance between jets and piston-engined fighters caused problems for Allied pilots during engagements. Allied pilots had not sufficient combat experience against the Me 262 to allow them to develop optimum tactics. There were numerous occasions when the



A battery of twenty four R4M rockets, twelve under each wing, gave the Me 262 formidable hitting power. But relatively slow velocity and a tendency to drift in high winds made the weapon less accurate than cannon shells, although the ballistic characteristics were similar.



The snaking problem at high speed common to all Me 262s made air-to-air guided missiles particularly attractive in preference to shells and unguided rockets that flew the trajectories they were launched on. The Ruhrstahl/Kramer X-4 was tested on aircraft *werke/nr* 111994 by Gerd Lindner in December 1944. It was too late to see active service.

German pilots' obvious superiority over their slower adversaries resulted in a wave-off. One such encounter, which did not produce the expected result, occurred on 21 January, when three P-51s of the 20th Fighter Group were jumped by fourteen jets over Merseburg. Piloted by Lts Lowell E. Einhause, Robert H. King and Garth L. Reynolds, the P-51s were flying escort for a Mosquito on photo-reconnaissance duties. For about twenty minutes before noon, the Me 262s made slash attacks on the wooden PR machine, but without result. Every time a jet came in to attack, the Mosquito turned head on to its assailant and the Me 262 broke off. Meanwhile, the relative speeds of the two types of aircraft made it virtually impossible for the P-51s to engage, but they fired chance shots from very close range, without proper targeting or gun-sight alignment. Neither the Mosquito nor the P-51s could get a bead on the jets, whose speed was too great for the Allied aircraft to synchronize their manoeuvres. In spite of fiercely pressed attacks and a resolute defence, no aircraft was shot down or damaged by either side.

Pilots of the 355th Fighter Group had a similar experience when their reconnaissance P-51s led by Capt Noble Peterson were bounced by two Me 262s near the Steinhuder Lake, two hours after the encounter described above. Try as they might, the P–51s could not stay with the jets, and one of them, piloted by Lt Roscoe Allen, became separated from its section. Allen escaped only by the judicious use of rudder and aileron, continually out-manoeuvering his adversaries. Low on fuel, he landed in France and returned to base next day. But if the piston-engine fighters were not shooting down the jets, neither were the jets bagging their intended targets quite as easily as they had expected; neither side was having a turkey shoot. But times were changing, and the later part of the month would see increasing Allied success against the German jets.

On 23 January there was a flurry of claims from several RAF squadrons, reversing the lack of success in preceding weeks. Flying Tempests from No. 56 Sqdn, Flt Lt F.L. McLeod and Flg Off R.V. Dennis were at 7,000ft (2,130m) near Achmer when they sighted a section of Me 262s leaving the airfield and flying fast across the rail lines that straddled the outer reaches of their takeoff path. With Dennis as his wing man, McLeod pushed into a shallow dive and selected maximum boost in an attempt to overhaul a jet. The Me 262 did not see the British fighters coming from port-quarter rear and slightly above; it followed the sinuous route of the rail line oblivious to the danger. As it came to the airfield at Hanover, the jet curved round to the left and the two Tempests cut across the arc to intercept it from the port side. Coming upon the Me 262 from immediately behind, McLeod began firing at a range of approximately 1,000ft (300m). He saw flames begin to pour from the aircraft as it entered a gentle, straight-line glide, with the apparent intention of putting down as quickly as possible. It touched down near Hopsten, lifted again, porpoised over a hedge and struck the ground nose down, bursting into a ball of fire and killing its pilot, *Oblt* Hans Holzwarth of *12./KG(J) 51*.

In a remarkable engagement that day No.401 (RCAF) Sqdn tangled with jets during an armed reconnaissance sortie near Osnabrück. The Allied pilots were informed by radio that several Me 262s had been seen taking off and landing at a satellite field in the vicinity, and they were warned to be on the lookout for surprises. Quite soon afterwards the squadron found its targets and charged in to what quickly became a mêlée, as jets dispersed in all directions, making flat turns and banked manoeuvres in attempts to escape. While at their most vulnerable, two Me 262s were claimed by Flg Offs R.D. Church and G.A. Hardy; a third was thought to have been shot down when Church and Hardy joined up with Flt Lt W.C. Connell. Going down to the airfield itself they strafed buildings and cut up six Me 262s parked near their hangars. Later that morning, No.411 (RCAF) Sqdn was patrolling in the region around Lingen and Munster when its pilots saw a lone Me 262. This was promptly dispatched by Flt Lt R.J. Audet, who then went on to shoot up an airfield where he claimed he damaged two more. Audet got to tango again with an Me 262 next day over Munster; after an inconclusive dogfight, he claimed he had inflicted damage on the aircraft without seeing it go down.

More accidental losses

Still the accidental losses of Me 262s continued. Although no claims were logged by either side for the rest of the month, four more jet fighters were lost before 1 February. On 29 January a Me 262A-2a belonging to *1./KG(J) 51* was destroyed during a ground strafing operation on Kizingen. Next day a Me 262A-1a

Uffz Eduard Schallmoser of Galland's elite unit, *JV 44*, a pilot who would score two kills in the jet, strolls back from his aircraft along with other pilots and ground crew.

of *III/EJG 2* force-landed at Lager-Lechfeld with technical trouble. Another, of the same type, from *III/EKG 1* crashed that day during an attempted takeoff from Alt Lonnewitz, killing its pilot *Oblt* Hermann Knodler. Finally, on the last day of the month, an Me 262A-1a from *10./EJG 2* force-landed at Schongau, injuring the pilot *Ofw* Helmut Klante. It had not been a good month for the jet aircraft. Records showed that twenty four aircraft had been lost in January 1945, against claims for seven Allied aircraft credited to the Me 262s. In fact, the number of Me 262s destroyed or damaged beyond repair through enemy action, mechanical failure or pilot error was probably in excess of thirty.

January had brought irreversible changes to the Luftwaffe. Many of its highly decorated aces were angry at the way in which they were criticized by Goering and his lackeys as well as by the politically motivated minority that was working to undermine the old order base and increase the power of the SS.

Rushed through by Goering as a political pawn to match Himmler's plea for a 'people's army' of volunteer old men and boys, the He 162 'people's fighter' arose from the *Salamander* programme for a lightweight combat aircraft. It was not liked and differed from requirements in that it was difficult to fly and unsuitable for a novice.

As the *Kampfgeshwadern* assigned to convert to the Me 262 came to operational status, the various *Gruppen* incorporated new tactics into their already considerable base of experience. The fighter fraternity, exemplified by men like Galland, Bär and Steinhoff, resisted the intrusion of 'bomber men' into their ranks. Conscious of their decreasing status in the records of air action since September 1939, the abandonment of a strategic bombing policy gave impetus to the bomber pilots' campaign for an important role in the jet age. The Me 262 was admirably suited to a multi-role combat function, and the bomber men were prepared to accept it as that. Not surprisingly, the fighter pilots saw only disaster in such a move, although there were sound practical reasons why the jet should be deployed to the *Kampfgeschwadern* as well.

For one thing, bomber pilots were trained in blind and cross-country flying, while fighter pilots were not. Increasingly, the ability to fly an aircraft under any circumstances was coming to mean the difference between life and death. In the harsh winter conditions of 1944–45 the jets were frequently called upon to operate in dense cloud and high fog layers. Also, pilots used to handling aircraft at speeds of 220–270mph (350–430km/h) had to adjust to a completely different set of reactions and sensory inputs when they found themselves routinely flying at more than twice that speed. It became apparent that some jet units had been declared operational long before they should have been pitched into the fray. Some of those units' commanders summarily withdrew them from the battle for further training.

There was to be little or no true respite from combat, and in the first few days of February the Me 262s aquitted themselves with distinction. On 1 February *Lt* Rudolf Rademacher of *III/JG 7* bagged a fighter he reported as a Spitfire (it may have been a Tempest) which went down near Krefeld. The following day an Me 262A-2a was destroyed when it crashed on takeoff at Giebelstadt, killing its pilot *Hptmn* Karl-Heinz Buhring of *I/KG(J) 51*. Three more aircraft were damaged during the day in accidents at Neuberg and Lager-Lechfeld. On 3 February *III/JG 7* made six claims – for three B-17s, a P-51 and two P-47 Thunderbolts – after a major daylight raid by the Allies on Magdeburg. The kills were credited to *Lts* Weber and Schnörrer, *Oblt*

The Arado Ar 234 split delivery of urgent turbojet engines which could otherwise have powered the Me 262 and drew resources to a bomber that had decreasing relevance to the fight for survival. In the end, nothing could repel overwhelming Allied air power.

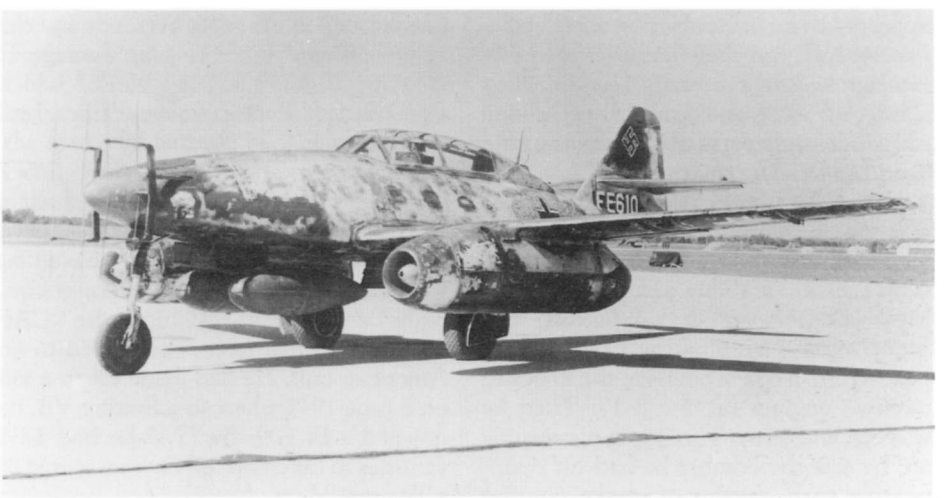
Wegmann, *Uffz* Schoppler and *Hptmn* Eder. In a further action that day the jets almost scored again, when they attacked a section from the 359th Fighter Group over Brunswick. Casualties included one Me 262A-2a seriously damaged during takeoff at Giebelstadt.

The next day no claims were made, but four jets were lost in various accidents. A Me 262A-1a from *III/JG 7* suffered engine failure at Briest; a Me 262A-2a from *III/KG(J)* 55 crashed during an attempted takeoff at Riem; a Me 262A-1/U1 from *10./NJG 11* came down some distance from Briest, killing its pilot *Ofw* Paul Brandl; and a standard Me 262A-1a from the same unit killed *Oblt* Walter Eppelsheim when it crashed north of Belzig. Two days later the first loss of a two-seat training version, a Me 262B-1a, was recorded when an aircraft of this type belonging to *III/EJG 2* came down in open country west of Landshut as a result of engine fire. The additional weight of the two-seat version made it more difficult to control at lower speeds: with one engine down, it was virtually unflyable. The inherent risk of training flights was confirmed two days later, on 8 January, when a Me 262A-2a of *9./KG(J) 54* ran into problems during such a flight and crashed at Zuchering, killing its pilot *Uffz* Heinz Maurer. Another three aircraft, all from *II/KG(J) 51*, were damaged, two in landings at Mülheim and one by German anti-aircraft fire.

The cost of inexperience

KG(J) 54 was already operational with Me 262s, but its former bomber pilots were not schooled in the techniques and tactics of air-to-air combat. They paid in full for that deficiency on 9 February. The engagements began in response to a major American air offensive aimed at oil fields and transportation nodes. The 8th AF put up 1,200 heavy bombers, comprising more than 800 B-17s and almost 400 B-24s, escorted by more than 800 fighters, the majority being P-51s. The 9th AF sent almost 350 medium bombers to communications centres and marshalling yards. In all, a force of some 2,350 enemy aircraft was over Germany. *I Gruppe* sent up ten Me 262A-2as against a component of this armada, finding the bombers at 24,000ft (7,300m) over Fulda. The jets circled high above the bombers and their escorts seeking vulnerable stragglers, but found none. One Me 262 dived down through the massed formation, but without firing a shot, while the others remained circling at altitude. Then another jet dived and struck at the lead bomber, which went down burning as six parachutes opened. This was a signal for three more jets to scream down upon their prey, but the P-51s fell on them and drove them off.

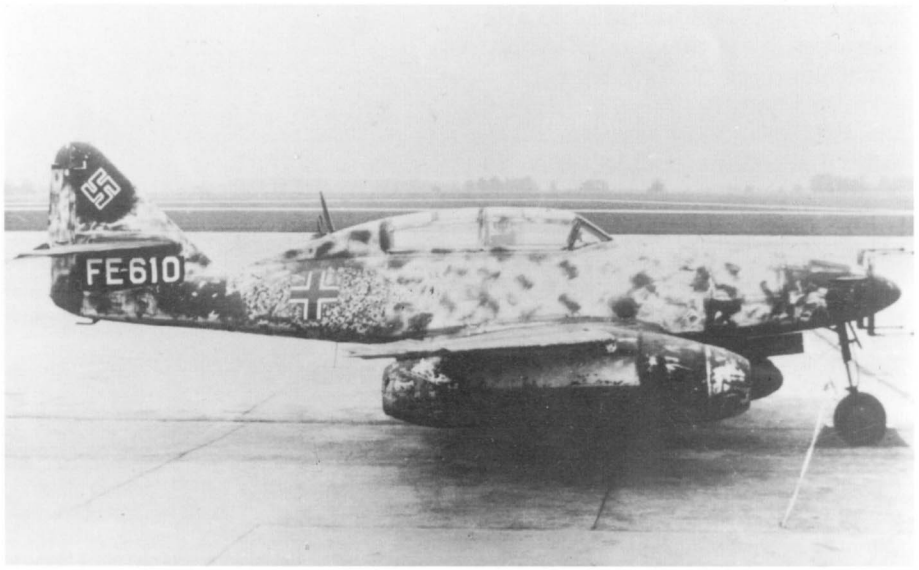
The Me 262s were being flown by pilots unused to the freewheeling tactics of close-order dogfighting. Trained as bomber pilots, the novice jet pilots lacked aggression, and tended to make exaggerated manoeuvres rather than the tight and twisting turns characteristic of an experienced fighter pilot. One Me 262 did weed out a straggler, attacking a B-17 which was already crippled by the loss of one engine, but the jet pilot wasted his opportunity and fled. Flying a P-51 from the 357th Fighter Group, Lt John L. Carter was



One variant that could, in the author's opinion, have done more than its anticipated share of the damage to Allied bomber formations, the superbly equipped Me 262 B-1a/U1 was too late and came in insufficient numbers to make its mark. Combined with some of the technical developments in radar it could have had a devastating effect on Allied night intruders.

failing to catch a speeding jet when another, damaged and flying slower, came into view. Carter closed in and gave it a long burst. Its canopy came off and its pilot, *Maj* Ottfried Sehrt, baled out, landing near Frankfurt. Some other straggling bombers were set upon by three Me 262s, which in turn were attacked by fighters from the 364th Fighter Squadron.

In one encounter, *Obstlt* Volprecht von Riedesel Freiherr zu Eisenach, the *KG(J) 54 Geschwaderkommodore*, was sent into the ground along with his aircraft, which exploded on contact. He was replaced on 27 February by *Maj* Hans-Georg Bätcher formerly of *KG 76*, which was equipped with Ar 234 aircraft. Two more *I Gruppe* pilots went down: *Oblt* Walter Draht was shot out of the sky over Meerholz; *Oblt* Gunther Kahler was killed in a dogfight near Neuhof. *KG(J) 54* had lost six aircraft and five pilots in one series of engagements, without claiming a single victory. It was a telling example of the consequence of assigning bomber pilots to fly very fast aeroplanes in a manner quite beyond their experience. The inherent potential of the aircraft, however, and the result of giving good fighter pilots the right equipment, was exemplified by the performance of *JG 7* over Berlin on the very same day.



Captured in flying condition, this Me 262B-1a/U1 from *10.NJG 11* displays a hybrid camouflage scheme. It bears the Foreign Equipment number 610 and carries fixed external fuel tanks on standard bomb racks under the forward fuselage.

The fruits of experience

Soon after *III Gruppe* scrambled to counter the massed bomber formations, the jets were at altitude and bearing down upon their quarry. *Lt* Rademacher bored in aggressively at a damaged B-17 which appeared to be in trouble, raking it with a two-second burst that unseamed part of its fuselage and set one engine on fire. As it slowly fell away and plunged to German soil, Rademacher was already pulling hard round to head for another B-17 less than 1,000ft (300m) away. Throttling back just a notch, he grazed the bomber's cockpit area with cannon fire and saw it, too, fall from the sky in a long and graceful dive. Meanwhile, *Hptmn* Eder was battling with escorting P-51s. Shaking them off, he headed into a box of bombers and knocked out two engines on one B-17. Then he was out and away. Turning in a sweeping arc he saw the bomber he had hit disappearing with streams of smoke pouring from its inboard wing area. *Oblt* Wegmann was just finishing off another B-17, bringing to four the number of aircraft destroyed in almost as many minutes. It fell to *Lt* Schnörrer to fasten on to a P-51 from the 357th Fighter Group, flown by Capt Browning, and shoot it down.

In the late afternoon *Uffz* Heinz Speck, *III/EJG 2* fell to the guns of a P-51 flown by Lt J. Sainlar of the 339th Fighter Group. But the record of *III/JG7* spoke for itself: five kills and no losses. However, the massacre of *KG(J) 54* belied this promising trend and made it a black day for the Me 262: in all, seven losses for five kills. The next day *KG(J) 54* lost two more aircraft: one crashed in a landing accident and the other suffered landing gear damage at Neuburg. *III/JG 7* also lost a Me 262, which force-landed because of engine failure and suffered damage.

On 11 February it was the turn of *JG 7* to suffer a defeat in combat against a worthy adversary, Sqdn Ldr D.C. Fairbanks of No.274 Sqdn, based at Volkel, Holland. A Native American, Sqdn Ldr Fairbanks had joined the RCAF in 1941 and had never transferred to an American unit. He had made his first kill on 8 June 1941 when, in a Spitfire VB, he downed a Bf 109. By 1945 he had 13½ victories to his credit, all but two scored in a Tempest V.

In one of eight Tempests on armed reconnaissance in the Paderborn-Hanover area, Sqdn Ldr Fairbanks caught sight of a lone Me 262A-1a from *11./JG 7*. He pursued it in and out of clouds for three or four minutes before it began to slow for an approach into Rheine airfield. Cutting across the widening arc it described when settling into finals, Sqdn Ldr Fairbanks gunned it down, killing the pilot *Maj* Hans Grotzinger. Another aircraft from *III/EJG 2* was lost this day when a Me 262A-2a crashed at Lager-Lechfeld. Then it was the turn of *KG(J) 51* to experience misfortune. On 13 February *Ofhr* Walter Kramer of *I Gruppe* was injured when his aircraft crashed near Cologne; next day another Me 262A-2a from the same wing suffered an accident while taxiing at Mulheim. But these were minor incidents compared to the losses this bomber unit was to suffer the same day, 14 February, at the hands of RAF pilots.

The massacre of K6(J) 51

In cold weather with varying cloud, *KG(J) 51* flew fifty five ground-attack sorties against Allied targets in the area around the ancient city of Cleves (Kleve). During the attacks, No.41 Sqdn, RAF, sent seven Spitfire XIVs on a patrol to Rheine in the hope of catching some of the jets during takeoff or landing. Several Me 262s were being seen in the circuit, but access to them was barred by aggressive, long-nosed

Fw 190Ds from *III/JG 54*. Shortly thereafter Spitfires from No.610 Sqdn flying over Rheine encountered a flight of Ar 234 jet bombers, which hurriedly opened their throttles and fled at high speed. Flt Lt F.A.O. Gaze left his wing man down low and climbed above the cloud, intent upon catching some approaching bombers, but instead chanced upon a *Kette* of three Me 262A-2a from *I/(KG(J) 51*. At full throttle, Gaze took off after them, dodging from cloud by cloud to avoid being seen. Coming within range, he fired a sustained burst at the starboard wing man, hitting the aircraft's starboard engine which caught fire and began to trail smoke. The stricken jet dived into a cloud; when it emerged it was spotted by Gaze's wing man, who saw it plummet to earth killing its pilot, *Fw* Rudolf Hoffmann.

Seeing the fate of their wing man, the other two jets sped away at full speed, at a height of 3,000ft (900m). Typhoons from No.439 (RCAF) Sqdn, forming up at 7,000ft (2,130m) after ground attacks, spotted the two fleeing Me 262s, each of which was carrying two bombs. Flg Off L.C. Shaver radioed his section to tell them he was going into the attack, pushed his nose down, and roared after the two fighter-bombers. As Shaver gained on them, the two Me 262s spotted the Typhoons and turned to port, heading for cloud 1,500ft (460m) below. Closing to within 300ft (90m), Shaver opened fire on the starboard aircraft, piloted by *Lt* Hans-Georg Richter. Seeing no result, Shaver pulled even closer in, to 150ft (45m), and opened fire again. His two-second burst had an immediate effect: the jet in front of him erupted in a fireball 200ft (60m) across. Meanwhile, Flg Off Fraser went for the other Me 262, closing to within 300ft (90m) before opening fire and scoring hits on the fuselage and wing. A moment later the jet's port engine came off, together with a section of wing that narrowly missed Fraser's Typhoon, as the Me 262 flew back below his aircraft. Pulling away and upwards to avoid a collision, the two aircraft hurtled into cloud. When Fraser emerged the Me 262 was plunging to earth; he watched as it exploded on contact, killing its pilot *Fw* Werner Witzmann.

Soon afterwards, Typhoons from No.184 Sqdn hit Me 262s near Arnhem. Capt A.F. Green reported damaging one. Sqdn Ldr D.C. Fairbanks hit and damaged a Me 262 over Rheine airfield. In a series of dogfights a Me 262 from *I/KG) (J) 51* was shot down, its pilot reaching safety by parachute, while an aircraft from *II Gruppe* crashed on landing. Altogether, *KG(J) 51* had lost seven aircraft for no return.

However, *JG 7* had a chance to shine when they scrambled to attack elements of a massive formation of heavy bombers, escorted by the usual swarm of P-51s and some P-47s. Six aircraft from *III Gruppe* and two from the newly-operational *I Gruppe* made contact with B-17s. Kills were recorded by *Lt* Rademacher, *Ufz* Schoppler and *Uffz* Engler, with no losses. Time and again the fighter units were outperforming the bombers, but overall it was a desperate game of attrition. The odds were overwhelming against the German pilots, and control of the skies was firmly in the hands of the Allies. But the *Jagdwaffe* pilots refused to give in, throwing themselves unceasingly against the aerial armadas that daily came to pound town, city and factory, tearing the very heart from their beloved Fatherland.

CHAPTER FIVE

Swansong

The second half of February 1945 proved disastrous for the Me 262 units, with as many aircraft (eighty one) lost in those two weeks as had been destroyed in the preceding three months. On 15 February the Soviet air ace Col Ivan Kozhedub, at that time commander of 176 Guards Fighter Air Regiment, was flying over pine woods on the Eastern Front when he spotted what would, under other circumstances, have been a well-camouflaged Me 262. But it had been snowing, and Kozhedub saw tell-tale smoke signs. Turning and diving down to investigate, he saw a German pilot gun an Me 262's throttles and begin to take off, the turbojets belching smoke under power. Kozhedub caught the jet with a hail of gunfire from his Lavochkin La-7, causing it to slew round and collide with a row of trees before erupting in a massive explosion from which the pilot could not escape. This was the first Me 262 lost on the Eastern Front.

It was another bad day for *I/KG(J) 54*, with one fighter-bomber lost during a training flight not far from Bad Mergentheim and two lost in combat: one at Obergrasheim, where the pilot baled out to safety, and a second during a forced landing at Mandelfeld. Another aircraft from *III Gruppe* came down near Ingolstadt because of technical trouble. However, *10./NJG 11* partly redeemed the day when, responding quickly to an interception alert, it made the day's only kill by an Me 262. Aircraft from the unit were scrambled to intercept P-38 Lightnings. Within minutes the Me 262s were in action, and after several inconclusive tussles, *Fw* Karl-Heinz Becker fastened on one twin-boom fighter and shot it down, but was himself set upon by two others which damaged his aircraft. The Me 262 struggled back to Handorf, where it force-landed and was put out of action. The pilot was unhurt.

March 1945 and despite the prevailing situation pilots of *3.JG 7* led by Staffelkapitan Oblt Hans-Peter Waldmann gather for an informal group picture.

Repainted after the war, this Me 262 wears a camouflage finish barely coincidental with its wartime original. Several aircraft captured by the Allies and put on public show were treated to such indignity. Some remain so.

The next day, 16 February, *I/KG(J) 54* lost two more aircraft: one Me 262A-1a burst a tyre on takeoff at Giebelstadt; a second was destroyed on the ground at Obertraubling during a strafing run. *Lt* Rademacher of *III/JG 7* claimed an aircraft destroyed during combat over Hannover; he specified an RAF Mustang, but none was lost that day. *Hptmn* Eder was injured when his aircraft was hit, spending the following month in hospital before rejoining *III/JG7*.

February 17 brought little respite. *I/KG(J)54* suffered a casualty when *Oblt* Franz Theeg's Me 262-2a was gunned down by P-51s near Wolkhausen, killing the pilot. But, unusually, it was *JG 7* that took the brunt of aircraft losses this day. *I Gruppe* lost a Me 262A-2a through engine failure north of Hamburg; the aircraft force-landed, receiving severe damage. *III Gruppe* lost two aircraft, both at Briest. *Ofw* Hans Clausen was killed in his Me 262; another aircraft was damaged when it was forced down in combat by Lts T.B. Westbrook and C.E. Buchanan of the 365th Fighter Group. The fifth loss of the day was suffered by *10./NJG 11*: *Ofw* Walter Bocksteigel was killed when his Me 262A-1a crashed three miles east of Burg. But *III/JG 7* returned good results once more, claiming four B-17s shot down; two of those were attributed to *Uffz* Koster. Next day two aircraft from *JG 7* went down. One was lost through technical failure, when a machine from *I Gruppe* crashed at Kaltenkirchen; in the second, flown by *Maj* Theodor Weissenberger of *Stab* flight, the pilot was slightly wounded after tangling with B-17s. Nevertheless the wing had its best day yet, shooting down thirteen B-17s and a P-51.

The Me 262 was now getting into its stride, and one man at least watched with envious eyes as the increasing experience of the jet pilots contributed to proving the worth of the aircraft as an interceptor. That man was Adolf Galland. In the last week of December 1944 Galland had been sacked from his post as *General der Jagdflieger* and replaced by Gordon Gollob, a dedicated Nazi who surreptitiously did the bidding of Heinrich Himmler while still toadying to the now virtually powerless Reichsmarschall Goering. After losing his post as chief of the fighter arm, Galland brooded over lost opportunities – and now he was planning to give a spectacular demonstration of élite fighter tactics by setting up his own *Staffel*-sized fighter unit. Permission for this had been denied by Goering at the time of Galland's dismissal – but things now were in a state of change.

A plot against Goering

During January a virtual revolution among high-ranking fighter pilots saw an attempt to remove Goering as head of the Luftwaffe. His leadership had brought chaos to Luftwaffe planning. It was apparent that the application of aircraft duties and roles was now being handled at lower levels with greater effectiveness than under Goering's control. The pilots had lost all faith in him and were convinced that Germany's only hope for marshalling resources for the defence of the Reich lay in his removal. There had been even graver issues. After the failure of the plot against Hitler, when a bomb planted in his conference room at Rastenburg on 20 July 1944 failed to kill him, there was talk in command circles of a military coup against the Führer's leadership. Some senior Luftwaffe commanders expected that the very existence of Germany would be threatened by a Russian invasion and occupation, and desperately wanted to strike a deal with the British and American leaders, to unite behind a common flag against the communist menace. After the war Galland would recall that at last they judged such approaches to the Western Allies to be unwise and counter-productive, fearing that they might cause a schism between the Army and the SS, resulting in a bloody factional war which would do nothing but accelerate the destruction of Germany.

Still, the grievances felt by the fighter leaders were persistent. As recently as the autumn of 1944 attempts had been made by certain elements in the Luftwaffe to gain control of the fighter forces. A prominent bomber leader, Dietrich Peltz, had risen to favour in the Luftwaffe hierarchy, but his interference in the affairs of the fighter units brought resentment. Peltz had been the brains behind Operation *Bodenplatte*, devised as a massive blow at Allied air bases and facilities on the opening day of the Ardennes offensive but delayed more than two weeks by poor weather. This had undermined Galland's plans for big blows against Allied bomber formations. Peltz had also argued for the Me 262 to be delivered to *Kampfgeschwadern*, where he claimed bomber pilots would fly the new aircraft with greater effectiveness. In fact, when it came to flying and fighting in the jets, the inadequacy of bomber pilots' training for this very different kind of air war was revealed. Unrest was aggravated by the tirade of abuse from Goering over the inability of the fighter pilots to gain air superiority and knock down the bombers in sufficient numbers to quell the Allied assault.

During the first two weeks of January

Johannes Steinhoff

Born on 15 September 1913 in Bottendorf, Johannes Steinhoff had his first experience of service life after joining the German Navy as an officer cadet at the age of 21. Just two years later he transferred to the newly-established Luftwaffe. By the time war started he was *Staffelkapitän* of *10./JG 26*, and was one of the first German pilots to shoot down RAF Blenheims near Wilhelmshaven. In February 1940 he was posted to command *4./JG 52*, remaining with this *Staffel* throughout the Battle of Britain before taking command of *II/JG 52* in February 1942. Awarded the Knight's Cross on 30 August 1941 after having achieved thirty five victories. Steinhoff received the Oak Leaves on 2 September 1942 after his 101st kill.

On 2 February 1943 he achieved his 150th victory and the following month was posted to North Africa, where he succeeded Joachim Müncheberg as commander of *JG 77*. One of the great personalities of the *Jagdwaffe*, 'Macki' Steinhoff was well liked and respected by his men, highly regarded by his superiors and feared by his enemies. He received the Diamonds to his Knight's Cross on 28 July 1944 after 167 kills. Steinhoff remained with *JG 77* for twenty one months; then, in December 1944, he took command of *JG 7*, flying the Me 262. Called by Galland to join the élite jet unit *JV 44*, he left *JG 7* in January 1945 to help recruit new pilots and to work directly under Galland in converting them to their new jet fighters. On 8 April 1945 Steinhoff started on his 900th sortie. His aircraft suffered a flat tyre and struck banking alongside the runway, cart-wheeling into the air before crashing to the ground in a terrific fireball. Steinhoff fought his way free but suffered terrible facial burns when his wing-mounted rockets fired spontaneously.

Years of hospital treatment gradually restored Steinhoff's face, although not until 1969, when an RAF surgeon grafted new skin from his arm to form eyelids, could he close his eyes. In all, Steinhoff scored 176 victories, six of them in the Me 262. In 1952 he joined the reconstituted Luftwaffe, becoming Deputy Chief of Staff, Operations, in 1956 and gaining promotion to *Generalmajor* in 1962. He was appointed German military representative to NATO and later became NATO Chief of Staff, Air Forces. His military career came to an end in 1972; he died early in 1994.

several prominent fighter leaders attempted to bring about Goering's replacement. In an attempt to reach Hitler and gain support for their plan, Steinhoff and two aides went to seek help from the dour and fanatical *SS-Gruppenführer* Otto Ohlendorf. All they got was a lecture about the incompetence of the *Jagdfliegers* before they were shown the door. The newly appointed Chief of the Luftwaffe General Staff, Karl Koller, was informed of the unrest by Galland's chief on the Fighter Defence Staff, *Maj* Gerd Müller-Trimbusch. Koller summoned Steinhoff and Lutzow on 17 January and told them that they must confront the *Reichsmarschall* in person. Accordingly, the fighter leaders attended a meeting two days later at which Goering confronted his accusers. Galland was not allowed to attend, but *Obst* Günther Lutzow represented his interests, making a lengthy speech in which the fighter leaders' grievances were expressed. Goering roared and ranted at their accusations, and soon after the five-hour meeting broke up, arrest warrants were issued for Lutzow and Galland. Lutzow was banished to command a non-existent unit in Italy; Galland was told to leave Berlin within twelve hours and not to move from his registered address. As for Steinhoff, he was removed from his position as *Geschwaderkommodore JG 7*, only one month after his appointment.

Galland's élite unit

On 23 January Goering announced that Galland had been dismissed as *General der Jagdfleiger* and that Gordon Gollob would take his place. One week later Galland returned to Berlin and the comfort of sympathetic friends. One of these, fearing that Galland was suicidal, telephoned Albert Speer to seek mercy for the dismissed ace, for there were rumours that he would be tried for treason. Speer called Hitler who, hearing of Galland's plight, made the SS withdraw its threats. Goering now ordered Galland to meet him at his country estate, Karinhall (built in memory of and named after his deceased Swedish wife). When Galland arrived he was subjected to an hour-long assault on his record, integrity, ethics and character. After venting this final burst of spleen, however, Goering told Galland that he would be allowed to form a special *Staffel*-sized unit to prove his claim that the Me 262 was a superb interceptor. He would also be free of Gollob's control. Gollob had wanted to send Galland to join *4./JG 54*, one of only two *Staffeln* fighting fiercely on the north-eastern front over the Baltic.

Before leaving Goering's office Galland had selected a designation for the new unit: *Jagdverband 44*, named both in recognition of his last year as head of fighter forces and in numerical reminisence of his first combat unit in Spain, *J88*. It was Galland's responsibility to find the men and the material for his new 'test' unit, but he was forbidden to use his own name or former position in the unit's designation. Nevertheless, word had spread to senior and junior levels alike of Goering's order of 23 January, and there were many pilots who, sensing the end was truly only weeks away, wanted to fly and fight at the side of the great fighter leader. At this time, too, Gollob ordered bomber units *KG 6*, *KG 27*, *KG 55* and *KG 30* to equip with the Me 262, and ordered *JG 300* and *JG 301*, specialized Reich-defence units, to do likewise. But circumstances worked against Gollob's edict: fuel shortages led to restrictions on fighter-bomber operations in the west and south by early February. Operations by *III/KG 76* with Ar 234 bombers and *KG(J) 51* with Me 262s were restricted to easily acquired targets with a positive tactical value.

It was not only fuel that caused operational delay. Aircraft were not emerging from the Me 262 production plan as scheduled, and Goering once again interfered with the dispositions of units and aircraft in a muddled attempt at readjusting the

Johannes Steinhoff received terrible facial injuries when his Me 262 overturned and burned during takeoff in April 1945. He would recover to become a *Generalmajor* in the reformed Luftwaffe and serve as the German representative to NATO.

balance. On 4 February, he ordered the disbandment of the *Industrie-Selbstschutzschwarme* (ISS; industrial air defence units), much to the fury of Otto Sauer, who also had other things on his mind. It had been he who had promised a production rate three times the size of the numbers of Me 262s actually reaching combat units. The Luftwaffe *Führungstab* (Operations Staff) had decided that it was better to make available more Me 262s than to commit jets to flying against small numbers of reconnaissance aircraft over vulnerable assembly plants. The deployment of Me 262s at Gollob's order was chaotic. *JG 300* and *JG 301* used their aircraft as ground-attack fighter-bombers rather than in the defence of German airspace. Meanwhile, the Luftwaffe proved increasingly unable to respond to the ever-increasing number of Allied aircraft operating over Europe.

In the first week of February, the *Oberkommando der Luftwaffe* (OKL) authorized Galland's *JV 44* to be assigned as the fourth *Staffel II/JG 7* 'Nowotny', a newly-established *Gruppe* for *JG 7*, known since its formation in July 1943 as *IV/JG 54* 'Grunherz'. The *II Gruppe* was commanded by *Maj* Hermann Staiger and was based initially at Landsberg and Lager-Lechfeld. In reality this move never took place, although plans existed to the end of the war to absorb *JV 44* into *II/JG 7*. Meanwhile, Galland tackled the task of setting up an organizational chart for *JV 44* and establishing the procedures for acquiring men and aircraft. This was to prove harder in practice than theory!

Galland, working through the Luftwaffe Personnel Office, obtained authorization to receive Me 262s from *16./JG 54* and *III/EJG 2* whenever they could spare aircraft (which was usually when they received new production aircraft from the factory lines). At this time the expansion of existing Me 262 fighter units progressed apace, with increasing numbers of aircraft becoming available. In January Messerschmitt's Augsburg and Regensburg factories produced 228 aircraft, almost twice as many than had been delivered in the preceding two months.

II Gruppe JG 7 suffered its first loss on 19 February when a Me 262A-1a piloted by *Fw* Aloys crash-landed near Stubben, Bad Segeberg. Four losses were shared equally between *KG(J) 51* and *KG(J) 54* this day. One aircraft was damaged while taxiing at Rhein-Main; one was forced down near Lingen; one crash-landed at Giebelstadt; one ran out of fuel and crashed at Wertheim. The latter fate was not uncommon in the *Jagdwaffe*: many piston-engined aircraft were now running out of fuel and crash-landing. Air superiority was now clearly in the hands of the Allies, and German aircraft frequently had difficulty getting back to their home bases. Air combat was often a mêlée from which German aircraft had little chance of escape. When the jets were able to reach optimum altitude and attack the enemy at speed, they proved difficult, elusive targets. Moreover, instead of diving away in an attempt to lose his adversary, an Me 262 pilot would roll out, gun the throttle and climb out faster than his opponent could follow. Many American pilots reported wasting a lot of fuel in trying to match the jets. Even so, the high loss rate continued. On 20 February, *10./EJG 2* lost a Me 262A-1a south of Lammerdingen, when *Fw* Germar Nolte was killed. *I/KG(J) 54* had one aircraft shot up on the ground at Giebelstadt and another downed at Odenheim without seriously injuring the pilot. A fourth aircraft, belonging to *1./NAGr 6* was lost when it executed a wheels-up landing at Lager-Lechfeld. This unit, formed under *Obstlt* Braunegg, comprised two *Staffeln* operating photo-reconnaissance aircraft.

The jets ended a barren four-day period on the night of 20 February, when

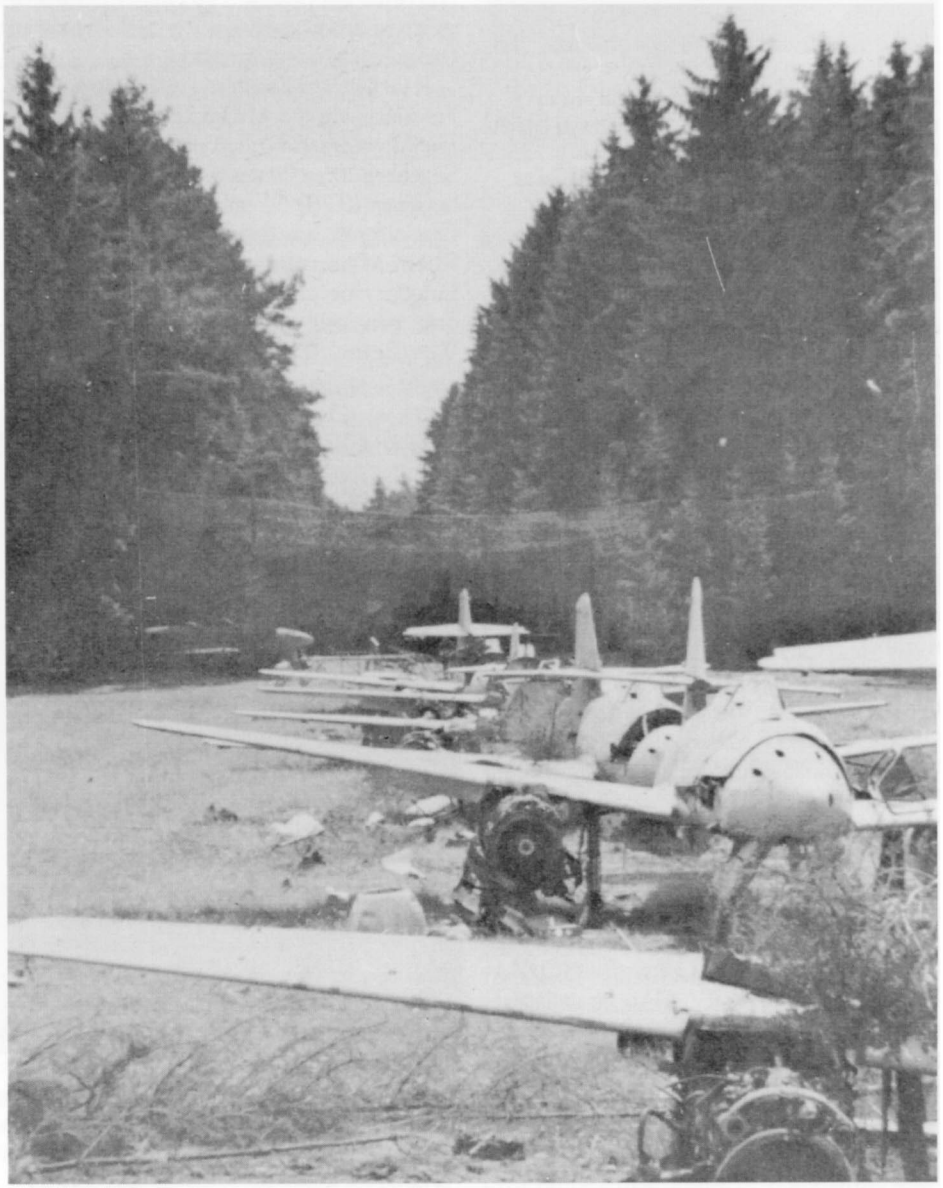
The sad fate awaiting the majority of the more than 1,400 Me 262s produced by the Messerschmitt Augsburg and Regensburg factories as time runs out for the Third Reich. The simplest way to disable the jet was to smash the forward landing gear leg. Aircraft in the foreground is the high speed prototype V9 (V1+AD) completed in January 1944 and used for communications testing.

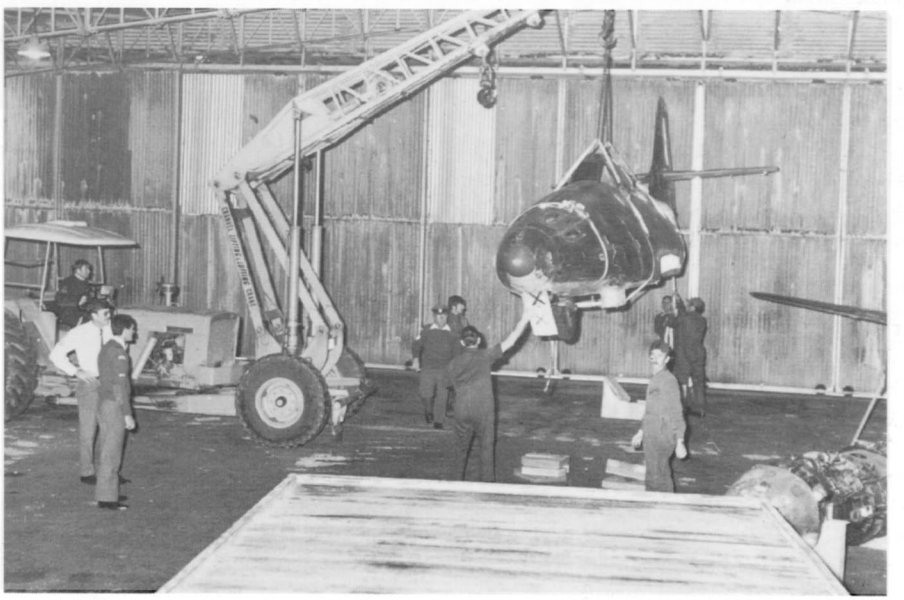
American servicemen at Lager Lechfeld in May 1945 where Me 262s lie abandoned in the fresh snow. Sadly, too few examples of this remarkable aircraft were preserved for posterity.

Me 262s lie abandoned by workers at the jet assembly-plant near Obertaubling airfield.

10./NJG 11 bagged three high-flying Mosquitos, but next day *II/JG 7* lost another aircraft when a tyre burst during takeoff at Parchim. No combat kills were recorded by Me 262 units on 21 February, but a further nine jets were lost either to technical problems or combat encounters. The unit harried P-51s of the 479th Fighter Group with much tenacity; neither side could get a bead on the other, for the German pilots exhibited both skill and cunning. *III/JG 7* lost another Me 262A-1a at Briest, when tail control problems caused a crash-landing that wrote off the airframe. *II/KG(J) 51* suffered badly. One of its aircraft was lost when a tyre burst, causing the Me 262 to slew off the runway and break its landing gear, which in turn broke the wing. Another aircraft crash-landed in countryside near Aschendorf; another had an in-flight failure due to technical trouble. *KG(J) 54* shared the gloom: one of its aircraft crashed at Giebelstadt because of engineering problems; another was lost during a ground strafing run.

Inexperience was probably why *Ofhr* Gerhard Rohde lost his life, when he made a fast pass at a Lockheed F-5 and came straight across the path of two P-51s flown by Lts H.E. Whitmore and Russell H. Webb of the 356th Fighter Group. From a distance of only 1,200ft (365m), Lt Whitmore fired on the Me 262 as it sped across his flight path, blowing it up with his first burst and this inflicting on *KG(J) 51* its fourth loss of the day. Two more losses were recorded: one of *10./NJG 11*'s jets was damaged during combat before making a





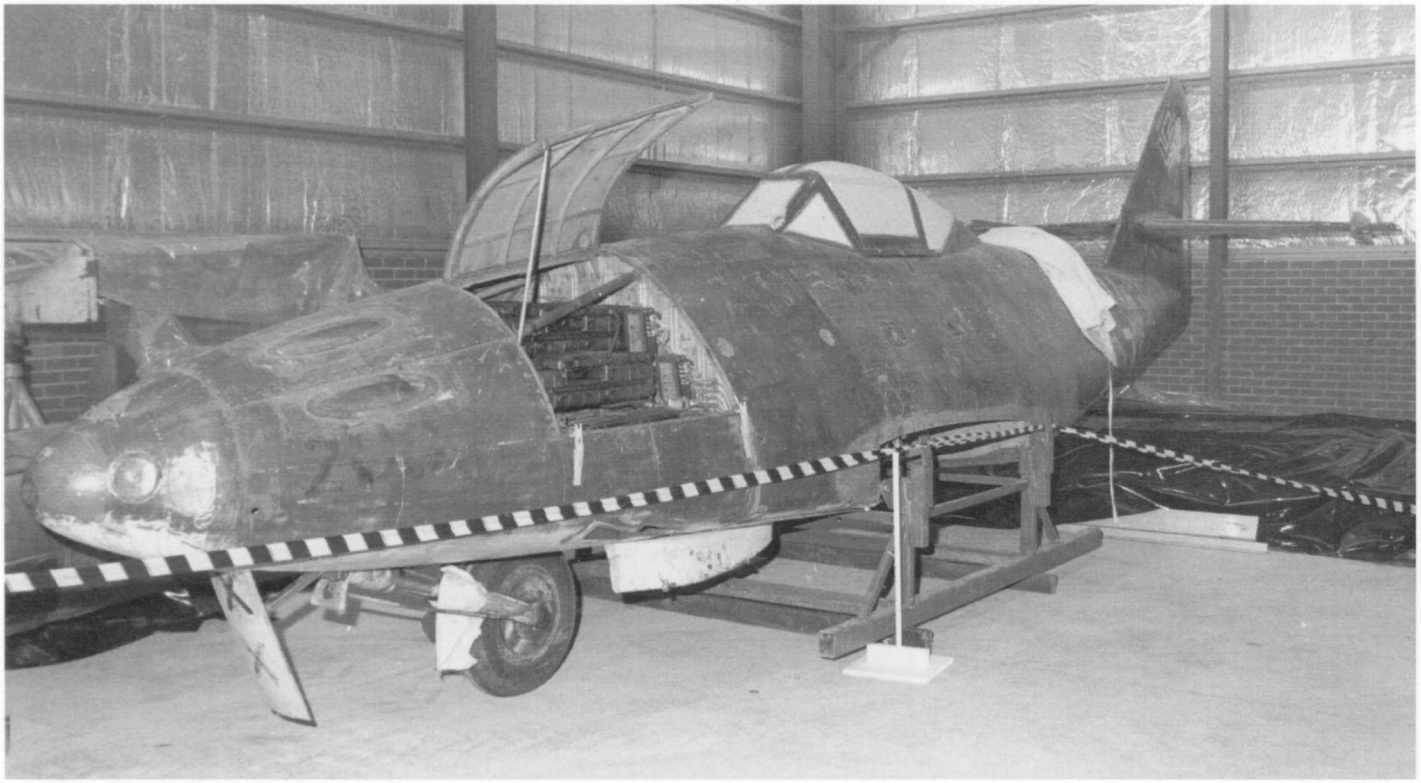
As part of the technical examination of Axis equipment, the jet and rocket powered aircraft came under special scrutiny and many examples were shipped out to Britain and the United States. This example, *werke/nr* 500200, was taken to Australia where it remains in its original condition.

forced landing at Prenzlau, while a photo-reconnaissance machine from *2./NAGr 6* crashed south-east of Landsberg during a training flight. To balance the loss of these ten aircraft, *Stab/JG 7* claimed two B-17s and *III Gruppe* claimed eleven heavy bombers, a P-51 and a P-47. *10.NJG 11* and *III/EJG 2* claimed a heavy bomber and a Mosquito respectively. Two *JG 7* pilots, *Lts* Ambs and Giefing, each made two kills. Elsewhere, Flt Lt L.A. Stewart, a Canadian pilot of No. 412 (RCAF) Sqdn, tangled with a Me 262 and reported damage when he saw black smoke coiling away from one engine – although undamaged jets might trail smoke in this way during tight manoeuvres.

The Allied Operation 'Clarion'

Launched by the Americans on 22 February, Operation 'Clarion' was intended to do to Germany's marshalling yards and communications centres what 'Big Week' had done to its fighter bases a year earlier. In all, more than 3,000 aircraft from the 8th, 9th and 15th Air Forces ranged over occupied Europe and Germany. With clear weather to aid visual targeting, the bombers could run in on their targets from only 10,000ft (3,050m) instead of the usual 22,000–24,000ft (6,700m–7,320m), making it easier for them to hit the smaller targets. Every *Jagdfleiger* who could fly was in the air in a vain attempt to blunt the assault. Around 50 Me 262s took to the sky – with mixed results. In many separate encounters, Allied escort fighters worked briskly to keep the jets from making slash attacks on the heavy bombers. From its base at Parchim, *III/JG 7* went up over Salzwedel and Ludwigslust, trying to penetrate the bombers' screens without success. Escort fighters from the 200th Fighter Group reported determined attacks; they held off the Me 262s and got some hits on the jets, but without reporting a kill.

III Gruppe put 34 Me 262s into the air, and shortly after midday *Obfw* Hermann Buchner and *Obfhr* Heinz Russel homed on a stream of heavy bombers near Stendal. Nearby were P-51s from three escort groups. One, comprising sixty one aircraft from the 364th Fighter Group, turned to fend off the jets. Although he had intended to dive on the bombers, *Obfw* Buchner diverted to the fighters when he saw them coming in fast, pulling round at full throttle to bounce a section led by Lt Cliff Hogan. Buchner hit Hogan's number two, Lt Francis Radley, who was trailing Hogan to his port rear. After a single burst, the P-51 was ablaze and on the way down from 10,000ft (3,050m). Some aircraft from *III Gruppe* were reported damaged, but the Allied claims



The Australian Me 262A-2a fuselage with guns installed. Several airframes were used for structures tests and wound up in laboratories which would discard them after trials. This particular aircraft is on display at the Teloar Centre, Canberra.

far exceeded reality. Aircraft from the 352nd and 363rd Fighter Groups reported contact with Me 262s from *JG 7*. *III Gruppe* got two B-17s and a two P-51s, the former going to *Uffz* Hermann Notter and the latter to *Lt* Hans Waldmann of 9 *Staffel*. Another P-51 was claimed by *Oblt* Günther Wegmann, but this was not confirmed.

JG 7's losses were heavy. *Uffz* Notter was hit after his double victory and crash-landed near Stade with injuries, as did another pilot from *Stab* flight. A *I Gruppe* pilot had to force-land at Kaltenkirchen after a severe mauling from several P-51s that, on this occasion, managed to prevent the Me 262 from seeking altitude in a fast climb. *III Gruppe* lost six aircraft including one damaged in combat, which crash-landed at Larz, and another which crashed in the same area before the pilot landed by parachute. One aircraft suffered an engine failure and crashed at Döberitz, killing its pilot; another suffered heavy combat damage and only just made it in to Oranienburg. *Ofw* Heiz Mattuschka baled out of a doomed aircraft near Hagenow and lived to tell the tale, but a machine from *10 Staffel* was jumped by P-51s and brought down near Schönwald-Niederbarn. As the pilot jumped he struck the tail of his Me 262, dying later of his injuries.

There were other actions on this day in which the Me 262s took a heavy beating. At Aachen, Me 262-2as of *KG(J) 51* based at Rheine were seen by Allied fighters while attacking American troops on the Pier-Duran autobahn, strafing them from low altitude before climbing back up to around 5,000ft (1,500m). Two P-47s of the 388th Fighter Squadron, 365th Fighter Group, dived after them. Lt Oliver T.Cowan, diving at 530mph (850km/h), caught a low-flying Me 262 unaware. Pulling the nose of the P-47 up to a good firing angle, he gave the jet piloted by *Lt* Kurt Piehl a burst; it fell away, hitting the ground with a plume of smoke. The second aircraft was chased by other P-47s but got away. Meanwhile, P-47s of the 48th Fighter Group were taken by surprise when three Me 262s jumped them near Wittstock. The jets were unable to get a hit, but one of the P-47s reported damaging a Me 262. Two more kills reported by American pilots were not confirmed, although a Me 262 from *II.KG(J) 51* crashed when the pilot misjudged his pull-up from a dive. One Me 262A-2a from *8./KG(J) 54* lost out to a P-51 over Landsberg; its pilot, *Ogfr* Jurgen Brink, died. In all, on the first day of Operation 'Clarion', twelve Me 262s were lost and only three heavy bombers shot down.

Heavy losses in February

In the remaining six days of February there were few claims but a run of losses. The RAF was out in force on 23 February, Mustangs from Fighter Command escorting Halifaxes, Lancasters and Mosquitoes from 4, 6 and 8 Groups. Despite cloudy skies which required the bombers to drop their loads on sky markers, Bomber Command got good results as it tipped a reported 300 high-explosive bombs and 11,000 incendiaries onto the Krupp works at Essen. Despite

activity by the Me 262s there were no kills to report. Warr Off H.A. Pietrzak, flying a Mustang III of No. 309 (Polish) Sqdn, reported damaging a jet fighter, but the only aircraft lost to air activity on 23 February was a Me 262A-1a of *I/KG(J) 54*, which crashed at Giebelstadt. Another aircraft, a Me 262A-2a, was destroyed in a landing accident. The day's greatest losses were suffered during a bombing raid on Neuberg, when five aircraft from *III/KG(J) 54* were damaged and one destroyed.

Next day, 24 February, *I/KG(J) 54* lost a Me 262A-1 when it force-landed west of Giebelstadt with the loss of its pilot, *Fw* Hans Bromel. *I/KG(J) 51* lost a Me 262A-2a which crashed near Essen-Kupferdreh, also killing its pilot. Later, *II/KG(J) 51* lost three aircraft: one crashed on takeoff; one crash-landed at Rheine; and one was shot up during its approach to Rheine by Flt Lt R.C. Kennedy in a Tempest of No 274 Sqdn. But the flak barrage set up to protect Me 262 airfields did its work, and No 274 Sqdn could do no more than damage the aircraft. Increasingly, however, for the Allies, damaged aircraft were almost as good as those destroyed. With spares and equipment at a premium, the lack of materials and parts was becoming a serious problem for the Luftwaffe; an aircraft might be grounded for several weeks while awaiting an essential part that never arrived. Although the production programme was at its peak, the converging trends of diminishing resources and advancing Allied ground forces slowly began to shut off the flow of aircraft, spares and munitions.

The British took a keen interest in the Me 262 and conducted flight tests in England with eight single-seat and one two-seat aircraft. Here, pilots from the Royal Aircraft Establishment, Farnborough, prepare a Me 262B-1a for flight and put it through its paces.

Germany's transport crisis

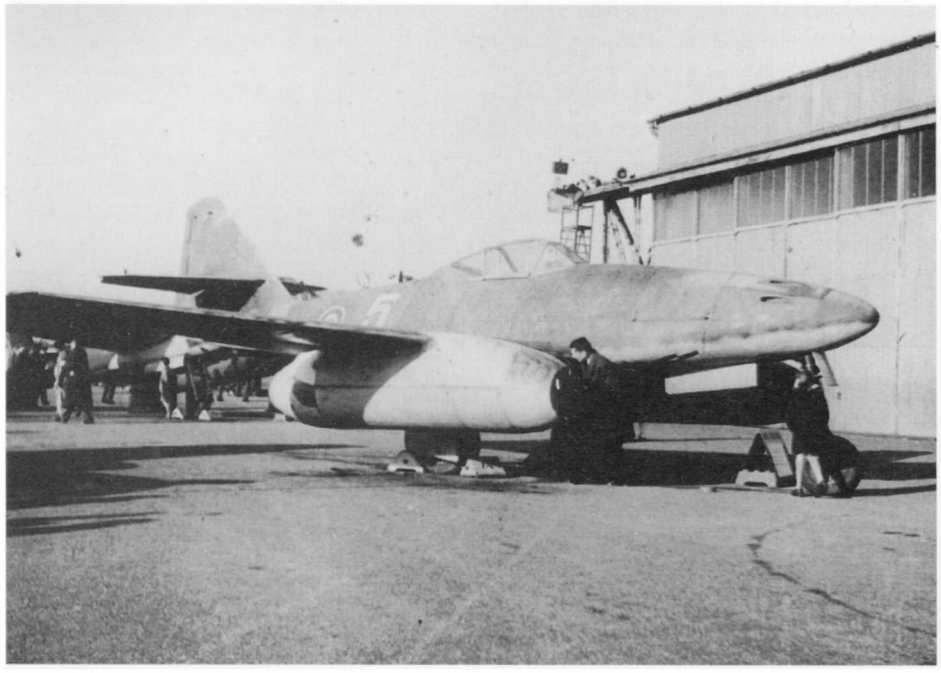
One problem with getting the stores and spares, as well as new aircraft, was the apalling condition of Germany's road and rail transport network, along with a general breakdown in the traditional efficiency of Germans in transport operations. With concentrated attacks on marshalling yards and railheads, and severe disruption to lines, the available locomotives and rolling stock were diminishing at an alarming rate. Raw materials could not be moved to the dispersed production centres, for rail lines that stretched for miles across open countryside would end suddenly, the track buckled or destroyed. Moreover, there was increasing demand on the rail system to move people rather than material – and not all the priorities established were official. Luftwaffe fighter units pulling back from their forward bases had to use trucks and half-tracks, while their aircraft flew back to an airfield where they would await the arrival of surface transportation. Frequently that never came. It might be shot up by strafing Allied aircraft – or, if it served their purpose, SS units would commandeer the transport at gun-point for their own use.

To these existing and worsening problems were added the danger of sabotage and the disruption caused by the dispossessed of Europe who had been brought in their thousands to work in apalling conditions on production lines in mine shafts and caves. These people who had a work life measured in weeks, were manifesting increasing resistance to the enforced slavery. As aircraft were being assembled by semi-skilled or skilled workers from occupied territories, vital components might be sabotaged or 'modified' in such a way that the aircraft would

fail after two or three flights (a sufficient delay to avoid immediate blame falling on production line). Unit commanders were increasingly reluctant to accept aircraft without a full mechanical inspection by engineers at unit level, but even so, many losses were attributable to silent resistance on the part of the armies of slave labourers, who never got the satisfaction of seeing the result of their sabotage.

Compounding these obstacles were the difficulties of getting bomber pilots satisfactorily re-orientated and 'de-trained' from their former flying experience in favour of the very different tactical requirements of jet fighters. In the attempt to get as many Me 262 units operational as possible, the luxury of adequate conversion training for individual pilots was denied. The price for that was paid in full on 25 February. For the Me 262 it was a black day; and for *KG(J) 54* it was almost terminal. There was nothing to indicate that the day's events would be so dreadful, but it saw the conjunction of random factors that might have produced the same result on any number of previous occasions. Things had been particularly bad on 9 February, when *KG(J) 54* lost seven aircraft and its *Geschwaderkommodore*. But it was to be much worse sixteen days later, when sixteen Me 262A-1a of *I Gruppe* and Me 262A-2a of *II Gruppe* ascended from Giebelstadt, climbed through thick cloud, and ran straight into a squadron of P-51s from the 55th Fighter Group, led by Capt Donald O. Penn.

Immediately on sighting the jets, Capt Penn ordered the P-51s to drop their tanks and engage the enemy. Bunting into a full high-speed dive, the Mustangs screamed after their prey, hitting 500mph (800km/h) as they howled down on their hapless victims. Their leader sighted a Me 262 heading back for its field and singled it out as his victim. Turning gracefully to port, the jet had its wheels down and was clearly about to land when Capt Penn got to within 900ft (275m) and gave it a burst of cannon fire, causing it to roll over with equal grace and dive straight into the ground. For the remaining Me 262s it was carnage. Within minutes, jets flown by *Lts* Hans-Georg Knobel and Josef Lackner and *Fw* Heinz Clausner of *5 Staffel* were shot out of the sky. One of those was Capt Penn's victim. In the same engagement, *I Gruppe* lost *Fw* Felix Einhardt, whose aircraft crashed at Langfeld after being badly mauled; *Lt* Wolf Zimmermann was hit, but baled out and survived. A third aircraft from *I Gruppe* crash-landed at Giebelstadt after coming under the guns of Capt Donald M. Cummings of the 55th Fighter Group.



Formerly with *KG(J) 51*, Me 262A-2a *werke/nr* 111690 is taken on charge by the RAF and test flown from Farnborough.

Later that day, *Stab* flight lost a Me 262A-1a in a strafing run on Giebelstadt; *I Gruppe* lost three during the same raid. Before the day was out *III Gruppe* reported that a Me 262A-2a had gone down at Swäbisch-Hall because of technical failure, and that a Me 262A-1a had been virtually written off in a crash landing at Neuberg. Added to *12 KG(J) 54*'s losses was another aircraft from *St./NAGr 6*, which force-landed at Lager Lechfeld badly damaged. Late that morning, P-51s of the 4th Fighter Group were on a strafing operation to Leipzig at an altitude of 8,000ft (2,450m) when they spotted a fast-moving jet about 4,000ft (1,200m) below and ahead. The 4th FG was the oldest in the 8th Air Force, having been formed from the original RAF Eagle Squadrons of volunteer Americans. Lt Carl G. Payne of the 334th Fighter Squadron (originally No 71 Sqdn, RAF) peeled off in pursuit and accelerated in the dive, gaining on the aircraft as he went.

Holding his fire until he was within 1,200ft (365m) of the jet, Payne then opened up with his cannon, holding the button down until he was a mere 300ft (90m) behind the Me 262. Hits were made on its port engine, which stopped running. As Lt Payne pulled away and came round for a second pass, Lt Arthur A. Bowers slipped in and took over, pouring lead into the jet. But he was so overcome with excitement at getting the better of a jet fighter that he failed to set his sights correctly; his tracer went too far in front, failing to hit the aircraft. As Bowers pulled away, Payne came back in again and jinked around behind the jet. By now they were almost down to ground level. Payne was not getting the hits he thought he deserved, so he flew up close and fired from a range of less than 100ft (30m). The Me 262 suddenly exploded, momentarily enveloping Payne's aircraft in flames, and crashed near Deberndorf. So died *Oblt* Josef Bohm of *11./EJG 2*.

In all, fourteen Me 262s were lost on 25 February – but it might have been worse. Shortly before 0900 hrs, sixteen Me 262s were sighted near Düren at 11,000ft (3,350m) and were pursued by P-47s from the 386th Fighter Squadron, 365th Fighter Group, led by Lt John H. Rogers. The jets, aircraft of *KG(J) 51* out of Rheine-Hopstein, turned to port when they saw

their pursuers and made off at speed. The P-47s had a single bomb beneath each wing and were unable to keep up. One of their number had engine problems and turned back, only to be jumped by a lone Me 262 which failed to get him in his sights. After a while, the remainder of Lt Rogers' flight were attacked by Me 262s. Jettisoning their bombs they split and scattered, and then regrouped to face their assailants. Lt J.L. McWhorter flew at one head-on and got some hits, but the Me 262s dispersed.

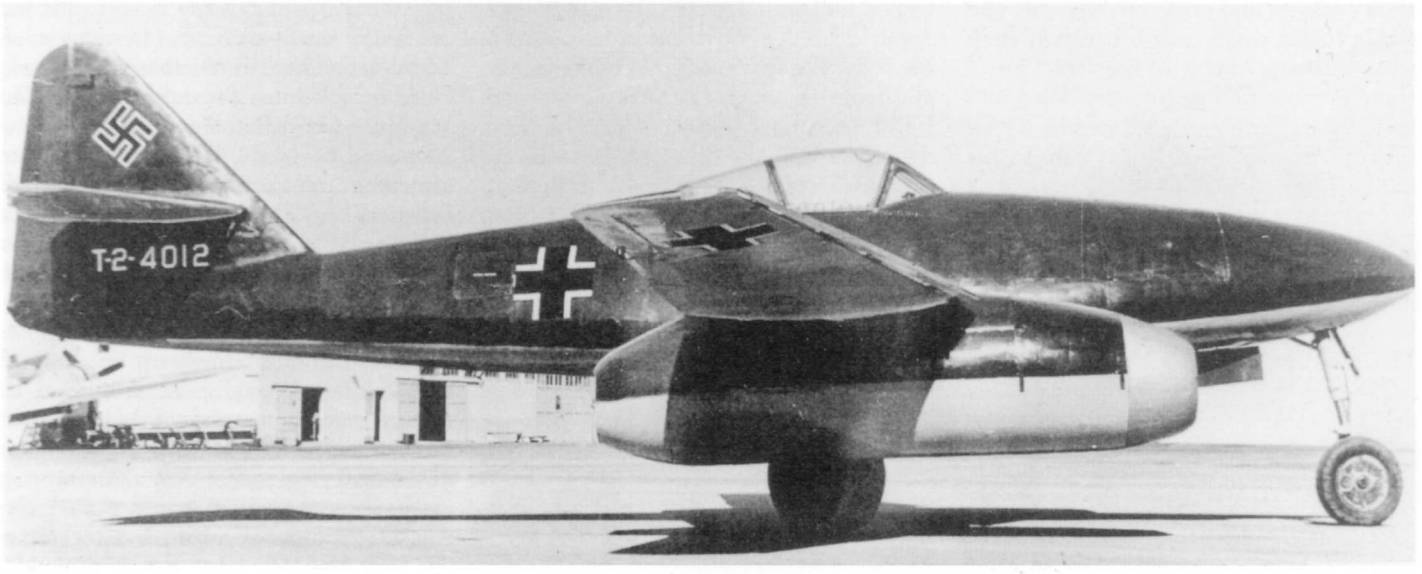
Later, again over Düren, Capt C. Ready and Lt L. Freeman got close to two more jets and opened fire, recording hits. On its way home the flight saw two more jets strafing Allied troop positions, but these turned and ran. The US 9th Air Force's 366th Fighter Group reported contact with Me 262s. The first encounter took place in mid-morning, when Lts M.R. Paisley and J.T. Picton each reported one Me 262 damaged over München Gladbach. Minutes later P-47s of the 405th Fighter Group made contact with Me 262s east of Erkelenz, and one was reported damaged by Capt R.W. Yothers. Meanwhile, between Linnich and Jülich, P-47s from the 373rd Fighter Group reported a dog fight in which Lt E.P. Gardner claimed one jet damaged. Two Spitfire units reported dogfights with Me 262s: Flt Lts K.S. Sleep and B.E. Innes of No. 402 (RCAF) Sqdn and Plt Off L.E. Spurr of No. 416 (RCAF) Sqdn laid claim to damaging two jets before the German aircraft fled. The decimation of *KG(J) 54* served notice on the bomber pilots that their aspirations were not to be realized without adequate training.

These captured Me 262s belong to USAAF Technical Service Command and after repainting and application of US insignia were put through preliminary flight tests before shipment home.

KG(J) 54: Batcher takes command

To replace *Obstlt* Freiherr von Riedesel, killed on 9 February, a veteran of *KG 76*, *Maj* Hans-Georg Batcher, was drafted in to command *KG(J) 54*. He arrived two days after the 'massacre' of the unit on 25 February and found under-trained pilots and a lack of morale. On the day of his arrival, three more Me 262s were lost. One crashed near Ingolstadt during a training flight, killing *Oblt* Hermann Kleinfeldt; the second crashed at Neuberg because of technical failure; the third was damaged on takeoff from the same field. *Maj* Batcher immediately ordered the unit to stand down and begin an intensive training programme. *KG(J) 54* would make only one claim against another aircraft in combat before the end of the war grounded the unit, but equally its days of heavy losses were over.

On 27 February, *Lt* Rademacher of



Originally a photo-reconnaisance variant, T2-4012 travelled to the United States on HMS *Reaper* and was fitted with a fighter type nose. After overhaul and with an overall smooth finish it was flown in comparative trials with the Lockheed P-80. It is now preserved in the Planes of Fame museum at Chino in California.

III/JG 7 was credited with shooting down a B-24 during an air raid on Halle and Leipzig involving more than 1,000 heavy bombers and almost 700 fighters.

On almost a daily basis now, the Allies were routinely sending more than 1,000 bombers to pulverize roads, railways and communications centres, creating havoc in German supply lines. Engines were not getting through to the jet units, spares were in shorter supply than ever, and now fuel began to run out. During February, 115 jets were either destroyed or seriously damaged, and the Me 262 pilots' claims of thirty one kills were certainly exaggerated. However, in the last two months of war the Me 262 would begin to excel, showing the world what might have been had the Germans had the Me 262 just a little earlier than they did. Not only would the jet fighter units achieve much better kill ratios, the élite *JV 44* was preparing for action. It had already fired its guns in anger before the end of February when *Obstlt* Steinhoff, the new *Staffel* training officer, knocked down an Ilyushin Il-2 while giving a pilot the value of his experience.

Galland's *JV 44* becomes operational

Much would be made of the crack unit *JV 44* and a great deal has already been written about the remarkable group of pilots who gathered around former *General der Jagdflieger* Galland and followed him into battle. It will suffice here to highlight *JV 44*'s activities only in so far as they concerned the Me 262. By late February Galland had made a formal request for establishment strength, requesting sixteen aircraft and fifteen pilots for *JV 44* along with seven aircraft and seven pilots for the *Stab*. To his surprise, his request was granted, and with a *Stab* flight enlarged to sixteen aircraft and fifteen pilots. In Berlin, Galland and Steinhoff began to select pilots by working through a list based on Galland's knowledge of *Jagdwaffe* units and their personnel. Many came to join *JV 44* without a second's hesitation, but some declined and remained where they were. Wolfgang Späte of Me 163 fame was asked if he wanted to join but declined; so did the Luftwaffe's leading air ace, Erich 'Bubbi' Hartmann, who preferred to remain on the Eastern Front, fighting the Russians from the cockpit of his Bf 109. *JV 44* would be at first based at Brandenburg-Briest; its ground personnel would come from *16./JG 54* and *III/EJG 2*.

In so far as the Me 262s were concerned, relatively little activity characterized the first half of March, although *JG 7* scored well. On 1 March two *I/KG(J) 54* jets were lost to P-51s flown by Lts John K. Wilkins and Wendell W. Beaty of the 355th Fighter Group. The German pilots, *Lt* Hans-Peter Haberle and *Fw* Josef Herbeck, were killed. Next day the same unit lost two more jets, when *Fw*s Günther Gorlitz and Heinrich Griem were shot down near Würzburg. However, spirited response to attack now marked a change in the attitude of the bomber pilots. No longer were they simply dropping their bombs and running. They now carried out their bombing mission and then turned to face their adversaries. The lessons of the preceding weeks were bearing fruit. Nevertheless, *II/KG(J) 51* lost three aircraft on 2 March, although only one fell in combat with the P-47s of the 365th Fighter Group; two went down because of technical failure. Finally, *Ofhr* Horst Metzbrand of *I/EJG 2* was shot down south of Dillingen.

Spirited response was also the order of the day on 3 March, when *III/JG 7* sent twenty six Me 262s to attack a force of more than 1,000 American heavy bombers, escorted by almost 700 fighters, attacking Hanover, Chemnitz, Nienburg, Bielefeld, Magdeburg and Brunswick. Intercepted near Hanover on their way to Hildesheim, B-17s of the 493rd Bomb Group were hit by a few Me 262s and some Bf 109s as they began their run in at 21,000ft (6,400m). The escorts up ahead had held off most of the jets, but some had managed to get through – and the escorts, being still engaged elsewhere, could not

Helped by Col Harold E. Watson, General Carl Spaatz inspects the cockpit of a Me 262 at Melun prior to its transfer by ship to the United States. Appointed by Spaatz to head the unit assigned to retrieve German war material, the Colonel's team were known as 'Watson's Whizzers'.

protect the bombers. The jets of 9 *Staffel* went in first, meeting a hail of fire from the turret gunners. *Hptmn* Heinz Gutmann got a B-17 which went down in flames, but took a direct shell hit on his cockpit, which also erupted in flames. A further three B-17s were shot down by *Obfw* Helmut Lennartz, *Ofhr* Heinz Russel and *Lt* Karl Schnörrer. In addition, *Oblt* Günther Wegmann shot down a B-24 from the 445th Bomb Group and a P-51.

Stab flight and *Staffeln 10* and *11* picked up the raiders near Magdeburg and harried them all the way to Berlin. *Maj* Rudolf Sinner attacked a formation of B-24s from the 467th Bomb Group head on. He flew right through the formation and then came round to attack from the rear, hitting one aircraft with a heavy burst of cannon fire. It fell out of the sky over Rathenow. Meanwhile, *Ofw* Heinz Arnold shot down a B-17 and a P-47. Some of the Allied escort fighters, hard put to it to keep up with the slash attacks of the jets, had memorable experiences. In an attempt to keep up with a disappearing jet, Lt Marvin C. Bigelow of the 78th Fighter Group dived his ageing P-51B at maximum speed. As he rushed earthward, throttle wide open, he recorded a speed of nearly 600mph (965km/h), his aircraft's wings shaking and rattling under the effects of compressibility. Bigelow dived from 20,000ft (6,100m), and when the Me 262 was clearly pulling away from him slowly pulled his aircraft level. But the P-51B was in very bad shape: a post-flight inspection declared it irreparable! Altogether, *JG 7* shot down seven bombers and two escort fighters for the loss of six Me 262s. One more jet was lost when its landing gear failed to deploy and it belly-landed at Oranienburg. A Me 262 from *10./NJG 11* crashed north of Magdeburg, killing *Ofg* August Weibl.

The bridge at Remagen

During the next two weeks *JG 7* had only one loss, when *Ofhr* Heinz Russel went missing near Lolland (Laaland) Island. But *JG 7*'s successes included one claimed on 7 March; another two days later; two on 14 March; three the next day; and four on 17 March. By now Allied armies were poised to cross the Rhine and were making headway against strong opposition. The US 9th Armoured Division had successfully taken the massive Ludendorff rail bridge at Remagen when charges placed by the retreating Germans had failed to blow it up, Hitler having ordered that the bridge be destroyed to prevent its use by the Allies. Consequently, on the morning of 7 March, eight Ar 234 jet bombers from *KG 76* were given the task of destroying it. Escorted by about thirty Me 262s from *I/KG(J) 51*, the bombers came in as American combat engineers were clearing débris and strengthening the bridge for the passage of heavy armour across the Rhine and into Germany.

Tempests of No. 274 Sqdn were flying cover over the Remagen bridge when the Germans attacked, and they were dispersed by the fighters before serious damage could be inflicted. The famous French air ace Flt Lt Pierre Clostermann locked on to a Me 262 north of the bridge and got up close to rake the aircraft with cannon fire, hitting its port engine which vented black smoke. Wide-eyed in disbelief, Clostermann watched as the jet opened up its starboard engine and sped away. In other action, *Ofw* Arnold of *III/JG 7* shot down a P-51 near Wittenberge. There was a sequel to the Remagen bridge story. For the next ten days it continued to provide a route across the Rhine, over which 8,000 troops crossed to the east bank in the first twenty four hours. But the timidity on the part of the American ground commander prevented the bridgehead from being exploited as it demanded. On 17 March the Ludendorff bridge collapsed of its own accord, killing twenty six people; but by that time a pontoon bridge had been thrown over the Rhine at the same site.

The capture of the Remagen bridge directly threatened operations at Rheine-Hopsten. On 13 March, when *I/KG(J) 51* evacuated to Giebelstadt, P-47s from the 365th Fighter Group jumped four Me 262s flying south-east; the jets promptly opened up their throttles and escaped. Later the P-47s encountered a lone Me 262 from *KG(J) 51* piloted by *Ofhr* Jurgen Höhne. Two P-47s went in to the attack; the jet was finished off by Lt Frederick W. Marling, who scored hits all over its wings and fuselage before an explosion near the cockpit sent it diving into the ground. Next day, P-38s from the 474th Fighter Group were flying cover over the Remagen bridge when they attacked three Me 262A-2as of *KG(J) 51* which were trying to bomb it. All three jets were hit and damaged before retreating. On 15 March Me 262s from *JG 7* scored again, making four victory claims: two B-17s and two B-24s. The claims would conceivably have been much greater if *JG 7* had been able to put up more than just a few aircraft. Me 262s from *III/EJG 2* also put in an appearance on 15 March, and B-25 Mitchells of the 15th Air Force reported contact with jets from *KG(J) 51* over Dorsten.

Next day *JG 7*'s new *II Gruppe* came into existence, based at Prague, with *Maj* Hermann Staiger in command, but it did not become operational for five weeks. On 17 March *JG 7* was again scrambled to attack a large American bomber formation. Four B-17s were claimed, two by *Uffz* Koster and one each to *Oblt* Wegmann and *Obfw* Gobel. The American escort fighters tangled with some of the Me 262s: Lt Kuhn of the 354th Fighter Group claimed one damaged, but none was shot down. The only losses on this day were two aircraft from *8./KG(J) 54*, one of which crashed near Ingolstadt during a training flight.

Bearing the Foreign Equipment number FE 110, this Me 262A-1a was marked up by 'Watson's Whizzers' with the nose emblem seen here.

The R4M rocket

Next day, 18 March, the Me 262 received a new and formidable weapon. Designed by Kurt Heber and manufactured by Deutsche Waffen-und Munitionsfabrik (DWM), it was the R4M, a thin-walled rocket projectile weighing 8.8lb (4kg), with folding tail fins for stability. Special wooden racks fixed flush on the undersurface of each outer wing carried twelve rockets apiece. Each projectile had the ballistics of a 30mm cannon shell, ensuring ease of sighting and use in combat. The R4M was a devastating weapon when used effectively, and made a great addition to the jet's four nose cannon. The rockets removed the need for the pilot to slow in order to sight his guns, thus contributing to more rapid fire response and quicker targeting.

An opportunity to use the new weapon came on 18 March, when the US 8th Air Force sent 1,184 heavy bombers and more than 420 P-51 escort fighters to hit railways and tank assembly plants around Berlin. Heavy cloud lay across much of northern Germany when thirty seven Me 262s were scrambled by *JG 7*. Ten jets from *Stab* flight and *III Gruppe* vectored on the 430 bombers of 1st Air Division and made a devastating slash attack, shooting down two bombers and damaging several on the first pass. Returning to the formation again, the ten Me 262s shot down four more B-17s. South of Hamburg, near Salzwedel, twelve Me 262s hit B-17s from the 3rd Air Division. In a concentrated attack, four jets aimed for stragglers in the low squadron of the 100th Bomb Group, hitting a B-17 on their first run in. Its port wing was a mass of flames as it slowly fell away, followed by a second bomber hit and burning. Another B-17 was badly mauled but flew onward until the Me 262s' continued harassment forced its crew to bale out of their doomed ship. Three Me 262s tore through the formation again, burning the tail from one B-17, then turning on another and damaging it so badly that it dropped away from the formation. Hit again, it began to fall; and parachutes appeared as it was left to its fate. One jet engaged a P-51 without result.

Over the Zuider Zee, B-17s of the 457th Bomb Group spotted Me 262s moving fast, but the jets did not attack and the bombers droned on toward Berlin. As they neared their target the B-17s were harried by a few Me 262s probing for weak points in the boxes. They found one when four bombers became detached from a group that made a wide, sweeping arc to get into clear air. The four strays were immediately pounced on by the jets, which came in fast from the rear. One bomber went down in flames and a second was badly damaged, losing a large chunk of its port wing and having one engine knocked out. Nevertheless, it made it back to Britain. The two remaining bombers used thick contrails to hide from their attackers. Escorting P-51s got few opportunities to tangle with the jets, although the 359th Fighter Group reported engagements with up to ten Me 262s, of which one was damaged.

In the vicinity of Rathenow, *Oblts* Seeler and Wegmann, *Obfhrs* Ulrich and Windisch, *Lt* Schnörrer and *Fhr* Ehrig hit B-17s of the 3rd Air Division with rockets, discharging them on the initial pass before returning to strafe the formation with cannon fire. Caught in a crossfire, *Oblt* Wegmann was wounded when 0.50in bullets shattered his right knee cap, demolished his aircraft's canopy and smashed his instrument displays. As he pulled away to head back to Parchim, his aircraft's starboard engine erupted in flames; Wegmann took to the silk at an altitude of 13,000ft (3,960m). On the ground he was rescued by a Red Cross nurse and taken to hospital, where his injured leg was eventually amputated. The Me 262 pilots who had been with Wegmann claimed three kills; 3rd Air Division recorded eleven heavy bombers lost, of which two went into the English Channel on the way back.

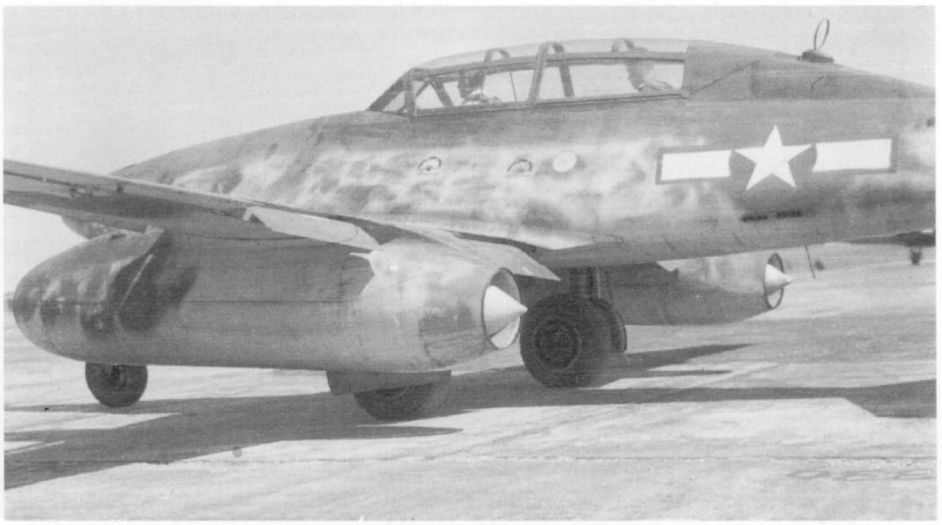
But German casualties came thick and fast too. *Oblt* Karl-Heinz Seeler claimed one kill, but then, three miles from Perleberg, his Me 262 came under such intense fire that it literally exploded, no trace of man or machine was ever found. *Oblt* Hans Waldmann and *Ofhr* Günther Schrey were killed when they collided near Schwarzenbeck. In all, on 18 March, five aircraft from *JG 7* were lost, although claims were made for the destruction of fourteen Allied aircraft, eleven B-17s and three P-51s; *Maj* Weissenberger of *Stab* flight claimed three B-17s; *Fw* Arnold got two P-51s. As for the Allied air forces, they suffered a remorseless assault mounted primarily by Bf 109s and Fw 190s. Of the 1,184 bombers that reached their targets, twenty eight were destroyed or written off, and an unprecedented 714 were damaged.

The Me 262s, which had claimed an extraordinarily high percentage of the total Allied losses, were now revealing their true mettle. It was not because of this day's performance alone that the US 2nd Air Division now mounted a raid on the Me 262 airfield at Neuberg, where some eighty aircraft were parked; the raid was a general acknowledgement of the concern felt in the Allied High Command about the jets. The Neuberg raid, made during daylight on 19 March, caught personnel at the training base unaware. Attacking from 15,000ft (4,600m), 125 B-24s hit the runways and buildings. Sixteen Me 262s were damaged, but none was destroyed despite the 284 tonnes of bombs that rained down. The only Me 262 sighted in

Heinz Bär

Heinz Bär, who would become one of the most popular pilots in the Luftwaffe, was born on 25 March 1913 in Sommerfeld near Leipzig. After youthful experience in gliders, he became a pilot of powered aeroplanes at the age of seventeen. He joined the Luftwaffe in 1937 and was with *1./JG 51* when war broke out, his first victory coming on 25 September 1939. Further kills came relatively slowly, but on 2 July 1941 he was awarded the Knight's Cross for twenty seven victories. Then, after he went to the Eastern Front on 27 July with *IV/JG 51*, his scoring rate accelerated. On 14 August he was awarded the Oak Leaves for his 60th victory, receiving the Swords on 16 February 1942 after his 90th. On one occasion he was shot down 30 miles (50km) behind Russian lines, but despite suffering a double fracture of the spine he made his way back to German positions. On 1 May 1942 he was posted to *I/JG 77* in Sicily, and nine days later reached his 100th victory.

On 28 December 1943 Bär moved units again, this time to *II/JG 1* based in Germany. He steadily increased his score, and on 22 April 1944 reached 200 kills when he shot down a four-engined bomber. Bär had the chance to fly the Me 262 for the first time in September 1944, and in January 1945 was posted to command *III/EJG 2*, a training unit for Me 262 pilots. Thence he moved to Galland's *JV 44* in early 1945, scoring a further sixteen victories to bring his total to 220 in 1,000 sorties, during which he had been shot down eighteen times. When Galland was shot down on 25 April he put 'Pritzl' Bär in command of *JV 44*; the handsome, charismatic leader ended the war as the unit's leading jet air ace. Ironically, he died in a light aircraft, when it spun into the ground from 150ft (45m) on 28 April 1957.



Cleaned up and bearing the US Army Air Force insignia, a two-seat Me 262B-1a trainer is flight tested in the USA. Note the extreme rear position of the second crewmember and the FuG 25a IFF radar loop antenna.

the air during the raid was shot down by a P-51 from the 355th Fighter Group.

On the same day *JG 7* put forty five jets into the air during a raid on Chemnitz. Although only twenty eight made contact, they shot down four B-17s with R4M rockets. Two jets from *III/JG 7* were shot down near Eilenburg, with the losses of *Ofw* Heinz Mattuschka and *Lt* Harry Meyer. However, the unit's Me 262s accounted for seven B-17s and one P-51. *Obstlt* Bär of *III/EJG 2* got a P-51, bringing the jets' total kills to nine. Late in the afternoon on 20 March *III/JG 7* was flying again, harassing bombers of the 1st Air Division during a raid on Hamburg. Seven B-17s were shot down for the loss of three jets. Another Me 262, from *I Gruppe*, was shot down over Kaltenkirchen.

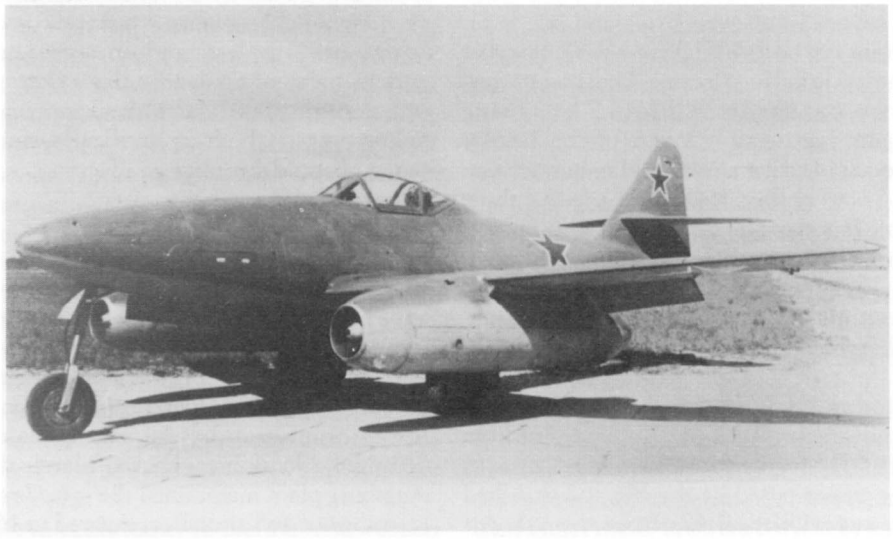
The premier jet fighter unit achieved an even better combat ratio on 21 March, when *JG 7* made fifteen claims for the loss of four of its own aircraft. But it was another black day for the bomber pilots. Four jets from *I/KG(J) 51* and one from *I/KG(J) 54* were shot down. In response to the threat posed by the Me 262 to Allied air superiority, P-47s from the 9th Air Force now made a series of raids on airfields known to be operating the jet fighters. During an Allied strafing run on the Leipheim road bridge, the newly-appointed *Gruppenkommandeur* of *I/KG(J) 51* was killed by a single bullet in the back of the head. More ground strafing took place the following day, when sixteen Me 262s were damaged at Giebelstadt and Kitzingen. The RAF joined in on this occasion, when two Mosquitoes from the Fighter Experimental Flight hit Neuberg airfield, claiming two jets destroyed and one damaged. But again *JG 7* excelled, claiming fifteen kills for four aircraft shot down in combat. Two days later, on 24 March, *JG 7* claimed sixteen kills for four losses. Although many of these claims were made in good faith, they were about 30 per cent higher than reality – but were good scores nevertheless, and an increasing endorsement of Galland's claim that, in sufficient numbers and with experienced fighter pilots at the controls, the jets would prove a formidable force.

A fall in Me 262 production

The current ability of *JG 7* to put relatively large numbers of jets into the air at any one time reflected a peak in aircraft production and availability. Production during January surpassed 228 aircraft; in February the Augsburg and Regensburg plants delivered 296 aircraft. During March the Augsburg plant maintained the same level (turning out 165 aircraft, compared to 166 in February and 163 in January), but production at Regensburg fell. The first Me 262s from this complex had been delivered in September 1944, building to a peak of 130 in February 1945, but in March only 75 aircraft came from the Regensburg facilities, which included the Obertraubling and Neuberg assembly plants. From the peak of 296 in February, Me 262 deliveries in March fell to 240. Even so, improved kill-to-loss ratios reflected increasing operational skills, while stricter basic technical checks were now being conducted on new aircraft, in order to guard against losses caused by concealed faults due to sabotage.

The last week of March provided the Me 262s with good hunting conditions,

Awakened to the importance of advanced research and technology made evident by the German developments in jet powered aircraft, the Russians obtained a single example of the Me 262 for evaluation. Later, Russian engineers executed a crash programme to catch up and used the BMW 003, redesignated RD-20, and the Jumo 004, redesignated RD-10.



and saw a steady increase in claims and fewer losses. The bomber units were now virtually defunct. There were fewer aircraft available, those units' losses had been unsustainable. On 20 March, *Stab/KG 51* left Rheine for Geibelstadt and Leipheim, before handing their aircraft over to *JV 44*. *I Gruppe* vacated Hopstein on the same day; it would finally settle at Munich-Reim, before integrating its aircraft and operations with *II Gruppe*. Only *JG 7* and the emerging *JV 44* would carry the fight through to the bitter end. Formed on 28 February 1945, *II/JG 7* trained at Lager-Lechfeld. By the end of March it was operating from Brandenburg-Briest in the defence of Berlin, but it would be forced to move to Bavaria on 10 April. All across Germany, control of munitions and weapons production was breaking down. The transport system was virtually non-existent. Pilots arriving at *JV 44* brought their aircraft with them, but spare parts were increasingly scarce and fuel was getting very low. Ironically, the lack of conventional aviation fuel kept Bf 109s and the Fw 190s grounded, but the jets had larger reserves.

On 25 March, *Lt* Rademacher of *III/JG 7* located a detached squadron of B-24s of the 448th Bomb Group near Lünenburg and shot down one, while *Lt* Müller got a B-24. Seconds later, Rademacher took a hit in the wing and force-landed at Stendal. As he swung into a hangar too fast, he caught and damaged five parked Ju 88s. *Fw* Fritz Taube got another B-24, but he was almost instantly bounced by a swarm of P-51s and died when his Me 262 blew up. Another aircraft flown by *Ofhr* Walter Windisch was riddled with more than thirty hits after its pilot flamed a B-24. Escort fighters from the 56th Fighter Group pursued the jets, which fled east and escaped. The P-47s diverted to a strafing run on Parchim airfield, arriving just as four aircraft were in the air, apparently preparing to land. Leading the charge, Capt George Bostick headed for an Me 262 that was flying low and fast, its undercarriage up, along the length of the runway, passing over the top of another Me 262 on finals. Thinking the low-flying Me 262 was about to land on top of him, the second jet's pilot broke hard to port and struck the ground with his wing. The jet cartwheeled and broke up. Bostick kept after the other jet but lost it when the pilot opened up and accelerated away. On this day, *JG 7* claimed seven B-24s and lost four aircraft.

Airfields under pressure

During the last ten days of March 1945 the jet airfields came under severe pressure, and many bases and operating fields were put out of action. Many unit locations became simply approximations, as runways were vacated in favour of *Autobahnen*, from which the jets thundered into the leaden, late winter skies. The rows of conifers that flanked the great, straight roads served well to veil the presence of the jets as the 9th Air Force, in particular, saw to it that every potentially useful airfield was attacked and smashed. No one on the Allied side now doubted that the war would soon be over. Only Bavaria and south and south-east Germany were as yet free of Allied ground forces; farther north, a giant pincer was closing on Berlin.

On 30 March, an 8th Air Force raid against Wilhelmshaven, Bremen and Hamburg, involving 1,320 heavy bombers protected by 852 fighters, drew up thirty one Me 262s of *JG 7* for a series of protracted engagements. The *geschwader* lost three jets, but claimed seven bombers.

Lt Karl Schnörrer was particularly successful, shooting down two B-17s before he in turn was hit by crossfire from determined mid-fuselage gunners. As he broke away to return to base, he was jumped by a flight of P-51s spoiling for action. Schnörrer knew he had neither the power nor agility for a fight, so he inverted his aircraft before releasing the canopy, undoing his straps and falling out. Before his parachute opened he struck the tail of his aircraft, reaching the ground in considerable pain. He was taken to Ülzen hospital, where he spent the rest of the war. Meanwhile, *Maj* Erich Rudorffer intercepted raiders over Hamburg with eight *I/JG 7* Me 262s from Kaltenkirchen. Rudorffer shot down two escorting fighters, while *Uffz* Gerhard Reiher downed a B-17 and *Gfr* Heim bagged a P-51. Not far from Bremen, *Fw* Geisthovel claimed a Mosquito but was himself shot down; he force-landed and escaped from his aircraft before P-51s shot it up.

There was cause for Allied gloating this day, when Messerschmitt test pilot Hans Fay, realizing that the war was lost, flew in to the American-held airfield of Rhein-Main with a brand-new, unpainted Me 262. He had been sent to Swäbisch-Hall to collect one of the last of twenty jets produced at Neuberg before the Americans arrived, but he had no stomach for more fighting and instead flew his aircraft from Hessental into captivity. Bearing *werke nummer* 111711, this was the first intact Me 262 to be examined by the Allies. Shipped to the United States, it was test-flown on 29 August 1945, but was destroyed when a turbojet failed in flight on 20 August 1946. The aircraft remaining at Swäbisch-Hall were blown up by the Germans before the Americans arrived.

The last day of March 1945 saw a record of twenty two Allied aircraft claimed by *JG 7*: two by *Stab* flight; eleven by *I Gruppe*; nine by *III Gruppe*. The day began when thirty eight Me 262s were scrambled to attack RAF Bomber Command Lancasters and Halifaxes that were raiding the Blohm und Voss shipyards at Hamburg. Unused to flying tight, boxed formations on daylight operations, the RAF bombers of Nos 1 and 6 Groups straggled across the sky, making perfect targets for the fast-flying jets. Moreover, the fighters assigned to escort the bombers had failed to rendezvous over Holland, so the heavies were sitting ducks. An additional twenty Me 262s were put up by *I Gruppe*, half going with *Oblt* Stehle to Bremen and half with *Oblt* Grunberg to Hamburg. Lancasters from three Canadian squadrons bore the brunt of the attacks, and gunners on five of these aircraft claimed Me 262s destroyed. At least one kill was affirmed, when the jet's tail broke off. Mustang escorts were involved in fierce combat near Hamburg, where they fought to protect bombers of Nos 1 and 8 Groups.

Subjected to one of the most violent attacks yet made by the Me 262 pilots, Allied airmen got a taste of what life would have been like had the jet fighters been available earlier. In the mêlée, *Oblt* Stehle claimed three Lancasters; *Oblts* Sturm and Gruneberg and *Lt* Todt got two each; and six other pilots claimed one each. In addition to *JG 7*, aircraft from *10./EJG 11* were also airborne, but their unfamiliarity with daytime operations led them confidently to claim eight bombers, where evidence exists for only one, a Mosquito credited to *Oblt* Welter. In all the Me 262s claimed twenty three kills, all but one made by *JG 7*, for the reported loss of four jets.

The development of fighting techniques and operational tactics for a new aircraft takes time. Such skills cannot be acquired in any other way than through a lengthy process of trial and error, enabling the pilot to learn through experience the optimum use of his machine and weapons. The men who flew the Me 262 were now acquiring a sound base of experiences upon which greater things might have been based. But that was not to be.

Galland plans for action

Aware that the pilots were now reaching a new peak with the Me 262, Galland was impatient to pitch his crack unit into the fray. Goering had ordered that Galland's name was not be attached to his fighter unit, but at the behest of *Generalmajor* Josef Kammhuber the *Oberkommando der Luftwaffe* (OKL), officially calling for the unit to become operational as soon as possible, referred to it as *Jagdverband 44* 'Adolf Galland'. During much of March, Steinhoff tested incoming pilots on the Me 262 while Galland pulled every trick in the book to get the aircraft he needed to the Brandenburg-Briest airfield. Galland also began to develop new attack formations for the Me 262, departing from the two-plane *Rotte* paired into a *Schwarme*, instigated by air ace Werner Mölders, and opting instead for a three-plane *Ketten* in which each aircraft flew at the corner of an equaliteral triangle, 450ft (140m) from the other two.

Galland's problems threatened to worsen as a result of internecine strife caused when Hitler appointed *General der Waffen-SS Obergruppenführer* Hans Kammler as his Plenipotentiary for Jet Aircraft Production and Operational Deployment. The powers given to Kammler edged Speer farther from control of the supply and delivery of raw materials, and production of Me 262s. On 29 March, a train headed south toward Munich-Riem packed with stores, vital equipment and *JV 44* ground personnel. The pilots, fewer than twenty in number, and the twelve aircraft followed two days later. On 3 April, the new *General der Jagdflieger*, *Oberst* Gollob, recommended to Goering and the OKL that *JV 44* be disbanded – but it was too late for such irrational politicking. A more influential factor was the approaching Allied armies. On that same day, the *Staffel*-sized unit conducted its first patrol, over the Munich area, without contacting the enemy. By the end of the first week in April, *JV 44* had eighteen aircraft, of which only six were serviceable.

March had been the peak month for Me 262 activity, when both claims and losses were the highest of any month in the aircraft's brief operational career. In all, seventy two aircraft were lost, while Me 262 pilots lodged 167 claims. In the first three days of April there was little activity, compared with the preceding two weeks. On 1 April, *I/JG 7* tangled with twenty B-17s over Stendal, claiming two kills. Next day *JG 7* attacked American bombers raiding the U-boat pens at Kiel, but without result, and on 3 April there was neither loss nor claim and only a few sorties. Things changed on 4 April, when P-51s of the 339th Fighter Group made a sweep across Rechlin airfield just as a flight of Me 262s of *III/JG 7*, led by *Gruppenkommandeur Maj* Rudi Sinner, climbed through low cloud immediately after takeoff. Sinner immediately ordered the two *Schwarme* to turn and head back for the flak corridor, but two P-51s pounced and set his aircraft cockpit on fire. Sinner jumped: his parachute opened only just before he hit the ground and the impact put him in hospital. The veteran Me 163 pilot Wolfgang Späte replaced him as *Gruppenkommandeur*.

A veteran of *Kommando Nowotny*, *Obl*

Franz Schall, fastened on to a fast-moving P-51 and fired on it until it fell away smoking, but he too was set upon and was forced to bale out as one engine lost power and the other stalled. Within minutes two more Me 262s had been claimed by pilots of the 339th Fighter Group. Within thirty minutes of the day's first engagements, two *Schwarme* of Me 262s attacked a formation of B-24s over Schwerin, en-route to Parchim at an altitude of 18,000ft (5,500m). A *Rotte* detached and streaked through the formation, firing as they went, but without apparent result. As the Me 262s wheeled round to make a second run, the escorting P-51s fastened on to them. Capt Robert H. Kanga got in a long, steady burst at a jet which began to curve down, smoking badly. It hit the ground at more than 500mph (800km/h). Minutes later, Lt Raymond A. Dyer got on the tail of another jet and shot it down. Three more Me 262s were encountered near Stendal, but they were driven away from the bombers. One jet was shot down and a second damaged.

Battle against the bombers

Action was thick and fast on 4 April. B-24s from the 448th Bomb Group were attacked by six Me 262s in the vicinity of Hamburg; three bombers were shot down, one exploding in mid-air. *JG 7*, using rockets against B-24s, got a bomber of the 93rd Bomb Group as well as a Mosquito flown by Col Troy Crawford, commander of the 446th Bomb Group (the latter was reported to be a jet). P-51s were quickly on to the Me 262s, the tenacity of their pilots exemplified by the action of Maj George Ceuleers of 364th Fighter Group, who chased a jet for almost 200 miles (320km) until he finally brought it down near Dessau from a range of 500ft (150m)! Some Allied bombers became separated from their escorts; one such formation of 150 aircraft was set upon near Nordhausen. *III/JG 7* got three B-24s near Bremen, while others to the south-east were attacked by rocket-firing jets and another bomber sent down in flames. Elsewhere dog-fights developed between support formations of P-47s and P-51s. The Luftwaffe jets made many more claims than losses. At the end of the day some forty seven Me 262s had been deployed and almost all had come to grips with the enemy. Against thirteen losses, *JG 7* claimed eleven kills; one more kill went to an aircraft from *III/EJG 2*.

The next five days saw relatively little activity, with only three losses and nineteen claims by Me 262 pilots. Several B-17s were claimed by *JG 7* on 5 April, while one bomber's upper gunner brought down a Me 262 as it made a low pass across a box formation. Escorting fighters were hard pressed to make contact with the jets and Allied pilots had difficulty keeping the jets in their sights for long enough to inflict damage. Galland's *JV 44* got its first scramble on 5 April, when five Me 262s led by *Oberst* Steinhoff were put up to locate and attack a force of 1,039 heavy bombers, escorted by 606 fighters, attacking marshalling yards, munitions dumps, airfields and industrial plant in south-

Derivatives and Dreams

Messerschmitt had always regarded the P.1065 and its service version, the Me 262, as merely the first steps on the road towards supersonic flight. While still developing the roles and operational capabilities of the Me 262, the company devoted much effort to derivatives of the type, beginning with stretched versions of the basic aircraft that extended its performance and operational capability. From early 1940, Messerschmitt was interested in swept wings. Although the wing sweep on the basic Me 262 was a result of aerodynamic tests that indicated a benefit to performance and handling, elementary research and development revealed as early as April 1941 an apparent advantage for the Me 262 if it was fitted with a wing of 35 degrees sweep. Since development of the Me 262 for combat took priority of time and resources, work on a high-speed, swept-wing variant was shelved for a time. In July 1943 it was begun again, with effort directed at a programme of sub-scale testing to obtain aerodynamic data by using models dropped from altitude.

A top-secret research project aimed at designing a unique wing for a high-speed jet bomber, called the P.1068, was undertaken in cooperation with the *Deutsches Forschungsinstitut für Segelflug* (DFS; German Research Institute for Gliding Flight), in the hope of developing a test schedule that would benefit the fighter derivative. Such a programme was established on 10 February 1944 under the auspices of Dr Erben of Messerschmitt and Dr Gothert of the *Deutsche Versuchsanstalt für Luftfahrt* (DVL; German Aviation Experiment Establishment). A series of drop-tests was made with one-twentieth scale models of various Me 262 wing shapes, to evaluate stability at high Mach fractions and to measure drag coefficient as a function of the Mach number. Overall responsibility for this work was given to Prof Ruden of the DFS. From the results came a project to set up at Oberammergau a special bureau to originate a generation of high-speed aircraft, in both fighter and bomber forms. From this it is apparent that Willi always preserved his multi-role preoccupation: having got his foot in the door with the Me 262, he now sought to develop unique designs for various operational tasks.

The first step was to set up a High Speed Programme designed to wring the most from the basic airframe and powerplant combination. The Me 262 V9 prototype was put into the workshops on 1 October 1944 for conversion to the HG I (High Speed Stage I), and was fitted with a special low-profile canopy, swept-back horizontal tailplane, and an enlarged fin and rudder unit. Messerschmitt wanted to work slowly toward operational aircraft, carrying out research and development on the back of the existing Me 262 programme. He had already been encouraged by positive results on wing sweep in wind tunnel tests, information on which had been passed on by the DVKL. Flight tests with V9 began at Lager-Lechfeld on 18 January 1945, with Karl Bauer at the controls. Five test flights were completed but control problems stemming from the modified tail were apparent. Twenty more test flights for pressure distribution measurements across the canopy took place during March 1945, with Lindner and Bauer at the controls, and the V9 was also used for electro-acoustical detector tests, carrying probes in the nose instead of armament.

The High Speed Stage II project featured changes suggested by the results of the HGI programme, with a new wing incorporating 35 degrees of sweep. Messerschmitt believed the tail surfaces could be eliminated and the wing chord significantly increased, resulting in a cleaner, flying-wing design like that adopted for his Me 163 rocket interceptor. To test the new wing and

various tail configurations, Me 262A-1a *werke.nr* 111538 was modified under a plan developed in June 1944. It was to have incorporated a V-shaped tail and tests were scheduled to begin in March 1945, but delays and accidental damage prevented the aircraft from making any flights in this configuration.

The HGIII project was a radical development of the basic Me 262 developed during December 1944, with a new wing, propulsion installation and tail unit. With the basic fuselage, the HG III had a 45-degree swept wing, but retained the standard outer wing sections of a production Me 262. The greatest change was in the installation of the two powerplants, which were removed from the underslung, wing-mounted nacelles and placed in new wing roots close to the fuselage. The engines were to be either two Junkers Jumo 004D or Heinkel HE S 011 types. The Jumo 004D produced a thrust of 2,315lb (1,050kg) at 10,000rpm and was essentially an up-rated version of the standard 004B. A fillet was attached between the rear part of the engine and the fuselage, and the main landing gear retracted forward and inward to the fuselage centre section below the cockpit. Optional tail arrangements were to be tested: first the standard design; then the V-shape of the HG II variant. For high-speed tests the aircraft was to have a low-profile racing canopy. Flight tests envisaged a speed of 650mph (1,045km/h) at sea level and 685mph (1,102km/h) at an altitude of 19,700ft (6,000m).

The HG III was never built, although models were tested in wind tunnels. But just as the standard Me 262 had prompted Messerschmitt to creative thought on role applications, so this project stimulated a proposed three-seat, night-fighter version. This design had the conventional fin and rudder, but the swept horizontal tail surfaces of the HG II; unlike the HG III, it had a new fuselage reminiscent of the P.1065 only in its triangular cross-section. It was to be powered by two Heinkel-Hirth HeS 011 turbojets, promising a combined thrust of 5,730lb (2,600kg) at 10,000rpm; each engine weighed 2,094lb (950kg), 32 per cent heavier than the Jumo 004B but giving a 5.5 per cent increase in thrust. The fuselage was broader and longer, with a more bulbous nose incorporating four Mk 108 cannon and a forward-looking radar dish. In addition there were two vertically mounted MK 108 cannon in a *Schräge Musik* arrangement.

The extended crew compartment carried a pilot in the front section, a radar operator in the mid position, and a rear-facing weapons officer in the aft position. The fuselage accommodated fuel in two main and two auxiliary tanks, their relative disposition being similar to that in the basic aircraft. The forward and aft main tanks each held 202gal (920l) of fuel, while the two auxiliary tanks each held 135gal (610l), for a total fuel load of 674gal (3,065l). Overall, the aircraft had a wing span of 42ft 10in (13m) and a length of 41ft 3 in (12.6m). The three-seat night fighter was the apogee of Me 262 derivations, representing the culmination of work begun more than five years before.

There was one proposal for an interceptor that would have given the basic Me 262 unparalleled power and acceleration. It was the third in *Heimatschutzer* (Interceptor) series first proposed in a technical document prepared by design engineers Degel and Althoff at Messerschmitt's behest. Unlike *Heimatschutzer I* and *Heimatschutzer II*, *Heimatschutzer III* was to be powered by two 3,750lb (1,700kg) thrust HWK R II-211 rocket motors installed in the fuselage in place of the two wing-mounted turbojets. With a thrust output 89 per cent greater than the standard Me 262 with two Junkers Jumo 004B engines, the aircraft would have had phenomenal performance. Calculations showed that the airframe would have been able to withstand the phenomenal acceleration, although the top speed would have been about the same as the Me 262, because of critical Mach limits. The *Heimatschutzer III* was never built, but projects like this stimulated a generation of research and development activity in the Allied countries after the war.

eastern Germany. The jets made contact with aircraft of the 1st Air Division over Straubing; a B-17 from the 379th Bomb Group was destroyed, but *Lt* Farhmann's aircraft was hit and he took to his parachute. After shooting down a second bomber, the jets arrived back at Munich-Riem just as a swarm of P-51s finished strafing the airfield. Now the unceasing threat of Allied raids on the airfield made it impossible to operate Riem as a normal base. After every flight aircraft were hurriedly pulled off into the cover of trees and into the surrounding countryside, to be towed back again for takeoff.

On 7 April, the 8th Air Force sent more than 2,000 heavy bombers and escort fighters to pound lines of supply, transport nodes and industrial targets. It was now routine for Germany to receive more than 5,000 tons of bombs a day, and the continued resistance against the bombers had become all but futile. Two B-17s from the 100th Bomb Group were knocked out by Me 262s, as was one from the 390th Bomb Group. One B-24 was brought down by an accidental collision with a Me 262 over Lüneburg. On this day the Me 262 units mounted a record fifty nine sorties, a peak that would not be exceeded, and their engagements included many inconclusive battles. Although German records for 7 April are poor, it is believed that *JG 7* pilots claimed some twenty eight kills. American records bear witness to some ferocious air combat.

Suicide squads

The Allies now faced another threat: the near-suicidal *Rammjager* missions. These were flown by the volunteer pilots of *Sonderkommando Elbe*, a unit that specialized in ramming bombers before the German pilots (supposedly) baled out. The brainchild of Hajo Herrmann, the *Werewolf* unit had three *Gruppen* of forty five pilots each, but these numbers were insufficient to daunt the massed armadas of bombers that daily came to blast German rail, oil, communications and production facilities. Hoping to use his *rammjagers* to force a change in Allied bombing strategy until the Me 262 could be produced in larger numbers, Herrman asked Goering for at least 650 pilots. The situation was critical, and Herrmann was ordered to hurl his volunteers into the fray.

In its death throes, the Nazi regime adopted, or considered, other bizarre and imaginative schemes. One such that might have affected the Me 262 programme, had the war lasted longer, was the *Mistel* programme. This involved a single-seat fighter mounted above a pilotless aircraft packed with explosives. One such combination mated a piloted Fw 190 to a pilotless Ju 88. Powered by the engines of both aircraft, the pilot of the upper component would fly the combination to the vicinity of the target and then release the lower component on a glide path to impact. Design proposals were made for a jet-power *Mistel* mating two Me 262s, for missions against hardened targets.

Meanwhile, back in the real world, on 8 April *Oberst* Steinhoff of *JV 44* shot down

a B-24. Aircraft from *JG 7* attacked RAF bombers over Hamburg, but none were shot down. Claims were made against escort fighters, with *Lt* Weihs getting a P-38 Lightning and *Fw* Geisthovel of *III Gruppe* attacking four P-51s and shooting down two of them. Next day, 9 April, the RAF was back over Hamburg. This time the Me 262s of *JG 7* were able to fight their way through the escorts, and *I Gruppe* claimed three Lancasters. *III Gruppe* was also scrambled in defence of Hamburg and *Oblt* Schall shot down another Lancaster. There was more combat over Munich, where Me 262s rose to repulse the 8th Air Force, which had sent 1,215 bombers and 812 fighters to attack south-east Germany.

In one incident of the Munich clash, an unidentified pilot of *JV 44* was spotted by two escorting P-51s and chased back toward Munich-Reim, where a third Mustang, flown by Maj Edward B. Giller of the 55th Fighter Group, joined the pursuit. Accompanied by his wingman, Lt Ernest E. Leon, Maj Giller dived on the unsuspecting jet from 24,000ft (7,300m), chasing it eastwards until he was at the airfield approach. There he overhauled the jet at 450mph (725km/h) and gunned it down from low altitude. Hit in the wings and fuselage, the Me 262 ploughed into the dirt 300yd (90m) to the right of the runway and broke into several pieces. Another pilot from the 55th Fighter Group shot down one more Me 262; a third was damaged. However, the real harm to the Me 262s was caused by the heavy bombing of Neuberg and Munich-Reim, both of which were rendered virtually unusable. Fearing last-ditch German resistance in Bavaria and Austria, Allied air power was now concentrating on this region in an attempt to knock out all airfields and aircraft. The successful raids of 9 April made a new operational base for *JV 44* and elements of *JG 7* essential for their survival. The blitz on air installations continued for several days.

Legacy

When the Allies overran the Third Reich and captured tons of German equipment and design plans, the full range of technical achievements funded by Hitler's war machine became evident. For a decade and more after the uneasy peace slipped irrevocably into the Cold War, the victorious powers profited from their booty. It took months to piece together the extent of German technical and scientific research; some work was not unravelled for years after the war. But from the outset several separate lines of development became apparent; each German company was seen to have pursued individual avenues of research pursuant to national requirements. It was a shock to the victorious power to find that these researches had continued up the very hour that Allied tanks rolled through the gates of German research establishments, test centres and technical institutes. Operating almost as if the war were on another continent, German scientists and engineers had tenaciously worked away, seemingly oblivious to the carnage all around them.

At Messerschmitt there were two lines of development: jet and rocket-propelled aircraft. The jet-powered designs fell into fighter and bomber categories (the rocket-powered proposals ultimately led to the Me 163). There was no direct derivative of the Me 262, but the most promising jet project which came as a result of work on that aircraft was Project 1101. Originating early in 1944, P.1101 called for a research prototype to test various wing sweep positions in flight. The single prototype was fitted with a variable geometry wing which could be adjusted on the ground to sweep between 35 degrees and 45 degrees in one of three fixed positions; construction was begun in July 1944 as a private venture.

The design was simple, with a single Jumo 004B turbojet fitted to the bottom of a barrel-shaped fuselage with a nose intake. The upper part of the fuselage extended back as a boom over the exhaust nozzle, carrying a conventional tail with swept surfaces. The wing was shoulder-mounted to the fuselage, ensuring a clean flow of air directly into the engine. Three fuselage-mounted fuel tanks between the cockpit and the wing spars held a total of 345gal (1,570l). When, late in 1944, the OKL ordered a high-performance aircraft capable of matching the B-29 in altitude and outpacing the P-38 and P-47 in speed and manoeuvrability, the P.1101 was submitted for what became known as the Emergency Fighter Competition. Protected by armour plate, the pilot would go to war equipped with up to four MK 108 cannon. Top speed was calculated to be 609mph (980km/h) at 22,960ft (7,000m), with a ceiling of 45,265ft (13,800m) and a range of 930 miles (1,500km).

The specification for the Emergency Fighter Competition stipulated the Heinkel-Hirth engine, but because that was not available the Jumo was adopted temporarily. Construction was halted when the Allied advance caused the project team to move from Oberammergau to the Tyrol mountains, where the advancing Americans found the P.1101 and took it to the United States. In August 1948, declared surplus to needs, it was handed over to Bell Aircraft for further study. From Bell's work came the idea of adjusting the wing 'in flight', and since the original design provided space for a variable sweep mechanism in the upper fuselage area, this conversion was pursued.

The Jumo 004B was to be replaced by an Allison J35 of 4,900lb (2,220kg) thrust, and there were plans to use the copious lower-fuselage engine bay to test a variety of US powerplants. However, examination of the airframe revealed damage incurred during delivery to Bell, so a completely new aircraft was built virtually to the same specification.

JG 7's worst defeat

On 10 April *JG 7* suffered its heaviest losses, which saw the first fully operational jet fighter *Geschwader* crippled beyond recovery. Air activity began in response to air-raid warnings alerting the fighters to the imminent arrival of the 1st Air Division's 442 heavy bombers, heading for Oranienburg and Rechlin. In all, with 2nd and 3rd Air Division, the 8th Air Force had 2,100 aircraft over northern Germany. *JG 7* put up fifty-five jets, the largest number of Me 262s deployed on a single mission. Operating in *Rotte* pairs, the jets cut through the fighters and charged at the bombers. Five B-17s were sent reeling earthward before fighters from the 20th Fighter Group arrived to halt the slaughter. Pilots from *I Gruppe* claimed ten kills, including escorting fighters; the American pilots claimed five jets down in this initial round. One Me 262 shot down was seen to fall in the heart of Berlin, while several more were damaged.

Meanwhile, bomber formations from the 3rd Air Division went for Brandenburg-Briest, Parchim and Magdeburg, where the Me 262s fought fiercely with R4M rockets (reported as underwing cannon by gunners on B-17s). As the bombers turned for home the jets

Designated X-5, it was first flown on 20 June 1951 and was followed into the air by a second X-5 on 10 December 1951. Tests with the variable-sweep aircraft were highly successful, but the US Air Force never committed itself to a fighter version Bell promoted. The second X-5 crashed on 14 October 1953 fatally injuring its pilot, Maj Raymond Popson. The test programme was terminated in 1955, and the first X-5 was handed over to the Air Force Museum at Wright-Patterson AFB, Dayton, Ohio. Compromised by the technical complexity of having to translate the wing forward and back according to the sweep angle, the X-5 was the only successful swing-wing concept until the definitive design appeared on the F-111, which first flew on 21 December 1964.

In another form also, the P.1101 lived on. At the end of the war the Swedish government obtained detailed information on many German projects. Seeking to play a larger part on the European stage, Swedish officials made documents and drawings available to SAAB, whose designer, Lars Brising, was tasked with designing a new fighter. The P.1101 was adopted by SAAB as the basic configuration for its J29 fixed-wing fighter, which first flew on 1 September 1948, powered by a De Havilland Ghost engine produced in Sweden as the Svenska Flygmotor RM2, with 5,000lb (2,270kg) thrust. The J29 proved the soundness of Messerschmitt's aerodynamic design, displaying stunning performance that included a better climb rate than the North American F-86E. The J29 entered service with the Swedish Air Force in 1951; later, redundant aircraft were bought by Austria, which continued to operate the type until 1973.

The P.1101 was not the only Messerschmitt jet design to live on in the equipment of another country. With a wing similar to that of the P.1101, the Messerschmitt P.1110 was a sleek, second-generation fighter concept. Its single engine was set in the rear fuselage; twin air intakes fed through ducts in the fuselage above the swept wing and just forward of the trailing edge. The P.1110 had a single vertical fin with a swept horizontal tail at its base. Power was to be provided by a 2,865lb (1,300kg) thrust Heinkel-Hirth 011A turbojet engine. Messerschmitt calculated that the P.1110 would have a top speed of 560mph (900km/h) at 22,960ft (7,000m), a ceiling of almost 43,000ft (13,100m) and a range of 932 miles (1,500km). As the SAAB J32 Lansen, it was powered by a 10,400lb (4,720kg) thrust Rolls Royce Avon, built in Sweden as the Svenska Flygmotor RM5A2. The J32 had a top speed of 730mph (1,175km/h) at 35,000ft (10,670m), a ceiling of 49,200ft (15,000m) and a range of 1,100 miles (1,770km). Flown for the first time on 3 November 1952, it embodied all the essential features of the P.1110. It was to remain in service with the Swedish Air Force until the late 1970s.

Two other Messerschmitt jet programmes deserve mention: the P.1111 and the P.1107 bomber. Designed as a single-seat, tailless interceptor powered by a Heinkel-Hirth 011A turbojet, the P.1111 had wings swept at 45 degrees with a broad root chord, giving almost the appearance of a delta, and a single swept-back fin. Air intakes were located in the wing root and fed the engines by way of curved ducts running to either side of the pressurized cockpit, which had an extended fairing back to the base of the fin. On a completely different scale, Messerschmitt designed a bomber which was to be powered by four BMW 109-018 turbojets, each of 7,500lb (3,400kg) thrust, on a swept and tapered wing. The powerplants were to be buried in the inner sections and fed with air by way of buried inlets and ducts in the leading edge (a concept adopted by De Havilland for the Comet airliner in 1945). The bomber, called the P.1107, was to have a Vee-shaped tail and was to have been capable of carrying a bomb load of 8,820lb (4,000kg) at a maximum speed of almost 550mph (885km/h).

attacked again, some harrying the Allied aircraft as far as Lübeck. But the Allied fighters were not limited to escort duty: some tactical P-47s flew airfield-strafing and ground-attack missions, Munich-Reim experiencing another low-level strafe during the day. On 10 April the ferocity of the air combat reached an intensity which had neither been seen before nor was matched since. For the first time, American claims actually fell short of German losses. At the end of the non-stop daylight operations, *JG 7* had lost twenty nine aircraft, more than half its operational strength, with a further six lost by *10./NJG 11* and *6./NAufkgr* 6. The jets' claims amounted to sixteen Allied aircraft. The air raids and the advance of Allied ground forces forced *JG 7* to move yet again. *III* Gruppe – the only one left with any semblance of its paper inventory – went to Prague, where it met the disbanded *KG(J) 54* and took over its few remaining aircraft.

While elements of *JG 7* were moving to Prague, there was a brief hiatus in that unit's operational readiness. Even as he was approaching Prague-Rusin for the first time, *Oblt* Hans Grunberg was attacked by fighters of the 31st Fighter Group and shot down. The RAF kept up its airfield strafing, and a Tempest of No 222 Sqdn, piloted by Sqdn Ldr E.B. Lyons, hit and damaged a Me 262 as it took off from Fassberg. The jet caught fire as it climbed away from the runway; it was taken to 2,000ft (610m) by its pilot, who then baled out.

JV 44 struggled to survive the incessant raids – repeated again on 11 April, when two waves of American bombers hit the city of Munich and nearby Riem airfield – and to bring new pilots into action at the bomb-blasted remnants of what had been a major air base. To *JV 44* during these dark mid-April days of 1945 came *Maj* Gerhard Barkhorn, whose combat experience included 301 victories; *Maj* Wilhelm Herget, who had once shot down eight RAF bombers in one night; and the ever-welcome Günther Lützow, who had received permission from Goering himself to join Galland's unit (which even Gollob now called *Jagdverband Galland*).

Over the next several days action was spasmodic. Few aircraft were serviceable. Spares were scavenged from damaged machines, and operations were limited to periods when the sky was relatively clear of enemy aircraft. On 12 April Me 262s were used in the ground-attack role, strafing the town of Westen, thirty miles (50km) from Bremen, when it was taken by British troops. Farther south, *JV 44* was active again, but without result. It had about twenty two serviceable aircraft and almost as many pilots. After a day of relative quiet, 14 April saw about a dozen Me 262s of *JV 44* moved from Parchim to Plattling; some had to navigate visually, following the Elbe River via Prague, because of thick low cloud. That afternoon *III/JG 7* lost another pilot: *Oblt* Erich Stahlberg was shot down and killed by a P-51 flown by Capt Clayton Gross of the 354th Fighter Group. Next day, Me 262s attacked thirty four Martin B-26 Marauders that were bombing the Gunzberg marshalling yards; the Marauders claimed that they hit and damaged two jets. Farther north, Me 262s were reported as attacking British positions near Otersen; some of them were believed

to be flying cover for Fw 190s in the ground-attack role. Two Tempests from No 56 Sqdn, on reconnaissance between Kiel and Oldenburg, attacked a lone Me 262 near Kaltenkirchen airfield, sending it plunging into a house some four miles from the runway.

On 16 April *JV 44* put up about twelve aircraft to engage B-26 Marauders with rockets. Galland shot down two, possibly from the 322nd Bomb Group. Later that day five Me 262s attacked a formation of P-38s from the 15th Air Force, which were dive-bombing the bridge at Walchensee, about 40 miles (65km) from Munich. When the American aircraft jettisoned their bombs, the jets pulled away. The Me 262s claimed nine kills, all but one to *JG 7*, for one loss, but there were many more skirmishes than these figures suggest. During the day Munich-Reim was hit by eleven strafing P-51s, which destroyed seventeen aircraft and damaged eight. On other fields hit by Allied aircraft, sixty two German machines were destroyed and fifty three damaged. Next day, 17 April, Galland led seven jets into combat against B-26s attacking Munich, while *III/JG 7* struck at B-17s south of Berlin, with mixed results. This was the last day on which the US 8th Air Force mounted a 1,000-bomber raid on Germany; of 1,054 heavy bombers dispatched, protected by 756 fighters, only 981 made it to their targets. Once again, Me 262s were also employed against the British 2nd Army west of the Elbe.

Steinhoff escapes death

Operations on 18 April were intensive, with heavy Allied air activity across south-eastern Germany. Again the 8th Air Force drew the jets: Galland scrambled two *Ketten* of six aircraft to attack heavy bombers in the Stuttgart area, presumed to be heading for Regensburg. The first *Kette* of three aircraft led by Galland took off, followed down the runway by the second *Kette* led by Steinhoff. As Steinhoff accelerated hard, with *Hptmn* Krupinski to his port rear and *Lt* Farhmann to his starboard rear, the port wing of his Me 262 dropped and struck the ground, slewing his aircraft to the left. Krupinski took off immediately over the top of Steinhoff's aircraft as the latter fought to keep it under control. But his speed was insufficient: his aircraft hit an embankment, catapulted into the air, crashed to the ground and erupted into a flaming wreck. Steinhoff escaped through a combination of lightning reactions and the will to survive, but he was badly burned and disfigured for life.

Obstlt Bar of *III/EJG 2* shot down a P-47 on 18 April, a day when *JV 44* acquired some additional aircraft when *4./KG(J) 54* arrived at Munich-Reim to hand over its Me 262s. The remainder of *II Gruppe* had no aircraft; its ground personnel were ordered to join *JG 7*, while *III Gruppe* was directed to hand over its aircraft to *JV 44* and then disband. But before *III Gruppe*'s machines could be delivered, almost all were destroyed by B-26 Marauders. Continual air raids on the few Luftwaffe airfields still operational hampered daily operations, while strafing attacks by P-38s and P-47s threatened during takeoff and landing. Galland ordered *Lt* Heinz Sachsenberg – cousin of a famous World War I ace, with thirty one victories – to form an airfield defence unit of Focke-Wulf Fw190Ds. By late April five of these aircraft were available, although often only two were serviceable. Each was painted with red and white diagonal stripes on its underside, and with yellow spinners, to aid identification by Me 262s and flak batteries.

By now almost the entire surviving Luftwaffe fighter force was based on the airfields at Munich-Reim and Prague-Rusin, both of which were under almost constant attack. On 19 April *III/JG 7* intercepted B-17s from the 490th Bomb Group over Prague. A head-on attack by a two-ship *Rotte* sent one bomber plunging to the ground, but escort fighters of the 357th Fighter Group chased the jets back to their base at Rusin and shot down both. Two more Me 262s made high and low attacks simultaneously, shooting down three more B-17s. In all, six bombers were claimed, four by *JG 7* and two by *JV-44*, for the loss of four aircraft from *III/JG 7*. These jets were shot out of the sky by P-51s of the 357th Fighter Group, while they were attempting to get back into Prague-Rusin. This was the last time Me 262s would bring down B-17s of the 8th Air Force. It also marked the end of operations for *III/JG 7*, leaving only *I Gruppe* to field a few aircraft. While officially credited with possessing some twenty aircraft, *JV 44* was unable to put more than a dozen aircraft on its operational roster, and there were rarely more than half that number capable of flying sorties at the same time.

An end to Me 262 production

The day of 19 April marked an end to Me 262 production. There would be no more jets of the type; at least, for about fifty years, until an ex-Messerschmitt engineer began building them again in Texas! In almost three weeks of April 1945 the dispersed assembly plants had delivered 101 aircraft, bringing to 1,433 the total number of production Me 262s turned out by the Augsburg and Regensburg facilities since March 1944. Of those, 497 had been destroyed or irrepairably damaged by air raid, either at the point of assembly of by strafing while awaiting delivery, leaving a total of 936 aircraft dispatched to operational units in just over one year. Of that number, more than 100 had to be virtually rebuilt from damage that, under normal circumstances, would have rendered them fit only for scrap. As it was, extraordinary efforts were made to salvage any potentially useful airframe. There are no official records as to the number of aircraft sabotaged on the assembly lines, but several leading German fighter pilots agree that it could have been as high as 15 per cent.

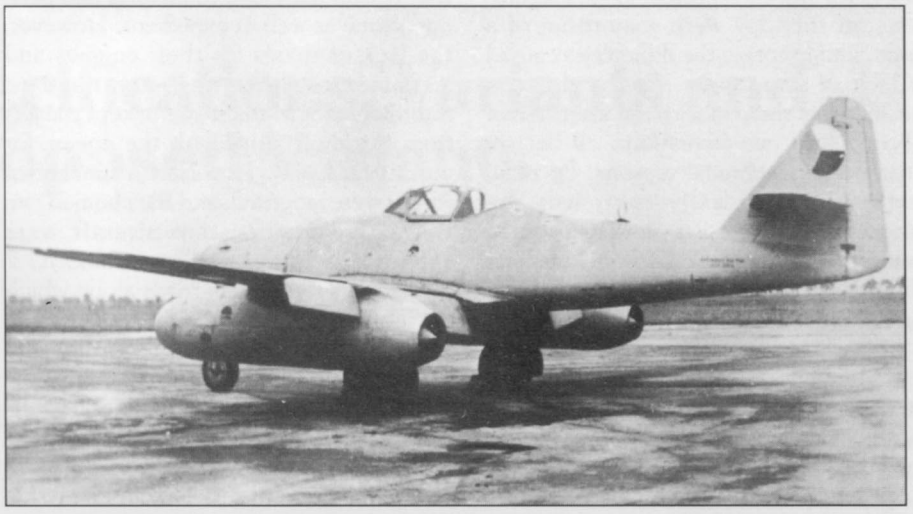
On 20 April *JV 44* attacked a formation of B-26 Marauders. An aircraft flown by *Uffz* Edward Schallmoser clipped the propellers of one medium bomber and fell away, only to collide with another bomber. His aircraft out of control and tumbling, Schallmoser took to his parachute, floating gently down into the garden of his mother's home near Munich where, minutes later, he sat eating her pancakes! There was one casualty for *III/JG 7*. *Obfw* Hermann Buchner escaped a fierce assault from P-51s only to come under fire once again as he struggled to get in to an airfield near Bremen. As he was landing, his port wing and engine nacelle were hit; his Me 262 went on fire as it slowed to a halt and was completely destroyed. Next day, 21 April, Me 262s were sighted by Spitfires of No 403 (RCAF) Sqdn, but no combats ensued. On 22 April jets from *II/KG(J) 51* were forced to take off hurriedly from their airfield at Strasskirchen when American troops overran the base. On 23 April a few encounters were reported when Me 262s attacked P-47s of the 27th Fighter Group over a bridge on the Danube.

Yet still pilots came to join Adolf Galland at Munich-Reim. On 23 April, with American troops only a few miles away, *Oberst* Heinz Bär decided to evac-

Czechoslovakian Postscript

During the war, factories and dispersed assembly facilities to produce Me 262s for the Luftwaffe had been set up in occupied Czechoslovakia. In the war's last months the Avia factory produced forward fuselage sections and other components for the jet. After 1945 these plants turned to the manufacture of Czech jet fighters. The manufacturing infrastructure remained intact, so they were well placed to continue their work for Czechoslovakia's new communist rulers. (Unlike most other East European states, the Czech communist government came to power early in 1946 as the result of free elections among anti-fascist coalition elements.) The Czech production lines were reopened, making use of airframes in hand at the war's end.

The basic Me 262A-1a was now known as the Avia S-92; the two-seat trainer version was designated the CS-92. The first Czech rebuild, S-92.1, took to the air on 27 August 1946. Two more aircraft, S-92.2 and S-92.3, flew before the end of 1946, followed by S-92.4 the following year. Avia had the first two-seat trainer, the CS-92.7, airborne in 1948. Political affinity aside, the Russians were interested in the Czech Me 262 programme; they had only one Me 262 of their own, a treasured prize that provided invaluable lessons for the Soviet jet-fighter programme. The sole Me 262 retrieved by the Russians took to the air with a Soviet pilot for the first time in August 1945. One year later the closest Soviet-built copy, the Sukhoi Su-9, made its first flight. Avia hoped to be granted licence manufacturing rights for the first-generation Russian jets: the company's diligence in putting the Me 262 on a modest production line anticipated this. But it was not to be.



When Czechoslovakia's modest aircraft industry copied the Me 262-1a it was designated S-92.1 and several aircraft of this type served with the Czech air force until Russia permitted licence manufacture of the MiG-15 and replaced the outdated copy.

For some years the Czechs continued to fly the S-92 and CS-92 types; eight such aircraft were on strength with the 5th Fighter Flight. In 1947 the Air Force put six into the air for a public flypast at Letnny. Ironically, by the time Yugoslavia showed interest in buying the S-92, Avia could no longer justify maintaining production facilities for the aged type; when the Avia factory was given licence production for the MiG-15, Me 262 facilities were dispersed to various locations around the country. Two Avia-built Me 262s survive today: designated V-34 and V-35, they are on display at the VM Aviation and Space Flight Exhibition, Kbely.

uate Lager-Lechfeld. He brought his sixteen aircraft and his men, what few were left, from *III/EJG 2* to offer their services to *JV 44*. Bär brought with him the Me 262A-1/U5, equipped with a formidable battery of six MK 108 30mm cannon. Later that day *I/KG(J) 51* evacuated Memmingem and brought its thirteen aircraft and their ground crew to Munich-Riem, where it also joined the twelve jets and five Fw 190D of *JV 44*. Of the forty one aircraft now assembled at Munich-Riem, only twenty six were operational; the remainder needed much repair or engineering work to bring them up to standard. It was an eventful day on the political front, also. Seizing the initiative, Goering sent Hitler a telegram stating that unless he heard from the Führer to the contrary, he would assume that all was lost at Hitler's Berlin bunker, and that he, Goering, would take over leadership of the Reich from his Obersalzburg retreat. Incensed, Hitler ordered Goering's arrest, and Speer sent a message to Galland asking him to fly to Berlin and prepare to secure the former *Reichsmarschall*. Galland ignored the request; the SS arrested Goering.

On 24 April the Allies mounted an intensive series of raids across the remnant of Germany still held by Nazi forces. By now *JV 44* had only eighteen serviceable aircraft out of a strength of forty three and thirty nine out of ninety three pilots. All its aircraft were packed into the one base, so a concentrated air raid on Munich-Riem would have destroyed for ever the world's first élite jet fighter force. On this day, *Obst* Günther Lützow went down near Donauwörth; his body was never found. On 25 April the US 8th Air Force made its last major raid, with 554 bombers and 539 fighters, on munitions facilities and marshalling yards at Pilsen, Salzburg and Bad Reichenhall. When major Allied air operations resumed one week later, they would be flights of mercy, dropping tons of food to the starving Dutch.

Collapse of the Reich

During 25 April *I/JG 7* put up a spirited show, claiming four aircraft shot down. *Ofw* Gobel got the last kill for *III/JG 7* when he downed a B-17, and *Oberst* Bär of *JV 44* got two P-51s. In operational use for

the first time was the Me 262A-1a/U4; it mounted a MK 214 Mauser cannon in the nose, 'protruding like a telegraph pole', American airmen reported. *JV 44*'s operations on this day were something of a fiasco, underscoring the difficulties caused by lack of spare parts. Of the thirteen Me 262s that took off with the intention of splitting into two formations, all but six returned for technical reasons. By now, Berlin was completely encircled; the Americans and the Russians had joined hands, first meeting not far from Potsdam, while the RAF pounded Berchtesgaden, the Führer's redoubt in the Bavarian Alps to rubble. He himself was awaiting death in Berlin, but the RAF's destruction of his mountain eyrie hammered home the imminent collapse of his Thousand-Year Reich.

On 26 April Galland led a sortie by five Me 262s, but one had to turn back. The remainder continued towards Ulm, encountering a formation of B-26 Marauders from the 17th Bomb Group, escorted by P-47s of the 27th and 50th Fighter Groups. Attacking from the starboard rear, Galland quickly shot down one bomber and, as he emerged from the formation, hacked down another before he was set upon by the escort fighters. Lt James Finnegan, flying a P-47 from 50th Fighter Group, hit Galland's aircraft in the region of the cockpit, shattering the instrument panel and sending shrapnel into the pilot's right leg. Bleeding profusely, Galland followed the autobahn back to Riem, arriving just as the airfield itself came under fierce attack. Unable to stay in the air, he slammed his Me 262 onto the runway and slithered to a stop in the midst of the ground strafing. It was Galland's last flight in a Me 262, and ended in a hospital where his leg was put in plaster. *Obstlt* Heinz Bär was appointed to command *JV 44* in Galland's absence.

Next day, 27 April, *JV 44* made its last significant stand against the might of Allied air power. Ironically (and contrary to popular belief), there was no shortage of fuel for the jets. Indeed, at Prague there was a veritable surfeit, and at Lechfeld, which had just been vacated, there was a large, untapped reserve. At Munich-Riem also there was fuel in abundance – and for that reason the move to Bavaria had been opportune as well as expedient. However, the lack of spares for their engines and airframes, together with continued air interdiction of Munich-Riem, kept the jets from getting to grips with the enemy for much of the day. However, a number of sorties were mounted, and Bär claimed two P-47s. By now Russian aircraft were appearing from the north-east, and *JG 7* used its jets for strafing roads along which Soviet troops advanced daily. Later on 27 April *JG 7* claimed twenty Ilyushin Il-2 Sturmovik ground-attack aircraft destroyed, although this could not be verified. The Allied bombers were now gone, but ground-attack fighters continued to sweep the airfields. *JV 44* claimed five P-47s, but lost two aircraft to Russian fighters.

Next day, 28 April, when *JG 7* went up against Russian fighters, *Lt* Ernst-Rudolf Geldmacher was shot down and killed. Galland received orders to move *JV 44* to Hörsching, south of Linz in Austria, and from there to Prague, where his unit was to resist the Russian advances by flying ground-support missions for the Wehrmacht. Realizing the war was lost, and fearing the consequences of falling into Russian hands, Galland shrewdly argued for a move, instead, to Innsbruck, with an interim stop at Salzburg. His request was granted. Late that day, when the Americans arrived on the outskirts of Munich, Galland decided to effect the move. Leaving Galland still in hospital at Bad Wiessee, *JV 44* moved from Munich-Riem to Salzburg-Maxglan.

On 29 April Me 262s were deployed against pontoon bridges across the Elbe. Patrolling P-47s found a group of Me 262s parked on stretches of autobahn and, in a strafing run, left nine destroyed and seventeen damaged.

On 30 April a few jets from *I/KG(J) 54* were sent against Soviet armoured columns; one was shot down by anti-aircraft fire. In Berlin, Adolf Hitler put a gun to his head and shot himself.

Surrender of the Me 262 units

On 1 May Galland considered a daring but unsuccessful plan to offer his élite jet force to the Americans. He proposed to send an emissary to negotiate surrender conditions for *JV 44*, stipulating that it should be kept in being, with its pilots, for use in the coming (*sic*) fight with the Russians. In the nearest that *JV 44* came to mutiny, Bär refused an order to move the unit to Prague, given when *Oberst* Hajo Herrmann visited Salzburg. On the morning of 4 May, while Maj Gen John W. O'Daniel of the US Army received the surrender of Salzburg, Bär ordered the destruction of all Me 262s under his command. *Hptmn* Walter Krupinksi took a tracked motorcycle around the lines of parked jets and tossed hand grenades into their Jumo engine intakes. It was an inglorious end for a remarkable fighter.

In the very last days of war, only *I/JG 7* and elements of *KG(J) 51* and *KG(J) 54* had been operational, the former flying missions in the Prague, but to little purpose. The last Me 262 lost in combat was a Me 262A-2a of *KG(J) 51*, shot down over Prague with the loss of *Fw* Poling. The last victory claim, and possibly the last German air combat claim of the war, was made by *Oblt* Fritz Stehle of *I/JG 7*. On 8 May he shot down a Yak-9 fighter over Czechoslovakia.

No sooner had the German surrender been announced than several pilots from the Eastern Front flew west to surrender to the British and Americans; some of them flew 300 miles (480km) to the relative freedom of what was soon to become West Germany (German Federal Republic). The war was over, but the Me 262 had been shown to represent the fighter of the future and, for the most part, the units that operated the revolutionary aircraft acquitted themselves well and with honour. This chapter in the history of air warfare is now closed but not forgotten. The Me 262 lives on in the memories of those who took part in the greatest air war the world has ever seen; the few examples that survived the wreckers' torches are preserved with pride.

Me 262 Specifications, Variants and Proposed Variants

Me 262 Variants

Me 262A-1a

The standard production fighter was known as the *Schwalbe* (Swallow). Its role as an offensive or defensive fighter was officially designated as *Luftüberlegenheits-jäger*, which translated literally means 'pursuit and interception', aircraft.

Specification – Me 262A-1a

Power Plant:	Two Junkers Jumo 004B axial flow turbojet engines
Thrust rating:	1,984lb (900kg) static
	1,610lb (730kg) at 273mph (439km/h) at sea level
	1,900lb (860kg) at 559mph (900km/h) at sea level
	1,300lb (590kg) at 273mph (439km/h) at 8,200ft
	1,600lb (725kg) at 559mph (900km/h) at 8,200ft
	5,73lb (260kg) at 534mph (860km/h) at 36,090ft
	7,15lb (325kg) at 559mph (900km/h) at 36,090ft
Armament:	Four 30mm Rheinmetall-Borsig MK 108 cannon with muzzle velocity of 1,720ft/sec (525m/sec) and firing rate of 660 or 860 rounds/minute. 100 rounds/gun for upper pair and 80 rounds/gun for lower pair.
Dimensions:	Span 41ft 0½in (12.5m); length 34ft 9½in (10.6m); height 11ft 6¾in (3.5m); wing area 233.58sq ft (21.72m); landing gear track 7ft 3⅓ in (2.32m); leading edge wing sweep 18 degrees 32 minutes, aspect ratio 7.5, fin/rudder area 34.5sq ft (3.2m²), tail-plane area (total) 41.2sq ft (3.8m²), elevator area 10.9sq ft (1.01m²)
Weights:	Empty 8,378lb (3,800kg); empty equipped 9,742lb (4,420kg); normal loaded with main fuel tanks full 14,101lb (6,396kg); loaded with maximum internal fuel 15,720lb (7,130kg). Allowance for pilot 220lb (100kg). Ammunition weight 408lb (186kg). Fuel weight 5,490lb (2,490kg) Engine weight: 1,588lb (720kg)
Performance:	Maximum speed (at 14,264lb; 6,470kg) 514mph (827km/h) at sea level; 530mph (852km/h at 9,840ft (3,000m); 540mph (870km/h) at 19,685ft (6,000m); 532mph (855km/h) at 16,245ft (4,950m); 510mph (820km/h) at 32,810ft (10,000m)
	Limiting Mach number 0.86
	Landing speed 109mph (175km/h)
	Range (with 396gal; 1,800l) 298 miles (480km) at sea level; 528 miles (850km) at 19,685ft (6,000m); 652 miles (1,050km) at 29,530ft (9,000m)
	Initial climb rate 3,937ft/min (1,200m/min); climb rate at 19,685ft (6,000m) 2,165ft/min (660m/min); at 29,530ft (9,000m) 1,082ft/min (330m/min)
	Time to 19,685ft (6,000m) 6.8min; to 29,530ft (9,000m) 13.1min; to 32,810ft (10,000m) 26min
	Service ceiling 36,080ft (11,000m)

Me 262A-1a (werke-nr 130-083)

One specially modified production aircraft carried a 50mm Rheinmetall-Borsig BK 5 instead of the standard armament. The gun projected almost 7ft (2m) ahead of the fuselage; its weight necessitated a mass balance in the tail and a modified nose-wheel assembly, made to rotate 90 degrees on retraction and to lie flat against the underside of the weapon. Although it generated a large amount of smoke, the BK 5 had no adverse effect on the aircraft's performance. Usually fired one round at a time, it achieved 25–27 hits out of 30 in air-ground firing trials, aiming at a rectangular target 105ft (32m) in length from altitudes of 3,940ft (1,200m) to 4,920ft (1,500m).

Me 262A-1a/U1

This was similar to the standard fighter, but with armament consisting of two 20mm MG 151 cannon with 146 rounds/gun, two 30mm MK 108 cannon with 60 rounds/gun, and two 30mm MK 103 cannon with a muzzle velocity of 3,140ft/sec (960m/sec) and a cyclic rate of 660rounds/min. The MK 103 differed from the MK 108 in having a longer barrel and higher muzzle velocity; it also had a muzzle brake. The MK 103 necessitated bulged side panels on the aircraft's nose section. Three models of the type were completed for armament tests only. The standard armament had been introduced as an interim package: this six-gun arrangement was an attempt to get a definitive production gun package.

Me 262A-1a/U2

A bad-weather fighter equipped with a Hermine FuG 125 radio instrument, as well as the standard equipment described in the text.

Me 262A-1a/U3

A standard fighter modified as an interim reconnaissance (*Aufklärer*) aircraft in accord with the diverse roles proposed by Messerschmitt on 11 September 1943, as Reconnaissance Aircraft I. Armament was removed and replaced by two Rb 50/30 cameras in the fuselage nose. The blister fairings seen on the Me 262A-1a/U1 for the MK 103 cannon breech mechanisms were used on this aircraft to accommodate the broad top of the camera housings. The camera lenses were aligned with optical ports on the underside of the fuselage nose immediately inboard of the spent cartridge chutes. Some aircraft were refitted with a single MK 108 cannon for defence. *Einsatzkommando Braunegg*, a special unit commanded by *Oblt* Herward Braunegg achieved good results while flying tactical reconnaissance missions from south Germany until early 1945, when the unit was incorporated into *NAG 6*, a forward reconnaissance *Gruppe*.

Me 262A-1a/U4

A specially modified aircraft (*werke.nr* 111 899) fitted with a 50mm Rheinmetall-Mauser MK 214A, with which ground tests began on 23 March 1945. In the search for a high-calibre weapon for the Me 262, transforming it into a *Pulkzerstörer* ('formation destroyer'), plans to fit a 55mm MK 114 cannon were abandoned in favour of the MK 214A. The gun had a muzzle velocity of 3,018ft/sec (920m/sec), but jammed frequently. Messerschmitt test pilots Lindner, Baur and Hofmann flew the aircraft and fired the cannon 128 times in ground and airborne tests. Luftwaffe *Maj* Herget of *JV 44* piloted the Me 262A-1a/U4 in April 1945, firing six shots against ground targets and then taking it into the air against American bomber formations, but without success. The war ended before a Mauser MG 213 repeating cannon could be fitted to another Me 262A-1a at Oberammergau. Tests with the MK 214A had also been conducted using Me 262A-1a *werke.nr* 170 083.

Me 262A-1a/U5

One modified aircraft (*werke.nr* 112 355) was equipped with six 30mm MK 108 cannon in place of the standard armament. This aircraft was taken to *JV 44* in April 1945 and flown operationally by *Obstlt* Heinz Bär. As part of a programme aimed at modifying the standard gun configuration to give the aircraft greater hitting power, two other aircraft at Tarnewitz were employed in tests with the 30mm MK 103 and 15mm MG 151 guns. This facility also tested the EZ 42 programmable, lead-computing gun sight.

Me 262A-1b

This aircraft was adapted to carry twenty four R4M unguided rockets on integral launch racks under the two wings, outboard of the Jumo turbojet engines. The 55mm R4M, designed by Kurt Heber, took its designation from being a *rakete* (rocket) weighing 8.82lb (4kg) and equipped with a *minen geschoss* (thin-walled container). A single hit by an R4M would bring down a four-engined bomber. Containing 17.6oz (500g) of hexogen (cyclonite) explosive, the rocket projectile was developed and manufactured by DWM (Deutsche Waffen-und-Munitionsfabrik) at Lübeck. The rockets were carried on a wooden rack flush-mounted to the underside of each wing, aligned to fire upward 8 degrees at a range of 1,970ft (600m). When fired, the rocket had the same ballistic characteristics as a shell from the MK 108, so it was aimed through the same Revi 16B gun sight used for the main armament. The rockets had a natural dispersion of 377sq ft (35m^2), forming a rectangular box around the target. The first trials were conducted by *Jagdgruppe 10* at Redlin near Parchim, beginning in late February 1945. The first combat missiles were delivered to *9./JG 7* on 15 March 1945 and were used for the first time against American bomber formations five days later. In April 1945 trials began with seventeen rockets under each wing; further plans were made for an Me 262 to carry twenty four rockets, but these were not completed by the end of the war.

Me 262A-2a

Dubbed *Sturmvogel* (Stormbird), this aircraft performed the role of a *Jagdbomber* (fighter-bomber). The only external feature distinguishing its role from that of the A-1a fighter was the pair of bomb racks beneath the forward fuselage. The warload was to comprise either two 551lb (250kg) bombs or one 1,102lb (500kg) bomb.

Me 262A-2a (werke.nr 111 994)

An aircraft modified to carry an R100/BS rocket projectile, containing 400 incendiary pellets, under each bomb carrier. In tests with a WGr 21 rocket launcher, the jet proved too fast on approach and results were poor. The effort was a precursor to the fitting of unguided, wing-mounted rockets on the Me 262A-1b. This aircraft was also used to evaluate the Ruhrstahl X-4 wire-guided, air-to-air weapon early in 1945. Four of these 132lb (60kg) missiles, each 6ft (1.82m) in length and fitted to a ETC70C/1 rack, were to have been carried by each aircraft, but only stability trials were completed. Designed by Dr Max Kramer, the X-4 was powered by a single BMW 109-548 liquid-fuel rocket motor. An Allied bombing raid destroyed the production facility, and for this reason, as well as the technical complexity of integrating it into the aircraft, the project was dropped. There was also a plan to use this aircraft to test the possibility of carrying up to three Hs 298 missiles, each weighting 275lb (125kg) and powered by a Schmidding 109-543 liquid-propellant rocket motor, but no tests were conducted.

Me 262A-2a/U1

In an attempt to produce a true *Schnellbomber* (fast bomber), Hitler ordered tests with the Me 262. Its development as a fully-developed *Blitzbomber* involved three aircraft (*werke.nrs* 130 164, 130 188 and 170 070) being modified for tests at Rechlin. Armament was reduced to two MK 108 cannon, and the aircraft were fitted with a special TSA (*Tief-und-Sturzfluganlage*) device for improved bombing accuracy. This TSA-A2 comprised a semi-programmable computing device which gave a four-fold increase in target accuracy when compared to the standard Me 262A-2a equipped with only the Revi 16B sight. Plans to produce aircraft to this specification were cancelled when Hitler revoked his decision and ordered full-scale priority to be given to the Me 262A-1a fighter and basic Me 262A-2a.

Me 26A-2a/U2

A significantly modified aircraft (*werke.nr* 110 484) with the original nose section and armament replaced by a rounded wooden

nose extension known as a *Loftekanzel II*, accommodating a second crewmember and a Lofte 7H bomb sight. The rounded nose had a glass front and top section; the bomb-aimer lay in a prone position. Delivered to Lechfeld in October 1944, it was joined by a second aircraft (*werke.nr* 110 555) similarly modified. Both were eventually fitted with the K22 automatic pilot built by Siemens. Both aircraft were tested by Baur and Lindner; the type would undoubtedly have entered service had not the war taken such a disastrous turn that bombers no longer had a place on the production line.

Me 262A-3a

A ground-strafing version of the Me 262A-1a with standard armament and extra armoured protection for fuel tanks, cockpit floor and sidewalls. No series production was initiated, since the aircraft had poor performance in this role. The low muzzle velocity of the MK 108 cannon and the relatively few rounds carried (360) made it difficult to hit targets from an altitude above 1,300ft (400m).

Me 262A-4a

This planned reconnaissance version of the Me 262A-1a did not materialize. It was to have had its armament deleted in favour of two Rb 50/30 cameras installed in the fuselage. It was cancelled in favour of the Me 262A-1a/U3.

Me 262A-5a

A developed, armed-reconnaissance version of the Me 262A-1a/U3. Only two MK 108 cannon were retained, two Rb 50/30 cameras were installed in the nose, and two 66gal (300l) drop tanks on *Wikingerschiff* pylons were attached to the lower forward fuselage to give increased range.

Me 262B-1a

A two-seat training version of the basic aircraft. Deliveries to *III (Erg.)/JG 2* at Lechfeld began in November 1944. The aircraft had a modified centre fuselage section in which the standard rear main and auxiliary fuel tanks were replaced by tanks of smaller capacity: 88gal (400l) and 57gal (260l) respectively. These were set further aft to make room for a second seat and a faired canopy extending back to include the instructor's position. Two 66gal (300l) fuel tanks were attached to standard *Wikingerschiff* pylons beneath the forward fuselage in order to maintain the centre of gravity close to the original value; these were retained during flight. The aircraft had full dual controls and standard armament of four MK 108 cannon. About fifteen were built for the Luftwaffe before production switched to the night fighter version.

Me 262B-1a/U1

An interim *Behelfsnachtjäger* (night fighter) version of the Me 262B-1a, with the same modified fuel tank arrangement, but the rear seat occupied by a radar control officer rather than an instructor. The only significant difference between the two aircraft was that the night fighter had a FuG 218 Neptun V radar with a *Hirschgeweih* array and a FuG 350 ZC Naxos device which homed the aircraft onto British H2S transmissions. Conversion to the type was carried out by the Deutsche Lufthansa works at Berlin-Staaken. The first conversion went to *Kommando Stamp* in March 1945.

Me 262B-2a

This was the definitive two-seat night fighter version, extended in length and with increased range. Two plug sections were fitted fore and aft of the two-man cockpit, extending the length of the fuselage by 3ft 11¼in (1.12m). This provided space to restore the standard main and auxiliary fuel tanks (198gal (900l) and 132gal (600l) respectively) that were deleted in the two-seal training version, and also to increase the capacity of the forward auxiliary tank from 37gal (170l) to 110gal (500l). The two 66gal (300l) underfuselage tanks were retained, giving the aircraft a much greater range. In addition, a *Deichselschlepp* pole arrangement provided an additional 198gal (900l) tank attached to a towed wing; fuel from this was to be used first, so that the gear could be jettisoned as soon as possible. Armament comprised the standard four MK 108 cannon, and plans were in hand to add a special *Schräge Musik* arrangement of two MK 108 cannon firing upwards from behind the dual cockpit.

The first Me 262B-2a had the same radar as the interim B-1a/U1; trials with this began in March 1945. Tests revealed that drag from the *Hirschgeweih* nose array (specifically, from the eight 0.25in (6.3mm) diameter dipoles protruding from the nose) cut 37mph (60km/h) from the jet's maximum speed. In attempting to reduce this drag, engineers devised a new antenna configuration; this was set in a redefined nose shape and was known as the *Morgenstern* system. A further development, however, provided a better solution: the FuG 240 *Berlin* system, with a dish scanner protected by a plastic radome over the nose-mounted cannon. The second Me 262B-2a was to have incorporated this system, but the war ended before it was completed.

Me 262 Proposed Variants

Except in a few instances, the following variants of the Me 262 were never deployed operationally. Each was proposed as a plausible development of a basic airframe capable of accommodating a variety of derivative variants. Messerschmitt provided options for a wide choice of engines in different sizes and shapes by selecting a design which carried the powerplants in pods beneath the wings, thereby maximizing future airframe/engine integration options. Due to the collapse of Germany's manufacturing base and the loss of territory to Allied armies, the majority of these concepts were not pursued and may be considered of academic interest at most. They do, however, signify the level of technical development which rendered the design flexible to alternative configurations.

The design philosophy behind these variants, each with extended performance and mission capability, lay in the multi-role aircraft set down by P.1065. Encapsulated at first as a fighter by the German Ministry, the company put together an aircraft that could perform fighter, bomber and reconnaissance roles from the outset and it was to perform operationally in all three roles before the end of the war. With that flexibility of design inherent in the aircraft, the natural evolution of extended-capability versions followed. If the original concept for what became the Me 262 could be said to be revolutionary, then all derivatives and variants were evolutionary, a natural product of a good design flawed only by inadequate propulsion.

The following descriptions and specifications of these Me 262 variants and derivatives, some of which were built and flown, are drawn from official Messerschmitt records, Luftwaffe documents and post-war analysis by Allied intelligence. Some of the detail has been provided by interviews conducted between the author and surviving members of the Luftwaffe, in particular the staff of *General der Jagdflieger* Adolf Galland. It is a measure of the aircraft's brilliant design base that the Me 262 was one of only four types, including the Heinkel 62, Arado 234 and Dornier 335, to be given the highest production priority at a meeting in late November 1944. Galland had been pressing for mass production of the Me 262 and it was largely at his instigation that reason prevailed.

The ability of the German war effort to produce so many design variations pays tribute to the inventiveness of German aircraft designers, manifest on countless occasions between 1915 and 1945. Well aware that Germany's enemies were well on the way to producing turbojet fighters of their own, Messerschmitt urged concentration on these new variants. At the same late November meeting where production decisions were made on the four prime types, Messerschmitt said that it was only a matter of time before the Allies produced a fighter to equal the Me 262. He was not to know that its use in combat would come after the war was over and in an engagement against an enemy Hitler had warned would be the West's next adversary – communism, when MiG fought F-86 in Korea and the age of the jet fighter had been born. What Messerschmitt produced in advance of that was a prophetic foretaste of an entirely new era in aerial warfare.

Me 262C-1a 'Heimatschutzer I'

The purpose of this design was to provide a fast pursuit fighter capable of sprint attack against massed bomber formations. The aircraft adopted a supplementary rocket propulsion system, a Walter HWK RII-211-3 used by Messerschmitt in the Me 163 rocket-powered interceptor and known to the Luftwaffe as the HWK 509A-2. Additional tanks were necessary for the rocket propellant, *T-Stoff* and *C-Stoff*, and these were fitted inside the fuselage. *T-Stoff* is composed of 80 per cent hydrogen peroxide and 20 per cent water while *C-Stoff* consists of a mixture of methyl alcohol and hydrazine hydrate. The *T-Stoff* was accommodated in the standard 900l tank situated in the forward fuselage and in a 295l jettisonable fuel tank under the fuselage. The *C-Stoff* was contained in a 625l tank which replaced the usual 750l jet fuel tank in the rear fuselage. Armament was to have comprised six MK 108 cannon, although in the one aircraft built, designated Me 262C-1a, only four were fitted.

Heimatschutzer I had a supplementary wheel attached to each main gear assembly and these were jettisoned shortly after takeoff. The HWK RII-211-3 rocket motor was carried in the rear fuselage. The rocket motor could be used for short periods or for a sustained acceleration. In all, the aircraft carried 1,820l of *T-Stoff* and *C-Stoff*, compared with 1,652l in the Me 163, as well as the 1,150l of fuel for the twin Jumo 004C turbojets. The Jumo 004C engines each delivered a thrust of 2,238lb (1,015kg) while the HWK RII-211-3 put out 3,750lb (1,700kg) of thrust. Together, all three propulsion units gave the Me 262 Interceptor I a total thrust of 8,226lb (3,730kg), the rocket motor alone boosting thrust by 84 per cent. But the Walter rocket motor was short lived and had fuel for little more than six minutes of burn time. Gerd Lindner and Karl Bauer made seven flights in the *Heimatschutzer I*, but it was decided to discard this configuration in favour of the Me 262C-3 with its external Walter motor.

Specification – Me 262C-1a

Maximum weight:	17,600lb (7,983kg)
Landing weight:	11,400lb (5,171kg)
Climb to 38,000ft (11,582m):	4min 5sec from standing start 3min 35sec from after takeoff
Ceiling at 38,000ft (11,582m) with turbojet engines:	42min
at 52,500ft (16,000m) with rockets engines:	5min 25sec
Maximum speed at 38,400ft (11,704m):	545mph (877km/h)
Range:	462m (743km) at 38,400ft (11,704m) 308m (495km) at 52,500ft (16,000m)
Takeoff distance (all propulsion):	2,700ft (823m)
Landing speed:	114mph (183km/h)

Me 262C-2b 'Heimatschutzer II'

On 26 March 1945 the *Heimatschutzer II* (Interceptor II) version of the Me 262 was flown for the first time. Designated Me 262C-2b, it made only one more flight

before the war ended but it was sufficient to demonstrate a remarkable capability. Unlike the other variants of the aircraft it had a revolutionary hybrid engine developed by BMW, which had been working on a combined jet and rocket engine for some time. Designated BMW 003A-1R (for *Raketen*) each engine physically combined a turbojet motor producing 1,760lb (798kg) of thrust with a BMW 109-718 rocket motor producing 2,700lb (1,225kg) of thrust. The rocket motor operated on *R-Stoff*, or *Tonka*, and *SV-Stoff*, or *Salbei*. *R-Stoff* consisted of equal mixtures of xylidine and triethylamine and *SV-Stoff* was a concentrated nitric acid. These chemicals had been used in the BMW 109-548 liquid propellant motor in the Ruhrstahl X-4, the world's first wire-guided missile.

Propellant for the turbojet component was contained in special tanks taking the place of jet fuel in the fuselage and in a drop tank under the forward fuselage. *SV-Stoff* was carried in the 900l forward tank and in a 375l jettisonable auxiliary tank. *R-Stoff* was carried in a 435l rear tank with jet engine fuel in a 250l tank forward of the cockpit and a 900l tank behind the cockpit. The main landing gear assemblies each carried an additional, jettisonable, wheel and the aircraft was armed with five cannon. The rocket motor would be ignited when the aircraft had reached 100mph (160km/h) during takeoff, producing phenomenal acceleration. Karl Bauer made two test flights in March–April 1945, but further tests were precluded by prevailing events.

Specification – Me 262 *Heimatschutzer II*

Maximum weight:	15,600lb (7,076kg)
Landing weight:	10,000lb (4,536kg)
Climb to 38,400ft (11,704m):	51min with turbojet engines only
52,500ft (16,000m):	5min 30sec with rockets
Maximum speed at 38,400ft (11,704m):	460mph (740km/h) on jets
Range:	525m (845km) at 38,400ft (11,704m)
	366m (589km) at 52,500ft (16,000m)
Takeoff distance:	3,180ft (969m) with turbojets and rockets
Landing speed:	106mph 9170km/h)

Specification – Me 262 *Heimatschutzer III*

Maximum weight:	15,300lb (6,940kg)
Landing weight:	8,200lb (3,719kg)
Climb to 38,400ft (11,704m):	2min 26sec from standing start
	1min 35sec from flying start
Climb to 52,500ft (16,000m):	3min 42sec from standing start
	2min 13sec from flying start
Endurance in level flight at 38,400ft (11,704m) at 500mph (804km/h):	7min 36sec
Endurance level flight at 52,500ft (16,000m) at 500mph (804km/h):	4min 12sec
Range at 38,400ft (11,704m) at 500mph (804km/h):	181m (291km)
Range at 52,500ft (16,000m) at 500mph (804km/h):	194m (312km)
Takeoff roll:	2,000ft (610m)
Landing speed:	95.5mph (154km/h)

Me 262 C-3

This was the definitive *Heimatschutzer I* concept, but with the Walter rocket motor mounted external to the fuselage. In this configuration the rocket propellant tanks were to be attached to modified bomb carriers beneath the forward fuselage, thereby allowing the aircraft to retain integral tankage for turbojet fuel and thus achieve greater combat radius. The jettisonable rocket motor would be carried beneath the centre-fuselage section and released at burnout, to parachute to the ground for recovery and re-use. Propellant for the rocket motor was to have been fed through a flexible line, but because the external tanks were slightly lower than the engine, fuel feed caused problems that were never satisfactorily resolved. No prototype was completed before the end of the war.

Me 262 'Heimatschutzer III'

This proposed version of the Me 262 would have replaced its two Junkers Jumo 004B turbojets with HWK RII-211 liquid propellant rocket motors similar to those used in the Me 163. Each engine produced approximately 3,750lb of thrust and had an endurance of about eleven minutes. Propellant for the Interceptor III variant comprised *T-Stoff* and *C-Stoff* and was carried in tanks filled with these chemicals. *T-Stoff* was located in the 900l forward tank, the 200l tank forward of the cockpit and in the 900l tank behind the cockpit. *C-Stoff* was carried in the 750l rear fuselage tank and in a 220l auxiliary tank beneath the fuselage. The propellant combination was highly volatile and intensely corrosive, so much so that pilots of the infamous Me 163 had to wear asbestos suits to prevent disintegration under the burning action of these chemicals.

The HWK RII-211 was throttleable in gradients between 300lb (136kg) and 3,750lb (1,700kg) but combustion was frequently unstable. The relatively short flight duration of the Interceptor III made its operational potential less than that of turbojet-powered variants. As a point defence fighter it had greater potential than the Me 163, if only because of its longer duration, and the aircraft was to have been fitted with six MK 108 cannon.

Me 262 Aufklärer I

Although some aircraft were used for photo-reconnaissance under the designation Me 262A-1a/U3, the first purpose-built derivative, *Aufklärer I*, was designed but never built. The A-1a/U3 model incorporated two Rb 50/30 cameras in the nose in place of the four MK 108 cannons removed to make space for the photo-reconnaissance equipment. *Aufklärer I* would have had no armament but two vertically-mounted cameras, one Rb 75/30 and one Rb 20/30, in the vacated space. Optical alignment with ground targets would have been facilitated by a window in the floor of the cockpit which allowed the pilot to line up the cameras. Of all the variants this was the least modified Me 262, but it represented the third of this aircraft's multi-role functions in addition to those of fighter and bomber.

The standard Me 262A-1a had a fuel

Specification – Me 262 *Aufklärer I*

Maximum weight:	14,500lb (6,577kg)
Landing weight:	10,000lb (4,536kg)
Maximum speed at sea level:	526mph (846km/h)
at 19,700ft (6,004m):	573mph (922km/h)
at 29,500ft (8,922m):	590mph (949km/h)
Climb rate:	4,730ft/min (1,442m/min) at sea level
	2,340ft/min (713m/min) at 19,700ft (6,004m)
	1,280ft/min (390m/min) at 29,500ft (8,992m)
Climb time:	6min 18sec to 19,700ft (6,004m)
	12min 24sec to 29,500ft (8,992m)
Ceiling:	38,000ft (11,765m)
Range:	335m (539km) at sea level (100 per cent thrust)
	633m (1,019km) at 19,700ft (6,004m)
	856m (1,377km) at 29,500ft (8,992m)
Maximum range:	422m (679km) at sea level cruise
	765m (1,231km) at 19,700ft (6,004m)
	956m (1,538km) at 29,500ft (8,992m)
Endurance:	39min at sea level (100 per cent thrust)
	1hr 18min at 19,700ft (6,004m)
	1hr 44min at 29,500ft (8,992m)
Maximum endurance:	1hr 20min at sea level cruise
	1hr 59min at 19,700ft (6,004m)
	2hr 21min at 29,500ft (8,992m)
Takeoff roll:	1,640ft (500m)
Landing speed:	105.5mph (169.8km/h)

capacity of 2,570l but this reconnaissance version carried 3,050l divided as to one 500l nose tank, the two standard 900l tanks forward and aft of the cockpit and a 750l tank to the rear. To give the aircraft improved performance the standard engines were to be replaced by a pair of Junkers Jumo 004C powerplants each with a static thrust of 2,238lb (1,015kg). The main advantages of this variant were speed, climb rate and sheer survivability. Like the Mosquito that gave inspiration to Messerschmitt the unarmed Me 262 *Aufklärer I* could have outrun any Allied aircraft in the sky. In the following specification chart speed figures are quoted which would have required changes to the airframe to increase the Mach limit set by aerodynamic performance.

Me 262 Aufklärer Ia

To external appearances this sub-variant of the photo-reconnaissance version appeared to carry a redesigned fuselage. The cockpit was moved forward from the mid upper position to a location in the nose ahead of the wing leading edge, giving the fuselage a cigar-shaped appearance. In fact, the fuselage was largely unchanged and the appearance of change was due entirely to the repositioning of the cockpit, internal fuel tanks and camera bays. The net effect was to readjust the centre of gravity and to achieve better mass distribution. Payload for the *Aufklärer Ia* was to have been two Rb 75/30 cameras situated in the fuselage aft of the rear fuel tank with provision for a high capacity film drum.

Internal fuel comprised a 900l forward tank, a 700l tank in the position usually occupied by the cockpit, a 500l tank behind that and a 900l tank in the rear. In total, 3,000l and a performance projection very close to that of the *Aufklärer I*.

Me 262 Aufklärer II

This proposed derivative of the basic Me 262A-2 was more radical than the others. It incorporated a completely remodelled fuselage based on the original type design but extended in the belly to incorporate a large internal fuel tank. The great advantage lay in the parallel use of jigs for formers and in the same machine tools for parts. The factories could have manufactured the belly bubble and attached that to basic Me 262 structural members, providing a deeper more rounded fuselage on the exterior. Additional, jettisonable, wheels were added to the main gear and the vertical tail was increased in size with a larger rudder for directional control. The cameras would have been carried in the nose section.

The arrangement of the fuel tanks was close to that configured for the standard Me 262: one 650l forward tank, a 900l main tank, a 250l tank forward of the cockpit, one 1,300l tank behind the cockpit and a 900l tank in the rear. The belly modification allowed an additional 1,450l of

Specification – Me 262 *Aufklärer II*

Maximum weight:	20,000lb (9,072kg)
Landing weight:	12,200lb (5,534kg)
Maximum speed at sea level:	513mph (825km/h)
at 19,700ft (6,004m):	548mph (882km/h)
at 29,500ft (8,992m):	513mph (825km/h)
Climb rate:	2,950ft/min (899m/min) at sea level
	1,320ft/min (402m/min) at 19,700ft (6,004m)
	394ft/min (120m/min) at 29,500ft (8,992m)
Climb time:	9min 54 sec to 19,700ft (6,004m)
	22min 12sec to 29,500ft (8,992m)
Service ceiling:	32,200ft (9,814m)
Maximum range:	322m (518km) at sea level (100 per cent thrust
	1,100m (1,770km) at 19,700ft (6,004m)
	1,465m (2,357km) at 29,500ft (8,992m)
Endurance:	1hr 10min at sea level (100 per cent thrust)
	2hr 4min at 19,700ft (6,004m)
	2hr 56min at 29,500ft (8,992m)
Takeoff roll:	3,120ft (951m)
Landing speed:	116mph (187km/h)

fuel in the internal lower fuselage tank. In total, 5,450l compared to 2,570l in a standard Me 262. Because of the higher gross weight, rocket-assisted-takeoff was a necessity.

Me 262 Schnellbomber I

The *Schnellbomber* concept played directly into Hitler's hands for a fast bomber capable of reprisal raids as well as battlefield support. The original Me 262 was uncompromised in its basic adaptation for this role, but the increase in maximum loaded weight brought about by a greater quantity of fuel and by the bomb load had its price in degraded performance. In effect, this proposed derivative was little faster than the latest Allied fighters and compromised manouverability for warload. To give the best to both load-carrying capacity and performance it was unarmed but the higher gross takeoff weight necessitated double wheels on each main leg, the second wheel being jettisoned shortly after takeoff.

To give the *Schnellbomber I* extra range fuel capacity was increased from 2,570l for a standard Me 262 to 4,050l. To accommodate the extra fuel a 1,000l tank was installed in the nose and a 1,000l tank in the rear fuselage in place of the usual 750l tank. In addition, there were the usual tanks around the cockpit area: separate 900l tanks immediately in front and behind and a 250l tank beneath. Power for the aircraft was to have been provided by two Jumo 004C turbojets each putting out 2,238lb (1,015kg) of thrust. Bomb load mixes were optional with maximum bomb load of 2,205lb (1,000kg).

Specification – Me 262 *Schnellbomber I*

Maximum weight:	18,300lb (8,300kg)
Landing weight:	10,420lb (4,726kg)
Maximum speed at sea level:	470mph (756km/h)
at 19,700ft (6,004m):	487mph (783km/h)
at 29,500ft (8,992m):	460mph (740km/h)
Climb rate:	2,760ft/min (841m/min) at sea level
	256ft/min (78m/min) at 29,500ft (8,992m)
Climb time:	10min 30sec to 19,700ft (6,004m)
	24min 12sec to 29,500ft (8,992m)
Ceiling:	31,000ft (9,449m)
Maximum range:	404m (650km) at sea level (100 per cent thrust
	733m (1,180km) at 19,700ft (6,004m)
	970m (1,561km) at 29,500ft (8,992m)
Endurance:	49min at sea level (100 per cent thrust)
	1hr 36min at 19,700ft (6,004m)
	2hr 10min at 29,500ft (8,992m)
Takeoff roll:	2,690ft (820m)
Landing speed:	107mph (172km/h)

Specification – Me 262 *Schnellbomber I*

Maximum weight:	20,000lb (9,072kg)
Landing weight:	11,500lb (5,216kg)
Maximum speed at sea level:	513mph (825km/h)
at 19,700ft (6,004m):	548mph (882km/h)
at 29,500ft (8,992m):	513mph (825km/h)
Climb rate:	2,950ft/min (899m/min) at sea level
	1,280ft/min (390ft/min) at 19,700ft (6,004m)
	354ft/min (108m/min) at 29,500ft (8,992m)
Climb time:	9min 54sec to 19,700ft (6,004m)
	22min to 29,500ft (8,992m)
Ceiling:	31,800ft (969m)
Maximum range:	472m (759km) at sea level (100 per cent thrust)
	850m (1,368km) at 19,700ft (6,004m)
	1,120m (1,802km) at 29, 500ft (8,992m)
Endurance:	55min at sea level (100 per cent thrust)
	1hr 47min at 19,700ft (6,004m)
	2hr 19min at 29,500ft (8,992m)
Takeoff roll:	3,120ft (951m)
Landing speed:	113mph (182km/h)

Me 262 Schnellbomber Ia

Messerschmitt provided the same modification for its *Schnellbomber* programme as it had for the reconnaissance variants by moving the cockpit from the mid-upper position to the upper forward fuselage, improving the distribution of mass and the centre of gravity. This sub-variant was able to accommodate virtually the same amount of propellant as well as defensive armament of two MK 108 cannon. Fuel was provided in five tanks, which in order from the forward tank, placed directly behind the cockpit, contained 900l, 700l, 500l, 900l and 1,000l in the rearmost tank. Projected performance was similar to that of the *Schnellbomber I* type although neither was built or flown.

Me 262 Schnellbomber II

All the airframe and fuselage modifications applied to the *Aufklärer II* reconnaissance derivative were given to the *Schnellbomber II* design. With deep belly modification the aircraft was able to carry 4,450l of fuel in a unique arrangement of tanks allowing for a relatively spacious bomb bay. *Schnellbomber II* was to have had six fuel tanks. In the forward fuselage, from the nose, there were to have been four tanks of 450l, 650l, 900l and 250l capacity respectively. Behind the cockpit was the main fuel tank of 1,300l with a 500l tank to the rear. The variant had the extended fin and rudder of the *Aufklärer II* reconnaissance aircraft. The internal bomb load allowed for 2,205lb (1,000kg) in a variety of combinations. Rocket assistance was provided for takeoff. Performance was similar to that of the *Aufklärer II*, which was essentially the same aircraft but for a different role and with different internal arrangement.

APPENDIX TWO

Me 262 Drawings

From the outset Willi Messerschmitt realized that the practical possibilities opened up by gas turbine propulsion would revolutionize aviation and sought not, as some observers have thought, to design one aeroplane for a particular task but rather to open a broad range of mission envelopes that jet-propelled aircraft could explore. When the De Havilland Mosquito appeared it gave inspiration. Here was an aerodynamically refined aeroplane of extraordinary capabilities powered by one of the most powerful reciprocating engines of its day. The Mosquito had a greater effect on the German aircraft and engine industries than any in the Allied camp realized at the time or have given credit for since.

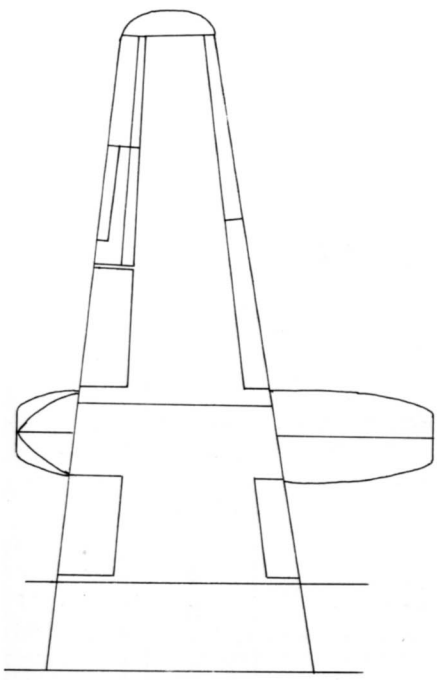
It is a myth of history that Messerschmitt designed the P.1065 as a fighter. While it was accepted as such by the RLM, there were many who wanted the variants promised by Messerschmitt to fill roles urgently in need of the speed and performance promised by this extraordinary aircraft. From the very beginning Messerschmitt honed it for a variety of mission options and made preparations to introduce it in a variety of roles. Indeed, he had to for it to survive. Fighters were merely one component of Air Wings (*Luftflotten*) that relied more on bombers and reconnaissance aircraft than escort fighters. So it was that the great German plane-maker tooled his factories for production of an aeroplane that, had the war lasted long enough, would have realized its true potential as a fighter, interceptor, bomber and reconnaissance aircraft. The following examples originated with the first thoughts about this aircraft and not, as most historians have repeated from verbatim reports of vested interests, as an afterthought by a demonic Nazi leader.

Adolf Hitler was generally inept in technical matters and repeatedly failed to see the advantage in revolutionary designs which seized technology at the forefront of invention. He was, however, quick to adopt ideas that suited his purposes or his decisions and when he was told about the work Messerschmitt had done to make the Me 262 a multi-role combat aircraft he seized upon this to exploit it as a bomber. History is written by the victors but since most records are usually lost in the battles those on the losing side get the chance to tell their own tales the way they want them understood. For the German military it was helpful to heap mistakes upon the dead for they could not respond and post-Second World War history is replete with examples where those who were alive justified their actions or explained failure on the orders or the mistakes of those no longer alive. Many low- and high-ranking Luftwaffe personnel wanted others to bear the blame for their failure to hold the skies.

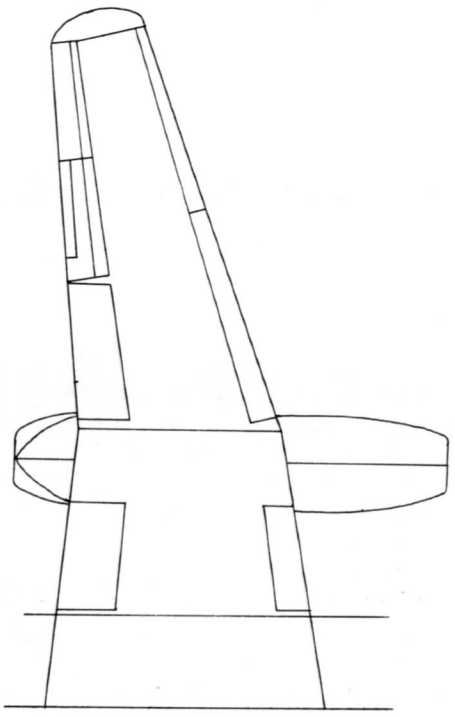
It is clear now after several decades that Hitler played almost no part in turning the Me 262 into a bomber; indeed by his own words he was concerned about too much emphasis on it being applied to one role. He undoubtedly wanted to see it exploited as a bomber but the idea that it could be used for that job was not his own and Messerschmitt himself had urged its adoption in several roles a few years earlier. The genius of Willi Messerschmitt was evident in the way he designed an airframe for these different roles and, as the drawings show, if the lottery of war had sustained German aircraft production for another year many of these variants would have taken wing. These majority of these drawings are 1960s copies of Messerschmitt factory drawings and bear the date of their original release. This clearly shows the diversity of role intended for the aeroplane.

The Messerschmitt Me 262 went through a series of design transformations before its definitive shape emerged from the factory. A common misnomer rests on the swept wing of the jet fighter, hailed as a typical example of advanced German engineering when it was in fact nothing of the sort. Work that would eventually show advantages with the swept wing concept for high speed flight came long after the evolution of the Me 262's swept planform. The original wing was straight without significant leading edge sweep, but where it did show advanced thinking was in the preferred thickness-chord ratio, kept low for reasons of high speed aerodynamic efficiency.

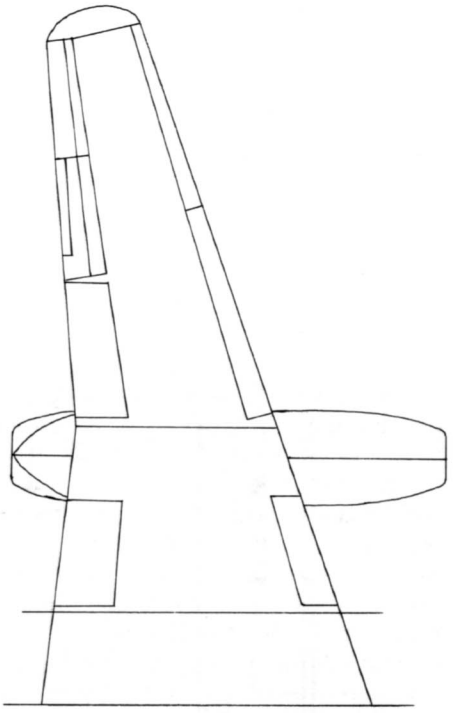
The decision early in the design stage to give the leading edge of the outer wing panels a modest sweep of 19 degrees at the 40 per cent span position was made necessary because the BMW engines came out heavier than expected and it was essential to sweep the outer panels to maintain the centre of gravity in the desired position. The inboard section remained the same as the original straight wing with only a few degrees of sweep. After the first all-jet flight on 18 July 1942, instability in mid-span air flow was corrected by continuing the sweep inboard to the fuselage, thus giving the aircraft a continuous leading edge as Willi Messerschmitt himself had preferred a year or so earlier. Thickness: chord ratio was maintained by thickening the wing root to the appropriate value for the chord. Thus did the Me 262 obtain its swept wing, not via the wind tunnel but through expediency.



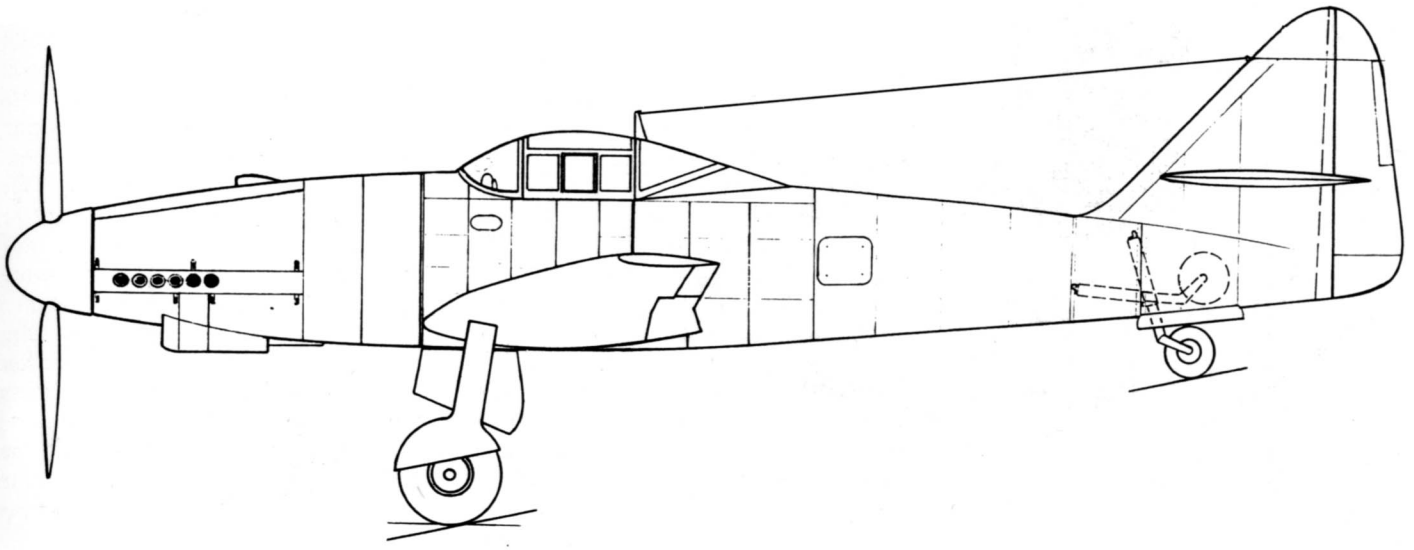
The original tapered wing design of the Me 262 was not proceeded with beyond the intial design stages but factory sketches showing this layout have survived.



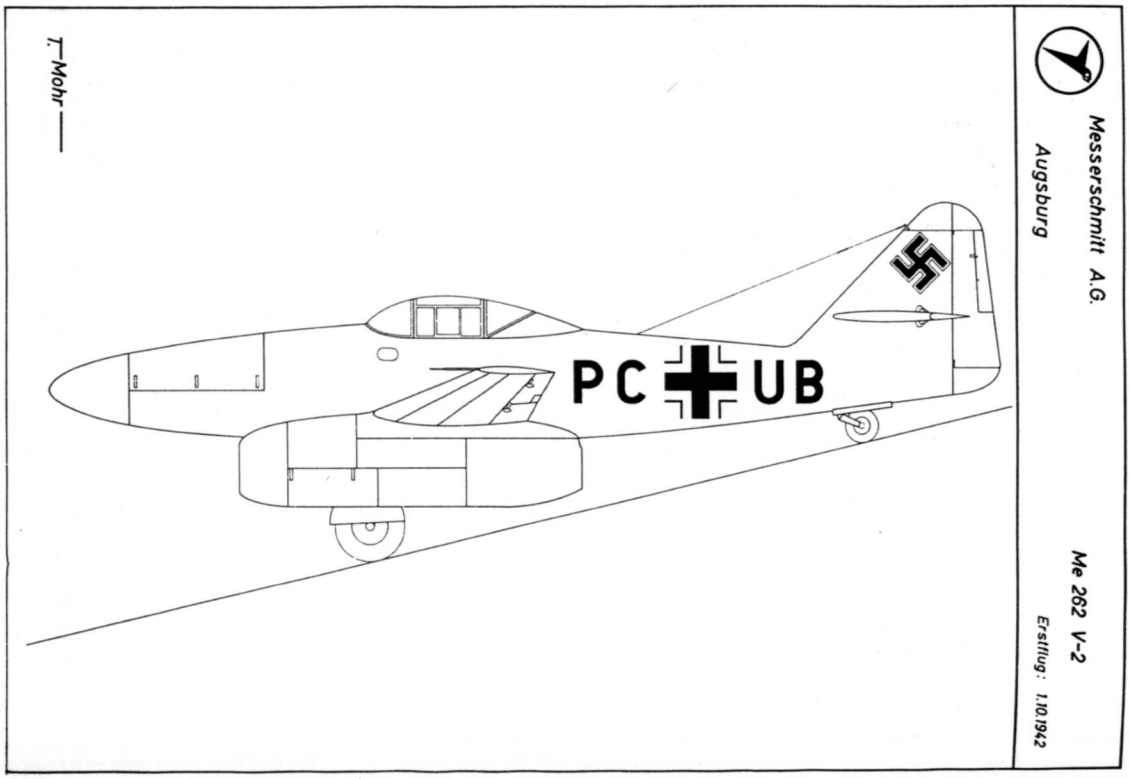
The wing fitted to the first prototypes retained the original tapered mid section with the outer panels swept back.



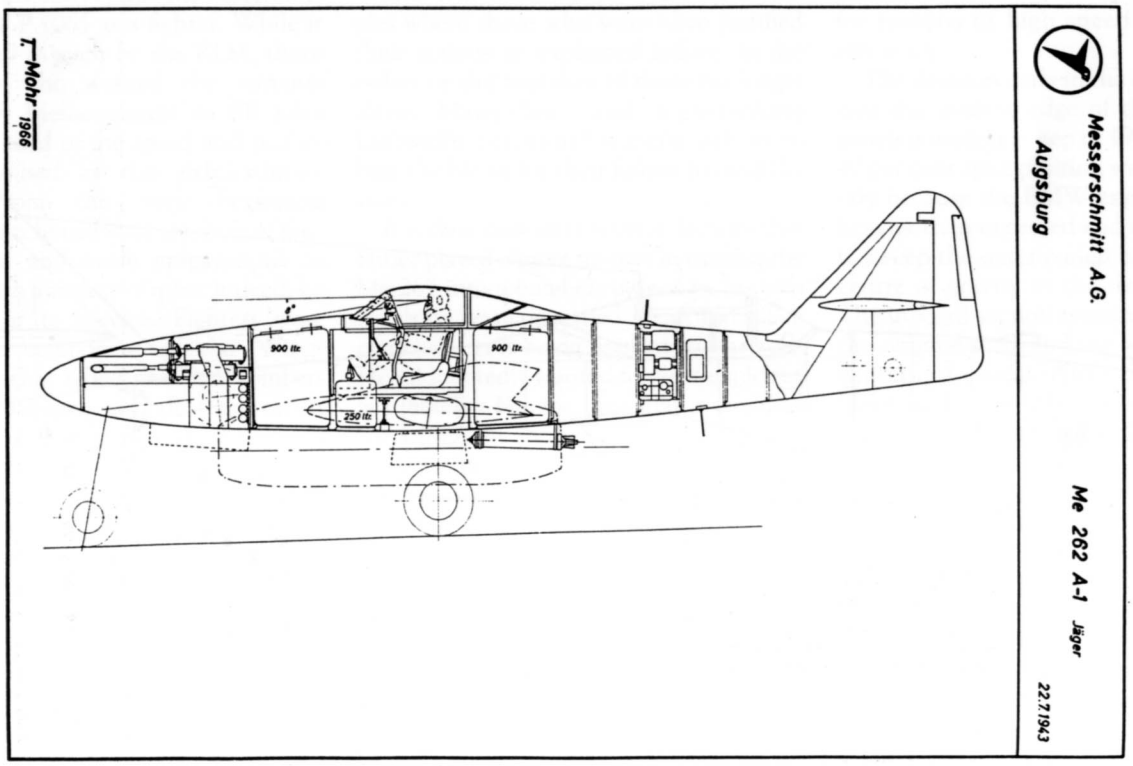
The final form of the wing with leading edge inserts and thickened root.



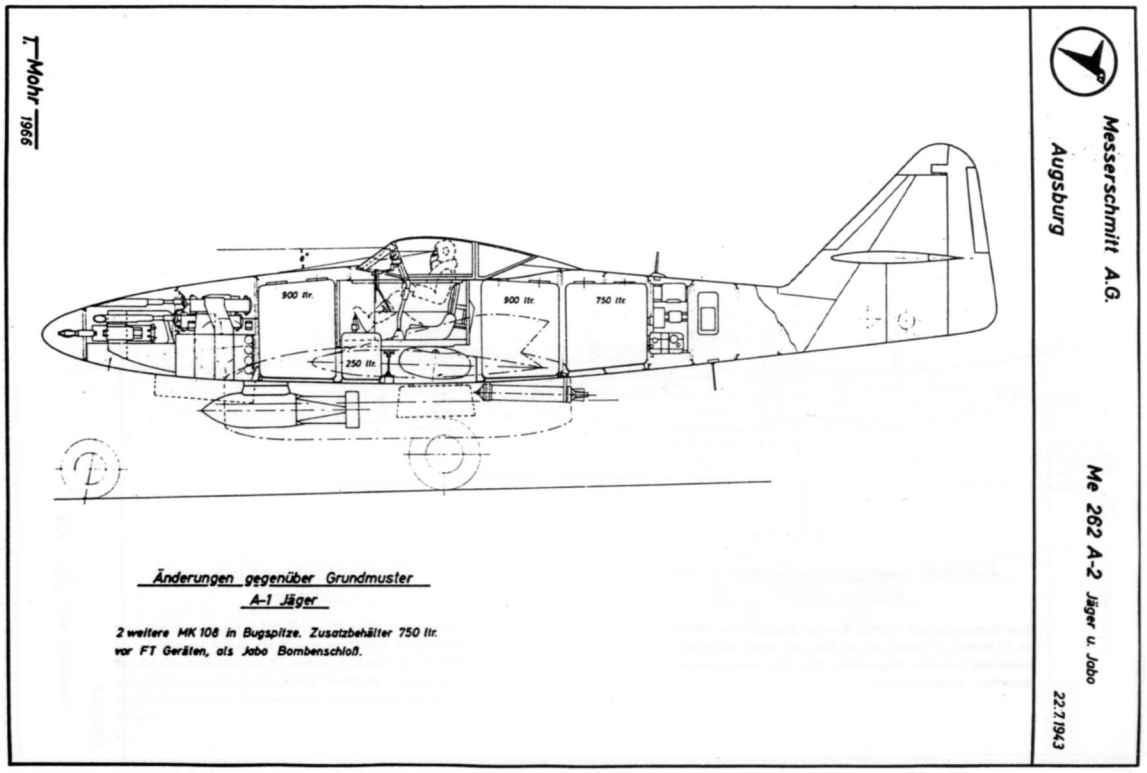
The design shape of the aircraft was compromised by the need to fly the aircraft first without turbojets and with a Junkers Jumo 210G installed in the nose driving a two bladed VDM Type 9-110 propeller. The aircraft bore the original cranked-sweep wing, a combination which took away all the aesthetic beauty of the basic design.



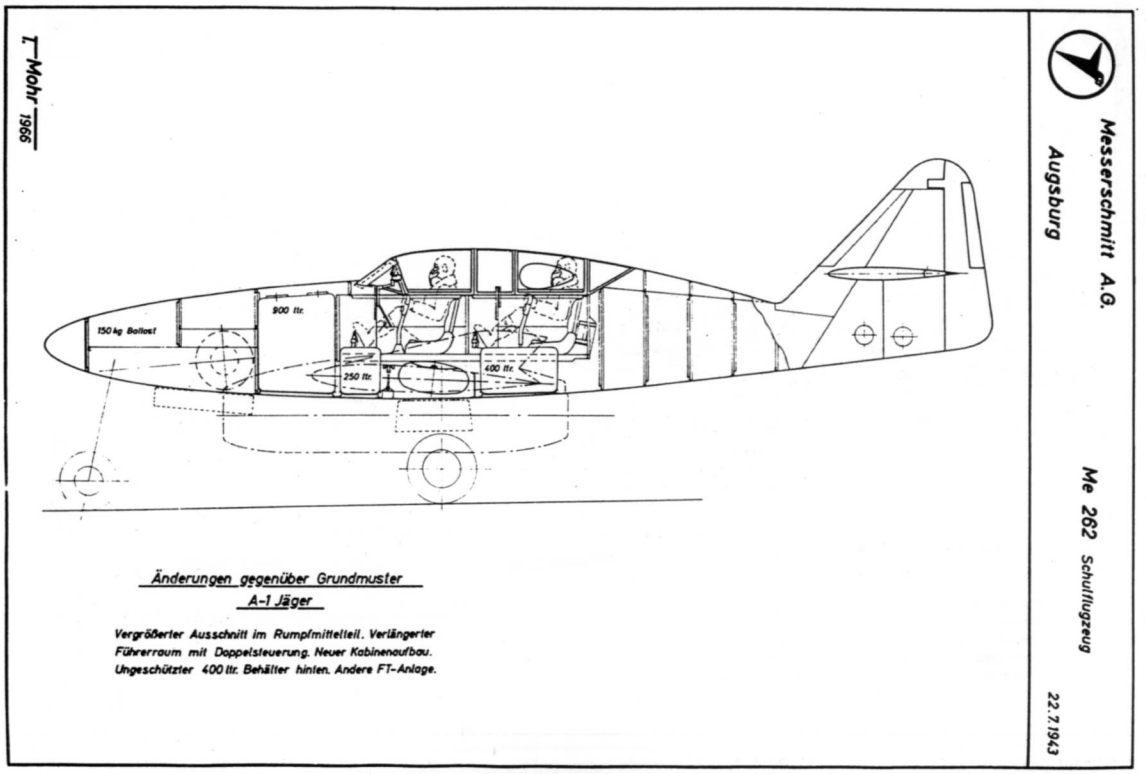
With the piston-engine Jumo 210G removed and turbojets added, the Me 262 regains its intended profile. Unseen on this V2 prototype is the inboard wing section which does not carry the 19 degree sweep of the outer wing section. The tailwheel will be replaced by nose gear on later prototypes and production aircraft.



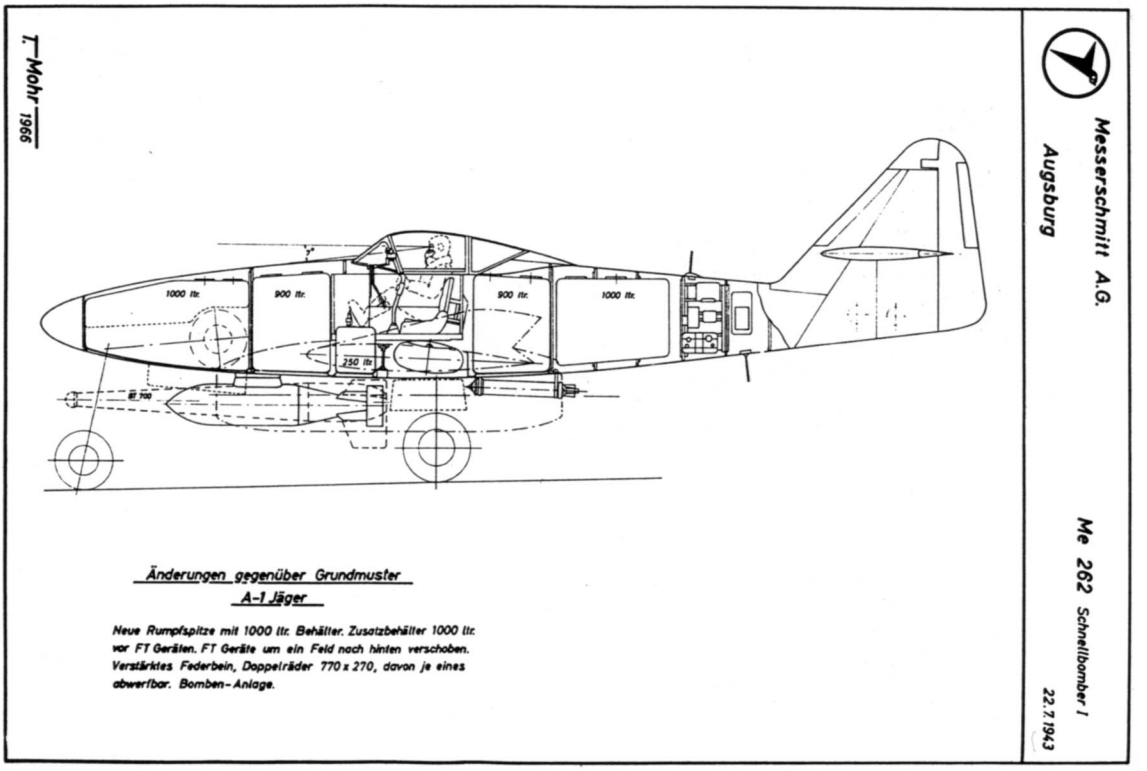
The inboard profile of the Me 262A-1 fighter variant of this multi-role aircraft displays the disposition of fuel tanks, armament, basic crew equipment and radio sets. The aircraft is seen here with a proposed rocket assisted takeoff motor under the centre fuselage section.



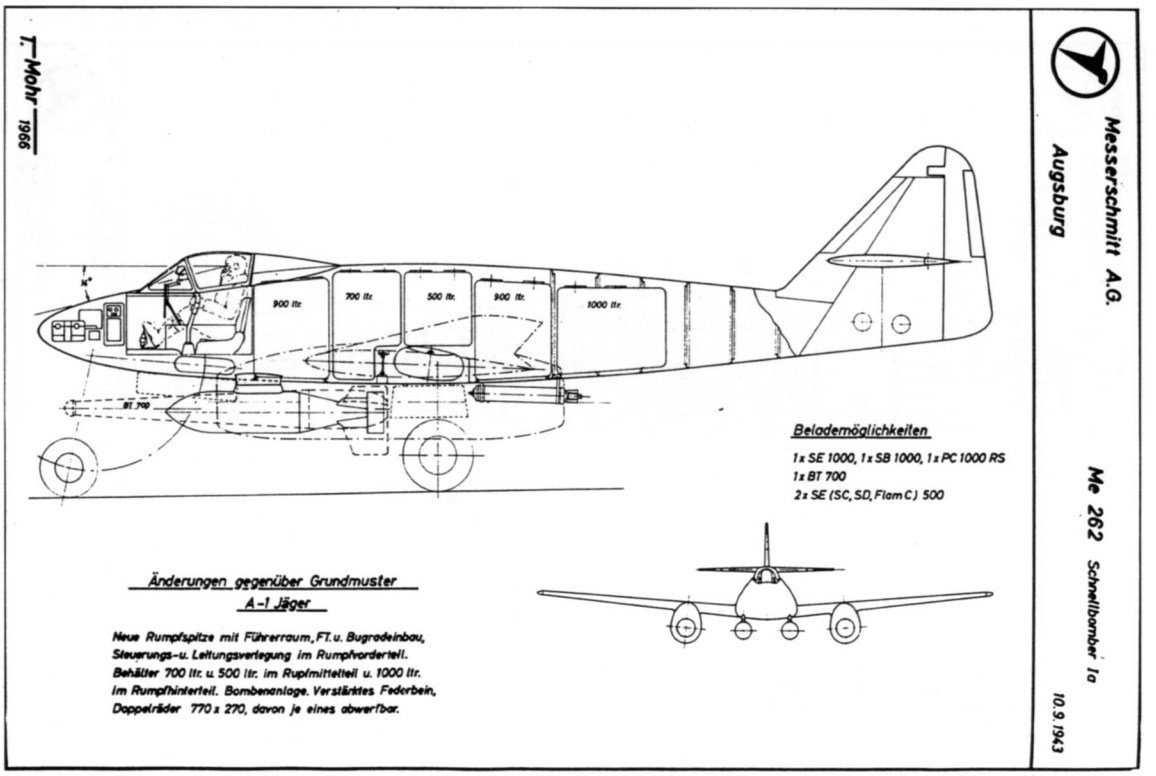
One of several optional configurations for developed versions of the Me 262A-2 envisaged the adoption of an additional 750l fuel tank in the rear in place of the standard 600l tank and a larger forward auxiliary tank of 250l capacity instead of 170l. The aircraft is assumed to have a solid propellant boost motor for assisted takeoff.



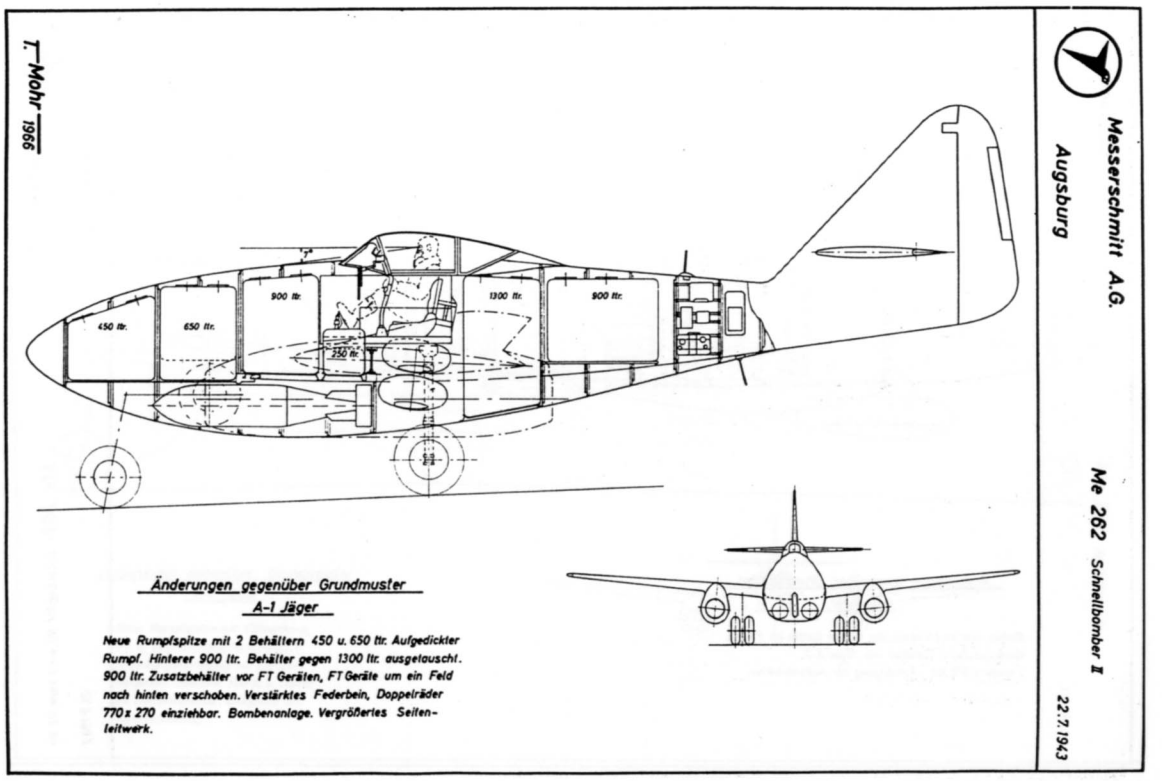
A developed training version of the Me 262 without the usual forward fuel tanks on underwing pylons, which were carried in that position to retain balance; the missing mass was substituted by 150kg of ballast. It was hoped to improve aerodynamic performance by cleaning up the frontal area.



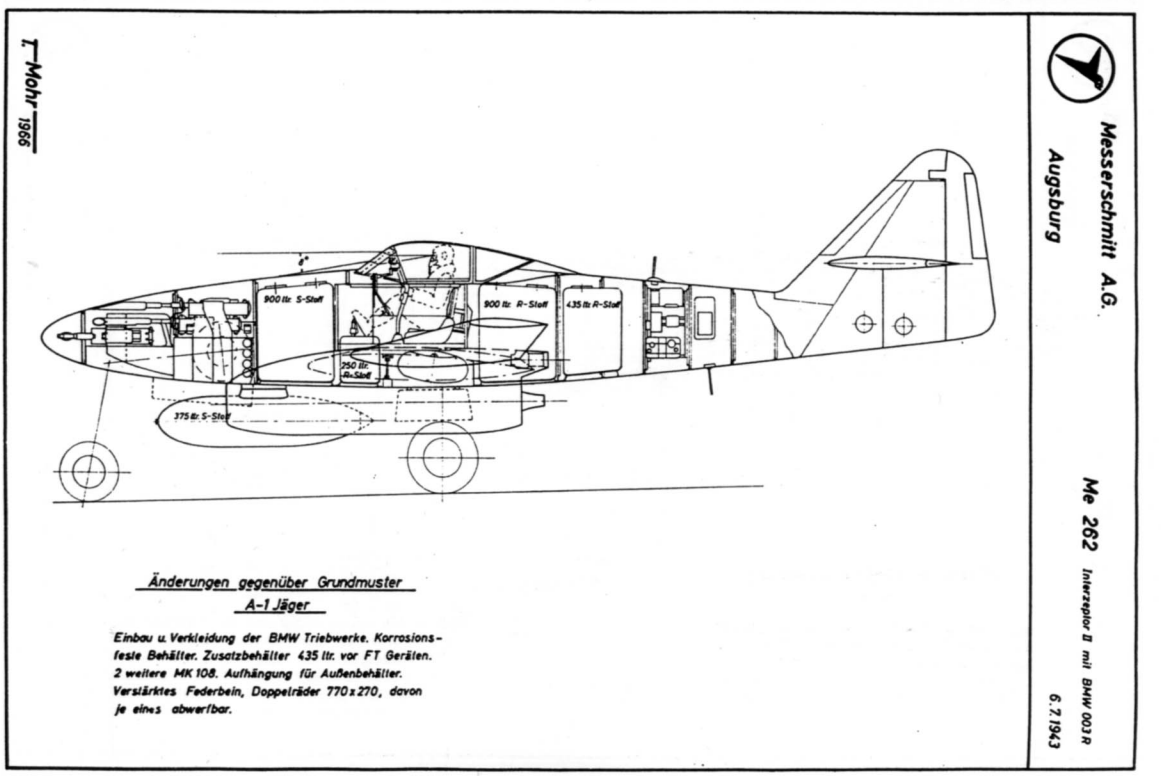
Equipped with two new 1,000l fuel tanks mounted forward and aft, the Me 262 *Schnellbomber* carries a fuel load of 4,050l compared with 2,580l for the standard model. The additional weight would be lifted into air with the aid of solid rocket boost. It was the increased intensity of Allied air raids on Germany that provided the stimulus to advance the concept of a fast bomber for reprisal raids.



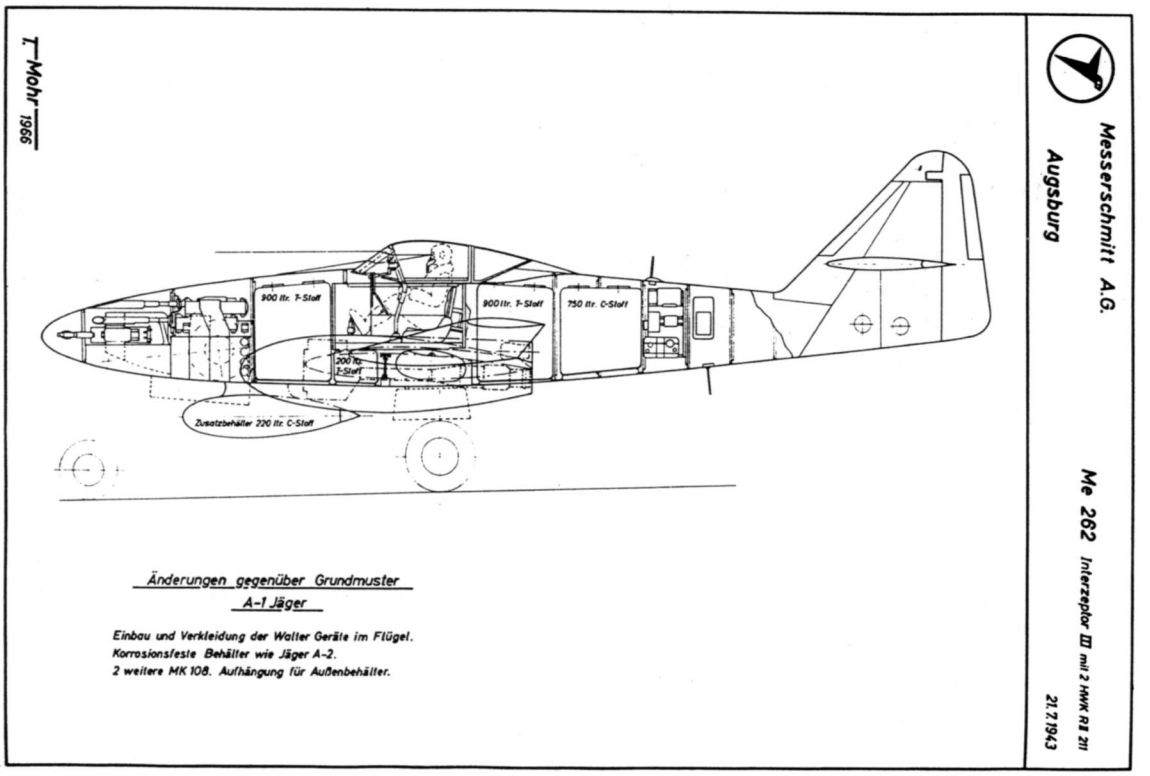
Taking the basic Me 262 fuselage and moving the cockpit forward, Messerschmitt increased the ability of the aircraft to carry a worthy bombload. It was called the *Schnellbomber Ia* and was also the basis for *Aufkärer Ia*, essentially the same but with cameras instead of bombs. Although it looks like a completely different fuselage, the cross-section is identical and appears fatter at the forward and mid section because of the change in canopy position.



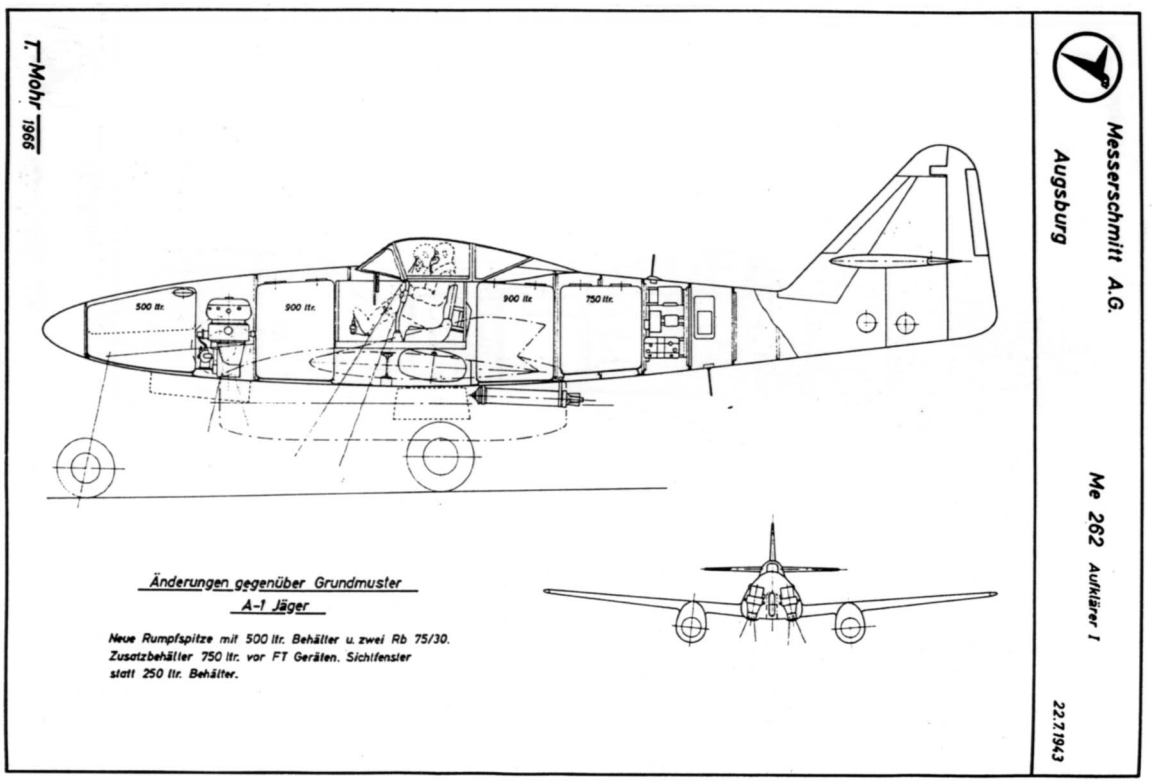
Taking the *Schnellbomber* I design a step further, a complete redesign of the fuselage greatly extended range and increased aerodynamic efficiency by enlarging the cross-section and incorporating a bomb bay. Restoring the pilot to the centre position gave the *Schnellbomber II* version better fuel load distribution with optimized centre of gravity. Note the twin-wheel main leg assemblies.



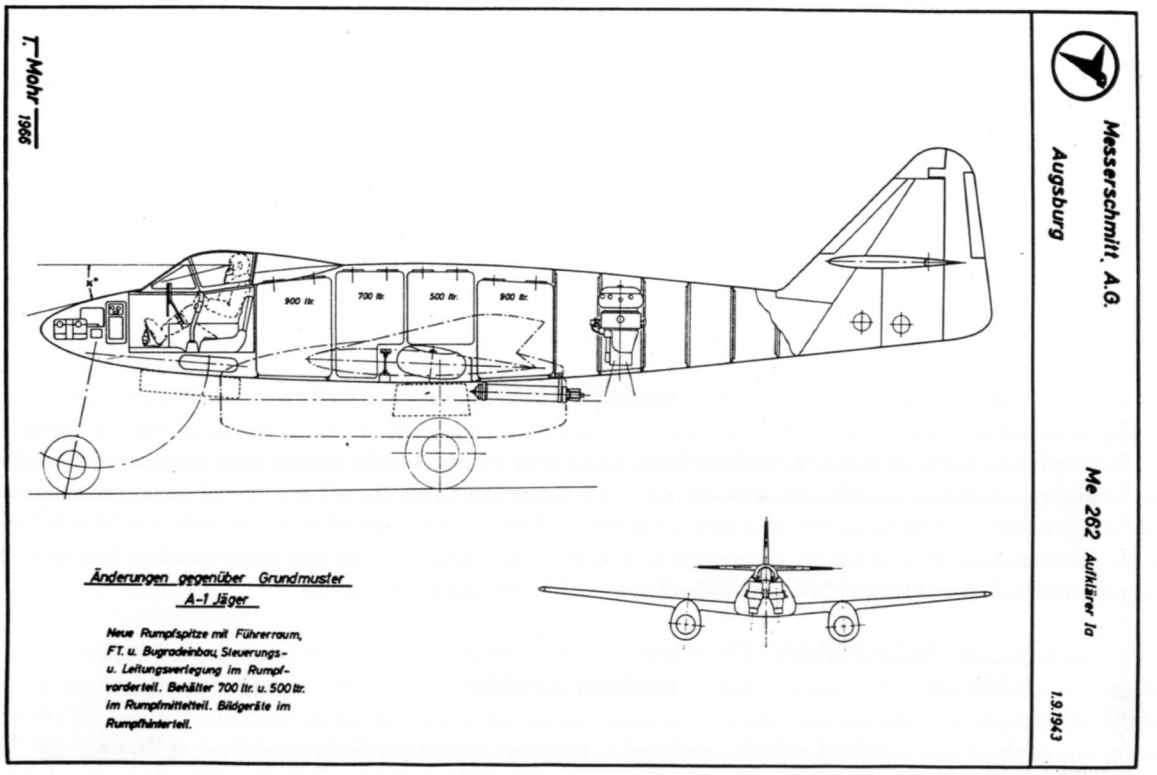
The hybrid propulsion system of this Interceptor II design first drawn up at the end of 1943 incorporated a BMW 003A-1 jet engine with a 109-718 liquid fuel rocket motor, propellant for which was to be carried in the fuselage and in an under-fuselage tank.



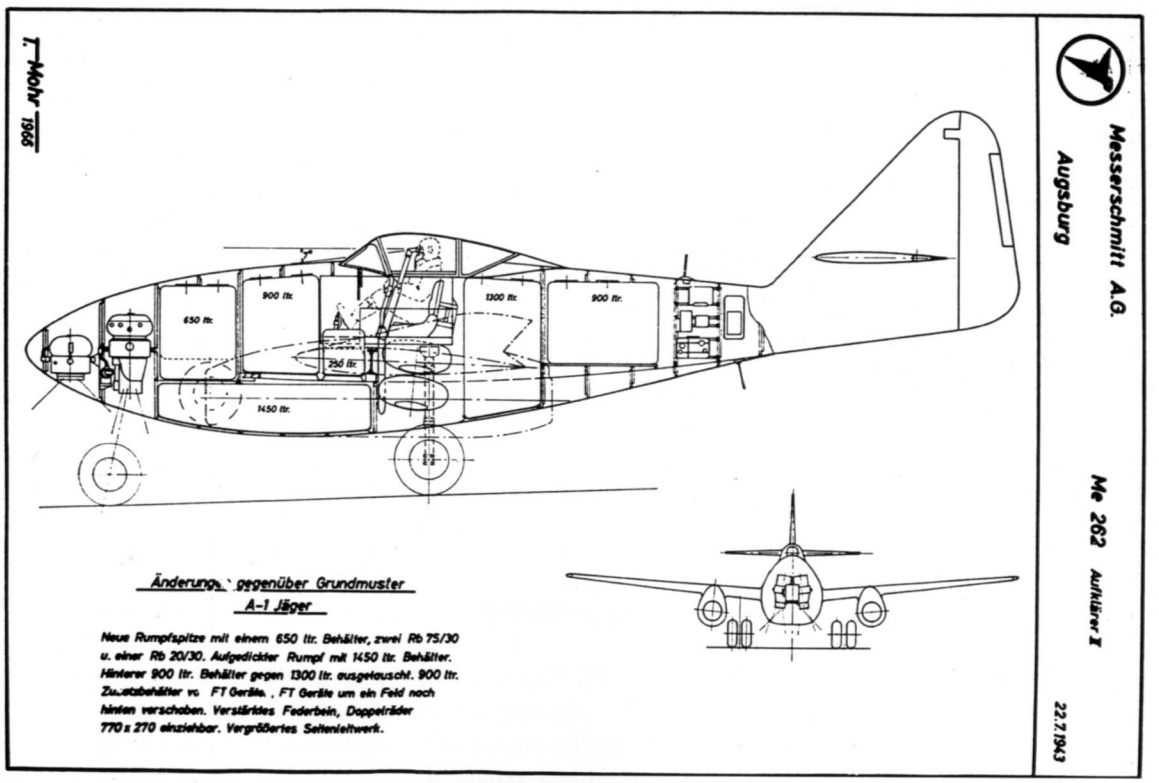
Powered by two HWK R-II-211 rocket motors, the Interceptor III was planned to have transonic capability and little advantage over the standard Me 262A-1 where speed was a problem as well as an asset.



With an Rb 75/30 camera system and additional fuel tanks, the *Aufklärer I* reconnaissance aircraft was adapted from the Me 262A-1a and carried the suffix variant designator /U3. The aircraft had armament deleted although some aircraft were fitted with a single MK108 cannon.



Aufklärer Ia was the same derivative as *Schnellbomber Ia* and all pertinent detail for that applies to this version of the basic Me 262.



A reconnaissance version of the *Schnellbomber II* design provided long range and ample load-carrying capacity for camera systems with optical sighting by the pilot through a telescopic lens system. Like its stablemate, this variant has twin main wheel units.

APPENDIX THREE

Me 262 Survivors

werke/nr 110305

Me 262B-1s/U1, which flew with *10./NJG 11* at Magdeburg, is the only two-seat night-fighter variant to survive. Originally painted with black undersurfaces and black nacelles, it carried a red '8' on its fuselage. This aircraft was one of three on charge with the Royal Aeronautical Establishment at Schleswig, but two were destroyed in 1947. It was shipped to South Africa in March 1947 and is now on display at the Johannesburg War Museum. As preserved, it displays the radar antenna and under-fuselage fuel tanks characteristic of the few aircraft modified in this way.

werke/nr 110639

Me 262B-1a was one of about one hundred aircraft converted as two-seat trainers by Blohm and Voss at Wenzdorfer. This particular aircraft was based at Lager-Lechfeld when the war ended. Bearing a white '35' on the fuselage, it was singled out as being of sufficient interest to take to America, but was used first by test pilots Bauer and Hofmann to train US pilots on the type. Damaged in a landing accident, it was repaired and shipped to America in July 1945, and was handed over to the Navy Armament Test Division for trials. In 1993 this aircraft was moved to Fort Worth, Texas, for restoration, becoming the engineering pattern for Herb Tischler's production line of Me 262 replica jets (see Appendix Four).

werke/nr 111617

Me 262A-1a/U3 was built as a photo-reconnaissance aircraft. It was taken to America in August 1945 and handed over to Hughes Aircraft, where it was prepared for tests. It flew against the P-80 Shooting Star in flight trials, proving superior to the American fighter. After attempts to have it cleared for air races were vetoed by the authorities, the aircraft was used as an instructional airframe at Glendale Aeronautical School, California, before being delivered to the Planes of Fame Museum at Chino, Calif.

werke/nr 112372

Me 262A-1a was operated by *3./JG 7* until it was surrendered to the Allies at Fassberg and flown by Wg Cdr W.E. Schrader of No.616 Sqdn to Lübeck, where it was damaged on landing. It was flown to the Royal Aircraft Establishment, Farnborough, in June 1945, and was used for handling trials before storage. Subsequently the aircraft was displayed at a number of RAF stations; early in 1997 it was based at RAF Cosford, Shropshire.

werke/nr 500071

Me 262A-1b made its first flight in March 1945. While with *9./JG 7* it engaged in a fight with B-26 Marauders near the Swiss border on 25 April. Its pilot, knowing he had not enough fuel to return to his base at Fürstenfelbruek, elected to land at Zurich. After landing at Dübendorff military airfield, the pilot, Hans-Guido Mutke, and his aircraft were interned by the Swiss authorities. The Swiss examined the aircraft and prepared a detailed technical report, but refused to hand the jet over to the Allies. In August 1957 Switzerland donated it to the Deutsches Museum, Munich, where it resides today.

werke/nr 500200

Me 262A-2a was constructed at Regensburg, assembled at one of the numerous dispersed facilities, and delivered to *4./KG 51* in April 1945. The aircraft was at Zatec, north of Prague, when it was handed over to the British on 7 May. After use by the Air Ministry for flight trials during October and November 1945, it was placed on the strength of No 47 MU at Sealand in August 1946. It was sent as a gift to the Australian War Museum, Sydney, in November 1946. Between 1955 and 1970 it was on display in the Aeroplane Hall, but was then moved to Point Cook, home of the RAAF Central Flying School. It finally came to rest at the Treloar Centre in Canberra, where it is to be fully restored.

werke/nr 500491

Me 262A-1a was the personal aircraft of *Ofw* Heinz Arnold of *II./JG 7* until he was killed, in another Me 262, during mid-April 1945. He had scored nine victories in the jet to add to his forty two in piston-engined aircraft. The Me 262s replacement pilot, *Lt* Müller, flew the aircraft into captivity on 8 May. It was shipped to the USA in July 1945 and handed over to Wright Field the following month. After preservation there, it was sent to the National Air and Space Museum, Washington, D.C., and fully restored for public display.

werke/nr unknown/US Navy BuNo 121442

Me 262A-1a was captured by the Americans and used as the personal mount of Lt Robert Strobell, who organized the removal of Me 262s from Germany to the US. Early in 1946 it was used by the US Navy for flight evaluation at the Naval Air Station, Patuxent, Md. In January 1947 it was delivered to a dump, but was retrieved ten years later. Today the aircraft is on show at the USAF Museum, Dayton, Ohio. Although its pedigree is unknown, it carries standard camouflage colours of 1945.

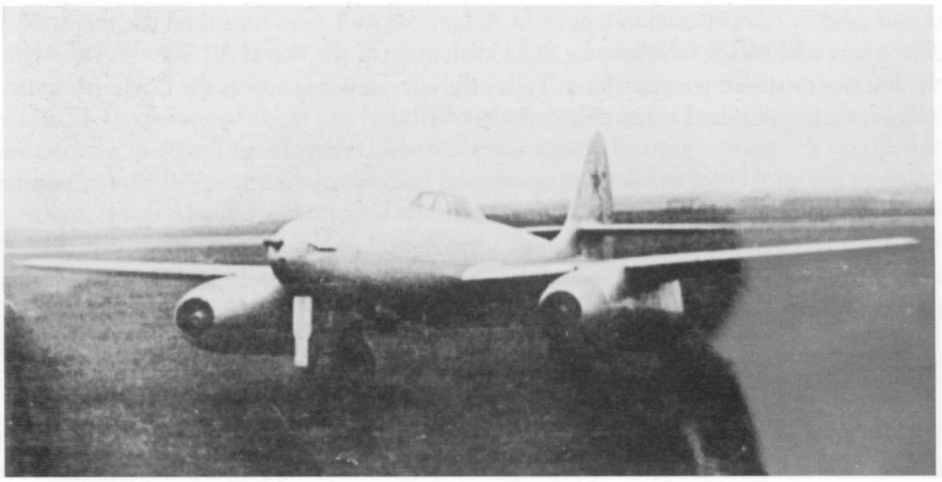
werke/nr unknown

Me 262A, an unidentified airframe in the possession of the Victory Air Museum, Mundelein, Ill., during the 1970s. The aircraft was delivered to Don Knapp in Abilene, Tex., where it underwent a restoration programme during the mid-1980s.

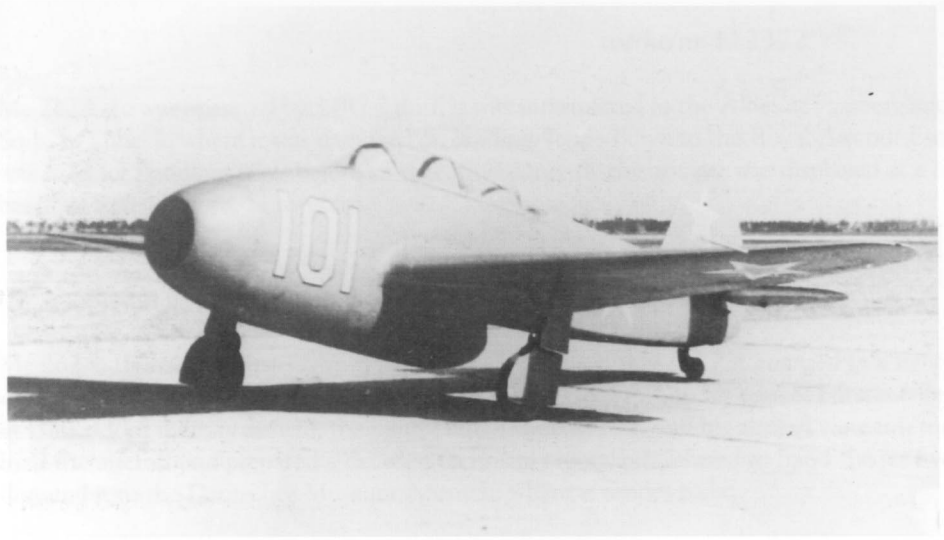
APPENDIX FOUR

Early Soviet Jets

In common with the United States and Great Britain, Russia took a great interest in the Me 262. Several captured examples were flown and minutely examined. While America took the lead in recruiting German scientists and using German data to foster its own jet development programme, Russia was not too far behind. Several types were developed in the late 1940s and these were all influenced to some degree by the Me 262.

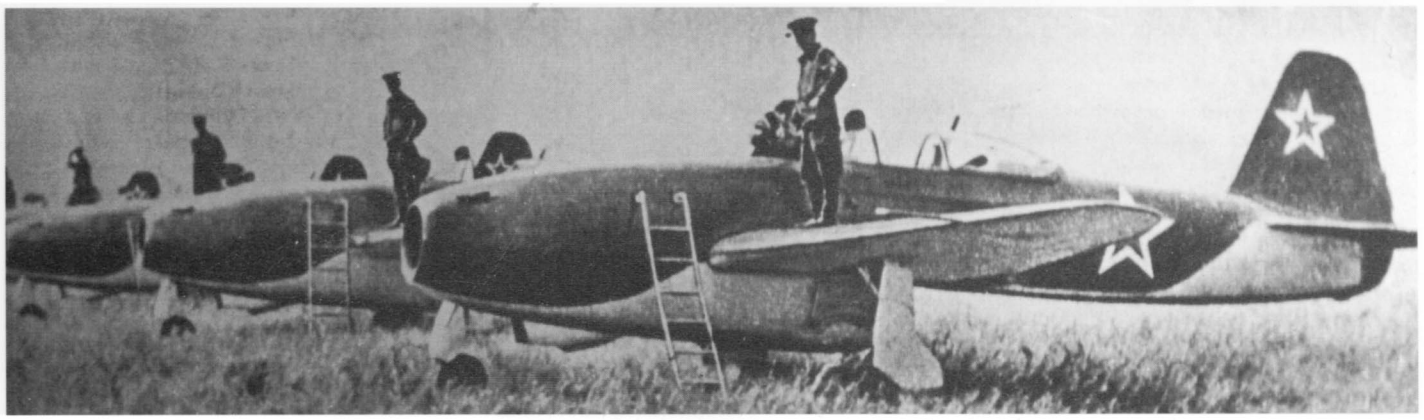


The Russian Sukhoi Su-9 evolved during the closing stages of the war and, although heavily influenced by the design of the Me 262, utilized a straight wing which contributed toward better low-speed handling.

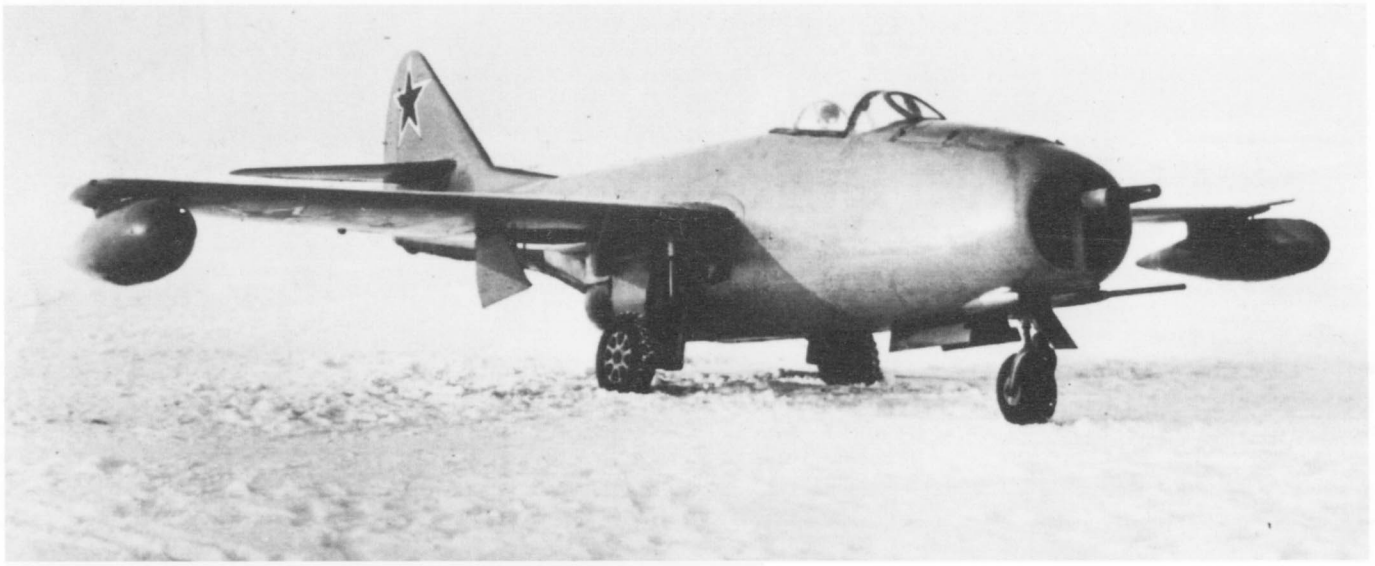


The first indigenous Soviet jet, the Yak-15, seen here in two-seat trainer configuration and known as the Yak-21, was a direct response to the appearance of the Me 262 and used the Yak-3 as the basic airframe.

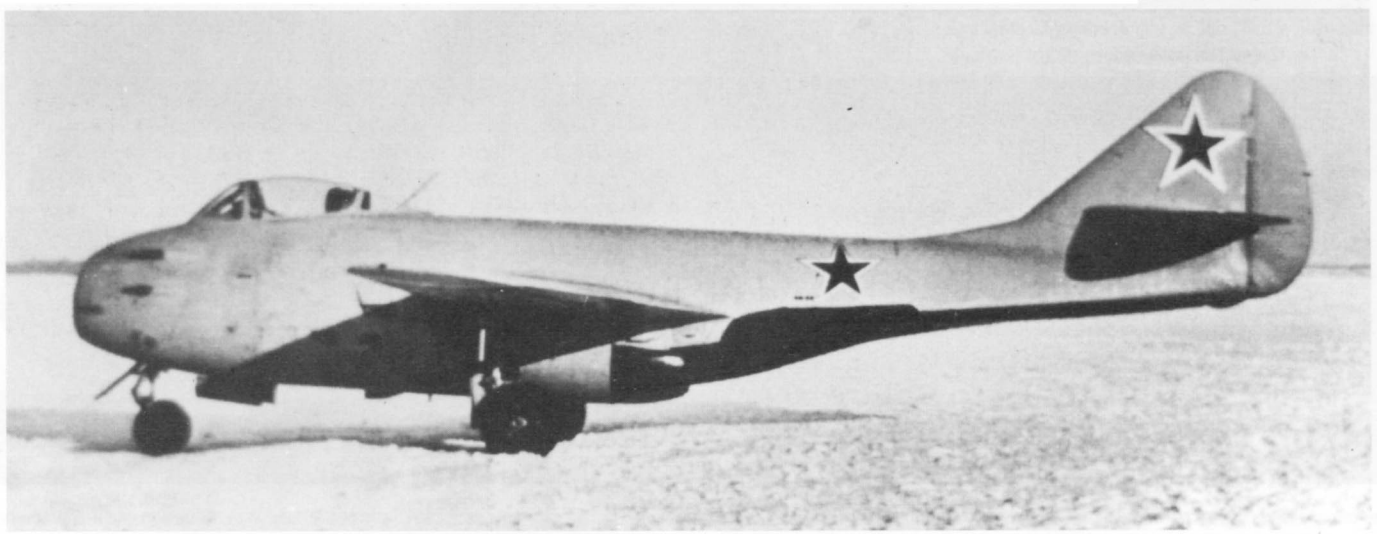
Arising from a decision in February 1945 to conduct a crash jet aircraft development programme, the Lavochkin La 150 series represents one of three first-generation Soviet jets. The straight-wing design was followed by the swept-wing La 160 (C5/19) which bore considerable resemblance to the Messerschmitt P.1101.



The tricycle landing gear of the two-seat trainer version of the Yak-15 was standard for the Yak 17, which was a considerable improvement in detail design and manufacture. Both models were powered by Jumo 004 copies.



The third of three first-generation Soviet jet fighters stimulated by the Me 262, the MiG-9 was powered by two RD-20 engines based on the BMW 003 and more than 600 aircraft of this type were built before it was replaced by the MiG-15 of a considerably different era. Thus ended the legacy of the Me 262, which had brought about the emergence of a new jet age in Soviet air power.



APPENDIX FIVE

The Tischler Replica Me 262 Project

After a break of some fifty years, Me 262s are back in production. At the Texas Airplane Factory on the outskirts of Fort Worth, Texas, Herb Tischler is building a batch of six Me 262s for professional pilot Stephen Snyder. They are based on the actual aircraft used in the 1940s by Messerschmitt test pilot Karl Bauer to familiarize American pilots on the type.

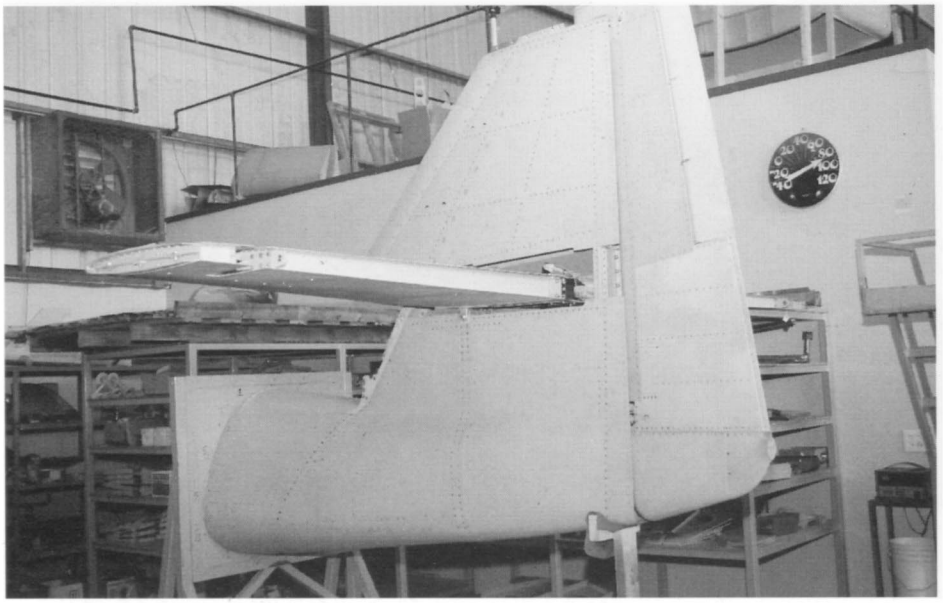
More than fifty years separate these photographs of Herb Tischler from his youth as an engineering apprentice to his days in the 1990s as an aircraft engineer of considerable skill and craft. Sent to the Eastern Front to fight, he was captured by the Russians and imprisoned for four years after which he moved to the United States and worked on the restoration of Bell Helicopters.

The fuselages of four new Me 262s in Herb Tischler's factory.

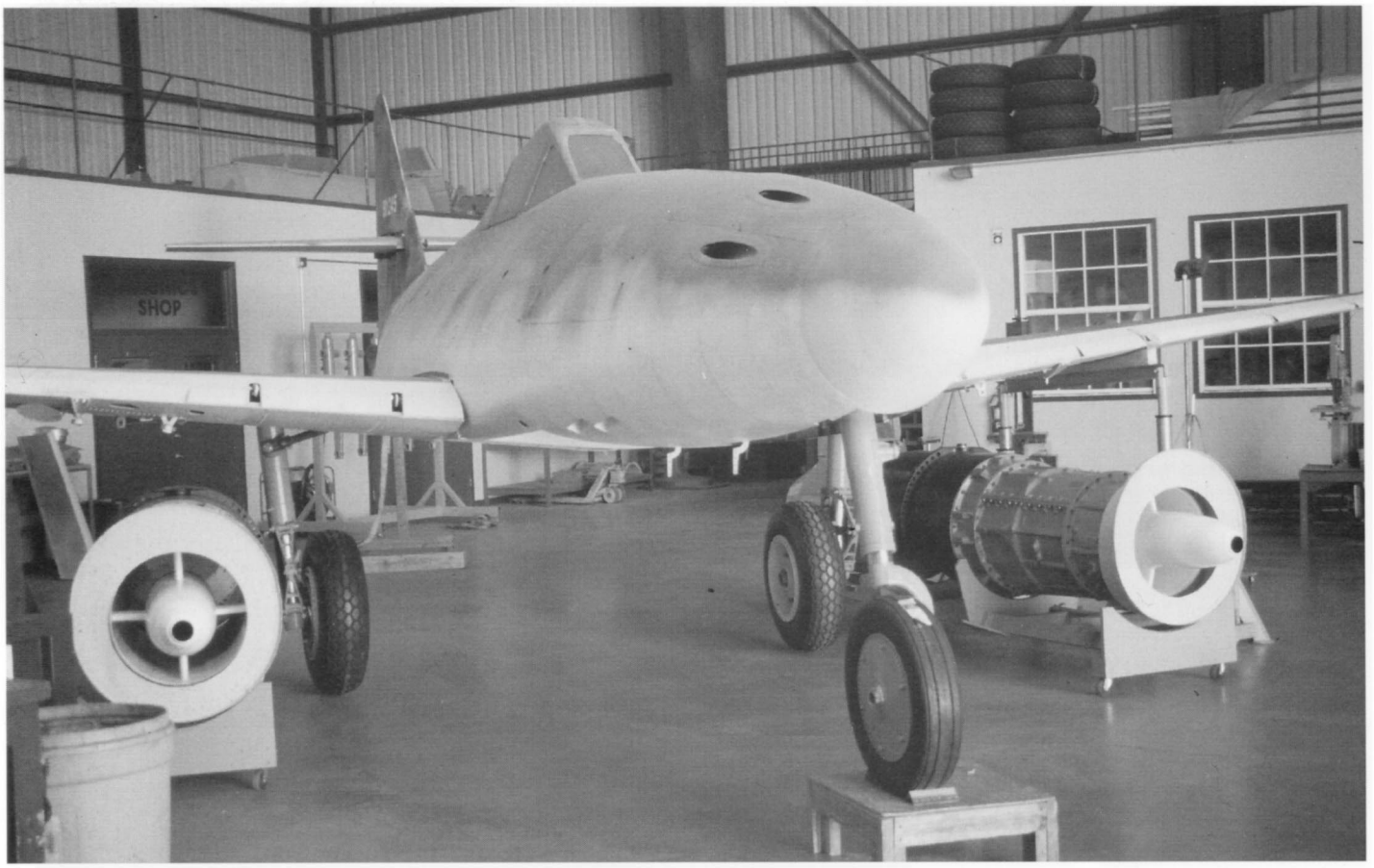
Me 262 *werke/nr*. 110639 arrives from the Naval Air Station at Willow Grove. Since no engineering drawings of the Me 262 exist, it was used as a pattern for the replicas. Built as a single seat Me 262A-1a, it had been converted to a two-seat training aircraft by Blohm und Voss near Hamburg and was brought to the US by 'Watson's Whizzers'. After years of exposure to the elements in outside display it was in bad condition but produced the information needed to re-create the blueprints for this famous fighter. The airframe will be returned to Willow Grove in far better condition than when it arrived.

Fine workmanship with craftsmanship and care denied to most of the hurriedly produced originals define the replicas Herb Tischler builds. Here an almost completed cockpit shows the original instrumentation and the almost obligatory modern radios needed to fly in today's crowded airspace.

Seen in its jig, the right hand wing of one of the replicas shows Tischler's superb workmanship and attention to detail.



Each component part of the airframe gets the same treatment. Fin rudder and stabilizer of one replica near completion.



The first replica was due to fly by late 1997 and by March had been test assembled in the hanger. Since the original, and unreliable, engines are not available, modern turbojets are being substituted and these will be fitted into dummies of the originals so that the dimensions remain the same and the engine will look correct even when the panels are removed.

Over fifty years after the end of World War Two, brand new Messerschmitt 262s will take to the air to show a whole new generation one of the finest aeroplanes of World War Two.

Index

Subject Index

Name Index

The Messerschmitt Me 262 rightfully takes its place in history as the World's first turbojet powered combat aircraft. *Messerschmitt Me 262* tells the story of this remarkable aircraft, from its origin in a technical requirement of 1938, through to its operational use where, due to shortages of fuel, it was unable to reach its full potential. Much has been written of Hitler's insistence that the Me 262 should have been developed as a bomber, not a fighter, but David Baker shows that, far from being the victim of a Führer's whim, the Me 262 was designed from the outset as a multi-role aircraft, able to provide the maximum capability from one basic airframe and the Führer's words were little more than opportunist propaganda.

The Me 262 was a 'first' in many ways and also a victim of its time. The technology that produced it was passed on to the Allies and it helped pave the way for the new generation of fighter-bombers that followed.

Messerschmitt Me 262 covers the aeroplane's development and operational use. Sidebars detail the personalities and events surrounding the story and the book includes a listing of all sub-types and surviving airframes. Fully illustrated with archive photographs, many of which have not been published before, it is a fascinating account of an important aeroplane.

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