Dr. Hans Guido Mutke and the Dive of his Me-262: First to Break the Sound Barrier?

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Hans Guido Mutke was a German Luftwaffe fighter pilot during World War II. He was born on March 25, 1925, in Neisse, Upper Silesia, now known as Nysa, Poland. He was called up to the military when he was still in medical school and spent 3 years as a night fighter reconnaissance pilot flying the Bf 110 and the Do 217. He was then assigned to be trained as a jet pilot flying the Messerschmitt 262 in the closing months of the war. Similar to Dr. Hubertus Strughold, he risked his life and career by refusing to join the Nazi party. On April 25, 1945, Mutke landed at DüSbendorf, Switzerland, flying a Me-262 jet fighter as a part of squadron Jagdgeschwader 7 (**Fig. 1**). He claimed that he got lost during a combat mission and landed there by mistake, although it appears that this was a defection. The Swiss authorities never attempted to fly the plane and kept it in storage, but returned it to Germany on August 30, 1957.

After the war, Mutke flew DC-3s for several airlines in Argentina and Bolivia (**Fig. 2**). He later finished his medical training in Berne and Zurich and returned to Germany as a gynecologist until he retired. He was a member of the Aerospace Medical Association and a founding member of the German Society for Aerospace Medicine (DGLRM) in 1962. He was one of the first to publish a paper discussing gynecological issues in aerospace medicine.[4] Hans Mutke died in Munich while undergoing a heart operation in 2004.

On a personal note, both of the authors had met Dr. Mutke and agree that he had a dazzling and charismatic personality. One of the authors (M. R. Campbell) met him personally when Dr. Mutke was contacted in 1990 concerning a paper that he had written describing hardware concepts for performing a surgical procedure in weightlessness.[1,3] In an extreme show of what a mentor should be, Dr. Mutke flew from Germany to a small town in Central Texas to visit the author and to discuss issues regarding "surgery in space." He mentioned that during the war he broke the sound barrier while flying the Me-262 in 1945, a claim the author discounted at the time. By all accepted accounts, on Oct. 14, 1947, Yeager was the first human to break the sound barrier when he flew his rocket-powered Bell X-1 over Rogers Dry Lake in southern California.

On April 9, 1945, Mutke, as a part of the Jagdgeschwader 2 squadron, took off from Lagerlechfeld near Innsbruck, Austria, in his Me-262 for a planned high-altitude training flight. He was climbing through an altitude of 12,000 m (39,400 ft) in near perfect weather with a visibility of over 100 km when his chief instructor Oberstleutnant Heinz Bär called out that a P-51 Mustang at lower altitude was approaching the plane of a comrade from behind.

Mutke went into a steep 40° dive with full engine power. While passing through the altitude of 12,000 m, his Me-262 started to vibrate and began swinging from side to side. The speedometer was stuck against its limit of 1100 km/h (682 mph) (the maximum design speed of the Me-262 is 870 km/h). The speed of sound is 1062 km/h (670 mph) at an altitude of 12,000 m, depending on the environmental variables (**Fig. 3**). The shaking intensified, and Mutke temporarily lost control of his plane. He reported that, with the speedometer still pegged off the scale, he attempted to recover from the uncontrollable dive by adjusting the main tailplane incidence angle. Rather than just having a hinged elevator, the Me-262 could change the angle of incidence of the whole tailplane, a design feature that was also later incorporated in the Bell X-1. Suddenly, the buffeting stopped, and control resumed for a few seconds. Mutke throttled back and his engines flamed out, and after a short period of smooth flight, the buffeting resumed and the aircraft began shaking violently again. He fought to regain control and relight the engines, eventually reducing the speed below 500 km/h and only then was able to pull out of his dive. After a difficult landing, it was found that his plane was missing many rivets and also had distorted wings[2] [Harsch V. Oral history of H. G. Mutke, Munich; 26th and 27th October 1989, 11th March 1999, and 13th April 2000].

At the time, Mutke did not understand the reasons for this strange behavior. This behavior is caused by the creation of shock waves that begin forming over the wings and stabilizer and surfaces in transonic flight. The transonic region is a flight regime where some parts of a plane are traveling supersonic while others are subsonic. For example, the overall airspeed of a plane could be Mach 0.95, or 95% of the speed of sound, but the air accelerating around some parts of the plane, like the wing, may be moving faster than Mach 1. It was only in 1989 that Mutke became convinced that he had broken the sound barrier. This was after discussing his flight with experts at a conference in Munich celebrating the 50th anniversary of jet-powered flight.

There is much discussion among experts as to whether the Me-262 was able to break the sound barrier. It is believed that the damaging effects experienced by Mutke were a side effect of supersonic airstream and shock waves over different parts of the airframe, called buffeting. This effect occurs at speeds approaching Mach 1, but ceases above Mach 1. A number of other pilots flying the Me-262 experienced similar strange accidents and even

From Paris, TX, and Neubrandenburg, Germany.

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Fig. 1. The Me-262a (#500-071) that Hans Multke flew to Switzerland in the closing days of the war. It is now on display at the Deutsches Museum in Munich.

fatally breaking apart in the sky because of buffeting at transonic speeds.

Mutke claimed to have overcome the ever-steepening dive by adjustment of the Me-262's tailplane incidence. This is the same technique that was employed by Chuck Yeager in the Bell X-1 to avoid what is known as Mach trim. Furthermore, Mutke's observation that he briefly regained control of the aircraft, while still accelerating, corresponds with later accounts of supersonic flight. One of the key problems he noted was the tendency of the nose to pitch down, a factor caused by the creation of shock waves over the wing that shift its center of lift aft.

Compressibility in the pitot tubes of the time often resulted in exaggerated speed readings near the speed of sound. American high-speed aircraft (including the Bell X-1) also experienced anomalous airspeed readings in the high-subsonic flight regime (between 0.8 Mach and Mach 1). The Me-262's pre-area rule fuselage would have additionally resulted in very high transonic drag. However, aircraft such as the Bell X-1 and F-86 Sabre similarly did not have area-ruled fuselages, yet flew at supersonic speeds. A computer-based performance analysis of the Me-262 carried out in 1999 by Otto Wagner at the Technische Universität München concluded that the Me-262 could indeed theoretically exceed Mach 1.

In a series of carefully controlled flight tests conducted in World War II by Messerschmitt, it was established that the Me-262 went out of control in a dive at Mach 0.86, and that higher Mach numbers would lead to a nose-down trim that could not be counter-acted by the pilot using the control column. The resulting steepening of the dive would lead to even higher speeds and self-destruction of the airframe due to excessive negative G loads. The Royal Aircraft Establishment in the United Kingdom later confirmed these findings during Britain's evaluation of the Me-262 after the war. The RAE found that the maximum safe speed that could be attained was Mach 0.84, and any higher speed would result in a fatal, uncontrollable dive from which recovery was not possible. So they corroborated Messerschmitt's results, although neither conducted a test flight that actually exceeded Mach 0.86.

Intriguing is the description in the Me-262 pilots operating manual by the Air Force in 1946: "Speeds of 950 km/h [590 mph] are reported to have been attained in a shallow dive 20° to 30° from the horizontal. No vertical dives were made. At speeds of 950 to 1000 km/h [590 to 620 mph], the airflow around the aircraft reaches the speed of sound and it is reported that the control surfaces no longer effect the direction of flight. The results vary with different airplanes; some wing over and dive while others dive gradually. It is also reported that once the speed of sound

Fig. 2. Dr. Hans Mutke as a civilian after World War II.

Fig. 3. Painting commissioned by the "Legend Flyers" entitled "Messerschmitt Me-262 Breaking the Sound Barrier, April 9th, 1945". The caption states: "Messerschmitt Me 262 'White 3' of JG 7, piloted by Hans Guido Mutke, breaking the sound barrier while in a dive on April 9th, 1945."

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is exceeded, this condition disappears and normal control is restored."[5]

The best overall conclusion is stated well by Dan Hampton, who wrote an excellent recent book on breaking the sound barrier: "I put the story [of Mutke's dive] in the book because it was possible, though not probable. Ken Chilstrom [F-86 Air Force test pilot and later commandant of the USAF Test Pilot School] flew a Me-262 back here in the States and told me the jet he used probably could not have gone supersonic, but he did admit that they varied and quality control in Germany in 1944/45 was inconsistent. Bottom line is that a swept wing jet, in a dive, could physically exceed Mach One—maybe without coming apart. But there was no proof that Mutke did it and no documentation" (personal communication with Dan Hampton on July 29, 2018).

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