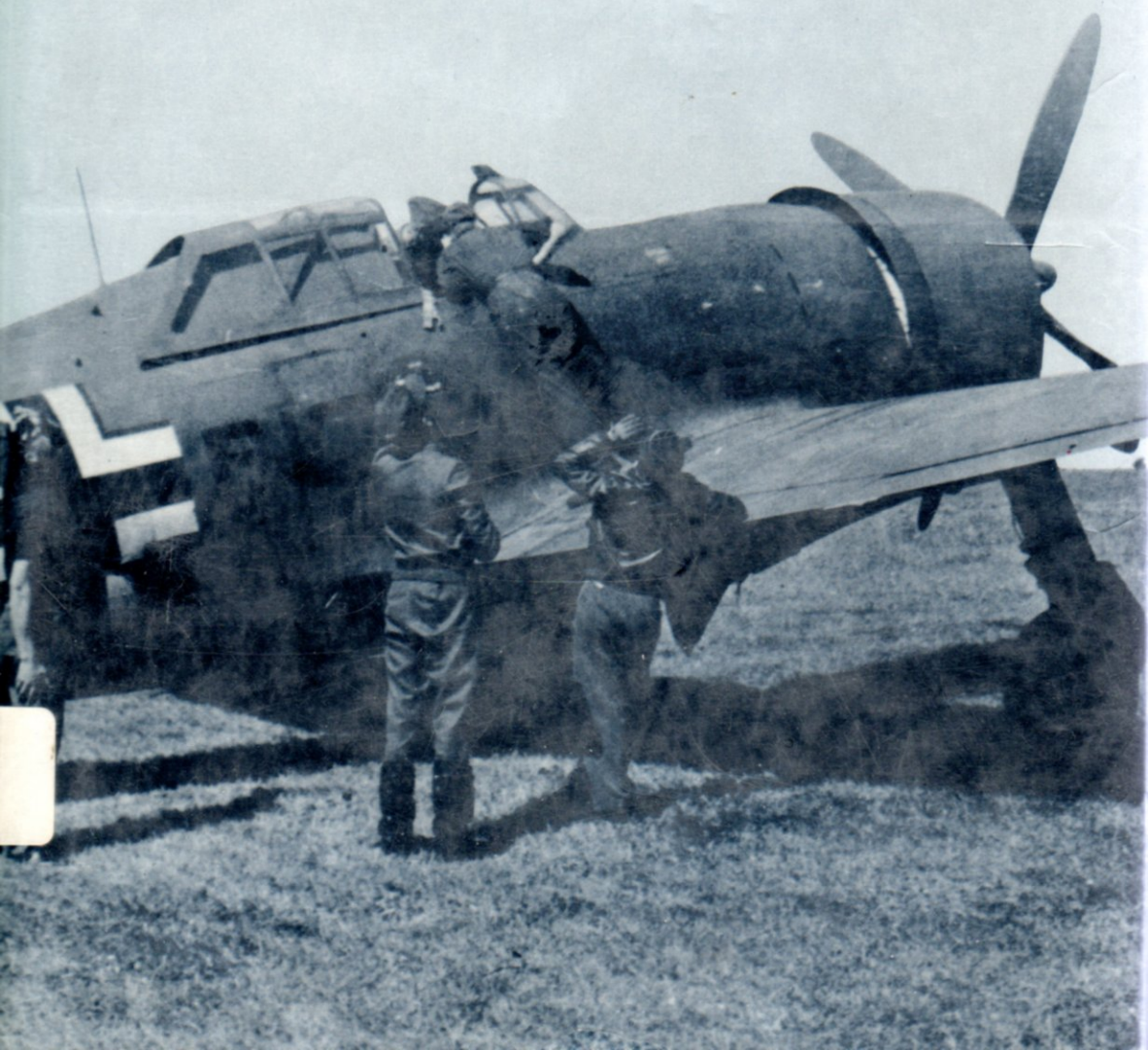


THE IWAFFE TEST PILOT

**Flying captured Allied
Aircraft of World War 2**

HANS-WERNER LERCHE



LUFTWAFFE TEST PILOT

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Aircraft of World War 2**

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The background to this book

During the final days of World War II, I ferried the fastest piston-engined aircraft in production at that time, the Dornier Do 335, from the Luftwaffe Test Centre at Rechlin to the factory at Oberpfaffenhofen, near Munich. Some weeks later, this particular machine, the Do 335A-02, was captured intact by the American forces and shipped to the USA. After a thorough evaluation the machine was taken over by the National Air Museum at the Smithsonian Institution in Washington. In 1974, following an agreement with the Deutsches Museum in Munich this sole remaining example of the unusual Do 335 was air-freighted back to Germany, completely refurbished by Dornier experts at Oberpfaffenhofen and was finally exhibited in the Deutsches Museum in 1976.

While discussing the article 'My last flight with the Do 335' with the editor of the magazine *Flugrevue*, Herr Pletschacher, I showed him my old log books and he suggested that I should write a book about my experiences as a test pilot. I agreed, and that is how this book came into being. Consequently, I would like to express my gratitude to Herr Pletschacher for his encouragement to begin this task, and the assistance he rendered during the writing of this book.

As long as I was working as a judge at the German Federal Patent Court in Munich, I never had any literary aspirations and the idea of writing a book seemed as distant as my test flying days during World War II. Yet scanning through the pages of the log books I had kept, past experiences came to mind again most vividly and with a lot of added detail to the notes I had made. In this book, I have given preference to descriptions of my experiences rather than repeating the generally well-known technical data on various aircraft types. This, I hope, will have the advantage of making the narrative easily understandable even to readers without a technical background.

The chapters are not necessarily in chronological order, for I flew so many different types of aircraft, from high-performance fighters to heavy bombers, within a few days of each other, that a chronological account would only be confusing. Therefore, I have grouped together all the flights in one type although there may have been a considerable time span between them.

To begin with, I shall describe my experiences with the large Allied bombers, then the evolution of my flying career and how I came to be involved in the unusual task of test flying, and finally my experiences in various fighters. Here and there I have also added comments on my experiences in German aircraft, which I often flew for comparison purposes.

For readers interested in exact details, I have tried as far as possible to give the identity markings or registration letters of the aircraft I flew. A list of all the aircraft

types I have flown is added in an Appendix. These total, not counting different versions of the same type, 125 different aircraft.

Finally, I would like to express my thanks for the photographs made available to me from various sources. They originate from the collections of Hanfried Schliephake, William Green, Wolf Schaefer, Dr Emilio Brotzu, *Flugkapitän* Rosarius and from the archives of the magazine *Flugrevue* and the Deutsches Museum in Munich. Without these photographs, this book would have remained incomplete.

Hans-Werner Lerche

'PAN' – a German Lancaster in distress

I got my first shock that night when engine No.2 went rough after I had switched the supercharger into its second stage for better altitude performance. Although it soon resumed working normally I was left with a very unpleasant feeling, hanging in the night sky above the clouds in this strange aircraft, a four-engined Avro Lancaster bomber.

It was August 1944. As head of section *E2 Beute* of the Luftwaffe Test Centre at Rechlin my task was to test-fly and evaluate all enemy aircraft that fell into our hands. On this occasion, I had to fly the Lancaster accompanied by three different German aircraft, a Do 217, Ju 88 and He 111, carrying new electronic equipment for the purpose of making a series of radar contacts and measurements at night. In particular, these tests were to help us solve the problem of distinguishing enemy bombers from strips of aluminium foil dropped in great quantities to mislead and jam the anti-aircraft and air interception radars. We had already finished our work with the second monitoring aircraft at an altitude of 13,000 ft and were waiting for the next to arrive. But what was this? Instead of announcing the third machine, my radio operator reached for the screwdriver! According to my experience of instrument flying, a screwdriver in the hands of a radio operator was an unfailing sign that he would be unable to extract another sound from his 'black box' for a while. My first impression was correct: there was a fault in his radio set, and so I was left to take care of the navigation myself. This was easier said than done, flying in a pitch-black night over the clouds. Even a sight of the ground would not have been very helpful, because of the total blackout at this time when British bombers of the same type were in the habit of unloading their cargoes over Berlin. What to do now? Bale out? There would always be enough time left for that. In addition, baling out is always a more delicate business at night and, even if we avoided hitting the Lancaster's twin fins, the risk would still have been considerable. It also came to my mind that the night before a crew from Werneuchen had to abandon their aircraft and, although they were successful, the pilot fell into a lake and had to swim for his life.

Apart from such considerations, it would have been a great pity to let this rare specimen of an aircraft go. What should I do then – fly on till dawn? In any case for that we did not have enough fuel. One thing was certain, though: I had to get clear of the 'colleagues from the other side' who would soon be approaching from the west as quickly as I could. Perhaps, while veering off to the east, I could even catch sight of an illuminated town with an airfield. Putting my thoughts into action, I came down through the cloud cover and 'sailed away' eastwards. It was pitch black, but at least the weather seemed to remain clear.

Every night flight, even without unforeseen events, is an exciting affair when you are hanging between heaven and earth with only a flight engineer and radio operator for company. I remembered a flight with an elderly He 111 on a close summer's night when pale blue St. Elmo's fire formed around the propeller tips. It was a most unusual experience. That is how I learned that this phenomenon was not confined to seafaring; in my case only the ship's hobgoblin was missing.

Under these circumstances the strange aircraft with its still unfamiliar instrumentation offered no reassurance to me. For one thing, the very basic blind flying devices indicated completely differently, making this particular night flight even more difficult. Such deviations naturally required the utmost attention on the part of the pilot. In addition to that the conversion of the indicated data, such as miles into kilometres and feet into metres, was also tedious and time-consuming work. I had to recall the words of an old instrument flying instructor who had stated that a blind flying pilot would find it difficult even to determine the opposite course because under those conditions only half his mind is responsible for its actions.

We were flying at an altitude of about 1300 ft across the landscape. I had the navigation lights on to show from afar that we had no evil intentions. Soon afterwards, a flashing light appeared to the left in front of us, and where there is a flashing light there must be something else. To be on the safe side, I began to fly in circles. What was more alarming, however, was that anybody who knew anything about aeroplanes could hear at once that we had a foreign aircraft. For that reason I lowered the undercarriage, switched on the landings light and let down the landing flaps a little as well. After these preparations I began to slowly 'crawl' around the flashing light with my Lancaster. I had heard once that this was the way deserters would ask for 'nice weather' - which for the time being seemed more important than the use of identification flares. This attitude of, so to speak, 'hanging in the sky like a ripe plum', incapable of any defensive reaction, may be compared with the pose of submission of an animal defeated in a fight when it presents its victorious adversary its unprotected throat. Flying so slowly we could not possibly have made too threatening an appearance. There was nothing to be seen for a while, but then suddenly airfield lights came on below us. This was an enormous turn for the better, and we were highly relieved. When I flew over the airfield at low level to orientate myself however, I saw that the available landing space was very short. But there was no other solution to our predicament than to go down here: it was a lucky coincidence that we had found an airfield at all.

I was now faced with the problem that worries every student pilot: how to land with 'such a big aeroplane on such a small airfield'. I flew a wide turn before approaching for landing and then, with nearly full throttles and just a little more than the minimum speed I hopped across the airfield boundary and touched down directly behind it. Immediately I pushed the pneumatic brake levers mounted on the control column vigorously as long as the remaining relative wind pressed down the elevator at the tail and helped to prevent a nose-over. Generally speaking, I did not like the unusual pneumatic brakes as much as our hydraulic brakes which, in my opinion, could be operated more precisely. But any brakes were a boon in this situation! In the meantime the red lights of the airfield boundary approached quickly: we had reached the end of the runway and there was just enough room for

a slight turn before we came to a standstill. It took a load off my mind to find ourselves safely back on the ground again.

There was no sign of the flying control, though; they probably thought it unnecessary to switch on their lights for a strange aircraft. So I decided to stay near the airfield boundary for the time being and turned off the engines. It was only then that I looked at my flight engineer and the radio operator who, although still a bit pale, were calm and rather pleased that everything had gone off so well, and together we gradually began to relax from the intense tension.

As we climbed down, some figures approached us in the darkness. But we did not receive the hearty welcome we had expected: two soldiers stopped at a respectable distance and pointed their submachine guns at us. Following the extreme tension of our flight, we felt more amused than scared by this behaviour. Naturally, nobody believed that we were Germans: a Lancaster was a Lancaster, and that was British! We could not show them any German newspapers of the day either. To begin with, not even my suggestion to telephone the Rechlin and Werneuchen airfields to confirm our identities was readily accepted: they probably feared that we would bolt in the darkness. Then, in the middle of our negotiations a third man came over from the airfield flying control office flourishing a white piece of paper. It was a teleprinter message that had just come in. Under the heading 'PAN' standing for 'Most Urgent to All', it said: 'German Lancaster in distress'. This changed the situation like magic. It transpired that *Flugkapitän* H. who had been flying the third of our monitoring aircraft, had returned to Werneuchen immediately after he had become aware that our radio had failed and sent this radio message 'To All'. I had to wait until the following day before I could thank him for his considerate action. Our colleagues at Werneuchen had, of course, been worrying about us, especially after what had happened the day before. At last we learnt where we had landed just before midnight: it was Königsberg/Neumark. The airfield was operated by a flying training school for single-engined aircraft and was never used by heavy multi-engined machines, hence the limited length of their runway. To me it was particularly gratifying that this night landing with a strange four-engined aircraft under such difficult circumstances had gone so smoothly on this small airfield.

After I had made calls to Rechlin and Werneuchen, we went off in search of something to drink and then celebrated our 'birthday', which is the custom among our airmen after having been given a new lease of life, so to speak. But not for long: despite the exciting flight we were soon ready for bed.

Next morning the Lancaster was, of course, an attraction for the local flying students. After a final check we took off shortly after 0900 hrs for our return flight to Werneuchen.

But how did all this start, how did I come to make this exciting flight in an enemy night bomber over the blacked-out Greater Berlin area?

This Avro Lancaster had fallen into our hands in slightly damaged condition a few weeks previously and was then repaired in the Lufthansa workshops at Travemünde near the Baltic Sea. On being detailed to examine this latest capture I had flown there with a He 111 to have the first close look at this bomber so well known from its much-dreaded night raids on Germany. I was very impressed by this big aircraft with its fuselage nose rising some twenty feet off the ground.

However, before I could study it more closely I was called to the phone and received the message that this very morning, 6 June 1944, and the first day of the Allied invasion of France, the first North American P-51 Mustang fighter had been captured on the Cambrai-Sud airfield. I was to ferry it to Rechlin for evaluation as soon as possible, and had to leave at once. I will come back on this in detail in a later chapter. It was only after this unavoidable delay that the Lancaster came back on the agenda and I flew to Travemünde again in a He 111. The same He 111 was to provide my escort on the way back.

When I had to test-fly captured aircraft for the first time - about which, as a rule, only sparse information was available - the first things I tried to find out were the wing area, weight, aerofoil section, flaps and the tail unit (or rather, its distance from the wing) - in short, all such details that would give an engineer-pilot valuable hints as to what he could expect in flight. However careful such preliminary examinations were though, only the flight itself would reveal the peculiarities of such a 'buck'.

Next, I had to establish the functions of the various instruments, devices and control levers. The first look around an unknown aircraft, especially a big, four-engined one like the Lancaster, is always a thrill, even for a test pilot who has known a good many big aeroplanes in his time. Although the large number of instruments did not confuse me as they would a layman, I did have to get used to instruments graded and marked according to foreign standards. Thus, the airspeed indicator showed mph instead of km/h, the altimeter feet instead of metres, the engine pressure gauge lb/sq.in. instead of *atü* (atmospheric pressure), and the fuel gauges Imp. gallons instead of litres. Just about everything was different, even the strange smell of these aircraft, which was probably due to their different type of protective dope, to say nothing of instruments and levers indicating or operating completely the other way round. The only readings that could be taken at face value were those of temperatures: they too were marked in Centigrades. If the red limit marks on the instruments were correct, the Rolls-Royce Merlin engines tolerated fairly high oil and coolant temperatures; would this also apply to the lower grade German lubricating oils filled into the Lancaster after repair? I derived some comfort from the fact that the Lancaster had been reconstructed in the Travemünde Lufthansa workshops where people had most extensive experience with larger aircraft. In fact, their specialists could assist me and my flight engineer in the inspection before our ferry flight. For the same reason I could also be confident that the correct high octane fuel and high grade engine and hydraulic oils had been put into the tanks.

When trying to identify the large number of control levers, I had mechanics standing underneath the aircraft telling me where each operation 'arrived' while I memorised this information. I intended to ferry the Lancaster direct to Rechlin, without a trial flight, taking only my flight engineer. My reasoning was simple: a small thing like a puncture was able to render this captured bomber, to us a unique specimen, unable to fly for quite some time, and each unnecessary take-off would naturally aggravate the hazard.

After these preliminaries things became more serious. The engines were running smoothly, as only Rolls-Royce engines can run. The power to fly was there; now for the rest of it.

The good wishes of those staying behind made it quite clear to us that this first flight in a strange aircraft after repair without any operating instructions or pilot briefing was anything but a routine matter. During taxiing the visibility was good, and I tried again to get a feel for the considerable height at which the pilot was sitting above ground level when the Lancaster was in tail-down position; this was important for a correct height estimate during landing. For example the pilot was looking down from about twenty feet like in our Ju 290 heavy transport. Of course, I also made a mental note of the line of sight from the cockpit over the fuselage nose to the horizon in tail-down position – this was of especial importance if the pilot did not know the landing speed. It would not have been the first flight for me to end with the airspeed indicator out of order.

To some extent I could rely on my previous experiences with very large aircraft, having flown quite a few four-engined and two six-engined machines before. I had, of course, studied the cockpit layout and the instrument panel of the Lancaster very carefully. But when I thought of the operating instructions for similar four-engined aircraft, usually compiled in a handy bound volume, while I had nothing of the kind – then, I recollect, I had an uneasy feeling. The knowledgeable reader will understand that it took quite some time to familiarise oneself with just the most important controls. It was not only a question of knowing the levers and controls for the propellers, undercarriage, landing flaps, trim, engine superchargers, fuel mixture control, coolant system, fuel, pneumatic and hydraulic pumps, and the fuel tank selector cocks. What were far more critical were the various little levers further back and below where some of the visitors and ‘experts’ had fiddled around. The fuel system control alone is a science in itself in a heavy bomber like this carrying some 2200 Imp. gallons (10,000 litres) altogether in various tanks. Among the more critical control elements are the cross-feed fuel cocks which serve to drain all available tanks in case of an engine or fuel tank failure: if mishandled to draw from or pump fuel into the wrong tank, this may cause an engine failure or dangerous shifting of the centre of gravity.

The starting of engines was also important, although not so vital: in case of failure one simply could not take off. There were a hundred and one things one could do the wrong way, to say nothing of the problems encountered in flight. Be that as it may, everything was ready now and I was standing with the Lancaster at the starting point. Having tested the four engines I opened the throttles carefully, because I could not help feeling that the big bomber had a tendency to swing to port. The empty aircraft accelerated quickly, its total weight now being hardly more than 22,000 kg (48,500 lb). However, to raise the tail I had to push the control column forward vigorously. Having no idea of the take-off speed, I had to make sure that I was not ‘hanging’ in the air with too little speed once I had become airborne. The elevator control forces were not exactly low, so I trimmed the aircraft with the big wheel on the right of the pilot’s seat. One had to make these adjustments automatically without diverting the eyes from the take-off direction. Then I pulled the Lancaster to a slightly higher angle of attack at which it had to become airborne if the speed was right. It was, indeed, kind enough to do me the favour. Immediately I throttled back to conserve the valuable engines, braked the wheels with the pneumatic lever at the control half-wheel, and then told my flight engineer to raise the undercarriage. The safety bolt which locked the

undercarriage in the down position to prevent premature operation on the ground could be pushed back easily. I wanted to take my time before raising the flaps, though: I already had certain experiences with flaps that had not been used for a while. It can happen with both hydraulically and with pneumatically-operated flaps that they do not retract equally on both sides. Frequently this situation cannot be compensated with the ailerons, and if near the ground, the result will be a 'complete success' (in the opposite meaning of the term). I was not keen on making this test. Consequently I first throttled back a little and operated the control levers to reduce the revs of the Hydromatic propellers, and when we were a little higher, raised the flaps partially. Only when this had gone off well did we raise the flaps completely. After this, the Lancaster became quite nose-heavy and had to be re-trimmed. Our friends from across the Channel certainly had to watch out when taking off at night with a full load of bombs and fuel, or if they had to go around again after a mishandled landing.

Everything seemed all right, and I thought I would first climb to about 7000 feet (instead of 2100 metres: I had no choice now but to gradually change my thinking into British measurements). At this altitude I had ample time to test all the functions, and in the event of any defect, or just the possibility of one, I would still be able to reach the Travemünde airfield. My confidence in this aircraft increased and our tension eased a little. At about 8000 feet I evaluated the stalling characteristics with both open and closed throttles and with flaps and undercarriage locked in up and down positions. During each operation I noted the figures on the airspeed indicator, because despite the absence of any ground effect these readings gave me certain clues as to the behaviour on landing. It was, of course, also of interest to find out whether the Lancaster had any dangerous stall characteristics at slow speed. As expected, the separation of the airflow at the inner wing announced itself by tail buffeting. The situation becomes dangerous if the disturbance of the airflow starts around the aileron area of the outer wings. In such cases the more a pilot tries to correct with the ailerons, the more acutely the aircraft will respond by dropping a wing without any warning - a hopeless situation if this happens near the ground.

The next thing I wanted to know was the change of trim while lowering and retracting the flaps and undercarriage, and also when opening and throttling back the engines. As I was throttling back, all of a sudden a horn began to sound and gave me a start. I already knew of this blessed device reminding the pilot to lower his undercarriage before landing from other British aircraft, such as the Spitfire, Blenheim and Wellington. Nevertheless, it will make you jump all the same if an aircraft suddenly starts giving off such unusual sounds. It makes you instinctively fear there must be a fire, or something equally unpleasant has taken place - the more so as you are hardly used to pleasant surprises as a test pilot.

One of our German aircraft, the twin-engined Focke-Wulf FW 58 Weihe, also had this type of horn. However, in order not to be bothered by this unpleasant noise during longer approach glides, the Germans, with their proverbial thoroughness, had installed a circuit breaker for the horn. This reminds me of a nice little story that made the rounds in airmen's circles. There was a well-known and highly regarded pilot with an even better-known passenger aboard a Weihe approaching an airfield for landing. Being considerate of their delicate ears, the

pilot had of course switched off the horn - and promptly landed the Weihe on its belly.

I tested the flying characteristics of the Lancaster more or less as a routine matter - for my own 'domestic use', so to speak. One could hardly expect any bad characteristics in an aircraft used in such great numbers for night operations. Probing and finding out the flight performance limits of this type of aircraft, however, can contribute a great deal to mastering and having confidence in it. I could not know at that time, of course, that all this would be of vital importance for me after just a few more flights with this heavy British bomber.

By now Lake Müritz was coming into sight and helped by the experience I had gained during the flight I managed to make a perfect touch-down. I landed at Lärz, an airfield that formed part of the Rechlin Test Centre and had a concrete runway. The reason for this detour was not the small grass field of Rechlin, but rather an inspection of various interesting aircraft by top-ranking officials which was scheduled for the next few days. It did not occur to me at the time that I had probably brought to Lärz not only the most interesting, but perhaps also the best aircraft: the Avro Lancaster, Republic Thunderbolt, North American Mustang and the Boeing Flying Fortress.

The flying characteristics and performance of the Lancaster were really of secondary interest to us at that time. It was already well known, of course, that this aircraft with its crew of seven normally carried between 5000 and 7000 kg (11,020 - 15,430 lb) of bombs and that its maximum take-off weight was between 31,000 and 32,000 kg (68,340 - 70,550 lb). Apart from that, the Lancaster had also gained prominence after the special tasks it was used for, such as the raid with special dam-busting bombs or the attacks on German submarine bunkers with 22,000 lb bombs. This sole example of the British night bomber captured in flying condition was of interest largely because of the difficulties it caused our air defences when dropping aluminium foil strips to jam or mislead ground or airborne radar. In an effort to solve this problem the Lancaster was to be probed at night by German aircraft equipped with new electronic AI devices operating from the Werneuchen airfield near Berlin. The installation of these new devices into the three aircraft earmarked for these tests had soon advanced far enough for me to fly the Lancaster over to Werneuchen. This presented no difficulties: after my three flights in this British bomber I regarded myself almost as a veteran Lancaster pilot.

Any flights to Berlin, particularly with a suspicious 'bird' like this, had to be duly announced and of course one had to be ready at any moment to fire the currently required identification flares: the yellow-painted engine nacelles and wing tips and the German crosses alone were no life insurance.

I had to wait another day at Werneuchen until German radio sets for the board-to-board and board-to-ground communications had been installed in the Lancaster. To be on the safe side I made another test flight to give my radio operator a chance to get used to the characteristics of the Lancaster with his instruments. After that, there was nothing in the way of our night flight. The weather was favourable, and there was a cloud cover at 6500 ft.

I took off in the Lancaster at 2147 hrs. There was a new moon and it was pitch dark by that time. At first we flew at an altitude of about 3000 ft under the clouds and very soon established radio contact with the German night fighters following

us. The first aircraft had completed its measurements within 30 minutes and seemed to have been successful. Then we penetrated the cloud cover and climbed to about 13,000 ft where the second aircraft was to make its measurements. And it was then that the trouble started with the sudden breakdown of our radio set, as described at the beginning of this chapter. It led to us hanging in a British bomber all alone at night over Berlin, flying on instruments and without any radio contact to the ground or other aircraft - and with the city below us blacked out and anticipating another British air raid. It was a predicament that easily could have had a different ending!

My first captured aircraft at Rechlin

In mid-June, 1941, I was transferred to the Luftwaffe Test Centre at Rechlin situated at the southern end of Lake Müritz, Germany's largest inland lake at that time. However, before that move took place I still had to complete a series of test flights with the Henschel Hs 128 special high-altitude research aircraft for the German Aviation Experimental Establishment (DVL) at Berlin-Adlershof. Fitted with a pressurised cabin and powered by two DB 601 engines equipped with TK 9 turbo-compressors developed jointly by the DVL and Hirth aero engine company, the Hs 128 was designed to reach an altitude of 14,000 m (46,000 ft). A Ju 52/3m test-bed fitted with a similar engine as the central power unit could climb to about 6000 m (19,685 ft). By this time of course I had already flown the better-known German aircraft such as the Heinkel He 111, Dornier Do 17, Junkers Ju 86 and Junkers Ju 88.

My real work at the Rechlin Test Centre began in early August 1941 in the Transport Group, which also handled the captured aircraft. Next to working with new transports, in particular with the Junkers types, this assignment was also intended to widen my flying experience. With just 380 flying hours in my log book I was hardly past the 'hatching stage' as a test pilot and still had to gather much experience on German aircraft. And, thanks to the fact that captured aircraft were also test flown by the same group, I now had an opportunity to fly these machines as well.

After several transport flights in the test centre's Ju 52/3m (DD +BD) I was able to try out the American Lockheed 18 Lodestar airliner, which had been captured in France in 1940. This aircraft with its two Pratt and Whitney Twin Wasp radial engines of 1200 hp each and 18 seats, was very pleasant to fly. The same type had been used by the American multi-millionaire Howard Hughes for his round-the-world flight in 1938. One felt immediately at home in this aircraft, and for the first time I also had the opportunity of admiring the smooth running of American aero engines. The fuselage of this mid-wing monoplane was so close to the ground that one could enter the passenger cabin with one large step directly from the ground. It was rather strange for me to make my way to the cockpit down the gangway between the passenger seats. The seats for the pilot and co-pilot were equipped with armrests and decidedly comfortable. On the other hand, immediately noticeable – and for us rather unusual in an airliner – was the limited view upwards. The frontal windscreen was divided down the middle and sloped forward, and was consequently very narrow, or low, but gave a perfect view to the front. A sliding cabin window enabled one also to see sideways in front. This bad-weather window proved extremely useful to me when, during one of my many

transport flights in the Lodestar, I flew into a heavy snow shower just before landing at Rechlin. On that occasion the visibility became so poor that it was necessary to go down to low-level flight immediately. I had no radio operator on board, and not even a German radio set. The only solution was to quickly open the sliding window to keep an eye on the railway line which I had been following: in this snowstorm the visibility ahead was practically nil. It was a good thing that in this terrible weather no other madman had tried to orientate himself by this railway line! However, turning around on one's heels in such a situation – which I had already done in sports planes – was a much riskier affair with larger 'pieces of furniture' like this Lodestar. One could never be sure that such an aircraft would not 'lay back its ears' (end up with broken wings) in a steep turn. After all, these bigger birds were not built to meet such extreme demands. On the other hand, by flying a shallow turn I could easily lose the railway line in this poor visibility. But I had the sky to myself that time.

By and large though, it was always fun flying the Lodestar. And during flights 'with no unusual occurrences', as they used to say, even the passengers felt comfortable in their easy Pullman seats aboard the DE+KL.

Another new aircraft type for me was the North American NA-57 two-seat trainer, better known as the Harvard. The KR+IX was one of a number captured in France in 1940 and the type was intended to be used for advanced training by the Luftwaffe 'as long as supplies lasted' as it were. The NA-57 was ideal for this role, apart from the higher fuel consumption of its relatively powerful engine.

Later I flew the military version of the civilian Lockheed Model 14, the Hudson, the development of which had been commissioned by the British for use as a maritime reconnaissance bomber. Compatible with its military purpose, the view upwards – practically nil on the civilian version because of radio equipment mounted under the cabin roof – was much improved by the glazed cockpit canopy. Flying this machine, which carried the captured aircraft identity markings 6+6, was not difficult, but to complete the picture I must not omit to mention that the efficiency of its ailerons in slow speed flight left much to be desired, exactly as on its civilian predecessor. From my experience in evaluating the characteristics of sailplanes I had learnt that when approaching minimum speed the ailerons on some types completely ceased to be effective and that any further deflection could cause the aircraft to drop a wing. Usually, the only remedy then was hard opposite rudder, and the Hudson was no different. I was really pleased that the experiences I had gained on sailplanes could now be put to good use on these bigger 'bumblebees'. In any case, one would hardly expect experienced pilots to leave such aircraft floating in the sky until they stalled. Without doubt the tendency to drop a wing in the case of heavier, multi-engined aircraft was delayed by the greater inertia moment around the longitudinal axis due to the outer wing engines, but it was a different matter on smaller types. One was quickly reminded that it was high time to gain some speed, or else. While we are on the subject I would also like to point irreverently to the stalling behaviour of our 'good old auntie' Ju 52: even this aircraft, known to be particularly good natured, would nicely drop a wing if one handled it the wrong way with the flaps up. This would usually occur only under abnormal conditions however, such as forgetting to switch on heating for the airspeed indicator Pitot tube when flying on instruments in clouds, or

during winter. Of course, a normal pilot would not treat the good old Ju so badly that it stalled. I had a taste of this when I had to make measuring flights with overloaded Ju 52s with a gross weight of some 12,000 kg (26,455 lb). The object of this was to determine whether the Ju 52/3m could retain height without difficulty in overloaded condition with a 'dead' starboard engine. It worked, and worked even better when the starboard engine was at a complete standstill. But one could only achieve that after the engine had cooled down and the Ju was flown very slowly. Obviously during these tests I took care not to let the aircraft go into a spin. Even as a student estimating the distribution of lift on wings I had realised that the sharply tapered wing was particularly prone to stall if nothing was done to counteract this tendency. My experience had taught me that special attention to stalling characteristics has to be paid when flying sailplanes, which contrary to powered aircraft are often flown at near minimum speeds while banking.

But back to my activities at Rechlin. On one occasion I was to participate in a round flight over the occupied areas of Russia to ferry captured Soviet aircraft to Rechlin. First we flew to Minsk, Smolensk and Vyazma, then via Bobruisk and the great Pripyat swamps in the direction of Vinnitsa. The flight over the Pripyat swamps is still very clear in my memory. We flew low over the tree tops and no one could mistake the fact that the ground below us was just one big and seemingly endless swamp. The slightest technical or mechanical fault, and we would all have disappeared for ever into the watery mass. It was an eerie experience.

It was said that a twin-engined Soviet SB-2 bomber was supposed to be available east of Vinnitsa. When we finally located it, the aircraft turned out to be no longer in flying condition: the starboard engine had either given up the ghost during the last flight, or 'an expert' had run it up slowly, but surely, to death on the ground. Whatever the reason a continuous trail of blue smoke seemed to indicate a certain lack of co-operation between the pistons and cylinder walls. The engine also made peculiar noises and compared to its willing twin on the port side, would not pick up any revs. So much for ferrying an SB-2! Our disappointment could not be dispelled even by some young local fellows performing breakneck stunts on their horses in exchange for cigarettes.

But more was to come. One of the feared, heavily armoured Il-2 ground attack aircraft was reported to be captured in flying condition somewhere south of Nikolaiev - east of Odessa. But all I found was a wreck lying on its belly opposite the Otchakov peninsula, from where the enemy was still busily firing away towards us. And so we had to start on our return flight empty handed, without realising my wish to fly back a Soviet aircraft. As we flew over Nikolaiev one could not miss noticing the huge hulk of the 45,000-ton Soviet battleship that had been under construction there.

When we landed back at Rechlin, the twin-engined Soviet Pe-2 dive bomber we had there had just crashed on its first test flight, killing a good friend of mine. If we had arrived back sooner I would probably have had to make that test flight; it really made me reflect on the vagaries of Fate.

At Rechlin I now had the opportunity of flying the British Bristol Blenheim medium bomber. Before the war it had been reputed to be a fast aircraft, especially compared to contemporary biplane fighters, but things had changed since. By the time this particular example was captured the Blenheim was no longer of much

interest to us on account of its performance. Our Blenheim with the captured aircraft identity markings 5+5 was the long-nosed version on which the fuselage was dented asymmetrically inwards in front of the pilot to improve his view. Due to the anti-clockwise running of the engines this aircraft demonstrated the for us unusual peculiarity of swinging to starboard at take-off. Nor was the Blenheim a good example of longitudinal stability: the elevator was rather sensitive, which made the landing approach and touch-down somewhat more difficult. However, it was an ideal test object for a German pilot who wanted to gain experience on more unusual aircraft. And, apart from everything else, the different control devices and instruments graded in feet, inches and miles also added to the complications on the initial flight with this aircraft. Thus, the pointers of the main British gyro device acted in reverse to those of comparable German instruments: the hanging pointer indicated movements around the vertical axis while the upwards-pointing needle showed the apparent perpendicular position of the aircraft in relation to the ground - which in our instruments was indicated by a small sphere moving inside a slightly downwards-curved tube with damping fluid.

The evaluation of the twin-engined Messerschmitt Me 210, which also began in 1941, gave me more opportunities of gaining flying experience with difficult-to-handle aircraft. This successor to the Bf 110, which I had also not flown as yet, was already in large-scale production even before the first prototype had made its maiden flight. Despite the adverse reports on this aeroplane I made my first flight in it quite illegally - and also in a somewhat foolhardy manner - by ferrying a Me 210 from Augsburg to Rechlin. This kind of initial acquaintanceship with a new aircraft type was of course strictly forbidden, and the Me 210 was full of nasty tricks. To begin with, one had to watch out on the ground because of its too short fuselage tail section the Me 210 tended to veer sharply left at take-off, or demonstrate some of its other bad habits. There were also problems not directly connected with this aircraft type as such. Thus, for example, my hair stood on end once - or at least tried to do so under my pilot's helmet - when after a take-off in the Me 210 SG+GI a fuel tank flap on the starboard wing slowly lifted up and the passing airstream formed an ideal mixture with the fuel that was being sucked out of the tank. One did not have to have studied at a technical college to realise that this mixture must have an excellent calorific value. But the worst thing about it was that exhaust flames from the starboard engine were licking over the wing just in front of this 'carburettor'. The observant reader will realise from the existence of these lines that I survived this flight at least without any bodily harm. What effect it had on my nerves is another matter.

On another occasion an engine cowling just disappeared in flight. Altogether, I ferried three Me 210s from Augsburg to Rechlin; their identity letters were SJ+GG, SJ+GH and SJ+GQ. I had to take special care with this type when matters were compounded by bad autumn weather.

But all the warnings of the Test Centre about defects found in the Me 210 were to no avail, for what should not be, could not be. Not until the first Knights Cross holders had fallen from the sky with their Me 210s was it decided that at least part of the continuing large-scale production run should be scrapped. The Me 210 really was a handful at the best of times. As long as both engines were running things were not too bad, but to 'lose' one spelled trouble. I recall one flight when I

had an engine failure (in addition to the above-mentioned I also flew the Me 210s SJ+GN and SJ+GL) and had to stagger home on one engine. Just before landing approach I took the risk of restarting the recalcitrant power plant just to be on the safe side. And behold: another machine flew right in front of me and forced me to go around again! In this case, even the slight contribution of the faulty engine was most welcome; I would have never made it on one propeller alone.

In between I also made several flights in the well-known Ju 87 dive bomber. The examples I flew carried the identity letters BK+EE, BK+EH and BM+EM.

After the very cold winter of 1941/42 Lake Müritz was still completely frozen over in March 1942. As we had to test the behaviour of the Ju 87 during take-offs and landings on iced-over water surfaces I made many flights in the BM+EM from and to Lake Müritz at that time. It was only then that one noticed how strongly undulating such iced-over surfaces really are; I had first noted it already while ice-yachting at higher speeds.

Later on I was also able to take over ferrying the Ju 87 BK+EB to Berlin-Tempelhof airfield. Another new aircraft type for me at that time was the Go 244 powered cargo glider fitted with two captured French Gnome-Rhône radial engines. With this type I carried out a series of endurance tests; the Go 244s I flew were identified by letters VC+OS, TE+UC, VC+OJ, VC+FG, RH+GS, RJ+II and RJ+IL.

Then I was given a very interesting task: I was to make the preliminary tests for air to air refuelling. A winch was installed in a Ju 88 bomber (GB+EU), the idea being to let out a stabiliser on the end of a trailing cable. This attached body that served first to stabilise the trailing cable itself and then the fuel pipe was made up of four triangles covered with fabric in such a way that when it was towed along with one corner pointing forward the air would flow straight through it. This produced perfect stabilisation at the first attempt. Later on, the fuel pipe reeled out of a He 111 also hung solidly in the air until the following machine approached the stabiliser. The problems began at this stage: the fuselage noses of the twin-engined machines intended for this operation (the four-engined FW 200 Condor was also considered at one stage) caused the stabiliser to swing out when they came to within about 4 feet of it. The same happened with the Do 217 and the Go 244 powered cargo glider. Moreover, care also had to be taken that the stabiliser did not tangle into the propellers of the following aircraft. And that is exactly what happened when a *Flugkapitän* (Flight Captain) from a plant at Kassel, who was working on the same problem, demonstrated catching a tow stabiliser to me: the wooden starboard propeller of our FW 58 Weihe splintered and bits of wood were flying around our ears. Yet the stabiliser could be caught quite easily and safely with a 4-ft bar fixed above the fuselage nose, but for some reason the trials were discontinued.

In addition to the Siebel Si 204 I also flew the twin-engined Ca 313 (CH+SA and 6+4) supplied by the Caproni works in Italy; this light Italian aircraft was also intended to be used for instrument flying training. (Curiously enough, the identity 6+4 also appeared on the Vickers Wellington with Twin Wasp radial engines which was test-flown by us later).

Meanwhile, I used every opportunity to gain more experience. When a Go 242 cargo glider had to be towed to Gotha, I took on the task in a Heinkel He 111

(KI+XB) and later brought it back again; I could not ascertain any fundamental difference from towing an ordinary sailplane. Certainly, one had to pay attention that the relatively low permissible towing speed of the cargo glider was not exceeded, but otherwise there were no problems. Shortly afterwards I had an opportunity of flying a Go 242 cargo glider myself.

In order to reach places where crash landings or accidents had occurred we had a small fleet of light aircraft at our disposal, such as the two-seat Fieseler Fi 156 (DF+KC and SI+GD), or its progressive developments, the Fi 253 (D-ERNG) and the four-seat Fi 256 (NF+SU and KG+GM). Previously, I had already flown the Morane 230 high-wing monoplane, which was particularly suited for towing sailplanes. Apart from that it had been the first captured aircraft that I had flown; it carried the identity letters VK+SH. The Morane 230 had the reputation of tending to swing a lot, but in fact it was just a matter of pilots not being used to its different behaviour characteristics: this model had an anti-clockwise instead of a clockwise rotating propeller generally used on German aircraft. Perhaps a short explanation would not be out of place here. The air flows over the fuselage in the direction of the propeller rotation, but this airflow is slower while taxiing or taking off and strikes the rudder at a wider angle. Thus the rudder is pushed to the left by an anti-clockwise rotating propeller resulting in a tendency to swing in the opposite direction. To complete the details, it must be mentioned that the gyro moments of the engine increase this tendency to swing if the fuselage is moved quickly from a tail-down to horizontal position. This also explains why this swinging tendency connected with the gyro moments does not appear during take-offs in aircraft with nose-wheel undercarriages where the tail does not have to be raised. The swinging tendency of the Morane 230 was certainly no greater than that of our Bf 109 fighter, but it affected the opposite side to the normal, and therefore one had to pay more attention.

Total alertness is also required during flights which seemingly do not call for complete concentration. Otherwise, how could it be that very experienced test-pilots, who are really old hands at the job, are also in the greatest danger during such 'easy' flights. Being accustomed to dealing with hundreds of levers and instruments in complete concentration, they would then forget, for example when flying a Fi 156 Storch, a practically foolproof slow aircraft, to open the fuel cock, or that the Storch required a somewhat longer take-off run than would sometimes appear to be the case on the airfield. It is incredible how many flights - even spectacular transcontinental flights - have come to an unexpected and premature end due to wrongly switched fuel cocks! Habit had to be avoided as much as possible during test- and evaluation flights as well. Naturally, a pilot who mainly flies large aircraft would find a small one relatively manoeuvrable, no matter how sluggish it really is. An example from car driving may illustrate what the effect of habit can be. There are people who always drive with the front wheels close to the kerb and do not notice if their car develops a tendency to pull to one side. They have become so accustomed to it that, when they get a new car, they think it has a tendency to pull to the other side.

Flying different types of aircraft had already attracted me while gliding, and in Rechlin I really developed a taste for it. Without doubt, my preparatory engineering training also played a role in this. I was aware of course that

considerable practice was necessary to fly different aircraft types; sometimes the number of funeral parades at Rechlin was frighteningly high and was comparable to the losses at the front. As is still the case today, most accidents were the result of a combination of several faults appearing simultaneously, some of them not always technically unavoidable. Apart from good luck, without which one should never begin flying in any case, care and above all practice were essential. But under 'practice' one should not mean flying the same aircraft for hours on end, but handling different types, which often added comparatively little flying time in the log book. This was the only way to discover all the tricks which are, I hope, pounded into pilots' heads at the test pilot schools today. After all, I had no wish to commit suicide and did not want to become expendable at Rechlin either. So I combined the pleasant with the useful and took advantage of every opportunity to fly various aircraft types. Naturally, this test centre offered many opportunities to do so.

Obviously one had to be very careful flying such different machines. For not only did they all react very differently to control movements, but the levers for undercarriage retraction, flap and trim activation, propeller pitch control, engine cooling and fuel cocks, to mention only the most important, were also differently arranged in every aircraft. Consequently, a pilot changing frequently to strange fighters and bombers from different foreign countries is always under stress and must concentrate continuously. So I do not believe that a well-known German fighter ace was right when he maintained that to fly an unknown aircraft it would suffice to know where the control column and throttle were. If it had been that simple so many captured aircraft would not have ended their first flights on their bellies or in crash landings. For one always has to expect failures and unpleasant surprises, particularly in test flying.

However, if critical events are too often placed in the foreground in this book, it could give the impression that flying at Rechlin consisted only of exciting incidents. This was not the case. There were also enjoyable cross-country and high-altitude flights; and on Sundays sailplanes frequently had to be towed up, or training flights with pilot pupils had to be made in two-seater sailplanes.

But it was not just flying: Rechlin offered other diversions as well. The place lay in beautiful scenery near Lake Müritz, so that in addition to hiking there was also the attraction of water sports. I had bought very inexpensively an old sailing boat reputed to be more like a submarine, which no-one believed could still be capable of a long cruise above water. It was made 'seaworthy' again with the aid of plastic materials which were just then being tested, and proved a great success. It was marvellous during fine weather on Sundays or after duty, if there were no important flights to be made, to sail on the lake, swim, and enjoy supper aboard in congenial company. There were of course other social meetings with friends of about the same age. Whereas the 'old Rechliners' mostly lived in villas on an estate near the test centre, the village of Vietzen with its one guest house-cum-restaurant provided an alternative to the mess for married colleagues. After having lived in the barracks as a soldier and allowed to enjoy the 'pleasures' of military service - often in the most original manner - reserved for engineer-soldiers as an 'z.b.V.R.d.L.u.Ob.d.L. ('For Special Employment of the Reich's Minister of Aviation and Commander-in-Chief of the Luftwaffe') I later moved into the so-

called 'bull cloister' as a bachelor. The female element was rather weakly represented at Rechlin by various secretaries and laboratory assistants, later reinforced by girls from the Reich Labour Service. At any rate to begin with, Rechlin was considered a 'sexually distressed area'.

My elementary flying training and further experience at the DVL (German Aviation Experimental Establishment) had already offered me a varied programme of aircraft types. Nevertheless, as is usual in other spheres too, I belonged to the so-called 'young men' at Rechlin at that time and therefore could not afford to make any blunders; otherwise I would never again be allowed to fly any of the precious 'birds'. Contrary to some of my colleagues who mostly flew the same or similar aircraft types, I tried continually to include new aircraft in my type-programme. Provided this was kept within reasonable limits, one never felt strained beyond one's capabilities. On the contrary, apart from a certain tension on some of my 'firsts' and ferry flights of captured aircraft - probably a kind of stage fright - I always felt fully in command of the situation. It was comparable to that feeling, full of expectations, one gets when beginning a long journey.

After having flown so many mainly larger aircraft types I was eager to put the Messerschmitt Bf 109 fighter through its paces in the air. In my opinion, of the two standard German fighters it was certainly the more difficult one to take-off and land. In any case, I did not want to be rather like an actor who is always seen in the same one-sided roles. And so, after a few flights in the Bf 109, a Spitfire was next on my programme, as will be recounted in another chapter.

In fact, everywhere in Rechlin there were opportunities to gather more flying experiences, and I made the most of it. Thus, in addition to parachute dropping tests in inclined flight from a Do 17Z (GM+AA), I carried out vertical diving trials with several Do 217s fitted with ribbon parachutes (KE+JA, SP+WI and CF+PO). In between, I ferried a Messerschmitt Bf 110G TF+UX from Gotha via Brandenburg to Rechlin. And then there was once again something special: the famous British Vickers Wellington bomber. This particular example was a Mk IV powered by two Pratt and Whitney Twin Wasp radials and carried the captured aircraft markings 6+4. I was really pleased to have an opportunity to fly this aircraft with its remarkable geodetic construction and fabric covering, and to find out what it could do. With regard to reliability and durability, the Vickers Wellington could be compared to our Heinkel He 111 and was the workhorse and backbone of RAF Bomber Command for a long time. It was first used for daytime raids, soon afterwards changing to night operations, until it was replaced by the newly-developed four engined bombers. At that time, there were reports of an extraordinary technical sensation which also gave an excellent testimonial to the abilities of British meteorologists: for an air raid on Königsberg in East Prussia the route was plotted around a passing low pressure area in such a way that the bombers had tail wind not only on the way there, but also on the way back, thus effectively increasing their range.

The Wellington was an unpleasant opponent in that it featured a tail turret which had been fitted quite consciously to the detrimental effect of its streamlined form. Before the war the opinion that streamlined bombers of high aerodynamic quality would be able to escape intercepting fighters had gained credence in Germany, and in fact this ability was first ascribed to the Dornier Do 17 fast

bomber. How great also was the delight in those days when the Heinkel He 70 high-speed mail aircraft outdistanced all fighters, mostly biplanes, over France! But these dreams of unarmed high-speed bombers were only of short duration. This ideal was later realised by the British with their remarkable de Havilland Mosquito, an exceptionally rare, successful combination of outstanding engines and a wooden airframe that started its combat career as a reconnaissance aircraft, then became famous as a day and night bomber and long-range day and night fighter, and was also used as a pathfinder for a considerable period of the war. On the other hand, modifying our Messerschmitt Me 262 jet fighter into a high-speed bomber could not lead to success.

Assuming an equal standard of development, only one certain kind of aircraft can be optimal for a given purpose, be it a fighter or bomber. I consider it wrong to modify an available and successful aircraft type to fulfil another purpose. It sometimes happened in German aviation that new constructions of great promise were to be used for tasks not originally intended during the design stage. This could happen as follows: for example, a single-seater was to be used as a night fighter because of its above average flight endurance. That went smoothly until they came around to the correct idea that a second crew member would be required to deal with the multitude of tasks involved in night fighting. But the second cockpit would only fit into the space previously occupied by the lovely big fuel tank! The moral of this was simple: you can't have your cake and eat it.

But back to the Wellington. Like all aircraft, it had its positive and negative sides. Thus I noticed that the control system of this bomber became rather heavy at higher altitudes. Possibly this was due to the greater resistance of the control cables which shrank in the colder air. The Wellington also seemed sluggish and 'soft' in the wing, with heavy ailerons; it would stall over a wing when flown too slowly. In addition to that, the longitudinal stability was not exactly overwhelming, especially in climb. I really did not envy my British colleagues flying a fully-loaded Wellington bomber at night.

A characteristic that was particularly unpleasant and unusual for German pilots only became clear to me later. I remember experiencing it during one of my first flights in the Wellington: everything went well until I was airborne, but then the power of both engines suddenly dropped. Instinctively I reached for the throttles, only to find that these had 'merely' moved back on their own and needed to be pushed forward again and locked into position. It was only later, whilst evaluating the Hawker Tempest, that I realised that the throttles in British aircraft moved back of their own accord unless locked. Our engines, on the other hand, were so designed that they automatically developed at least cruising power. After I had ferried the Wellington to Berlin I heard that it departed from this life on one of the subsequent flights. The crew suffered no serious harm, but the rare bird was lost; it was said that both engines had lost power after take-off. There are of course numerous causes which can have the same effect, but I could not help recalling my own experiences in the Wellington with the throttles moving back after take-off. Perhaps someone had been playing around with the throttle lock in Berlin.

I had a lot of fun with the Ju 188, a fast and very manoeuvrable bomber. After a trial flight in the DF+EW I ferried another Ju 188 (GB+NC) to the Junkers plant at Dessau.

Then I had the opportunity to fly the Messerschmitt Me 323 powered cargo glider. This giant aircraft with its six Gnome-Rhône engines and a span of more than 180 ft made an enormous impression when one sat enthroned in the cockpit several yards above the cargo space. Both flight engineers were accommodated in the wings between the inner engines, operating these according to the ratings set, and instructions received via intercom from the 'conning tower'. The first two 'Giants' I flew were the DT+DT and RD+QE. Flying the latter, I lost the propeller of No.6 engine, as recounted elsewhere in this narrative. Subsequently I ferried the RD+QE from Rechlin to Leipheim.

On one flight in the Me 323 RF+XG to Lodz via Poznan I had to bring back 91 Russian VIPs to Rechlin. It looked quite adventurous as my passengers began to make themselves comfortable on the fuselage floor of the giant Me 323; only a camp fire seemed to be missing. All in all, it was an impressive transport mission, and made me think as I made my way through the camping bodies to the ladder and then up to the first floor and the cockpit. In any case, security guards were also aboard and all over the place. Shortly afterwards I gave the flight engineers sitting in the wings the signal 'Full steam ahead' and we were on our way. The engineers were responsible for controlling the fuel mixtures for take-off and emergency power, propeller pitch settings, fuel booster pumps, fuel system and temperature control; only the throttles were left in the pilot's cockpit. We radioed Rechlin regarding our expected arrival a good two hours later, and set course accordingly. I trust my passengers - who were said to include some experienced airmen - will forgive me the little bump on landing at Rechlin; it was not intentional. The enormous fleet of vehicles awaiting them at the parking area was at least as impressive as about a hundred people swarming from the giant aircraft, an altogether unusual sight at that time.

In between I enjoyed flying the beautiful Siebel Fh 104 Hallore SG+GI; this twin-engined five-seater was used as a courier aircraft for generals.

Another interesting aircraft was the asymmetrical Blohm und Voss BV 141, nicknamed 'Modern art'. The example I flew carried the identification NC+RG.

Then came flights in the special Ju 86 high-altitude aircraft. This Ju 86R with a pressure cabin and two supercharged Jumo 207 diesel engines was of particular interest to me for comparison with the experimental Henschel Hs 128 high-altitude aircraft I had flown previously, as both machines were suitable for operations up to an altitude of about 46,000 ft. Of course the vision from the pressurised cabin of the Ju 86R CM+AH was worse than from the standard Ju 86 bomber, but that had to be expected. After an engine repair I took the Ju 86R first to 8500 m (27,880 ft.) and then to 11,000 m (36,090 ft) without any problems. But these special aircraft had to be handled with care, especially when descending from higher altitudes: the pilot had to watch that the aircraft did not gain too much speed to overtax the strength of the elongated wing tips used on this version. Apart from that one had to pay attention that after idling from a great height the diesel engines came back to full power again and there was no 'flame-out'. This was quite difficult because the Ju 86R had a wing span of 32 m (105 ft) and, when descending, had a very low sink rate like a high-performance sailplane. Thus, when throttling back the engines, there was a definite danger that they would refuse to start up again.

Meanwhile I had flown the Henschel Hs 129 anti-tank single-seater powered by two Gnome-Rhône radial engines; this particular machine carried the identification KG+GM. Later, when tests were to be carried out with the Hs 129 towing a DFS 230 cargo glider for the purpose of quickly transferring smaller military units, for a change I took my seat in the DFS 230 cargo glider (6+7) for what I believe was the first towed flight with the Hs 129. It was something new for me again. Since everything went so well, we took off once more and tested all the details in one flight lasting nearly an hour. By that time I had gained quite an expertise in this line, and it became customary for the cargo glider pilots to come to me when they had something on their mind. For example, a test had to be made to establish how the Go 242 cargo glider would behave towed behind the fast Ju 88. This was rather difficult because the Ju 88 had to be flown very slowly: the maximum permissible speed of the cargo glider was critically near the minimum speed of the Ju 88. I had noticed already earlier when towing standard (lighter) gliders that the directional stability of the towing aircraft was considerably improved by the tow cable and the drag of the attached glider. Without doubt, in this fettered state, the towing plane could be flown still more slowly than normal as it were, for movements – even slight ones – around the vertical axis are usually the decisive factor leading to a stall, and especially a spin.

Gradually I had become an 'old hand' at this business and on 29 October 1942 I was given the task of towing with a He 111 (RD+ZQ) what must have been the first jet fighter in the world, the Heinkel He 280, on a cross-country ferry flight from Rostock to Rechlin where both jet engines were to be changed. I then did some further flights in the Hs 129, KG+GI, towing DFS 230s and also measured take-offs with heavier loads. I made other flights in the He 111 RD+ZQ towing DFS 230 cargo gliders in the so-called 'rigid tow' arrangement, i.e. hooked to the tail of the He 111 by means of a 3-ft bar and gimbals. The advantage of this method was that one could fly blind even with a glider in tow (in the meantime I had also obtained my blind flying licence). Using this method instrument flying, including icing conditions, ground radio controlled approach in bad weather and then landing all gave quite satisfactory results. At another point I shall relate a take-off with a fully loaded DFS 230 glider in rigid tow that suddenly went into a very violent upward swing and had to be disengaged to avoid an inevitable crash.

The rigid tow proved to be quite pleasant also during cross-country flights. On one occasion we made a flight to Darmstadt and back, and on another to Ayrnring and back. We also carried out a longer flight at night with a cargo glider in rigid tow. Later I also had two cargo gliders in double tow behind a He 111.

After several fully loaded take-offs and climbing flights in a Messerschmitt Bf 110F TM+OS, and a Bf 110G TF+UT for performance measurement purposes, I ferried a Bf 109G fighter (CC+PI) to Dessau to pick up a Ju 252 transport (DF+BR) and ferry it back to Rechlin. This aircraft was the successor of the good old Ju 52/3m with retractable undercarriage and smooth metal sheet skinning. It had a hydraulically-operated ramp under the fuselage which could be lowered for vehicles to enter from the ground, and for aerial drops. I had several opportunities to fly this machine on performance calibration flights. Once two DB 603 power plants were urgently required at Venlo in the Netherlands for a Heinkel He 219 night fighter, a type then just going into service. I flew the Ju 252 DF+BP via

Udetfeld in Upper Silesia to Vienna. In my haste I had not kept strictly to the prescribed air corridor and on arriving in Vienna was excitedly informed that a Heinkel He 177 had flown over a prohibited area without permission. I managed to calm down the good people there because I flew a Ju 252, but it seemed to me, however, that the local air observation posts had confused the protruding nose of my Ju 252 with that of the He 177. In Vienna, the required DB 603 power units first had to be well lashed down in the fuselage to avoid shifting in flight. When my take-off was further delayed due to damage to a starter mechanism, the Heinkel works management offered me a chance to fly their He 219 night fighter. No sooner said than done, and I romped about in the air with the DH+PV for some 20 minutes before landing full of enthusiasm.

During the subsequent flight to Venlo I was glad that the DB 603 units were securely fastened behind me in the fuselage of the Ju 252, for there was a fierce thunderstorm over the Thuringian Forest and, flying blind, I had to move the controls as far as they would go to keep the heavy machine in the correct attitude. After a particularly vicious flash of lightning it seemed to smell 'electric' in the aircraft, and the radio operator could no longer establish contact. Our guess that the antenna had melted proved to be correct when we landed at Venlo at 2110 hrs after a bumpy flight across Germany.

Subsequently my aircraft type programme was expanded by a flight in the first four-engined aircraft, a Heinkel He 177. After one instructional flight, I flew a few wide circuits around the airfield in the He 177 GI+BN and had the opportunity to familiarise myself with the peculiarities of this model. These were concerned not so much with certain difficulties caused by the fuselage being a little on the short side, as with the pilot and crew being well versed in the actions necessary in the case of engine fires, i.e. being able to immediately initiate the correct fire extinguishing procedures before the wing spar was damaged, and disengage the two coupled power plants. Further flights followed in other He 177s, the VD+US and VF+QD.

In April, 1943, I was again presented with a special task: I was to make the maiden flight with the twin-engined B 9, a special construction for prone piloting of the *Flugtechnische Fachgruppe Akaflieg* of Berlin on the request of the DVL, the German Aviation Experimental Establishment. The B 9, registered D-ECAY, carried the official RLM type number 8-341 and was to be flown for the first time at Berlin-Schönefeld airfield.

There was a good reason for research into prone piloting. In banking or when pulling out of a dive, the centrifugal forces which affect not only the airframe but also the pilot increase to coefficients much higher than normal weight, corresponding to acceleration due to the gravitation pull of the Earth (known as 'g'). Thus, at about four 'g' the human heart can no longer pump blood to the eyes of an airman in a sitting position, and he suffers vision blackouts. However, for a human body in a prone position this limit can be raised to eight 'g', which means one could still see at gravitational force equal to eight times his own weight. These considerations led to experiments with prone positions for the pilot, of which the first use in Germany was made on the FS 17 sailplane built by *Akaflieg* (Association of Technical College Students) of Stuttgart.

Freshly recovered from a high-altitude training period in the mountains I first had to make the above-mentioned flight in the He 177, and three days later used a

Ju 88, SG+MB, for the flight to Berlin to get acquainted with the B 9.

It really was a strange feeling taking off for the first time in this aircraft, lying on one's stomach with the head forward and chin resting on a support. The view out of the glazed nose section was of course excellent, but it was more difficult to judge the position of the aircraft. Apart from that, the instruments had to be read via a mirror so as not to restrict the view. Fortunately, the airfield at Berlin-Schönefeld was large enough to make some trial take-off runs to get the 'feel' of this unusual machine. This was fine, except that throttling back just before becoming airborne caused a sharp change of momentum around the vertical axis which was quite hard to control with the rudder. But then, the robust retractable undercarriage withstood even this strain, to the satisfaction of the workshop chief. Having accustomed myself to this unusual position, there were no problems in flying the B 9. However, it was impossible to maintain high 'g' acceleration in banking flight for longer periods because the engines were just not powerful enough. I made a total of another seven flights in the D-ECAY.

After the trial take-offs with Ju 52/3m transports in overload condition with an all-up weight of some 12,000 kg (26,450 lbs) already described, I had an opportunity to acquaint myself with the Boeing B-17 Flying Fortress. This aircraft was a well-known sight in the German skies, but quite a rarity on a German airfield. As was proper, I first had an instructional flight in the B-17 DL+XC and then moved over to the 1st pilot's seat on the left to get an idea of the flying characteristics of this four-engined bomber during two take-offs when I took over the controls myself.

By that time I had flown not only most types of German aircraft, but also all the new and interesting captured machines in so far as they were available at Rechlin.

This considerable amount of experience on various types of aircraft was no doubt instrumental in my being put in charge of *E 2 Beute* (Captured Aircraft Section) at Rechlin.

Boeing B-17 Flying Fortress

One day in October 1943 I received a call that an intact Boeing B-17 had made a forced landing near Esbjerg in Denmark. I believe it was the first B-17G to fall into our hands, and we were naturally most interested to find out what was new. Arrangements were made at once, and we set off for Flensburg and Esbjerg in an Arado 232 which was also intended to escort the B-17 on the way back. The Ar 232 was a combat zone transport designed to take-off and land on unprepared ground, having in addition to the normal tricycle undercarriage another 22 small independently-sprung wheels in two rows under the fuselage. This facilitated operations on uneven ground and made it possible to negotiate ditches up to 5 ft in width. For landings on normal airfields the main wheels and the nose wheel could be lowered so that the smaller ventral bogie wheels were not in use.

We found the big American bomber standing in a clearing, surrounded by tall trees. Fortunately the soft ground had shortened the landing run so much that no damage had been done. The reason for this forced landing was that the propeller pitch-change had failed on one engine, leaving it set in take-off position. As a result, the aircraft had rapidly lost speed and had to leave its formation; on its own it would have been most vulnerable on the return journey. Naturally, one propeller being set in take-off position did not mean any hindrance to me, but the soft ground could be most troublesome. Looking over the available take-off space I estimated that the trees began only some 2500 ft away and to get the big aeroplane airborne under these conditions it had to be lightened as much as possible. Consequently, I had everything that was not absolutely necessary dismantled from the B-17, such as all armour plating and weapons; and left just enough fuel to reach the airfield at Esbjerg.

The next morning everything went well; the engines started immediately, and all other equipment and instruments also seemed to be in order. I tried a few taxiing runs with the big bomber, and did not get the impression that its wheels sank in too deeply. The next step was to mark out the half-way point of the available take-off distance to determine what speed the B-17 would have reached at this stage. By then I was already more or less familiar with the cockpit layout, but for all that it was encouraging that this was not my first flight in a B-17. Typical of the B-17 were the throttle levers which were shaped like a small ladder split open in the middle to facilitate the separate operation of the inner and outer engines while taxiing and during formation flying. During the trial take-off run I noticed that the much lightened aircraft accelerated relatively well, and at the half-way mark we reached the speed of 85 mph. This was promising, and I closed the throttles, braked, and taxied back to our starting point. Now it became serious:

first full on the brakes, full power, and then we were off! Judging by my experience and intuition this should get us off the ground with the lightened B-17. In fact I was able to become airborne just beyond the half-way mark, and pushed the control wheel forward again to remain barely above the ground to gain enough speed to pull the B-17 away over the tops of the first trees. The landing on the airfield at Esbjerg was no problem. There, we refuelled and loaded back some of the things we had removed previously; our escorting Ar 232 had come in very handy indeed. The time passed more quickly than we expected and it was already 1624 hrs when I opened the throttles again for take-off. It was 16 October, and there was not much time left before twilight. The Ar 232 took up a position in formation alongside us and we were on our way. The defective propeller pitch control now became inconveniently noticeable, as that engine had to be throttled back to avoid overspeeding. As a result, the speed of our B-17 was greatly reduced and we made only very slow progress against a headwind. Very soon it was clear to me that we would never reach Rechlin that evening. There was nothing for it now, and I prepared to land at Schwerin. I estimated our time of touch-down at 1755 hrs which, being some 25 minutes after sunset, was officially a night landing. For this reason I hoped that the radio operator in the Arado 232 that had meanwhile flown on to Rechlin, had advised our arrival at Schwerin; we could not do it ourselves. The airfield was well marked with lights and appeared to be in use at night. The landing created no problems; as far as I could remember, the aircraft taxiing for take-off there were night fighters. Subsequently over supper in the officers' mess, the person next to me remarked about how careless some people could be as, completely out of the blue, a B-17 bomber had just landed – a whole 25 minutes after sunset! I could not see anything 'careless' in this since I had arrived over the airfield with our escorting Ar 232 which had indeed announced our impending landing over the radio. Obviously, our arrival in a captured B-17 would not be announced to one and all over the loudspeakers! And an emergency is an emergency.

The rest of the ferry flight was then completed the next morning within half an hour.

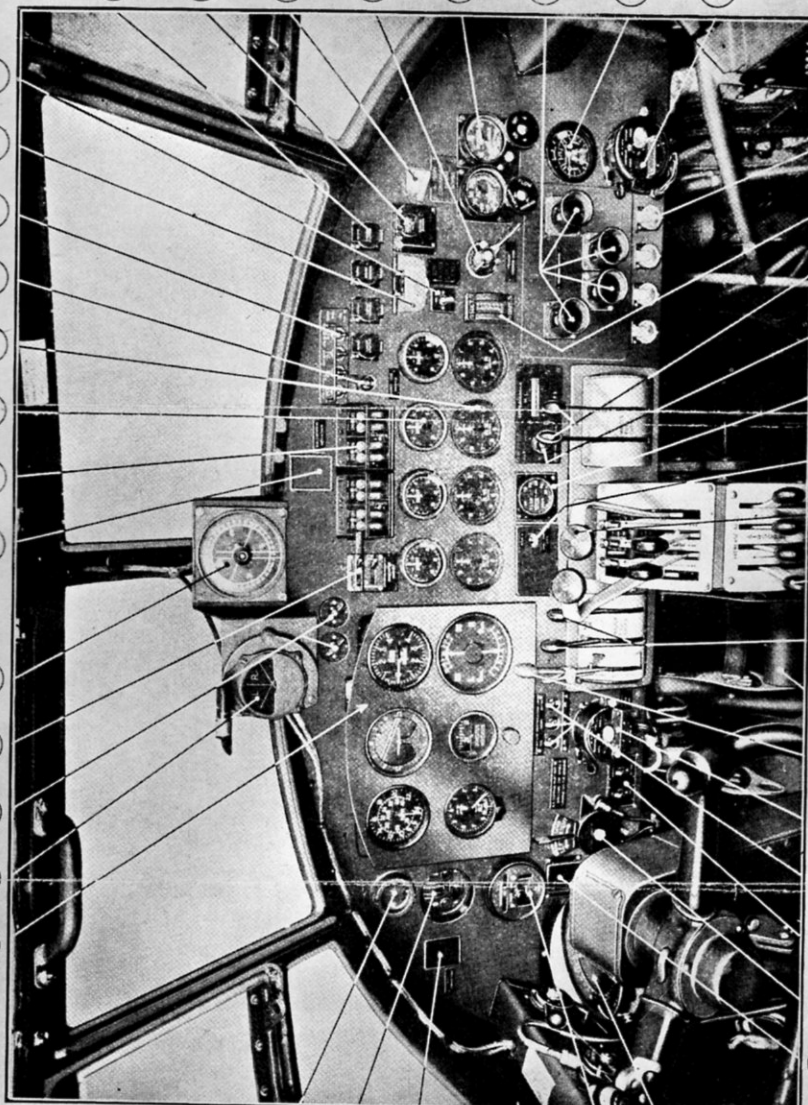
The B-17 interested us not so much because of its flying characteristics but more because of its supercharged engines, which gave excellent performance at higher altitudes. These superchargers were activated by exhaust-driven turbines which became really efficient corresponding to the greater difference in air pressure at higher altitudes, exactly when more power was needed. For that reason the Flying Fortress was primarily made available to the power plant experts, who tried to get to the bottom of as many details of the engines as possible. The most varied measuring instruments were installed for this purpose, so that the fuselage behind the bomb-bay was like a laboratory with engineers in attendance. I took over the following test flight, which was to take place with the full complement of engineers aboard; our task was to monitor the engine and airframe performance in climbing to higher altitudes. I remember this flight particularly well, and shall therefore dwell on it in some detail.

The take-off was made with full fuel tanks which meant having some 2310 Imp gals of fuel on board. We departed from the concrete runway of Lärz airfield and the take-off was monitored on instruments. Even with the comparatively heavy

KEY TO Fig. 1

INSTRUMENT PANEL

1. Instrument flying panel.
2. D.F. indicator.
3. Landing light switches.
4. Undercarriage indicator switch.
5. D.R. compass repeater.
6. D. R. compass deviation card holder.
7. Ignition switches.
8. Boost gauges.
9. R.p.m. indicators.
10. Booster coil switch.
11. Slow-running cut-out switches.
12. I.F.F. detonator buttons.
13. I.F.F. switch.
14. Engine starter switches.
15. Bomb containers jettison button.
16. Bomb jettison control.
17. Vacuum change-over cock.
18. Feathering buttons.
19. Triple pressure gauge.
20. Signalling switchbox (identification panel).
21. Fire-extinguisher pushbuttons.
22. Suction gauge.
23. Starboard master engine cocks.
24. Supercharger gear change control panel.
25. Flaps position indicator.
26. Throttle levers.
27. Propeller speed control levers.
28. Port master engine cocks.
29. Rudder pedal.
30. Boost control cut-out (recognition lights).
31. Identification lights colour selector switches.
32. D.R. compass switches.
33. Auto controls steering lever.
34. P+ compass deviation card holder.
35. Undercarriage position indicator.
36. A.S.I. correction card hold.
37. Ram approach indicator.
38. Watch holder.



INSTRUMENT PANEL

FIG 1

FIG 1



Henschel Hs 128 high-altitude research aircraft

William Green coll.



Hs 128V-1. Both Hs 128 prototypes were flown by the author

William Green coll.

Lockheed 14 commercial transport in Rumanian air force and civil markings

Wolf Schaefer coll.





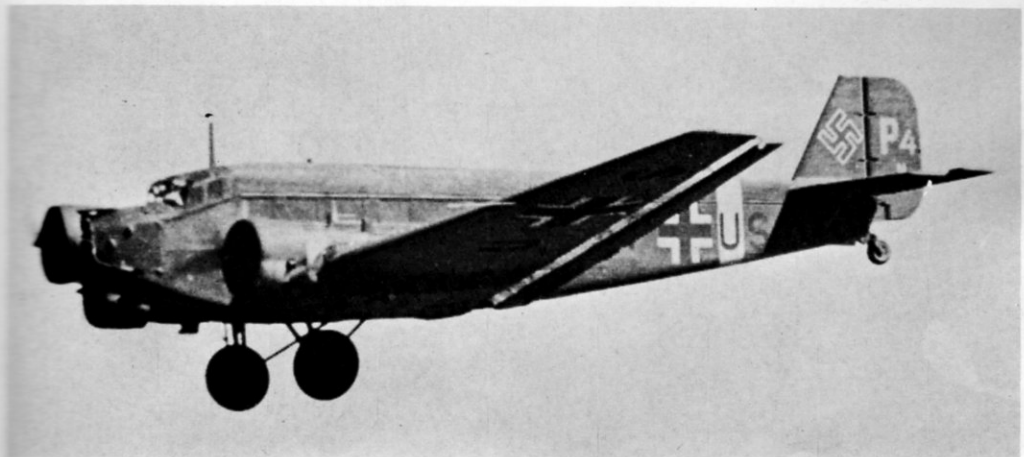
Captured French Morane 230 trainers (here BR+IF) were one of the many older aircraft types used as glider tugs by the Luftwaffe
William Green coll.

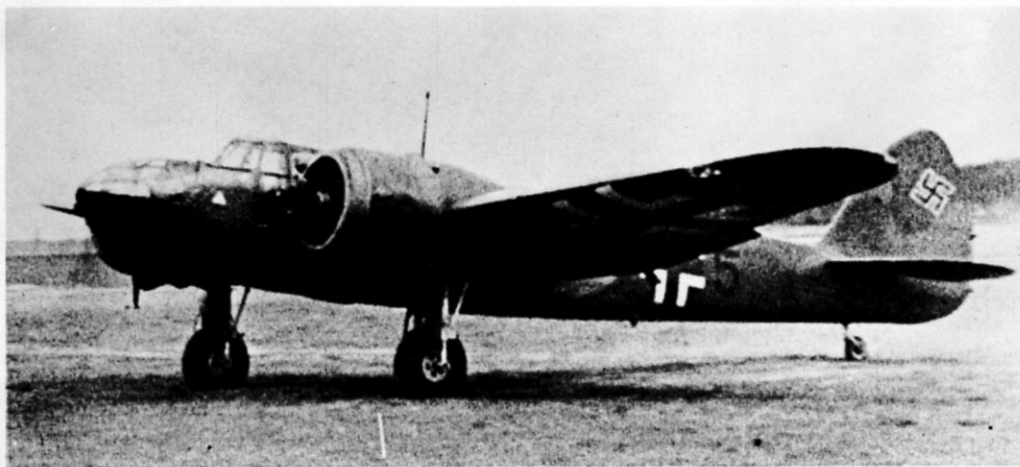


Captured French air force NAA-64 (Harvard) advanced trainer in Luftwaffe service
William Green coll.

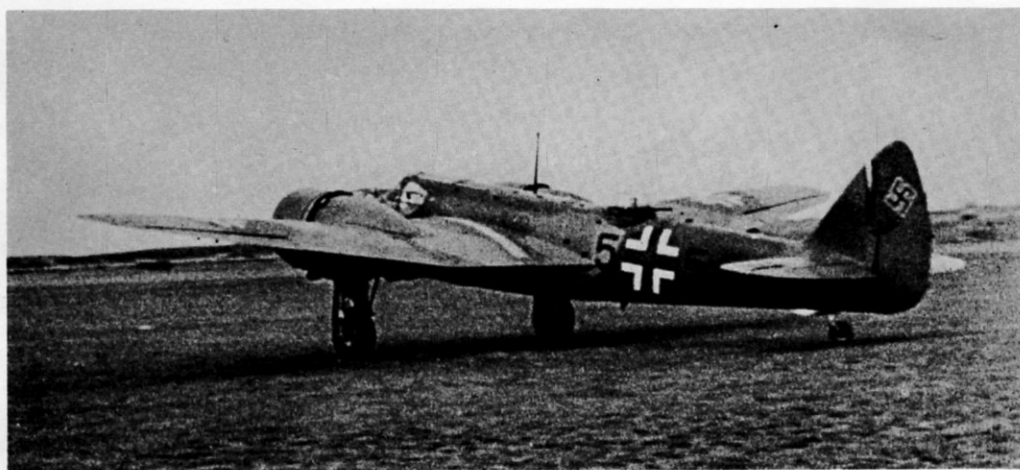
Junkers Ju 52/3m g5e troop and cargo transport

Hanfried Schliephake coll.

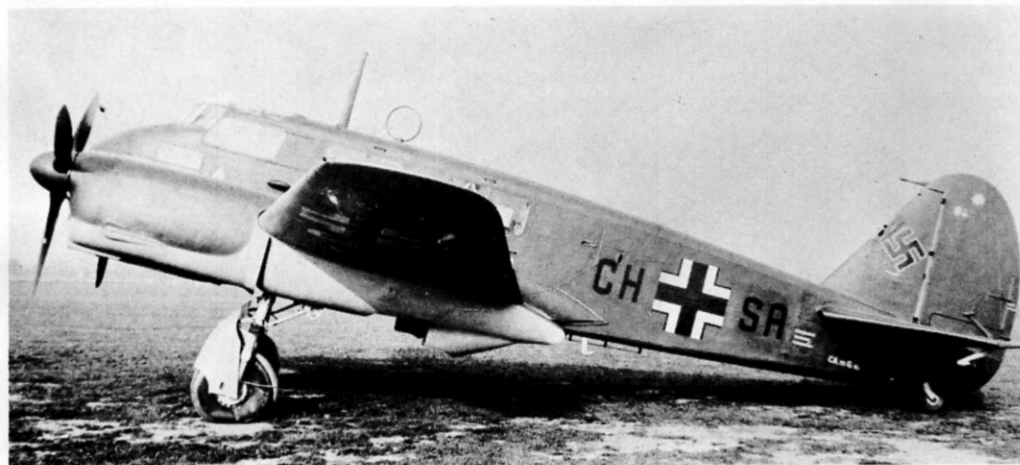


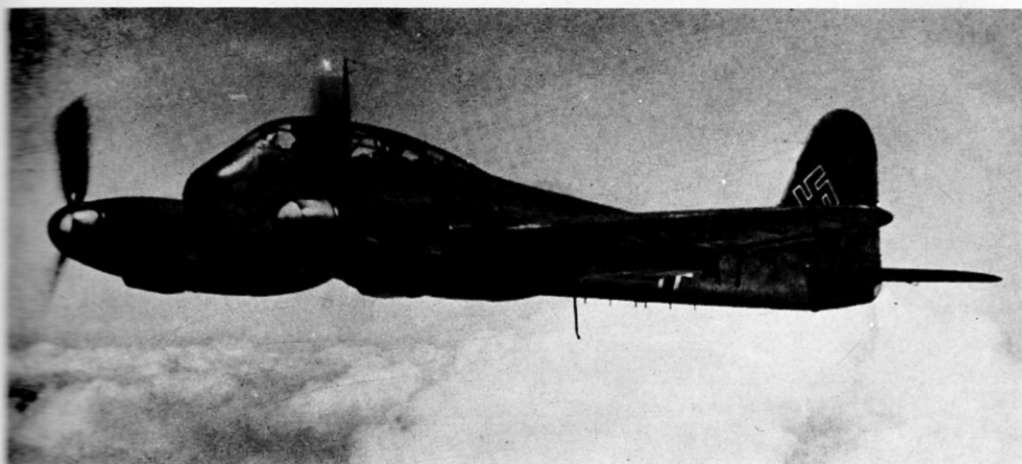


Bristol Blenheim Mk IV in Luftwaffe captured aircraft markings 5 + 5 under test in Germany *IWM*

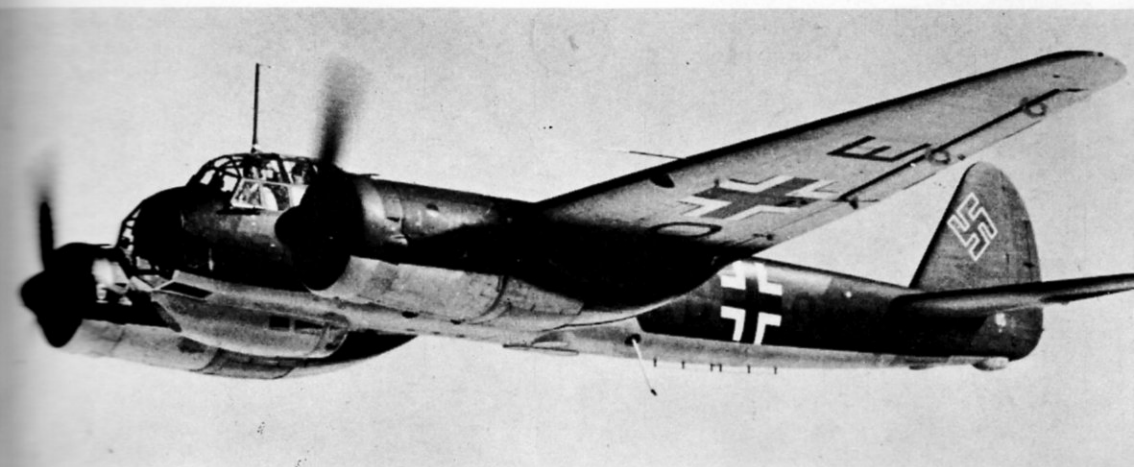


Italian Caproni Ca 313 training and communications aircraft in Luftwaffe service
Hanfried Schliephake coll.





Messerschmitt Me 210A-1 heavy fighter (Zerstörer)



Junkers Ju 88A-4 horizontal and dive bomber

Hanfried Schliephake coll.

Junkers Ju 86E-2 bomber used in the training role

Hanfried Schliephake coll.

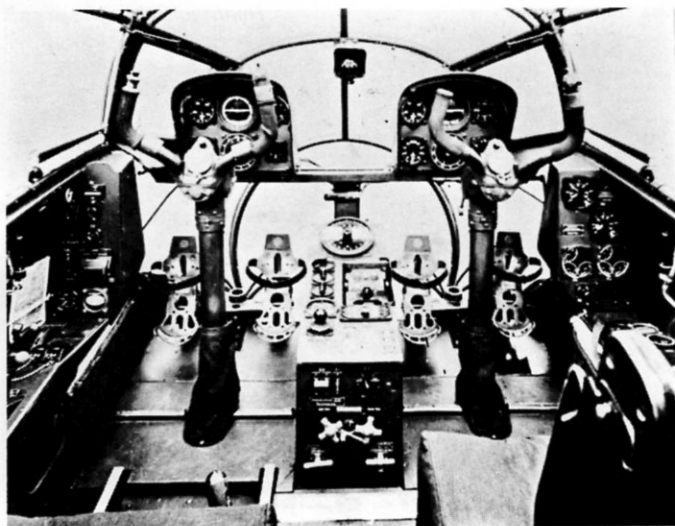




Junkers Ju 87B-1 dive bomber

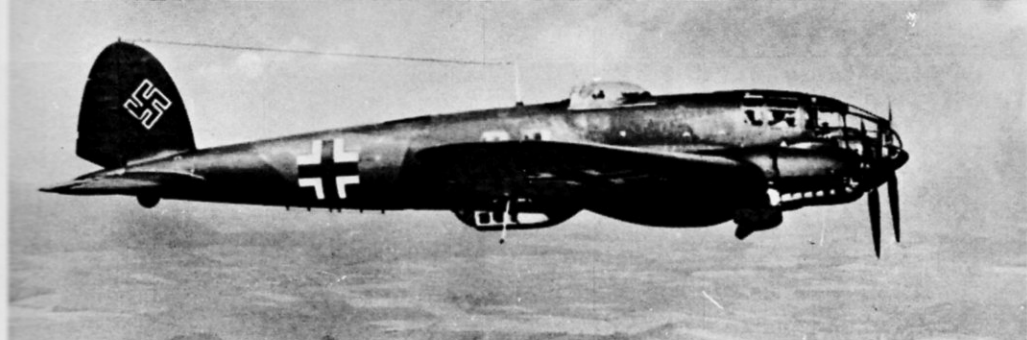


Si 204D multi-purpose trainer



Si 204D cockpit with duplicated instrumentation and dual controls

Hanfried Schliephake coll.

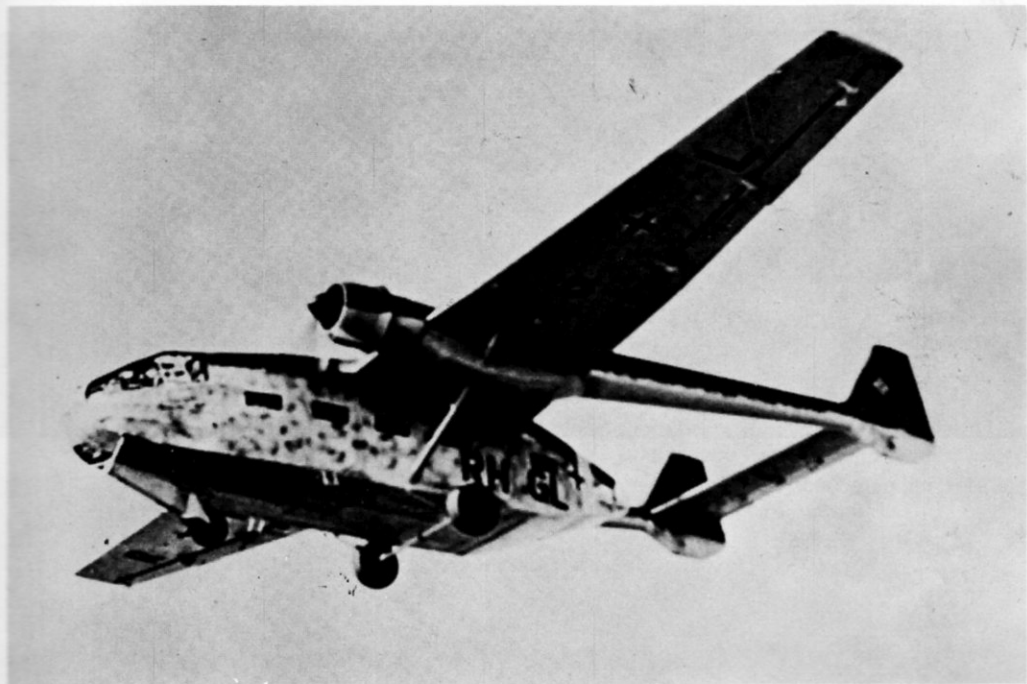


Heinkel He 111P bomber

Hanfried Schliephake coll.

Gotha Go 244B-1 powered version of the Go 242 cargo glider

Hanfried Schliephake coll.

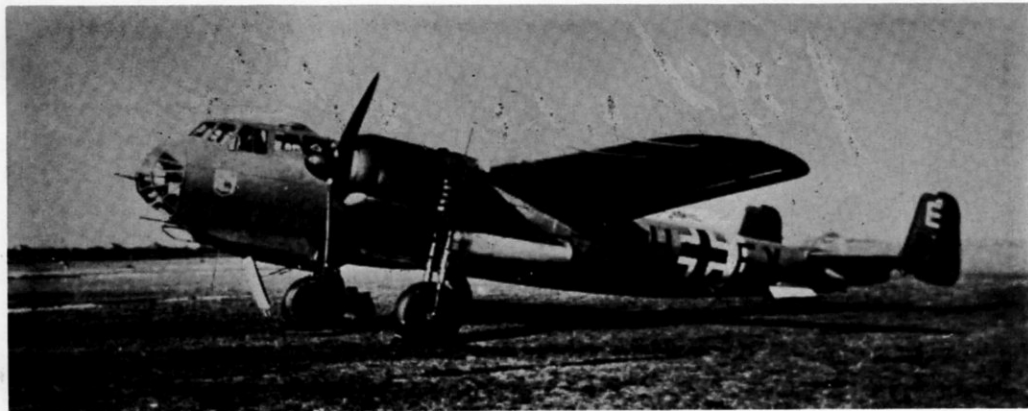


Go 244B-1 cockpit with Th.
Goedicke (+) in the pilot's seat
Hans-Werner Lerche coll.

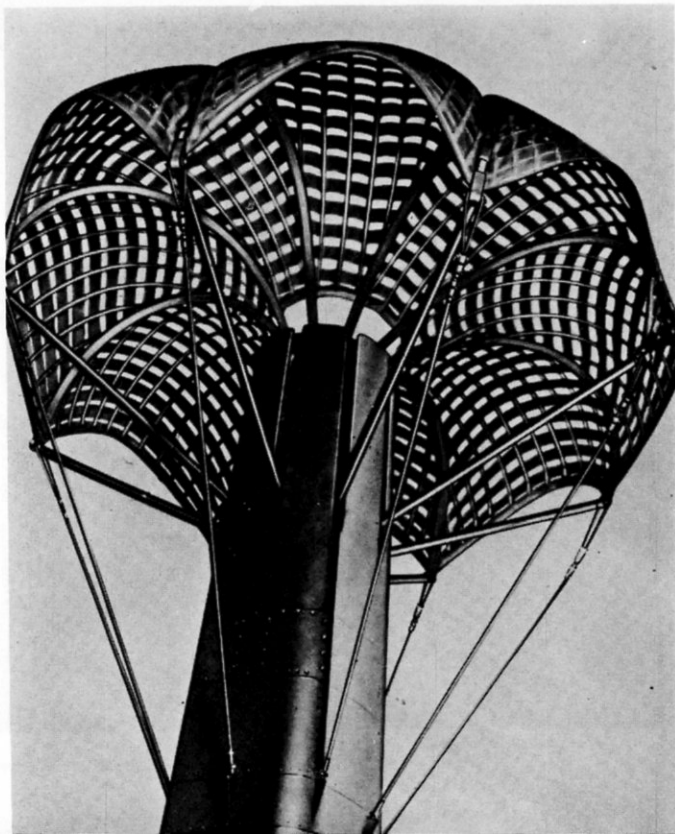
Fieseler Fi 156D-1 Storch
casualty evacuation version
Wolf Schaefer coll.



Dornier Do 217E-4 horizontal
and dive bomber
Wolf Schaefer coll.



Do 217E tail parachute
Dornier archives





Henschel Hs 129B close support
and anti-tank aircraft
Hanfried Schliephake coll.



Siebel Si 104 Hallore staff
communications aircraft
Hanfried Schliephake coll.

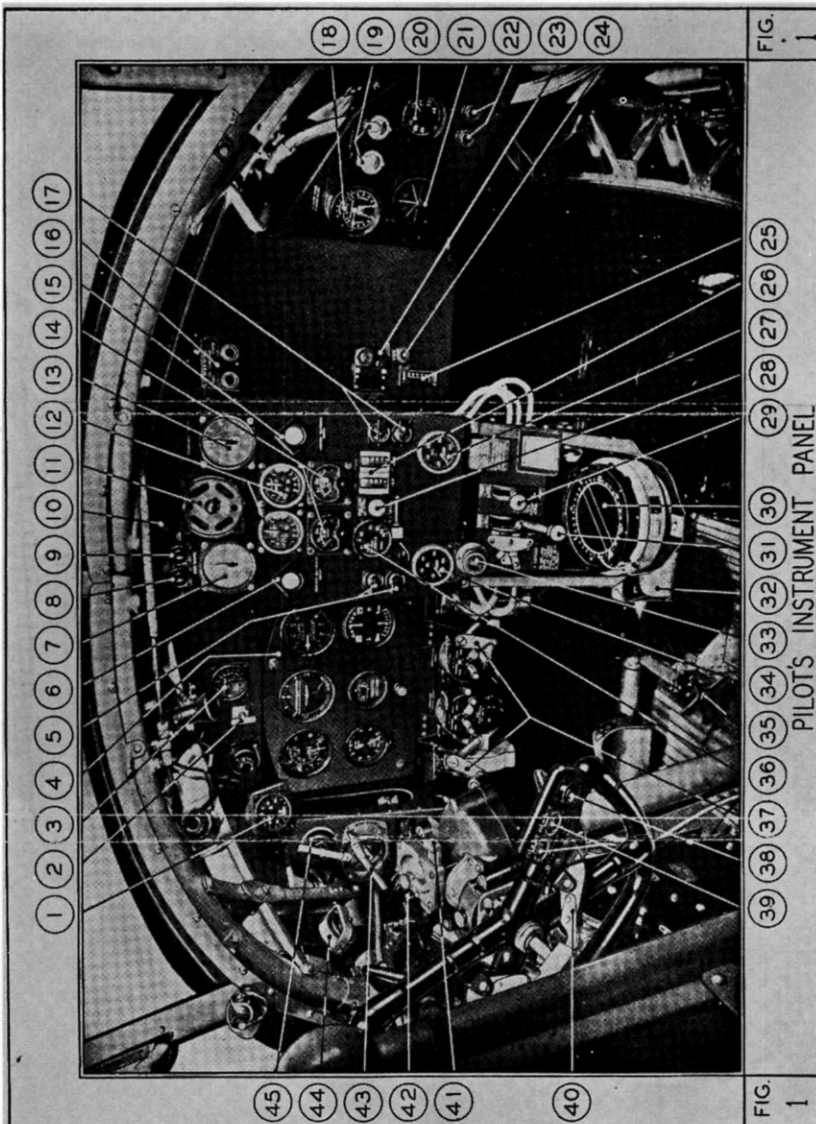


Vickers Wellington Mk IC T2501
(probably 'F' of 99 Sqn, RAF) in
Luftwaffe captured aircraft
markings 5 + 4 under test in
Germany *IWM*

PART V—ILLUSTRATIONS

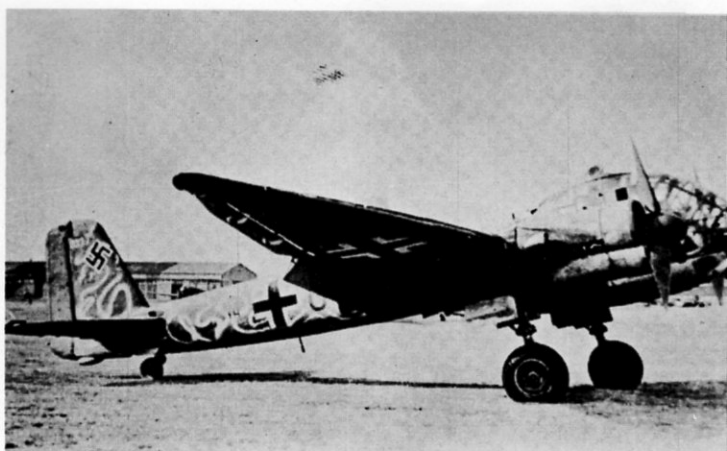
KEY TO FIG. 1

1. Bomb steering indicator.
2. Bomb/depth charge jettison control.
3. Auto-controls pressure gauge.
4. Instrument flying panel.
5. Starter and booster coil pushbuttons—port engine.
6. Propeller feathering switch—port engine.
7. Port engine speed indicator.
8. Undercarriage warning horn test pushbutton.
9. Fuel contents gauges pushbutton.
10. Windscreen wiper controls.
11. Undercarriage indicator.
12. Boost gauges (two).
13. Starboard engine speed indicator.
14. Cylinder temperature gauges (two).
15. Propeller feathering switch—starboard engine.
16. Oil tank low-level warning lights (two).
17. Starter and booster coil pushbuttons—starboard engine.
18. Pneumatic pressure gauge.
19. Fire extinguisher pushbuttons (two).
20. Air temperature gauge.
21. D.F. indicator.
22. Fuel pressure warning lights (two).
23. Pilot's call light.
24. Flare launching warning light.
25. Suction gauge.
26. Oil pressure gauges (two).
27. Oil temperature gauge—starboard engine.
28. Boost gauge reversal control.
29. Flap control lever.
30. Compass.
31. Undercarriage selector lever.
32. Rudder pedal—starboard.
33. Windscreen de-icing pump.
34. Oil temperature gauge—port engine.
35. Rudder bar adjustment wheel.
36. Flap indicator.
37. Cooling gill controls (two).
38. Intercomm. microphone pushbutton.
39. Torpedo release pushbuttons (two).
40. Brake lever.
41. Bomb release slide.
42. Bomb release pushbutton.
43. Bomb door control.
44. Landing lamp switch.
45. Bomb master switch.



Junkers Ju 188A-2 high-speed
bomber in Arctic seas
camouflage

Hanfried Schliephake coll.

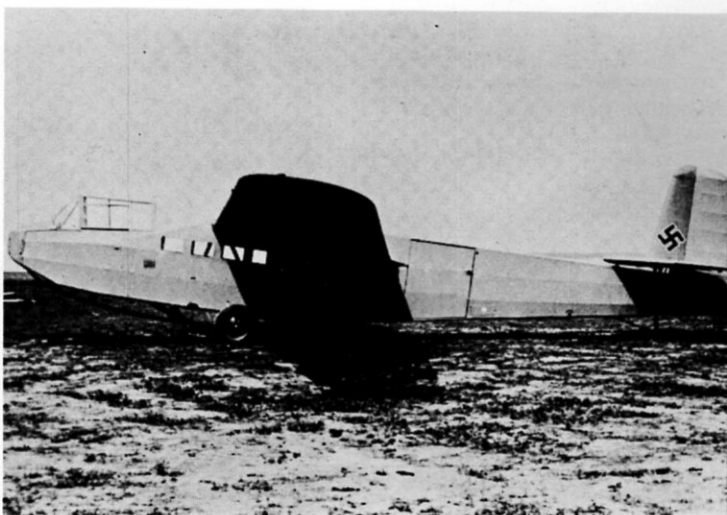


Dornier Do 215B-4
reconnaissance bomber

Dornier archives

DFS 230A-1 light assault and
cargo glider

Hanfried Schliephake coll.



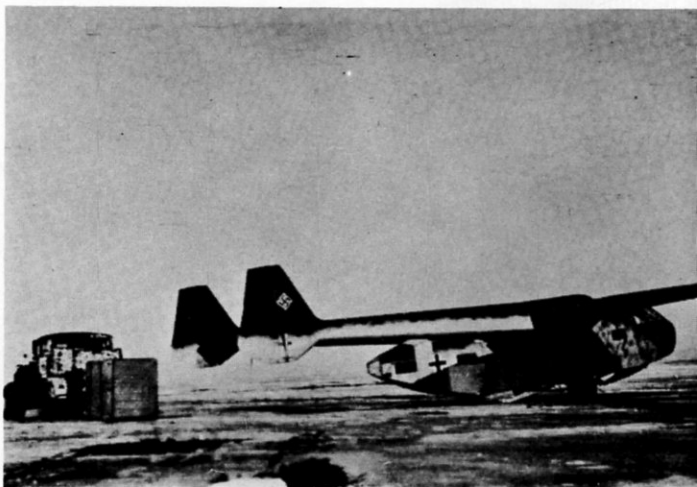
Messerschmitt Me 323D-2
Gigant large capacity transports
had Heine two-blade fixed-pitch
wooden propellers

Wolf Schaefer coll.



Me 323E-1 introduced the
so-called 'Erkerstand' enclosed
beam gun positions with MG
131s

Deutsches Museum Munich

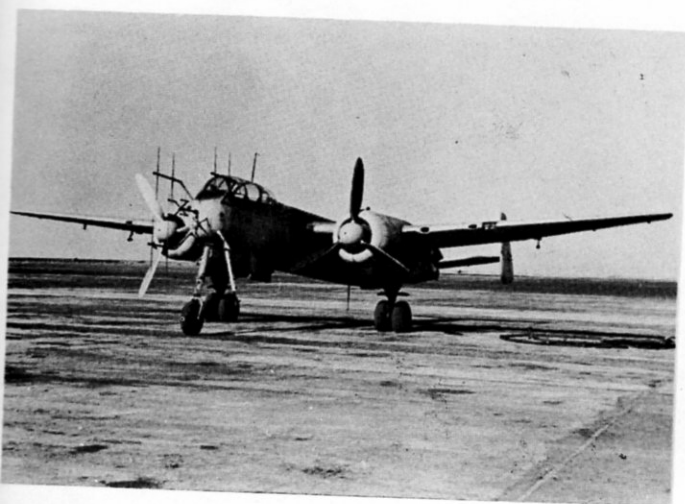


Gotha Go 242 cargo glider. The
wooden crate behind the
tailplane gives an indication of
the bulky cargoes this glider
could transport

Wolf Schaefer coll.



The first Ju 252 prototype on a test flight with stopped port engine
Dornier archives



Heinkel He 219A Uhu night fighter with FuG 220 SN-2 and FuG 212 Lichtenstein C-1 AI radar equipment
Hanfried Schliephake coll.



Heinkel He 177A-5/R2 Greif heavy bomber. This version could carry up to three FX 1400 Fritz or Hs 293 guided bombs on external racks
Hanfried Schliephake coll.

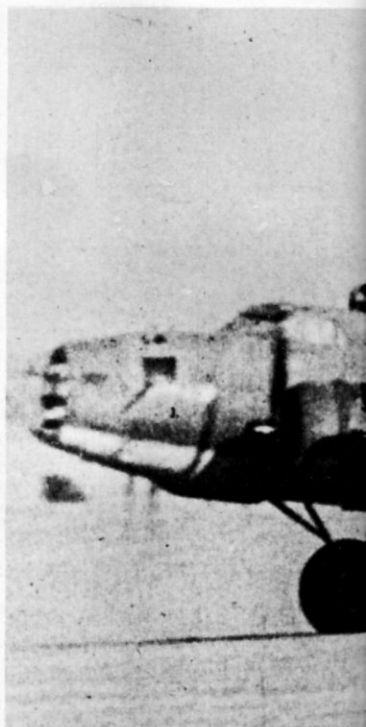
Boeing B-17F 41-24585 DL + XC, formerly 'Wulf Hound' of 360th BS/303rd Bomb Group, US 8th AAF, which was forced down near Rouen, France, on 12 December 1942. This captured Flying Fortress was widely used for demonstration purposes by the Luftwaffe *IWM*

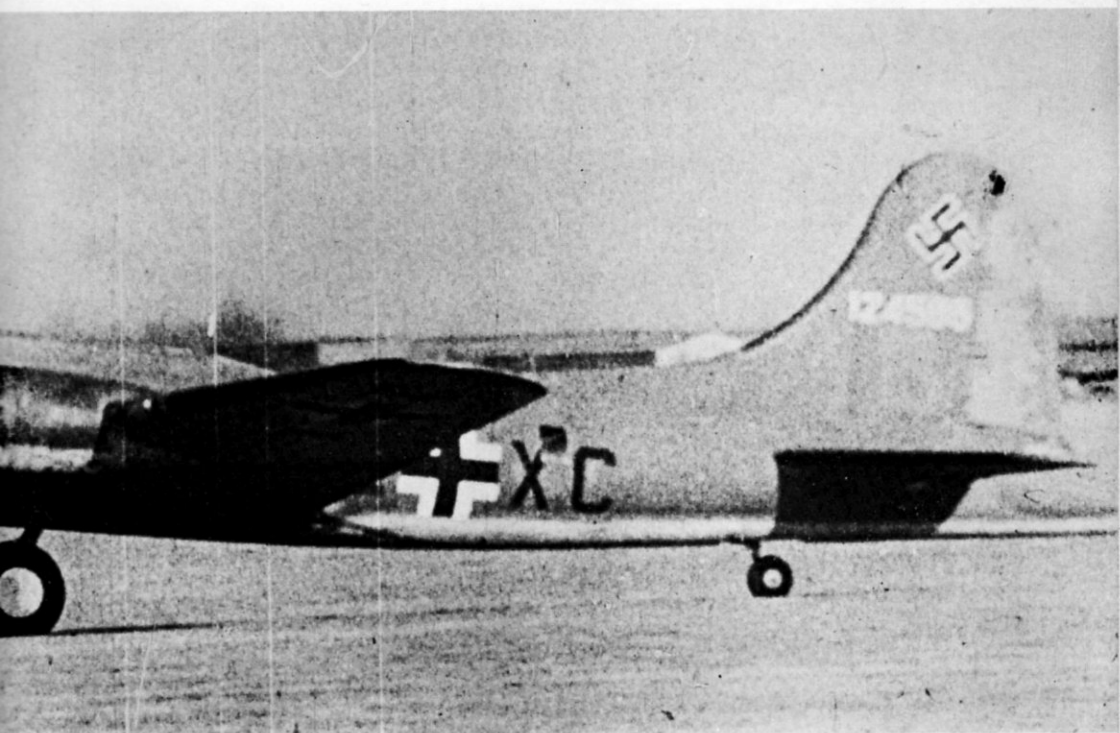
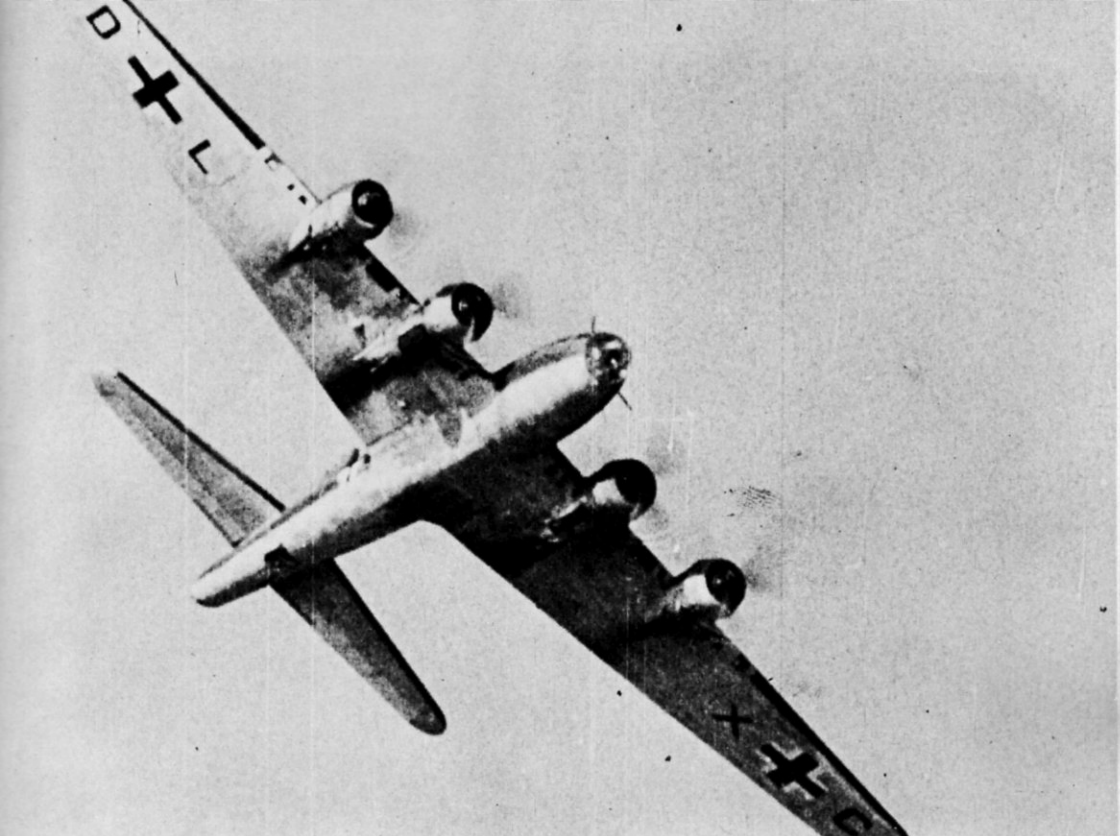
The *Akaflieg* Berlin B 9 twin-engined prone pilot research aircraft shortly before its first flight piloted by the author

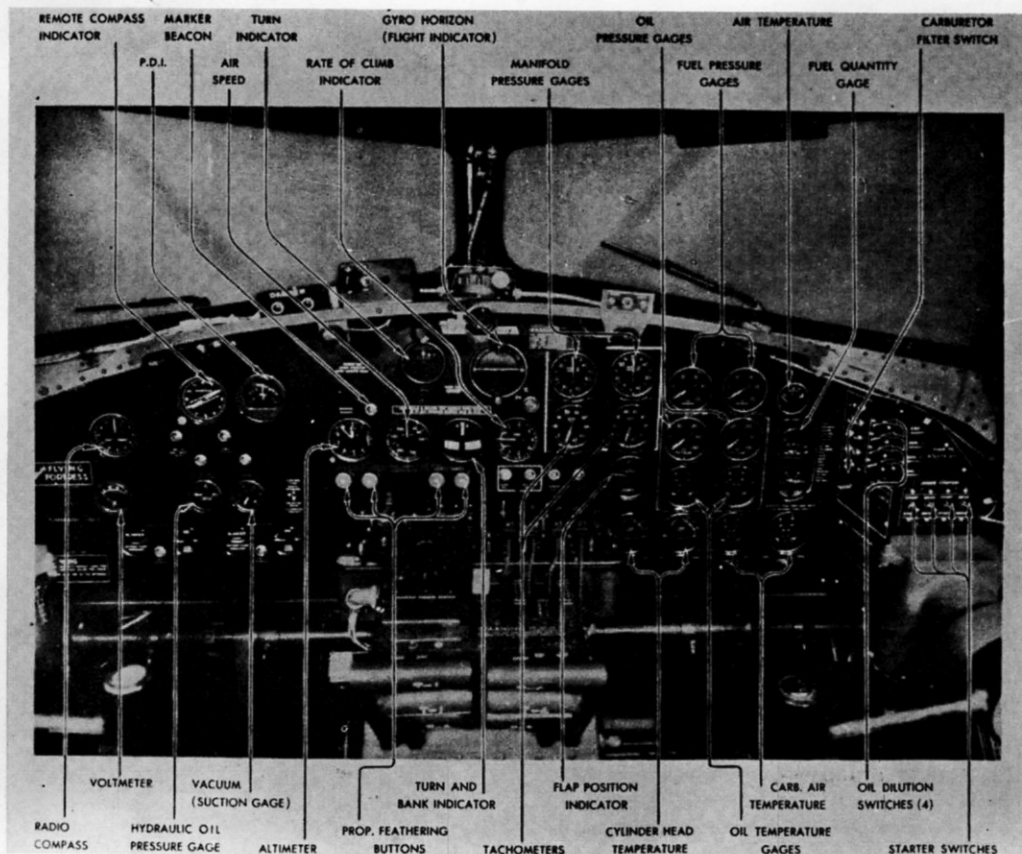
The author with the chest parachute used during his test flights with the B 9

A ground crew member tightens the author's chest parachute harness before the flight

*all three photographs:
Hans-Werner Lerche coll.*

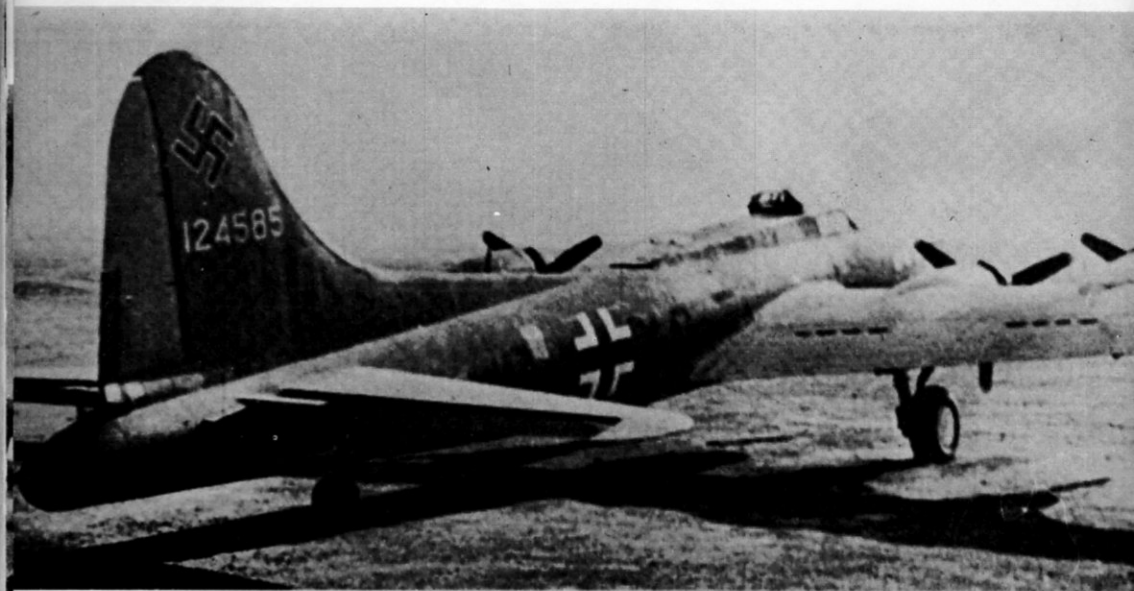






Boeing B-17G cockpit
instrumentation and controls
via Roger Freeman

Boeing B-17F 41-24585 DL + XC



all-up weight the actual take-off presented no problems and the aircraft handled normally. Then began the climb with maximum climbing power which was also measured and monitored. Everything went very well at first. The engineers were busy doing their job, and we had meanwhile reached an altitude of at least 9000 ft, when suddenly the flight engineer, sitting in the co-pilots' seat, pointed to the right and we saw ourselves in a nice mess: the starboard outer (No.4) engine was on fire! It was quite a remarkable fireworks display with flames flaring out just behind the engine nacelle and over the wing to a length of some 15 feet.

Now, what does one do when an engine is on fire? By no means throttle back the misbehaving engine, but instead stop the fuel flow immediately by shutting the relevant fuel valve so that the fuel already in the pipes and carburettor is used up as quickly as possible. That done, I alerted the rest of the crew and the engineers about the fire - in so far as they had not already noticed it themselves. For this purpose there was a loud alarm bell in the B-17, which could be heard everywhere despite the rumble of the engines. In any case, I also opened the bomb-bay doors as I considered this the best method of baling out from this aircraft without getting caught in the tail unit. The fuel in the pipes was soon used up, but I let the engine run for a while longer to make sure every last drop was gone. Despite this, the flames hardly became smaller at all.

Meanwhile, I had set course for Rechlin. We were still flying at about 10,000 ft and despite the considerable all-up weight, the aircraft was quite easy to hold at this height on only three engines. By this time the crew had been alerted and were standing at the bomb-bay doors, ready to bale out should the danger become acute. But, of course, I was determined to try to land the precious aircraft normally in Rechlin, hoping the fire would go out before the strength of the wing was impaired. We were well aware of a bad counterpart in the shape of our Heinkel He 177, whose wing would break off fairly quickly in the case of an engine fire. But my patience and fears were put to the test for a long time! With a presentiment of things to come, I had appropriated a chest parachute for this B-17 mission instead of the normal seat parachute. This type of parachute was not hooked on until the situation became serious and would give me the only real chance, especially in abnormal, uncontrollable flight conditions, to get past the dorsal machine gun stand to the bomb-bay doors. Whilst the rest of the crew were at the open bomb doors awaiting developments, I was standing between the two pilots' seats in the middle of the cockpit with my parachute hooked on and both hands on the control wheel of the B-17. Naturally, the aircraft had already been trimmed to fly on three engines since the propeller of No.4 was feathered, but the fire was still on. We had searched in vain for automatic fire extinguishers that we assumed to be fitted inside the engine nacelles. Finally, after three or four minutes of stand-up piloting the flames began to decrease but it took about six minutes before the fire went out completely. We heaved a sigh of relief as the worst seemed to be over. But I was still left with the task of landing the strange heavy aircraft on only three engines; I was certain that carrying that amount of fuel the B-17 was heavier than the permitted landing weight. There was no emergency fuel release and I also had to take into account the fact that with only three engines it would be impossible to go around again if we failed at the first attempt. Therefore, the landing had to be a close fit! In any case, the day was already too far advanced to fly around and consume the

remaining fuel.

I recalled the time during my training at a *C-Schule** when I had to land a machine with one 'dead' engine. It happened during a cross-country flight in a twin-engined Dornier Do 17 bomber, the so-called 'Flying pencil'. On the way from Neuruppin, one of its proven but old BMW V1 engines began to vibrate so badly near Jüterbog that I feared it would part company with the starboard wing. In no time the engine was stopped and the propeller feathered, but it was at least comforting to see that I could maintain altitude with only one healthy engine. We had just passed an airfield, and now it was only a matter of getting back to it. However, in my excitement I had failed to notice that it was the smaller Jüterbog-Damm airfield used by a primary flying training school operating smaller and slower aircraft, and not the other, larger Jüterbog field! The approach with the undercarriage down happened rather high and not being able to go around again on one engine I had no alternative but to perform a so-called 'Giant Californian side-slip'. Despite the small field the landing worked out very well indeed, and the pupils stared in amazement when I put down the Do 17 with one 'dead' engine beside the landing cross and taxied to a standstill right in front of the workshop hangars.

Such emergency situations give an enormous amount of experience and when the outcome is successful, also add to the pilot's self-confidence. Why shouldn't the landing of the overloaded B-17 at Rechlin be just as successful? And it did work! To be sure, I had selected the longest landing run and there was hardly any wind, but fortunately there were no other aircraft around either. After the landing flaps and the under-carriage had been lowered, I even had to open the throttles a little until the B-17 touched down on the grassy field. Due to its effective split landing flaps the aircraft had a relatively small angle of incidence on the ground and consequently a fairly short and very robust undercarriage.

We were all very pleased over the safe outcome of this flight, as the 1870 Imp gals of fuel still aboard would have produced a remarkable fireworks display. The subsequent examination revealed that an exhaust pipe had become loose so that the hot exhaust gases had blown directly onto the fuel pipes, which inevitably caught fire.

Another, but more pleasant memory concerns a round flight with the B-17 demonstrating the Flying Fortress to our fighter pilots from all angles, both on the ground and in the air, where they had the opportunity to try out mock attacks. It was in May, 1944, and I had just returned with a Heinkel He 111 from Paris. The take-off from Paris-Orly had been delayed because of air raids until 1850 hrs, and as it was forbidden to fly straight and level and one had not only to keep to the marked flight paths but also fly close to the ground on account of possible attacks by enemy aircraft, this particular flight lasted about 3½ hours. And when after this performance I was advised that enemy aircraft had also penetrated over Germany - I was of course flying with a radio operator on board - I decided to land after a two-hour flight at Giessen. It was a close shave: a good friend of mine who had tried to reach Rechlin that same evening was unfortunately so badly blinded by local Flak searchlights during his approach that he crashed.

The take-off next morning was as early as 0625 hrs - a sure sign that many

*Flying training school (Multi-engined aircraft)

THE
WRITING
WAS ON
THE WALL

strange aircraft could be expected over Germany that day, not because I was an enthusiastic early riser.

On 12 May the air situation apparently made an excursion to Brandis possible with the B-17. The flights there and back, each of three-hour duration, were put to good use for the instruction of Luftwaffe fighter units.

Two days later began the proper round flight with the B-17, taking me via Munich and Vienna to Prague to demonstrate the aircraft to the fighter units stationed there. To avoid being molested by enemy aircraft, the take-off from Rechlin was set at 0643 hrs. It was an extremely pleasant flight. In fact, I even switched in the autopilot, which worked perfectly. I am emphasising this because I was no friend of seldom-used three-dimensional autopilots. On one occasion, one of these gadgets had gone crazy on me and only by immediately activating the emergency release had I managed to save the aircraft and my crew from a nasty fate.

Just before Munich we had a rather pleasant experience. As I was descending to the airfield, I overtook a Focke-Wulf FW 56 Stösser trainer probably doing his Sunday morning exercises. When the pilot recognised the B-17, he displayed a perfect bunt for us. Of course, one could understand his shock, but when the pilot, a colonel, later complained to the air traffic control we just laughed. After all, our flight had been properly notified and nobody could expect me to keep away from every single sports aircraft.

That afternoon we made the first flight that brought us into contact with Luftwaffe fighters. At that time, attacking the B-17 from ahead was considered a particularly effective tactic. However, during the preliminary discussions I had already pointed out that the B-17 had a rather tall fin, a point that had to be kept in mind when sweeping in towards the bomber. Be that as it may, I must say that the fighters dealt pretty hard with the 'enemy' afterwards, and sometimes my fingers itched to make a timely evasive manoeuvre. To be sure, the fact that I was flying a 'friendly' B-17 must have had something to do with their wild attacks. However, the training session passed without incident and finally I was relieved to land with an undamaged tail unit after all. Meanwhile, the word had got around that a B-17 was standing at Munich-Riem airfield and this attracted not only the fighter pilots who had a professional interest, but also other military personnel. So much so in fact that even generals were queueing up to have a look! Further flights followed above the cloud cover over the Lower Alps and one can imagine that it must have been an exalting feeling for the fighter pilots to fly so close to a Flying Fortress without being shot at 'out of all buttonholes'. The following flight to Vienna-Aspern airfield was also used for training fighter units and consequently lasted nearly four hours. Naturally, there was also much interest in the B-17 in Vienna too, not only in the air but also on the ground.

We had arranged that after one of these flights in the B-17 it should also be shown at Cobenzl, the residence of Colonel H., a relative of Göring, who commanded the local fighter units. I had great fun demonstrating the Flying Fortress in low-level flight there. Being accustomed from my evaluation flights to change continually from one aircraft type to another, and thus never really feeling at home in any of them, I really enjoyed making several flights one after another in the same aircraft, which of course allowed me to become much more familiar with

it. The B-17, because of the strong control forces required to activate its ailerons and rudder, was not exactly the ideal object to be whirled around so close to the ground; but with the strength of a well-trained oarsman I succeeded in adjusting the steep turns with the Flying Fortress to the hilly Cobenzl landscape. The flight back to the airfield at Aspern took us over the rooftops of Vienna, passing close to the giant wheel of the Prater amusement park at the height of its axle. I really had fun on that flight! However, when after landing at Aspern one of the flying control fellows came running towards us I had second thoughts on whether my low-level 'exhibition flying' had really been approved. After all, there was the famous Paragraph 92, which was supposed to keep an eye on the flying discipline and order amongst airmen. Known concisely as the 'paragraph against flying indecency', it made flying 'at inadequate height' a punishable offence. I suddenly remembered with a shock that a short while ago I had visited a good friend of mine 'in confinement', who had turned some fancy rolls in a Do 217 bomber and had been observed and reported by a spiteful spectator.

But everything was quickly clarified to our complete satisfaction - and relief. The 'big chief' at Cobenzl had been delayed by another appointment and had only seen the final part of our air display. In fact, he had rung up the airfield flying control and left a message asking whether I could possibly come around again. This was more like it, and with the greatest of pleasure we took off again immediately into the calm evening air. My crew were also pleased to note that as a result of our earlier practice I could really 'take on' the Cobenzl landscape, and I was also flattered to see a non-pilot engineer colleague from *E2 Beute* section lying prone in the bombardier's position in the nose, quite enjoying my aerobatics 'on the ground floor', so to speak. It was nice to know that someone had that much confidence in my flying ability.

There were no further 'unusual occurrences' and the flight continued smoothly next morning. In Prague too there was great interest amongst the fighter units to see the big American bomber in the air and on the ground. There was also a happy reunion with former flying instructors from Neuruppin, and I took one of them with me for a flight in the B-17. The only trouble was that when one with supreme effort managed to swing the 'heavy bird' from one steep banking turn into another so close to the ground, there was always the danger that the spectators would get the impression they were watching an easily manoeuvrable plane - which is certainly not true of the B-17! It had never been intended for that purpose.

The flight back to Rechlin created no difficulties. In June, 1944, I ferried the B-17 to an inspection at Lärz, followed later - as already mentioned - by the Lancaster, Mustang and Thunderbolt.

That the B-17 was a particularly robust workhorse is also shown by the fact that it could easily be used for towing. When a DFS 230 ten-seat transport glider had to be towed to higher altitudes and the good old He 111 proved too weak 'in the lungs', we simply mounted a tow coupling unit onto the B-17. I must say it was a completely novel feeling for me to tow a transport glider with a B-17 to higher altitudes! With these additional flights I clocked up a total of 35 flying hours on the B-17. I really enjoyed flying the 'Fort' as it made a most reliable impression, and the engines always performed perfectly, except for the one engine fire which was probably due to maintenance difficulties. Perhaps there were other aircraft that

were even more pleasant to fly than the B-17, because it did have its drawbacks: for example, the forces acting on the ailerons were relatively high, and the rudder felt as if it were set in concrete. But it was much more important that the aircraft was easy to fly and land. When one had become accustomed to the higher all-up weight and the strange instruments, it could be compared with our He 111 in the degree of effort needed to fly it.

What was really outstanding about the B-17 which made it, together with the Liberator, the standard day heavy bomber in the European theatre of war? It certainly was not fast in low altitudes; only the exhaust-driven turbo-superchargers gave the B-17 its good performance at higher altitudes. All in all, that was for me the most admirable thing about American planning, namely the consequential pursuit of a concept once it had been recognised as correct, in this case the effectiveness of raids carried out by well-armed high-altitude bombers flying in close formations. One must remember that several years would pass between planning and execution of a concept. Possibly only the idea of keeping the attacking fighters at bay with heavily-armed bombers flying in close formation and firing from all 'portholes' had to be revised. This consequently happened after the raid on Schweinfurt which, due to the long distance involved, had to be carried out without fighter escort. During this raid the USAAF bombers suffered heavy losses from twin-engined *Zerstörer* and single-seat fighters attacking with rocket missiles, which naturally caused quite a crisis. The correct solution to this problem was soon found: 'elimination of the sluggish, rocket-carrying Luftwaffe 'destroyers' by escort fighters - and several versions of these, with excellent performance, were also soon available. Nor did the rather poorly adjusted control forces on the American bombers have much detrimental effect, as this was certainly not decisive during the approach at great height, and even less so after the bombers had been equipped with an excellent three-dimensional autopilot. It must be stressed that the respectable speed of the B-17 at higher altitudes was due solely to its excellent exhaust-driven turbo-superchargers. But for the production of these devices one required not only the know-how but also large quantities of heat-resisting materials which we were lacking in Germany.

Occasionally I would receive via Switzerland foreign reports on German aircraft, and it was interesting to read that they quite often not only praised the construction of the machines but the engines as well, more often than not concluding that the Germans just did not have the necessary heat-resistant metals for even better performance.

During such critical take-offs as that with the B-17 from a clearing near Esbjerg, the question arises of whether it is worth risking a few small tricks when every single metre matters. For example, things like lowering the landing flaps shortly after attaining the unstick speed, or raising the undercarriage at the first hop off the ground. I don't think much of such niceties when every metre is at stake. Anyhow, the limited chances of success in such situations already takes for granted absolute familiarity of the pilot not only with the aircraft, but also with the operational effectiveness of the hydraulics of that particular machine. And, of course, as far as it is necessary co-ordination with the co-pilot and/or the rest of the crew must also be perfect. The rapid retraction of the undercarriage alone is a case in point: one must be completely in the picture as to what exactly happens when it is retracted. For

example, if the main wheels have so-called partial (or hinged) covers which have to open before retracting, this may not only increase the drag as the undercarriage begins to move, but impair the lift as well – both very disagreeable phenomena if the aircraft is ‘hanging’ in the air at minimum speed. (Crews on Jumbo Jets are reported to have already experienced this.) But there are also other errors to be made! Once I had the pleasure of witnessing a very impressive visual lesson from the ground, when an especially smart pilot took off in an Arado Ar 79, a small two-seat sports aircraft in which the undercarriage could be raised in one movement. As he was catapulted prematurely into the air by a bump in the ground, he immediately retracted his wheels – and promptly flopped back on to the ground on his belly. It was a lesson I never forgot.

I recall having lowered the wing flaps shortly before becoming airborne only once, in October 1943, when I had to tow the Heinkel He 280 twin-jet fighter from Marienehe to Rechlin with a Heinkel He 111. The take-off was critical in as much as we needed the whole airfield because the He 280 behind me had a much higher unstick speed and could only become airborne after the He 111. But that was an exceptional case.

Junkers Ju 290 and Martin B-26 Marauder

A particularly interesting period of my evaluation flying career now began. There was hardly an aircraft type from a six-engined transport to a single-engined fighter that I had not flown. Perhaps the difference from my earlier days at Rechlin is best characterised by the fact that I no longer had to ask whether I might be allowed to fly a new aircraft type. This was the most definite indication to me that I had matured as a test pilot. I now participated whenever there was something interesting to fly.

It was at this stage that I was offered a special flying delicacy: the Ju 290. This large four-engined transport with BMW 801 radial engines represented a military development of the pre-war Ju 90 airliner, and an example came to Rechlin in April, 1943. This military transport version featured a ventral loading ramp which, when hydraulically lowered, lifted up the tail end of the fuselage to permit vehicles and similar loads to be driven into the giant cargo hold.

My first flight in this precious 'ship' was in the Ju 290 CE+YZ. Later, I flew the Ju 290s SB+QG and SB+QB. Although I had already flown the larger Messerschmitt Me 323, the giant powered cargo glider with six Gnome-Rhône engines, the Ju 290 was a 'real' aeroplane. And, considering its large size, it was exceptionally pleasant to fly.

I remember well a particularly interesting flight in the Ju 290 when we had to evaluate the FuNG 101 precision radio altimeter. At long last there was a task that made a pilot's heart beat faster! Just imagine: officially permitted low-level flying with such a huge 'steamer'! It was simply fascinating. As it was impossible to do this over land, even over the largest fields, I flew the required measuring run over Lake Müritz. Of course, one had to be terribly careful because the pilot's seat was fairly high up in the Ju 290 cockpit and it would not have been the first time that someone had 'tickled the waves' with the propeller tips. But I really enjoyed this low-level flight.

Later on I also had an opportunity to ferry a newly completed Junkers Ju 290 from the factory at Dessau to Rechlin. It really was a giant piece of hardware with its 137 feet span and enormous fuselage. In fact, the Ju 290 was hardly smaller than the Boeing B-29 Superfortress, although the latter of course had more powerful engines and a greater all-up weight. Thus, whereas the four engines of the B-29 developed 8800 hp for take-off, the Ju 290 could 'only' manage 6800 hp. Accordingly, the gross weights were 55,000 kg (121,250 lb) and 40,000 kg (88,180 lb). Looking back, I would have very much liked to evaluate a B-29 Superfortress as well, but that was not to be - it never got to Europe, in any case. And, by God, the completion of my personal collection of aircraft types was no

reason to wish for a prolongation of hostilities!

On overland flights I could really enjoy the excellent view from the Ju 290 cockpit. Despite its size the aircraft was pleasant and simple to fly, but on landing one always had to remember that the height of the pilot's eye level on touching down was more than 20 feet above the ground. The qualities and performance of the Ju 290 transport, reconnaissance and bomber variants exceeded those of the Focke-Wulf FW 200 Condor quite considerably, especially as regards armament and maximum range - which, in the case of the Ju 290, was some 6000 km (3730 miles).

These few weeks were just according to my taste again. And of course I did not even dream that just one month later I would be presented with a B-24 Liberator as well. Be that as it may, even the types I had flown during May, 1943, also made quite an interesting collection. Beginning with a Messerschmitt Bf 109G fighter, I then followed with overload take-off tests with a Ju 52/3m. Then came flights in its successor, the Ju 252, with its smooth metal skinning and retractable undercarriage - quite a difference from the old 'Auntie Ju'; then a cross-country flight in a Messerschmitt Bf 108 Taifun; measuring flights in a Henschel Hs 129 single-seat anti-tank aircraft towing a DFS 230 cargo glider; flights in the Fi 256, the four-seat successor of the well-known Fi 156 Storch; and cross-country flights in the giant Messerschmitt Me 323. In between there were more flights in the He 111, Ju 252, then Siebel 204, two flights in the He 177, and again Me 323 and a Siebel 204; then the Arado Ar 232 (of which more later), again a Ju 252, and an He 177 (DM+QH) with more powerful DB 610 engines. These heavy bombers were powered by two coupled engines, initially two DB 606 (each unit comprising two DB 601 engines) and later two DB 610 (2xDB 605). Each power unit with two engines mounted side-by-side was in a common nacelle and drove a single propeller. These later versions of the He 177 also had a longer fuselage and other improvements. Amongst other things, attempts had been made to reduce the notorious danger of engine fires by fitting an ingenious 'gutter' between the coupled engines which collected the leaking oil drops and prevented them dripping onto the red-hot exhaust pipes. In May I also added the He 219 night fighter to my list, and, as already mentioned above, the Ar 232 assault and general purpose transport also enriched this varied programme.

The Ar 232 was initially powered by two BMW 801 radial engines, and the machines flown by me carried the following identification letters: VD+YD, TC+EC and TC+ED.

With the Ar 232 TC+EC I once had to fly a very special 'porcelain' transport mission.

It was on the occasion of the RAF raid on the Peenemünde flying bomb and rocket test centre on the night of 17/18 August, 1943. In the morning of 18 August, I had made two flights in the Ar 232 TC+EC and knew that the aircraft was in perfect order. As a second raid on Peenemünde was feared, it was decided that the still intact aircraft should be flown out to safety. However, as this could not be expected of the pilots and crews at Peenemünde, still in a state of shock after the night attack, a relief action was organised from Rechlin and 24 test pilots and flight engineers were to be taken to Peenemünde to fly out the valuable machines to nearby Anklam. Thus, in the afternoon of 18 August I received orders to transport

the 24 men to Peenemünde and then bring them back again from Anklam. I was very conscious of the great responsibility involved, but also very pleased at the confidence placed in me. Yet on the other hand, I did not feel too comfortable, especially when before our take-off I saw many of the notable Rechlin test pilots standing around in the Ar 232 fuselage as if in an underground train; there just were not enough seats in the machine.

As far as one could judge from the airfield, Peenemünde presented a terrible picture after the night raid. I discharged my precious load and flew on to Anklam with my three crew members, where the ferry crews, after landing the most important of the Peenemünde aircraft, were to be picked up again and flown back to Rechlin. Everything went smoothly and as I landed back at Rechlin at 2002 hrs, I had done a really good day's work and there was a load off my mind. An accident during these flights would have practically paralysed our test centre at Rechlin.

Later, a good friend of mine crashed with a similar Ar 232 and was killed. After taking part in a demonstration, the Arado took off from the concrete runway at Lärz with one wing hanging and tightened in a turn until it crashed. This would seem to indicate a fault in the ailerons or landing flaps as the cause of this tragic accident.

In addition to the twin-engined Ar 232A I later also flew the four-engined Ar 232B version with BMW-Bramo 323 engines of 1000 hp each. Apart from the engines, there was hardly any difference between the airframes of these two versions, except slightly longer span and one pair less bogie wheels on the Ar 232B. Perhaps this alteration had something to do with a peculiarity of the Ar 232 on touch-down when the landing gear was in position for unprepared ground. If the Ar 232 were pulled to the maximum angle of attack, then the last pair of the small rear wheels touched the ground first and being too weak for the total weight naturally immediately gave up the ghost – not that anything else could have been expected! Otherwise, the Ar 232 was pleasant to fly; I cannot recall any bad flying characteristics.

Once, when I was flying this relatively slow aeroplane a bird smashed against the cockpit glazing. It had however decently chosen a steel strut as the point of impact for its suicide and thus the collision had grave and final consequences only for the bird. But the danger of a 'bird strike' was always there.

After a ferry flight of a Do 217N with night fighter 'antlers'* from Munich-Riem to Rechlin, there was a new attraction: the first Ju 390 prototype, a very long-range reconnaissance aircraft powered by six BMW 801 engines. I was very proud to be one of the few pilots chosen to fly this heavy aircraft. The Ju 390 had been evolved from the Ju 290 by the addition of more fuselage bays and wing sections to carry another pair of engines, and had a span of over 50 m (165 ft). As a result, the wing structure was not very strong and the big aircraft had to be flown very carefully. All in all, the Ju 390 was a remarkable monster with an empty weight of about 40,000 kg (88,180 lb); fully loaded it was expected to tip the scales at some 75,000 kg (165,350 lb). It was said to be able to fly non-stop from Germany to Tokyo or New York and back. But piloting it was another matter! Even a slight movement of the control column caused vibration of the wings, so it had to be handled with a very light touch. On the other hand no bad characteristics of a

*Colloquial Luftwaffe term for FuG 212 and similar AI radar antennae

basic nature could be established during the first careful flights. As with every large aircraft, it appeared to be slow when seen from below, an illusion helped by the fact that due to its light load the Ju 390 really could be flown very slowly. Consequently, the landing approach made a very imposing impression on all spectators.

And there were always new aircraft types for me to try out! So I had an opportunity to fly the de Havilland Dragonfly (RP+MY), a twin-engined biplane airliner of pre-war days, to get an idea of its flying characteristics. This biplane was braced with two struts on each side, but despite the wire entanglement the de Havilland engineers had succeeded in producing a fast passenger liner with a good wing profile, and an aeroplane that was also pleasant to fly.

Meanwhile, there was again something better on the agenda, a captured Martin Marauder. The Martin B-26, powered by two Double Wasp R-2800 radial engines, was a fast medium bomber with a maximum speed of about 310 mph at 13,000 feet altitude. A mid-wing monoplane with an aerodynamically faultless fuselage, the aircraft had a fast and racy look about it even from the outside. Its long range also made it suitable for direct ferry flights across the Atlantic. But the B-26 also had its negative points. With its small wing area and a gross weight of some 30,000 lb (later increased to over 38,000 lb), the load per square foot of the wing area was relatively high, and the high take-off and landing speeds caused so many bad accidents that this aircraft at first had a poor reputation amongst the crews and was known as the 'Widow Maker'. Its other nickname of the 'Flying Prostitute' was unknown to me when I became intimate with the Marauder for the first time. Apart from other bad characteristics, malicious tongues also asserted that the Marauder's landing speed was higher than its cruising speed. Yet all this did not prevent experienced crews from appreciating the combat value of the B-26 on account of its high speed and strong armament, and using it accordingly. That much was known to us – and it was to be expected that the small grass field at Rechlin would not be abundant enough for this 'hot' aircraft.

Our share of excitement with the Marauder was still to come. Perhaps the adjustment of the propellers was not set correctly, or perhaps someone had already tinkered about with them. But what I experienced on my first take-off in this strange aircraft surpassed all expectations! Naturally, based on my experiences with the Liberator (of which later) I had tried to determine the correct centre of gravity for take-off; I could also expect that the nose-wheel would at least prevent any unpleasant surprises, such as a sudden swing during the take-off. Of course, before the start the engines were carefully and briefly run up and then switched off again, and the speed governors tested.

The direction for take-off was along one side of the Schropp'schen mountain – although the description 'mountain' was slightly exaggerated; it was a ridiculous little rise topped by a radio station. I had placed the Marauder as far as possible behind the air traffic control van in order to make full use of the available length of the field. Then the usual procedure: full on the brakes, full throttle, and then brakes off and away! At first the engines ran perfectly and the aircraft accelerated well, pushing my back into the seat.

It may have been that the automatic propeller regulator did not function properly, letting the engines overspeed before reducing the revs, and then

unevenly. All at once the starboard engine began losing power and the Marauder showed a strong tendency to swing despite the nosewheel undercarriage. By that time it was already too late for me to cut the throttles as the aircraft was going too fast to stop, but on the other hand not fast enough to become airborne. Nevertheless, although the engines were running with far too few revs I managed to lift the Marauder just off the ground shortly before reaching the airfield boundary. As soon as I could feel that the aircraft was actually flying and had not just been 'hailed up', I ordered the flight engineer to raise the undercarriage since I wanted to avoid the risk of touching the ground with the wheels down. In this manner we floated past the radio station on the right at a height of some 3-6 feet. Since there was no immediate danger for our aircraft in the shape of trees or other obstacles, I thought it would be better to stay close to the ground and wait to see whether the engines would pick up enough revs to allow us to climb, or whether I had to cut the throttles and risk a crash landing. But for my colleagues observing this take-off from the other side of the field everything looked much more hair-raising. They had heard the brief overspeeding of the engines, the subsequent regulation of revs and the irregularities in the engine running, and then seen the Marauder speeding towards the Schropp'schen mountain just skimming the ground. In addition to that the B-26 raised a cloud of dust as it raced low over tilled land, like the lift turbulence produced in a wind tunnel, until the spectators could no longer see the aircraft. As a result, quite used to untoward happenings at Rechlin, they awaited the seemingly inevitable crash and subsequent blast of flames and mushrooming smoke.

However, the propeller speed control gradually began to function smoothly and I succeeded in commencing a climb after raising the landing flaps. Perhaps the lubricating oil had been too thick and prevented correct regulation of the propellers. Be that as it may, I am sure that my decision to stay close to the ground at low speed had been correct; it was also best in case of a possible crash landing.

My colleagues later confirmed that they had not given much for my chances and the aircraft at that moment!

After the engines, or rather their propeller adjustment, had been reminded of their duty, I got to know the B-26 as a quite passable aircraft. But it was a piece of equipment that had to be handled with great sensitivity. On a longer flight, I then became good friends with the Marauder and the propeller pitch control now functioned properly. This was one of the typical instances when a report on faults could only be prepared when everything had gone well in the end. If the take-off had gone completely wrong, no-one would have known that the cause was nothing more serious than the hydraulic oil which had probably become too thick. Even today, such difficulties still arise, despite radio-telephone communications, as in moments of great danger the pilot has more important things to do than chatter. This can only be overcome by the direct radio transmission not only of the data indicated on the control instruments, but also the critical values regarding, for instance, strength and rigidity which cannot be reconstructed after a crash, as is indeed usual practice during test flying today.

I can imagine that the high wing loading of the Marauder had caused difficulties similar to those experienced at the beginning with our Ju 88, whose wing area also had to be increased for single-engined flight. With raised flaps and undercarriage,

the Ju 88 was extremely pleasant to fly. However, with lowered flaps and undercarriage, the pilot of the Marauder had to be careful when coming in to land due to the high sinking rate, although as long as both engines were running the landing approach with open throttles and the landing itself with the nose-wheel undercarriage on a long run-way presented no problems. Anyway, after my experiences during the first take-off in the Marauder, I preferred the long concrete runway at Lärz, our second base, for the landing and further evaluation flights. And there everything went smoothly.

Italian aircraft

As an expert on foreign aircraft, I also tested nearly all Italian aircraft types we were interested in, i.e. those that could be used for training, paratroops, transport, and the like. I had the doubtful pleasure, however, of landing with a Siebel Si 204 at Vergiate, the works airfield of Savoia-Marchetti, exactly on 8 September 1943, the day royal Italy surrendered to the Western Allies.

True enough, our crew comprising an *Oberleutnant* friend of mine, the flight engineer, radio operator and myself, had heard the excited speeches on the radio, but it was only when we went for another swim in the splendid Lake Maggiore that a German embassy official told us what had really happened. A telephone connection to Milan or any other German post was impossible to establish. We had to be on our guard now, of course. In the evening we discussed the various possibilities of perhaps taking a boat and crossing Lake Maggiore for Switzerland, but we remained calm.

The night in the hotel 'Tre Re' (Three Kings) was not exactly peaceful; each uniform popping up in the building could mean trouble for us, and we therefore took turns on guard duty during the night. But the night passed without any trouble, although next morning when we went back to our Si 204 on the Savoia-Marchetti works airfield, the Italian workers standing on the apron did not have a very friendly appearance. We had the impression that only a spark was needed to blow up the powder keg and we tried to avoid anything that might antagonise the locals. Our Siebel had been broken into, but to all appearances nothing was missing. There had been no weapons on board in any case: we were carrying our pistols with us. Unfortunately, we could not rule out sabotage though. Nonetheless, I decided to take off with the Siebel for Munich-Riem, but planned to fly over the flat land on the south side of the Alps for the first ten minutes. Should no defects become apparent, I would then – without using radio communications – head for Munich. It had to be a direct flight because a stop-over at Vicenza, according to our original instructions, was not advisable under the prevailing conditions. The Savoia-Marchetti people did not make any difficulties for us, and so we took off at 1145 hrs. Our Siebel also did not show any malice, and soon the climb over the Alps began. Ninety minutes later we landed safely in Munich, looked at with astonishment, besieged and questioned about happenings in Italy: we were the first to arrive at Munich-Riem from Italy after the recent events. Eventually news came in that there had been fighting in some places in Italy. In the afternoon we continued our flight to Rechlin.

Then I received an order to fly to Italy once more to find out what aircraft might be of interest to us. I took off in a He 111 on 13 September to fly to Treviso and

Vicenza, and then on to the Italian test centre at Guidonia which is situated east of Rome. The first aircraft I tested there was a Savoia-Marchetti SM.82, a three-engined heavy transport. It was a relatively harmless aircraft which presented no operational difficulties and was later used by the Luftwaffe. When I tested it at Guidonia, it still had the unfamiliar arrangement of the throttle levers: in Italian, and originally also in French aircraft, the throttles were pulled back for full power, opposite to our practice. However, the Savoia-Marchetti SM.82 being a good-natured aeroplane, I had no problems in operating the throttle levers the other way round. The return flight took me to Turin via Reggio Emilia and Milan. There I test-flew the Fiat G.55 fighter which was powered by a German DB 605 engine. It had the Italian throttle arrangement, and that again took some getting used to. On the return flight I had to take part in various discussions at Vergiate, Lonate, Milan and Vicenza before I got back to Rechlin. There was hardly any time to relax.

Another orientation flight to Italy followed on 6 October 1943 in an Arado Ar 232B combat zone transport which had to undergo an endurance test. By then, the bogie wheel arrangement of this aircraft had gained it the nickname *Tausendfüßler* (Millipede).

This time I flew to Venice via Munich-Riem. It was already late in the day, and so the touch-down at Venice airfield approaching over the Lido became a night landing. Contrary to many other previous night landings, I was flying a German aircraft with a radio operator this time, and was even duly announced – quite an exception. I already knew the airfield from my previous trip to Italy with a Heinkel He 111. At that time I had approached the field from the land side over the tall trees and gained the impression that the air traffic control at this small place did not often have a He 111 as a visitor; the only bigger aircraft to land there were probably the Ju 52/3m transports. The approach by night, from the water side this time, was far more impressive, and I was sure that if I came in a bit too low my Arado would not have got the better of the three foot high quay wall. When we were being taken to the Danieli hotel through the night I could not help remembering my mother telling us with great enthusiasm about her journeys to Venice and the ‘Danieli’. The following round-flight took us again across northern Italy and to Turin. There I made another test flight with the most modern Fiat fighter, the G.55 with the German DB 605 engine. The G.55 was certainly not a bad aircraft, but compared to our Bf 109 and FW 190 fighters it was not decisively better, either. This, I believe, also held true for the Macchi C.205 with the DB 605 engine, whose flying and other characteristics I could later test in Germany. But the Italian throttle lever arrangement demanded the utmost concentration, even in these single-engined machines.

At Sesto Calende and Vergiate, where the Savoia-Marchetti works airfield was situated near Lake Maggiore, I also flew the SM.91, a twin-engined heavy fighter powered by two DB 605 engines. This aircraft was of similar layout to the American P-38 Lightning, with a twin-boom fuselage and a central cockpit. The test flights with this Italian machine were quite fascinating for me: the weather was gorgeous and I was hovering high above Lake Maggiore seeing Mont Blanc in the far distance. Afterwards I ferried this twin-boom fighter to Rechlin via Munich-Riem. Further test flights revealed, however, that this aircraft was of no special

interest to us, since it offered no technical advantages over our own *Zerstörer*. It was also found that, when flying at speeds exceeding 600 kmh (373 mph) 'a little man joined in' (as we used to say) in the elevator control, i.e. there were signs of vibration.

While it was not easy even in single-engined or good-natured multi-engined aircraft to get used to the Italian way of pulling throttle levers, the control of twin-engined high-performance aircraft with a certain tendency to swing at take-off demanded unusual concentration. The effectiveness of the rudder was frequently inadequate to prevent these machines from getting off course when taxiing for take-off, and the pilot was obliged to use assymetric power for both engines in order to avoid a swing. This additional operation of the throttles was immensely complicated with the throttles set the other way round. The extent of this handicap could be made clearer by a comparison with driving a car with the brake and accelerator pedals exchanged. When later on Luftwaffe units made check flights with similar non-converted aircraft there were a number of bad accidents. Apart from unsuccessful take-offs there were occasions when pilots taxiing to the parking area in front of a hangar instead of cutting power rammed into other aircraft or into the fully occupied hangars with full power. To eliminate the hazard of such serious accidents, German aircrews were soon forbidden to fly Italian aircraft with their original throttle arrangement. As the modification of the throttles involved very high costs that seemed unjustifiable for usually only single test or evaluation flights, I was therefore given special permission for flying such unconverted machines.

After a test flight at Vergiate I took the SM.91 over to Rechlin on the afternoon of 12 October 1943. During a subsequent flight a situation came up that seemed critical at first. The task was to find out why this aircraft became unsteady in the elevator control during inclined power-off glides. All of a sudden, flying at a speed in the region of 650 kmh (404 mph) at 2500 m (8200 ft) there was a loud bang and a whistling noise in the cockpit. Something must have been ripped off! I immediately levelled off carefully without any problems, and noted to my relief that apparently no vital element was missing. After a slight turn I headed for home handling the controls very gently, because I certainly did not wish to increase the vibrations undoubtedly felt in the elevator. Even the slightest vibrations will cause any test pilot to feel pretty uncomfortable – they are often an indication of worse to come. Back on the ground I found that a glazed section of the rear cockpit cover had disappeared, hence the bang. It could not be ruled out that the vibrations of this rather pliable glazed section had been responsible for the slight vibrations felt in the elevator control. Apart from the fact that this aircraft was not fully satisfactory as regards its instrument flying qualities, a series production under licence would have been difficult in view of the precarious military situation. In a country where the sky was blue most of the time, the requirements regarding instrument flying were, of course, not as strict as in our northern latitudes. There was another reason however why I was particularly interested in this aircraft resembling the Lockheed Lightning, and in another Savoia-Marchetti aircraft (SM.92) which had its cockpit behind the port engine instead of in the centre: to my regret I did not get a chance to fly the Lightning. One P-38 that had become available in airworthy condition had crashed before I could get hold of it. The

SM.92, having no central cockpit, held the promise of even better performance. I had an opportunity of flying this machine during another round-flight through northern Italy, which began on 19 February 1944.

I took off for Vincenza in a Ju 188. I had a comprehensive six-day schedule testing Italian aircraft ranging from single-engined fighters to the four-engined Savoia-Marchetti SM.95, and including the twin-engined Cant 1018, three-engined Cant 1007 and Caproni Ca 133 – ten aircraft altogether.

It was a very busy time for me, and 25 February turned out to be a particularly interesting day. In the course of the morning I had test flown the Ro 41 biplane fighter-trainer, followed by the Caproni Ca 133 bomber-transport. After a flight over Gallarate in the Fiat CR.42 biplane fighter, which was somewhat similar to our Henschel Hs 123, I was taking off with the Ro 41 again when the engine failed. I had to jam on the brakes and pull the machine around so vigorously to stay clear of the approaching fence that the biplane slightly touched the ground with one wing. However, no damage was caused.

Some of these aircraft already had their throttles changed our way, so that you pushed the lever forward to 'gun' the engine. There were some machines among them, especially the single-engined types, that would have been quite suitable for advanced training purposes, while other types, such as the three-engined Ca 133 high-wing monoplane, for instance, could be used for paratroop training after only minor modifications.

At the end of this round trip, I landed again at the Savoia-Marchetti Vergiate airfield where I was to test-fly the SM.92 and 95 with original Italian throttles. Both machines were first demonstrated to me by the works chief pilot. From the ground I watched the take-offs and landings very closely, of course, in order to draw my own conclusions as to what I had to expect. As soon as the twin-engined SM.92 heavy fighter lifted its tail wheel, I noted some unsteadiness around the vertical axis, and then I realised that the chief pilot made – although extremely well executed – 'wheel' landings. This meant that, other than in an exact three-point landing, the tail wheel needed some special effort to get it down on the ground.

Then I boarded the machine. First, I had to adapt myself to not sitting in a central cockpit but assymmetrically behind the port engine. The arrangement was basically similar to the twin projects investigated towards the end of the war, such as the two Do 335s mounted side by side, or the Twin Mustang. The only difference was the elevator assembly extending from one fuselage to the other. A certain tendency of the aircraft to swing during take-off was to be compensated by assymmetric throttle opening for the two engines. Naturally, this – combined with the unfamiliar way of opening the throttles – required the utmost concentration, but the take-off went off quite well. In retrospect I believe that the tendency to swing at take-off was even greater on the first Me 210 series with a short fuselage.

First I climbed to about 2500 m (8200 ft) because I wanted to try out a few things before beginning the real business of evaluation flying. At least I was familiar with the two DB 605 engines, and, as far as the general flying characteristics were concerned, the aircraft did not seem too bad. However, when at the altitude of 2500 m I extended the undercarriage and landing flaps and flattened out as if for the landing operation, I realised that the effect of the elevator control was not

sufficient to bring the aircraft into three-point position. Then I tried the same manoeuvre with the throttles opened just a little, and this time it worked. It was not necessary for me to make a comprehensive assessment of this aircraft; in view of the worsening military situation production of this type of aircraft of which only a single prototype existed, was out of the question anyhow. Still, it was interesting to have an opportunity of testing all the qualities we required of aircraft fully capable of instrument flying. Thus for instance, all machines used for blind flying were to have positive side-slip rolling moments – important when flying blind according to a turn and bank indicator. The turn and bank indicator is a gyro instrument indicating even slight movements around the vertical axis, and will therefore respond to the rudder control. An aircraft with a hanging wing kept on course by means of a turn and bank indicator should be brought back into its normal, or horizontal position without using the ailerons. The mechanics of this operation are as follows: if a machine is flying one wing low, an aircraft with good aerodynamical properties will try to go into a turn in the direction of the hanging wing. This turn around the vertical axis is indicated by deflection of the turn and bank indicator. If the pilot attempts to counteract this turn by opposite movement of the rudder, so that the turn and bank indicator returns to its centre position, then the aircraft will side-slip into the direction of the hanging wing. This lateral movement should cause the wing hanging in the same direction to raise again by itself. In other words, a rolling movement around the longitudinal axis of the aircraft should be initiated for the lateral movement to produce a positive rolling moment i.e. to raise the wing. That is the description of the positive side-slip rolling moment.

For the sake of completeness it should also be mentioned that during a side-slip the trim changes in the elevator control should be kept to a minimum.

And so back to the SM.92 – The aircraft showed good performance, quite in line with the altitude capabilities of the DB 605 engine. But I had to hurry up; I still had to make a test flight in the four-engined SM.95. To demonstrate how familiar I now was with the SM.92 I approached the airfield at low level, followed by some steep turns; then cut power and extended the flaps and undercarriage without any problems. Then I came in for the landing and even managed, with a 'shovelful of gas', so to speak, to bring the tail wheel to the ground. All this with the throttles fixed 'the wrong way'. The Italian experts waiting at the landing 'T' met me with applause. When I taxied to the hangar I even came nicely to a halt right in front of it despite the Italian throttle levers.

If I remember correctly, about three weeks after my visit the SM.92 with an Italian test pilot in the cockpit was intercepted and shot at by an Italian Macchi C.205 whose pilot had mistaken the Italian twin-boom fighter for an enemy Lightning. I understood that the SM.92 was only damaged and could be repaired after a forced landing.

The big Savoia-Marchetti SM.95 came next. It had four 800 hp Alfa-Romeo radial engines and was intended as a passenger airliner or long-range bomber. Getting the necessary information about the most important levers and switches was not so critical because an Italian flight engineer was coming with me, and so I was able to concentrate essentially on the aeronautical aspects. Fifteen minutes after I had landed in the SM.92, I pulled – not 'pushed' – the throttle levers of the SM.95 to full power, making a very gentle take-off run. But the aircraft could be

kept on course quite easily with the rudder; it was not heavy and climbed like a balloon. Apparently the centre of gravity was exactly right, too. The SM.95 showed good aerodynamic qualities and generally made a good impression. As usual, I climbed a little in order to familiarise myself with the machine and its characteristics when the undercarriage and flaps were operated and power was reduced. The Savoia engineers were standing on the field, watching. On the one hand I certainly did not wish to cause them any worry about their 'best number', but on the other hand I also wanted to show them that I could master the big, four-engined bomber. A few steep turns, changing from one steep bank into the opposite, went off so well that I decided to please the Italians with some more closer to the ground.

I have always enjoyed flying big aircraft. Although it was great fun to romp around in a small, powerful machine, if possible near the ground, the mastering of a very large aircraft really was a wonderful experience.

As the SM.95 was only lightly loaded and certainly did not weigh more than 17,000 kg (37,480 lb), there was no reason why I should not take it around in a few steep turns. Then I placed the machine nicely on the grass runway again. After the landing I could feel that my Italian spectators had enjoyed the show and were impressed. By then it was 1812 hrs and no longer bright daylight. This beautiful day culminated in a glorious motorboat trip on the lovely Lake Maggiore. During the subsequent merry get-together I felt very much better than on the occasion of Italy's capitulation five months before.

At 0958 hrs the next morning I was on the Gallarate runway with a three-engined Caproni Ca 148, a civil version based on the Ca 133, which I was to ferry to Rechlin via Vicenza and Munich-Riem. The flight over the Alps, or more accurately 'in between' the Alp mountains, was great fun to me. It made me think of a photograph I had seen of Mussolini, showing the Duce 'with nerves as hard as steel' (so the caption read) in the co-pilot's seat. Why not have a stylish photo taken of myself in the 'Duce pose' in the Caproni? The only difference would be that I was sitting in the pilot's seat on the left, with the snow-covered mountains in the distance forming a unique background.

If the weather was good, it was very pleasant to fly across the Alps, particularly in a three-engined aircraft where one could sit really relaxed in the pilot's seat and admire the scenery. For some reason or other, be it on account of the air situation or the weather, or both - I had to stay a day in Munich. Well, there was nothing wrong with a day off in that town; it was a welcome break for me.

Not until the afternoon of the following day was the meteorologist prepared to let me go, and then I had to fly rather low, because of the low cloud ceiling. With this slow 'steamer' I could practically drive along the *Autobahn*, which I was eventually using as a guide. Only just after Nuremberg, near the Hersbruck Alb hills, did the two *Autobahn* lanes separate. The clouds were almost touching the tree tops. It was in this area that, shortly before the end of the war, as I was heading for Oberpfaffenhofen near Munich in a Do 335, I came under fire - and I never found out from whom!

On this day, however I was very much slower with my Caproni high-wing monoplane, which was no longer as fresh as a daisy, and it took me more than three hours from Munich to Rechlin. A little later I took this aircraft to Salzwedel; I am

sure the paratroop schools were well served with this slow 'flying umbrella'.

Now that I had just got used to slow aeroplanes, I returned in a Fieseler Fi 256, a progressive development of the well-known Fi 156 Storch STOL aircraft.

The final test- and evaluation-flights with different types of aircraft described above, which I made in Italy in February 1944, augmented my by then already quite comprehensive type collection by one four-engined, three three-engined, two twin-engined and three single-engined aeroplanes.

During my test flights at Vergiate, we also had discussions about the SM.93, an aircraft with the pilot in a prone position. This experimental single-engined machine was also powered by a German DB 605 engine, like nearly all the latest Italian fighter designs. With the pilot in a prone position behind the engine, his vision was hardly better than in other aircraft of conventional layout, and the reduction of drag offered by the smaller fuselage cross-section, due to this prone pilot arrangement, was not really used to advantage. The experts from Savoia had asked my opinion on this aircraft because they knew that a year ago I had made the maiden flight in the twin-engined B 9, a special research aircraft for prone pilot arrangement built by *Akaflieg* Berlin for the German Aviation Experimental Establishment. Such occasions gave rise to some very interesting discussions.

In between, I again flew the Heinkel He 219 night fighter. Then there was the Savoia SM.79 three-engined torpedo-bomber waiting for evaluation tests at Schongau - the German aircrews had voiced some complaints about it that had to be investigated. A Heinkel He 177 heavy bomber awaiting delivery to Munich-Riem came in very handy as my 'courier aircraft', so to speak.

The main problem the German aircrews had with the SM.79 was that small airfields were just too short for them. The reason why most ferry flights had ended badly was that, apart from losing one's bearings and coming down somewhere else, the airfields used were not long enough and the machines swept through the perimeter fence. I had no ready explanation or advice, either. At Schongau I had a close look at a Savoia SM.79 and noted what I later found confirmed during a test flight, that the landing flaps were hydraulically coupled with the slats; as these came out due to the suction effect at slower flying speeds they also extended the flaps. From the reports I heard I had already guessed that there was something wrong with the landing flaps. To find out for myself, I took my place in the cockpit together with one of the local pilots in the second seat, and off we went. First we climbed to about 8000 ft to have some height margin in the event of a failure or some unexpected flying conditions. Then I tried to close the throttles as for landing and to extend the undercarriage and the landing flaps. I found at once that the flaps showed no tendency to extend to landing position within the normal time. I therefore re-opened the throttles just enough to keep the aeroplane at a very slow airspeed without losing height. And, indeed, there were the slats coming out of the wings, and with them the landing flaps, although very slowly. As the landing flaps extended, the airspeed indicator clearly moved back. I repeated the same operation several times: flaps in, flaps out, and it worked better each time. Perhaps the slow movement of the landing flaps was due to hydraulic oil of excessive viscosity at low temperatures. After some more landing flap 'massage' they came out as quickly as they should. There was nothing in the way now for a smooth landing, for I had also noted the indicated minimum airspeed.

Naturally, I wanted my landing to be as smart as possible because the people standing down below were experts and critical spectators. So I went rather low well in advance, the landing flaps came out beautifully, then I opened the throttles a little just to slide over the airfield boundary, levelled off, touched down and braked gently with the pneumatic wheel brakes. Sure enough, I had used up only a fraction of the available runway! This was a great success which, perhaps helped a little to improve the opinion the serving officers held of the Luftwaffe engineers, an old bone of contention. The basic mistake was probably the fact that the engineers had been put in uniform in the first place and thus forced into the military hierarchy. Most of them did not care for the external trappings of glamour, anyway.

For my return to Rechlin I used a Do 217 night fighter which conveniently happened to be awaiting this ferry flight from Munich. In between the red tape business, preparation of test- and evaluation-reports, and discussions with aircraft manufacturing people I managed to put in a few more final flights in the Italian SM.91 heavy fighter. But there were already other tasks coming my way.

Consolidated B-24 Liberator

The first airworthy Consolidated B-24 Liberator, the four-engined US bomber that surpassed the B-17 in range, fell into Italian hands in spring, 1943, in Sicily, which the American pilot had mistaken for Malta. Because the Liberator was known as a high performance aircraft, we were very interested of course. Therefore every effort was made by Germany to bring this bomber from Italy to the Luftwaffe Test Centre at Rechlin at least for a short time for evaluation. At the end of June, 1943, we were then able to welcome the B-24D with an Italian crew and markings and the registration I-RAIN landing in Rechlin.

On the fuselage nose this aircraft, named 'Blonde Bomber II', carried the picture of a voluptuous blonde whose oversized bust could not be ignored. In contrast to the slender and stylish wing of an extremely high aspect ratio the fuselage looked somewhat dumpy, perhaps because it also seemed on the short side. But then, the Liberator really had a wing of an unusually high aspect ratio. Our test flights were to be limited to the minimum and carried out as quickly as possible, while the Italian airmen – a colonel, a major and two mechanics – were to stay in Rechlin until completion. We were together often and got on well, and we agreed to make our test flights with the Italian mechanics on board.

Here I would like to add that to praise these Italian mechanics more would be almost like 'carrying coal to Newcastle'. On these flights at Rechlin, and in Italy, when I had to evaluate Italian aircraft, I always had the impression that their mechanics were ingenious 'old hands'. In fact, it seemed a matter of professional pride for them to have the aircraft in airworthy condition the next morning, even far away from the base workshop. With the Italian Liberator I knew that I had nothing to worry about with such resourceful fellows as these.

What could we expect from the B-24? It had a relatively small wing, therefore also higher wing loading. Thus, at approximately comparable gross weights the B-17 wing offered more than 45 per cent additional area, which would indicate considerably higher take-off, approach and landing speeds for the Liberator. That was my first impression. One entered the B-24 from under the fuselage between two roller-type bomb door segments, which retracted upwards along the sides of the fuselage. Even the specialist is surprised time and again by the great number of levers and instruments on entering the cockpit of an unknown four-engined heavy bomber for the first time. Every foreign aircraft has its peculiarities, especially if the instruments are also calibrated in inches, feet and miles per hour, which must be 'digested' if one is to avoid a shipwreck after the first unforeseen incidents. Apart from the instruments for flight control I also carefully scrutinised the levers for activating the landing flaps, undercarriage, engine cowling gills, the exhaust-

driven turbo-superchargers and the intercoolers for them, and so on. It is very important to know which engines are driving the generators for the electric current and which the hydraulic pumps, to make sure there will be some electric power and hydraulic pressure available in case of engine failure, e.g., for the brakes. As usual in American aircraft the temperatures of the engine cylinder heads were also indicated.

It was planned to start our tests the following morning, with the first flight intended for airspeed indicator calibration and ground speed measurement purposes over the measuring base. Flights with other test pilots of our test centre, especially the bomber experts, were also on the programme. The first measuring flight took place on a calm day to ensure accurate values. Already after starting I noticed the steady and pleasant running of the engines, so typical of American power plants. After releasing the parking brake the big bomber began to taxi 'rocking like a reed in the wind', perhaps because of the uneven grass field and the very elastic nose wheel leg. Previous to this I had flown only two other aircraft with nose-wheel undercarriages, the P-39 Airacobra and our own Heinkel He 219 night fighter, but it did not take long to get back into stride again. One of the advantages of the nose-wheel undercarriage is the very good vision while taxiing, which I now could enjoy again sitting in the glazed Liberator cabin. After a lot of preparations – we had no check lists or any other help of course – I locked the nose-wheel straight and opened the throttles of all four engines. As expected of nose-wheel aircraft, it was not difficult to keep the Liberator on course. However, despite the low weight the take-off distance seemed rather long to me – the price the B-24 had to pay for its higher wing loading compared to the B-17.

After becoming airborne and raising the flaps and the undercarriage, I was surprised to find that I had to struggle to keep the Liberator steady in the elevator: the whole aircraft felt rather unstable longitudinally. It is possible that the centre of gravity was too far back in spite of the nice blonde on the fuselage nose. This unstable behaviour would fit into the nodding movements during taxiing, which created the impression the Liberator would drop on its tail if left to its own devices. I was anything but enthusiastic; it felt like driving a furniture van through pudding. At this stage I would have liked to find out more about the flying characteristics of the Liberator, but our programme stated speed measuring base and that had priority.

For calibrating the airspeed indicator we would fly along a measured stretch of a railway line at an altitude of about 150 ft. The measured distance of 1 km (3281 ft) was timed in both directions in order to eliminate the effect of possible wind. I flew the first track with maximum mixture for continuous power, whereby the Liberator once again became slightly unstable. Flying the next runs at normal and combat power my intention was to determine the corresponding speed points at the same time. Owing to its higher wing loading the Liberator turned out to be faster than the B-17 near ground level, but this evened out higher up.

It is not the purpose of this narrative to discuss the performance of these aircraft in detail, but this much I would like to say: at first, I was rather disappointed by the speed of these two bombers near ground level. For the rightly admired maximum speed performance of these aircraft was achieved only at altitudes of 7500 to 9000 m (24,600 to 29,500 ft) thanks to their engines whose power was boosted by

exhaust-driven turbo-superchargers. Naturally, the speed varies according to the equipment and weight of the aircraft, depending on the bomb and fuel load and armament carried. Generally speaking, of these two bombers the Liberator, with its wing aspect ratio of more than 1 : 11 and its high wing loading, was predestined for greater ranges.

After two hours I had completed the speed calibration tests and flew the Liberator back home again. However, before landing I just could not deny myself the fun of testing the behaviour of this big bomber in slow flight with lowered flaps and undercarriage and running engines. I was surprised to notice tail buffeting at quite small angles of attack. With the undercarriage and flaps down and idling engines the sinking speed seemed very high, but this I had already expected owing to the high wing loading and the highly effective landing flaps which in addition to enlarging the wing area also gave a certain amount of specific lift. I approached to land with open throttles and after touching down hopped over the rough grass strip, stepping a bit on the brakes. Now the Liberator had excited my curiosity. After we had stopped at the parking area I began to swing the Liberator by hand – and it seemed touch and go whether it dropped on the emergency tail skid which was just above the ground. Now I was convinced that I had flown the big bomber with its centre of gravity (CG) too far back, a sufficient reason for its not too rosy flying characteristics. In the calm air of the evening I made another calibration flight after we had tried to bring the CG a little forward by re-pumping fuel and with sandbags. It had a positive effect and I felt much better on the subsequent flight. But I still could not imagine where they found the courage to have pilots fly into combat with this machine, even on flights at higher altitudes and with good auto-pilots. For these reasons I wanted to move the CG even further forward for the next flight. This was to be a climb with heavier loaded weight of 47,000 lb to an altitude of 8500 m (27,880 ft) to take speed measurements at this altitude and lower. The take-off weight was just about enough for our small grass field of no more than 3300 ft runway, as revealed later on.

In the morning there was a flight with a Junkers Ju 290 large-capacity transport on the programme. I cannot recall any more what the purpose of this flight was, but I am sure I had more fun with this aircraft which had a gross weight of about 40,000 kg (88,200 lb). Generally speaking, heavier German aircraft were more pleasant to fly, particularly as regards the harmonisation of the various control forces. This may be said even about an aircraft like the He 177 whose stability was not exactly ‘captivating’ with the short tail but improved after the fuselage was lengthened. Apart from its coupled power plants which tended to catch fire and brought it the fitting nickname ‘Reich’s lighter’, the He 177 had nothing to fear in comparison with the Liberator. With a wing area of 1098 sq.ft, just a bit more than the Liberator, the Heinkel had a gross weight of 30-32,000 kg (66,140 to 70,550 lb) which corresponded to the later versions of the Flying Fortress and the Liberator. Higher all-up weights were reported only seldom. It so happened that take-off tests with the He 177 also had to be made at that time. A friend of mine, who was the He 177 ‘Type attendant’* at Rechlin had expressed doubts after some take-offs whether these could be expected of operational crews and asked me if I would fly the He 177 in overload condition. He was interested to hear my opinion because I

**Typenbegleiter*. An attendant appointed by the RLM.

seldom flew the He 177 and was not so well versed on it. I sought of course every opportunity to get to know the German aircraft types even if it meant taking on flights that were out of the ordinary. It was only like this that I could form an unbiased opinion on captured aircraft. For this reason I would like to mention an event that could have had dire consequences.

The task was to measure take-offs with a He 177 from the runway at Lärz, first with a loaded weight of 31,000 kg (68,343 lb) and then with 32,000 kg (70,547 lb). The only thing disagreeable I felt on these flights was the poor efficiency of the rudder around the mid-position at the start of the take-off, and therefore one tended to tread the rudder pedals more than necessary. However, if one waited for developments it was relatively harmless, if the tail was not raised too soon. We had loaded in 7000 kg (15,430 lb) of concrete bombs which I had to drop over Lake Müritz. The take-offs had been successful and after we had dropped the bombs for the second time, the tail gunner reported via intercom that all bombs had gone. Well, it was about time to finish for the day so what better than to 'take on' the test centre employees crowded on the railway platform at Rechlin for the journey home? After this mock attack I prepared for landing on the grass airfield at Rechlin as required. At first all was well, and the touch-down was also normal. But then I felt a little jolt, the big machine was thrown up in the air again, floated a bit, then touched down and taxied normally. After rolling to a stop I saw the nice mess we had made: a 1000 kg (2205 lb) concrete bomb had hung up in the fuselage after release and dropped out at touch-down. The fuselage was only slightly damaged, but the one ton reduction in weight had caused the short jump on landing. With a shudder, I thought what would have happened if the bomb had decided to take its leave during my visit over the station platform at Rechlin! From then on I made up my mind to confine my 'public displays' to guaranteed empty aircraft.

It was interesting for me to hear that subsequent Liberator versions were also reported to have taken off with this gross weight in exceptional cases. With a similar wing area to the He 177, this would have corresponded to a wing loading of about 320 to 330 kg/sq.m (65.5 to 67.6 lb/sq.ft), although the lower take-off power of the Liberator engines would have necessitated a considerably longer take-off run.

And then once again I was sitting in the Liberator and the climb to 8500 m (27,880 ft) could begin. The take-off was to be made with increased gross weight including some 6000-7000 litres (1320-1540 Imp.gal) of fuel, the following climb to be measured, the first speed measurement to be made at 8500 m (27,880 ft) and then on the descent further speed measurement points determined. Of course I had checked beforehand that the oxygen apparatus was functioning faultlessly, and gone through the usual routine actions as in other four-engined aircraft: the controls had to be trimmed to zero around all three axis, the electric generators and hydraulic pumps switched on and the propeller pitch control set on 'fine'. As far as possible, we had also made ourselves familiar with the fuel system. Thank goodness there were some instructions for the crew in this bomber: after all, the Americans and British also had to come to grips with this machine. Next, the electric fuel pumps had to be switched on and the mixture for the engines set at 'rich'. There were some difficulties in correctly controlling the manifold pressure and the engine revs per minute, the superchargers and their intercoolers.

Naturally, in addition to the notes in the cockpit I had tried to gather all possible information from our own specialists.

As the CG was now more towards the nose, there was no longer the feeling that the Liberator would drop onto the emergency tail skid at any moment while taxiing. When we were standing in the direction for take-off the nose-wheel was also locked and the flaps lowered to take-off position. Now we were ready. In order to shorten the take-off run as much as possible, I opened the throttles while braking strongly, and then let go.

To complete the picture, it must be mentioned that I had also released the parking brake, which was an elegant addition in the Liberator. The machine began to move sluggishly and swayed over the grassy ground. Now it could demonstrate what it was made of! There was always a thrill on such initial flights that disappeared as soon as the engines were running at full power. Thanks to the nose-wheel, there was no difficulty in keeping straight in the take-off direction, and the view was also good for the same reason.

It could not be overlooked that the take-off distance was considerably longer due to the greater weight. As the airfield boundary came nearer, the Liberator made no indication of leaving the ground. Instead, the nose-wheel began fluttering gently. Pulling hard on the control column, I was able to raise it off the ground and the machine gradually became airborne. The control forces on the elevator were quite remarkable and I immediately operated the elevator tab control. The new CG position more to the fore had increased the stability of the aircraft and that was noticeable on the elevators.

The layman may imagine that stability has something to do with strength, but that would be wrong. In aeronautics, stability is understood as the endeavours of the aircraft to return to its original position on its own accord after a disturbance such as a gust of wind, which has upset the equilibrium. As longitudinal stability had now been achieved, the speed for the best climb could be maintained without difficulty, naturally with higher control forces. The weather situation was not too bad: at about 6000 ft there was broken cloud cover which one could fly through quite easily. The CG being what it was, there was no concern when flying on instruments through the clouds. At an altitude of about 11,000 ft we put on our oxygen masks, while I checked the functioning of the oxygen system and supply once more and drew the attention of the rest of the crew to this.

On such altitude flights adequate oxygen must be regarded as a very serious matter; the lack of it can be absolutely lethal.

Another look at the instruments: temperature and pressures were in order. However, as we tried to open the engine cooling gills a little more in order to reduce the temperature, I thought I noticed a slight buffeting of the tail unit. But even with the engine gills set back a bit, the engine temperature remained within normal bounds so there was no cause to worry on that account. Meanwhile, it had become clear to me that the decreasing atmospheric pressure as we climbed higher increased the difference in pressure affecting the turbo-superchargers and that might result in overloaded engines. The remedy here was to put back the control levers for the exhaust-driven turbo-superchargers in such a manner that the engine manifold pressure did not increase – just one of the many things we had to find out and take a note of for future reference. When, after heading north for a while, the

Baltic Sea appeared in the distance we banked slightly to bring us back again in the direction of Rechlin. Nothing of note occurred on this flight. On reaching 8500 m (27,900 ft) I made two more speed measurements (five minute limit and maximum level/continuous-power) to complete our schedule. As the density of the atmosphere decreases with higher altitude, the speed shown on the ASI is always less than the actual air speed because the instrument works on dynamic – or air impact pressure. We were already using special airspeed indicators for such purposes which were corrected to the relevant air pressure and altitude. I had roughly calculated beforehand the measuring points for the Liberator at high altitudes and the expected speed indications on the instruments. As it takes quite some time for such a heavy aircraft to reach constant speed, it had proved practical to circle the right figures; one noticed fairly quickly if speed under the calculated figure continued to increase, or if a higher speed caused by inclined flight decreased. Like this, I was able to determine the correct data relatively quickly.

The subsequent glide also brought no problems – I just had to make sure that the engines did not cool down too much. To ensure this the gills were closed and from time to time the throttles opened so that the engines could be brought up to normal operating temperature at any time. I was quite satisfied for we had determined the most important aspects of the B-24D performance. The Liberator also showed quite high control forces when gliding, and after lowering the flaps and the undercarriage the elevator had to be re-trimmed. I approached the airfield boundary with open throttles, but levelling off and touching down at minimum speed required considerable elevator forces this time. We were back on earth again, and I began to brake intermittently, noticing that the effect of the hydraulic always kept us waiting for a while.

I was already thinking, 'That has gone well', when at the end of the landing roll the nose-wheel caught in the rough grassy ground, there was a crack, the nose-wheel leg buckled, and our 'borrowed' Liberator ended up on its belly at the front. It was most disagreeable, and a puzzle to me for there had been no loads that a healthy nose-wheel should not have withstood. As the nose-wheel leg went the way of all things exactly during the final bit of landing run, that is at very slow speed, I did not need to reproach myself at all. Only later did I learn that the nose-wheel leg was known to be one of the weak points of the Liberator, and the aircraft was as a rule flown only from concrete runways. Much later, I also learnt that due to this inherent weakness the nose-wheel had to be raised as soon as possible at take-off to ease the load on the oleo leg. For this reason we could be thankful that the nose-wheel had not given up its duty already during our take-offs from the grass airfield at Rechlin; that would have caused much more trouble and possibly led to a total write-off of the aircraft. It was well known that the grass airfield at Rechlin was pretty rough, which came in handy while evaluating undercarriages. In one such dip I had already knocked off the tail-wheel of our Wellington, and now this! But in the event these were also the only damages I had ever caused to aeroplanes during my entire flying career on powered aircraft, and especially during my test- and -evaluation work. Of course one never knew what strains the undercarriages of the captured aircraft had undergone previously; this was an additional unknown factor we had to face.

A few days later I got into a critical situation with a Ju 188 bomber. Flying from Rechlin to Warsaw I ran into bad weather, and the radio equipment failed into the bargain. In the rain and low cloud, I was glad to find the airfield at Warsaw and flew a very tight circle in my fast Ju 188 in order not to lose sight of the field. Approaching and touching down a little too fast, which on the slippery ground could not be compensated by braking. I came alarmingly close to two hangars with aircraft parked in front of them. It was only with great effort – and some luck – that I managed to guide my Ju 188 through the parked machines towards a spot between the hangars where there were some trees. While rolling to a stop the fuselage cockpit happened to come between two trees, and braking sharply I ended up on my nose. Of course, I had already switched off the master electric switch and the ignition, so that the engines had already stopped running and the propellers were not damaged. But it was a close thing. On both sides where the wing tips had met the trees, the rivets had sprung in two metal sheets, but there was no other damage. The undercarriage was checked and found to be in order, and the day after next I was in the air again with my crew in the same Ju 188.

I am very pleased that I was spared further accidents and to tell the truth, also rather proud that despite my extensive and risky test-flying on captured aircraft unknown to us, no further damages ever occurred.

There was another incident that happened with an aircraft flown by me, but that can hardly be attributed to me. On that occasion I had to test whether the six-engined Me 323 could keep its altitude on only four engines carrying a certain load, and the following took place in the giant transport: The flight with four engines had been completed successfully, and it was time to 'go normal' again. The flight engineers sitting in the wings between the engine nacelles were instructed to re-start the two temporarily stopped engines. When after a few minutes all six engines were running again, I suddenly felt a shock through the machine and the flight engineer in the starboard wing informed me over the intercom that a piston had seized up in No.6 engine. Accordingly, he feathered the propeller of the 'dead' engine, or thought he had, as it could not be seen by us, and we flew home on five engines, which was no problem at all. After the landing run on the airfield at Rechlin, the cockpit was opened and the co-pilot stood upright like a tank commander to guide me for taxiing; the view sideways was rather limited because of the engines, and the *Gigant* had a wing span of 180 feet. Astonished, my co-pilot suddenly cried out that No.6 engine no longer had anything in front of it! It transpired later that when a piston had seized up, the crankshaft had broken at a shrinkhole and the propeller had become independent and whirled away just under the elevator unit, ripping the fuselage along the side. Two hours later, an amazed farmer near Neustrelitz rang us to report a propeller that he had found embedded in his field; would this by any chance belong to us? This incident too could have had a more serious ending; the Me 323 was after all only a giant powered glider.

Be that as it may, to the displeasure of ourselves and especially the Italian crew, the nose wheel oleo leg of the Liberator was bent and our repair workshop was not at all enthusiastic about having to fix the damage. Fortunately, we had already completed the most important performance measurements, anyway.

When the Liberator was in working order again some weeks later, I ferried it to

Fassberg. During this flight, both starboard engines suddenly failed. In this case, it was immediately obvious to me that it was 'only' a question of incorrect fuel-switching. Despite the loss of two engines I had the impression that we could retain our height on the other two units running at combat power because we were only lightly loaded. Naturally, adequate speed was necessary in order to compensate for the torque of the engines, both pulling to one side, with the rudder. This was of decisive importance and not so easy with the longitudinal stability decreasing due to slower speed. Whilst I was fully engaged in trimming the Liberator for two-engined flight, my loyal flight engineer, a civilian mechanic who had meanwhile been promoted to the exalted rank of lance-corporal, manipulated all the available fuel cocks until both striking engines came back to their senses again. Consequently, I did not have to pay a visit to the field I had already chosen for a possible forced landing, and I was very pleased about it too, as a forced landing in the fast Liberator would have been rather critical. I had even determined the wind direction by the position of the cows, which are supposed to stand with their backs to the wind.

When the starboard engines were running again I had much less trouble re-trimming the Liberator for normal flight. There were yet more surprises in store for us on this flight. When we landed at Fassberg, there had already been an air raid warning - and to be flying a Liberator over Germany at such a time was anything but good life-insurance.

Meanwhile, I had learned one thing, namely that the Liberator with a correct CG could be flown and landed trouble-free, but for take-offs and landings - especially with heavier loads - it was advisable to use sufficiently long concrete runways.

In this narrative I have quite deliberately described the problems I faced while flying the Liberator, which would never have arisen - or at least would have been less troublesome - if some instructions or manuals had been available. But all this was part of the trials and tribulations of a test-pilot flying strange aircraft.

On analysing the difficulties encountered during the initial stages of these test flights and distancing myself from them, I must concede that the conception of the Liberator combining the excellent exhaust-driven turbo-supercharged engines with the very slim wing featuring the unique Davis high-lift profile, and accepting higher wing loads, had led to a first-class aircraft, especially with regard to its range. However, despite the high wing loading, use of the effective Fowler flaps made it possible to increase the wing area to attain acceptable take-off and landing speeds. The unavoidable difficulties for the pilot, which resulted from these built-in characteristics, were reduced by the nose-wheel undercarriage and the use of concrete runways several kilometres in length, especially for take-offs with heavier loads. Neither in the case of the Liberator nor the Flying Fortress was the maximum weight kept to the initial 55,000 lb; their maximum loaded weight was gradually increased to about 32,000 kg (70,500 lb) which corresponded to the German Heinkel He 177.

It seems to be a kind of empirical experience of all aircraft-building nations that aircraft in operational service always become heavier and heavier. Assuming similar armament and load conditions, the Liberator had the advantage of greater range compared to the Flying Fortress, and was certainly also faster than the B-17

from the ground level to its own operational altitude. But the operational ceiling of the B-17 – always assuming similar armament and loads – must have been about 5000 to 6600 ft higher than that of the B-24 due to its larger wing area. The unquestionably good performance of the Liberator which qualified it for employment as a long-range bomber and transport, and also for maritime patrol and even anti-submarine tasks, was dearly paid for with poorer flying characteristics. Obviously, on concrete runways the strength of the nose-wheel leg was adequate; I experienced only a suggestion of a nose-wheel flutter. It could be that the grass airfields I mainly used when flying the Liberator were to some advantage in this respect as they suppressed any nose-wheel flutter, whereas the concrete runways with less friction were also less effective in reducing this tendency. The tail buffeting caused by the open engine cooling gills and the loss of lift coupled with increasing drag were of course unpleasant. But as soon as we understood this phenomena it was easy enough to open the cooling gills less than one third, or even to leave them closed for short periods during take-off and landing, providing the engine and oil temperatures, and the oils used, allowed it. However, what proved to be a far greater problem was the insufficient stability around the horizontal axis, i.e. controllability of the elevator, which occurred when there were even slight changes in the CG position. If the Liberator was loaded nose-heavy until the elevator seemed stable in flight, then the stick forces were rather high, or at least so high as to make it very difficult to level off and attain the correct angle of incidence at the minimum speed required for landing. On the other hand, if the CG was further aft so that the stick forces were less, there was a certain loss of longitudinal stability and the pilot had to take care not to slow down too much and thus stall on the final approach.

This danger of stalling with its devastating consequences was increased by the considerable drag of the fully extended Fowler flaps and the excessive rate of sinking. This may have been the reason, if I were correctly informed at a later date, why the co-pilot would call out the indicated air speed to the pilot during approach, like Mark Twain once did with the depth of water.

To be sure, the narrow wing of low mean chord, which contributed to the very good flying performance of the Liberator, also caused remarkable variations in longitudinal stability after the slightest alteration in load disposition. In flight, the forward CG position was normally created by the crew members working in the nose of the aircraft, such as the frontal machine gunner and the bomb-aimer. However, during take-off and landing they had to retire to the centre of the fuselage to avoid coming to any harm should for example the nose-wheel leg collapse. These moves too had to be done with great care to prevent the aircraft from dropping onto the emergency tail-skid as it rolled along the ground. The fact that the changing position of the crew members facilitated the establishment of the correct CG position during flight as well as when taking off and landing was something I only learnt by experience after my first flights in the Liberator without any pilot's notes or instructions.

Nevertheless, the potential positive points seemed to outweigh the negative ones, and therefore I was rather surprised that this highly efficient aircraft failed to impress me with its flying characteristics during my first flights in it. It goes without saying that these difficulties were obviously amplified when flying with heavier

loads. American and British colleagues who flew the Liberator agreed that it was not an easy aeroplane to fly, especially when approaching for landing.

Thinking of our own four-engined long-range bomber, the Heinkel He 177, perhaps a slightly longer fuselage would have helped the Liberator too. But accidents will happen even in the best families. Aircraft that have been in full-scale series production for some time have revealed poor flying characteristics during tests that could be improved with a longer fuselage. I am thinking here of the Me 210 which, as the Me 410 with a longer fuselage, became quite a tolerable aircraft.

Naturally, I have considered what we would have done in Germany with a big aeroplane like the Liberator. I am afraid that in our typical German thoroughness we would have strengthened the construction of the nose-wheel, modified the engine cowling gills and extended the fuselage, not to mention other detail changes. As a result, the development period would have been lengthened by one or two years despite the desperate situation in which we found ourselves. But this is only a hypothetical case, anyway.

In this context, one cannot ignore the decisive difference between the German and Allied, particularly American air attacks. Whilst German aircraft often attacked in small numbers at relatively low altitudes, and sometimes even made single attacks, the Allies raided mainly in big formations at high altitudes whereby the flying characteristics did not play such an important role – especially if a good auto-pilot were available. These considerations were probably the determining factor in deciding to continue producing the Liberator with only a few minor modifications, consisting essentially of improved defensive armament and increased bomb and fuel loads. Thus the basic construction of the fuselage, wings and the tail unit did not need to be altered. And it worked, much better than we would have liked at that time. For these reasons more Liberators were built than any other bomber. Granted, the He 177 heavy long-range bomber – at one time known as the so-called ‘Ural Bomber’ – was more pleasant to fly and also somewhat faster near the ground, especially its later versions with the longer fuselage and four separate engines, but it is no secret that the coupled power plants tended to cause engine fires, particularly at the beginning. It was said that fuel and oil leaked between the engines onto the hot exhaust collectors and if one did not notice the resulting fire (the engines were situated far to the rear of the cockpit) and react immediately, there was a danger that the main spar would be affected and the wing break off in mid-air.

If I were asked whether I would prefer to have flown a Liberator with its not completely satisfying flying characteristics or a Heinkel He 177 with practically faultless characteristics but unreliable power plants, I must confess that I would have preferred to pilot the Liberator, to say nothing of the superior numbers and the fighter escort.

In fact, the He 177 with the longer fuselage was not difficult to fly at all, and the version with the separate engines could have made quite a decent combat aeroplane. Perhaps an aircraft combining the new He 177 airframe with the excellent American high-altitude engines with their exhaust-driven turbo-superchargers would have made the ideal bomber at that time.

I myself see other and deeper reasons, rather than the fault of the engineers, for

the debacle with the He 177 and other bad planning on the part of the Luftwaffe. The politically false assessment regarding the entry into the war of Great Britain and later the USA, and the underestimation of the Soviet military power, made the development of a long-range bomber appear superfluous at that time. Then, when the He 177 became available and held promise of evolving into an efficient combat aircraft, the State Ministry of Aviation insisted that the He 177 also had to be capable of diving attacks to a far greater extent than planned. This led to a whole series of unnecessary structural alterations and reinforcements which, in turn, meant increased weight. In the meantime, the first military successes had been achieved and the Russian campaign also appeared to be running to plan. It seems it was not just a bad joke that, for example, the supply of agricultural machinery to the occupied regions of the Soviet Union – and there was even talk of erecting folk museums! – ranked higher than the needs of the Luftwaffe on the priority list. Consequently not only the He 177 but also several other aircraft developments were postponed, or at least delayed.

After the initial successes in the war, in which the Luftwaffe undoubtedly played a major part, it became evident already during the Battle of Britain that the technical development of the Luftwaffe was not keeping pace with that of the RAF. When it was finally realised that a long-range bomber was necessary, the general shortages had made themselves felt and in the meantime the production of fighters had become at least as essential. It was particularly difficult to try and make up the head start in the development of more powerful and reliable engines, especially in the field of high-altitude power plants. Undoubtedly there was also a lack of the necessary heat-resistant materials resulting in the development of the overbred coupled power plant as fitted in the He 177, with all the attendant difficulties. Instead of systematic research and development, it was a case of makeshift alterations as with the He 177, dependent upon who had the final say at that particular time. The amazing thing is that even under these unfavourable circumstances the He 177 turned out to be quite a good aeroplane in the end.

At this point, I could also consider the question of to what extent foreign air forces pamper their crews and in particular their pilots. For example the B-24D Liberator which I flew in the first instance still had a manual propeller rev control instead of the more comfortable automatic device. Also, the engine fuel mixture still had to be set manually at 'rich' or 'weak' according to the load, and the oil and engine cylinder temperatures also had to be regulated by hand. For us, it was rather unusual to measure the cylinder temperature, although in retrospect perhaps such an installation would have indicated defects in our engines in time to do something about them.

The exhaust-driven turbo-superchargers on the American bombers and fighters also had to be controlled manually, depending on altitude and the air speed indicator. The inter-coolers also had manual controls. One could of course say that dealing with all the various levers in a bomber is not difficult with a co-pilot or a flight mechanic in attendance – and in fact I later heard that the Liberator was always flown like that. There was no doubt that the American pilot was well looked after; he was even provided with ashtrays built into the hinged armrests of his seat, a rather refined touch.

Nevertheless, although the control of the superchargers and the high-altitude

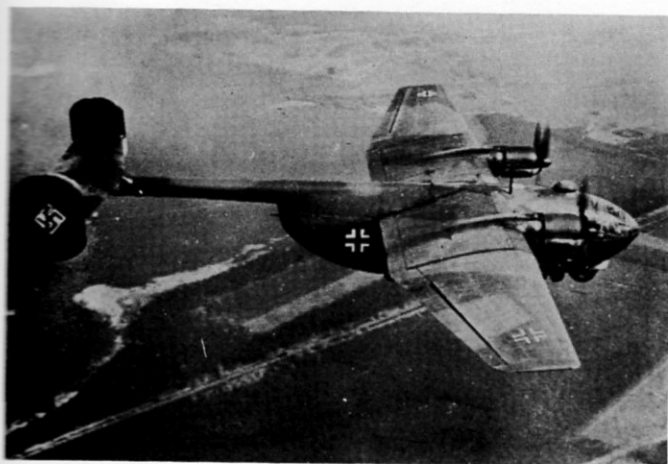
engines by a second crew member may be regarded as reasonable in a bomber, to my mind the supervision of all these devices by a fighter pilot was too much to expect. This was recognised and in the Thunderbolt, for example, a warning light would appear when the exhaust-driven turbine was overspeeding. In Germany, great efforts had been made to ensure that control and operation of the engines was foolproof. Of course one must take into account that German engines were much more sensitive to correct temperatures, pressures, revolutions per minute, and so on, but perhaps the simplification was sometimes taken too far. In this connection I should like to mention the *Kommando-Gerät* (automatic engine control device) for the BMW 801 double-row radial engine. This control device was designed to adjust the boost pressure and engine revs according to the different performances required under throttled back, normal, combat, take-off and emergency power conditions by means of a single lever. Naturally such desirable engine control simplifications demanded great effort and more important, much valuable development time. And so it took literally years before the urgently needed BMW 801 – which had caused certain difficulties only at the outset with insufficiently cooled rear lower cylinders – was finally performing perfectly with its automatic control device. Generally speaking, I believe the Allies expected much more of their aircrews in this respect, while God knows we really had no money, time or effort to spare for such automatic devices.

Meanwhile, we had heard that an almost undamaged Liberator had made a forced landing in a maize field near Ploesti during an attack on the oil wells. I don't remember exactly what was wrong with it; possibly it was also a matter of a damaged nose-wheel. The repairs had already been completed and the Liberator stood ready to fly on the same maize field. It was November 1943. At that time I had had the most experience with this type of aircraft and was prepared to fly the B-24 out of the field for the Rumanians.

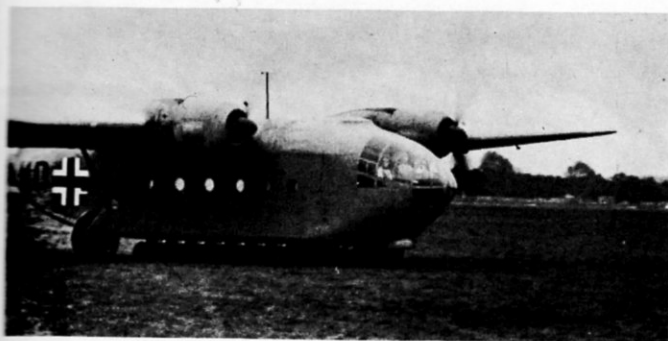
My trip to Bucharest had been delayed due to the first undamaged Republic Thunderbolt that had landed on an airfield near Caen in France, and of course everyone was eager to see whether the performance of this fighter was really so legendary as it was reported to be. For these reasons the American fighter came first and so I took over the Thunderbolt and flew it, with intermittent landings at Corneilles and Deelen, to Rechlin where I arrived on 14 November, as related in another chapter.

Whilst the Thunderbolt was being examined on the ground by the various specialists, I intended to use the time to fly the Liberator out of Ploesti. A Ju 188 was put at my disposal and I planned to fly to Bucharest on 18 November. But it was not to be: after taking off from Rechlin in bad weather, the starboard engine failed during a flight in clouds somewhere over Frankfurt on the Oder. There was not much I could do on some airfield between Rechlin and Bucharest with my lame Ju 188, so it was back to Rechlin. With the performance reserves of the Ju 188, returning home flying blind and landing on one engine was no problem. The weather gradually became worse and according to forecasts prepared by our meteorologists (or 'weather frogs', as they were called) 'no weather at all' could be expected for a day or two. Flying being out, I decided to go to Bucharest by train – a nice change for a pilot. As I departed from the Silesian Station in Berlin that evening, the air raid sirens started to howl announcing the first heavy air raid on

Junkers Ju 290A-2 long-range
reconnaissance version with
FuG 200 Hohentwiel ASV radar
Wolf Schaefer coll.



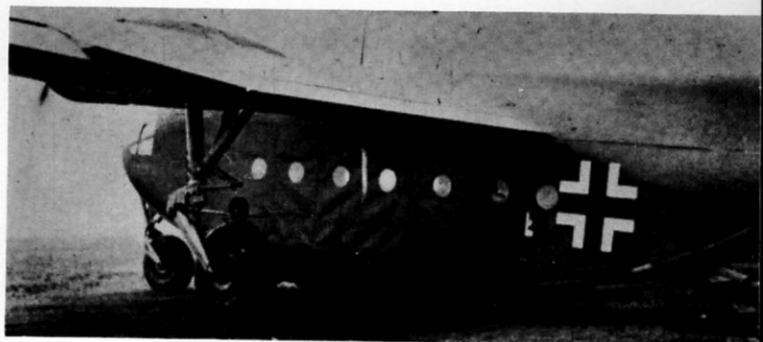
Arado Ar 232A twin-engine
tactical transport

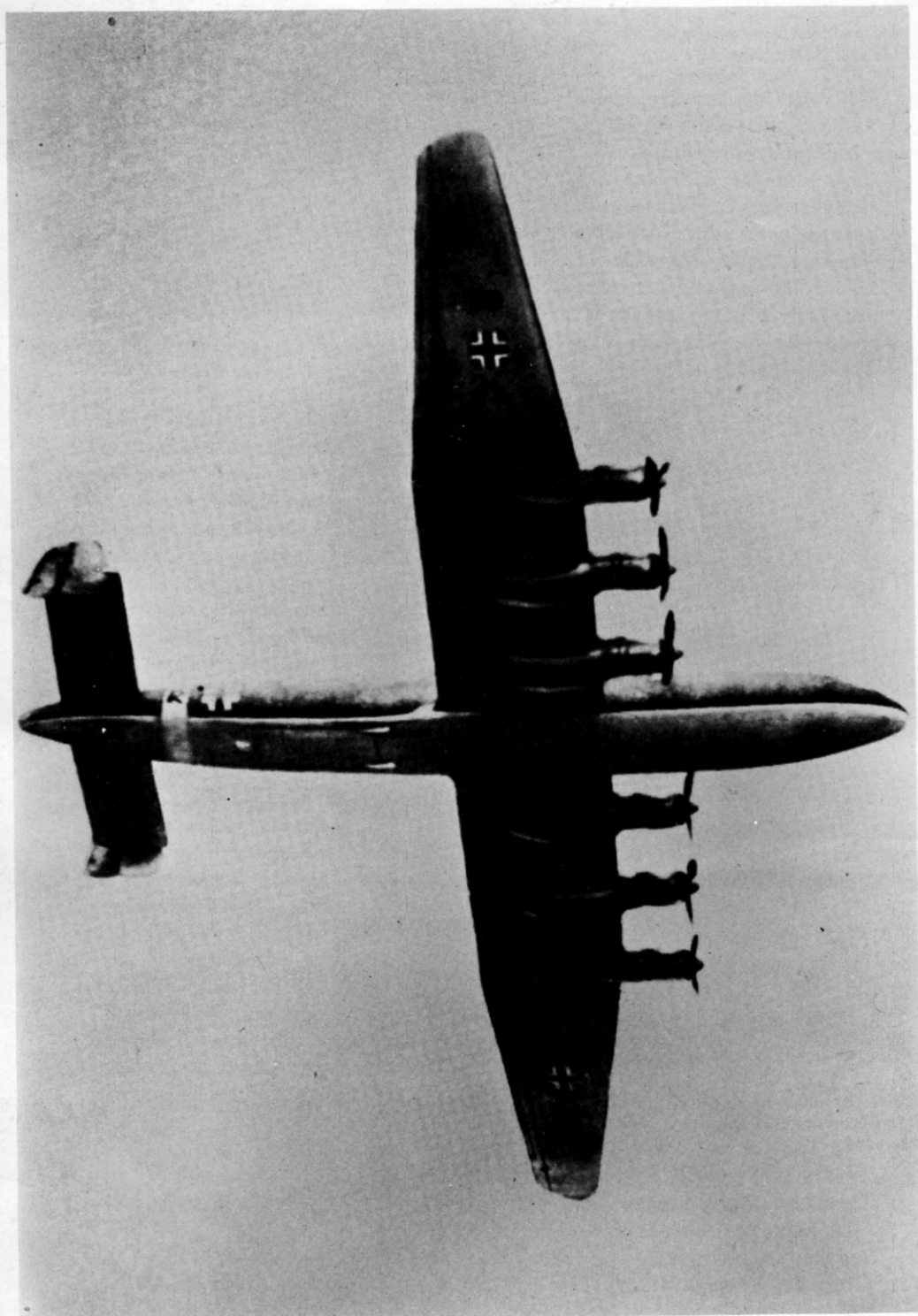


Ar 232A VD + YA taxiing on idler
wheels *via Alex V. Baginskis*

Ar 232A on uneven ground with
the main undercarriage
extended

via Alex V. Baginskis





Junkers Ju 390 was intended as a very long range transport and reconnaissance aircraft. Illustration shows the second prototype RC + DA; the author flew the first Ju 390 prototype GH + UK
Deutsches Museum Munich

Three pages from the author's log book recording the various types of aircraft he flew during May (above), August (centre) and October 1943 (bottom), including his 'porcelain flight' to Peenemünde in an Ar 232A
Hans-Werner Lerche coll.

Uhr Zeit Ankunft	Einsamung des Passagiers	Führer	Fluggast	Zusatz Flieger	Abflug		
					Ort	Tag	Uhrzeit
11:05	MITER	Loche	1.2	E	Nichtentf.	11.5	18:55
12	10+95	"	+3	"	Rumflie	11.5	19:05
12	"	"	+3	"	"	"	16:41
12	15+96	"	+5	"	"	12.5	11:50
15	"	"	+5	"	"	"	11:12
19	15+128	"	+3	"	"	"	23:55
21	10+120	"	+2	"	"	12.5	19:12
22	15+128	"	+3	"	"	"	19:05
23	10+120	"	+1	"	"	"	19:05
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Lin. No. des Papier	Tag	Flug- dauer	Abflugs- Ort	Zeit
1	2	10.33		
1	18.8.	22	Raffin	10.37
2		36		11.07
3		15	Pranginich	11.08
4		19	Kuchan	11.09
5	19.8.	11	Kuchan	11.09
6		28		11.29
7	20.8.	35		11.34
8		32		11.34
9	21.8.	24.40		11.34
10	21.8.	14.19	Pranginich	11.34
11	24.8.	24	Raffin	11.34
12	25.8.	5.34		11.34
13		31		11.34
14		4.15		11.34
15				
16	Die Flugszeit der einzelnen Flüge			
17	von St. 1	bis St. 18	wird berechnet	
18	beinhaltet			
19	Medien den	20. 8. 18		
20				

[illegible]

Line No. Date Page	Tag	Flug- dauer	Abflugs- Ort	Zeit
1	2	3	4	5
25	15. 9.	14. 30	Wien -> Linz	16. 01
26	15. 9.	2	Regen	16. 01
27	15. 9.	16	Regen	12. 10
28	"	11. 01	Regen	15. 58
29	"	33	Regen	12. 25
30	16. 10.	21	Hollwies -> Linz	12. 38
31	"	11. 31	Regen	16. 24
32	17. 10.	32	Regen	12. 01
33	18. 10.	50	Regen	16. 48
34	"	11	Regen	12. 41
35	22. 10.	33	Regen	11. 27
36	23. 10.	26. 06	"	15. 33
37	24. 10.	40	Regen	16. 56
38	25. 10.	14. 45	Regen	12. 43
39	26. 10.	15	Regen	12. 55
40	27. 10.	15	"	16. 13
41	30. 10.	35	"	10. 41

Landungs- Ort		Flugzeug	Aufgabe *)
12.44	Raaf	SM 91	
12.56	"	SM 91	
12.56	"	Königsberg	
12.58	Flamberg	Ar 232	
12.58	Flamberg	"	
12.58	"	B 72	
12.58	Lysarwin	B 12	
12.58	Raaf	"	
12.58	"	He 219	
12.58	Raaf	"	
12.58	"	He 111	
12.58	Wienaufer	He 112	
12.58	"	SM 199	
12.58	Raaf	Do 26 N	
12.58	"	He 350	
12.58	"	"	
12.58	"	Königsberg	

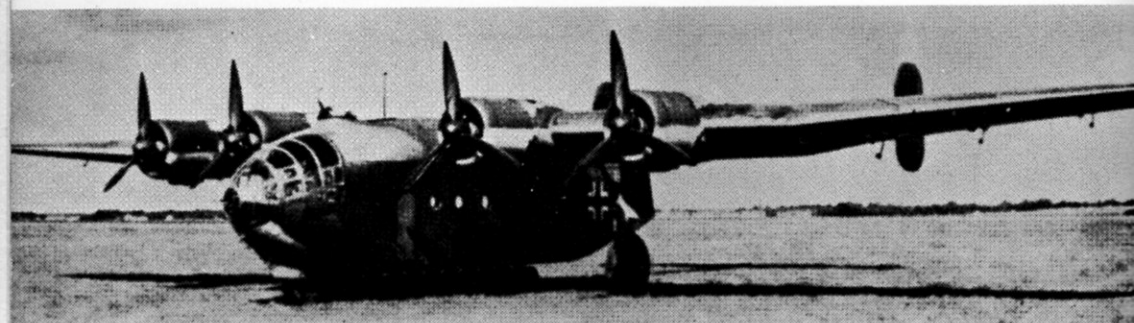
Die Richtigkeit der eingebrachten Fällg
von Nr. 1 bis Nr. 38 wird hiermit
bestätigt.
den 30. 10. 73

27 W. 19 Min
38 Fl
21 Fl

*) Angabe ob: ☐ Erwerbseinkommen, ☐ Nichterwerbseinkommen, ☐ Rente, ☐ Unterhalt, ☐ sonstige Einnahmen



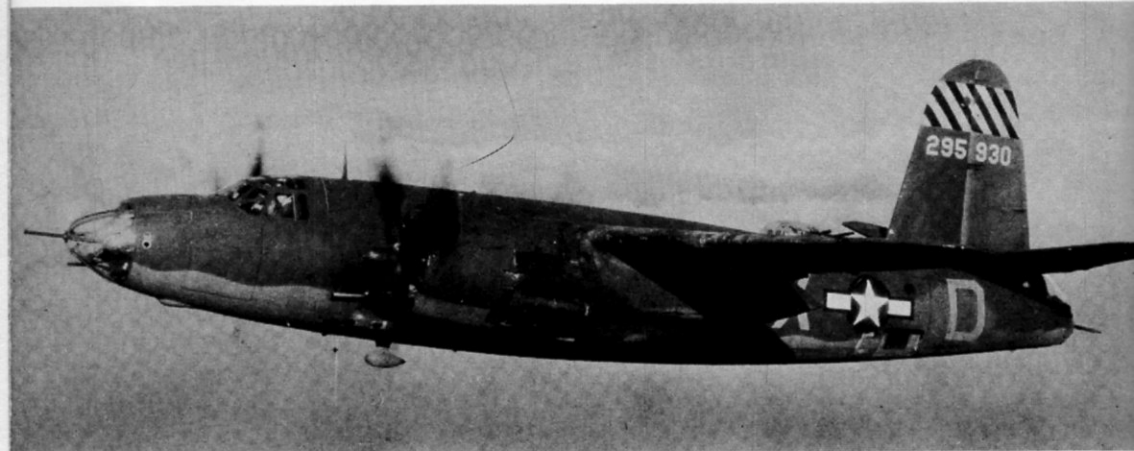
de Havilland DH 90 Dragonfly in Indian civil markings. The example flown by the author carried the Luftwaffe registration RP + MY *Hanfried Schliephake coll.*

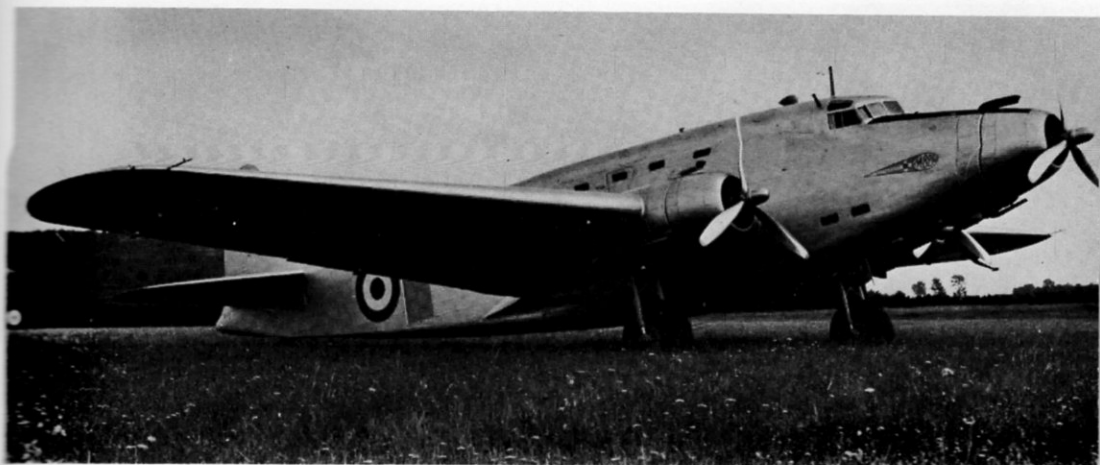


Arado Ar 232B version with four BMW-Bramo 323R radial engines

Martin B-26B Marauder medium bomber of 387th Bomb Group, US 9th AAF

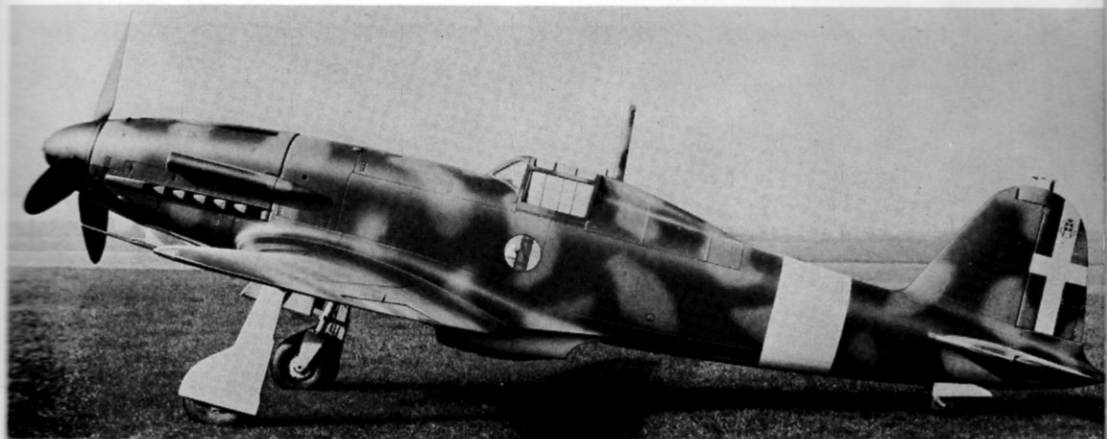
William Green coll.





Savoia-Marchetti SM.82 Canguro was the largest and most efficient Italian transport aircraft. A substantial number continued to serve under Luftwaffe command after the Italian surrender in September 1943

SIAI-Marchetti archives



Fiat G.55/1 Centauro fighter was powered by an Italian-built DB 605A-1 engine

Fiat Aviazione archives

Macchi C.205V Veltro fighter

Aeronautica Macchi archives

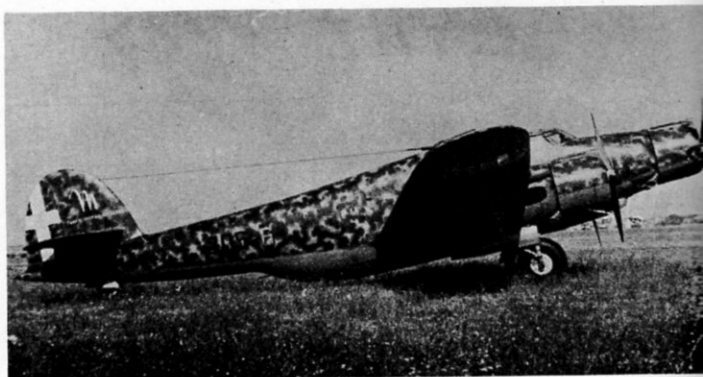




Savoia-Marchetti SM.91 heavy fighter prototype

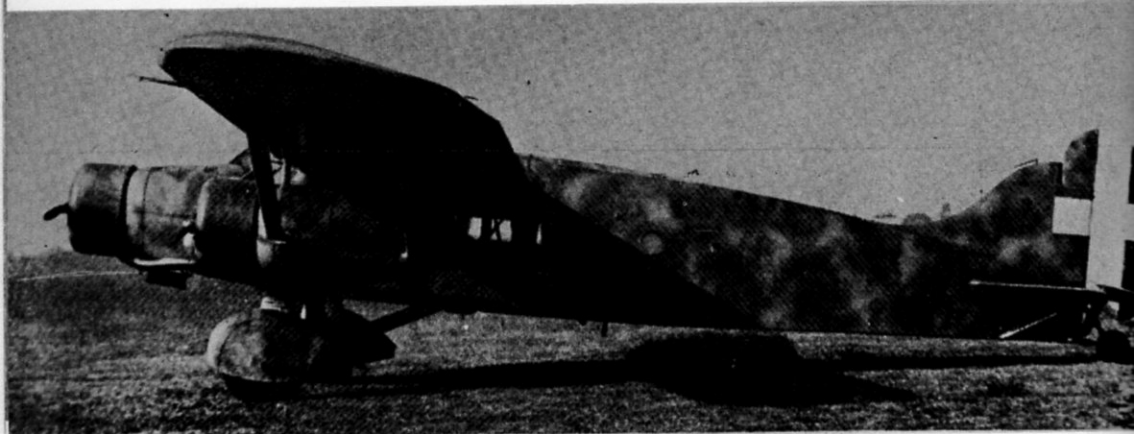
SIAI-Marchetti archives

Cant 1007bis Alcione medium
bomber
Hanfried Schliephake coll.



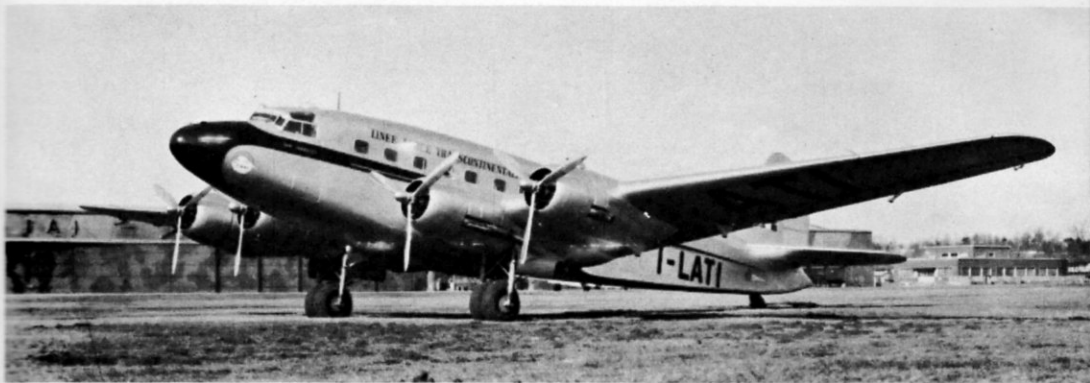
Caproni Ca 133 transport

Hanfried Schliephake coll.



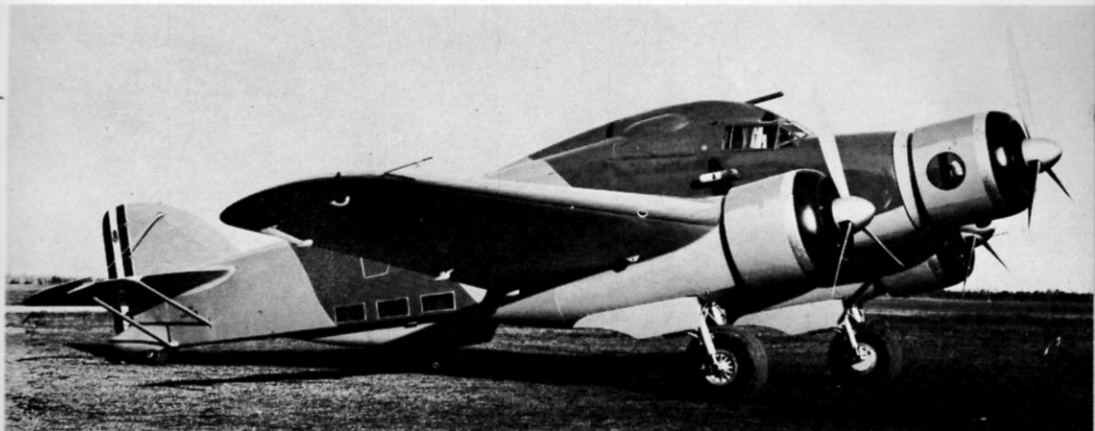


Savoia-Marchetti SM.92 heavy fighter prototype in Luftwaffe markings. This twin-boom design had a cockpit on the port fuselage only
SIAI-Marchetti archives



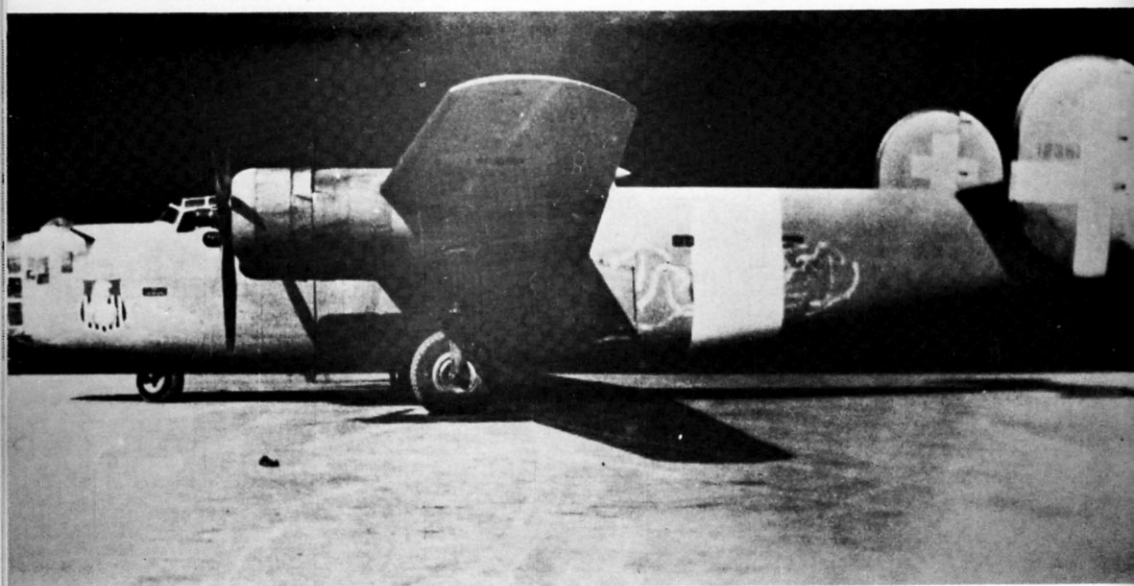
Savoia-Marchetti SM.95 transport in post-war commercial service
SIAI-Marchetti archives

Savoia-Marchetti SM.79 Sparviero torpedo bomber prototype
SIAI-Marchetti archives



Consolidated B-24D Liberator
'Blonde Bomber II' landed in
error in Sicily in spring 1943 and
was captured by the Italians. It
was subsequently test-flown by
the author at Rechlin

Dr Emilio Brotzu coll.



Keys to Figs 1 and 1a

COCKPIT — GENERAL VIEW

Fig. 1 shows arrangement of controls and instruments on early aircraft, Fig. 1a on later aircraft. Key numbers in squares indicate re-positioned items. Key number in circle within square indicates item on later aircraft only.

1. Propeller governor range-limit indicator lights (green).
2. Supercharger controls.
3. Shielded panel light(s).
4. Throttle controls.
5. Propeller feathering push-buttons (shielded).
6. Mixture controls.
7. Propeller governor switches.
8. Sperry pilot "on-off" control.
9. Wing de-icer control.
10. Rudder trim-tab control.
11. Flap selector lever.
12. Flying controls locking lever.
13. Bomb jettison control.
14. Parking brake lever.
15. Radio transmitter controls.
16. Undercarriage selector lever.
17. Aileron trim-tab control.
18. Rudder pedal.
19. Rudder pedal adjusting trigger.
20. Brake operating toe pedal.
21. Elevator trim-tab control.
22. Identification light and signalling switch box.

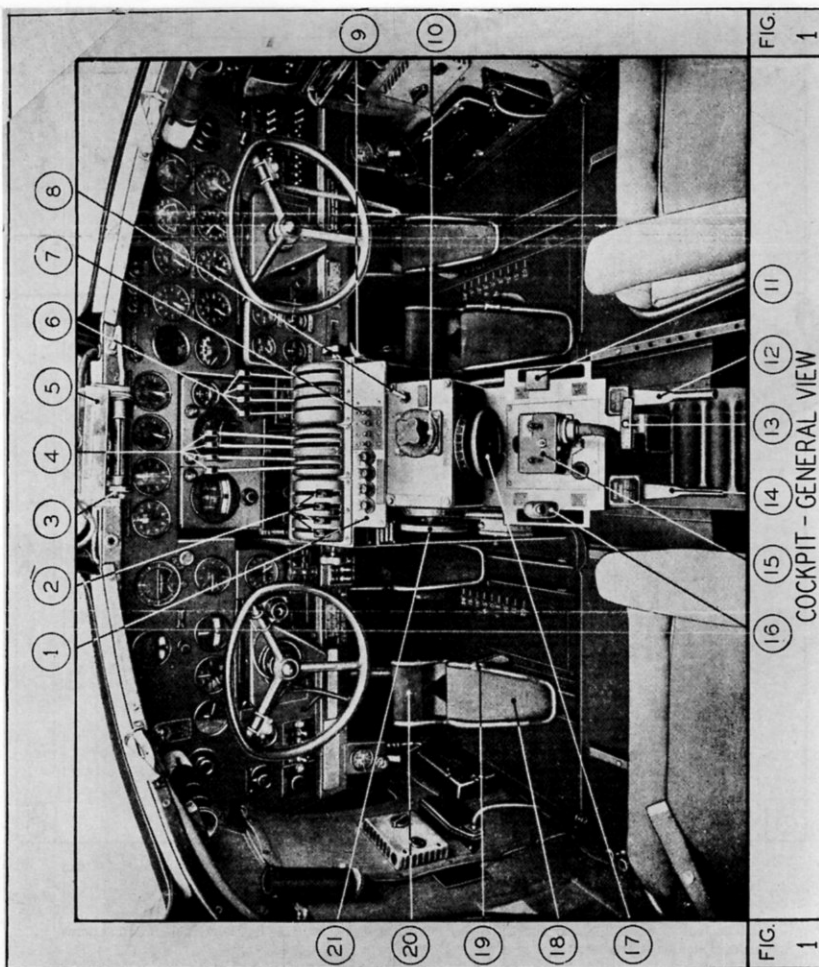
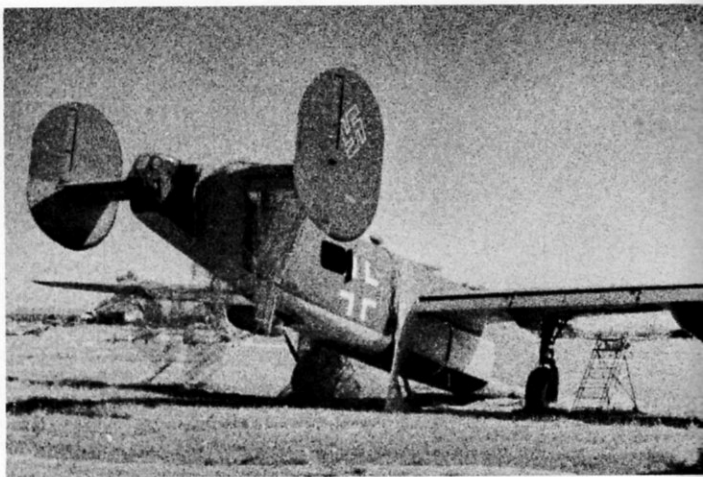


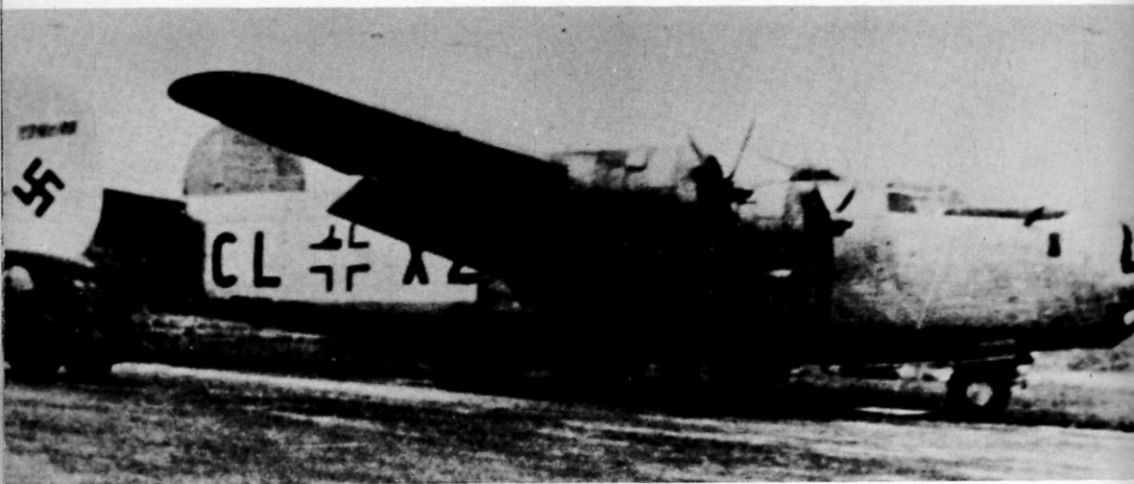
FIG. 1

FIG. 1
COCKPIT - GENERAL VIEW

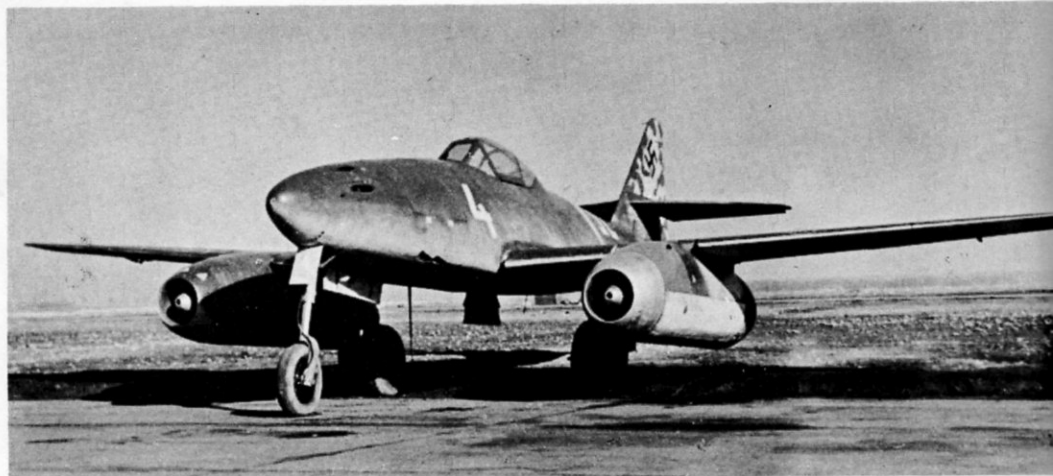
A damaged Luftwaffe B-24J Liberator (probably ex-KG 200) near Salzburg, Austria, shortly after the end of the war



Another captured B-24J Liberator with the Luftwaffe registration CL + XZ was to have a decisive influence on the author's future

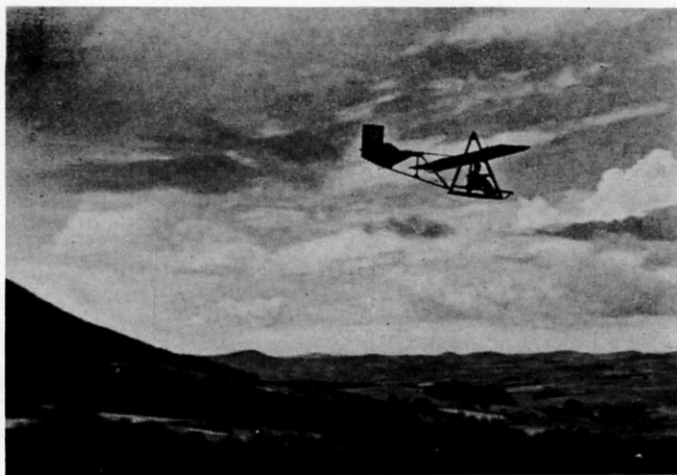


Messerschmitt Me 262A-1a jet interceptor fighter was flown by the author in spring 1944
Deutsches Museum Munich



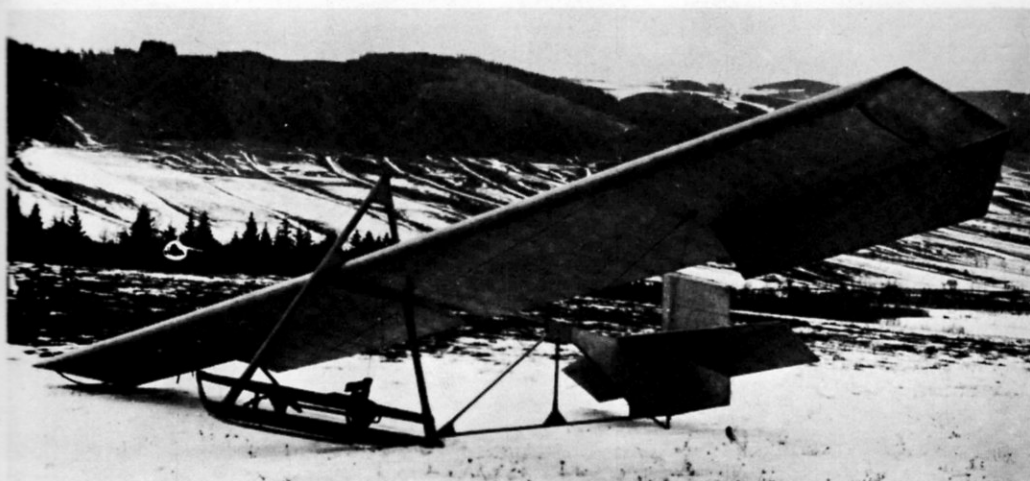
ESG-29 primary training glider
in flight

Deutsches Museum Munich



An ESG-29 on the ground. Note
the 'skull splitter' bar directly in
front of the open pilot's seat

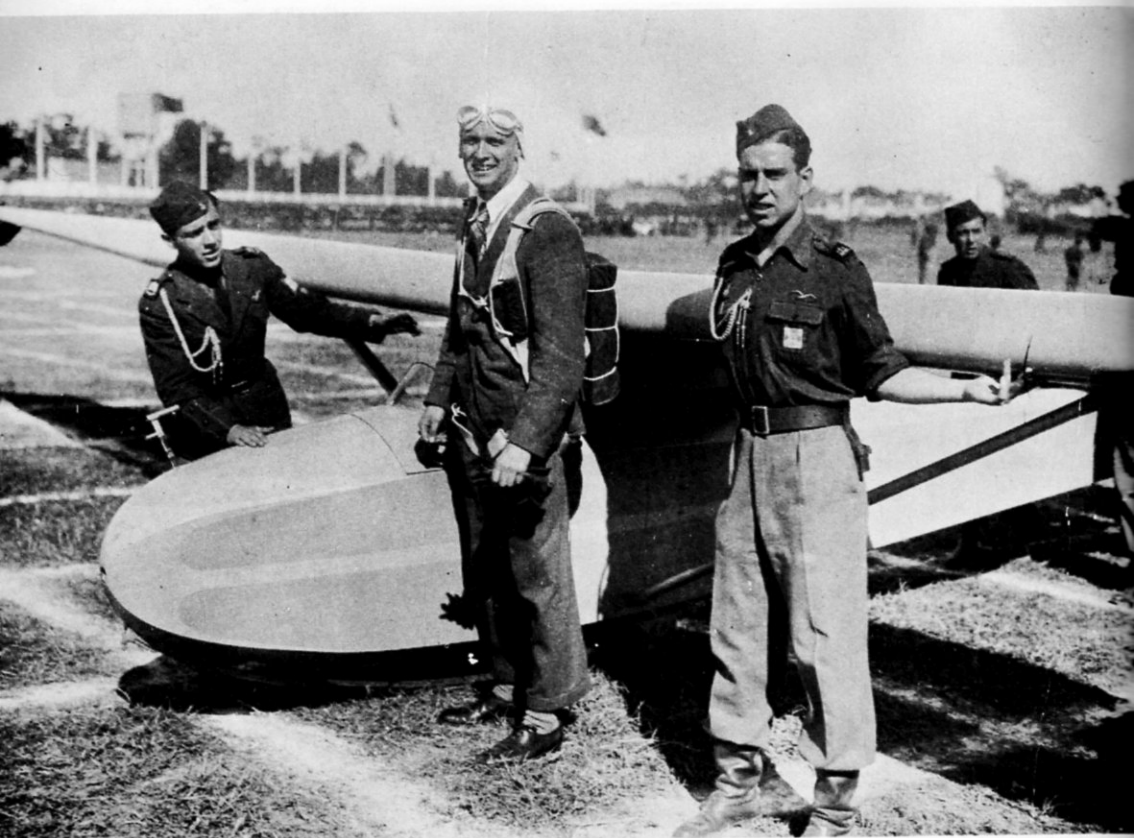
Deutsches Museum Munich



The author in a Rhönbussard
high-performance sailplane
during his time at the *Akaflieg*
Berlin. On the extreme right:
Gotthold Peter who lost his life
in December 1944 due to a
technical defect in the He 162
'Volsjäger' prototype he was
demonstrating

Hans-Werner Lerche coll.





The author after an aerobatic display flight in a Wolf sailplane during the Portuguese national festivities in Lisbon in summer 1938
Hans-Werner Lerche coll.

The author in a Wolf aerobatic sailplane after a demonstration flight in Portugal
Hans-Werner Lerche coll.



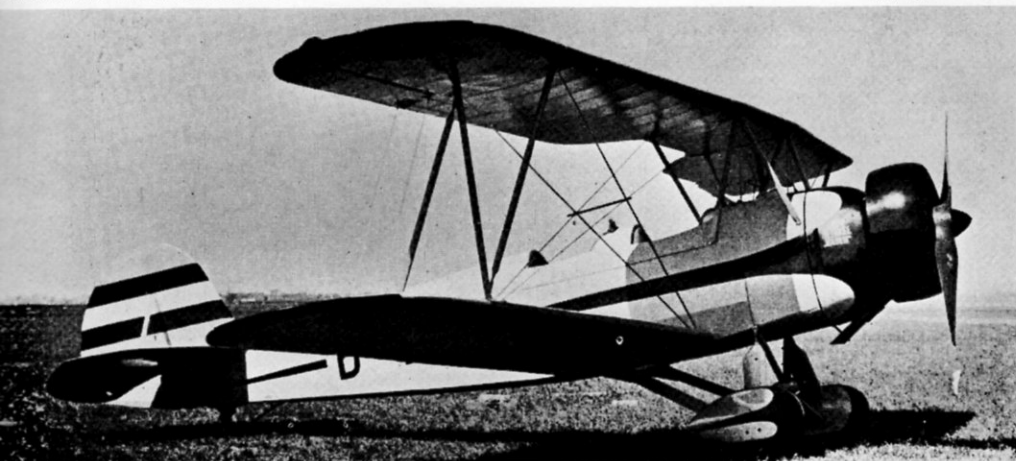


Bücker Bü 131 Jungmann primary trainer

Copyright Jane's

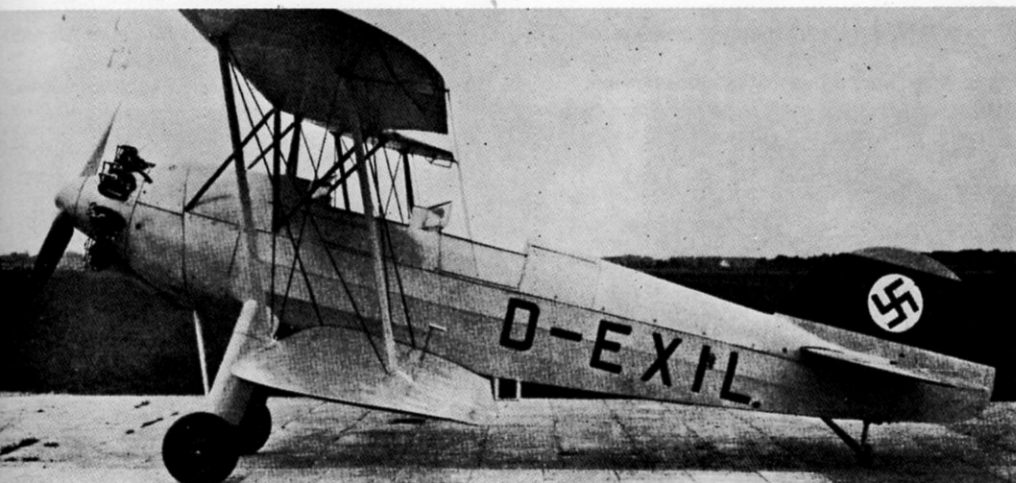
Heinkel He 72 Kadett trainer

Copyright Jane's



Hamburger Flugzeugbau Ha 135 sports and training biplane

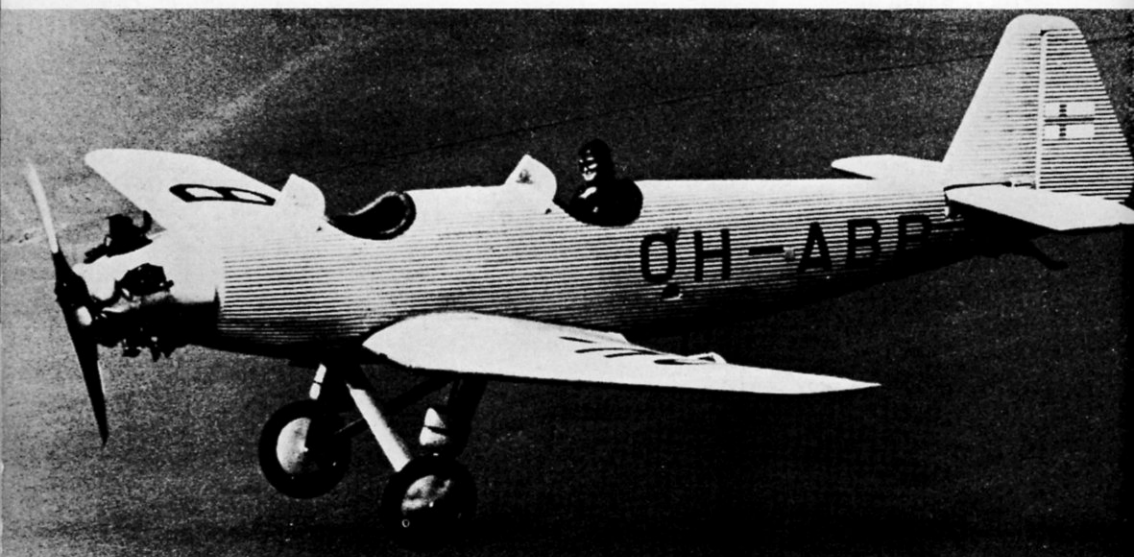
Copyright Jane's





Klemm KI 35 sports aircraft

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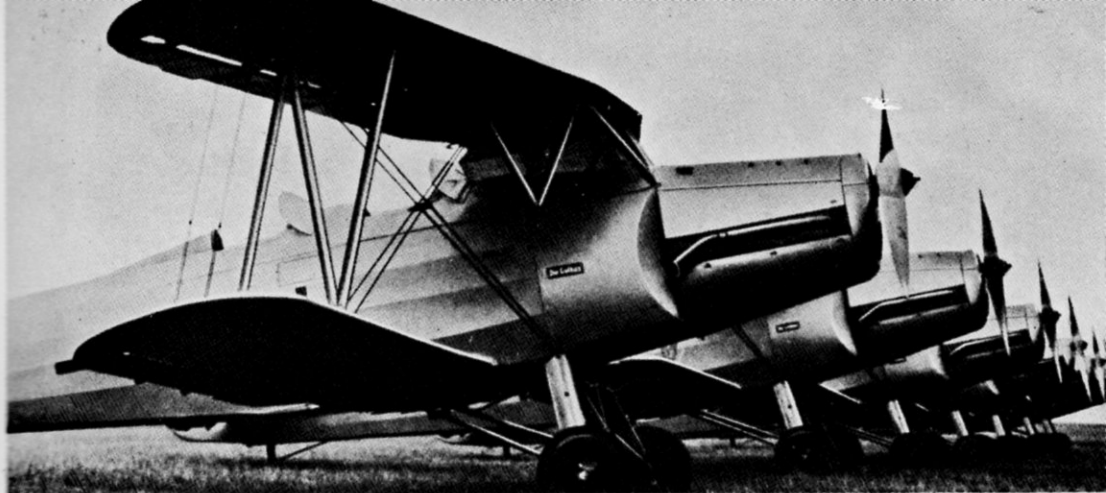
Junkers A 50 Junior all-metal sports aircraft

Deutsches Museum Munich

Arado Ar 66 was a heavier B-1 class trainer

Copyright Jane's





Gotha Go 145 was slightly faster than the Ar 66

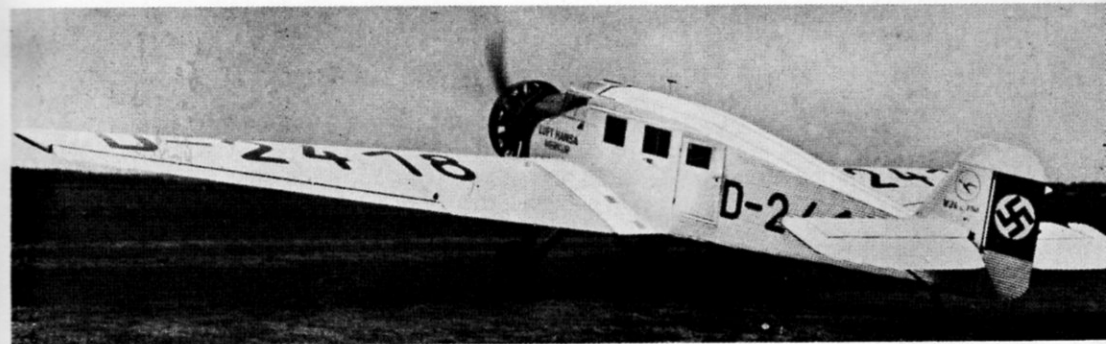
Copyright Jane's

Albatros L 101 sports and touring aircraft was one of the rarer types flown by the author
Hanfried Schliephake coll.



Junkers W 34 general utility and training aircraft was built in many variants

Copyright Jane's





Focke-Wulf FW 56 Stösser aerobatic and fighter-trainer

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Focke-Wulf FW 44 Stieglitz. The author made a harrowing bad-weather flight in one of these trainers

Copyright Jane's

A page from the author's log book recording some of the varied aircraft types he flew during his training at the DVL (German Aviation Experimental Establishment)

Hans-Werner Lerche coll.

Nr. des Fluges	Datum des Fluges	Führer	Fluggast	Zweck des Fluges	Abflug			Landing			Auftrag Nr.	Bemerkungen
					Ort	Tag	Uhrzeit	Ort	Tag	Uhrzeit		
15	2.10.35	Lerche	-	Landung	Halle	2.10.	14.45	Halle	2.10.	14.45	Fl. 44	
16	2.10.35	"	-	"	Halle	2.10.	15.05	"	2.10.	15.05	Fl. 44	
17	2.10.35	"	-	Übung	"	"	15.25	"	"	15.25	Fl. 44	
18	2.10.35	"	-	"	"	"	15.45	"	"	15.45	Fl. 44	
19	2.10.35	"	-	"	"	"	16.05	"	"	16.05	Fl. 44	
20	2.10.35	"	-	"	"	"	16.25	"	"	16.25	Fl. 44	
21	2.10.35	"	-	"	"	"	16.45	"	"	16.45	Fl. 44	
22	2.10.35	"	-	"	"	"	17.05	"	"	17.05	Fl. 44	
23	2.10.35	"	-	"	"	"	17.25	"	"	17.25	Fl. 44	
24	2.10.35	"	-	"	"	"	17.45	"	"	17.45	Fl. 44	
25	2.10.35	"	-	"	"	"	18.05	"	"	18.05	Fl. 44	
26	2.10.35	"	-	"	"	"	18.25	"	"	18.25	Fl. 44	
27	2.10.35	"	-	"	"	"	18.45	"	"	18.45	Fl. 44	
28	2.10.35	"	-	"	"	"	19.05	"	"	19.05	Fl. 44	
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30	2.10.35	"	-	"	"	"	19.45	"	"	19.45	Fl. 44	
31	2.10.35	"	-	"	"	"	20.05	"	"	20.05	Fl. 44	
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55	2.10.35	"	-	"	"	"	28.05	"	"	28.05	Fl. 44	
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83	2.10.35	"	-	"	"	"	37.25	"	"	37.25	Fl. 44	
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85	2.10.35	"	-	"	"	"	38.05	"	"	38.05	Fl. 44	
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88	2.10.35	"	-	"	"	"	39.05	"	"	39.05	Fl. 44	
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94	2.10.35	"	-	"	"	"	41.05	"	"	41.05	Fl. 44	
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98	2.10.35	"	-	"	"	"	42.25	"	"	42.25	Fl. 44	
99	2.10.35	"	-	"	"	"	42.45	"	"	42.45	Fl. 44	
100	2.10.35	"	-	"	"	"	43.05	"	"	43.05	Fl. 44	

Berlin that November. With various stops, the journey turned out to be quite entertaining. In the sleeping car a gentleman with greying temples attracted my attention as the train personnel were particularly courteous to him. I soon found out that he was the German ambassador von Papen on his way to Turkey, where something was threatening to go wrong. Later on, I met some old acquaintances and we spent a few amusing hours in the restaurant car. It was a pleasant interlude, but I sat in that train ten times longer than I would have done in my Ju 188.

Bucharest, a wonderful city, made a very peaceful impression. That was probably the reason for the strict instructions that all members of the German armed forces had to live and eat in the army quarters and thus save the foreign currency allocated for such purposes. And as it was like peacetime in Bucharest, and getting near Christmas as well, some of the German armed forces administration centres seemed to be preoccupied with other activities than looking after new arrivals. That suited me: I had to, and also wanted to be independent of the military organisation! As expected, I had some difficulties with the administration before they found me a reasonable hotel room and arranged my expenses in the local currency, but this allowed me to be independent. Meanwhile, on one of the airfields, Bucharest-Pipera, I had appropriated a Fieseler Storch to commute between Ploesti, Mizil and Cilistea to where the Liberator had to be ferried.

My first flight in the Storch was to Ploesti, where I examined the Liberator carefully. Everything seemed to be in order and the engines ran perfectly. However, I had some doubts about taking off from this field, and not trusting the nose-wheel all that much I ordered the maize field - my 'runway' - to be flattened and hardened with rollers. The next day, 1 December, I flew from Ploesti to the IAR works at Cilistea, whose chief pilot was to fly as my co-pilot in the Liberator. My return flight to Bucharest-Pipera in the Storch was via Ploesti and Bucharest-Baneasa, where all the other preparations had to be made.

The available take-off run was not exactly abundant for a Liberator, but we had dismantled all dispensable equipment from the aircraft to lighten it. On 3 December everything was ready, and I made another flight to Ploesti in the Storch. The weather was perfect, and there was even a slight breeze. Now there was no time to lose! The engines ran perfectly, and the take-off was exactly as desired. However, the burnt child being wary of the fire, I had tried to raise the nose-wheel as soon as I could feel a little pressure on the elevator, and we got away with it. We also seemed to have fixed the CG just right as the Liberator showed no tendency to drop back on to the emergency tail skid, and was not too nose-heavy either. The flight itself was trouble free, and after 23 minutes we landed on the Cilistea airfield without any complications. I had already made friends with the IAR chief pilot who accompanied me on this flight and thus had a chance to get to know the peculiarities of the Liberator. The welcome at the airfield was extremely cordial and lasted several hours, so that it was much later when I climbed into the Go 145 biplane which I used for the flight back to Bucharest-Pipera, and enjoyed the alcohol-free air. Two days later I returned to Cilistea to discuss all the details involved in flying the Liberator, and then set off for home again - by train.

On my return to Rechlin, I had to go to Vizzola in Northern Italy where I had to carry out a series of test-flights with the three-engined Caproni Ca 133 and 148 monoplanes. Both aircraft types were to be used for paratroop training. Back again

in Rechlin, I had to make a test-flight in a Savoia-Marchetti SM.82 transport the day before Christmas, and then the first high-altitude test flight to 11,000 m (36,000 ft) in the Thunderbolt, as related in a later chapter.

My further flights in Liberators were confined to later versions, which basically provided little additional knowledge regarding performance and flying characteristics. Thus, for instance, on 18 March, 1944, I ferried a late model Liberator which had landed at Eger in airworthy condition; I believe it was either a B-24H or B-24J, which both had a rotating gun turret in the fuselage nose. Apart from this armament they differed from earlier Liberators also by carrying heavier bomb loads and more fuel. As expected, on suitably long concrete runways these later-version Liberators behaved quite well.

There is one ferry flight in a Liberator which I like to recall for quite different reasons, when in December, 1944, I had to fly one from Landsberg to Oberpfaffenhofen near Munich. By then I had flown the Liberator twelve times and felt well acquainted with it, and although this final flight did not add anything new to my flying experiences it resulted in another experience that was to be singularly decisive for me.

On the airfield at Landsberg there was a B-24G with the German markings CL+XZ which had made an emergency landing with a faulty engine, but was otherwise in flying order. Replacing the engine with another from a Liberator that had been forced down over Germany but was no longer in airworthy condition was no great problem. By early December 1944, this Liberator was once again fully fitted out and stood ready to fly at Landsberg. This particular machine already had the retractable ball-shaped ventral turret behind the wing.

However, before tackling this, by then almost routine flight, I had an opportunity of flying the Messerschmitt Me 262, the first jet-powered aircraft on my list. I made two take-offs from the concrete runway at Lärz, which is part of the Rechlin airfield complex, and enjoyed every minute. It was a marvellous feeling, moving through the air in this fast machine! On the other hand, the fairly low clouds that day also showed one the limits of this type of aircraft.

Then I set off in the direction of Landsberg with my faithful flight mechanic G., the expert on captured aircraft. We checked the Liberator and found it fully airworthy, ready for our flight the next morning. That evening I held a talk on my experiences with captured aircraft before the assembled pilots of the local fighter unit. Among them were some who had taken part in the mock attacks on my B-17 Flying Fortress during the demonstration flight in May of the same year and, as is always the case on such occasions, long and interesting discussions followed my lecture.

The B-24G at Landsberg was to be transferred to the *Flug-Funk Forschungsinstitut* (FFO) (Aviation Radio Research Institute) at Oberpfaffenhofen for radio-technical measurement purposes. I wanted to ferry the Liberator and carry out the first flights myself, and simultaneously instruct a *Flugkapitän* who was employed there and had meanwhile become a non-commissioned officer. The ferry flight went smoothly and a landing soft as butter on the concrete runway at Oberpfaffenhofen was no problem. The Liberator and everything else being ready, I made the first longer flight for the FFO that same afternoon. Among the many spectators at my take-offs and landings at Oberpfaffenhofen was also a

pretty young lady. After gaining her A-levels, studying at an art school and the compulsory RAD (*Reichsarbeitsdienst* = State Labour Service) she was in danger of being impressed 'to tighten bolts at the MAN* works for the war effort'. She had started work at an FFO laboratory, which was also considered important for the war effort, a few days earlier. She was tall and slim and very soon attracted my attention; she also looked very charming in her white laboratory smock. Then after the next flight, when some remaining wires from the dismantled radio sets smelled of 'amperes', she appeared at the Liberator with another female colleague and a mechanics' tool box. As she later admitted to me, she didn't have a clue about electrical engineering and had only joined her colleague in order to get a closer look at the strange aircraft. It was a particularly favourable opportunity to get to know her better, and I made the most of it. We soon found ourselves in interesting conversation and I showed her the Liberator inside and out. Naturally, we met frequently afterwards and, despite the generally cheerless times, we had a few very enjoyable days.

I made two more flights in the B-24G CL+XZ, and then everything was ready to hand over to the Flight Captain. My flight mechanic also remained there to look after the Liberator for the next few flights, but after only four days at Oberpfaffenhofen duty called me back to Rechlin: I still had to fly some performance and flight evaluation tests with the Soviet La-5FN fighter, which I had ferried from Gross-Schirmanen. There was hardly any time left over for other things in life, and my private link with Oberpfaffenhofen could now unfortunately only be maintained by letter. Naturally, both sides engaged every available courier flight to this end, and without doubt this experience had considerably increased my partiality for the Oberpfaffenhofen airfield. Among other things it also contributed to my ferrying shortly before the end of the war a Do 335, probably the fastest piston-engined fighter in series production, to the Dornier works at Oberpfaffenhofen. It also concluded my career as a test-pilot.

*Maschinenfabrik Augsburg-Nürnberg AG

My flying background

How in fact does a person, who feels himself to be quite normal, and – I hope – is so judged by his fellow men, and who also has no ambitions to become a hero, adventurer or even a daredevil, come to be involved in an activity such as being a test-pilot, which for many people ranks next after a triple somersault without a safety net in a circus?

I really cannot maintain that I felt the urge to fly from my earliest youth. I did, however, as a small boy, have a great interest in all things mechanical, which was demonstrated not only in taking apart old alarm clocks without being able to put them together again. Indeed, the desire to enter a technical profession became evident at a fairly early age. The present of my first metal-construction set at the age of ten sent me into raptures. From then on I continually designed new models and entered them, or the drawings for them, in the annual competitions which then brought me replenishment for the next largest set.

The first decision to have an effect on my future career came in 1927 when I entered the Lower Third at the age of thirteen. I had begun with Latin and then English in addition and now had to decide whether I wished to continue with Greek in the humanist high school or with French in the modern high school. Today one can imagine only with difficulty the devastating economic situation in 1927, only three years after the inflation, which certainly contributed to the subsequent disastrous political developments in Germany. At that time, a young man who announced that he wanted to be an engineer only met with a pitying smile.

With the intention of being able to resort to other careers, such as schoolmaster, if necessary, I decided at that time to stay on the humanist side and therefore continued with Greek. It must be noted, however, that the technical subjects of mathematics, physics and chemistry were also adequately dealt with in the humanist sector and after obtaining the Leaving Certificate it was still possible to move on to a technical university. This ambitious goal was always in my mind. My family was in a difficult economic situation: my father had died in 1919 when Posen became a Polish town after World War I. When my mother then opted for Germany we had to leave Posen in 1921 and settled in Breslau. My mother had a very hard time of it bringing up us four children, as I had three elder sisters. The pension my father had earned was much reduced by inflation and my mother had to continue working as a librarian.

Gradually, my interest turned increasingly towards aviation. I read all the available aviation magazines and built practically only aircraft models with my metal construction set. Soon I came to realise that a metal construction set is really

not very suitable for building aeroplanes and on my own initiative gradually changed over to normal aircraft model building methods. Gliders of bamboo and cane were created and when they actually flew as well, my delight knew no bounds. It also goes without saying that I often stood at the railings of the Breslau-Gandau airfield gazing at the various aeroplanes taking off and landing.

On the occasion of an advertising campaign several gliders were lined up on a large square in Breslau and I got into conversation with the young people there. One thing led to another, and I was invited to visit their model-building workshop in one of the old barracks near the Gandau airfield. The group was the Breslau Model- and Glider Club 'Silesian Eagle'.

Model-building gave me a great deal of pleasure. First of all, under professional supervision I constructed a glider of over 7 ft wingspan made up of plywood ribs and a main spar bonded together in a mould. I was very proud of the finished product and naturally wanted to see it fly. The next logical step was to join in the gliding activities at the club, which consisted partly of bungee (rubber catapult) launches and guide pulley tows at the airfield, and partly of gliding off the slopes of the Zobten hills. Due to the generally poor economic situation, it was very difficult in those days to lead a club of enthusiastic, but poor young people. For that reason alone much respect is due to the selfless efforts of the club leaders, a professional chimney sweep and a graduate engineer, who also made considerable financial sacrifices, as state aid of any kind did not come into question at that time. But the industrious efforts of the members alone was not enough to build a glider or to run it. In fact, it became increasingly difficult even to scrape together the most necessary funds for new materials for another glider. Casting around for additional funds we managed to get some sponsoring, and sometimes the name of a cigarette company, or even the names of some private individuals were displayed on the wings. It even happened that different names appeared on the port and starboard wings at the same time! Both would then be replaced by the names of other tenaciously solicited sponsors some months later. It was a hard struggle, but well worth it, and sometimes we had a lucky break. Thus, we were absolutely delighted when a soft drinks company put a lorry at our disposal which allowed us to drive in style to the 20 mile distant gliding area on the Zobten slopes. Otherwise, we had to cover that distance on bicycles.

I soon realised that participating in the activities with real gliders brought me much more pleasure than just flying models, even if my participation only consisted of pulling out the catapult ropes and transporting the gliders back to the take-off point. On the other hand, learning to glide while working with the gliders at the club was such a protracted affair as to be practically hopeless. Even if one managed to get in one or two glides on a Sunday, the little one had learnt was forgotten again after one or two weeks, so that one had to start from the beginning again. Obviously, it was not possible to fly every Sunday either, due to bad weather and other difficulties.

Naturally, during the initial training stages, the danger of damaging a glider was particularly great, ruining weeks and months of work by the club members. But accidents were unavoidable and we had to be prepared to cope for such emergencies. For the members who were less experienced as craftsmen the main task in the workshop was making the wing ribs. These consisted of slats which were

placed in a model pattern, bonded with small plywood pieces at their nodal points, and then nailed together. The finished ribs were pushed onto the main wing spar and formed the profile of the wing. The more complicated tasks were left to the carpenters and mechanics and particularly good progress was made when some of the members were out of work and could devote their working time to the club. I worked there two evenings a week, mostly between 7 to 10 pm; my travelling time was in addition to that. At the Elisabeth High School, we had a rowing squad and on one or two afternoons a week I had rowing on my timetable. On Saturday afternoons there was time over for the gymnastics club so that my week was fairly full. Naturally I viewed with envy my club colleagues who had already passed their A-, B- and even C-Certificate glider examinations as they flew. In reply to my question, how one came to fly without money, I was given a tip to make enquiries at the regional group of the German Aviation Society(DLV) and put my name down for a vacancy at the Grunau gliding training school in the Riesengebirge mountains. Claspng a letter of recommendation from the club leader, I appeared with a fast-beating heart before the omnipotence, a retired major, in the rooms of the regional group. I had been given a piece of good advice, namely to keep talking at all costs until he had made a note of my case. And that was what actually happened. My case was made more complicated by the fact that, being still at high school, I only had the summer vacation free for the three-week course, and during this period the courses were usually so well attended that there were no vacancies. In short, nothing could be done in the summer of 1931. However, shortly afterwards I received a letter which I excitedly opened. It had worked! I was so happy: there was a vacancy on the beginners' course No 18 at the Grunau gliding training school between 22 September and 13 October, 1931.

But like so many things in this life, I slowly realised that this success was just the beginning of the real difficulties. First of all, I had to explain to my mother, who was most concerned about her only son, that on such a gliding course one hardly *left the ground and that nothing could possibly happen. Then I needed leave from school, as the three-week course was much longer than the short autumn holiday.* Finally, the money for board and the inevitable additional expenses had to be scraped together, with which my three elder sisters helped in the most touching way.

Today, one can hardly imagine how difficult it was in those economically bad times, to scrape together the few coppers needed even for the most thrifty lifestyle.

After a few cutting remarks from the teachers, who no doubt failed to see a direct enrichment of my humanist education in the gliding course, I did obtain the necessary leave. At last everything was arranged and an acquaintance took me to Grunau in his car. It was a very exciting time. Naturally, as a seventeen-year-old, I was nervous about what was in store and how I would react. As a child who had grown up only in the city, I was first of all very enthused by the beautiful mountains near Hirschberg in the Riesengebirge mountains.

At the beginning of the course, we were introduced to the head of the school, Wolf Hirth, then to our gliding instructor, Pit van Husen, who was to teach us flying individually. Full of respect, we firstly viewed the slim high performance gliders in the hangar. But we were only destined to use the simple, standard Grunau school glider (ESG), in which one sat open to the air on a small board with

only a strut in front to hold on to which bore the promising name of 'Skull Splitter'. I was No 13 in the course. I wasn't too happy about it, not being completely devoid of all superstition, but perhaps this fact contributed to taking more heed of my mother's warning to be very careful.

Gradually we got to know the other participants on the course. Indeed, I was one of the youngest and naturally had no idea that the people I was mixing with on this course were later to become so famous. A pleasant young lady, particularly enthusiastic about flying, attracted my attention; her name was Hanna Reitsch. Another participant later became famous as an ace fighter pilot. However, some of the participants were considerably older and even staid family fathers. I think it should be especially mentioned, and not just taken for granted, that the comradeship and unity between the older and younger members of the group were quite exemplary.

The training at that time was done in single-seat school gliders. People did not realise until later that training in a two-seater with an instructor was more effective, if also more expensive. The course began in the mornings with instruction, and then the gliders were set up on the edge of the slopes facing into the wind. We learnt to balance them by moving the control stick to the left and right over the ailerons. Then in the afternoon the flying began with slides on the lower part of the slope where the ground levelled off. We were strapped into the open glider, a rubber catapult rope was attached to front of the machine through a hook that was open underneath, and then, at the command 'Pull', four or five men pulled on both ends of the V-shaped catapult rope, heaving it apart whilst two men held the tail of the glider. At the command 'Run', they started trotting and when the tension on the rope was strong enough, the glider was released by the tail team at the command 'Let go'.

For the very first slides the pupil had the control stick so positioned by the flying instructor that he didn't leave the ground but only had to keep the glider balanced using the ailerons. After my first slide, I made my first 'jump' the same afternoon. When the ropes were pulled more forcefully, the glider became airborne, rising some one to one-and-a-half metres off the ground. The problem then was to steer as sensitively as possible with the elevator, without forgetting the aileron control. Of course, I was very proud to have been in the air without having done anything wrong. However, the next two days brought bad weather and strong winds making the beginners' training impossible, and one had an opportunity to digest the first impressions. The great advantage of this type of training was that one could learn from the mistakes of the other participants. During flying practice the next day, I did three further 'jumps' and my fourth launch that day resulted in my first 10 second flight. After that, the wind began increasing in force so the training had to be abandoned. It may appear ridiculous even to call a 10 second flight a flight at all, or even talk about it. However, I believe that only someone who has experienced it himself can appreciate the happiness a beginner feels after such a flight. And one shouldn't dismiss even these few seconds as ridiculous. Anyone of a different opinion should follow the second hand of his watch to see how long ten seconds really are and how much can go wrong in that brief span of time! The next day brought me three flights of 20, 14 and 12 seconds. I was already doing well, keeping the glider in flight with the elevator along the gently falling slope,

balancing it with the aileron control and holding direction with the rudder. On the following day my tenth launch was due, including slides and 'jumps'. This launch began somewhat further up the slope, and 'Pull, Run' and 'Let go' followed later so that as much energy as possible was provided by the rubber rope. After rising, not only the position of the glider, but also the wind blowing into your face and rushing through the bracing wires, gave indications of the right speed, which in no case should be allowed to reduce too much; nor were the point of orientation on the horizon to be forgotten, and one had to retain adequate control to land. In fact, everything had gone very well. At first, I was not quite sure what the shouting up on the slope meant. I really hadn't done anything wrong! Then the first comrades reached me and congratulated me on passing my A-Certificate examination. The flight had lasted 31 seconds, and was the first A-Certificate examination of this course. So the number thirteen had even brought me luck after all! Obviously, I was extremely pleased. And I can still recall the few lines to mark the occasion which a poetic member of the course, an employee of the German State Railways, had made up:

As he was the first to fly the 'A'
Let us sing aloud.
He's achieved it without a fall,
but after all, it's easy for a lark!
(Lerche = lark).

In as far as the training was not completely interrupted because of bad weather during the next few days, we moved continually higher up the slope, harnessing a horse in front of the glider, which was put on a wheel, in order to pull it up. Now one could attain much more height over the slope and we began to introduce stylish turns with the ailerons and rudder, not forgetting the elevator. The flying time gradually increased and came fairly close to the one-minute line. The B-Certificate examination consisted of five flights of one minute each with an S-turn. The number of launches obviously decreased due to the length of the flights, so that one averaged one launch daily. Clearly, it was important that the participants progressed more or less equally. This particular difficulty, which occurs on every course, really only became apparent to me one year later, then 18 years old and a licensed gliding instructor myself, when I was standing on the slopes. The weight of the pupil was important in the light school gliders used for the beginners' training. For a heavier occupant it is more difficult to rise free off the ground, as he requires a higher unstick speed and naturally also descends again more quickly. It is probably comparable to bobsleigh riding, the only difference being that bobsleigh drivers collect the heaviest people possible around them in order to descend more quickly, whilst gliders really want to stay in the air as long as possible. For a heavier flying pupil, the correct adjustment of the control stick in the elevator and the launching speed are that much more difficult, as on the first 'jump' the pupil should neither purposely nor inadvertently operate the elevator control, since obviously a beginner has not yet mastered the carefully measured moves of the stick necessary to attain the correct flying position. Besides, as a flying instructor, one is careful not to give 'heavyweights' too much speed at the beginning, so that they cannot do anything silly. Consequently, on most beginners'

courses, the heavier, usually older, pupils tend to be somewhat neglected.

My first launch from the very top resulted in a wonderful one-minute, 22-second flight – my first B-Certificate flight. The next day came the second B-Certificate flight. Then for two further days instruction stopped due to bad weather and strong winds and we helped our colleagues on the advanced course with launching and bringing up the machines for glides from the west slope for longer flights.

The next day brought training weather again. Hanna Reitsch had already completed her five flights for the B-Certificate examination, the first one on the course. That day I completed the remainder of my B-Certificate flights with one minute, 18 seconds; one minute, 15 seconds; and one minute, 16 seconds, in a total of 21 launches. With one more launch and my farewell flight, the 23rd launch of one minute, 27 seconds, the flying course came to an end for me.

I very much appreciate the influence of two such excellent flying instructors as Wolf Hirth and Pit van Husen on my further flying career. The farewell from the course was a jolly affair with a slightly too spicy spit-roast over an open fire. Then each of us went his own way.

I was very proud of my B-Certificate badge with its two white seagulls on a blue background, as I returned to my school desk in the Lower Sixth. There were no opportunities for flying with the club during the winter, but in the spring I had the chance of a short flight of 20 seconds on the Breslau-Gandau airfield with a catapult cable and guide pulley, a so-called hoick launch. Not until eight months after the beginners' course at Grunau did I have the opportunity of a real flight within the club activities, but that flight was at least of considerable importance at the time. I must say in advance that the club gliding was done at Zobten, a mountain rising approximately 2,400 ft above the flat land. To the east and west launching tracks in the form of wooden planks had been laid in clearings in the woods, on which the skids of the glider could slide and were guided. Only at the knoll of the Zobten was the launch difficult, as it was surrounded by high trees so that after leaving the launching ramp, the glider had to rise several metres to clear them. Two previous launch attempts from the knoll had ended in crashes; the gliders fell into the trees without the pilots being hurt.

For some time, a high-performance two-seater built by the gliding club itself had been standing on the knoll dismantled on a transport lorry in a garage belonging to the mountain inn. On Sunday, 26 June, 1932, the garage had to be cleared, however, and the glider either transported or flown down. On the preceding Friday evening there was a big meeting, as really everyone was desperately needed to help. I had agreed to join the gang out of sheer goodwill, as at that point I really couldn't have expected to gain any advantage from helping in the operation.

The Sunday came and we trooped up to the knoll of the Zobten. It was beautiful weather and a 20 mph wind was blowing from the north-west, just the right direction. It was quite clear to everyone that advantage must be taken of this ideal weather. I don't recall whether the 'star pilots' of the club had no time or no interest, but anyway, I was asked whether I dared to fly the glider down. And how! But, I must add, my entire flying experience at that time consisted of a total 24 launches, including slides and 'jumps' in open gliders from low slopes and all – apart from one short launch from the airfield – eight months ago! Besides, this

glider was a high-performance sailplane with an enclosed fuselage. Only someone who has undergone a similar kind of gliding training can judge what a gigantic stride I was about to make.

On the other hand, I don't want to give the impression that either the club leader's offer, or my acceptance of it, was rash in any way. By that time, I had carefully studied the physical foundations of gliding which made me feel confident of being able to make this flight.

And so the glider was assembled and prepared for the big event. To make the best possible use of the available take-off distance we made a launching ramp of planks placed on margarine boxes. Good advice poured in from all sides, as naturally this was an attraction for the visitors on the Zobten. The glider, named 'Gildehof' after the cigarette company that had made a gift of the materials for its construction, was raised onto the planks and placed with the landing skid over the back end of the ramp, so as not to lose even one metre of the slipping length. Like this, the tail of the 'Gildehof' protruded beyond the ramp, which was well lubricated with soft soap. Then I climbed into the front seat and strapped myself in - at that time no one had even thought of a parachute. The second seat at the centre of gravity remained empty. In order to complete the picture for the expert, it should be mentioned that the whole instrumentation consisted of a single cup-anemometer mounted on the fuselage nose in front of me. This was an instrument for measuring the wind strength at ground level, and correspondingly sluggish in operation. The first tall trees of the forest began about 90 feet away, their tops rising some 10 feet above the ramp.

Shortly before the take-off I was given another very important tip, to land as near as possible to Gorkau-Rosaliental, for that day there was a fun fair known as the 'Marriage market' that promised a worthy ending to the day. By then I had the feeling I had had as much advice as I could take; it was time to go. The launching teams took up their positions at the back of the fuselage and at the catapult ropes in front. Before leaving me to my own devices I was given a pair of flying goggles to wear, just in case. Then finally came the 'Pull' and 'Run', only this time the launching teams remained hidden from sight by the edge of the slope. But I could well imagine how my colleagues were now leaping over rocks like chamois bucks! The knots of the gradually tightening catapult rope, which was no longer the newest, moved slowly forward to the end of the ramp and as their movement decreased I gave the order 'Let go'! At the first jerk of gathering speed the end of the fuselage banged against the ramp, but apparently nothing was ripped off. The speed provided by the energy of the catapult rope combined with the wind made it easy for me to pull the glider over the tops of the first trees and I was away! It was an indescribably wonderful feeling, soaring for the first time to 1000 feet above the steeply sloping land. It was all new to me; I had never even been a passenger in an aeroplane. The air was fairly bumpy and I quickly realised that the initial enthusiasm over this flight had to give way to some well-considered measures to keep the glider under full control. Being theoretically master of the situation, I knew where the main up-current area was to be expected over this slope; the rotating cup-anemometer was of little interest to me. A sideways glance confirmed that the angle of incidence of the wing with the horizon was more or less correct. The next step was manoeuvring; it was all important to steer the glider into the

main upcurrent area, as of course I wanted to stay up as long as possible. My second thought, to try to fly the glider as well as possible with the best sinking rate and at optimum speed, was rather more critical. Until then, I had not considered how unreliable the cup-anemometer really was: its inertia still kept it rotating happily when the glider was already 'hanging in the sky like a ripe plum' and with little speed left, about to stall. And one thing I knew already: speed is survival! This applies as much to a glider as to a large six-engined aircraft. By then I was high above the launching point and as I flew over it, everyone waved enthusiastically. My height gave me a certain amount of safety, as the small mistakes I made did not have such a drastic effect. Gradually, I managed to gain control over the - for my situation - relatively big high-performance sailplane and began to fly it more or less as it should be. In fact, I thought I was doing rather well, and hoped that my colleagues down below had ceased to worry. Further into the up-current area, I continued to turn into the wind and so managed to retain my height for quite a while. I had no idea how long I had already been airborne; I was far too busy concentrating on controlling the glider and enjoying the flight to think about time. However, everything comes to an end and so did my first longer flight. Slowly the glider started losing height, probably due to the decreasing wind, and I began to aim for the landing area near Gorkau-Rosaliental. I had chosen a large field, but overlooked the fact that it was slightly sloping. Up to the point of landing I had learnt to control the glider quite adequately. But in those days there were no landing flaps or spoilers to reduce the gliding angle before touching down. Besides, after only 24 'jumps' and shorter flights in a glider I had no idea how one could reduce surplus height or overrun by using a side-slip. And so I 'floated' on over the field, which fortunately proved long enough and the landing went smoothly; indeed, I could have glided on for another 600 feet. The local celebrations had long since lost their attraction and I had some trouble keeping the people away from the glider. It also took some time for my comrades to arrive. To my surprise, they all congratulated me: apart from having made the very first successful launch from the knoll of the Zobten, the subsequent flight had lasted 35 minutes and thus qualified me for the C-Certificate; it was also my 25th launch in a glider - all three good reasons to celebrate. The glider was dismantled and loaded onto a transport lorry, and then nothing remained in the way of our visit to the fair at Gorkau-Rosaliental.

The reason I have dwelt in some detail on my gliding training at Grunau and this first longer flight in particular is that it gave me considerable self-confidence and was thus decisive in furthering my flying activities. Both during the subsequent gliding and especially during the later test-flying of powered aircraft, I frequently became engaged in relatively difficult tasks for which my flying experience was not really adequate. I was also frequently asked, especially by various experts, how I began test-piloting and particularly evaluating captured aircraft. In times like the present when every test pilot is prepared for his job by undergoing a clearly designed programme at a training school for test pilots, I think it is important to describe the details of how a pilot assimilated the subject matter step by step. It may be that this is what made my flying so interesting and why I always had to have all my wits about me. Looking back on my entire flying career I would like to say in retrospect that even risky flights when the pilot had to

be fully alert are less dangerous than routine flights which can cause absent-mindedness and negligence. And with regard to the oft-repeated statement that flying is so wonderful, irrespectively if one is stirring the control stick in a small sports plane or flying large and fast aircraft, one should not forget that not only in the case of test-piloting there are often only tenths of a second between moments of greatest delight and light-heartedness and absolutely lethal danger. I believe that the knowledge of this fact is valid even today, despite the quite unbelievable perfection of power plants and airframes and the development of other aids, and could possibly help prolonging life.

For me, however, there was now a pause in flying. In the autumn of 1932 I had to have an appendix operation and next came matriculation exams three months later, which I managed to pass still only 18 years old.

My attitude to flying at that time, and the attitude of my classmates is shown best of all in a verse from the matriculation newspaper, in which I am made fun of because of my christian names:

Hans-Werner, Helmuth, Günther's grasped it,
He is only interested in what suits his name:
The lark (Lerche) flies as high as the mountains.
And soon we'll see Hans-Werner
As he builds his splendid plane,
And everyone will gaze into the skies
To see the aeroplane wonder!
Let's hope it keeps on flying up -
And never down!

Then began my six months' practical studies with the State Railways at Breslau - a prerequisite for registration at the Technical College. During that summer I only managed a few flights in the Zobten area.

In the autumn I started my studies in Mechanical Engineering at the Technical College in Breslau. The 43 hours a week curriculum, including practical work, technical drawing and so on, made great demands on me and I noticed little of the proverbial free and easy life of students. During the holidays at the end of the first winter term I was involved in the so-called Voluntary Service. Participation was again a prerequisite for registration in the second term. At first I was delegated to shovelling near the Polish border, but thanks to my knowledge of glider construction I was finally sent to Trebnitz, a villa suburb only some 12 miles from Breslau. There I applied myself to building a glider and conducted the maiden flight at a ceremony in May. In addition to another two shorter flights that summer I also made my first longer flight in a glider from the launching site on the big Riesener at Zobten in July 1934. Unfortunately it had taken us far too long assembling the glider on the launching site so that my flight had to be abandoned after 3 hrs 20 mins due to darkness.

Following the summer term it was intended that we should visit an SA* sports camp that did not exactly have a good name among the students. I was not looking forward to it either, but then chance came to my rescue: one day the director of the Institute of Physical Training for the University and the Technical College at

*The SA ('Brownshirts') controlled large sections of German sporting and other public activities.

Breslau telephoned me and enquired whether I knew of a gliding instructor who could take over some courses at the gliding school at Kltschen, on the spur of the Zobten. I explained to him that I was a licensed gliding instructor myself and would be glad to oblige, but had to attend that certain sports camp during the time in question. To my great pleasure he assured me that this activity as a flying instructor would be acceptable instead of the SA camp. Naturally, I accepted immediately and both of us were satisfied. As a result I was busy as a gliding instructor on the slopes throughout the holiday period until well into October. I really enjoyed it, but cannot conceal the fact that the great responsibility, especially for the older pupils, caused me a certain amount of concern. It was not easy for a 20-year old, and usually the youngest in the group, to decide whether the launching place should be altered when the direction of the wind changed and if so, at what stage; or when, because of freshening wind, one should not risk any more launches. But there were also some amusing times, especially when there were some girls on the course. I can also recall quite well an occasion when we offered a passenger flight as a prize at the end of a dance in the village. We had a two-seat 'Poppenhausen' type glider at our disposal which had hardly been used till that time, and did not really expect that our prize would be claimed. We were that much more surprised when the next day the winner, a young farmer, appeared on our doorstep. He really intended to make use of his tombola prize – and unfortunately, he wasn't afraid either! There was nothing for it but to prepare our 'Poppenhausen' and first of all make a trial flight to ensure that everything was in order, which I did. The following day I took up our eager passenger, who was absolutely delighted, although it was only a glide from the knoll.

Then in mid-October came a period of really strong winds, which meant that the beginners' course had to be abandoned. I used this break to complete the three flights I still needed for the official glider pilot's licence in a Grunau Baby I named 'Ostmark'. This licence permitted a pilot also to use non-approved gliding areas, and the necessary requirements were five flights of at least two minutes each over the launching point and a total of 30 minutes flying time. During my previous gliding flights, the C-Certificate qualification flight of 35 minutes and the second flight of 3 hrs 20 mins, I had already achieved the required flying time. With the subsequent three flights of 50, 13 and 7 minutes all the remaining requirements were met in due course. Later on, I became even more daring and during stronger winds let myself simply be pushed into the air without a catapult rope, just by two men holding on to the wing struts. After returning home, I then made my first aero-tow and motor-tow launches in a glider on the Breslau-Gandau airfield. Gradually I made up the flying I had missed during my first course. And, inevitably, my head began to swell!

At the beginning of December 1934 we were to take part in an inaugural ceremony at the Kltschen gliding field. On the previous evening I had been to a ball in Breslau, which had detained me much later than I had intended. Nevertheless, the next morning I was standing as fresh as ever on the slope at Kltschen. Against all expectations, there was a suitable gliding wind and I took off in the Grunau Baby I 'Ostmark' for a 30-minute flight. Afterwards, everyone was in a good mood with free beer and *schnaps* laid on, and they all wanted to drink my health. As it happened, the leader of a friendly group who had apparently

taken too much advantage of the free alcohol part, asked me to make a flight in his place. I agreed, and tired as I was after my late night, I glided for some time over the area, but on landing on uneven ground the fuselage made a loud, audible crack. Although I had landed safely, and nothing serious had happened to the glider, the whole episode was rather unpleasant for me. This was, after all, the first damage I had caused to an aircraft – and it would not have happened but for my youthful rashness.

One had already noticed how during that year since Hitler had come to power money was much more readily available, and everyone who wanted to fly could do so without even an hour's work beforehand in workshops; in addition to that in 1935 we were given a large number of new gliders. Thus, for example, the flying sport group at Breslau received two new high-performance 'Condor I' sailplanes, in one of which I was later towed by a powered aircraft to a flying demonstration at Obernigk near Breslau. At home, I was very quiet about my progress in flying in order to spare my mother unnecessary worry. But as luck would have it, some very good friends of ours, a dentist couple, had seen the flying performance from their weekend house in Obernigk, and my name was also mentioned in this connection. Anyway, the next time my mother went to the dentist she was congratulated on the flying success of her son. The fact that she knew nothing about it was at least as embarrassing for her as it was for me!

During an air display at Breslau I glided in the 'Condor' for a whole hour over the airfield. After landing right in front of the cordoned-off spectators' stand I happened to meet some of my former teachers from my old Elisabeth Grammar School. I recalled how some of them had expressed doubts when I applied for a brief leave from school to complete my initial gliding course, and was glad that I had proved them wrong: my interest in gliding had not affected my education, but had continued hand in hand.

Meanwhile, the Institute of Physical Training had obtained a 'Rhönbussard' sailplane, in which it was said one could also fly aerobatics. I didn't have to hear it twice and on the second aero-tow I tried my first loop. It went extremely well, and I was really pleased with the performance. At that time I had not even flown in a powered aircraft, let alone tried looping.

During an air display at Brieg I slid into a group of trees when landing in the 'Rhönbussard' and damaged the leading edge of the wing. To make the situation worse, during a competition at Grunau while attempting to pull my glider, a 'Condor', away over a cornfield before touching down, I broke the tubular support of its low-set rocking one-piece elevator. Fortunately the damage was not serious and the 'Condor I' was flying again the next morning. In a way it was typical that such mistakes did not happen at the beginning of my flying days when I was more frequently faced with challenges beyond my flying abilities at that time; they did not set in until I believed myself fairly capable and master of my trade. I can only thank my Maker for giving in this way such a gentle but firm damper and reminder that one must never be careless when flying.

Later on, I only slipped up once more during a comparative test for gliders at Göttingen, when on my first take-off in aero-tow, the glider – which had a poor reputation as far as its flying characteristics were concerned – broke away from the towing direction. A take-off control vehicle happened to be in the way, and came

out on top as a result of our encounter. Considering the 'criminal' flying characteristics of this sailplane, there were even some people who subsequently grasped my hand and expressed their satisfaction that at least I hadn't been hurt by this beast. They expressed indeed my own innermost thoughts.

I believe I can afford to recount here the details of my 'Storm and Stress' gliding period (as one could call it) without extenuating phrases. Nor is it in my nature to put the blame for these mistakes on other causes, such as the usual air turbulence (the renowned 'duty sun gust'), other gliders hindering me, or even the bad visibility while flying into the setting sun. These mistakes promoted the necessary self-criticism and later fundamentally contributed to the extra-careful treatment of the many exceptional or otherwise particularly valuable aeroplanes in my flying collection, so that none of them suffered serious damage and I never ruffled a hair on my own head. And in the relatively brief period until the end of the war, that was after all a total of 125 different types of aircraft. God knows that there was certainly no lack of difficult or critical situations during my later test-piloting days, especially in the case of maiden or test-flights in, for us unknown, captured aircraft.

After my first flight in a warm up-current in the 'Condor' high-performance sailplane during an air display at Breslau, I had further opportunities for thermal soaring in the summer of 1935. This kind of flying represented gaining or retaining height in a glider in an air current which rises from the ground for example, above cornfields that have been warmed by the sun's rays. This must be differentiated from gliding in the up-current of a slope which is basically a stronger wind deflected by a mountain.

Naturally, it was also my intention to qualify for the International Silver Award in gliding, known as the 'Silver-C' for short. This was awarded by the ISTUS, the International Study Commission for Unpowered Flight for a 5-hour flight, a cross-country flight of 50 km, and an altitude flight gaining more than 1000 metres (3000 ft) over the launching point, which could be linked with the cross-country or endurance flight. After being launched for an endurance flight at Silberberg near Glatz on the Bohemian border, a severe thunderstorm blew up after three hours and I had great difficulty during the strong, stormy squalls, with poor visibility, in preventing myself from being forced over the border into Czechoslovakia. After my first shy attempt at a long-distance flight which got me as far as Ohlau, I succeeded in making a good 119 km (74 mile) flight lasting 4 hours and reaching an altitude of 1450 metres (4760 ft) over the launching point, in this case above the height of my release from aero-tow. Naturally, I had a map with me and on this flight observed assiduously - or, as we used to say, 'did a Franz'. (In the old days 'Franz' was the nickname bestowed to the observer, and 'Emil' to the pilot). As my flight came to an end due to the gradually decreasing up-currents I should have been just beyond Gross-Strehlitz in the direction of Gleiwitz in Upper Silesia. The landing presented no problem on the wide fields, but when children came running towards me speaking in Polish I feared that I had been 'Franzing' wrongly after all, looking out for clouds and air currents. Thank heaven, it was not so: I had remained fairly well on course, and the children belonged to some local Polish farm labourers.

This flight fulfilled two of the three requirements for the 'Silver-C', and only the endurance test remained. Now and then during the holidays I took on the task of

gliding instructor again and even taught pupils on the Breslau-Gandau airfield to use the car- or winch-tow, driving the car myself. As a matter of interest I would like to add that this was also how I learned to drive a car, the airfield not being a public area. Meanwhile, I was earning some money as a gliding instructor at the University Institute of Physical Training and wanted to acquire a driving licence on the proceeds. I had already made enquiries about a driving school that did not cost the earth, and put my name down for a test 'as soon as possible'. When registering, I did not forget to mention in all modesty that I could already drive. The driving instructor just murmured, 'That's what they all say', but then his face brightened. He had spied the driving school car hemmed in between two other cars and said to me with a friendly smile: 'Well, in that case, you can drive out the school car from there right away!' This I promptly did without batting an eyelid and the drive began. We got on well with each other, and after some twenty minutes he just murmured, 'Another typical illegal driver' and then asked me if I wanted to take my test. Yes, it was all fairly simple in those days.

After the third term at the Technical College in Breslau I passed the first part of the preliminary examinations in the spring, but didn't concentrate on my studies so much during the summer term. All summer long, I was an instructor for the University Institute of Physical Training, made up of gymnastic students, both male and female. It goes without saying that these courses were real fun and there was always something happening. I have often thought back with pleasure to this enjoyable time. In the village where we were staying, an old night-watchman still carried out his duties. When he wasn't doing his rounds, he resided in a small square wooden hut. Since we usually arrived in the village at night, and also had drinks with us, we got on with him very well. But on one occasion I suppose we really went too far: as the night-watchman was doing his rounds, we, in high spirits, tipped his little hut onto its side and dragged it across the street in front of the inn. When he returned he complained of course, but didn't really get angry until we only reacted to his reproaches of 'he really couldn't be everywhere at once', simply by saying that he should just join us in our merrymaking. The next day, a policeman appeared to see me. As I discussed the matter with him in the courtyard, one of the female gymnastic students photographed us from the first floor. I had great difficulty in keeping a straight face. Everything was soon settled, but the documentary photograph later brought forth storms of laughter over and over again. I kept it for years, but lost it at the end of the war along with all my other belongings. It's a pity, as it would still give me pleasure today and remind me of those wonderful weeks. We were so young and happy - even without much money and without any kind of luxury.

I should also like to mention briefly a pleasant experience from my gliding days at Breslau: I had only told my mother what was absolutely necessary about my flying because she was so worried about her youngest child and I didn't want to burden her or myself more than was necessary. I once participated in a competition at Grunau together with my gliding group and entered under the name of 'Paul Vogel' (Paul Bird), afterwards reading all about 'Paul Vogel's cross-country flights at Breslau' in the newspapers. And there was peace at home! But there was an unexpected sequel to this. Obviously, people got to hear about this pseudonym and my old colleagues called, and still call me 'Paul', and some of them

don't even know to this day that I wasn't really christened by that name. After forty years, a very good old friend, a former *Flugkapitän* of the DVL and later at the Rechlin Test Centre, wrote me an amusing letter after he had searched in vain for the name 'Lerche, Paul' in the Munich telephone directory.

The following winter term, however, I had to stick to my studies in preparation for the preliminary exams; I passed them successfully in March.

As I wanted to study aircraft engineering at all costs, I decided to continue my studies at the Berlin-Charlottenburg Technical College and to do practical work during the summer in the Henschel aircraft factory at Johannisthal and Schönefeld. I received a letter of recommendation from the director of the University Institute of Physical Training at Breslau, Dr S., who was much respected by us. He was a World War 1 pilot who had remained youthful, who joined in our gliding activities and who often had difficulties in smoothing out our 'practical jokes'. So equipped I reported at the RLM (State Air Ministry) in Berlin and received a grant to continue my studies.

During my practical work at the Henschel aircraft factory in Berlin-Johannisthal in the summer of 1936, I made several towed flights for the University Institute of Physical Training in Berlin. In Ahrensdorf and during the autumn on the Hornberg mountain, I also made several longer flights during a meeting of the flying groups of the University Institute of Physical Training.

That winter my studies occupied a great deal of my time, but in the new subject - aircraft engineering - I was in my element. I also joined up with aeronautical students of the *Akaflieg* Berlin, which was part of the DVL (German Aviation Experimental Establishment) in Berlin responsible for trainee engineers and received subsidies from the Institute.

Several powered aircraft and gliders were available for flying at Berlin-Johannisthal. The group also had a workshop not far from the University, where they constructed their own gliders and later even powered aircraft. There were always about 15 to 20 active group members who gave a considerable amount of their free time for group activities including designing, building and flying. Hardly any of them were acquainted with the earlier tiresome beginners' training with slides and 'jumps' from the slopes; most of them began straight away with training on powered aircraft and after some practice went to the DFS (German Research Institute for Gliding Flight) at Darmstadt and usually returned after one or two courses with the Silver-C.

Indeed, exceptional possibilities were offered to a student keen on aviation by these *Akaflieg* groups.

During my three-year membership of the *Akaflieg* group in Berlin, three gliders were designed and built before the war broke out in the autumn of 1939. They were the B 5, a high-speed sailplane with a gull-shaped middle-mounted wing of 15 m (49 ft) span; the B 6 with a middle-mounted wing in slight dihedral setting and NACA double aerofoil profile which in combination with the double external aerofoil flaps permitted turning flights in tight thermals; and the B 8, a competitive design for the so-called 'Olympiajolle' class of the German Research Institute for Gliding Flight at Darmstadt. These were used to participate in competitions and comparative flying events against the other aeronautical expert groups. This was an ideal activity because during the comparative events one could gather

experience on other gliders. Furthermore, all problems connected with flying gliders, especially those of measuring performance and efficiency and judging characteristics of the sailplanes, were discussed afterwards and the experiences passed on.

During the winter term of 1936/37 there was a great deal of work for me at the Charlottenburg Technical College. I had to catch up on the feared oral examinations in aircraft construction elements which the other students during my year in Berlin had been able to take before the preliminary degree examinations. Any remaining time was spent with the *Akaflieg* group participating in the designing, constructing and calculating. It was really enjoyable to meet other young people there who had the same interests. Naturally, we were not always deadly serious. There was some fun and several noteworthy celebrations like, for example, a very elegant Christmas party at the famous 'House of Airmen'. In the spring flying activities got under way again. Apart from the powered aircraft, of which I still had no advantage at that time, the *Akaflieg* group also possessed a 'Rhönbussard' sailplane. As it happened, two other members of the group* also needed the five-hour flight for their Silver-C and we decided to make the attempt at the first suitable opportunity.

In the middle of May the weather was ideal for soaring with a cloudless sky and so-called blue warm thermals, which are circular streams of up-currents not crowned by a cumulus cloud formation. Thus we were able to complete our five-hour flights over Berlin on consecutive days. Obviously, one had to be careful over Berlin that one didn't fly too low and run into the danger of not finding anywhere to land in the middle of the sea of houses. These circular up-current streams, or 'beards' as they were called, - moreover, the plane was registered under the name of 'D-So'n Bart' ('D-Such a Beard') - had to be sought out with a feeling in one's seat. The confirmation of the presence of the up-current then registered on the variometer, the instrument which indicated the rising or falling speed. My turn came on 24 May, 1937, when I sat for my five hours over Berlin, reaching a height of 1460 metres (4800 ft) above the point of release, i.e. the height at which I released myself from the towing aircraft. I had finally accomplished the endurance flight for which I had been waiting for two years and received the 'Silver C' Performance badge No 451.

In August, 1937, I had the opportunity of taking part on a pilots' course for powered aircraft organised by the German Aviation Experimental Establishment, but an official medical examination was necessary before taking part. I wasn't too happy about that since I knew from my gliding course, that is from the results of the medical at that time, that my sight was not quite adequate. Above all, in powered flying this could represent an obstacle which would be very difficult to overcome. Fortunately in the case of people who had already been successful in flying gliders, there was a special authorisation from the Air Ministry which normally took the form of a stamp in the pilot's licence to the effect that, 'Spectacles must be worn during flying and a replacement pair always available'. I was very pleased that

*One of whom was Gotthold Peter who lost his life at Schwechat on 10 December, 1944, when the first Heinkel He 162 'Volksjäger' prototype he was piloting broke up during a high-speed low-level flight. The probable cause was said to be defective bonding of the wooden construction wing of this jet fighter.

they forgot this stamp in my case, not only in the civil licence, but also later in my military pilot's licence. This sight defect really only bothered me during longer landing approaches on to unknown fields, when I couldn't quite make out the correct direction of the landing cross. I was not very short-sighted and never wore glasses. For one thing, I was aware that changing to and from glasses would only have restricted my sight and ability to judge distances, for example when levelling off to touch down. I only ever wore glasses once for my last flight near the end of the war in a Do 335, but in that case only to be able to recognise enemy aircraft in good time. The course had the advantage for those with previous flying experience (gliding), in that it was intended to simultaneously fulfil the function of completing the flying training for engineers and that it was free of charge. The Flying Section of the DVL guaranteed a really excellent training, and even fully qualified engineers took part in this course within the framework of their training as aeronautical officials. The whole had been devised analogous to the government training scheme for other engineer officials and included practical work in industry and government service. The idea behind all this was to endow both studying and already qualified aeronautical engineers with extensive practical flying experience. Such practical knowledge was certainly indispensable for those working on the design and construction of aircraft. It was only to be expected that people who had taken part in such courses were particularly favoured if they wished to change over later to test-piloting.

For test-piloting one needed first of all pilots with a good feeling for flying and with technical knowledge and understanding who were capable of safely landing even aircraft with particularly critical characteristics. Furthermore, the designer needed to know which characteristics made an aircraft unsuitable for example for a flying pupil or a less-experienced private pilot, or what contributed to making instrument flying, night-flying or aerial gunnery more difficult.

There were only a few shy attempts at separating the judgement of the flying characteristics, the rigidity or strength of an aircraft from the subjective observations of the pilot by using for example gyro-controlled self-recording instruments. In any case, such experimental instruments were mostly still unreliable, while communication of such data by radio or by automatic recall did not even come into the question at that stage. It was still hoped that one could expect more precise information from pilots with engineering training, if possible along with suggestions for improvement. Attempts had also begun to try and obtain important information about the behaviour of the aircraft with regard to the altitude and effect of control forces and vibrations about the three axes by using such simple devices as spring-balances and stopwatches, or for example by attaching and observing strands of wool in order to establish disturbed airflow under different flying conditions, and consequently add more precision to subjective comments such as 'a lively bird', 'a tired crow' or things as simple and expressive as 'a real bitch'.

Naturally, I was pleased to start powered flying. The exciting part of it for me was that I had largely taught myself to glide, apart from the beginners' course six years ago at Grunau. I had indeed taught pupils in two-seater sailplanes, but had never flown together with another flying instructor. So I was particularly interested in discovering whether any bad or negligent habits had crept in over the

years. I well remember my flying instructor, from whom I learnt a great deal. He gave us this piece of practical wisdom to help us on our way: 'You must learn to fly yourselves, I can only make sure you don't fall down at the beginning!' The group into which I was put trained in the Bücker Bü 131 Jungmann biplane, an agile and easy to fly aircraft, but having little in common with the gliders I had flown up to then. The flying instructors on this course, especially *Flugkapitän* M., head of the flying section, were very experienced pilots and first class instructors. I met some of them again later during my test-piloting days.

Although, once in the air, I could discover few basic differences from flying a sailplane, powered flying was of course different when taking-off and landing. The taxiing to the take-off with a pulled control column in order to prevent the aircraft standing on its nose, the subsequent accurate directional control with the rudder, taking into account the airflow around the rudder from the propeller, the pressure on the elevator to raise the tail skid or tail-wheel, at which point the additional tendency to swing due to the torque effect of the engine had to be countered by the rudder, and finally the cautious raising of the aircraft with the elevators on attaining the flying speed were all different and it was a matter of feeling your way into them.

The flight round the airfield should form the basis of a rectangle. On landing, attention had to be paid to the straight approach, whereby the correct speed had to be maintained with idling engine and, in comparison with a sailplane, a much steeper gliding angle had to be correctly estimated.

Finally, levelling off to land, not too high and not too low, had to be carried out so accurately that the aircraft landed on all three wheels simultaneously. It was also new for a sailplane pilot to have to keep the control column firmly against the stomach during the landing run, so that the tail unit was pressed down to prevent the aircraft from nosing over.

Obviously, it was of great advantage being a glider pilot, in that one very quickly felt at home in the air in a powered aircraft; adjustments were only necessary in the case of take-offs and landings.

Thanks to my previous experience I didn't have to wait too long for my first solo flight. The day before, I flew through various 'danger situations' with an instructor, such as correct procedure on stalling, side-slipping, pitching down and stalling out of a turn, recovery from a spin, and many more things for which a pupil required preparation. I must admit that being accustomed to gliding, experiencing the first solo flight in a powered aircraft was not really so exciting for me. But of course it was pleasant now to be able to move through the air with a powered aircraft.

I eagerly practiced my circuits and bumps round the airfield, getting more confident all the time. Occasionally our instructor would accompany us again, to make sure that no errors or bad habits had crept in. After we had gathered and assimilated our first experiences in flying circuits in the Bücker Jungmann, we gradually started to concentrate seriously on type flying. That was the speciality of this course for the technically orientated flying at the German Aviation Experimental Establishment, namely that even in the beginners' course one was to fly different aircraft types on one's own. In fact, we were accompanied by an instructor only while flying the first of these new types, the Heinkel He 72 Kadett.

Later I met him again at Rechlin where he was leading the bomber section.

After the first solo take-off in the Heinkel Kadett, it was the turn of the Focke-Wulf FW 44 Stieglitz. Quite honestly, it did not feel much of an achievement after flying the Bücker Jungmann to change over to other such well-known biplanes as the Kadett and Stieglitz; the machines were just slightly bigger. But this was hardly true of the next biplane on my list, the Hamburger Flugzeugbau Ha 135. Then came solo flights in the Klemm Kl 25, the first low-wing monoplane in my log book. Apparently these flights were accomplished to the full satisfaction of our instructors as none of them accompanied me again. From then on our flying began to get more diversified and also more interesting. First on the list were flying a figure of eight in the Jungmann and precision landings, then a few more flights in the Stieglitz followed by landing outside our airfield in the Klemm Kl 25. After that came the faster Klemm Kl 35, and my first flights in this shapely monoplane were already something special. Next, a flight to higher altitude in the Bücker Jungmann, followed by a cross-country training flight in the Klemm Kl 35 when I was accompanied by an aeronautical official in training (all my other flights from the Heinkel Kadett onwards had been solo). Another new type was the Messerschmitt M 27 which I flew solo after the first cross-country flight. The official 300 km (186 mile) cross-country flight in the Stieglitz took me over Magdeburg to Halle and Leipzig. My type experience was then widened by an opportunity to fly the Klemm Kl 32 with an enclosed cockpit, and the Junkers A 50 all-metal monoplane - two aircraft types of which a beginner could feel particularly proud.

And so the end of the course drew nearer. As a special treat I flew - solo again the first time round - the Arado Ar 66 and the Gotha Go 145, both heavy B-1 class* machines. This allowed me to keep up with the other participants more easily on the next course, already in the Luftwaffe service and under war conditions since I joined up six weeks after the others. The flying instructors in the Luftwaffe whom I told about the various types I had already flown on the beginners' course at first seemed to consider me a bit of a braggart, but I didn't hold it against them. It was soon clear to me that I had been given an exceptional opportunity to gain above average experience in type flying. Naturally, I had not been dealing with aircraft that were difficult to fly, but since one could fly them all solo, without being trained by an instructor or even corrected, it had become second nature right from the start to pay attention to the fact that there were aircraft with very diverse flying characteristics: all points that were of decisive importance, not only during the subsequent test- and evaluation-flying, but especially while testing captured aircraft.

Here I would like to recount another pleasant experience, which however caused me a few anxious moments at the time.

While getting in more flying practice with the Arado Ar 66 and Gotha Go 145, both heavier B-1 class machines, I got to know another member of our course, a Luftwaffe doctor and enthusiastic glider pilot, who unfortunately later lost his life in a crash. One day, without having arranged it amongst ourselves beforehand, we both began to turn around each other in the air and pulled out all the tricks of a

*B-1 class: An aircraft carrying up to three persons and having a maximum all-up weight of 2500 kg (5511 lb).

regular dog-fight. This went on for a while and only a glance at our watches reminded us that 'they' were waiting for us to return to the field sometime, and so we finally let each other go. Unfortunately our dog-fight had not gone unnoticed and, quite rightly, we were both reprimanded. It was indeed rather unusual for people who were not even in the possession of their A-2 pilot's licences* to behave like 'handbrushes gone wild' in these heavy biplanes. A forced landing in either of these machines would have been a very unpleasant experience indeed. But even without any such mishap, this divergence from flying ethics could easily have cost us our A-2 licences and consequently we were very relieved that our imprudence was not taken too seriously. Meanwhile, during a motor-glider comparative flying event at Rangsdorf, south of Berlin, I had the opportunity of flying the Münchener 'Motor-Merlin'. Then came the moment when we all sat together for the last time in the airfield canteen, the so-called 'heroes cellar', as we had so often done between flights. Our course was over.

Proud of my newly-awarded A-2 pilot's licence, I could now participate in the powered flying activities of our *Akaflieg* group, having qualified with my 40 hours' flying experience. An added bonus was that apart from normal local flights from the Adlershof airfield, one could also arrange occasional practice flights home. On one of these flights to Liegnitz with an accompanying colleague we got hopelessly off course. My colleague, another one who later also lost his life in a Heinkel He 162 Volksjäger crash, had taken on the task of observation and navigation. It was lovely weather and we were both pleased to be alive, until neither of us any longer knew where we were. We had relied on each other, and now we were both lost. It was a most unpleasant situation and made such an impression on me that during all my subsequent flights, if I did not have a radio operator with me, I always knew my position fairly accurately and kept carefully to the compass course. At that time, the Spree forest over which we were flying offered very few prominent landmarks that could help us to orientate ourselves. I latched on to a railway line and one of the next small towns even had an airfield. Neither of us had any idea where we were: communications with my colleague in the front seat wasn't easy in an open aircraft with all that noise going on, so I decided to land. Carefully, we made our way towards the control tower, hoping to be able to spot the name of the airfield on some sign, but had no such luck. Finally, in the flight briefing room we deciphered pinned on a wall map the whereabouts of our chance landing place (at that time, airfields were not marked on normal German flying maps). Proof of the fact that this landing on a completely unknown airfield was a unique experience for me is that I can still remember the name of it; it was Alt-Lönnowitz.**

I don't remember however what excuses I made to the people in the control tower for our landing there.

During the rest of the flight to Liegnitz and Breslau I kept my finger on the map, always right on the spot over which we were just flying! I had learnt a new lesson that I never forgot.

The experience of finding out how valuable it can be always to know exactly

*A-2 pilots' licence: Authorised to fly aircraft carrying up to three persons and having a maximum all-up weight of 1000 kg (2205 lb).

**From late 1943 onwards the main assembly centre for Arado Ar 234 jet reconnaissance bombers.

where one is, was underlined during later cross-country flights in the autumn and winter of that year. On one occasion, during a flight to Breslau, the weather suddenly worsened and it was obvious that it was not just a shower which one could have flown around. Once I realised this, I immediately went lower in order not to lose sight of the ground; once this has been lost there is no chance of recovery in weather like that. In due course I chanced upon a railway line and flew along it at about 60 feet from the ground. According to my map no high ground was to be expected, but the visibility continued to get worse and I realised that it was slowly becoming too dangerous to go on: I could suddenly fly into some obstacle before I had a chance to avoid it. The difficulty was to strike a reciprocal course in this bad visibility, at the same time not losing sight of the railway track. First, I made a slight bank to starboard, then a sharp turn to port, and there was my railway track again! Thank goodness the visibility improved just a little and I decided to land on the nearest airfield, which happened to be Guben. On the approach, I was still moving fairly fast and realised how typical it was to underestimate the speed after flying at low altitude for a long time. One more vigorous side-slip to take away the impetus, and I landed smoothly. The airfield controller was very surprised to have his leisure disturbed by a sports aircraft in that terrible weather. However, the for that time relatively unique civil aircraft I was flying, plus the fact that it belonged to the German Aviation Experimental Establishment, seemed to indicate that I was an experienced pilot, used to this sort of flying. But as we later got talking, the devastating question was soon asked as to how long I had had my pilot's licence, and I had to quietly admit it was only two months.

For all that, this flight had made it quite clear to me that one should avoid flying into bad weather areas with such poor visibility, although my reactions on entering this bad weather zone had been basically correct. The danger in flying is primarily that a pilot may easily make a mistake which cannot be rectified when he finds himself in a critical situation he has never experienced before.

That winter I also learnt that orientation over snowy ground, especially over frozen lakes, was particularly difficult, for snow-covered roads, railways or fields are not easily identifiable.

Naturally, I tried to collect more experience in powered aircraft whenever possible. Such an opportunity was, for example, the transfer of aircraft for the German Aviation Experimental Establishment to various destinations. In between I also made my first glider towing flights in a powered aircraft. Thus, in addition to the aero-tow qualifications and the A-2 pilots' licence, I then also received the *Segelflughauptlehrer* (Chief Gliding Instructor) licence, as it was called at the time, which meant that apart from motor- and winch-towing, I was also authorised to train gliding pupils in the use of the aero-tow. Since I had already trained several hundred pupils in launches from slopes and with motor- and winch-tows without a single accident, I received a particularly attractive offer for a young man: to act as gliding instructor for six months in Lisbon during the summer of 1938.

Most formalities were quickly and satisfactorily dealt with. The Portuguese government had also quickly approved my appointment. Incidentally, I had prudently pointed out that, being born in 1914, I was liable for military service and also required the approval of my Recruiting District Headquarters. My passport

had to be consequently extended to cover sojourns abroad. Suspecting nothing adverse, I went to my Recruiting District HQ on the Kurfürstendamm in Berlin, which already had a bad name with the students. A major promptly advised me that anyone could come in with such a story and that I just had to do my military service. I reported this to the State Air Ministry and to the Aero Club, which was responsible for journeys abroad. But they did not seem worried and encouraged me, saying, 'Just keep on packing'. The next morning at the Recruiting District HQ, the same major explained to me with many military convolutions that he would finally make an exception and authorise my trip.

Meanwhile, my financial situation had somewhat improved as well. Having already been given the rank of *Bauprüfer II*, (Construction Controller II), which qualified me to examine and accept sailplanes whose construction plans had previously been approved, I was promoted to *Bauprüfer I*, and could now examine and approve new sailplane construction as well. Thanks to my advanced studies at the Technical College in Berlin-Charlottenburg, I had been given the task of proving the strength of the 'Rossitten Ass' (Rossitten Ace) sailplane at the aircraft test centre. That wasn't only an interesting task, but also improved my finances. It was most gratifying not to have to turn to my mother any longer for financial support since having received the grant for my studies in Berlin. More money was also forthcoming from an interesting job with a group of six men for a film company. For the film *Narren im Schnee* ('Fools In The Snow'), a ski-glider had to be constructed for a skier to fly down a slope. With the aid of much theory and practice, a small flying wing was then built. The arrow-shaped wing had to be inherently stable so that it could be controlled by the skier moving his weight, rather similar to hang-gliding today. To make quite sure, we built a 1:10 scale model which was of good use to us later on.

One of my colleagues from the *Akaflieg* group, an excellent skier and ice-hockey player, who unfortunately later met his death in the Arctic Ocean as a Ju 88 pilot, offered to assist during the filming on location in the Dolomites. It then became apparent that one required very steep slopes to get airborne with this wing. However, when our colleague who was standing in as a double for a well-known film actress, got the skies crossed on landing and fell, confidence in our work began to dwindle and the film people decided to suspend the actress in the glider from a crane and move her through the air, and then use the free-flying model for further shots. So we all got what we wanted – and we got our money too.

Meanwhile, the preparations for my trip to Portugal continued. I first went to Breslau with a colleague who was to accompany me on my journey and act as workshop manager there. Naturally, by then my mother had realised that flying wasn't just a passing whim with me, but I still had to try to relieve her worry about any particular flight. I had of course told her about the imminent post as a gliding instructor and despite her concern for me she was naturally very pleased about her son's new and interesting job abroad. The good wishes and warnings were consequently not just directed towards flying activities, but no less towards the 'terrible temptations of such a large southern seaport'.

The flight to Lisbon with Lufthansa was due to take place in two stages: first we flew from Berlin to Stuttgart and the next day took off for the flight to Portugal. One had to be very niggardly with luggage, as I believe not more than 10 kg (22 lb)

per person were allowed. Even the flight to Stuttgart in the Ju 52/3m had been an experience, so the next day was absolutely unique for a young man who had never been in an airliner before. Although it was cold and wet early in the morning in Stuttgart, May was displaying its best side during the first stop in Geneva, so that we could partake of our second breakfast in the warm spring sunshine. We flew on over the wonderful Swiss mountains and the Rhône valley towards Marseilles, where I sat together with our captain over lunch and had the opportunity of recounting to him my mission in Lisbon and explaining that I already had a sports pilots' licence. From Marseilles we flew north along the Pyrenees. The Spanish Civil War was still on and we had to keep north of the Spanish border as far as Biscay, and only beyond Biarritz could we change course for Salamanca in Spain. There weren't many passengers left on board after Marseilles and when we were on course again, having flown past Santander, the captain had me called to the pilot's cabin. First he indicated the traces of fighting on the ground, and then he moved into the co-pilots' seat. I could hardly believe my luck when he asked me to take my place in the left-hand seat and keep the Ju on course and at the correct altitude while he watched. After a few moments he had convinced himself that I didn't represent any danger for the passengers, crew or his aircraft, and I was allowed to fly the Ju for half an hour. It was difficult to explain how I felt as a 24-year-old at the controls of a Lufthansa Ju 52/3m airliner over Spain but it was an experience that I never forgot. At that time I had no idea that I was to fly the Ju 52/3m many more times and later as a test-pilot regard flying in the good old Ju almost as a relaxation. The saying, 'He who flies a Ju lives longer', was not known to me then - although it must be emphasised that this did not apply to transport flights on the Eastern and North African fronts.

Even on the stretch to Salamanca, the old trenches from the Civil War were still noticeable. Before the approach flight to Salamanca I had of course exchanged my captain's seat for the first passenger seat on hand. And that was also interesting: I had no choice, but to peruse the porno magazine spread out by the man in front! The airfield was quite a way out, and a straw-roofed hut hardly deserved the name of an airfield control building, but that's all there was. Our fuel tanks were filled by a rough and ready method straight from the barrels with a hand pump. It took a while, but we needed the fuel: there was quite a strong head-wind and we had several hours flying time to Lisbon. Nevertheless, we still arrived by daylight and had an opportunity to cast a first glance over this beautiful city.

We were received on the airfield by two gentlemen from the German Embassy and some Portuguese, who were determined not to miss this opportunity to welcome us to Lisbon. First we went to the hotel 'Duas nações' (Two Nations), where we intended to stay for the time being. This hotel belonged to a local German, hence its name. After supper, a long stroll through Lisbon at night brought this eventful day to a close and gave us a first impression of this pulsating metropolis, where people of all nations came together.

The training was intended to be in motor-towing, and the military airfield of Amadora had been selected for our courses. The school's gliders were partly of German manufacture and partly built at the Lisbon technical college. Before towing began, I did some stunt flying on the Portuguese national holiday in a 'Wolf' sailplane as part of a performance at the Jockey Club, and landed between

the hurdles on the race course. My aerobatic flying performance consisting of some loops, turns and a spin, the usual things which one taught oneself, was subsequently depicted with extremely friendly commentaries in the next day's newspapers.

However, I had the feeling after the stunt-flying in the glider and the immaculate landing between the hurdles, that at least a small untoward incident on landing would have been more fitting for the spectators' desire for sensation. Later during a conversation with the Portuguese, it became apparent to me that some spine-chilling thrills are usually expected in public shows, be it bull-fighting or stunt-flying in a glider; the local people get enthusiastic very easily. I soon had an opportunity to confirm this for myself at a bull-fight which I attended in Lisbon right at the beginning of my stay. In contrast to bull-fighting in Spain, there is never any bloodshed in Portugal: the bull is not killed. The bull's horns are made harmless by covering them with leather caps and thus represent no danger for horse or rider, while the bull-fighters demonstrate the most refined skills of riding on first-class horses and thus delight the spectators. This method of bull-fighting obviously appeals more to the Portuguese mentality. On the other hand, with bull-fighting in Spain, not only the bull, but also the usually inferior horses just seem to be objects for general wear and tear.

The open school glider for the beginners' course having been put in good order, the training began. The open Ford car for towing was also available for our private use. The participants on the course were mostly between 16 and 18 years old, some of them college-pupils, and were really splendid athletic boys. Naturally, it was especially important for me in a foreign country not to have any accidents during the training. In particular during the direct car-tow, one can have the situation very much under control while steering the car if one turns round and manoeuvres the pupil to where one wants him by an astute use of the accelerator. This type of training also has the advantage that as soon as one sees that the pupil is making the right corrections with his controls he can be towed low over the field so that he can become accustomed to flying.

This and the next course went very well and there were no accidents; I believe that only after one rather hard landing the bracing cable had to be tightened. Not so pleasant were the fierce heat of the summer and the high humidity due to the nearness of the sea. Naturally we used every free hour and every Sunday to get to know the wonderful country of Portugal. The city of Lisbon, like all beautiful cities which believe in themselves, lies on seven hills, and had me completely captivated. I soon knew my way around very well and during car rides through the city was a good match for the taxi drivers.

After the first month in the hotel I moved into furnished rooms with my colleague. We were very pleased to be able to prepare food for ourselves in German style again in the evenings – or, if we felt like it, to have some solid home-cooking in a German tavern at the port. The beautiful drive along the Tejo until it flowed into the Atlantic was particularly attractive and we drove along it as frequently as possible. Swimming in the Atlantic was also wonderful. However we were always very aware that we had to be most careful of the strong currents pulling out to sea just before the ebb set in and of the breakers, and we always took the warnings of the local people on the beach most seriously.

The good and varied Portuguese food with several courses and a great deal of fruit, which wasn't just 'consumed' but really 'celebrated', was very pleasing to our palate. We were however not able to avoid having to resort to charcoal tablets after two or three weeks. One shouldn't drink the tap water there anyway and we soon caught on to the fact that the spring water was sold in 5 litre jugs for 2 escudos (then 22 pfennig) and red wine in 5 litre jugs for only 55 pfennig. The arrival of the vendor could not be missed. He shouted out his wares and belonged to the general noise of the large city like many other street pedlars in this colourful metropolis. In volume he competed with the Portuguese fishwives who balanced their heavy wares graciously on their heads.

We accepted every opportunity offered to us, whether it was bull-fighting, football, *fado*-singing*, a visit to the gaming casino in Estoril or invitations to the various fiestas. But we were also very aware that in Portugal one had to be very reserved towards the gentler sex: the extremes were too far apart. On the one hand, the modestly strolling little daughters on the Avenida da Liberdade under the surveillance of chaperoning bow-wows with marriage altars in their pockets and on the other hand, the love-life of the 'better' society which seemed exceptionally free even to a student living in Berlin. I had meanwhile learnt enough Portuguese to be able to get along very well when shopping or in the hotel, although the pronunciation is very difficult. I noticed though that my knowledge of school Latin and French helped me to learn the roots of the words. On the other hand, English and some French were used during the glider training, as most of the participants had studied these languages at school.

When the German ambassador returned to the Port of Lisbon from home leave, I appeared overhead in a sailplane which had been towed from Amadora by a military aircraft, to greet him.

My invitation to the German Embassy represents a particular climax to my time in Lisbon.

We took advantage of a few days' holiday from training to make a trip to Seville in Spain. As German *aviadores* we even got a reduction from the 'Ala Littoria' and flew to Seville in a three-engined Savoia, the later military version of which I had many opportunities of flying during my test-piloting days. There we realised how much the Atlantic alleviated the heat in Portugal: when the aircraft door was opened, the heat hit us as if straight from an oven. But one also accustomed oneself to that quite quickly; also, the hot air was drier and thus more pleasant. We didn't just visit the sights in Seville; I can also remember a very pleasant evening in a dance hall. We thought we had changed more than enough money, but things are often different from what one expects them to be and at the end of the last evening we just had enough left to pay the horse-drawn cab home.

The gliding training continued. The new pupils meant continuous variation and new friendships were made. In between we helped with new gliders which were being built at the technical college. Working with the Portuguese authorities was most pleasant; they made every effort to implement our suggestions and satisfy our wishes.

The time flew by and I was soon thinking sadly of the approaching return home at the end of September: I still had to keep to the call-up date of 1 October.

**Fado*: Popular melancholy Portuguese songs.

Moreover, the political situation was anything but rosy, and the conflict with Czechoslovakia was at a critical stage.

The Portuguese wanted to extend the length of our activities there, and I passed this on officially to Germany, as an official authorisation was necessary to be released from military service. In this case remarks like 'it'll all work out in the end' didn't help and I had to prepare for my departure. I said farewell at the military airfield in Amadora, at the German Embassy, at the Portuguese Aero-Club, where I received a valuable cigarette case with beautiful filigree work, and finally took leave of my comrade, who apart from his main job as a workshop manager, was also an experienced glider pilot, and had assisted me during the training sessions.

I was really pleased that everything had gone so well and in particular that there had been no accidents. Summer was long past in Portugal. It was raining on the morning of 27 September, 1938, when I climbed into the taxi taking me to the Lufthansa pick-up; by then I could converse with my driver about almost everything. The visibility for the take-off from the Cintra airfield was anything but good, but the Lufthansa crew knew their stuff and soon I was airborne and flying towards an uncertain future. It became gradually even more clear to me how important this widening of horizons at this particular time was for a young person through sojourns and jobs in a foreign country.

I can clearly recall only the final part of the return flight at night from Stuttgart to Berlin: continually passing batteries of searchlights grasping at us with their long fingers. It was rather eerie and strange.

On the Berlin-Tempelhof airfield there was a really nice reception for me. My comrades from the *Akaflieg* group were nearly all there and had brought along a Spanish friend as a surprise, who sprung a welcome speech upon me in perfect Spanish. Although I didn't understand a word, I nodded appreciatively and then joined in the general embracing. It was a day to remember.

Now I had to take a particularly high hurdle, to obtain the postponement of my military service for one more year to enable me to take my degree exams. It wasn't easy and I really needed all my powers of persuasion to achieve this at the Recruiting District HQ. Thank goodness, the same major was no longer there who in May had only let me go to Portugal most unwillingly. With rhetorical questions like whether I only intended to do my military service when I was a great-grandfather, they tried to get around me. But my reply, that neither the powered aircraft pilots' course nor my sojourn in Portugal could be regarded as intended postponement of my educational studies, finally fell on fruitful ground; the deferment was granted.

After flying home for a brief visit to Breslau for the wedding of an ex-girlfriend - I had really been away that long! - the final spurt for the exams began at the Technical College in Berlin, which after the wonderful months in Portugal wasn't so easy. Additionally, there was the work with the *Akaflieg* group, so not much flying was possible that winter. However, I managed to have some aerobatic practice with my first loops and rolls in a powered aircraft.

In the spring I stood in on a course for a towing pilot who had fallen ill, doing about 60 towing flights in three days and even flew a new aircraft type for me, the Albatross L 101, a high-wing monoplane known as the 'Umbrella'. Shortly afterwards I made my most distant and longest flight in a sailplane with the B 5

from the *Akaflieg* in Berlin to beyond the northern Harz, a total of 240 km (149 miles) in seven-and-a-half hours' flying time. After this flight I was also supposed to participate in the competition of flying the Target Route 39 which I did, although it was clear to me that my chances in the fast B 5 against the for the most part professional sailplane pilots, and without experience of flying blind, were very slim. Especially with the weak warm thermals there, it was difficult to approach the given targets in this fast glider, at times even against a head wind. As a result, I landed amongst the 'also rans', but it was still very interesting to take part in such a competition.

The following weeks were spent working hard again at the Technical College. The political situation got more and more precarious. When war finally did break out, I was far enough advanced to take the exams and pass them.

I was hardly a fully-fledged qualified engineer (Dipl. Ing.) with a degree when my mobilisation order fluttered into the house with the obligatory wording: 'From midnight you are a soldier.'

And so it was until the last day of the war. I certainly won't need to emphasize the fact that the recruit training was not very pleasant at 25 years of age! I had some advantage though, due to my good athletic training. And so gradually this period at Schweidnitz in Silesia not far from the gliding field at K ltschen where I had spent so many pleasant days as a gliding instructor, came to an end without too many bitter difficulties.

As they apparently didn't quite know what to do with all the recruits after six or seven weeks' basic training, I was transferred to what amounted to a second basic training session at the higher technical flying school at Berlin-Adlershof.

The very least I could do was to gain some advantage for myself from the proximity of the State Air Ministry and their Chief of the Training Programme, and remind them of my completed training as a sports pilot.

Accordingly, I presented myself to the sergeant-major with a request for leave in Berlin. I replied candidly to his enquiry as to the reason, informing him that I had to go to the State Air Ministry. The thunderbolt that then descended on me cannot be described in detail.

But I had good connections with the orderly room and the lance-corporal there detailed me for an 'official errand' in Berlin. I duly reported my departure two days later. Like this, the military rules had been complied with and the sergeant-major had no worries about keeping to the official channels.

Naturally as a plain 'Airman L.' I had some difficulty in snapping to attention in the State Air Ministry, when a real live General climbed into the 'paternoster' lift cabin with me. There wasn't much room and I perspired easily!

I was completely satisfied with the subsequent interview in the ante-room of the Training Department and left in high spirits, not forgetting to bring along the cinema tickets, and duly reported back to my Adlershof establishment according to orders. My visit to Berlin had been completed none too early either, as two days later scarlet-fever broke out in our group and we were confined to quarantine.

Whilst on guard duty a few evenings later, I suddenly developed a temperature of over 40°C (104°F). I was given a 'horse hypodermic' shot in my rear, my temperature was back to normal the next day, and I was graciously allowed to participate again in long-distance running with gas masks around our building.

Moreover, just to be on the safe side, I had of course sent an application to my company commander, pointing out my flying education and requesting the 'continuation of same'. A few weeks later I was able to reap the benefits of my visit to Berlin, and read it in black and white. In an order from the air base stood: 'Airman Lerche is with immediate effect transferred to the pilots' school A/B 9 Grottkau and is to be despatched immediately after the termination of the quarantine period.'

This news fell like a bomb, since obviously many other people had volunteered for pilot training, including non-commissioned officers on the training staff. Then they tried to discover how I had managed it. Even the strict company commander summoned me and in the presence of his platoon commanders, tried to get something out of me. But I kept my mouth shut and was roguish enough even to thank him heartily for supporting my application and passing it on. The quarantine period came to an end and shortly afterwards I arrived at the pilots' school at Grottkau to continue training. Amongst others, there were already five comrades there from other *Akaflieg* groups, of which however, only one survived the war.

Thanks to my previous training at the German Aviation Experimental Establishment, I soon caught up although the course had been running for six weeks, and by the second and third days had already made my precision landings and high altitude flights in the Arado Ar 66. Subsequently, I was the first one on the course allowed to fly the Henschel Hs 123 dive-bomber.

The type flying in the B-1 class aircraft like the Focke-Wulf FW 56 'Stösser', Arado Ar 65 and 68, Heinkel He 45 and 51 and the aerobatics in the Focke-Wulf 'Stieglitz' and the 'Stösser' were most enjoyable. The training then continued with the Junkers W 33 and 34 in which we did instrument flying and cross-country flights, the latter also in the Focke-Wulf FW 58 'Weihe' for the Luftwaffe pilots' licence, and of course night-flying.

In Grottkau we also had a gliding group, which at the beginning however, only had one glider. There was a possibility of obtaining a few gliders from the Research Institute for Gliding Flight in Darmstadt. Still only a lowly Airman and not quite six months in the service, I was entrusted with the responsibility of driving to Darmstadt, handling the negotiations for the transfer, receiving the gliders and loading them. The mission was a complete success. I even succeeded in getting hold of three high-performance sailplanes, including a two-seat 'Kranich', for our flying group. The machines were dismantled, loaded onto lorries and shortly afterwards they rolled up undamaged at Grottkau. My mission to Darmstadt, which had been arranged at an absolute minimum cost, was acknowledged with gratitude by the school principals in Grottkau, and a little later, I was able to convince the head of the school of the joys of gliding in the 'Kranich' two-seater. After completing the requisite number of flights, I obtained the military pilot's licence and insignia and was also entitled to wear the pilot's dagger; I also moved up the military ladder to the rank of *Gefreiter* (LAC). But to carry the big pilot's dagger on leave as a simple airman was somehow even more impressive: after all, the majority of people with the Luftwaffe pilot's licence had naturally been in uniform quite a bit longer, and were correspondingly kitted out with 'stronger' ranks and silver piping.

After leave and a short period of marking time in a stop-over Luftwaffe station in Magdeburg, I arrived at the pilot's training school C 2 at Neuruppin in September 1941 and there flew heavier multi-engined machines. It was certainly a proud feeling to take one's place for the first time in first pilot's seat on the left and open the throttles for take-off in such well-known aircraft as the Ju 52/3m and the Ju 86. But the three-engined Ju's were getting rarer by the day: they were in great demand as transports on the Eastern Front and elsewhere, and so we had to make do with the Ju 86. But there were also other aircraft types, of which the Do 23 was a particular attraction as the pilot had his head in the open atop the fuselage. A metal guard was supposed to prevent him from accidentally touching the rotating propellers – a nice thought, that.

One of these Do 23s was the SA+FL. After taking off one had to stop the still turning wheels with a kind of coachman's brake, otherwise there was the danger that the front part of the fuselage, including the pilot's seat, would start vibrating unpleasantly. For reasons of structural strength, one was also warned not to fly any steep turns. Yes, the old Do 23 was quite something.

Then came the precision landings, i.e. landings with throttled-back engines in a predetermined field, which were no problem with the Ju 52/3m; next, navigation and cross-country flights with a radio-operator. During the instrument flying, one learnt to fly from a completely curtained-off left-hand seat and to trust the instruments even long after one had the feeling that the machine was flying one wing low or that it was turning.

Then there was the old He 111B; its DB 600 engines were not exactly regarded as a symbol of reliability. Having seen an He 111B crash as a result of an engine failure after take-off and the crew losing their lives, I was not exactly inspired with confidence in those power plants although I later had the 'pleasure' of enjoying their company during the blind flying training at night. After the night, cross-country and instrument flying, we then re-trained in the modern Ju 88 with Jumo 211 engines, at that time regarded as the most efficient tactical bomber in service. Of the other tactical bombers, I also flew the Do 17, the so-called 'Flying pencil', powered by two old BMW VI in-line engines. These Do 17s were marked SA+BG, SA+BH, and SA+BJ. I have already mentioned elsewhere in this narrative the smooth emergency landing during a cross-country flight at Jüterbog, south of Berlin, after an engine failure in the Do 17E SA+UO.

In Neuruppin I also trained the members of the local glider group, mainly in aero-tow two-seaters. Even the commander of the school, a former World War I pilot and, in our opinion, already a comparatively old gentleman, joined in the gliding. He particularly impressed us by also flying the Ju 88; not very many of former World War I pilots re-trained on these fast, modern bombers. Training him to glide was a singular experience and even more so, when I had to make a judgment of his flying abilities for his glider pilots' licence. There certainly cannot be many licences for which an *Oberst* (Colonel) was evaluated by a *Gefreiter* (LAC)! In Neuruppin we could use the French Morane 230 high-wing monoplane for glider towing, an aircraft that had a relatively powerful engine and could climb at a considerable speed, even with the glider in tow. It was also the first captured aircraft I flew, as related earlier. We also had another two-seater glider, the 'Goevier', known as the 'Cuddleboat' because of its side-by-side seats. But with

whom could one cuddle in the Luftwaffe? Meanwhile, training on the Ju 88, about which we were all enthusiastic, came to an end, and I received the ELF*, the extended Luftwaffe pilots' licence.

After the course had finished, I – meanwhile promoted to a non-commissioned officer and KOA** – was transferred to the command of the engineer-soldiers, or as it was so nicely called, 'for special employment to the State Air Ministry and Commander-in-Chief of the Luftwaffe' at Braunschweig-Volkenrode with the DVL, the German Aviation Experimental Establishment. There I had the opportunity of flying the He 46 high-wing monoplane with the registration GC+AA and the Arado Ar 96 trainer (GA+NL) as well as the Hs 126 high-wing monoplane (PL+NW). For me, a particular attraction was an old Junkers F 13 all-metal aircraft for four passengers, with which air traffic in Germany had really begun. This particular example had already done 4,998 hours' flying and was due to be broken up. As it had no brakes, there was a great danger that, especially with side-wind, one would not be able to keep it straight on a landing run. To avoid this, there was a particularly refined method of using the ailerons in the opposite direction, so that the aileron, deflected downwards, acted as an airbrake on that side. The F 13 CB+EN was the oldest aircraft I flew in my career. It reminded one of the old times of sports flying, when one climbed into these commercial machines with a pilot's helmet and goggles. The old Junkers L-5 in-line engine showed itself from its best side, and after a flight I was able to return this oldtimer unharmed. Most interesting for me was the fact that at the Experimental Establishment I was able to fly aircraft types that were new to me without any previous briefing, which was contrary to the standard Luftwaffe practice. However, during my first flight with the Messerschmitt Bf 108 'Taifun', the sleek, fast four-seat tourer with retractable undercarriage, there was an untoward incident. In the morning I had made two longer flights round the airfield in the Bf 108 KB+IG to get acquainted, and intended to fly the machine via Brandenburg to Rechlin that afternoon with two passengers. After take-off, I had pumped in the undercarriage with my right hand, as required on the Bf 108, the left hand holding the control column and more or less following this pumping movement, then throttled back the Argus As 10C engine for a cruising flight. After a while, the normally very reliable engine started 'spitting'. This was not what I had in mind for my first cross-country flight in the 'Taifun', especially with two passengers, so I turned back and landed again at Braunschweig and explained my troubles to an old, experienced works foreman. He only grinned and said, 'Yes, didn't you know that you shouldn't throttle back the Argus engine in the 'Taifun'?' Wise after the event, I set off again and, quite against my natural instincts, let the engine run on full throttle. But the experienced works foreman was right: the As 10C ran perfectly and gave no occasion for further worry.

It was my first landing on the Rechlin airfield, which was forbidden to normal Luftwaffe aircraft. I had always wanted to see this Mecca of test-flying, and through some friends had managed an introduction to some of the group leaders responsible for the E 2 department (airframe testing and flying characteristics), all

*ELF=Erweiteter Luftwaffenflugzeugführerschein

**Kriegs-Offiziers-Anwärter = Wartime Officer Cadet.

of them qualified engineers who also had a marvellous reputation as airmen. On that occasion, we also came to talk about my flying career to date and shortly afterwards one of these gentlemen in charge of the Transport Group took me to the head of E2, Dipl.-Ing. F., who was also in charge of the whole Rechlin test centre. An excellent pilot and of course a fully qualified engineer, he had made a name for himself with his attack in a Ju 88 on the British aircraft carrier *Ark Royal* on 26 September, 1939, when a bomb close to the ship's stern had almost capsized her. Without his knowledge the *Ark Royal* was reported sunk by the High Command, with predictable results. That day, he questioned me on details of my flying training and then asked me whether I would like to come to Rechlin and join his team. There could be only one answer – yes! A little later, this affirmative of mine was sealed by an UHF conversation with the *Generalluftzeugmeister* in Berlin.

However, before this move could take place I still had to carry out a series of flights in accordance with previous requests from the DVL. These comprised high-altitude release tests of the 'Fritz X' guided bomb from a Heinkel He 111 bomber flying from Berlin, and trial flights with the TK 9 turbo-compressors evolved by the DVL and fitted in the Henschel Hs 128 special high-altitude aircraft powered by two DB 601 engines. In order to test this high-altitude power plant a Ju 52/3m had been fitted with the same combination as its centre engine for preliminary trials. A further request to employ me for testing a new kind of balloon cable fender fitted in front of the wing leading edge that was supposed to repel or sever the balloon cables was rejected by the Chief of the test centre with the comment, 'You're too good for that.'

And so the signposts were set on the road to test flying. Perhaps I should also mention that at the beginning of my test-flying, my total flying experience – including all glider tows and cross-country flights in sports aircraft – amounted to just 300 flying hours.

The 'Fritz X' was a guided bomb with an unusually shaped tail unit with elevators and rudders that were controlled by radio from the launching aircraft. In September 1943 one of these guided missiles sealed the fate of the surrendering Italian battleship *Roma*, but that was still in the future. For our tests, the 'Fritz X' was to be dropped from a Heinkel He 111 at altitudes of between 6000 and 7000 m (19,700 to 22,960 ft), and it was emphasised how important it was to maintain the exact height and speed at the time of release. The bomb was guided via two control panels (for elevators and rudder) fitted inside the He 111 cabin and operated by technicians from the DVL who at that time were engaged in the development of these guidance systems. After release, the path of the bomb could be followed by means of a spotlight attached to its tail and corrected accordingly.

Naturally, the atmospheric conditions were seldom good enough to permit observation of the bomb all the way down and we frequently returned without having completed the task and had to land again with the bomb. Since we intended to try our luck again in the afternoon, we landed on the nearby airfield at Jüterbog, not far from which the contours of a ship about 250 m (820 ft) in length were marked out in the bombing practice area, clear enough to be seen from an altitude of 6000 to 7000 m (19,700 to 23,000 ft). Obviously, we all wore oxygen masks on these flights, and I had to take great care to keep the exact speed and altitude.

At Jüterbog, I once had an experience not directly connected with aviation but worth recounting nevertheless. As I was about to land with the bomb hanging under the He 111, I spotted an officer with a bicycle near the landing cross. As I had no reason to assume that the man was completely deaf, I just carried on. A few moments before I touched down, the man suddenly became fairly active and dashed to one side with his bicycle. Obviously, at the moment of landing I had other things to do and was not able to see whether he fell down in the rush to get away. I duly taxied to the parking area where people interested in the novel bomb quickly crowded around. The 'Fritz X' had attracted attention not only because of its unusual tail unit, but also because of the thick layer of ice accumulated during our flight at about 7000 m (23,000 ft) altitude where the temperature was -56°C (-69°F), the after-effects of which were particularly noticeable on a hot day in May.

It did not take long before the officer with the bicycle appeared - he turned out to be a *Hauptmann* (captain), and seemed rather steamed up. However, the civilian registration of our He 111, D-ADVL, didn't give him much chance to complain. But when he then espied me in my non-commissioned officers' uniform, his face lit up as the possibility of being able to give me a proper dressing-down seemed to increase. He tried to begin his tirade by asking me whether I hadn't seen him during my approach. But I was confident of my case: no one could really expect me to go around again with the heavily-laden machine because somebody was standing at the landing cross! And as I then smartly and decidedly contradicted him regarding the facts, a long-serving non-commissioned officer through and through, he saw his opportunity fading fast and quickly complied with my request for some troops to be made available to guard the secret bomb. My flight mechanic had already wrapped a canvas around the strange missile with its unusual tail, and the matters were settled. It was one wartime experience that had its funny side to it and made service life more bearable.

These tests lasted almost two weeks and were very successful, resulting in hits or near misses in an area of 20 m (66 ft) around the target from altitudes of 6000 to 7000 m (19,700 to 23,000 ft). All our test drops were filmed by a female cine-operator flying with us in the He 111.

Subsequently, I took over the test programme with the Henschel Hs 128 special high-altitude aircraft, of which only two prototypes existed. The Hs 128 had a slim wing of over 30 m (98 ft) span and a fixed undercarriage, and was equipped with a pressurised cabin; it was designed to attain altitudes in the region of 14,000 m (46,000 ft). For this purpose, the aircraft was powered by two DB 601 engines fitted with TK 9 turbo-superchargers developed jointly by the DVL and the Hirth aero engine company. The Hs 128 was an unusual aircraft in several ways, but the view from the bulls-eye windows of the pressurised cabin was not particularly good for the pilot. One climbed into the machine through a turret hatch which was then closed by a screw-on cover plate. It was always unpleasant having to fly in and out of Berlin at a height of only 100 m (330 ft) right alongside the *Autobahn* ring road: due to the low altitude the temperature of the engine coolant then usually reached about 100°C (212°F). Apart from that, on account of the novel equipment one unfortunately could always expect something to go wrong with it. Thus on one occasion an engine failed in flight and I had to return and land on half the

power. There was also another potentially negative point: due to the poor view to the front and especially to the sides, there was a danger of nosing-over with the fixed landing gear. Then the Hs 128 would have been upside down on the turret hatch, and one would have stood no chance of getting out of the plane. To be sure, a hatchet, a hammer and a saw were provided inside the cabin to console the crew, but I was pleased not to have to make use of this rescue equipment. On the first two local flights in the second prototype with the civil registration D-APXN, the project leader himself sat behind me in the measurement observation seat; he apparently wanted to give me encouragement to chauffeur around in the air in this flying dragon. It was a matter of getting used to something new, and during these extended local flights I had the opportunity of getting accustomed to the Hs 128 V2. I had no intention of trying any aerobatics of course, but wanted to be fairly conversant with the aircraft in case any faults should occur. And things were not as bad as they seemed at first: apart from the poor view through the bulls-eye windows, the Hs 128 was not unpleasant to fly. The narrow long-span wing which, because of its construction, was intended to contribute to the good altitude performance of this design, also had the effect of making the Hs 128 float on too far on landing, like a glider.

After these two familiarisation flights, I then made my first high-altitude flight to 9000 m (29,500 ft) with the measurement observer that afternoon. Apart from the rising temperature of the coolant liquid as we flew over the edge of the *Autobahn* ring road near Berlin at low height, everything went well. In good weather, one had an incredible view and the Berlin lakes shrank to quite tiny size. There was a telescope mounted between the pilot's knees, through which he could look down below, but the external lens underneath the fuselage really had to be very clean in order to distinguish anything.

During a flight with the same machine the next afternoon one engine spluttered and stopped, but with the excellent performance reserves of this aircraft keeping level and landing didn't give me much trouble.

In between I also flew the first Hs 128 prototype which carried the civil registration D-ARHD. With some exceptions, these flights were usually to an altitude of 9500 m (31,170 ft). Sometimes we climbed higher, but to reach the 14,000 m (46,000 ft) of which this aircraft was supposedly capable, the engines with their turbo-superchargers were apparently not reliable enough. The pressurised cabin worked fairly reliably and, if I remember correctly, at great heights the pressure was about equivalent to that at 2800 m (9200 ft). Of course, we always had the oxygen apparatus at hand – just in case. Technicalities apart, the view from 9000 m (29,500 ft) was really intoxicating, and the Baltic sea and the Berlin lakes belonged to the normal points of orientation.

Each flight was carefully announced to all concerned to avoid unpleasant interchanges with our fighters. The Hs 128 was, after all, quite unknown, and German aircraft usually did not fly that high. Who knows whether we would have seen the intercepting fighters soon enough and, even then, whether we could have fired the identification ammunition quickly enough from the pressurised cabin fired through the hole specially made for this purpose and sealed accordingly.

The wonderful view from the great heights always fascinated me, and was a minute foretaste of what one sees on satellite photographs of today.

This special research flying activity also had other bonuses: it was pleasant for me to be able to enjoy Berlin in civilian clothes at this time, and only see uniforms when I collected my pay.

In order to complete the picture, it is interesting to reflect that for the same job which I did then I would have received many times more than my service pay at that time, including the extra pilot's allowance, if I had been working as a civilian pilot for the industry.

Naturally, I gradually became more daring and flew above the clouds without a radio operator, which was not without its dangers near Berlin. Occasionally I also flew the Ju 52/3m with the high-altitude engine in the central position. This aircraft belonged to the DVL and carried the registration D-AUPU. In its fuselage were several measuring posts with special equipment and seats for the monitoring engineers. Thanks to its special central engine, we could often fly this Ju above 6000 m (19,700 ft); at such times, the two outboard engines were just ticking over. Often, we also made cross-country flights with this special Ju, which were naturally used to gather various data, so that the 'backroom' in the fuselage was always full. Later we also made some demonstration flights to Stuttgart-Echterdingen (Hirth Engine works), Lemwerder, and once even to Rechlin. Meanwhile it was the end of July, 1941; the essential points of the programme had been fulfilled and I was able to make preparations to begin my activities at Rechlin early in August. Although I had enjoyed my stay in Berlin, especially as a civilian, I must admit that I wasn't all that keen on high-altitude flying in the Hs 128 with its one dorsal escape hatch. This arrangement, combined with the poor view from the pressurised cabin and the fixed undercarriage, made nosing-over in case of a forced landing a dreaded possibility. Altogether, the Hs 128 seemed to offer little chance of escaping unharmed when in difficulties, and especially in case of fire.

Supermarine Spitfire and Bell Airacobra

Except for the flight instruction and, perhaps, the training at test-pilot schools most pilots will be inclined sooner or later to fly either big or small aircraft only. This should be true not only of civil aviation, that is commercial and private flying, but also of military and test flying, no matter whether in the air force or when employed by the aircraft manufacturers. I have already mentioned how my enthusiasm for flying awakened my interest not only in the big multi-engined aircraft but also in the single-engined fighters, although initially that was not all that easy. For instance, the well-known Messerschmitt Bf 109 fighter – which at take-off and landing was certainly not as easy to control as the other standard Luftwaffe fighter, the Focke-Wulf FW 190 – was not made available by any official in charge of fighters at Rechlin just for training or any other flights not serving test purposes. It was known that at take-off and landing the Bf 109 always kept some unpleasant surprises in store not only for pilots flying it the first time, or seldom, but also for experienced veterans. Basically, the powerful engine combined with the small airframe favoured a tendency to swing to port at take-off, while at landing, if levelled off a little too high above the ground, the 109 had a habit of suddenly dropping a wing – the after-effects of which could not be prevented by the narrow undercarriage. But if one did not make any howlers, the Bf 109 could be flown quite safely. When our routine programme called for 100-hour endurance tests with this fighter I was able to make two flights in the Bf 109F-4 CF+BN. For my third flight I was to take the Bf 109G BD+LF in a climb to its operational ceiling. According to my instructions, at take-off and immediately afterwards the new DB 605 engine was to run first with emergency power and then at combat power in a climb to the ceiling. At first all went well, but at 10,500 m (34,450 ft) the engine started misfiring. After testing both magnetos I knew that it had nothing to do with ignition. As I was not keen on waiting until the engine caught fire, I immediately discontinued the flight and landed safely. It was known that a fire in the Bf 109 could be most unpleasant, especially for a beginner in fighter testing. As it turned out, my action was fully justified – there would have been a fire, as an examination of the engine proved later on: one cylinder, or rather the piston, had refused to grind on and demonstrated this by punching a sizeable hole in the pistonhead. In those days, it seems, this phenomenon was not all that rare with this engine.

Having thus proved an 'old hand' at flying fighters, I was given the chance of flying the Spitfire IIA, then just completing its evaluation at Rechlin together with its 1200 hp Rolls-Royce Merlin engine. It was intended to make some flights for filming purposes, in which I was to simulate a crashing Spitfire by means of an

attached smoke cartridge.

The first thing I noticed was that, when taxiing, the field of vision was not as good as in the Bf 109 because of the 'wide shoulders' of the 12-cylinder upright-V engine. To make sure not to overrun somebody, one had to work vigorously with the pneumatic brake lever at the control column and with the rudder pedals to advance in snaking lines. The take-off and flying the Spitfire were not difficult: it was sensitive in the elevator, but the stick forces for the ailerons were rather high, especially when diving. Thanks to its armament and the low wing loading the Spitfire was a remarkable opponent in climbing and turning dog-fights, but I think at that time it was a little slower than our fighters. It is not the purpose of this book to deal with the technical specifications or performance of these aircraft; they have been treated in great detail in the specialized literature. It is well known that the Spitfire was continually improved in turn with the German fighters, and therefore an exact comparison of their performance could only be made with regard to given altitudes and taking into consideration the continuous changes of the engine power, airframe and armament. Above all, there would have been no point in comparing the latest German types available at Rechlin with the captured Allied aircraft which had been in service for some time.

The German fighters were often said to be inadequately armed, but the decision was not an easy one for the industry and the planning board. Fighter aces who were good shots were content with two machine guns to get on target with the cannon; other fighter pilots preferred to cover their opponent with eight machine guns as did the Hurricanes and Thunderbolts.

The armament also interested our specialists at Rechlin. Naturally, all the latest findings about the armament of Allied aircraft, no matter whether they resulted from aerial combat reports or shot-down enemy aircraft, were immediately passed on to the operational units. To my knowledge we obtained very few Spitfires in flying condition, and I regretted that I did not have an opportunity to fly a later version.

I added to the flying experiences I had gained on fighters by taking on various measuring and proving flights. Thus, for instance, I made several demonstration flights at displays with the Bf 109F-4 NE+MK and VQ+BN, and many altitude, measuring and other test flights with the Bf 109Gs NI+BW, CC+PI, BD+GF, BD+GX, BD+GB, BD+GP and VJ+WB. In this way I came to feel at home in fighters just as much as in multi-engined aircraft.

When in June 1943 the first captured damaged Bell P-39 Airacobra was reported repaired and fully airworthy again by the Espenlaub aircraft factory at Düsseldorf, I took over the task of ferrying it to Rechlin.

From the performance point of view the Airacobra with its 1200 hp Allison engine was not of much interest to us, but we were rather intrigued by the construction of this fighter in having the engine near the CG behind the pilot and the power being transferred via a transmission shaft under the pilot's seat to the propeller, which had a 37 mm cannon firing through its spinner. The Airacobra was sent primarily to the Soviet Union and used on the Eastern Front. Another interesting feature of this machine was the nose-wheel undercarriage. In fact, the Airacobra was the first aircraft with a nose-wheel undercarriage that I had an opportunity to fly. We flew to Düsseldorf in a Siebel Si 204 that was to escort me

back, and landed there after a fierce air raid on 12 June, 1943.

The Airacobra did not have the reputation of being exactly a terrific aircraft; it was even called the 'widow-maker'. But what was there to go wrong? After all, I was still a bachelor. First of all, I tried to become familiar with this machine as far as possible and hoped that the repairs had been carried out all right. On examining the controls I was surprised to find that flaps and under-carriage were operated electrically. Another unusual feature were the side entrance doors. The engine was running satisfactorily, and as we had no idea if another air raid was expected, I took off with the Airacobra GE+DV the same evening with the Siebel Si 204 KM+GB as escort.

The take-off with the nose-wheel undercarriage presented no difficulties whatsoever and after becoming airborne I operated the switch for raising it. At least that was what I thought. The little red pins for the nose-wheel on the upper side of the fuselage and for the main wheels on the wing surfaces seemed to show them 'up'. The propeller pitch control worked all right, the flaps were raised; the engine coolant temperature was not exactly low but not alarmingly high either. In short, there was no reason to worry, and I started the flight to Rechlin in the wake of the Siebel Si 204. One thing that puzzled me was the speed; the Airacobra seemed to be terribly slow, although everything was working the way it should. Could it be the fuel? But the mechanic had assured me that the tanks had been filled with the correct captured high-octane fuel. What else could it be?

It is always somewhat difficult to fly behind another aircraft and not to lose one's bearings at the same time; one is busy all the time watching the other machine. Even if one was confident to be led into the right direction, one still did not know exactly where one was. And this can often be of decisive importance. We had to leave the Ruhr area by the prescribed air lane, and I had tried to orientate myself as well as possible; there was no *Autobahn* to Münster at that time.

Suddenly all the electrically operated instruments seemed to go mad and started flickering. I racked my brains to detect what could be wrong with the aeroplane but I could not think of any plausible cause. When I first noted that the fuel indicator was flickering I thought that I had run short of fuel. Perhaps for some reason the tanks had not been completely filled? At least I was glad that the engine was still running, although a breakdown of the electrical system – what else could it be? – meant that the situation was very serious, especially with this aircraft where so many functions, such as the landing gear, flaps, propeller pitch setting and so on were operated electrically. It was clear to me that something was bound to happen, and soon. At least I knew that we were not far from Münster, and so I overtook my escorting Siebel and briefly rocked the wings; that was the only possibility of showing my colleague that something was wrong. Then I banked away in the direction of Münster. I must admit it calmed my nerves when I saw that my escort followed me at once, for it did not seem advisable for me to appear over Münster quite alone with the Airacobra. Who knows, there might be some Flak commander down there whose neck was itching for a Knight's Cross? An Airacobra, and especially one that did not shoot back would have been just right! Meanwhile my colleague had understood that I wanted to land, but he must have said to himself that as he could be of no help for me there he might as well leave me to my own devices and continued towards Rechlin. Over the airfield I throttled

back a bit to lower the flaps and reduce my speed so that the undercarriage could be extended. But after I had tried to get the gear down, nothing happened: the undercarriage seemed to have gone down a little, probably due to its weight, but then stopped and could not be budged either up or down. Now the situation was highly unpleasant, for I had to take into account that a partially lowered undercarriage would make a belly landing even more critical. In addition to that, the Airacobra offered the 'comfort' of having the heavy engine directly behind the pilot's seat and there was a good chance of getting the engine on your back in case of an unsuccessful landing. As the undercarriage was lowered electrically, there was little chance of getting it down by trying to 'dip' the aircraft with the control column. Another peculiarity of the nosewheel aircraft was that if the main wheels were down but, unbeknown to the pilot, the nose wheel was only partially lowered and not locked down, there was the danger of boring into the mud with the nose on landing. That, of course, would have been the end. With these thoughts in my mind, I circled the airfield again and again looking for the emergency undercarriage operation, while the people down there were probably already wondering what the comical foreign fighter was up to. I am ashamed to admit that I had neglected to find out beforehand how to operate the emergency undercarriage system. I assumed that there must be something for the purpose under the pilot's seat on the floor of the cabin. True enough, in letters that were partly illegible there was an instruction written on the floor how to get down the landing gear manually - in English, of course. I now had to figure out the hardly legible letters and their meaning. It said something about a crank, which I eventually felt under the seat. When I held it in my hands after some difficulties with the narrow seat, I was really glad that it had not been pinched by a souvenir hunter. I even found the square screw bolt on which it was to engage. At last I could start cranking, a difficult thing to do in the narrow cockpit of a fighter which wanted controlling in the air at the same time as well. I don't remember whether the 12 rounds I had flown around the airfield sufficed, but a success seemed to be underway because the crank did not turn idle. Finally a red pin appeared in front of me on the fuselage, which I remembered to have seen at take-off. Very ingenious, I thought, and well thought out too: the nosewheel was locked before the main undercarriage. After some more rotations of the crank the red pins for the main wheels appeared on the wings, near the undercarriage positions, obviously indicating that the main wheels were locked, too. Meanwhile I had stowed the crank safely away so that it could not drop into the control linkage and block it during flight or landing; it had become known that this had been a cause of some crashes. After another show flight around the airfield and while reconsidering what else was to be done, I even believe to have noticed the green lamps on the instrument panel flicker as a further sign that the landing gear was down and locked.

Now there was nothing in the way for landing. I kept my speed while coming in, for I expected that the flaps too would not come down to their full extent. My first landing with a nosewheel landing gear, which in this case had also given me the final proof that the undercarriage was really lowered and locked, was easy and pleasant. I gave a sigh of relief that I was back on the earth again, but I wanted to know exactly what this odd bird was suffering from, and taxied to the workshop

hangar. It was Saturday evening and, if I was not mistaken, even the Saturday before Whitsun! Nevertheless, I hoped to get hold of somebody and I was lucky; a competent master mechanic attended to me and we jacked the machine up and found confirmed what I had already suspected: the entire electrical system of the Airacobra had broken down. But why? I attached my hand-crank again and began turning it in the opposite direction to wind up the undercarriage. When the wheels were almost fully retracted, we saw the defect: the main wheels, which were retracted sideways into the wings had, as usual, a flat fairing, in order not to disturb the airflow over the underside of the wing. But this fairing, of course, could not cover the complete wheel, because the elasticity of the oleo leg and the tyre would have made the cover touch ground when the aircraft was standing. For that reason this covering ended a few inches above the ground and another partial plate mounted under the wing was used to cover the rest of the wheel in the wing. This partial wheel covering was designed to be pivoted by means of a lever over the retracting wheel to lie flat against the wing undersurface. And this wheel covering was to blame for everything; it had been wrongly mounted and had prevented complete retraction of one wheel. Now everything was clear. The electric undercarriage retraction motor had been activated, the wheels had come up until stopped by the misplaced partial cover plate, but the motor had kept on working and eventually affected the whole electric system. And not only that; the almost but not completely retracted main undercarriage had also blocked the radiator air intakes behind the mainwheel oleo legs so that the engine was not properly cooled. All this had substantially increased the drag, hence the remarkably slow speed for a fighter! It was not difficult to adjust the partial wheel covering, and connected to external batteries the undercarriage worked perfectly; there was no sign of any fundamental defect. I had the aircraft battery charged during the night and went to sleep cheerfully. My thirst for adventure had been satisfied for that day! Of course, I called Rechlin and reported what had happened.

The next morning I gave the machine another thorough check. Above all, I made sure there was enough fuel in the tanks. The Airacobra carried a comparatively large amount of fuel for a fighter, so under normal conditions it should be enough to get to Rechlin. Then I was on my way again. The flight had been announced to the air observer service, for now I had to fly without an escort; I had also provided myself with ample identification ammunition. It was the 13th of the month again, but that did not worry me: after being No.13 at my first gliding training course and having flown to Lisbon by Lufthansa on a 13th to act as a gliding instructor in Portugal, I had, without further hesitation, chosen 13 as my lucky number. Superstition was very widespread among airmen and for many of them even a new flying helmet or a pair of new gloves involved immense problems. Although not free from such feelings, like any human being, I had forced myself from the beginning not to worry about such trifles. To be superstitious would have been an unreasonable stress in test flying.

It was a marvellous, cloudless day, Whit Sunday, and I had a lovely flight. When the Steinhuder Meer (a lake in Lower Saxony) appeared, I could not resist paying a short visit to the sailing-boats cruising there. I'll bet that made the holidaying crowd scratch their heads a bit, trying to identify my unusual fighter! All went like clockwork, and within one hour I was back at Rechlin. As I had mentioned before,

the Airacobra was of interest mainly to the armament specialists because of its 37 mm cannon. Later on I made two more flights with it for the film *Panzer greifen an* (The Tanks Are Attacking). I had to fly a mock low-level attack with the Airacobra over a 'battlefield' with dug-in explosive charges that were supposed to be ignited as I flew by. I came along flying very low, but the worthy man in the shelter nervously fired his explosives prematurely and the whole bag of tricks went off before me. Nothing happened to me, but some dents in the wing leading edges of the Airacobra later showed that a few good lumps had been flung about.

During my second flight I was also to shoot – the first time I had fired from an aircraft. My target was a thick armoured plate with a hole in the centre, behind which a cine-camera was positioned, and I was very proud to have hit the plate on my first attempt. Of course, I should have liked to have got the camera through the hole as well! That kind of success would have resulted in a terrific booze-up, judging by the number of bets placed, but unfortunately my shooting skill was still far off the mark.

What became of the Airacobra I have no idea; perhaps it was destroyed during one of the heavy air raids on Rechlin later on. I would like to add that in the concluding report about the airframe and the flying characteristics of the Airacobra there was nothing really exciting to be mentioned.

Republic Thunderbolt and North American Mustang

One day in November 1943 the news burst upon us that the first American Republic P-47 Thunderbolt fighter had landed in airworthy condition near Caen on the Channel coast. As there was naturally the risk that the squadron comrades of the US pilot would make some attempt to destroy this interesting aircraft which had fallen intact into our hands there was no time to lose, and we took off in a Heinkel He 111 that same afternoon in the direction of Creil near Paris. In addition to a complete crew for the return flight we also had an aero-engine specialist on board whose help I wanted to make use of upon my first meeting with the Thunderbolt. There were still some problems, especially as regards operating the exhaust-driven turbo-supercharger, which I wanted cleared up before the precious aircraft or its engine were damaged. After landing at Creil, we continued by car via Chantilly and Evreux to Caen.

As we passed through the town of Chantilly, I recalled a pleasant episode which occurred in the entertainment hall of the same name in Paris – I wouldn't like to withhold it. From time to time we had to fly to Paris, for example to comb through the crashed enemy aircraft parks for spare parts for our machines. If it was not too often, we were happy to get out of Rechlin now and again, especially when there was a chance to go to Paris; we had no reason to be down in the dumps there. Anyway we were already quite merry that time in the 'Chantilly', quite a lively place. A colleague from the *Beutereferat* (department for captured aircraft) was also with us, a World War I pilot with the rank of a Staff sergeant, who was still busy flying heavy machines like the Italian transports or the Boeing B-17. Besides, he knew how to enjoy himself too. To our amazement, there appeared at a very advanced hour a military police patrol, which seemed to dislike the presence of this staff-sergeant in the 'Chantilly' at such an hour and in such circumstances. A long palaver followed with the aim of removing the sergeant from the place, while for me there was no doubt that I must prevent this. Eventually the patrol moved on after I had declared this staff-sergeant indispensable for our official duties there and of course the leader of the patrol had taken down all the details carefully in his note book. So strict were the customs of the 'Prussians' in those days, even in Paris! About three weeks later, I had the opportunity at Rechlin of discussing in finer detail the points which had given rise to our 'overtime' in the 'Chantilly', but in the end I got over that night in Paris and the subsequent report to our test centre without damage to my body or soul.

On the way to Caen there were some interesting discussions with highly decorated fighter pilots from operational units in their officers' messes in the evening.

We arrived in Caen on the Channel coast without any complications and at long last I was standing in front of the legendary Thunderbolt. It was already known as a very hefty machine and looked as if there was enough room in the fuselage for a number of passenger seats. In fact, its fuselage cross-section was bigger than that of the pre-war high-speed Heinkel He 70 six-seat airliner!

It was a well-known trait that the operational fighter units always wanted to appropriate and try out captured aircraft for themselves. It was inevitable in such cases that valuable aircraft were damaged or even destroyed before important data could be obtained or the aircraft evaluated. For exactly this reason instructions were issued that all interesting aircraft that were captured intact should first be brought to Rechlin for evaluation and then shown to the industry (i.e. aircraft and aero-engine manufacturers). When the reports on the flying characteristics and performance were completed, the aircraft were transferred to the so-called '*Beute-Zirkus Rosarius*' ('Rosarius captured aircraft circus', named after its commanding officer) at Oranienburg near Berlin, from where they were flown for demonstrations to operational units.

Even if a technically trained pilot who in addition also had the necessary flying experience would have found the best prerequisites at Rechlin to quickly familiarise himself with unknown aircraft types, the general examination, the evaluation of the handling characteristics and in particular, the exact measurement of the performance nevertheless took quite some time. Moreover, I believe that, in the case of fighters, the measurement of the horizontal and climbing speeds in conjunction with time to complete a full circle and the rates of roll enabled better judgments to be made of their respective qualities than ordinary comparative flights, which are affected by too many unknown factors.

But now back to the Thunderbolt. The P-47 cockpit could baffle even an experienced pilot. I gradually managed to ascertain the functions of most of the levers and instruments, but there were also some obscure controls, the meaning of which was not immediately clear to me. For example, the flaps were hydraulically operated and there was one lever which was apparently connected with the compensation of the flap angle on both sides of the wing, but how this should function was at first a mystery to me. So I decided to try the flaps at a safe altitude and to operate them step by step. Lowered for take-off, they seemed able to take some dynamic pressure.

On the other hand, I was most obliged to the Americans for having meanwhile indicated on the instruments with red and green sections regarding which values were acceptable for the engine and which were not. This was probably due to the fact that the P-47 was also flown in combat by non-English speaking pilots who could not easily understand the inscriptions. The levers for regulating the fuel mixture and the hydraulic constant-speed propeller were so connected with the throttle that the propeller was moved into full revs when the throttle was fully opened. A warning lamp was provided to indicate overspeeding of the exhaust-driven turbine which activated the supercharger of the 2000 hp Double-Wasp radial engine at higher altitudes, but I did not intend to test this during my ferry flight. The sliding cockpit hood in the Thunderbolt was particularly pleasant and could be easily opened at low speeds. The roominess of the cockpit was also pleasantly surprising and comfortable, with the exhaust pipe leading to the

turbine being behind the pilot's compartment. I was used to cowering in the Bf 109 seat to avoid continually knocking my head against the cockpit hood, compared to which sitting in the Thunderbolt was flying in comfort indeed.

A highly decorated fighter pilot stationed at Cormeilles gave us every assistance during the preparations for the ferry flight. It was important to obtain the correct high-octane fuel, to respray the Thunderbolt with German markings and also to have the necessary devices for these operations on hand. Our fighter ace had flown to Caen in his Bf 109 and naturally did not want to miss the opportunity of flying back to his operational base at the controls of the Thunderbolt. Apart from the fact that I had orders to make the first flight anyway, I had the impression that his enthusiasm had waned somewhat by the sight of so many unknown instruments and levers, and we finally agreed that I would make a flight locally to check the machine and then he would fly it from Caen to Cormeilles. And so came my first flight in our first captured Thunderbolt in the afternoon of 10 November 1943. With its broad and robust undercarriage taking off and landing were not difficult at all, but nevertheless it was important to lock the tail wheel to keep the big fighter straight. Later on, I once forgot to do this when taking off and was barely able to avoid a ground loop when landing. There were no difficulties in flight. I first climbed to 4500 ft and tested the stalling speed with flaps and undercarriage lowered, and everything worked out fine. The engine was running beautifully smoothly, something that I was already accustomed to from the other American aircraft I had test-flown. But I could discover nothing of the speed for which the Thunderbolt was renowned, at least not near the ground level.

Obviously, the flight had been duly announced everywhere in advance, but I still paid particular attention so that nothing unforeseen would occur during my first flight near the Channel with this strange fighter in German markings. As already mentioned, I was not quite sure about the compensation of the hydraulic pressure for the flaps, so I did not raise them until I had reached a higher altitude, and then only step by step in order to avoid surprises due to the unequal reaction, but nothing untoward happened. The landing approach also went smoothly and landing this over five tons heavy fighter was no problem.

The next day there was nothing in the way of our fighter ace flying the Thunderbolt the remaining 30 miles to Cormeilles. For this flight he put his victorious Bf 109 at my disposal to act as an escort. Soon we were over Cormeilles, and approached to land after making a greeting circuit over the airfield. But to my great dismay, I then noticed that our prize machine was approaching with flaps down but the undercarriage still up! The air traffic control had noticed that too, and had already started shooting 'radishes' (red signal flares) across the field. With the Bf 109 I then overtook the Thunderbolt and lowered my undercarriage twice. Our fighter expert understood at once; his wheels came down, and after making another circuit round the airfield we both landed smoothly. Perhaps all the excitement had been unfounded and the 'Chief' had merely wanted to demonstrate the Thunderbolt to his comrades in slow flight.

The weather was so bad during the next two days that a ferry flight was quite impossible, so I spent this time in the pleasant company of the front-line fighter pilots, talking mostly shop, but also discussing the war situation frankly and informatively. The weather finally improved somewhat in the afternoon of the

third day, so I took my leave of my friends at Corneilles and flew the Thunderbolt to Rechlin. A fighter pilot from this formation later told me that during my farewell display in the Thunderbolt it had temporarily 'pulled' contrails from the wing tips near the ground. That could well be.

There is nothing extraordinary to be said about this ferry flight; the weather was not good, and so I flew fairly low and after an hour landed at Deelen, where the Thunderbolt was fittingly admired by the fighter pilots based there. I didn't leave Deelen until about three o'clock in the afternoon and so didn't arrive over Rechlin until almost half past four. Being November, this meant that it was shortly after sunset and it was already much mistier than I had thought as I circled over the field with recognition lights on. Approaching over Lake Müritz I noticed once again how dangerous it was when the grey of the lake melts into the grey of the mist without a visible horizon and one must suddenly change from visual to instrument flying: But as far as the flying characteristics were concerned the Thunderbolt presented no problems and I succeeded in making a smooth landing.

The subsequent test flights then proved that the Thunderbolt was rather lame and sluggish near the ground level, with a maximum speed of scarcely over 500 km/h (310 mph). But its real performance potential was soon revealed, and I was astonished to note how lively the Thunderbolt became at higher altitudes. Thanks to its excellent exhaust-driven turbo-supercharger this American fighter climbed to 11,000 m (36,000 ft) with ease, and its maximum speed at about 9000 m (29,500 ft) was approximately 640 km/h (400 mph).

The strength of the Thunderbolt in dive was particularly impressive, and to this I probably owe my life. I am thinking here of a really critical situation, the critical thing being that afterwards I could not remember the actual sequence of events. It happened this way: during a high-altitude flight in the Thunderbolt between 9000 and 11,000 m (29,500-36,000 ft) the oxygen supply must have been insufficient, with the effect that after some time I found myself at about 4000 m (13,000 ft) with the engine throttled back. That I had been temporarily dead to the world could also be noted from the fact that the engine was so cool that it could not be revved up any more. With the cowl gills closed I then very gradually and carefully let out the throttle until I slowly managed to get the engine running at speed again, found my way back to base and landed safely. It only became clear to me later on what had really happened, or rather what could have happened! Altitude sickness, especially in single-seat aircraft, is quite an insidious thing and it is perhaps a little-known fact that at the beginning of the war our losses of flying crews due to altitude sickness were higher than those due to enemy action. It works like an intoxication, the danger being that one feels so well that one doesn't notice becoming slowly drowsier and is then gone for good without oxygen. As was shown in my case, an altitude of 11,000 m (36,000 ft) was about the maximum a human being could manage without a pressurised cabin.

I was probably helped during this dangerous incident by the fact that once a year I participated in an altitude training course intended for pilots who were often involved in high-altitude flying. For three weeks we lived in a village high in the Central Alps, skiing and climbing without the use of lifts and twice a week having to breathe an oxygen mixture equivalent to a height of 7500 m (25,000 ft.). Under medical supervision it was established that the time lapse before the first symptoms

of the altitude sickness appeared became gradually longer and longer. Thus the body becomes acclimatised to such conditions within certain limits, which vary according to the individual. After this altitude training, I didn't suffer from altitude sickness in the low-pressure chamber until it reached 7500 m (25,000 ft) all through the following summer. After four or five minutes I myself could feel my strength ebbing, but with even, deep breathing I slowly recovered again. These tests were regularly interrupted after 15 minutes.

One thing was certain: the strong points of the Thunderbolt did not lie in dog-fighting or at heights under 5-6000 m (14,600-19,700 ft). It was excellent in higher altitudes, in diving attacks and flying with maximum boost. No wonder then that the Thunderbolts were always the decisive factor as escort fighters for bomber attacks at high altitudes, their numerical superiority also putting them in a favourable position, of course. What the Thunderbolt lacked was good performance at lower altitudes. The P-47 was to gain this as a result of water injection into the engine developed for a new production series, which increased the power from 2000 to 2300 hp. Of course this version was of interest to us too - but where could we get hold of it? *IT WOULD BE TOO LATE TO GET IT ANYWAY - UP YOURS NAZI*

As if on order, a Negro lieutenant who had probably lost his way, landed with this new Thunderbolt some time later at Rome-Littorio. On the day I heard about it, we flew as far as Munich-Riem in a Ju 88 the same evening because there was no time to lose: the front line was approaching Rome fast and the Thunderbolt was in great danger. We were off again the next morning at 0516 hrs bound for Bologna.

I had been advised to go on from there by car, as further south German aircraft were in too much danger of being shot down. Although we were already in Bologna by half past six, it took till midday to arrange for a car with a driver from a Flak unit. I quickly had lunch in the officers mess where an affable general advised me to take care on the return journey not to be shot down in the Thunderbolt by his Flak unit, and I was polite enough not point out that not every anti-aircraft shell hits its target.

It was at the end of May 1944. How pleasant a drive to Rome could have been! But under these circumstances, we had to be extremely careful: the road through the mountains was endangered by partisans and the Via Aurelia down over the plain was regularly patrolled by enemy fighters. With my parachute and my toothbrush I climbed into the car next to the driver. We decided to go along the Via Cassia, that is along the middle route. There was a great deal of traffic on the roads and we only made slow progress.

I can no longer remember where we spent the night. Around midday the next day I noticed a gigantic mushroom cloud: an ammunition transport had been hit by low-flying fighter-bombers, so we had to divert from that section of the road and take a side road, where unfortunately our car whirled up a lot of dust. It was clear that we now had to pay particular attention to low-flying fighters and it wasn't long before a formation of four Mustangs appeared in the sky, preparing to dive on us. I yelled as hard as I could and the driver braked immediately. Thank goodness there was a slope nearby: no sooner had we fallen flat against the side of the slope away from the attack than the fireworks started. I had already heard that the Americans had transferred their fighter training schools to Italy and I got the impression that the 'comrades from the other field-post number' who repeatedly

flew in the same circle and approached from the same direction, had not had all that much combat practice. For all their efforts they couldn't even hit the car with my parachute in it! But when they finally turned away, my comment, 'Your shooting is terrible!' came out quite subdued; a single fighter flying his attacks from different directions would certainly have hit us. Then we drove on in an attempt to reach Rome as quickly as possible, since it was reputed to be Italy's largest air-raid shelter and thus offered us a degree of safety.

In the afternoon we drove straight to Littorio airport where I inspected my Thunderbolt more closely. There was only a handover detachment consisting of a few men left on the airport, and I was glad that Rechlin had already ordered the required fuel and the necessary repainting: all captured aircraft had their wing tips and fuselage noses painted yellow and the nationality markings covered by the *Balkenkreuz* (the Luftwaffe cross). As the capture of Rome by the Allies was expected very soon I wanted to be sure to get away as early as possible the next morning. I knew the Thunderbolt already, which facilitated the checking of the instruments and devices. The engine was running perfectly, the controls were in order; I was satisfied. The airport guard reassured me that they had left a narrow take-off runway lane unmined. They were also prepared to illuminate this lane for me with two stable lanterns the next morning and even arranged to put me up for the night in one of their tents.

But sleep had to wait: some old friends arrived with a rear detachment and there was no reason for not going with them into Rome and enjoying the city before it would be occupied, the more so as my Thunderbolt was well taken care of. It was the night of 2 June, and the Americans were expected to arrive in the city in two day's time. We had a lovely evening together, and in a bar we drank to a successful end of my forthcoming flight – all of which made this night in Rome rather short. Not until 13 years later was I to see this beautiful city again. In the morning everything went according to plan. The entire 'airport illumination', consisting of two stable lanterns, shone in all the brightness it could muster. It was practically still dark as I opened the throttle on my Thunderbolt at 0450 hrs to start my flight to Vicenza. Rome was still asleep, and also the warriors before and around the city had nothing more important to do at this hour. The take-off went well; the engine and all the other instruments on board appeared to work satisfactorily. The rising dawn presented a fascinating view, with fogbanks hovering around the mouth of the Tiber.

There was no question for me which route to follow. For better orientation it would have been easiest to fly along the Via Aurelia, but this would not have saved me crossing the Apennines and in addition to that it was to be expected that I should meet my 'other colleagues' there who were constantly patrolling along this road. I also preferred to keep my yellow-nosed 'bastard' away from our own small bunch of fighters.

Along the most eastern Via Flaminia I might have been left in peace by fighters, but this road soon entered the Sabine Hills and in its further course also touched higher mountains. After all, one could not rule out a defect in the aircraft, and a forced landing in the mountains would certainly not have ended well; not to mention the partisans and possible firing from mountain hideouts. I certainly did not want to invite such 'interludes'. Under these circumstances I had already

declined an escort, as I could not see any advantage in it. The Via Cassia was therefore the only remaining possibility, and I decided essentially to follow its course. In the beginning of the flight and as long as it was possible to orient myself by the lakes, I thought it best to keep west of Lakes Bracciano and Bolsena and later, as the mountains became higher, to follow the road. I had studied the charts very thoroughly for this flight and was pleased each time when I recognized on the map some place known to me from my Latin classes. With rising dawn I could at least be certain that the weather was going to join in too. A forecast had not been available, of course, because a weather station did not exist any more just before the occupation of Rome. Quite obviously I now had the benefit of my early start, and no other aircraft came into sight until I reached the Apennines. As I passed the towns of Siena and Florence at about 0530 hrs, the day on earth had apparently not yet begun. When crossing the Apennines, I even found it fun to fly close by the hill tops which, after all, rose up to 1000 m (3300 ft) as long as I did not spot anything Flak-like. But I got the impression that, considering the deflection of sound in the mountains, I was too fast to permit a fix to be taken on my aircraft.

Bearing in mind the fatherly counsel from the German Flak general, I by-passed Bologna at a safe distance and only resumed the low-level flight over the plains beyond. It was nearly 0600 hrs now, and by this time mine was no longer the only aeroplane over Italy. Above all, Allied formations were visible in higher altitudes.

The engine of the Thunderbolt was running reassuringly smoothly, and the needles of the instruments stood imperturbably in their normal ranges. Most of the time I also knew my position fairly accurately. Not before I crossed the River Po did I notice German formations which were flying higher above me. Regarding the orientation, this was certainly the most difficult part of the way for me. However, the River Adige with its tributaries coming from the north and winding through the first low foothills of the Alps offered some navigational help; there were no recognizable motorways in those days.

When approaching Vicenza I intended to climb to about 330 feet just before reaching the town, lower the landing flaps and undercarriage and push the cockpit cover backwards. This was the typical 'humble attitude' of deserters, which I intended to enhance by energetically shooting - what I had hoped was the right - identification ammunition. Just before reaching the airport I therefore started banging away, but there was no sign of anyone trying to do me any harm. The landing was smooth, and as I was taxiing to a standstill I was delighted to see the Ju 88 in which I had flown to Bologna; I was immensely relieved that I now would be able to fly home escorted by Major H. When I landed it was not even 0630 hrs, and only gradually did the airport awake to life. Of course, my Thunderbolt was a special attraction again. This was not the first time that I had landed at Vicenza with some exotic bird; on the last occasion I had brought in a three-engined Caproni high-wing monoplane. After all, the instructions were to stop over at Vicenza before crossing the Alps for Munich-Riem. On this day there were quite a few air raid alarms, which prevented us from continuing our flight. Although a cloud layer was forming over the Alps in the afternoon, I had no objections against following the Ju 88 with its radio operator on board and crossing the Alps in formation above the clouds. Munich itself was still reported to be covered by sufficiently high clouds.

I took off from Vicenza at 1735 hrs, hung on the Ju 88 and started through the clouds towards home. North of the main ridge of the Alps the cloud cover broke up. When the Tegernsee (lake in upper Bavaria) came into sight through a hole in the cloud cover, I signalled by rocking my wings and other signs that I was leaving my escort and going down on my own. Who knows whether the cover over Munich-Riem was equally scattered and convenient to penetrate as here.

I approached the Riem runway again with my flaps and landing gear down, open cockpit, and firing identification ammunition from some way off to be on the safe side. After a smooth landing I had to ask for a guard detail to cordon off the Thunderbolt from too many curious people; it was quite an occasion to have an American fighter land there for a closer look. Meanwhile, the Ju 88 had landed as well; it had taken us exactly one hour and twenty minutes from Vicenza to Munich. After so many days full of suspense and, above all, the very short night I had in Rome, we decided to call it a day and stay in Riem. In any case, it had got rather late to continue our flight.

The next day brought bad weather – so bad in fact that a ferry flight really seemed out of the question. But my flight orders were made out in such a way that I was not bound to minimum weather conditions which applied to ordinary Luftwaffe aircrews. And so we started on the last stage of our trip, although I admit I was rather pleased to be able to hang on to the Ju 88 with its radio operator. At 1123 hrs both aircraft landed safely at Rechlin. Already during the ferry flight it had become clear to me that except for the extra 300 hp provided by the water injection, this new P-47D Thunderbolt variant did not feature any fundamental innovations compared to the version I had already tested and evaluated.

This ferry flight of the Republic Thunderbolt marked the beginning of an extremely eventful month in my experimental test flying as evidenced by my log book. It really did not happen too often that, in the course of only a few weeks, such a large variety of different aircraft types would come to hand, including some for their first flights in Germany: the Heinkel He 111, Junkers Ju 88S-3, Ju 188, Republic P-47D Thunderbolt, Avro Lancaster, Boeing B-17G Flying Fortress, Hawker Typhoon and, last but not least, the North American P-51 Mustang, with which I shall deal now.

After Rome had been taken by the Allies on 4 June 1944, more bad news was to follow suit only two days later – the invasion of Normandy. On the same day, 6 June 1944, I also received the news that the first P-51 Mustang fighter had landed intact at Cambrai-South airfield. I had just flown to Travemünde with a He 111 to inspect the Lancaster which had been reconstructed in the local Lufthansa workshops, but as this was more important I climbed back into my He 111 without delay and returned to Rechlin in order to make the necessary arrangements for my ferry flight with the Mustang. At that time the wildest rumours about the front situation were going around, and one was at a complete loss to know in what type of aircraft it would be safe to show up over France at all.

All hell was let loose there of course, on this first day of the invasion. After making some detailed enquiries it seemed best to take a Ju 188 high-speed bomber and arrive in the evening dusk. We took off from Rechlin at 1719 hrs and headed for Venlo in the Netherlands, where we wanted to get more news on the situation at the invasion front to be on the safe side. Our Ju 188 touched down at Venlo at

1900 hrs. According to the sparse information that was available, it seemed possible to approach Cambrai as the darkness set in. Accordingly, we took off from Venlo at 2112 hrs and arrived over Cambrai at 2200 hrs when the air space over France had calmed down after this eventful day.

I was really looking forward to meeting the North American Mustang. From the reports I had seen to date I believed it to be an extraordinarily good aircraft not only because of its excellent engine, but also on account of its well-designed airframe. When I had a first look at it I noted that the radio identification set was still cheerfully transmitting: the American pilot had obviously left it on to attract his comrades' attention. This, of course, involved the hazard of our captured Mustang being attacked by the Americans, and we had to act fast. The self-destruct set was also still in place and had to be removed, and then I immediately settled down in the cockpit. In the light of torches we started a busy search to find out which levers might serve what purposes. I was no longer a beginner on American aircraft by that time, and it did not take me too long in the Mustang either until I was pretty sure I would not confuse the fuel safety cock with the landing-gear retraction lever. According to the information coming in from all parts, the only chance of getting the Mustang out was to make off at the crack of dawn. Thanks to the preparations made beforehand, the machine had already been resprayed with the yellow captured aircraft identification, and the fuel tanks filled.

The night was rather restless, but at this time of year the sun rose early, so that I could take off at 0519 hrs (summer time). It goes without saying that I was eagerly looking forward to this flight. Although I could look back on some experience with unusual aircraft there was no doubt that the Mustang I had received was a very exceptional aeroplane. In addition, goings-on on the second day of the invasion certainly helped me not to get bored. I was set at ease, though, by Major H. and his Ju 188 escorting me again. We had become quite a good team by then, a fact that I certainly appreciated.

Even when revving up the Packard-built Rolls Royce Merlin, one felt that this was a very special high-performance engine. But I dared not run up the good Merlin at maximum take-off power; I did not want to risk a nose-over, because with increasing power the Mustang got rather restive on its legs. I should have made myself look really foolish if the aircraft had breathed its last even before take-off! Noticing that the engine revs hardly decreased after warming-up I switched over to both magnetos for weak continuous power; I wanted to reserve the full take-off and emergency power for the take-off. When checking the instruments the temperature and pressure indications were reasonable, and so I taxied on to the runway where the Ju 188 was already waiting to let me take off first. I opened the throttle very carefully, because the strange aircraft might have had a tendency to swing. Everything went off well, but right from the beginning I had the impression that I was handling a very sensitive machine, especially as far as the elevator control was concerned. I fell back behind the Ju 188, which had taken off after me.

As the night before, we wanted to stop over at Venlo. There was no doubt, the Mustang could really race: in order not to overtake the Ju 188, which was by no means slow, I had to throttle back the engine quite considerably. As my previous ferry flights had gone off quite smoothly, I was by now actually waiting for some

irregularity in the pressure or temperature indications, which in the present case would have been particularly critical. I kept watching the instruments - but nothing happened, even the fuel-level indicator showed the appropriate decrease for the flying time. There were so many things requiring my attention that time passed quickly, and I was surprised when I saw Venlo lying in front of us. As the Ju 188 had radio on board, we were sure at least not to get involved in an incoming enemy air raid and were also able to duly announce our arrival. This sorted out, I started a normal approach. Undercarriage and landing flaps went down as scheduled. The control forces were low, corresponding to the elevator sensitivity, and required only little trimming. I set the propeller pitch, or rather the speed setting of the constant-speed propeller to maximum in case I should have to go around again. During the final levelling-off before landing I could also feel the sensitivity of the Mustang in the elevator, but the wide undercarriage made things quite a bit easier. In any case, the Mustang was not so critical as the Bf 109 if levelled off too high.

Having made my first landing in a Mustang successfully, I taxied on to the flight control. The aircraft appeared to be in perfect order, and so we decided not to stay long; nobody knew what the air situation had in store for us. Naturally, the Mustang was in the centre of attraction at Venlo too. I also ran into some acquaintances who still remembered me dashing to Vienna about twelve months ago with a Ju 252 transport to get a couple of DB 603 engines they so urgently needed at the time. However, for all our friendship as far as an 'inspection' of my Mustang was concerned and, in particular, the wish 'just to sit in the cockpit', I was very reserved because of some past experiences. Also, I was not keen on checking about a hundred levers and switches for their correct positioning before my next take-off.

An hour or so later we were in the air again. The initial uncertainty had by then given way to the pleasure of flying this American fighter. It did not take long before the familiar surroundings of Rechlin came into sight in beautiful weather. It was about time now to end the ferry flight 'in style' and throw the Mustang around a little as a welcome for the astonished Rechlin people, which I did. During the subsequent landing, my second in a Mustang, I almost felt like an 'old hand' in it. One thing was certain: after only two flights it had become quite clear to me the Mustang was a truly unique aircraft. Its performance characteristics were very good, and the engine too made an excellent impression. But one also felt at once that it required careful handling: when revving up it reacted very sensitively to the correct operating temperatures and, if handled roughly, it countered with unsteady running. I had the impression that you could hear immediately if the engine disliked something. Of course, the Packard-Merlin did not like jerky opening of the throttle either, but if the air temperatures were right it ran smoothly and reliably.

Very soon the news got around what a special treat we had received with this Mustang and, when examined in more detail in the workshops, it gained general appreciation and was constantly besieged by representatives from all kinds of departments.

The first item on the next day's programme was a flight with a Ju 88S-3, a new version of this well-known bomber powered by two Jumo 213E engines. After that,

as already described, I flew the Avro Lancaster from Travemünde to Lärz where an exhibition had been arranged. On the following day there was the B-17 Flying Fortress and the Thunderbolt with water injection engine I had just ferried back from Rome. In the evening when the air was really calm, I took the Mustang for the first flights over the measured course in order to calibrate the airspeed indicator. It was indeed a pleasure when flying this speed course at a height of about 150 ft to see the airspeed indicator needle move around the 600 km/h (373 mph) mark! The first climb to 11,500 m (37,730 ft) was due the next day. It was fun to fly such an excellent and responsive aircraft both at low level and at higher altitudes; I was really enthusiastic about it. The Mustang also excelled in turning flight, and if I remember correctly, my P-51B clocked about 670 km/h (416 mph) at an altitude of 7000 m (23,000 ft). When considering that this speed was reached with the relatively low-power Merlin engine, one can appreciate the excellent aerodynamic properties of the Mustang airframe. Unfortunately I no longer possess a test report on this Mustang, but I seem to recall that in comparative flights with some of our fighter aces only the Bf 109G-10 and the FW 190D-9 could more or less keep abreast with it.

When I had acquired some practice with the Mustang, I found it fun to take off with only a little fuel, i.e. at low weight, retract the undercarriage and landing flaps at once and then immediately fly a full circle close to the ground. Apart from everything else, this manoeuvre really showed the agility of this fighter. I would also like to add that I always felt at home in the Mustang. But there were points to watch; with the fuel tanks filled to a certain level and the CG shifted to the rear accordingly, the Mustang had its limits as to longitudinal stability. And at full throttle one could stall it even in a steep turn.

After I had delivered this P-51B to the 'Beute-Zirkus Rosarius' it crashed during a comparative flight and was lost together with its pilot.

TOO BAD HE DIDN'T FLY THE
P-51B MUSTANG.

NOW THAT WAS

AN AIRPLANE.



How Do You Know? You've never
F-Lown One Either!

Lavochkin La-5, Yakovlev Yak-3 and Hawker Tempest

On 6 March, 1944, I had the chance to fly the Fokker CVE, a narrow-winged sesquiplane which, I believe, had formerly been used for tactical reconnaissance. After the test flights with the Hawker Typhoon early in June, 1944, my programme included flights with the Mustang which I often took up to about 11,500 m (37,730 ft).

Having completed the test- and evaluation-flight series with the Avro Lancaster in August, 1944, as described in the first chapter, I received news in mid-September, 1944, that the first airworthy example of the well-known Soviet Lavochkin La-5 fighter had become available at Gross-Schirmanen in East Prussia. This promised to be interesting, and I immediately set out for East Prussia – in the sleeping car of a train for a change.

Apart from everything else, this fighter was the first Soviet aircraft that I would be flying, because at the time of the I-16 Rata evaluation I had not yet joined the Rechlin team. Most of the Soviet aircraft that had fallen into our hands at the beginning of the Eastern campaign and later on, in so far as they were in airworthy condition, had been ‘used up’ by the local Luftwaffe units. And now, at long last, I had my chance to sample Russian produce.

The captured La-5 – actually an La-5FN – was powered by an M-82FNV twin-row radial engine with direct fuel injection. It was obvious from the start that this aircraft was no longer comparable with the earlier Soviet fighter types of sometimes rather primitive construction, and was a very serious opponent to our fighters in altitudes below 3000 m (10,000 ft). More detailed information as to its performance and flying characteristics will be found in my original test report, a copy of which is reproduced on p.155 of this book; unfortunately this is also the only such test report that has remained in my possession.

As was the usual procedure, I then spent some time getting acquainted with the array of instruments, levers and switches in the pilot’s cockpit. Naturally, I first required the assistance of Russian-speaking experts to decipher the inscriptions and indications before we could start. The engine was noisy, but seemed to be running all right, and the other devices appeared to be in order as well.

Having tried to get to the bottom of all operational functions as usual, I took off from Gross-Schirmanen at 1603 hrs on 15 September, 1944 and arrived at Rechlin at 1933 hrs according to schedule after a stop-over at Märkisch-Friedland from 1712 to 1738 hrs. That evening I felt rather dizzy. I could not think of the reason why, but it could not be ruled out that I had breathed in some CO (carbon monoxide) with the exhaust gases while piloting this fighter, and my colleagues advised me to wear an oxygen mask on future flights with the La-5FN. I was

aware, of course, that even small amounts of carbon monoxide can be deadly. A friend of mine had crashed with a Ju 87, and the accident had been ascribed to the presence of carbon monoxide gas in the cockpit after a new series of engine had been fitted in the aircraft. We had heard the screaming sound of the Stuka in a terminal dive and were unwilling eye-witnesses as it plunged into Lake Müritz. Although there was no hope, the motor boat went out without delay, but there was nothing one could do any more. A little later his wife was at the airfield gate to meet him for a swim during the lunch break. Life could certainly be cruel at times.

Although less dangerous, but by no means pleasant was the noisy running of the La-5 engine, which had deafened me by the evening. On later flights I always tried to remember bringing along some cotton wool to plug my ears.

Be that as it may, the aircraft was of special interest to us. Experts were flocking in from all quarters to have a close look at its engine and airframe, and we had a hard time preventing the machine from being dismantled there and then.

Not counting the air raids and bad weather, I met no difficulties on my test flights and my observations and conclusions were set down in a test report reproduced in this book. The reports on other captured aircraft were in principle similar. If, for some reason or other, the testing took longer than scheduled, preliminary reports were also made, and sometimes special performance measurements were laid down in separate performance reports. If flights at high altitudes had to be made in winter time or if tests were delayed by engine or airframe trouble, it was rather difficult not to delay the reports too much and at the same time base them on reliable performance measurements. Unfortunately the reproach that everything took too long was often justified. But the imputation that orders had been given from 'above' to detract from the performance of captured aircraft, was absolutely absurd. An interesting sidelight was that operational units frequently submitted requests that we should work out brief operating instructions for the most common types of foreign aircraft as a help to those shot down or taken prisoner to escape. I believe something of the sort was to be worked out for the Mustang at one time. But I was not quite convinced of the idea; the whole procedure seemed hardly suitable for such a 'correspondence course'. And somehow I also could not imagine a poor POW on an enemy airfield with a file of operating instructions under his arm.

I completed the tests with the Thunderbolt and then took it to Oranienburg on 12 October. As I wanted to know more about the performance of the latest German aircraft, however, I made some high-altitude and measuring flights with the Fw 190 BG + KC and the Ju 388 high altitude bomber DW + YY in altitudes to about 11,000 m (36,000 ft). I was specially interested in the excellent performance of the Fw 190D-9 with the Jumo 213 as a forerunner of the Ta 152. The Ju 88 with Jumo 213 engines was also on my programme. Then there was another new and interesting task coming up: I was asked whether I would be prepared to fly a Heinkel He 111 with an attached manned V-1 missile which was known under the cover name of 'Reichenberg Re 2'. Of course I was! It seemed a most interesting combination. The manned V-1 was suspended at the starboard side, and partly underneath the fuselage of the He 111, so that its windscreen was located somewhere behind the inner landing flap of the bomber. Although the word went round that certain difficulties with the automatic course control of the V-1 were

the reason for these flights, the actual object of these tests was probably the intended use of such manned V-1 missiles for the so-called 'self-sacrifice' attacks. It was said that some well-known pilots had volunteered for these operations which did not offer any chance of survival, and certainly did not correspond to our mentality.

Our test programme envisaged a series of test launches with the manned V-1 to prove the feasibility or otherwise of this concept. To start with, these launches were to be carried out at an altitude of about 3000 m (10,000 ft) without power. In the beginning everything went off quite well with three pilots whom I had known since my gliding days. However, when on subsequent flights the V-1 pulse-jet engine had to be started, some critical incidents occurred. The first pilot had to bale out and was lucky to pass clear of the V-1 tail assembly. The second pilot managed all right until just before landing, when the V-1 pulse-jet engine suddenly started again during levelling-off, probably due to the inclined position of the fuel tank. The thrust of the pulse-jet above the CG generated a moment of nose-heaviness, which the pilot counteracted by vigorous pulling of the elevator control. Then the pulse-jet stopped again, the V-1 stalled, and the pilot wrenched his spine. The third pilot had no luck either: he was hit on the head by the cockpit hood which had come off in flight, probably because it was not completely locked. He suffered severe injuries but managed to land the V-1 with a fractured skull. The first loss of a pilots' life came during subsequent flights.

As far as I know further test flights with the manned V-1 were then continued by *Flugkapitän* Hanna Reitsch.

In between there were always some other, different tasks for me. At the end of September, for instance, I went to Berlin-Gatow to check a night landing procedure evolved by *Flugkapitän* Dipl.-Ing. Melitta Schiller, von Stauffenberg by marriage. I made seven night landings with her. The procedure was based on the idea that by fixing on the intersection point of two light beams attached to the aircraft during levelling off near the ground it was possible to make three-point landings. The idea was certainly not bad, but it was not followed up.

In November I made some more test-flights with the Soviet La-5FN fighter, but there was a complete change when the Kalkert Ka 430 transport glider had to be towed from Lärz to Rechlin on 8 November. The only transport gliders I had flown so far were the ten-seat DFS 230 and the larger Go 242, and so naturally I was interested to find out how the Ka 430 behaved. I took a He 111 to Lärz and then got into the pilot's seat of the Kalkert glider. This type of 'bird' really had little to do with gliding any more, but nevertheless I found it interesting to fly such a piece of furniture for a change: after all, there might be a chance that an Airspeed Horsa, the British counterpart, would fall into our hands.

By that time the military situation was getting steadily worse, fuel became scarce and could, of course, only be used for the most urgent programmes. These included primarily the Messerschmitt Me 262 jet programme in which I was to participate if not prevented by really urgent test flights with captured aircraft. Tasks of this nature and other urgent jobs were welcome opportunities for me to replace the desk chair with the pilot's seat.

In the East, the major Soviet offensive against East Prussia began from the direction of Lomzha around 6 January, 1945. A few days later the first Soviet

Yakovlev Yak-3 fighter landed intact at Gross-Schimanen, an airfield I had already visited the previous September.

This was exciting news indeed, as everybody was most anxious to know more about this latest Soviet fighter. According to reports, it was not only much lighter than the Yak-9 but was also said to be superior to it in performance regarding climbing speed and turning radius, especially from the ground level up to about 3000-3500 m (10,000-11,500 ft).

The necessary arrangements did not take long, and on 11 January I set out again by train to Gross-Schimanen. By then, travelling by train had become rather wearisome; they were late and without heating, and the air raids had made everything uncertain. I took my experienced flight engineer with me as well; he could not fly back with me in the single-seater, but would be of great assistance in identifying the various control levers.

After many difficulties and a very uncomfortable journey - I also had my parachute with me - we finally arrived at Gross-Schimanen.

The Yak-3 made a very good impression; in particular, the finish of its plywood wing surface was of an excellent quality. It was smaller than the Yak-9 and weighed only 2500 kg (5512 lb) all up, and therefore its power loading was only about 4.5 lb/hp. One can imagine what this meant in terms of acceleration alone! Another surprising fact was that, in spite of the small wing of about 15 sq.m (161.5 sq.ft) area the wing loading was also relatively low due to the light all-up weight. >

As I walked around the Yak-3 I noted with satisfaction that it had a nice, wide undercarriage which retracted inwards to meet under the fuselage. Then I settled down in the pilot's seat and began the usual search to find out where the various lever operations 'arrived' when watched from the ground. The water-cooled inline engine ran very well, and the propeller even had quite a bit of ground clearance. Still, I knew I had to muster my utmost flying skill, because these fast little devils could be very nasty at times, if 'only' by trying to swing or stall at take-off. The trapezoid wing, which was tapered at a ratio of about 1:3, suggested that there was the hazard of stalling if it was not set in a special way, so that the outer wing sections had a smaller angle of incidence which would delay the separation of the airflow in the area near the ailerons.

The next morning, on 12 January, there was so much 'other traffic' in the air over Gross-Schimanen that a take-off with the captured Yak-3 was out of the question. Not until it was afternoon and the weather was getting worse, dared I take off in the direction of Märkisch-Friedland. One had to watch the agile little aircraft very carefully to prevent it from having its own funny ways during the take-off. The view was not too good while I was taxiing on account of the upright-V 12-cylinder engine, but in flight the visual range was all right. The control forces were slight, so that one had to be careful not to over-react. However, the engine was running smoothly and encouraged me to fly at low level. I had decided to do without an escorting aircraft, so that there was no possibility of testing the Yak-3 thoroughly at higher altitudes. Still getting my 'feel' of the Soviet fighter, I landed at Märkisch-Friedland fifty minutes later, approaching at a rather high speed.

The control forces were notably reduced with undercarriage and flaps down, and the landing was a bit shaky, but the wide undercarriage helped, and I was

quite contented with my smooth three-point landing. When taxiing to a halt, however, trying to help with the pneumatic brake lever on the control column, I noted that the compressed air pressure had run down. There was a pressure gauge in the cockpit, but, of course, I did not know the correct values, and so I had to taxi with utmost care. What was more important: I had been graciously accepted without being fired at; perhaps I had even been properly announced. The lack of compressed air was by no means just a flaw, because not only the brakes but also the undercarriage, flaps and the radiator gills were pneumatically operated. Something had to be done about it. My luck held at the workshop, and as we started the engine, the soap suds we had put along the air pipe system formed some lovely bubbles at a cap nut. So the damage was not serious and could be repaired by cutting a new gasket and tightening the nut. But even these minor repairs meant that there was not enough time left that afternoon to continue the flight; after all, it was January. I was relieved that the compressor had not suffered any damage because repairing or even replacing would have been a time-consuming business.

The next day, it was again the thirteenth (of January), the weather was beastly. It was snowing and there could be no question of taking off, but the weathermen dangled hopes before my eyes for the afternoon. The Yak-3 had no blind-flying instruments, though, and I had to get down somewhere and be able to know my position, too. As it happened, the meteorologists' prophesy even came true, and so I got ready. Much to my surprise, the air pressure in the system was right, too, and at 1527 hrs I opened the throttle again, taking care that the Yak-3 did not swing during take-off. Although the flight was properly announced, I carried the signal pistol with the identification ammunition as well. I glanced frequently at the manometer, but the pressure seemed to remain constant. The weather too improved a little as I got further west, and so I ventured a little higher to make some initial tests regarding the stability in the elevator and rudder controls – I was not tired enough of life to test the Yak at slow speed and low level. The short winter day was getting near the end, it grew misty again and I was glad after a 45-minute flight to spot Lake Müritz with the Rechlin airfield on its south end. Even when I extended the undercarriage and flaps the air pressure remained constant, which was reassuring. Soon afterwards I placed the Russian bird smoothly on the grass, and with compressed air power on hand the taxiing in wavy lines was not too difficult either. The pneumatic brake reacted on one wheel following the corresponding rudder movement, and on both wheels in central rudder position. As a result of my experience with the noisy La-5 I had plugged my ears with cotton wool under my flying helmet for this flight. The engine of the Yak, which was not exactly quiet either, had therefore not deafened me as much as that of the La-5, and so I was able to answer the questions my colleagues were bombarding me with. As usual, the aircraft was taken into the workshop hangar for inspection by various experts. General interest was roused by the excellently finished plywood wing surface. It created minimum friction and also offered the advantage of easy repair even on front-line airfields with makeshift facilities.

Before I was able to think of the first test flights, I received the news that *Reichsmarschall* Göring wished to see the aircraft at Oranienburg near Berlin, and I was to fly it there the next day. The morning arrived with snow and low clouds

reaching down to the tree tops in some areas and I wanted to decide from what I could see myself whether or not it was possible to fly. I finally got my way and was cleared for Oranienburg by the air-traffic control, but the weather was really very bad and I had a hard time with the fast and sensitive aircraft not to lose sight of the railway line to Neustrelitz which I was following to start with. There was no other way of getting to Oranienburg in this poor visibility. Before I had reached Neustrelitz where I had to 'change' to the railway line to Berlin, I plunged into the cloud-layer reaching down to the trees in several places. I really would have liked to get through to Oranienburg, but at last reason prevailed; it would have been irresponsible to go on under the circumstances. The inspection had to take place without the Yak, I could not help it. I started looking for a piece of land without woods and low cloud cover in order to get my machine on opposite course. It did go off well, as often practised, but I had the impression that on this flight at least I had reached the limits of what one could risk; after all, this was only my third flight with the sensitive Russian bird! I found my way back to Rechlin all right and after a 25-minute flight landed on the airfield. All flying operations had already been suspended for 'lack of weather' and my colleagues were surprised to see a lonely fighter still hanging around in the air. However, soon afterwards the meteorologists held out hopes to me again. Not only did they forecast that the weather would improve - it could not get worse, anyway - but they said that this would happen very soon, and I had my Russian bird refuelled in order to be prepared just in case. Two hours later I had another go and got through to Oranienburg.

The inspection had started already, and everyone was pleased that my attractive aircraft was now available as well. I put on my best service uniform with holstered pistol on the belt, took on a generally more military air and planted myself beside the Yak-3.

I thought it quite interesting to witness this to-do for once. Soon the swarm around the marshal drew nearer. I saluted smartly, as I had learnt during my military training but rarely needed to as *Fliegerhauptingenieur*, and made my report. Göring looked at me in a kindly way with his blue eyes. Everything seemed a bit theatrical. I noticed his hectically flushed cheeks and his soft Russian leather boots of the same colour. My reply to his questions regarding the Yak-3 was that performance measurement tests had not been made yet, but due to the extremely light weight of the aircraft combined with the high aerodynamic quality and available engine power, excellent climb and superior low-level dog-fighting performance might be expected compared to our Bf 109 and FW 190 fighters. All this was based on simple physical laws, which were obvious to anybody with the slightest technical background; also, one could not overlook that the aerodynamic design of the Yak was excellent. I said as much but I could not fail to notice that the inferiority of the aircraft above medium altitudes as a result of the poor altitude performance of its engine fitted the bill somewhat better. It was all a bit odd, being there and accounting to the highly praised and, a little later all the more abused *Reichsmarschall* Hermann Göring about the latest Soviet fighter which I had just flown. Apparently, they did not intend to go into any technical details. It was clear to me that Göring's rights were already curtailed at that time and that he was being bypassed. I certainly did not want to be in his shoes.

And so the swarm of people, whose individual faces now escape my memory,

marched on. *Sic transit gloria mundi*. As by then it was too late to fly home I sat down in the mess with a few pals from 'Zirkus Rosarius' and passed the time in friendly discussions. Apart from their 'organising' of captured aircraft for their own purposes before we could test them, we got on quite well with one another. I was able to promise them that they could have the La-5FN as soon as the test flights were completed. When I returned to Rechlin with the Yak the following day, I felt at home in it already. It was then that I really appreciated how pleasant it was to fly this fighter in good weather conditions.

Our work at Rechlin became more and more difficult and hopeless as the military situation deteriorated. Many colleagues had already been taken away and impressed into paratroop or infantry units by a specially appointed general nicknamed the 'hero pincher' (in analogy to a black goblin called the 'coal pincher' which had been invented for the purpose of reminding people to save fuel during the war). Only the most urgent test- and evaluation programmes could still be carried through because fuel was getting scarcer, too. In addition to the still outstanding flights with captured aircraft I also participated in the work on the Messerschmitt Me 262 jet fighter, about which more later. The performance evaluation tests with the Soviet fighters presented some problems in so far as they were mainly high-altitude flights which could only be made in good weather, rare in January. And on the few days when the weather was suitable the sky over Germany was crowded with many strange aircraft which rendered performance measurement flights, particularly with captured aircraft, impossible. It also happened, of course, that on days which would have permitted flying activities, take-offs had to be cancelled as a result of minor defects in the aircraft.

Despite the depressing situation our work schedule remained quite full. Thus, time and again pilots were wanted to carry out important measurement flights with new German aircraft and I participated in making speed-course flights with the Bf 109K, although my main flying activity was concerned with captured aircraft. In addition to the first measuring flights with the Yak-3 there was one more scheduled evaluation flight with the La-5FN still outstanding, after which I ferried it to 'Zirkus R' at Oranienburg.

Another new aircraft type was already waiting there to be tested, the Hawker Tempest, and I took it back to Rechlin. For this ferry flight I again had the choice between bad weather and air raids, and I had to make the best of it. It was urgent, as usual, and I had little time to familiarize myself with the instruments, control levers and switches in the cockpit. To be on the safe side, I made a trial take-off in this fighter which had the reputation of being a very fast aircraft. So much so in fact that it had got around that with the Tempest it was possible to shoot down, or at least to intercept and cause premature crashing of the V-1 flying bomb. The flight promised to be interesting!

I settled myself in the cockpit, primed the engine, and the 24 cylinders roared into life. I was pleased to note that the big Sabre was running smoothly and to see that all the other devices and instruments appeared to be in good order. During the first few take-offs with aeroplanes unknown to me I was, of course, on the look-out for any tendency to swing or an untimely lift-off. The Tempest was a remarkable aircraft also regarding its flying characteristics. I felt really good in its cockpit, and as I was flying over open country I could not resist the temptation of pushing the

throttle lever all the way forward to see what the fighter was capable of. I soon realized that the Tempest – assuming the airspeed indicator was not entirely off the mark – could achieve about 600 km/h (373 mph) even at low level. Although this was quite remarkable, it would still have been necessary to push down its nose in order to overtake the V-1 flying bomb. According to reports, the British fighters not only managed to shoot down the V-1 in this manner, but also applied another tactic of approaching the flying bomb close enough to get a wing tip under the V-1 wing and tip it over. This was too much for the relatively simple controls that kept the V-1 on course; it crashed prematurely and not only after the measured amount of fuel that determined the pulse-jet cut-off and the subsequent dive to impact, had been used up.

All I had found so far was that the Tempest displayed good characteristics during take-off and landing, which went off without any difficulties, and that it could accelerate to remarkable speeds at low altitude. Not until I was back in Rechlin did I have the time and opportunity of taking a closer look at this exceptional aircraft. The Hawker Tempest – I believe it was a Tempest V – was an improvement of the Typhoon. Like its predecessor, it had the conspicuous radiator underneath the engine, each of whose 24 cylinders developed 100 hp. The cylinders were arranged in lines of six forming four blocks, which had an H-shaped cross-section. Compared with the Typhoon, the wing was thinner, and although its surface area had been increased, it had a lower total profile drag. In order to gain space for an additional fuel tank, the fuselage had been lengthened and the vertical fin extended, with its rounded-off fillet merging into the fuselage. Thanks to all this, the improvement in performance and aerodynamic characteristics was quite stunning. The Typhoon had started its career with a bad reputation, but after overcoming its teething troubles had become a dreaded very low level attack aircraft with rocket missiles, and had also proved to be an effective fighter-bomber. I had an opportunity to fly the Hawker Typhoon too. If I remember rightly, it had fallen into our hands in damaged condition and after repairs its engine was never quite up to the mark so that proper test flying with that particular example had been impossible. Soon afterwards I ferried the Typhoon to our 'captured aircraft circus' at Oranienburg.

But there was no doubt about this one: the Tempest was an impressive, highly-powered aeroplane by any standards. With little fuel and lightly loaded it had the outstanding power loading of only 2 kg/hp or, to put it another way, each hp had to accelerate only about 4.5 lb of gross weight.

With the hopeless military situation at that time most of our work did not seem to make much sense any more. More and more people were removed from our establishment and impressed into ground fighting units 'for the final victory'; supplies of fuel, lighting, heating and food got scarcer by the day, and work in the repair shops became more and more difficult. Part of the time we worked with the shovel digging trenches near our base, but the test flights still had to go on.

I intended to take the Tempest at least over some speed measuring points at higher altitudes; after two flights it had gained my confidence and I enjoyed flying this fast fighter.

During my third flight I established that the maximum speed at about 5000 m (16,400 ft) altitude was in the region of 680 km/h (423 mph). This would mean



The author (3rd from left) during his training on multi-engined aircraft at FFS C2 Neuruppin
Hans-Werner Lerche coll.

The author photographed during one of his many flights as a gliding instructor in a two-seat Kranich sailplane
Hans-Werner Lerche coll.



Dornier Do 23G bomber/trainer in pre-war Luftwaffe markings

Wolf Schaeffer coll.





Junkers F 13, the world's first all-metal commercial transport aircraft

Deutsches Museum Munich

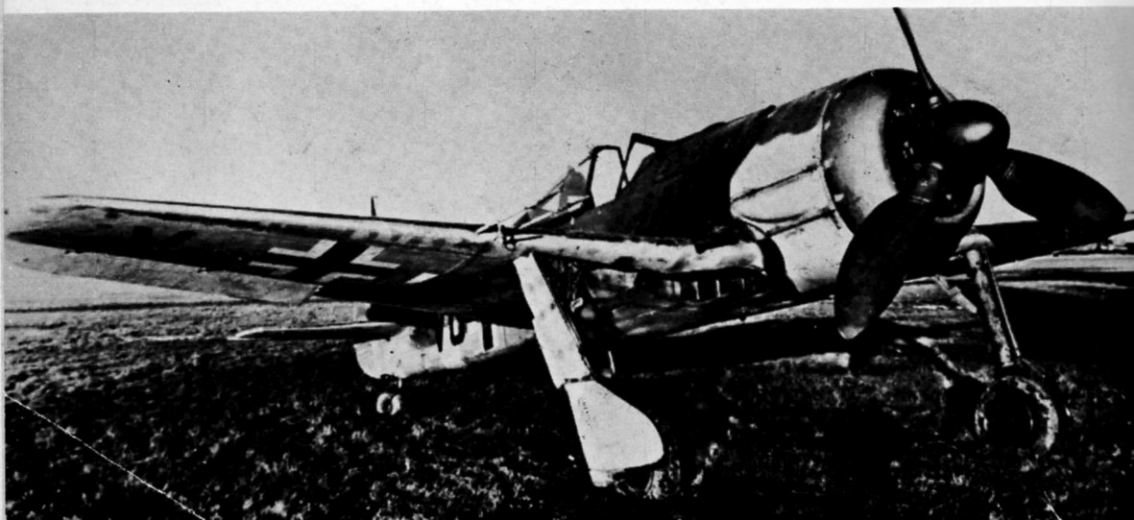
Focke-Wulf FW 58C Weihe
multi-engine and blind-flying
trainers

via Alex B. Baginskis



The author flew several versions of the FW 190

Hanfried Schliephake coll.





The four-seat Messerschmitt Bf 108 Taifun was a very advanced design for its day. Illustrations show an early production Bf 108B-1. Flying an aircraft of this type the author made his first landing at Rechlin and was offered a job as a test pilot

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Messerschmitt Bf 109F-4 fighter before delivery to an operational unit *Hanfried Schliephake coll.*

A captured Spitfire Mk IA fighter shortly after a forced landing in France

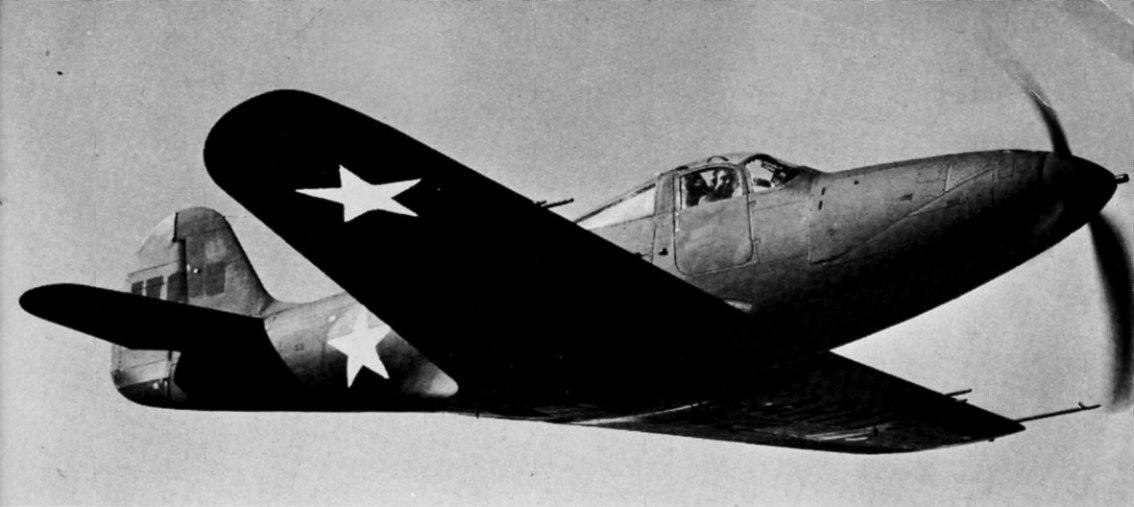
Wolf Schaeffer coll.



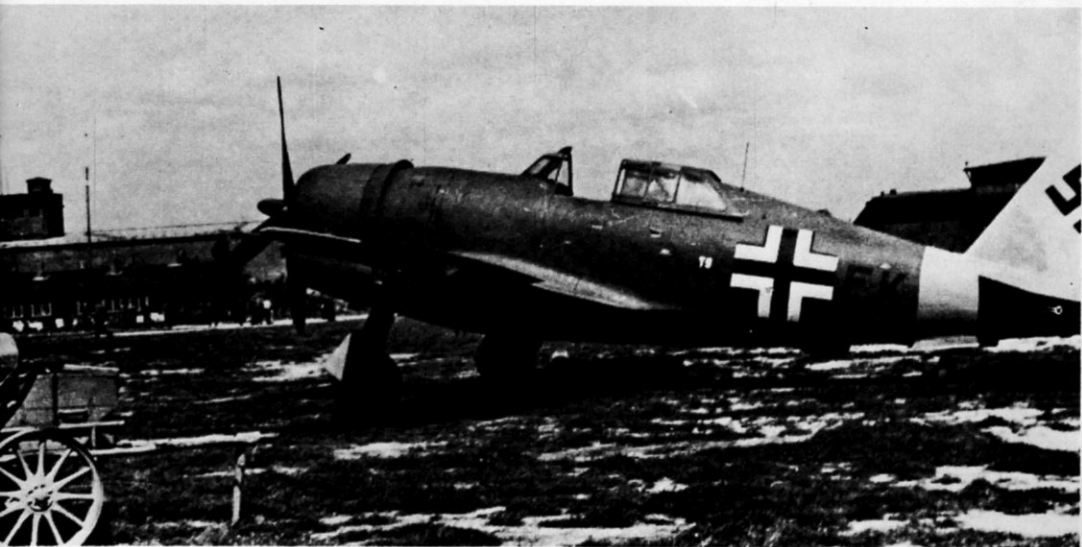
A captured Spitfire Mk XII fighter coded T9 + BB as flown by 'Beutezirkus Rosarius'

Flugkapitän Th. Rosarius coll.



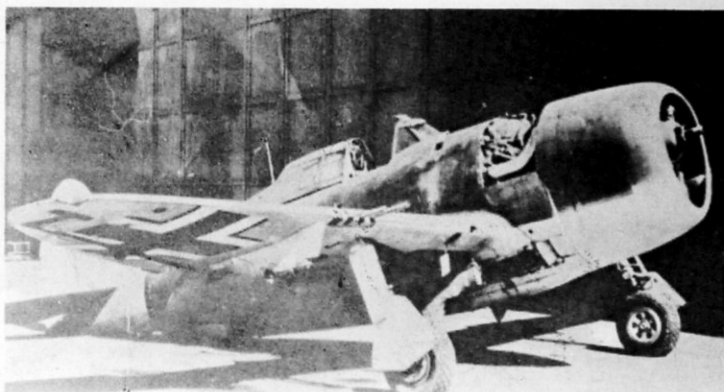


Bell P-39D Airacobra fighter during a factory test flight (the serial numbers on the tail have been deleted by the wartime censor). The author had an unforgettable experience flying a captured Airacobra with unsuspected faulty electrical system
Copyright Bell Aerospace Systems



Republic P-47D-2 Thunderbolt as T9 + FK of 'Beutezirkus Rosarius'. This machine was formerly 42-8370 of 355th Fighter Group, US 8th AAF, forced down near Caen in France in 1943 and subsequently test-flown by the author. It was the first Thunderbolt captured intact by the German forces

*via Werner Girbig
 and Hanfried Schliephake coll.*



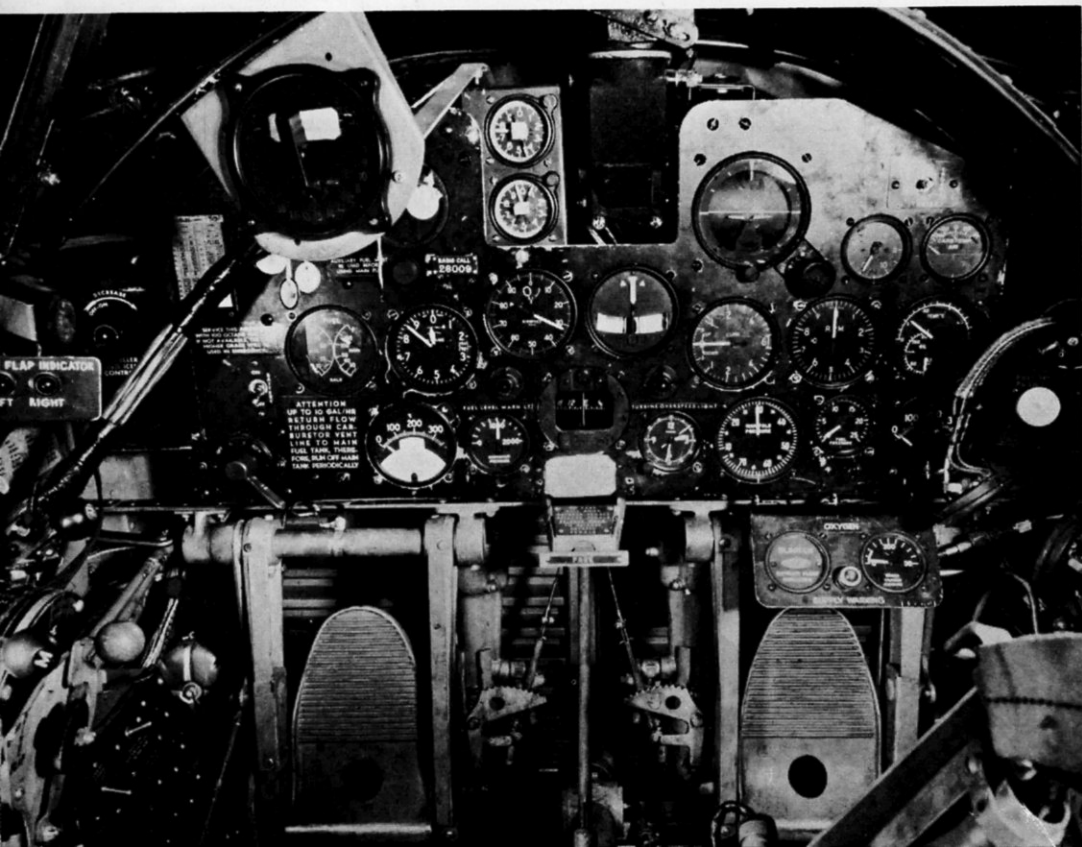


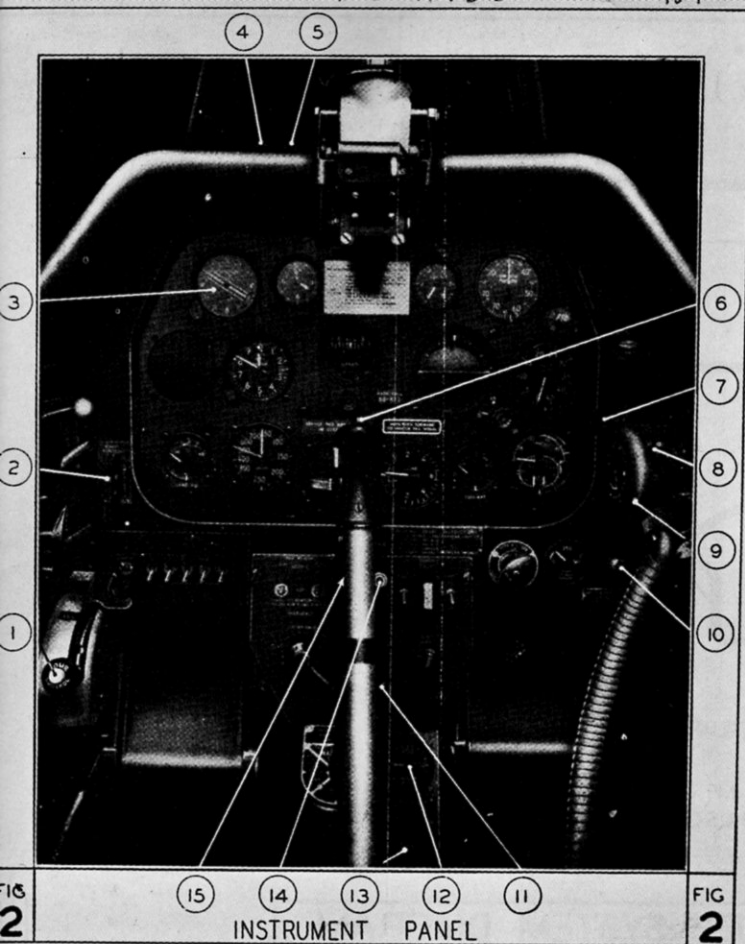
Republic P-47D-2 as T9 + FK of 'Beutezirkus Rosarius'

Flugkapitän Th. Rosarius coll.

Republic P-47D-5 cockpit instrumentation and controls

via Roger Freeman





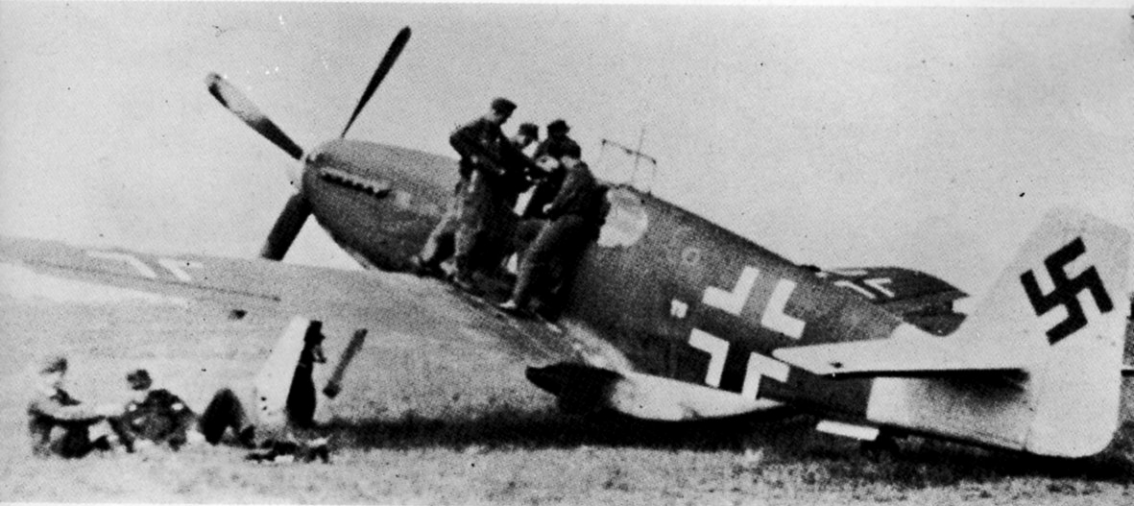
North American P-51B
Mustang cockpit
instrumentation and
controls
Pilot's Notes/Crown Copyright

Key

1. Bomb control handle
2. Boost override (inoperative)
3. R.I. compass
4. Undercarriage warning light test button
5. Undercarriage warning light
6. Bomb release button
7. Oxygen EMERGENCY control
8. Oxygen AUTOMIX control
9. Oxygen demand regulator
10. Oxygen pressure warning light
11. Fluorescent lights rheostat
12. Hydraulic pressure gauge
13. Undercarriage emergency knob
14. Supercharger gear-change warning light
15. Supercharger gear-change switch

North American P-51B Mustang of 'Beutezirkus Rosarius'

Flugkapitän Th. Rosarius coll.



Three pages from the author's log book recording the many different types of aircraft he flew during a few weeks in June-July 1944, including several first flights on captured aircraft

Hans-Werner Lerche coll.

Am. Nr. Flugzeug	Tag	Flugdauer	Abflugs-Ort	Zeit	Landungs-Ort	Flugzeug	Aufgabe *)
1	2.6.	1' 33	Rom. H. Horio	4 50	6 23	Pracenza	Handelshiff
2	"	1' 19	Tramer	14 50	10 50	Wien	"
3	3.6.	1' 30	Wien	7 53	11 23	Rafler	"
4	"	43	Rafler	8 11	9 02	Pracenza	Se 101
5	"	45	Pracenza	10 20	11 05	Rafler	"
6	"	1' 49	Rafler	17 19	19 00	Wien	In 108
7	"	48	Rafler	21 53	22 00	Canberra	"
8	7.6.	56	Canberra	5 10	6 15	Wien	Wien
9	"	1' 34	Wien	8 26	9 00	Rafler	"
10	8.6.	15	Rafler	15 00	15 55	"	In 108
11	10.6.	44	"	12 52	13 36	Pracenza	Se 101
12	11.6.	11	Rafler	13 30	13 48	Wien	B 12
13	"	33	"	15 12	16 20	Handelshiff	"
14	"	13	"	20 30	20 03	Rafler	Wien
15	10.6.	49	Pracenza	14 45	15 30	Canberra	Canberra
16	12.6.	9	Rafler	8 00	10 00	Wien	"
17	13.6.	1' 22	Wien	11 00	12 40	"	H = 11 500 m
18	"	9	"	19 01	19 00	Rafler	B 12
19	14.6.	1' 32	Rafler	6 45	8 22	Pracenza	Se 101
20	"	1' 45	Pracenza	13 10	14 00	Rafler	"
21	"	28	Rafler	19 12	19 50	Wien	Se 101

*) Angabe ob: Einflugschlag, Startzeit, Startort, Landungszeit, Landungs-Ort

Am. Nr. Flugzeug	Tag	Flugdauer	Abflugs-Ort	Zeit	Landungs-Ort	Flugzeug	Aufgabe *)
22	14.6.	26	Wien	17 10	21 15	Rafler	In 108
23	15.6.	31	Rafler	17 10	20 00	"	In 108
24	15.6.	8	Wien	17 10	18 15	Rafler	Wien
25	"	4	"	17 10	18 15	"	Wien
26	16.6.	1' 42	Rafler	17 10	18 15	"	B 12
27	17.6.	1' 09	"	17 10	18 15	"	Handelshiff
28	"	23	"	17 10	18 15	"	Wien
29	18.6.	1' 51	"	17 10	18 15	"	Wien
30	"	1' 18	"	17 10	18 15	"	Handelshiff
31	19.6.	23	"	17 10	18 15	"	Wien
32	20.6.	32	"	17 10	18 15	"	Wien
33	21.6.	10	Rafler	17 10	18 15	"	B 12
34	"	1' 39	"	17 10	18 15	"	Wien
35	22.6.	23	Rafler	17 10	18 15	"	Wien
36	"	1' 16	"	17 10	18 15	"	Handelshiff
37	23.6.	25	"	17 10	18 15	"	Wien

Chemisches Abflugs-Ort: Wien
Landungs-Ort: Wien
Flugzeug: Rafler
Aufgabe: B 12

Am. Nr. Flugzeug	Tag	Flugdauer	Abflugs-Ort	Zeit	Landungs-Ort	Flugzeug	Aufgabe *)
38	24.6.	19	Rafler	17 10	18 15	"	Wien
39	25.6.	23	"	17 10	18 15	"	Wien
40	"	50	Pracenza	17 10	18 15	"	Wien
41	26.6.	1' 05	Rafler	17 10	18 15	"	Wien
42	"	50	Pracenza	17 10	18 15	"	Wien
43	27.6.	1' 12	Rafler	17 10	18 15	"	Wien
44	28.6.	1' 30	"	17 10	18 15	"	Wien
45	29.6.	1' 34	"	17 10	18 15	"	Wien

Handelshiff
B 12
Wien

*) Angabe ob: Einflugschlag, Startzeit, Startort, Landungszeit, Landungs-Ort

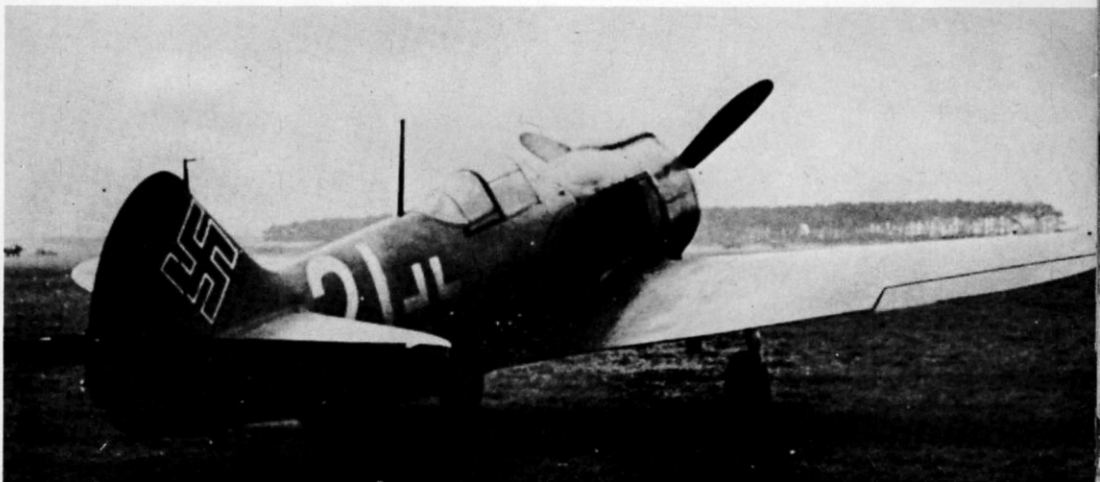
Fokker CVE. Flying an aircraft of this type in March 1944 provided a complete contrast to author's almost daily test-flights in modern high-speed machines. The aircraft shown here coded 3W + OD served with the Estonian-manned NSGr.11 on the Eastern Front

William Green coll.



Lavochkin La-5FN in Luftwaffe markings. A captured fighter of this type was first flown by the author in September 1944

William Green coll.





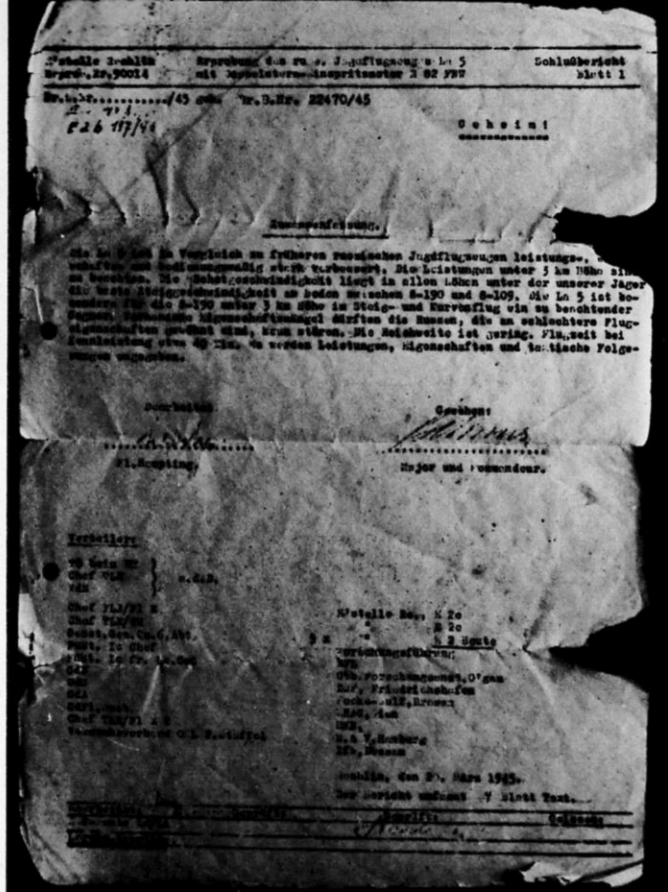
The author in autumn 1944
Hans-Werner Lerche coll.

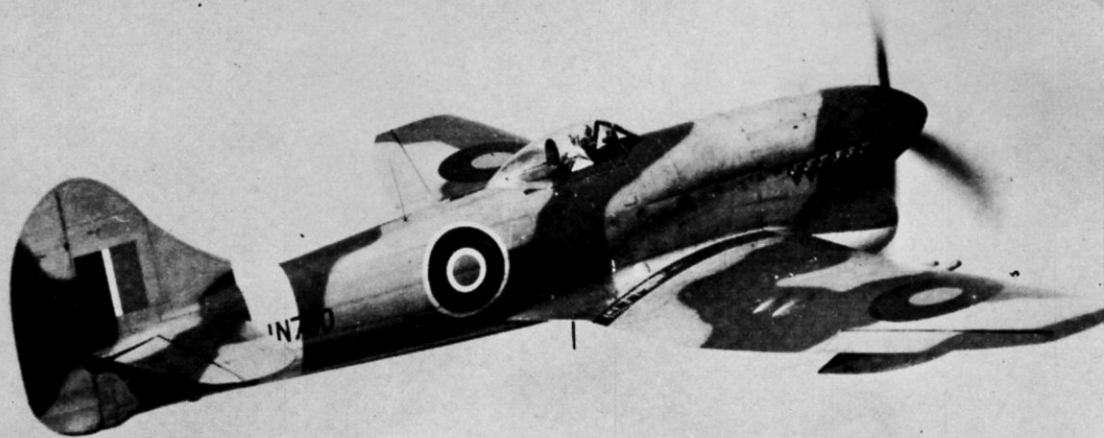
First page of author's final test report on the La-5FN prepared on 20 March 1945. Translation of the complete document is reproduced as Appendix 3 on p. 155

Hans-Werner Lerche coll.

A shot-down Hawker Typhoon Mk IB at a Luftwaffe collecting park for captured enemy aircraft in France in 1943. The author flew a reconditioned Typhoon fighter early in June 1944

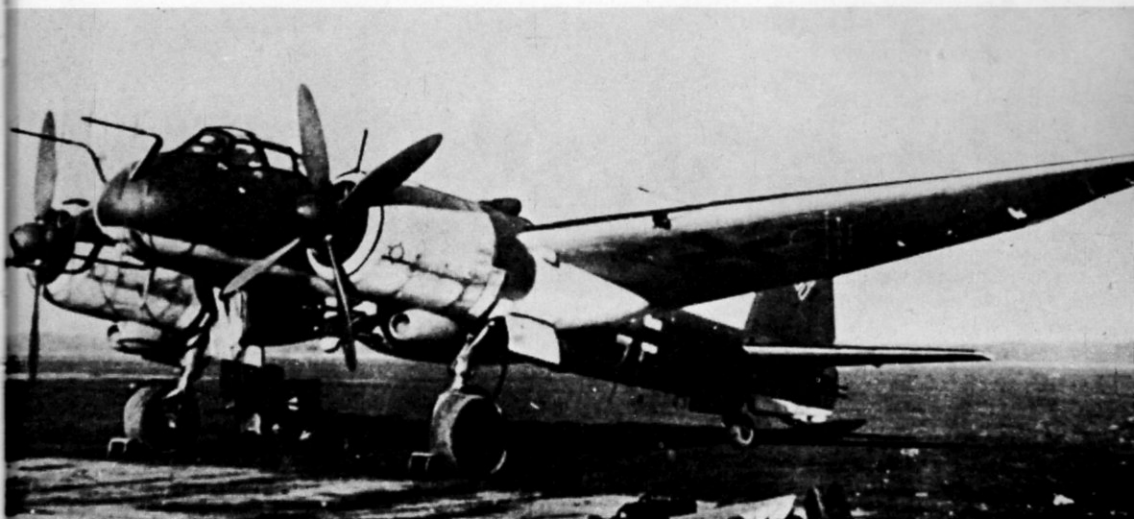
Bundesarchiv





Hawker Tempest Mk V. The author first flew a captured fighter of this type early in 1945

William Green coll.



Junkers Ju 388J night fighter prototype

Hanfried Schliephake coll.

Ju 388L-1 long-range reconnaissance version





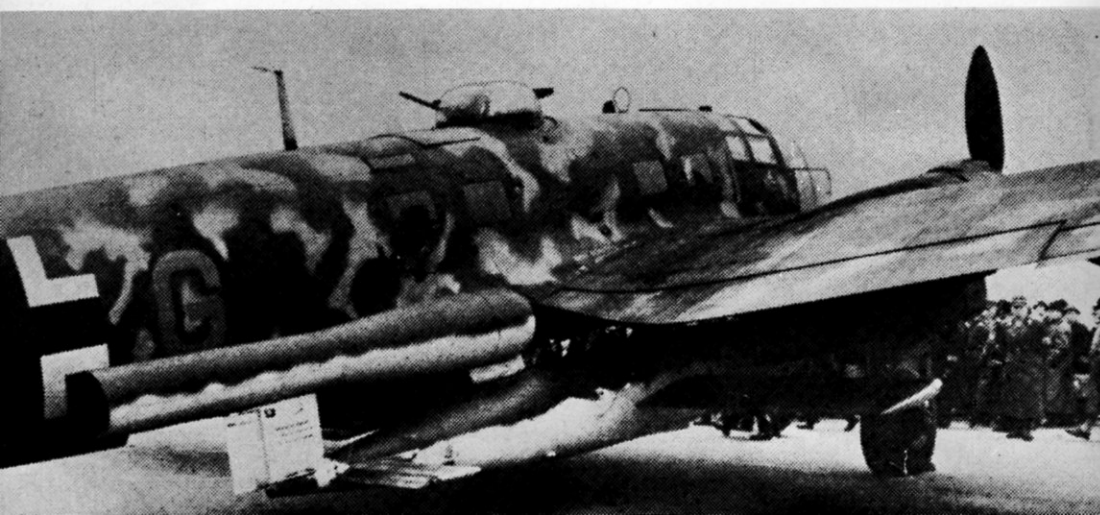
Kalkert Ka 430 cargo glider was a great improvement on the Go 242 but arrived too late and only a small number were completed
Hanfried Schliephake coll.

Yakovlev Yak-3 fighter of the French 'Normandie-Niemen' regiment that fought as part of the Soviet Air Force on the Eastern Front. The author was the first Luftwaffe test-pilot to fly a captured Yak-3 early in January 1945

William Green coll.



Heinkel He 111H-22 with an attached Fi 103 (V-1). The author participated in the early air-launching trials with piloted Fi 103s flying the carrier He 111



Flugbefehl Tag der Ausstellung: 16.4.45 Tag der Durchführung: 16.4.45 Befehlendes Dienst: 1890	
Zweck des Fluges: <u>Überflug</u>	
1. Pilot: <u>Fl. Hauptmann Hans-Werner Lerche</u> Kommandant 2. Pilot: <u>Fl. Hauptmann</u>	
Flugzeug: <u>Do 335</u> / <u>VERBODEN VOOR</u>	
Flugweg: <u>Rechlin - Oberpfaffenhofen</u>	
Besatzung: <u>Andere Insassen oder Lasten</u>	
1. Name: <u>Fl. Hauptmann Lerche</u> 2. Name: <u>Fl. Hauptmann</u> 3. Name: <u>Fl. Hauptmann</u> 4. Name: <u>Fl. Hauptmann</u> 5. Name: <u>Fl. Hauptmann</u>	
Der Flug ist genehmigt: <u>Ja</u> Unterschrift: <u>Hans-Werner Lerche</u> Datum: <u>16.4.45</u>	
Für Vermerk: <u>Ja</u> Unterschrift: <u>Hans-Werner Lerche</u> Datum: <u>16.4.45</u>	

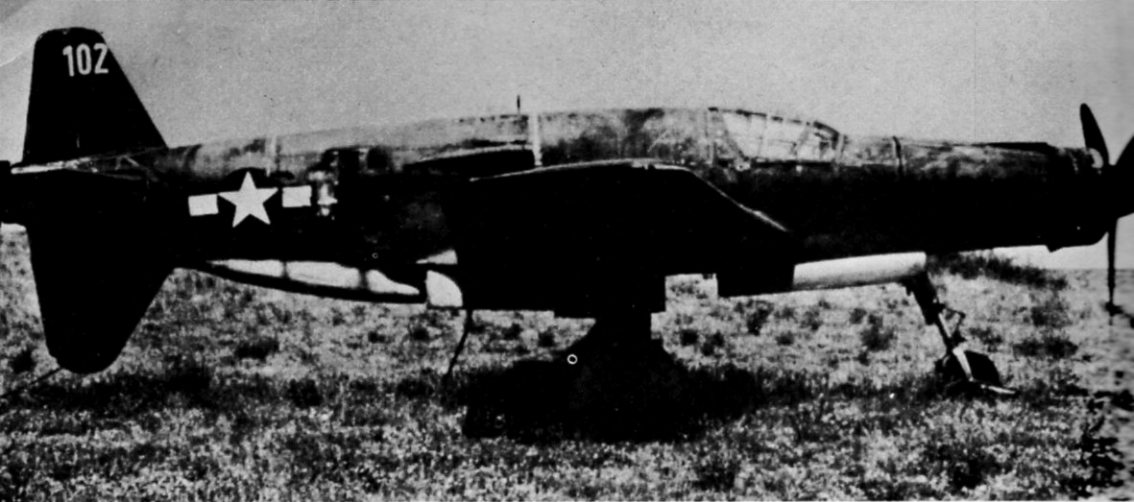


The author in a British POW camp at Thamsweg in Austria
Hans-Werner Lerche coll.

Author's flight order dated 16-April 1945 authorizing his ferry flight with the Dornier Do 335 VG + PH from Rechlin to Oberpfaffenhofen
Hans-Werner Lerche coll.

The author with his wife Gertraud shortly after their marriage in 1946. They first met beside the captured Liberator CL + XC in December 1944
Hans-werner Lerche coll.





Dornier Do 335 Werk-Nr. 102 in American markings. This was the aircraft in which the author made his last flight before the end of World War II
Dornier archives



Do 335 VG + PH after its return from the USA and restoration by Dornier specialists in 1975

Dornier archives

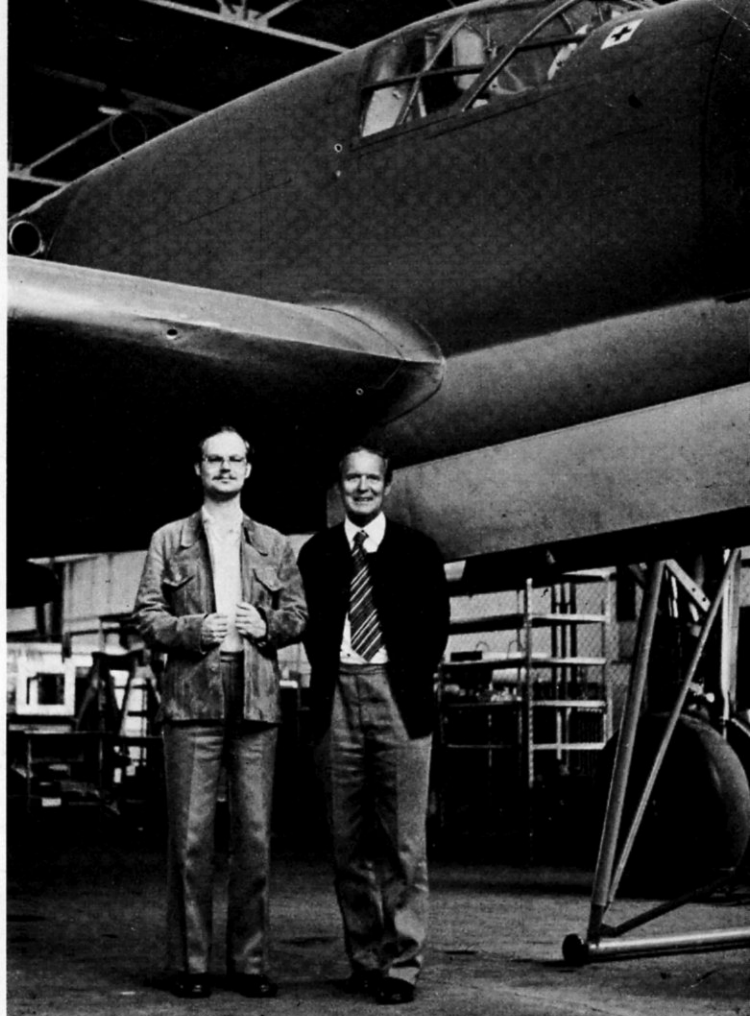
Two famous test pilots meet again: Hans Dieterle, who established a world air speed record with the He 100 in 1939 and later carried out the initial flight tests with the Do 335, in the cockpit of the restored VG + PH, with the author standing on the wing beside him

Hanfried Schliephake coll.

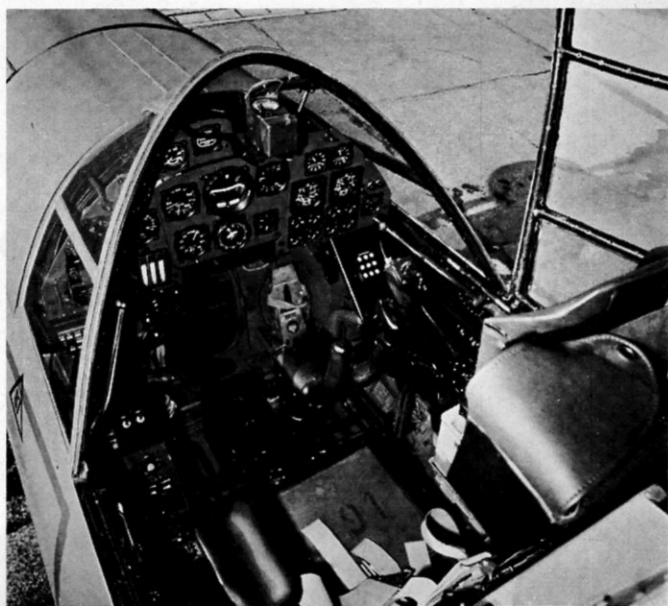


The author with his son
Hans-Ulrich in front of the
restored Do 335 VG + PH thirty
years after his last flight with the
aircraft

Hans-Werner Lerche coll.



Pilot's cockpit of the Do 335
VG + PH. Note the very neat and
compact layout and the
ejector seat *Dornier archives*

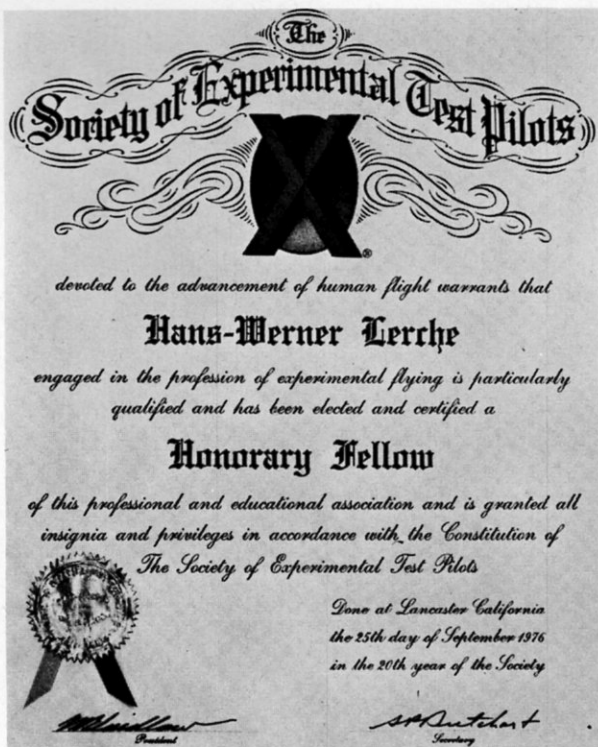


The document confirming author's election as a Honorary Fellow of the American Society of Experimental Test Pilots (SETP)

Hans-Werner Lerche coll.

The American astronaut Dave Scott (2nd from right) who drove the first 'Moon buggy', with the Lerche family at the Beverly Hilton, Los Angeles, during the SETP symposium of 1976 when the author was elected an Honorary Fellow of the American Society of Experimental Test Pilots

Jim Collison



that with its 2400 hp Napier Sabre engine the Tempest was even faster than the earlier P-51B Mustang that I had flown. All other points apart, only German series-production fighters fitted with the new DB 603 and Jumo 213 engines could keep up with this performance.

As things were, only the Messerschmitt Me 262 jet fighter was actually superior to the enemy piston-engined fighters with regard to maximum and climbing speeds. But it was at a great disadvantage in numbers, however, and sometimes perhaps also wrongly used tactically. Thus, it was reported again and again that a Me 262 had been shot down by a Mustang, Thunderbolt or Tempest despite its superior maximum speed, and I have often seen myself how Me 262 pilots let themselves in for dog-fights with enemy fighters which put them at a distinct disadvantage. Apart from unavoidable surprise attacks at higher altitudes and especially during the landing approach, when the jet fighter was hanging in the air clumsily with its undercarriage and flaps down, it was dog-fighting in particular that the Me 262 had to avoid at all costs. It is a fact that aircraft with high wing loading need high minimum speed in a turn (and thus greater radius) to hold themselves in the air, and that in a tight turn the load to be carried by the wings will be increased to three or four times the normal gross weight due to the centrifugal force. Therefore in this flight condition the airflow hits the wing at rather higher angles of attack than just before landing. This creates vastly increased drag, to overcome which the aircraft needs more thrust from its power plants – and this is exactly what the jet engines could not provide in low-speed flight. This characteristic of the Me 262 was clearly apparent during the take-off as well: if the throttles were fully opened, the acceleration was very much less than with a piston-engined fighter, and it took some blind trust to rely on an increase in the jet thrust with increasing speed. The jet fighters therefore took a lot of time to accelerate again after coming out of a tight curve. The Thunderbolt may be considered tactically similar compared with its piston-engined adversaries: with its engine boosted for better altitude performance by an exhaust-driven turbo-supercharger, its dynamic strength in a dive and high all-up weight made the Thunderbolt excellently suited for diving attacks from altitudes higher than the opposing aircraft. It had to avoid low-level flying and dog-fighting, and could not afford to lose speed if it did not want to 'get a licking'. I realize, of course, that all this is easier said than done. After all, the numerical superiority of enemy aircraft at that time was overwhelming, so that even if our aircraft were equal in performance there was always some enemy fighter in a better firing position. This was one of the reasons why indications of certain peculiarities and performance data on captured aircraft, such as for instance the altitudes when their engine supercharger stages came into operation were important. It was bitter of course that the enemy fighters were superior in performance at exactly those altitudes in which their massed bomber formations were usually flying their raids under an overwhelming escort protection.

But let us get back to the Tempest. I had just throttled back the emergency power which had been required to determine the maximum speed points, leaving only one that would reveal the best altitude for the low-level supercharger stage. As I was about to re-open the throttle to the full, I thought it odd how easily the throttle lever moved forward, and there was no reaction from the engine. Moving

the throttle lever back and forth several times did not help, although the rod linkage seemed all right as far as I could see from the pilot's seat. Even though I was used to irregularities in this respect, it was an entirely new feeling: for the first time in my pilot's life I had to think about how to get down again! And it was no joking matter: the situation was in fact highly unpleasant.

To my relief I soon found that the engine power was at least sufficient to keep the altitude. Contrary to our own engines the British units did not go on full power if there was a defect in the throttle linkage system, so there was some time left for me to contemplate what could be done. There was no reason for an immediate emergency or wheels-up landing. I wanted to get this fine machine down in one piece, of course, but on the other hand I was not keen on breaking my own neck in doing so either. There were two possibilities to stop the engine for the landing: to cut off the fuel feed, or to turn off the ignition. It was also clear that the undercarriage and flaps had to be extended while the engine was still running. Weighing up the pros and cons of the situation I decided against the first solution because for an accurate landing approach I should first have to try out how long the engine continued running on the fuel remaining in the pipe system after the fuel cock had been closed. Restarting the engine in case of an emergency by reopening the fuel cock would be critical and, above all, might cause a fire. It would therefore have been impossible to extend the glide while approaching to land, not to mention going round again for another try. For these reasons I chose the second possibility, although I fully realised that this too could cause trouble. To play safe, I wanted to make a brief preliminary 'ignition off' trial to see whether the engine started to run idle without delay or whether self-ignition or some other dastardly trick would cause something unforeseen to happen. I only hoped the engine mounting would stand the experiment and not part company with the airframe when I restarted the engine!

If at that time I had known of the experience I made with my car some twenty years later, I don't think I would have run the risk. We were travelling in my good old Borgward Isabella de Luxe with a caravan trailer attached, when my little son asked me what would happen if one turned off the ignition while on the move. I replied – perhaps recalling the good-natured behaviour of the Napier Sabre engine so many years ago – that just nothing would happen, and then turned it off. Of course, the car was not fitted with a steering wheel lock in those days. When I restarted the engine a few seconds later, there was an almighty bang: the unburnt petrol mixture had had a delayed ignition and torn the exhaust to pieces. For the rest of the journey home we made a noise like a tractor. My son used to laugh about this for many years afterwards, and often reminded me of this incident – especially while studying for his driving licence when he would cut short many a piece of good advice on my part by pointing out my 'great success' in the past.

But without the burden of my later knowledge I turned off the ignition in the Tempest for a second or two and waited for developments. The Sabre stopped at once and then re-started with a vigorous jerk – the engine mounting frame had apparently withstood the shock. So far, so good. The next thing to do was to extend the undercarriage and flaps with the engine running. One final precaution had to be taken: since the engine power would probably be insufficient to keep the Tempest in horizontal flight for long, I had to approach the field at the right

altitude and from the right direction. The best way of doing this was to approach Rechlin in a diagonal way so that in an emergency I could use the small Roggentin airfield in front of it as well; it was separated from the main Rechlin field only by a railway level crossing. This approach route had proved useful once before when I had to land a B-17 Flying Fortress with overload and on only three engines after an engine fire.

I wanted to start the last part of my landing approach with a stopped engine from between 600-900 ft and expected that, due to the drag of the windmilling propeller, the landing glide angle would turn out rather steep. So what! Lower the undercarriage and flaps and turn off ignition! But what happened next exceeded my boldest expectations: the large, four-bladed windmilling propeller of about 14 ft diameter which turned the 24-cylinder engine, braked the airstream like a parachute – particularly around the wing centre section which provided most of the lift – so that this landing approach was more like a controlled crash. This impression was confirmed to me later by alarmed spectators.

But that was not all: I also needed a good deal of excess speed to be able to level off this powerful aircraft from its extremely steep glide to avoid boring into the ground. The excessive elevator movements required in the airstream that was braked by the windmilling propeller made this dangerous situation quite clear to me. There was now only one way to gain a bit more speed, and I pushed the control column forward some more. The steep glide angle was just enough to get me over the boundary fence of the Roggentin airfield, and a full elevator movement was then necessary to level off before touch-down. Although this was anything but a perfect three-point landing, after a few jumps the Tempest taxied to a stop on its wide undercarriage and with a stationary propeller.

It was then that the colleagues watching this performance realized that an engine failure had caused this landing like a 'piano dropped from the fourth floor', as we used to say.

It had been a tough piece of work right to the end!

My last flight with the Do 335

(from the author's article in Flugrevue magazine, May 1976, on the occasion of completing the restoration of the Do 335 returned from the USA)

It was mid-April, 1945, in the Luftwaffe Test Centre at Rechlin in Mecklenburg. Fewer and fewer German aircraft were to be seen in the skies and it was obvious that the war was nearing its end. However, despite the fuel shortage and everything else I still had to complete a series of most urgent test flights with three captured aircraft, the British Hawker Tempest and the Soviet Lavochkin La-5FN and Yakovlev Yak-3 fighters.

We also had instructions to ferry available German test aircraft from Rechlin to their manufacturers if at all possible and this, together with the speed of the Do 335, hastened my decision to ferry one of the two Do 335s still at Rechlin to Oberpfaffenhofen near Munich. I also had another, and more personal reason for wanting to make this flight: my future wife lived in the area.

The necessary preparations were soon completed, but as I was taxiing to the take-off point one of the tyres had a puncture and I had to abandon my first attempt. The cause was probably one of the numerous bomb splinters lying around on the airfield. As it was impossible to repair the tyre at that time I had to leave the Do 335 VG+PI (Wk.Nr. 103) to her fate and prepare the last remaining Do 335, VG+PH (Wk.Nr. 102) for the ferry flight.

Because of the continuous air raids I was only able to take off in the evening of 20 April. The night before I had heard on Radio London that the Soviet encirclement of Berlin from the east and north was progressing rapidly, and I prepared my flight plan accordingly. I intended to by-pass Berlin by flying south-west of the city, and to keep as low as possible to avoid being set on by enemy fighters or anti-aircraft guns. I was of course well aware that navigation under these conditions would not be easy with such a fast aircraft as the Do 335 which clocked around 550 km/h (342 mph) throttled back. But then, there were such things as railways and motorways which would help me in my flight preparations. All this was vital because my aircraft did not carry any ammunition and, in any case, I had no experience in aerial gunnery; in addition, I was not familiar with the radio and navigation systems of the Do 335. To date, I had only made blind approach flights with the help of a radio operator, but this time I was flying a single-seater. Apart from that, it was questionable if the ground organisation was still intact and if, by using radio, one was not simply attracting the attention of enemy fighters. In short: I was going to fly low and fast and orientate myself like in the old days. I stowed my few personal belongings over the bomb-bay doors, and was ready to go.

The take-off went well, and in short sequence I had completed all the necessary operations: retracted the undercarriage, throttled back the engines, set the

propeller pitch, retracted the flaps and trimmed the machine for level flight. Both engines were running smoothly, and all the instruments were indicating the correct values; I was on my way. The first lakes and woods around Rechlin, well known to me from countless previous flights, including gliding, offered reliable orientation points – in any case, more accurate than the compass reading which, to my surprise, indicated a different direction to the one I was actually flying. The reason for this deviation became clear to me only later on. Normally, the master compass in an aircraft is situated in the rear fuselage, that is, as far as possible from the engines which affect their normal functioning. But the Do 335 was of tandem engine layout, with the second engine in the rear fuselage driving a pusher propeller via an extension shaft. For that reason the master compass had to be transferred to the port wing where, to the detriment of the pilot, it led a life of its own, being influenced by additional acceleration and thus defeating its own purpose. This wilful behaviour of the compass, as I heard much later, caused another Do 335 to land in enemy-occupied territory resulting in a long incarceration in a POW camp for the pilot.

I made quick progress. Soon I saw the Nauen radio towers appearing 'above' me to port; I was on course. Berlin was also easily distinguishable. Only then did I begin to become aware of approaching darkness; the take-off from Rechlin had been considerably delayed.

As my Do 335 was not fully tanked up, to be on the safe side – and test the installation – I switched on the fuel transfer system which was supposed to pump fuel from the wing tanks into the main fuselage tank behind me. The 3600 horses of both engines drank up at least 900 litres (198 Imp.gal) of fuel in an hour! After a short while however, I realised that the pumps were not working. This fact, and the rapidly approaching dusk made it clear to me that it would be impossible to reach Lager-Lechfield, south of Augsburg, in one bound. The K.d.E. (Commander of Test Establishments) was there at the time and I had to deliver some important documents to him. On the spur of the moment, I decided to fly in the direction of Prague where I was familiar with the large Rusin (Rusyne) airfield, having made a series of instructional flights with a captured B-17 Flying Fortress for the Luftwaffe fighter formations based there.

The district of Beelitz-Heilstätten south-west of Berlin whisked by underneath me, and already I was flying along the southern *Autobahn* ring road. On no account could I afford to miss the turning to Dresden – and there it was. Still flying low level, I suddenly spotted some figures scattering in all directions as my Do 335 thundered over them at some 150 m/s (490 ft/sec). They were easily recognisable as Russians, with their vehicles. At this speed and so close to the ground an aircraft is no easy target, even for light AA guns, but I asked myself what's the point of having a fast aircraft if not for this, and pushed the throttle lever forward some more. Now I had a bit more time; the *Autobahn* was clearly visible, only the night was drawing on fast.

Despite the approaching darkness I decided not to switch on my position lights – why invite unnecessary attention? Shortly afterwards I rushed past Dresden, left the *Autobahn*, and very soon the lights of Prague appeared before me. I quickly found the airfield, which was already lit up for night operations. Out with the undercarriage, and down she goes! But I had spoken too soon: the wheels would

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ANYWHERE

not budge. Thank God there was such a thing as an emergency undercarriage lowering system! It should really be second nature to a pilot to know the service instructions of his aircraft by heart. To my knowledge, the Ju 88 pilots were the first to be instructed so thoroughly that they could operate all control levers and switches blindfold. Of course, it is more difficult if one is flying different, and often completely unknown aircraft daily, as I did while testing captured aircraft types. I imposed this precaution on myself after circling an airfield 13 times on my first flight with the Airacobra, trying desperately to find out how to operate the emergency undercarriage release system on this nose-wheel aircraft. Aircraft with such undercarriages are particularly tricky in this respect, especially as regards the nose-wheel itself: if the main wheels are locked down but the nosewheel leg is not, the consequences can be more unpleasant than with a 'normal' belly landing. And a forced landing with the Do 335 had its own tricky side: the ventral fin would have tilted the machine forward and made it 'plough up' the field with the front engine. At a touch-down speed of around 200 km/h (124 mph) that would have given very poor chances of survival, and for that reason the ventral fin of the Do 335 could be blown off by explosive charges in an emergency. Nevertheless I was glad that I did not have to try out these refinements, including the ejector seat of my Do 335, because in the meantime I had felt around and found the handle for the pneumatic emergency undercarriage lowering system. The typical slight thumps caused by locking down of the undercarriage in flight, and the three small green lights on the instrument panel indicated that all was clear for a normal landing on the long, well-lit runway. It was already 2020 hrs, and quite dark.

My next thoughts, after a short rest, were of refuelling as I wanted to take off again first thing the next morning. However, despite my urgent flight orders I was told that the coveted high-octane fuel simply was not available. To cut a long story short, after a bit of a palaver a few packets of cigarettes changed hands and the costly juice began to flow into the tanks of my Do 335. Soon they were full 'to the collar'; I had no intention of relying once more on the electrically-operated fuel transfer system. The only thing that worried me was the reluctant undercarriage, but finally I managed to interest a mechanic from the workshop hangar in my problem, and I am grateful for his kind help to this day.

After I had a quick bite, we met again in the hangar, jacked up the Do 335 and retracted the undercarriage. An easily rectified slight defect had been responsible for the trouble. Of course, it was also possible that the aircraft had simply not been properly serviced during these last few weeks of the war. In any case, my Do 335 was soon ready to go again.

The weather experts did not hold out much hope for my flight the next morning, though, and so I went to bed. True enough, early next day it was *qbi* (bad weather regulations in force); in fact low clouds and pouring rain made any kind of flying impossible - 'even the sparrows had to walk', as airmen used to say. There was nothing for it, and I had to stay where I was. After all, I had to be able to find my way through a valley in the Bavarian forest! At this time trouble was already brewing in Prague, and troops were pulling out through the town. I had to leave as soon as I could. The next day was just as bad. Even though the forecast for the following day was still bad, I decided to take the risk and carry on. At least according to the meteorologists the weather was supposed to be improving over

southern Germany.

I rose at 0400 hrs in order to make use of the first light. It was still raining, but the clouds were lifting. I will never forget the date: it was 23 April, 1945. All preparations went according to plan, and the take-off was no problem. I flew a little higher at first to get my bearings in this strange area; I could not rely on the compass. Who would want to be after my neck at this unearthly hour in this dripping grey weather? ✕

I put my trust in Fate and my own intuition and actually found a valley to fly along in the Bavarian forests – to this day I don't know which one – and began to think I already had the worst part of the journey behind me. Even the weather began to improve.

Suddenly, tracer whipped past the Do 335 from behind. I still have no idea if this welcome came from the ground or from some enemy fighter, but it made me instinctively go into a violent evasive action, ram the throttles forward and plunge down almost to the tree-top level.

When I had recovered from the shock, I slowed down a little and began to check the instruments for any tell-tale signs of damage, especially the temperature of the rear engine: if it had been hit in the oil or coolant system it would have seized in about 30 seconds. With both engines intact I had nothing to fear: no enemy fighter could overtake me. The fiery greeting had probably come from some American ground troops who had already advanced past Nuremberg. In the meantime I set my course due south, crossed the Danube, and helped by the appearance of the Alp panorama in the gradually improving visibility was able to get my bearings even before reaching Munich. I flew past the Pasing railway station at telegraph pole height and turned westwards. High above me I noticed the first contrails of my 'comrades from the other side'; I had to keep an eye on them, just in case.

The railway has always been an ideal navigational help to pilots, and if I followed the old airman's rule of 'left wheel on the right-hand track' I only had to watch out that the points were set correctly beyond the Pasing station. I avoided Fürstenfeldbruck airfield: I did not want to run into any enemy fighters, and our own light Flak could also have taken a shot at me. It was now quite easy to find Lager-Lechfeld airfield. After a tight circuit around the field, the undercarriage came down on the first try, and I was back on the ground once more. I taxied to the flight control building where they told me that there was yet another air raid alarm on, and I had practically no hope of seeing my Do 335 in one piece again afterwards. It was too late to try and reach another airfield – we could already hear and see the approaching bombers and fighter-bombers. There was no time to spare, and I took cover in a ditch while all around me bombs and shells wreaked havoc. In all, 16 well-camouflaged aircraft were destroyed there that day, and a nearby ammunition depot (Schwabstadel) literally went up in the air before our eyes, together with a small wood around it. But unbelievable as it may sound, my Do 335 standing out there as on display remained undamaged! They probably thought it was a dummy; it looked unusual enough.

I completed my mission as well as I could under the circumstances, fetched my new flight orders directing me south, and climbed into my aircraft towards the evening after the air raids had abated. I was on the last lap of my journey to Oberpfaffenhofen, the Dornier works airfield, in my unscathed Do 335. And this

time I left the undercarriage down – one never knows!

The take-off, which proved to be my last, went well, and a few minutes later I landed my valuable aircraft intact at Oberpfaffenhofen and parked it nicely in front of the main building, to the surprise of the Dornier staff who could hardly believe their eyes.

That I should see this unique aircraft – the same Do 335 VG+PH – 30 years later at the Dornier works, on the same airfield, where it had been renovated for the German Museum at Munich, was something I had never even dreamed of. I have long since forgiven the Do 335 the slight teething troubles all new aircraft have, and which rather spiced my last flight. After all, the Do 335 was an unusually powerful aircraft with exceptional flying qualities, and an aeroplane that bestowed on me the pure pleasure of flying, a feeling which I shall not forget as long as I live.

Epilogue

The foregoing account of my ferrying what was probably the fastest series-production piston-engined fighter in the world, the Dornier Do 335, from Rechlin in Mecklenburg to Oberpfaffenhofen in Bavaria, was written many years afterwards. It is one of my many flights that I shall never forget.

Unbeknown to me at the time, it was to be my last flight and also marked the end of my career as an experimental test pilot.

In the days that followed I withdrew further south, towards the Alps, in order to avoid being taken prisoner too soon. On the other hand, I also did not care to be snatched by my own countrymen who still not had enough of fighting. The war ended for me in the Austrian village of Thamsweg. I was not spared captivity, and it was a time of privations and hardship. What counted, however, was that I had survived. My mother and my three sisters with their five children had settled in western Germany, and while their husbands were still in captivity I was able to help them soon after I was released. Then I met my girl from Oberpfaffenhofen again in Augsburg, and we got married in March, 1946. The acquaintance we had made beside a captured Liberator bomber had led to 'Bavarian-Prussian' marriage.

Thirty years later I unexpectedly got into contact with flying again. A Dornier Do 335 arrived back from the USA where it had been stored at the Smithsonian Institution after some postwar tests. It came as a surprise indeed to learn that this particular aircraft was the same Do 335 VG+PH that I had ferried to Oberpfaffenhofen two weeks before the end of World War II! It was my son Hans-Ulrich, a lawyer and a keen amateur aircraft model builder who had discovered the original flight order among my old papers and brought my attention to this amazing fact.

This discovery got me into contact again with aviation circles, and, not least, with the Society of Experimental Test Pilots (SETP), an international association of test pilots. Having flown 125 different aircraft types of various kinds and sizes, including 'first flights', so to speak, on captured aircraft without any pilot's notes or operational manuals (apart from a genuine first flight with the twin-engined *Akaflieg* Berlin B 9), a late, but all the more appreciated honour was conferred on me: the SETP appointed me its 25th Honorary Fellow on the occasion of a banquet held at the Beverly Hilton, USA, in 1976. In my address of thanks I took the opportunity to point out that I probably owed my life to a large extent to the fine quality of captured aircraft which, despite all the problems encountered, had always brought me back to earth safe and sound.

Appendix 1

Aircraft types flown by the author (with known identity markings)

(a) *Six-engined*

Junkers Ju 390V1 GH+UK
Messerschmitt Me 323 Gigant
RF+XG, DT+DT, RD+QE

(b) *Four-engined*

Arado Ar 232B 'Tatzelwurm'
Heinkel He 177A Greif VD+US,
DM+QH, GI+BN, VF+QD
Junkers Ju 290A CE+YZ, SB+QG,
SB+QB
Boeing B-17F & G Flying Fortress
DL+XC
Consolidated B-24D, G & H Liberator
I-RAIN (D), CL+XC, CL+XZ (G)
Avro Lancaster
Savoia-Marchetti SM.95

(c) *Three-engined*

Junkers Ju 52/3m NM+EX,
DD+BD, D-AUPU (special)
Junkers Ju 252 DF+BR, DF+BP
Junkers Ju 352 Herkules
Cant 1007
Caproni Ca 133
Caproni Ca 148
Savoia-Marchetti SM.79 Sparviero

(d) *Twin-engined*

Arado Ar 232A VD+YD, TC+EC,
TC+ED
Akaflieg Berlin B 9 (8-341) D-ECAV
Dornier Do 17E, F & Z GM+AA,
SA+BG, SA+GH, SA+BJ, SA+UO
Dornier Do 23 SA+FL
Dornier Do 215B

Dornier Do 217E & N KE+JA,
SP+WI, CF+PO

Dornier Do 335A Pfeil VG+PH

Focke-Wulf FW 58 Weihe

Focke-Wulf FW 189 Eule

Gotha Go 244 VC+FG, VC+OJ,
VC+OS, TE+UC, RH+GS, RJ+II,
RJ+IL

Heinkel He 111 KI+XB, RD+ZQ,
D-ADV L

Heinkel He 219A Uhu DH+PV

Henschel Hs 128V1 D-ARHD

Hs 128V2 D-APXN

Henschel Hs 129 KG+GM, KG+GI

Junkers Ju 86

Junkers Ju 86R CM+AH

Junkers Ju 88A GB+EU, SG+MB

Junkers Ju 88S-3

Junkers Ju 188 R cher DF+EW,
GB+NC

Junkers Ju 388 Stortebecker DW+YY

Messerschmitt Bf 110F & G TF+UX,
TF+UT

Messerschmitt Me 210A SJ+GG,
SJ+GH, SJ+GI, SJ+GL, SJ+GN,
SJ+GQ

Messerschmitt Me 262A

Siebel Fh 104A Hallore SK+ZB,
SG+GI

Siebel Si 204 SG+GI, KM+GB

Bristol Blenheim Mk IV 5+5

Cant 1018

Caproni Ca 313 CH+SA, 6+4

de Havilland DH.90 Dragonfly
RP+MY

Lockheed 18 Lodestar DE+KL

Lockheed Hudson

Martin B-26B Marauder

Savoia-Marchetti SM.82 Canguro

Savoia-Marchetti SM.91

Savoia-Marchetti SM.92

Vickers Wellington Mk IV 6+4

(e) *Single-engined*

Arado Ar 65
Arado Ar 66C D-IXOS, D-IKEX
Arado Ar 68
Arado Ar 96 GA+NL
Albatros L 101 D-ENEN
Blohm & Voss Ha 135 D-EKME
Blohm & Voss BV 141B NC+RG
Bücker Bü 131 Jungmann D-ETTI
Bücker Bü 181 Bestmann
Bücker Bü 182 Kornett
Fieseler Fi 156 Storch DF+KC, SI+GD
Fieseler Fi 253 Spatz D-ERNG
Fieseler Fi 256 NF+SU, KG+GM
Focke-Wulf FW 44 Stieglitz D-EBXU
Focke-Wulf FW 56 Stösser
Focke-Wulf FW 190 BG+KC
Gotha Go 145 D-IRIY
Heinkel He 45
Heinkel He 46 GC+AA
Heinkel He 51
Heinkel He 72 Kadett D-EQIF
Henschel Hs 123A
Henschel Hs 126B PL+NW
Junkers F 13 CB+EN
Junkers W 33
Junkers W 34
Junkers A50 Junior D-EMOT
Junkers Ju 87 BK+EE, BK+EH,
BM+EM, BK+EB
Klemm L 25
Klemm L 26
Klemm Kl 32 D-EHTE
Klemm Kl 35 D-EEKY
Messerschmitt M 27
Messerschmitt Bf 108 Taifun KB+IG
Messerschmitt Bf 108 109F-4
CF+BN, NE+MK, VQ+BN
Messerschmitt Bf 109G CC+PI,
BD+LF, NI+BW, BD+GF, BD+GX,
BD+GB, BD+GP, VJ+WB
Bell P-39 Airacobra GE+DV
Breda Ba 25
Fiat CR.42 Falco
Fiat G.55 Centauro
Fokker CVE
Hawker Typhoon Mk IB
Hawker Tempest Mk V
Lavochkin La-5FN
Macchi C.205V Veltro
Meridionali Ro 41
Morane 230 VK+SH
North American NA-57 Harvard
KR+IX

North American P-51B Mustang
Republic P-47D Thunderbolt
Supermarine Spitfire Mk V
Yakovlev Yak-3

(f) *Powered gliders*

Akaflieg Munich 'Motor-Merlin'

(g) *Military gliders*

DFS 230A 6+7
Gotha Go 242
Kalkert Ka 430

(h) *Civilian gliders and sailplanes*

Akaflieg Berlin B 5 high-speed design;
mid-wing layout
Akaflieg Berlin B 6 high-performance;
external aerofoil flaps
Akaflieg Berlin B 8 Olympia-class;
high-wing layout
Akaflieg Munich Mü 13 Olympia-class
Condor (Schleicher) high performance;
gull wings
ESG 29 *ab initio* training glider;
single-seater
Gildehof club design; two-seater
Goevier training two-seater
Grunau 8 training two-seater
Grunau Baby I, II and III training
single-seaters
Kranich (Schweyer) high-performance
two-seater
Meise (DFS) Olympia-class
Minimoa high-performance single-
seater
Poppenhausen training two-seater
Prüfling training single-seater
Rhönadler (Schleicher) high-performance
single-seater
Rhönbussard (Schleicher) high-
performance; suitable for aerobatics
Rhönsperber (Schweyer) high-
performance single-seater
Wolf training; suitable for aerobatics
Zögling training glider

Appendix 2

Principal characteristics of the aircraft mentioned in text (compiled by the Editor as a basic guide)

GERMAN

Designation	Function	Crew/ seats	Power plant/ T/O rating	Loaded weight	Max. speed/altitude	Climb	Service ceiling	Range	Span	Length	Wing area
Albatros L 101D	Sports, trainer	2	Argus As 8A 1 x 120 hp	1830 lb (830 kg)	106 mph/sea level (171 kmh)	3280 ft (1000 m) 7 min 0 sec	11,810 ft (3600 m)	578 mls (930 km)	41 ft 0 in (12.50 m)	27 ft 10½ in (8.50 m)	215.28 sq.ft (20.0 sq.m)
Arado Ar 65e	Fighter/ Trainer	1	BMW V17.3 1 x 750 hp	4255 lb (1930 kg)	186 mph/sea level (300 kmh)	(initial) 2086 ft/min (10.6 m/sec)	NA	NA	36 ft 9 in (11.20 m)	27 ft 6¼ in (8.40 m)	322.92 sq.ft (30.0 sq.m)
Arado Ar 66C	Trainer	2	Argus As 10C 1 x 240 hp	2932 lb (1330 kg)	130 mph/3280 ft (210 kmh/1000 m)	3280 ft (1000 m) 4 min 6 sec	14,765 ft (4500 m)	445 mls (716 km)	32 ft 9½ in (10.0 m)	27 ft 2½ in (8.30 m)	318.9 sq.ft (29.63 sq.m)
Arado Ar 68E-1	Fighter/ Trainer	1	Jumo 210Ea 1 x 680 hp	4433 lb (2020 kg)	208 mph/8690 ft (335 kmh/2650 m)	19,685 ft (6000 m) 10 min 0 sec	26,570 ft (8100 m)	310 mls (500 km)	36 ft 1 in (11.00 m)	31 ft 2 in (9.50 m)	292.85 sq.ft (27.3 sq.m)
Arado Ar 96B-5	Advanced trainer	2	Argus As 410MA 1 x 480 hp	3858 lb (1750 kg)	205 mph/9840 ft 330 kmh/3000 m)	6560 ft (2000 m) 4 min 18 sec	22,965 ft (7000 m)	615 mls (990 km)	36 ft 1 in (11.00 m)	29 ft 11 in (9.13 m)	184.07 sq.ft (17.1 sq.m)
Arado Ar 232A	Tactical transport	4	BMW 801MA 2 x 1600 hp	46,584 lb (21,130 kg)	210 mph/18,045 ft (338 kmh/5500 m)	NA	NA	621 mls (1000 km) max	104 ft 5 in (31.83 m)	77 ft 2 in (23.52 m)	NA
Dornier Do 17Z-2	Medium bomber	4	BMW-Branno 323P 2 x 1000 hp	18,983 lb (8590 kg) max	255 mph/13,120 ft (410 kmh/4000 m)	3280 ft (1000 m) 3 min 18 sec	26,900 ft (8200 m)	720 mls (1160 km)	59 ft 0½ in (18.00 m)	51 ft 9½ in (15.80 m)	592.02 sq.ft (55.0 sq.m)
Dornier Do 23G	Med. bomber/ Trainer	4	BMW VIIU 2 x 750 hp	20,280 lb (9200 kg) max	161 mph/3940 ft (260 kmh/1200 m)	3280 ft (1000 m) 4 min 0 sec	13,780 ft (4200 m)	840 mls (1350 km) max	84 ft 0 in (25.60 m)	61 ft 8 in (18.80 m)	1147.43 sq.ft (106.6 sq.m)
Dornier Do 215B-1	Reconn. bomber	4	DB 601Aa 2 x 1100 hp	19,400 lb (8800 kg)	292 mph/16,405 ft (470 kmh/5000 m)	6560 ft (2000 m) 7 min 30 sec	29,530 ft (9000 m)	1523 mls (2500 km) max	59 ft 0½ in (18.00 m)	51 ft 9½ in (15.79 m)	592.02 sq.ft (55.0 sq.m)
Dornier Do 217E-2	Medium/ Dive bomber	4	BMW 801ML 2 x 1580 hp	33,070 lb (15,000 kg)	320 mph/17,060 ft (515 kmh/5200 m)	6560 ft (2000 m) 7 min 30 sec	29,530 ft (9000 m)	1430 mls (2300 km)	62 ft 4 in (19.00 m)	59 ft 8½ in (18.2 m)	613.54 sq.ft (57.0 sq.m)

Dornier Do 217N-2	4	DB 603A 2 × 1850 hp	29,100 lb (13,200 kg)	311 mph/19,685 ft (500 kmh/6000 m)	19,685 ft (6000 m) 13 min 0 sec	31,500 ft (9600 m)	1305 mls (2100 km)	62 ft 4 in (19.0 m)	62 ft 0 in (18.9 m)	613.54 sq.ft (57.0 sq.m)
Dornier Do 335A-O Pfeil	1	DB 603A-2 2 × 1750 hp	20,966 lb (9510 kg) max	455 mph/23,295 ft (732 kmh/7100 m)	26,247 ft (8000 m) 14 min 30 sec	31,170 ft (9500 m)	1336 mls (2150 km)	45 ft 3 1/2 in (13.80 m)	45 ft 5 1/4 in (13.85 m)	414.41 sq.ft (38.5 sq.m)
Fieseler Fi 156C-2 Storch	1 + 1/2	Argus As 10C 1 × 240 hp	2910 lb (1320 kg)	109 mph/sea level (175 kmh)	3280 ft (1000 m) 3 min 24 sec	16,700 ft (5090 m)	239 mls (385 km)	46 ft 9 in (14.25 m)	32 ft 5 1/2 in (9.90 m)	279.9 sq.ft (26.0 sq.m)
Fieseler Fi 253 Spatz	2	Zündapp Z9-092 1 × 50 hp	NA	NA	NA	NA	NA	NA	NA	NA
Fieseler Fi 256	1 + 3/4	Argus As 10P/C 1 × 240 hp	3704 lb (1680 kg)	NA	9840 ft (3000 m) 18 min	NA	454 mls (730 km)	48 ft 10 1/2 ins (14.90 m)	31 ft 9 1/4 in (9.70 m)	290.63 sq.ft (27.0 sq.m)
Focke-Wulf FW 44C Stieglitz	2	Bramo Sh 14A 1 × 150 hp	1918 lb (870 kg)	115 mph/sea level (185 kmh)	3280 ft (1000 m) 5 min 30 sec	12,795 ft (3900 m)	419 mls (675 km)	29 ft 6 1/2 in (9.0 m)	23 ft 11 1/2 in (7.28 m)	215.28 sq.ft (20.0 sq.m)
Focke-Wulf FW 56 Stösser	1	Argus As 10C 1 × 240 hp	2171 lb (985 kg)	166 mph/sea level (267 kmh)	3280 ft (1000 m) 2 min 12 sec	20,340 ft (6200 m)	230 mls (370 km)	34 ft 5 1/4 in (10.5 m)	24 ft 11 in (7.6 m)	150.7 sq.ft (14.0 sq.m)
Focke-Wulf FW 58C-1 Weihe	2/6	Argus As 10C 2 × 240 hp	6435 lb (2919 kg)	163 mph/3280 ft (263 kmh/1000 m)	9840 ft (3000 m) 14 min 0 sec	8370 ft (5600 m)	447 mls (730 km)	69 ft 0 1/2 in (21.05 m)	45 ft 10 1/2 in (13.995 m)	509.14 sq.ft (47.3 sq.m)
Focke-Wulf FW 189A-1	3	Argus As 410A 2 × 465 hp	8708 lb (3950 kg)	217 mph/8200 ft (350 kmh/2500 m)	(initial) 1017 ft./min	23,950 ft (7300 m)	584 mls (950 km)	60 ft 4 1/2 in (18.40 m)	39 ft 0 1/2 in (11.90 m)	409.03 sq.ft (38.0 sq.m)
Focke-Wulf FW 190A-8	1	BMW 801D-2 1 × 1700 hp	9660 lb (4380 kg)	402 mph/18,040 ft (647 kmh/5500 m)	(initial) 3450 ft./min (17.5 m/sec)	33,800 ft (10,300 m)	497 mls (800 km) max	34 ft 5 1/2 in (10.51 m)	29 ft 4 in (8.95 m)	196.98 sq.ft (18.3 sq.m)
Gotha Go 145C	2	Argus As 10C 1 × 240 hp	3043 lb (1380 kg)	132 mph/sea level (212 kmh)	3280 ft (1000 m) 5 min 30 sec	12,140 ft (3700 m)	391 mls (630 km)	29 ft 6 1/2 in (9.0 m)	28 ft 6 1/2 in (8.7 m)	234.12 sq.ft (21.75 sq.m)
Gotha Go 244B-2	2 + 23 or cargo	Gnome- Rhône 14M 2 × 715 hp	17,196 lb (7800 kg) max	180 mph/sea level (290 kmh)	(initial) 886 ft./min (270 m/min)	25,100 ft (7650 m)	435 mls (740 km)	80 ft 4 1/2 in (24.50 m)	51 ft 10 in (15.80 m)	693.19 sq.ft (64.4 sq.m)

Designation	Function	Crew/ seats	Power plant/ T/O rating	Loaded weight	Max. speed/altitude	Climb	Service ceiling	Range	Span	Length	Wing area
Heinkel He 45C	Reconn. bomber	2	BMW VI 7.3 1 × 750 hp	6052 lb (2745 kg)	180 mph/sea level (290 km/h)	3280 ft (1000 m) 2 min 24 sec	18,040 ft (5500 m)	746 mls (1200 km) max	37 ft 8 1/4 in (11.5 m)	32 ft 9 1/4 in (10.0 m)	372.33 sq.ft (34.59 sq.m)
Heinkel He 46C-1	Army co-operation	2	Bramo 322B 1 × 650 hp	5070 lb (2300 kg) max	161 mph/2625 ft (260 km/h/800 m)	6560 ft (2000 m) 5 min 30 sec	19,685 ft (6000 m)	615 mls (990 km) max	45 ft 11 1/4 in (14.0 m)	31 ft 2 in (9.5 m)	354.13 sq.ft (32.9 sq.m)
Heinkel He 51B-1	Fighter/ Trainer	1	BMW VI 7.3Z 1 × 750 hp	4189 lb (1900 kg)	205 mph/sea level (330 km/h)	13,120 ft (4000 m) 7 min 48 sec	25,260 ft (7700 m)	354 mls (570 km)	36 ft 1 in (11.0 m)	27 ft 6 1/4 in (8.4 m)	292.778 sq.ft (27.2 sq.m)
Heinkel He 72B-1 Kadett	Primary trainer	2	Bramo Sh 14A 1 × 160 hp	1907 lb (865 kg)	115 mph/sea level (185 km/h)	3280 ft (1000 m) 6 min 0 sec	11,480 ft (3500 m)	295 mls (475 km)	29 ft 6 1/2 in (9.0 m)	24 ft 7 in (7.5 m)	222.8 sq.ft (20.7 sq.m)
Heinkel He 111B-2	Medium bomber/ Trainer	4	DB 600CG 2 × 950 hp	22,046 lb (10,000 kg) max	230 mph/13,120 ft (370 km/h/4000 m)	NA	22,960 ft (7000 m)	1030 mls (1660 km) max	74 ft 1 1/4 in (22.6 m)	57 ft 5 in (17.5 m)	942.92 sq.ft (87.6 sq.m)
Heinkel He 111H-16	Medium bomber	5	Jumo 211F-2 2 × 1350 hp	30,865 ft (14,000 kg)	252 mph/19,685 ft (405 km/h/6000 m)	19,685 ft (6000 m) 42 min 0 sec	27,890 ft (8500 m)	1200 mls (1930 km)	74 ft 1 1/4 in (22.6 m)	53 ft 9 1/2 in (16.4 m)	931.07 sq.ft (86.5 sq.m)
Heinkel He 177A-1/R1 Greif	Heavy bomber	5	DB 606 2 × 2700 hp	66,138 lb (30,000 kg) max	317 mph/19,030 ft (510 km/h/5800 m)	(initial) 649 ft./min (198 m/min)	22,960 ft (7000 m)	3480 mls (5600 km) max	103 ft 1 1/4 in (31.44 m)	66 ft 11 in (20.4 m)	1097.92 sq.ft (102.0 sq.m)
Heinkel He 177A-5/R2 Greif	Heavy bomber	6	DB 610A/B 2 × 2950 hp	59,966 lb (27,200 kg)	303 mph/18,700 ft (488 km/h/6700 m)	9840 ft (3000 m) 10 min 0 sec	26,250 ft (8000 m)	3417 mls (5500 km) max	103 ft 1 1/4 in (31.44 m)	72 ft 2 in (22.00 m)	1097.92 sq.ft (102.0 sq.m)
Heinkel He 219A-0/A-2 Uhu	Night fighter	2	DB 603A 2 × 1750 hp	27,558 lb (12,500kg)	348 mph/18,700 ft (560 km/h/5700 m)	19,685 ft (6000 m) 11 min 30 sec	30,510 ft (9300 m)	1305 mls (2100 km)	60 ft 8 1/2 in (18.5 m)	50 ft 11 1/4 in (15.54 m)	478.99 sq.ft (44.5 sq.m)
Henschel Hs 123A-1	Dive bomber/ Close support	1	BMW 132Dc 1 × 880 hp	4880 lb (2217 kg)	213 mph/3940 ft (342 km/h/1200 m)	(initial) 2950 ft/min (900 m/min)	29,530 ft (9000 m)	534 mls (860 km)	34 ft 5 1/2 in (10.50 m)	27 ft 4 in (8.33 m)	267.48 sq.ft (24.85 sq.m)

Henschel Hs 126B-1	2	Bramo 323A-1 1 × 850 hp	7209 lb (3270 kg)	221 mph/9840 ft (356 kmh/3000 m)	13,120 ft (4000 m) 7 min 14 sec	27,000 ft (8230 m)	360 mls (560 km)	47 ft 6¼ in (14.5 m)	35 ft 7 in (10.84 m)	340.14 sq.ft (31.6 sq.m)
Henschel Hs 128V1	2	DB 601 + TK 9 2 × 950 hp	NA	NA	NA	39,090 ft (12,000 m)	NA	85 ft 3¼ in (26.0 m)	58 ft 4½ in (14.75 m)	NA
Henschel Hs 128V2	2	Jumo 210 + TK 16 2 × 680 hp	NA	NA	NA	55,770 ft (17,000 m)	NA	85 ft 3¼ in (26.0 m)	58 ft 4½ in (14.75 m)	NA
Henschel Hs 129B-2	1	Gnome- Rhône 14M 2 × 700 hp	11,547 lb (5250 kg) max	253 mph/12,570 ft (407 kmh/3830 m)	(initial) 1595 ft/min (486 m/min)	29,530 ft (9000 m)	428 mls (690 km)	46 ft 7 in (14.20 m)	31 ft 11¼ in (9.75 m)	312.153 sq.ft (29.0 sq.m)
Junkers F 13L	2 + 4	Junkers L-5 1 × 250 hp	5512 lb (2500 kg)	cruis. 106 mph/6560 ft (170 kmh/2000 m)	6560 ft (2000 m) 15 min 0 sec	16,730 ft (5100 m)	528 mls (850 km)	58 ft 2½ in (17.75 m)	31 ft 6 in (9.60 m)	430.56 sq.ft (40.0 sq.m)
Junkers W 33	1 + 4 or cargo	Junkers L-5 1 × 280 hp	6614 lb (3000 kg)	119 mph/sea level (191 kmh)	6560 ft (2000 m) 21 min 0 sec	10,500 ft (3200 m)	584 mls (940 km)	58 ft 2½ in (17.75 m)	34 ft 5 in (10.5 m)	473.6 sq.ft (44.0 sq.m)
Junkers W 34h	2 + 4	BMW 132E 1 × 650 hp	7055 lb (3200 kg)	160 mph/sea level (258 kmh)	3280 ft (1000 m) 3 min 12 sec	20,670 ft (6300 m)	560 mls (900 km)	58 ft 2½ in (17.75 m)	33 ft 8½ in (10.27 m)	462.85 sq.ft (43.0 sq.m)
Junkers A 50 Junior	2	Siemens Sh 13A 1 × 80 hp	1323 lb (600 kg)	109 mph/sea level (175 kmh)	6560 ft (2000 m) 12 min 0 sec	12,460 ft (3800 m)	373 mls (600 km)	32 ft 9½ in (10.0 m)	23 ft 4 in (7.12 m)	148.55 sq.ft (13.8 sq.m)
Junkers Ju 52/3m g2e	3 + 16 or cargo	BMW 132A-3 3 × 725 hp	23,146 lb (10,500 kg)	165 mph/sea level (265 kmh)	9840 ft (3000 m) 17 min 30 sec	19,360 ft (5900 m)	621 mls (1000 km)	95 ft 11½ in (29.24 m)	62 ft 0 in (18.9 m)	1189.42 sq.ft (110.5 sq.m)
Junkers Ju 86G-1	4	BMW 132N 2 × 865 hp	18,124 lb (8222 kg)	236 mph/13,120 ft (380 kmh/4000 m)	13,120 ft (4000 m) 16 min 0 sec	25,265 ft (7700 m)	870 mls (1400 km) ^{hax}	73 ft 9¼ in (22.50 m)	57 ft 4 in (17.47 m)	882.64 sq.ft (82.0 sq.m)
Junkers Ju 86R-1	2	Jumo 207B-3 2 × 1000 hp	24,420 lb (11,530 kg) max	261 mph/29,530 ft (420 kmh/9000 m)	36,090 ft (11,000 m) 45 mins 6 sec	47,340 ft (14,430 m)	1085 mls (1750 km)	104 ft 11¼ in (32.0 m)	54 ft 0 in (16.46 m)	1049.48 sq.ft (97.5 sq.m)
Junkers Ju 87B-1	2	Jumo 211Da 1 × 1200 hp	9560 lb (4340 kg)	238 mph/13,410 ft (383 kmh/4090 m)	6560 ft (2000 m) 4 min 18 sec	26,250 ft (8000 m)	490 mls (790 km)	45 ft 3½ in (13.8 m)	36 ft 5 in (11.1 m)	343.37 sq.ft (31.9 sq.m)

Designation	Function	Crew/ seats	Power plant/ T/O rating	Loaded weight	Max. speed/altitude	Climb	Service ceiling	Range	Span	Length	Wing area
Junkers Ju 88A-4	Medium/ Dive bomber	4	Jumo 211J 2 × 1340 hp	30,865 lb (14,000 kg) max	280 mph/19,685 ft (450 kmh/6000 m)	17,716 ft (5400 m) 23 min 0 sec	26,900 ft (8200 m)	1696 mls (2730 km) max	65 ft 7½ in (20.0 m)	47 ft 2½ in (14.4 m)	586.63 sq.ft (54.5 sq.m)
Junkers Ju 88S-3	Medium bomber	3	Jumo 213A 2 × 2125 hp ²	23,126 lb (10,490 kg)	382 mph/27,880 ft (615 kmh/8500 m)	NA	37,730 ft (11,500 m)	1243 mls (2000 km)	65 ft 7½ in (20.08 m)	48 ft 8½ in (14.85 m)	586.63 sq.ft (54.5 sq.m)
Junkers Ju 188E-1 Rächer	Medium bomber	4	BMW 801D-2 2 × 1700 hp	31,898 lb (14,510 kg)	310 mph/19,685 ft (500 kmh/6000 m)	20,000 ft (6100 m) 17 min 36 sec	30,665 ft (9350 m)	1210 mls (1950 km) max	72 ft 2 in (22.0 m)	49 ft 0½ in (14.9 m)	602.78 sq.ft (56.0 sq.m)
Junkers Ju 252A-1	Transport	3 + 32 or cargo	Jumo 211F 3 × 1340 hp	52,910 lb (24,000 kg) max	272 mph/19,030 ft (437 kmh/5800 m)	3280 ft (1000 m) 4 min 18 sec	20,670 ft (6300 m)	4100 mls (660 km) max	111 ft 10 in (35.08 m)	82 ft 4¼ in (25.1 m)	1319.65 sq.ft (122.6 sq.m)
Junkers Ju 290A-1	Transport	5 + 48 or cargo	BMW 801L 4 × 1600 hp	90,588 lb (41,090 kg)	273 mph/18,040 ft (440 kmh/5500 m)	6560 ft (2000 m) 10 min 0 sec	19,720 ft (6010 m)	3480 mls (5600 km) max	137 ft 9½ in (42.0 m)	92 ft 6¼ in (28.2 m)	2209.83 sq.ft (205.3 sq.m)
Junkers Ju 352A-1 Herkules	Transport	3/4 + cargo	Bramo 323R-2 3 × 1000 hp	43,034 lb (19,520 kg)	205 mph/sea level (330 kmh)	3280 ft (1000 m) 3 min 12 sec	19,685 ft (6000 m)	1852 mls (2980 km) max	112 ft 2¼ in (34.2 m)	79 ft 4¼ in (24.2 m)	1379.93 sq.ft (128.2 sq.m)
Junkers Ju 388L-1	High-alt. photo reconn.	3	BMW 801TJ 2 × 1800 hp	32,350 lb (14,670 kg) max	383 mph/40,300 ft (616 kmh/12,300 m)	36,100 ft (11,000 m) 30 min 0 sec	44,100 ft (13,450 m)	2160 mls (3500 km) max	72 ft 2 in (22.0 m)	49 ft 0½ in (14.9 m)	602.78 sq.ft (56.0 sq.m)
Junkers Ju 390V1	VLR transport	—	BMW 801E 6 × 1970 hp	166,450 lb (53,112 kg) max	280 mph/20,340 ft (450 kmh/6200 m)	(initial) 690 ft/min (210 m/min)	NA	6030 mls (9700 km) max	165 ft 1 in (50.32 m)	112 ft 2½ in (34.2 m)	2729.73 sq.ft (253.6 sq.m)
Klemm Ki 25D	Sports, trainer	2	Hirth HM 60R 1 × 80 hp	1587 lb (720 kg)	87 mph/sea level (140 kmh)	3280 ft (1000 m) 5 min 48 sec	15,750 ft (4800 m)	404 mls (650 km)	42 ft 8 in (13.0 m)	24 ft 7¼ in (7.05 m)	215.28 sq.ft (20.0 sq.m)
Klemm L 26	Sports	2	Siemens Sh 13 1 × 82 hp	1367 lb (620 kg)	99 mph/sea level (160 kmh)	3280 ft (1000 m) 8 min 0 sec	11,480 ft (3500 m)	497 mls (800 km)	42 ft 8 in (13.0 m)	25 ft 3 in (7.7 m)	215.28 sq.ft (20.0 sq.m)
Klemm Ki 32b	Sports	2	Bramo Sh 14A 1 × 150 hp	2095 lb (950 kg)	127 mph/sea level (205 kmh)	3280 ft (1000 m) 6 min 0 sec	15,750 ft (4800 m)	548 mls (860 km)	39 ft 4¼ in (12.0 m)	23 ft 7½ in (7.2 m)	183.0 sq.ft (17.0 sq.m)

Klemm Kl 35D	2	Sports, trainer	Hirth HM 60R 1 × 80 hp	1654 lb (750 kg)	132 mph/sea level (212 kmh)	3280 ft (1000 m) 6 min 0 sec	14,270 ft (4350 m)	41.3 mls (665 km)	34 ft 1½ in (10.4 m)	24 ft 7¼ in (7.5 m)	163.6 sq.ft (15.2 sq.m)
Messerschmitt M 27b	2	Sports	Argus As. 8 1 × 100 hp	1609 lb (730 kg)	124 mph/sea level (200 kmh)	6560 ft (2000 m) 10 min 6 sec	17,060 ft (5200 m)	435 mls (700 km)	39 ft 4½ in (12.0 m)	25 ft 11 in (7.9 m)	156.08 sq.ft (14.5 sq.m)
Messerschmitt Bf 108B Taifun	1 + 3	Liaison	Argus As. 10C 1 × 240 hp	3086 lb (1400 kg)	186 mph/sea level (300 kmh)	(initial) 1132 ft/min (345 m/min)	15,750 ft (4800 m)	590 mls (950 km)	34 ft 10 in (10.62 m)	27 ft 2½ in (8.3 m)	176.53 sq.ft (16.4 sq.m)
Messerschmitt Bf 109F-4	1	Fighter	DB 601E-1 1 × 1350 hp	6393 lb (2900 kg)	388 mph/21,325 ft (625 kmh/6500 m)	9840 ft (3000 m) 2 min 36 sec	39,370 ft (12,000 m)	528 mls (850 km)	32 ft 5¼ in (9.90 m)	29 ft 0½ in (8.84 m)	174.37 sq.ft (16.2 sq.m)
Messerschmitt Bf 109G-2	1	Fighter	DB 605A-1 1 × 1475 hp	6834 lb (3100 kg)	406 mph/28,540 ft (635 kmh/9000 m) ³	19,685 ft (6000 m) 5 min 6 sec	39,379 ft (12,000 m)	528 mls (850 km)	32 ft 6½ in (9.92 m)	29 ft 0½ in (8.85 m)	173.3 sq.ft (16.1 sq.m)
Messerschmitt Bf 110G-4	3	Night fighter	DB 605B 2 × 1475 hp	20,700 lb (9390 kg)	342 mph/22,950 ft (550 kmh/8000 m)	(initial) 2170 ft/min (661 m/min)	26,250 ft (8000 m)	1305 mls (2100 km)	53 ft 4¼ in (16.27 m)	41 ft 6¼ in (12.65 m)	413.33 sq.ft (38.4 sq.m)
Messerschmitt Me 210A-1	2	Heavy fighter	DB 601F 2 × 1350 hp	21,390 lb (9700 kg)	350 mph/17,820 ft (563 kmh/5430 m)	13,120 ft (4000 m) 7 min 30 sec	22,970 ft (7000 m)	1130 mls (1820 km)	53 ft 7½ in (16.34 m)	39 ft 9¼ in (12.12 m)	389.657 sq.ft (36.2 sq.m)
Messerschmitt Me 262A-1a	1	Interceptor fighter	Jumo 004B 2 × 1980 lb (900 kg)/st.thr	14,108 lb (6400 kg)	540 mph/19,685 ft (870 kmh/6000 m)	19,685 ft (6000 m) 6 min 48 sec	37,565 ft (11,450 m)	525 mls (845 km)	40 ft 11½ in (12.48 m)	34 ft 9½ in (10.6 m)	234.0 sq.ft (21.7 sq.m)
Messerschmitt Me 323E-2 Gigant	7/11 ⁴	Large capacity transport	Gnome- Rhône 14N 6 × 1140 hp	99,210 lb (45,000 kg) max	137 mph/9840 ft (220 kmh/3000 m)	(initial) 866 ft/min (264 m/min)	14,760 ft (4500 m)	745 mls (1200 km)	180 ft 5½ in (55.0 m)	93 ft 6 in (28.5 m)	3229.0 sq.ft (300.0 sq.m)
Siebel Fh 104A Hallere	1 + 4	Liaison	Hirth HM 508D 2 × 280 hp	5180 lb (2350 kg)	217 mph/sea level (350 kmh)	3280 ft (1000 m) 1 min 54 sec	21,650 ft (6600 m)	572 mls (920 km)	39 ft 6¾ in (12.06 m)	31 ft 2 in (9.5 m)	240.0 sq.ft (22.3 sq.m)
Siebel Si 204A	2 + 6	General purpose	Argus As. 410 2 × 360 hp	11,023 lb (5000 kg)	200 mph/9840 ft (322 kmh/3000 m)	(initial) 846 ft/min (258 m/min)	21,000 ft (6400 m)	621 mls (1000 km)	69 ft 11¾ in (21.33 m)	42 ft 8½ in (13.02 m)	495.1 sq.ft (46.0 sq.m)
AMERICAN Bell P-39D Airacobra	1	Fighter	Allison V-1710-35 1 × 1150 hp	7845 lb (3558 kg)	335 mph/5000 ft (540 kmh/1524 m)	5000 ft (1524 m) 1 min 54 sec	29,000 ft (8840 m)	600 mls (965 km)	34 ft 0 in (10.36 m)	30 ft 2 in (9.19 m)	213.0 sq.ft (19.79 sq.m)

Designation	Function	Crew/ seats	Power plant/ T/O rating	Loaded weight	Max. speed/altitude	Climb	Service ceiling	Range	Span	Length	Wing area
Boeing B-17F Flying Fortress	Heavy bomber	10	Wright R-1820-97 4 × 1200 hp	55,000 lb (24,950 kg) norm	325 mph/25,000 ft (523 kmh/7620 m)	20,000 ft (6069 m) 25 min 42 sec	37,500 ft (11,430 m)	4420 mls (7112 km) max	103 ft 9 1/4 in (31.63 m)	74 ft 9 in (22.78 m)	1420.0 sq.ft (131.92 sq.m)
Boeing B-17G	Heavy bomber	10	Wright R-1820-97 4 × 1200 hp	72,000 lb (32,660 kg) max	302 mph/25,000 ft (486 kmh/7620 m)	20,000 ft (6096 m) 37 min 0 sec	35,500 ft (10,850 m)	1800 mls (2897 km)	103 ft 9 1/4 in (31.63 m)	74 ft 9 in (22.78 m)	1420.0 sq.ft (131.92 sq.m)
Consolidated B-24D Liberator	Heavy bomber	10	Pratt & Whitney R-1830-43 4 × 1200 hp	64,000 lb (29,030 kg) max	303 mph/25,000 ft (488 kmh/7620 m)	20,000 ft (6096 m) 22 min 0 sec	32,000 ft (9754 m)	1800 mls (2944 km) ⁵	110 ft 0 in (33.53 m)	66 ft 4 in (20.22 m)	1048.0 sq.ft (97.36 sq.m)
Consolidated B-24J Liberator	Heavy bomber	10/12	Pratt & Whitney R-1830-65 4 × 1200 hp	55,400 lb (25,400 kg) norm	300 mph/30,000 ft (483 kmh/9144 m)	20,000 ft (6096 m) 25 min 0 sec	35,000 ft (10,060 m)	1700 mls (2736 km) ⁶	110 ft 0 in (33.53 m)	66 ft 4 in (20.22 m)	1048.0 sq.ft (97.36 sq.m)
Lockheed 18 Lodestar⁷	Airliner	3 + 14	Pratt & Whitney S4C4G 2 × 1050 hp	18,500 lb (8392 kg)	277 mph/16,700 ft (446 kmh/5090 m)	(initial) 2010 ft./min (613 m/min)	28,000 ft (8535 m)	1700 mls (2736 km)	65 ft 6 in (19.96 m)	49 ft 9 1/4 in (15.186 m)	551.0 sq.ft (51.19 sq.m)
Lockheed Hudson	Maritime patrol bomber	4	Wright R-1820-87 2 × 1200 hp	21,000 lb (9526 kg) max	253 mph/15,000 ft (407 kmh/4572 m)	10,000 ft (3048 m) 6 min 18 sec	26,500 ft (8077 m)	2800 mls (4505 km) max	65 ft 6 in (19.96 m)	44 ft 4 in (13.51 m)	551.0 sq.ft (51.19 sq.m)
Martin B-26B Marauder	Medium bomber	7	Pratt & Whitney R-2800-1 2 × 2000 hp	34,200 lb (15,513 kg)	317 mph/14,500 ft (510 kmh/4420 m)	15,000 ft (4572 m) 12 min 0 sec	23,000 ft (7163 m)	1150 mls (1850 km)	65 ft 0 in (19.81 m)	58 ft 3 in (17.75 m)	602.0 sq.ft (55.93 sq.m)
N. American NA-57 Harvard II	Advanced trainer	2	Pratt & Whitney R-1340 1 × 600 hp	5300 lb (2404 kg)	206 mph/5000 ft (332 kmh/1520 m)	(initial) 1350 ft./min (412 m/min)	21,500 ft (6553 m)	720 mls (1159 km)	42 ft 0 1/4 in (12.81 m)	29 ft 0 in (8.84 m)	257.73 sq.ft (23.89 sq.m)
N. American P-51B Mustang	Escort fighter	1	Packard V-1650-3 1 × 1400 hp ⁸	11,200 lb (5080 kg)	440 mph/30,000 ft (708 kmh/9344 m)	10,000 ft (3048 m) 1 min 48 sec	42,000 ft (12,800 m)	2200 mls (3450 km) max	37 ft 0 1/4 in (11.89 m)	32 ft 3 in (9.83 m)	233.0 sq.ft (21.65 sq.m)
Republic P-47D-2 Thunderbolt	Fighter- bomber	1	Pratt & Whitney R-2800-21 1 × 2000 hp	13,500 lb (6124 kg)	420 mph/30,000 ft (676 kmh/9145 m)	20,000 ft (6096 m) 11 min 0 sec	42,000 ft (12,800 m)	835 mls (1344 km) max	40 ft 9 1/4 in (12.43 m)	36 ft 1 1/4 in (11.00 m)	300.0 sq.ft (27.87 sq.m)

Republic P-47D-10 Thunderbolt

BRITISH

Avro Lancaster Mk I

Bristol Blenheim Mk IV

de Havilland DH 90 Dragonfly

Hawker Tempest Mk V

Hawker Typhoon Mk IB

Supermarine Spitfire Mk IIA

Vickers Wellington Mk IV

DUTCH

Fokker CVE

1	Fighter-bomber	Pratt & Whitney R-2800-63 1 x 2300 hp	15,000 lb (6804 kg) max	433 mph/30,000 ft (697 kmh/9145 m)	25,000 ft (7620 m) 15 min 0 sec	42,000 ft (12,800 m) 835 mls (1344 km) max	40 ft 9 7/8 in (12.43 m)	36 ft 1 1/4 in (11.00 m)	300.0 sq.ft (27.87 sq.m)
7	Heavy bomber	Rolls-Royce Merlin 20/22 4 x 1460 hp ⁹	65,000 lb (29,484 kg)	281 mph/11,000 ft (452 kmh/3350 m)	20,000 ft (6096 m) 41 min 36 sec	24,500 ft (7470 m) 1730 mls (2784 km)	102 ft 0 in (21.09 m)	69 ft 6 in (21.18 m)	1297.0 sq.ft (120.49 sq.m)
3	Medium bomber	Bristol Mercury 15 2 x 905 hp	13,500 lb (5124 kg)	266 mph/11,800 ft (364 kmh/3595 m)	10,000 ft (3084 m) 7 min 12 sec	27,264 ft (8310 m) 1460 mls (2350 km) max	56 ft 4 in (17.17 m)	42 ft 7 in (12.98 m)	469.0 sq.ft (43.57 sq.m)
1 + 4	Communications	DH Gipsy Major 10 2 x 145 hp	4000 lb (1814 kg) max	144 mph/sea level (232 kmh)	(initial) 730 ft./min (223 m/min)	18,100 ft (5516 m) 900 mls (1448 km)	43 ft 0 in (13.11 m)	31 ft 8 in (9.65 m)	256.0 sq.ft (23.78 sq.m)
1	Fighter	Napier Sabre IIA, B or C 1 x 2180 hp	13,000 lb (5897 kg)	426 mph/18,500 ft (685 kmh/5640 m)	15,000 ft (4572 m) 5 min 0 sec	36,500 ft (11,125 m) 1530 mls (2462 km) max	41 ft 0 in (12.50 m)	33 ft 8 in (10.26 m)	302.0 sq.ft (28.56 sq.m)
1	Fighter-bomber	Napier Sabre IIA 1 x 2180 hp	13,980 lb (6341 kg)	405 mph/18,000 ft (652 kmh/5486 m)	15,000 ft (4572 m) 6 min 12 sec	34,000 ft (10,363 m) 1000 mls (1610 km) max	41 ft 7 in (12.67 m)	31 ft 11 in (9.73 m)	249.0 sq.ft (23.13 sq.m)
1	Fighter	Rolls-Royce Merlin XII 1 x 1190 hp	5900 lb (2676 kg)	357 mph/17,000 ft (574 kmh/5180 m)	20,000 ft (6096 m) 7 min 0 sec	37,230 ft (11,350 m) 406 mls (654 km)	36 ft 10 in (11.22 m)	29 ft 11 in (9.11 m)	242.0 sq.ft (22.48 sq.m)
6	Medium-heavy bomber	Pratt & Whitney S1A4G 2 x 1050 hp	31,500 lb (14,288 kg)	247 mph/14,500 ft (398 kmh/4420 m)	10,000 ft (3048 m) 18 min 0 sec	17,700 ft (5395 m) 2250 mls (4104 km) max	86 ft 2 in (26.26 m)	64 ft 7 in (19.68 m)	840 sq.ft (78.04 sq.m)
2	Light bomber	Bristol Jupiter or Pegasus IIM2 1 x 625 hp	5402 lb (2450 kg)	174 mph/6560 ft (280 kmh/2000 m)	9840 ft (3000 m) 7 min 42 sec	24,940 ft (7600 m) 559 mls (900 km)	50 ft 2 1/8 in (15.3 m)	30 ft 6 in (9.3 m)	423.02 sq.ft (39.3 sq.m)

Designation	Function	Crew/ seats	Power plant/ T/O rating	Loaded weight	Max. speed/altitude	Climb	Service ceiling	Range	Span	Length	Wing area
FRENCH											
Morane 220	Advanced trainer	2	Salmon 9Ab 1 × 250 hp	2664 lb (1208 kg)	120 mph/9840 ft (193 kmh/3000 m)	9840 ft (3000 m) 11 min 18 sec	NA	NA	35 ft 1 in (10.7 m)	22 ft 9¼ in (6.942 m)	212.055 sq.ft (19.7 sq.m)
ITALIAN											
Breda Ba 25	Trainer	2	Allia Romeo Lynx 1 × 200 hp	2205 lb (1000 kg)	127 mph/sea level (205 kmh)	16,400 ft (5000 m) 25 min 0 sec	16,075 ft (4900 m)	250 mls (400 km)	32 ft 9½ in (10.0 m)	26 ft 3 in (8.00 m)	269.1 sq.ft (25.0 sq.m)
Cant 1007 bis Alcione	Medium bomber	5	Piaggio P.XIbis RC.40 3 × 1000 hp	30,029 lb (13,621 kg)	282mph/13,120 ft (454 kmh/4000 m)	19,685 ft (6000 m) 16 min 8 sec	24,610 ft (7500 m)	1087 mls (1750 km) max	81 ft 4½ in (24.80 m)	60 ft 2½ in (18.35 m)	807.29 sq.ft (75.0 sq.m)
Cant 1018 Leone	Medium bomber	4-6	Piaggio P.XII RC.35 2 × 1320 hp	24,580 lb (11,150 kg)	323 mph/13,120 ft (520 kmh/4000 m)	6560 ft (2000 m) 3 min 10 sec	24,610 ft (7500 m)	1367 mls (2200 km) max	73 ft 9¼ in (22.5 m)	57 ft 9 in (17.5 m)	679.2 sq.ft (63.11 sq.m)
Caproni Ca 133	Bomber- transport	4	Piaggio P.VII C.14 3 × 450 hp	14,154 lb (6420 kg)	174 mph/9840 ft (280 kmh/3000 m)	9840 ft (3000 m) 10 min 6 sec	18,040 ft (5500 m)	839 mls (1350 km)	69 ft 8¼ in (21.24 m)	50 ft 4¼ in (15.36 m)	699.66 sq.ft (65.0 sq.m)
Caproni Ca 148	Civil transport	3 + 18	Piaggio P.VII C.35 3 × 500 hp	15,212 lb (6900 kg)	155 mph/sea level (250 kmh)	NA	11,480 ft (3500 m)	808 mls (1300 km) max	68 ft 8¼ in (21.00 m)	53 ft 3¼ in (16.25 m)	NA
Caproni Ca 313 R.P.B.2	Light bomber/ Trainer	3	Isotta Fraschini Delta RC.35 2 × 730 hp	13,007 lb (5900 kg) max	271 mph/11,480 ft (436 kmh/3500 m)	13,120 ft (4000 m) 11 min 30 sec	23,950 ft (7300 m)	497 mls (800 km)	54 ft 7½ in (16.65 m)	38 ft 8½ in (11.80 m)	421.94 sq.ft (39.2 sq.m)
Fiat CR.42 Falco	Fighter/ Close support	1	Fiat A.74 R.I.C.38 1 × 840 hp	5060 lb (2295 kg)	273 mph/19,685 ft (493 kmh/6000 m)	19,685 ft (6000 m) 9 min 0 sec	33,470 ft (10,200 m)	482 mls (775 km)	31 ft 9¼ in (9.70 m)	27 ft 0½ in (8.257 m)	241.1 sq.ft (22.4 sq.m)
Fiat G.55/I Centauro	Fighter	1	Fiat RA.1050 RC.58 Tifone 1 × 1475 hp ¹⁰	8095 lb (3672 kg)	385 mph/19,685 ft (620 kmh/6000 m)	19,685 ft (6000 m) 7 min 12 sec	41,830 ft (12,750 m)	1025 mls (1650 km)	38 ft 10½ in (11.85 m)	30 ft 9½ in (9.39 m)	227.23 sq.ft (21.11 sq.m)

Macchi C.205V Veltro	1	Fighter	Fiat RA.1050 R.C.58 Tifone 1 × 1475 hp ¹⁰	7108 lb (3224 kg)	399 mph/23,620 ft (642 kmh/7200 m)	9840 ft (3000 m) 2 min 40 sec	36,090 ft 646 mls (11,000 m) (1040 km)	34 ft 8½ in (10.58 m)	29 ft 0½ in (8.85 m)	180.84 sq.ft (16.8 sq.m)
Meridionali Ro 41	1	Fighter/ Trainer	Piaggio P.VII C.45 1 × 390 hp	2756 lb (1250 kg)	180 mph/sea level (325 kmh)	13,120 ft (4000 m) 6 min 25 sec	26,900 ft 373 mls (8200 m) (600 km)	28 ft 10¼ in (8.81 m)	21 ft 11¼ in (6.7 m)	206.13 sq.ft (19.15 sq.m)
Savoia Marchetti SM.79-II Sparviero	4-5	Medium/ Torpedo bomber	Alfa Romeo 126 RC.34 3 × 780 hp	23,700 lb (10,750 kg)	267 mph/13,120 ft (430 kmh/4000 m)	3280 ft (1000 m) 3 min 28 sec	21,320 ft 1180 mls (6500 m) (1900 km)	69 ft 6¼ in (21.2 m)	51 ft 10 in (15.8 m)	1180.0 sq.ft (61.7 sq.m)
Savoia Marchetti SM.82 Canguro	3 + 40 or cargo	Transport	Alfa Romeo 128 RC.21 3 × 950 hp	39,286 lb (17,820 kg)	230 mph (370 kmh)	9840 ft (3000 m) 18 min 0 sec	19,685 ft 1864 mls (6000 m) (3000 km)	97 ft 4½ in (29.68 m)	75 ft 1½ in (22.9 m)	1276.6 sq.ft (118.6 sq.m)
Savoia Marchetti SM.91	2	Escort fighter	DB 605A-1 2 × 1475 hp	19,599 lb (8890 kg)	363 mph/22,970 ft (584 kmh/7000 m)	19,685 ft (6000 m) 8 min 30 sec	36,090 ft 994 mls (11,000 m) (1600 km)	64 ft 7½ in (19.70 m)	43 ft 5½ in (13.25 m)	449.5 sq.ft (41.76 sq.m)
Savoia Marchetti SM.92	2	Escort fighter	DB 605A-1 2 × 1475 hp	19,290 lb (8750 kg)	383 mph/24,935 ft (615 kmh/7600 m)	19,685 ft (6000 m) 7 min 10 sec	39,370 ft 1242 mls (12,000 m) (2000 km)	60 ft 10¼ in (18.55 m)	44 ft 11¼ in (13.70 m)	414.63 sq.ft (38.52 sq.m)
Savoia Marchetti SM.95	4 + 18 or cargo	Transport	Alfa Romeo 128 RC.18 4 × 850 hp	47,641 lb (21,610 kg)	224 mph/9840 ft (360 kmh/3000 m)	9840 ft (3000 m) 13 min 2 sec	20,830 ft 1242 mls (6350 m) (300 km)	112 ft 5¼ in (34.28 m)	72 ft 11 in (22.22 m)	1381.0 sq.ft (128.3 sq.m)

Designation	Function	Crew/ seats	Power plant/ T/O rating	Loaded weight	Max. speed/altitude	Climb	Service ceiling	Range	Span	Length	Wing area
SOVIET											
Lavochkin La-5FN	Fighter	1	Shvetsov M-82FNV 1 × 1850 hp	7379 lb (3347 kg)	403 mph/20,670 ft (648 kmh/6300 m)	16,400 ft (5000 m) 4 min 42 sec	31,170 ft (9500 m)	475 mls (765 km)	32 ft 1 in (9.80 m)	28 ft 5 1/2 in (8.67 m)	188.37 sq.ft (17.5 sq.m)
Yakovlev Yak-3	Fighter	1	Klimov VK-105PF 1 × 1300 hp	5864 lb (2660 kg)	407 mph/10,170 ft (655 kmh/3100 m)	16,400 ft (5000 m) 4 min 6 sec	35,430 ft (10,800 m)	560 mls (900 km) max	30 ft 2 1/4 in (9.2 m)	27 ft 10 1/4 in (8.49 m)	159.63 sq.ft (14.83 sq.m)

NA = Not Available

Footnotes

- ¹ Incl. AI radar antennae
- ² With GM-1 boost
- ³ With GM-1 boost
- ⁴ 120 fully armed troops, or 60 casualties or cargo
- ⁵ With 4000 lb (1814 kg) bomb load
- ⁶ With 5000 lb (2268 kg) bomb load
- ⁷ Data relate to I8-14 series
- ⁸ Packard-built RR Merlin 65
- ⁹ or 1640 hp RR Merlin 24 engines
- ¹⁰ Licence-built DB 605A-1

Appendix 3

Author's final report on the Lavochkin La-5FN
(translation)

Rechlin Test Centre
Test No. 90014

Test of the Russian La-5 fighter with
M-82FNV direct-injection twin-row
radial engine

Final Report
SECRET!

.....No...../45 secret Br.B.No.22470/45
E2b 187/45

Summary

The La-5 represents a great improvement in performance, flying characteristics and serviceability compared to earlier Russian fighters, and its performance below 3000 m (9840 ft) is particularly noteworthy. Maximum speed is below that of our fighters at all altitudes; best climbing speed near ground level lies between those of the 8-190 and 8-109 (FW 190 and Bf 109 - *Ed*). In the climb and turns below 3000 m the La-5 is a worthy opponent, particularly for the 8-190. The type's manufacturing shortcomings should hardly affect the Russians, who are used to inferior flying characteristics. Range is short, flight endurance at rated power being about 40 mins. This report presents performance data, flying characteristics and tactical conclusions.

Prepared by:
(H.W. Lerche)
Fl.Haupting.

Seen by:
.....
Major and CO

Distribution

TO beim RM
Chef TLN a.d.D.
KdE
Chef TLR/Fl.E.
Chef TLR/Rü
Genst, Gen, Qu. 6 Abt,
Fü.St.Ic Chef
Fü.St.Ic fr.Lw.Ost
Gd J
GdS
Gd A
GdFl.Ausb.
Chef TLR/Fl.E2
Versuchsverband Ob.d.L. 2.Staffel

E'Stelle Re. M2c
E2c
5x E2 Beute
Forschungsführung M.L.
DVL Forschungsanstalt O'gau¹
D.F., Friedrichshafen²
Focke-Wulf, Bremen
EHAG, Wien³
MKN
B & V, Hamburg
Ifa, Dessau⁴

Rechlin, 20 March, 1945

This report comprises 4 pages of text

Prepared by:

Checked by:

Read by:

¹ Messerschmitt AG/Oberammergau

² Dornier-Werke GmbH

³ Ernst Heinkel AG

⁴ Junkers Flugzeugbau AG

Data

Weight distribution

Equipped weight	2773 kg (6114 lb)	Left wheel	1437 kg (3168 lb)
Fuel (460.1=101.2 Imp.gal)	354 kg (780 lb)	Right wheel	1484 kg (3273 lb)
Lubricants (51.1=11.2 Imp.gal)	46 kg (101.4 lb)	Tailwheel	426 kg (939 lb)
Ammunition (2×200 rds)	96 kg (207.2 lb)		3347 kg (7379 lb)
Pilot	80 kg (176.4 lb)		
All-up weight	3347 kg (7379 lb)		

Span 9.80 m (32 ft 1 in)

Wing area 17.5 sq.m (188.37 sq.ft)

Wing loading 191 kg/sq.m (39.1 lb/sq.ft)

Take-off power 1850 hp

Armament: 2×20 mm cannon with 200 rds each

Armour protection: 57 mm armoured glass windscreen

68 mm rear armoured glass plate as head protection, and

7 mm rear armour plate

The engine and airframe have already been described in detail in a report prepared by TLR/Rü. The performance data are provisional; a more detailed report will follow.

Performance

	Manifold (boost) pressure	rpm
	1000 mm C.S. (1.36 ata=19.9 lb/sq.in)	2400
	1180 mm C.S. (1.605 ata=23.6 lb/sq.in)	2500
Airspeed, emergency power, sea level	520 km/h (323 mph TAS)	
Airspeed, rated power, sea level	490 km/h (304.5 mph TAS)	
Airspeed, emergency power, 1000 m (3280 ft) pressure alt	540 km/h (335.5 mph TAS)	
Airspeed, rated power, 2400 m (7870 ft) pressure alt	540 km/h (335.5 mph TAS)	
Airspeed, rated power, 5000 m (16,405 ft) pressure alt	560 km/h (348 mph TAS)	
Airspeed, rated power, 6500 m (21,320 ft) pressure alt	545 km/h (338.7 mph TAS)	
Supercharger change-over altitude (manual selection)	3500 m (7720 ft)	
Rate of climb, rated power, at 300 m (984 ft)	16.17 m/sec (3182 ft/min)	
Rate of climb, rated power, at 4000 m (13,120 ft)	13 m/sec (2558 ft/min)	
Rate of climb, rated power, at 7000 m (22,960 ft)	6 m/sec (1180 ft/min)	
Ceiling	8000-9000 m (26,250-29,530 ft)	

The supercharger must not be used at emergency power. The (full throttle) altitudes are so low that full emergency power cannot be achieved either in climbing or horizontal flight.

The aircraft itself was fully serviceable. Its flying hours are not known, but the machine has been in service for some time. Surface finish, especially that of the wings (wood) is good; the sideways and forwards-extending slats fit very accurately.

2) *Characteristics*

The pilot's sitting position is comfortable. Forward vision from the cockpit is normally adequate, but during take-off, landing and taxiing it is much obstructed by the twin-row radial engine. On the ground and in flight strong exhaust fumes are troublesome. The high-altitude oxygen system was apparently never used and leaked significantly when tested. It is a copy of the German diaphragm flow economiser system. The propeller pitch change, radiator, cooling gills, trimmers, etc. are operated mainly by Bowden and other cables, resulting in a lot of lost motion and mushy response.

Take-off

There is some swing proportional to engine power, but it can be held. The tail should be raised slowly and not too soon, bearing in mind the limited propeller ground clearance. Acceleration is good and the distance relatively short (flaps 15° to 20°). Correct setting of the elevator and rudder trimmers must be watched, because there are no trim-position indicators.

Stability, control power and effectiveness

Longitudinal stability at normal angles of attack, with undercarriage and flaps retracted or extended, is surprisingly good, even in a full power climb, and the elevator power is normal. In steep turns, elevator forces are fully positive and fairly high, so that nose-trim is advisable in a sustained, turn.

Static directional stability is combined with normal rudder forces, but these diminish sharply at low airspeeds. Rudder effectiveness also reduces at low speed. Dynamic directional stability is weak and damping is bad. Yawing oscillations only damp out slowly. But the yaw oscillation cycle (at Va 450 km/h 280 mph at 2000 m 6560 ft about 3 sec) is not so short that the pilot cannot immediately stop it at any moment with the controls. Gun-aiming is therefore quite easy. Roll response to rudder is mild: the nose rises or falls in response to rudder, but this is not particularly disturbing. Adverse yaw and rolling moments (Dutch roll *Ed*) are slightly negative but, because of the good directional stability, are hardly disturbing and can be cancelled out by small rudder movements. Aileron effectiveness is outstanding. At Va 450 km/h (280 mph) a roll takes barely 4 sec; at Va 600 km/h (373 mph) aileron forces become high but can be assisted by rapid rudder movements. Yaw attitude noticeably affects required stick movements.

Stalling

At rated power, flaps and gear retracted: at Va from 210 to 200 km/h (130.5-124 mph) the slats extend and aileron forces reduce to the point of over-balance. At Va 180 km/h (112 mph) roll damping seems to disappear, with yaw or further airspeed reduction the aircraft drops a wing. With throttle closed and flaps and gear extended, the same responses occur at similar airspeeds. If the pilot pulls the stick further back, the elevator force suddenly reduces to the point of over-balance and its effectiveness nearly disappears. At the very high angles of attack which ensue, the aircraft drops a wing.

A stall in a steep turn with power produces similar results, but aileron over-balance appears much more pronounced and occurs at rather higher airspeeds. Thus it happens at 2400 m (7870 ft) altitude at 320 km/h (199 mph) and 2.6 g, equivalent to 67° bank and a 30 sec turn (360° in 30 sec *Ed*), and at a slightly lower airspeed or more g the slats have already opened. The condition is not pleasant when one is forced to make sharp aileron movements; the stick then has a tendency to move right to one side. Nevertheless this flight condition is still not dangerous, because after the extension of the slats there is a reserve of

angle of attack before the break. Apart from the unpleasant aileron over-balance the smallest turning circle at rated power at this height is about 28 to 30 sec for a stable 360° turn at constant height. This implies a minimum time for a 360° turn at 1000 m (3280 ft) and with emergency power of about 25 sec.

Landing

Level-off at speeds below 200 km/h (124 mph) only with power. It is advisable to trim the aircraft, because elevator forces become quite high at the round-out. It is possible to achieve a three-point attitude and to touch down without difficulty. If this does not work, or if the ground is uneven, then the unpleasant low-speed characteristics appear and are emphasised by the poor undercarriage damping. The aircraft quickly goes beyond the three-point attitude, elevator forces diminish to the point of over-balance and the effectiveness of the elevator now immersed in the wing wake is hardly sufficient to stop the resultant porpoising (lit. 'galloping'). Because of the limited ground clearance the propeller is especially endangered. If greater angles of attack are reached the aircraft drops a wing, which is not drastic because of the wide undercarriage. In a cross-wind, the rudder is not powerful enough to prevent a break-away; the compressed air wheelbrakes have to be used to help out.

Tactical conclusions and advice

The La-5 is best suited to low-altitude combat by virtue of its engine performance. Its top speed at ground level is slightly below that of the 8-190 and 8-109 (using emergency power). The 8-109 with MW 50 is superior over the whole height band in top speed and best climb rate. Acceleration is probably comparable. Aileron effectiveness is better than that of the 8-109. Turning times at ground level are better than those of the 8-190 and worse than those of the 8-109. In best rate of climb, the 8-190 is poorer until 3000 m (9840 ft). Because of its higher weight, the 8-190 accelerates less well, but by the same token it is superior in all diving manoeuvres and when it turns away level at high speed. Apart from sudden evasive action, it is basically right to dive away (like the Thunderbolt) because of the higher weight and wing loading of the 8-190, thereafter to pull away in a high-speed shallow climb to reach a new attacking position (at best climb speed, the La-5 climbs at a steeper angle), not to let the speed drop and to avoid prolonged turning dog-fights, because you have to accept that the Russians, who are accustomed to poorer handling characteristics, will not allow themselves to be impressed by the La-5's handling in the turn as previously described.

Attention is drawn to the short endurance of about 40 min at rated power and less with the supercharger engaged.

