Defending the Reich

Part 1: Rockets, stovepipes and the "Crab Device"

Luftwaffe specialist **ROBERT FORSYTH** opens a three-part series on the research and development work undertaken by specialist unit *Erprobungskommando* 25, formed in April 1943 specifically to devise and test potential — and often bizarre — solutions to the overwhelming problem of the USAAF's increasingly effective daylight bombing campaign

IN THE SPRING of 1943, with Germany's population, industry and transport network suffering under the Allies' steadily intensifying strategic bombing offensive, the Luftwaffe found itself under mounting pressure to respond and counter the growing threat. As one part of its response, a small unit, tucked away at Wittmundhafen airfield in north-west Germany, close to the North Sea coast, was formed specifically to devise inventive and radical solutions to the escalating problem of the USAAF's four-engined heavy bombers, which were attacking the Reich in daylight in ever-increasing numbers.

Erprobungskommando 25 (Test Command 25) was formed on April 17, 1943, under the command of *Major* Heinz Nacke, a very experienced airman and previously the *Kommandeur* of nightfighter unit III./NJG 3. A veteran of the Spanish Civil War, Nacke had been awarded the Knight's Cross in November 1940 for his 12th aerial victory while flying Messerschmitt Bf 110 Zerstörers with 6./ZG 76. His tenure in command of E.Kdo 25 was brief, however, and he was replaced, on a temporary basis, within a matter of weeks by an equally experienced Zerstörer pilot, *Hauptmann* Eduard Tratt, erstwhile *Staffelkapitän* of 1./ZG 1 in the East. Tratt was also a recipient of the Knight's Cross, having been decorated in April 1942 for his 20th aerial victory.

Following his arrival at Wittmundhafen, Tratt set about arranging the establishment of three *Staffeln* for the embryonic *Kommando*. First, a *Jagdstaffel* (fighter squadron) was formed under *Leutnant* Wilhelm Sbresny and equipped with three Messerschmitt Bf 109Gs and seven Focke-Wulf Fw 190s, intended to conduct trials with numerous weapons, including rearward-firing armament, periscopes, acoustic fuzes and wing-mounted RZ 65 rockets, originally intended for use by Bf 109s in the ground-attack role against locomotives on the Eastern Front.

Secondly, a *Zerstörerstaffel* (bomber-destroyer squadron) of twin-engined heavy fighters was set up under Ltn Vossel, equipped with around ten Bf 110s, a single Messerschmitt Me 210 and a pair of Me 410s, intended to trial heavy-calibre armament such as the 37mm Flak 18 and Flak 43 and 50mm Flak 41 anti-aircraft cannon. These weapons were tested in a variety of hand-fed, belt-fed and automatic configurations. Generally, however, the results were not encouraging and the eventual operational losses suffered by aircraft fitted with such armament were disproportionately high in the relatively few missions flown, with their envisaged capability nullified by a loss of aircraft speed and the defensive fire of enemy bombers.


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ABOVE Hauptmann ***Eduard Tratt (left), clad in a "souvenir" British Irvin flying jacket, during his tenure as*** **Kommandeur** ***of II./ZG 26. Credited with 38 aerial victories, Tratt was the highest-scoring Luftwaffe Zerstörer pilot. This photo was possibly taken on February 22, 1944, the day he was killed in action.***

Finally, a *Kampfstaffel* (bomber squadron) was formed, equipped with two Dornier Do 217s, three Junkers Ju 88s, a solitary Heinkel He 177 and four Bf 109Gs for escort purposes. This Staffel was intended to assess air-burst bombs, towed bombs, the radio-guided Henschel Hs 293 glider-bomb, underwing mortars and rockets, as well as conduct experiments in air-to-air bombing.

Like Nacke, Tratt would remain in command at Wittmundhafen for only a short time, until his permanent replacement arrived in the form of *Oberleutnant* (soon promoted Hauptmann) Horst Geyer, a fighter pilot who, in early 1940, had been assigned as adjutant to the *Generalluftzeugmeister*, Ernst Udet, before joining II./JG 51, with which he was credited with 18 victories. Geyer's service on the Eastern Front came to an end when, in November 1941, he returned to Germany to attend Udet's funeral and was promptly transferred to the staff of the new *General der Jagdflieger* (Commanding General of Fighter Forces), *Oberst*

OPPOSITE PAGE, BOTTOM ***Young Luftwaffe fighter pilots watch and listen carefully as an experienced NCO pilot uses a model of a Messerschmitt Bf 109 to demonstrate tactics to be deployed against an American B-24 bomber in Sicily in 1943. The model is fitted with wire frames to represent the cones of fire from a B-24's defensive guns.***

AUTHOR'S COLLECTION

ABOVE ***Hauptmann Horst Geyer took over from Eduard Tratt as commander of Erprobungskommando 25 in the late summer of 1943. Like his predecessor, he seems to wear an enemy flying jacket as a mark of office, this time a USAAF garment. He is seen here at Achmer in early 1944 beside one of the Kommando's Messerschmitt Me 410s.***

Adolf Galland. In May 1943 Galland ordered Geyer to relocate to Wittmundhafen and take over command of E.Kdo 25 from Tratt, who was returning to I./ZG 1.

Rocketeering

Geyer quickly rose to the challenge of his new command and one of his first initiatives was to investigate the use of wing-mounted rockets and mortars by single-engined fighters against enemy four-engined bombers, or *Viermots* ("four-motors") as they were referred to colloquially by the Luftwaffe. As a first trial, two Fw 190s were each fitted with a pair of external wing-mounted "firing frames", each built to carry four 65mm spin-stabilised RZ 65 rockets.

Designed by Rheinmetall-Borsig at its factory at Unterlüss, between Hannover and Lüneburg, the RZ 65 was intended to be launched from an externally mounted rack or from a Föhn "honeycomb" barrel of tubes. Originally loaded with a "compressed black powder" as a propellant, this was later replaced by a more efficient smokeless powder and activated by an electric threaded primer. Weighing 3·15kg (7lb), including a warhead of 840g (1·85lb), the rocket had a nominal velocity of 300–380m/sec (985–1,245ft/sec) and was fuzed with an electric and mechanical percussion fuze. It was to be fired at a maximum range of 300m (1,000ft) from a target and, once launched, would spin at 19,700 r.p.m. with a maximum thrust of 200–220kg (440–485lb).

The RZ 65 is thought to have first seen operational deployment with E.Kdo 25 when two Fw 190s took off as part of a four-aircraft *Schwarm* to intercept raids by the US Eighth Air Force against Bremen and Kiel — targets close to Wittmundhafen — on June 13, 1943. Geyer led one of the two-aircraft *Rotte*, each machine carrying RZ 65s, while the other Rotte was led by Oberleutnant Erwin Hardtke, who had joined E.Kdo 25 from Schl.G. 1. Geyer recalled:

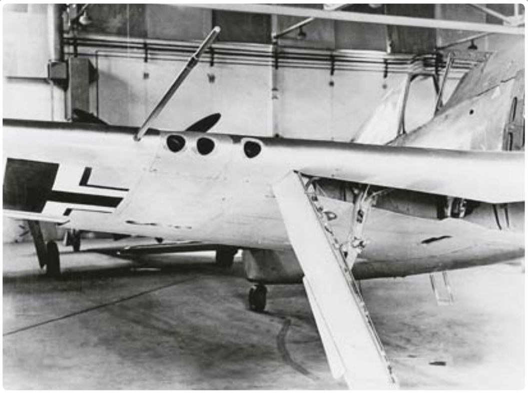
"This mission would see my first *Abschuss* [victory] as *Kommandoführer* of Erprobungskommando 25. Scattered bomber units were making their way home after their raid on the ports. There were no escort fighters in sight, so I attacked two [Boeing] B-17s which were flying close together. I fired all eight RZ 65s and after the two bombers were forced to separate, I was able to wreak havoc on the machine flying lowest and to the right with several bursts from my MK 108 cannon.

"From about 2,000m [6,500ft], I observed two parachutes fall out while the B-17 was evidently trying to go for an emergency landing. Meanwhile I had lost contact with my three comrades, but they all landed back at Wittmundhafen without damage. What was key here was that the rockets had weakened the bombers' defensive fire, shocked the crews and enabled me to get in close to make my shoot-down."

In a later modification, the wing leading edges of at least one of the Kommando's Fw 190s had launch tubes for six RZ 65s installed internally, with three tubes built into each wing, but this brought little result.

Despite isolated successes, deployment of the

This Focke-Wulf Fw 190A-5 of E.Kdo 25 has been fitted with six tubes, probably for spin-stabilised RZ 65 rockets, built into its wings. The concept proved disappointing in limited operational trials during the summer of 1943, and was dropped from the Luftwaffe inventory later the same year.



AUTHOR'S COLLECTION x 2

RIGHT ***A close-up of the three rocket tubes for spin-stabilised RZ 65s fitted within the starboard wing of one of the Kommando's Focke-Wulf Fw 190A-5s.***

RZ 65 by E.Kdo 25 proved largely unsatisfactory owing to technical problems. A week after Geyer's attack on the bombers he reported that "the use of the RZ 65 has shown that impact on a target at a key point cannot be seen. The calibre [of the rocket] is too small when compared to the size of a four-engined bomber. In addition to the extraordinary stability of these aircraft, it has recently been discovered that crews (or at least the pilots) are provided with chain-mail armour in addition to the normal armour plating. This provides excellent protection against small shell splinters. Even when fired in mass, there is little chance of success owing to the poor ballistics".

Indirectly, this was a testament to Geyer's flying skills on June 13, but further trials with the rocket were dropped.

From rockets to mortars

What had been learned by Geyer and his pilots was the value in dispersing the bomber *Pulks* (literally, throngs) so that their defensive fire could be weakened and suitable confusion caused within a formation to enable single, isolated bombers to be targeted more easily. At that point, the fighters could engage more closely and use their cannon and machine-guns to bring the bombers down. What was needed to do this, however, was a more powerful weapon that could cause an even greater breakdown of an enemy formation.

One option lay in the form of an army infantry weapon designed for use in ground warfare — the 21cm (8¼in) Nebelwerfer 42 mortar. As hopes fell for the effectiveness of the RZ 65 in June 1943, so a consignment of 30 mortar tubes, together with 200 shells from the *Wehrmacht* munitions storage facility at Lübeck-Gestringen, was delivered to the Fw 190-equipped I./JG 1 at Schiphol in Amsterdam, with a further 34 tubes and 200 shells going to similarly-equipped II./JG 26 in France, where trials were placed under the supervision of Ltn Otto Hummel of 5.Staffel.

It was at this point that Hptm Tratt, who in the meantime had been appointed to command the Zerstörerstaffel of E.Kdo 25, was assigned temporarily to I./JG 1, where he formed the Erprobungskommando/JG 1, equipped with four Fw 190A-4s, specifically to undertake tests with the mortar. Firing took place over the North Sea, and as early as June 13 three B-17s were claimed by mortars over the German Bight, while on the 22nd, *Oberfeldwebels* Hans Laun and Günter Fick of I./JG 1 claimed a further two Viermots shot down and two damaged. These initial results proved sufficiently satisfactory for trials to continue using aircraft of both JG 1 and JG 26 as well as E.Kdo 25, and the weapons-testing centre at Tarnewitz.

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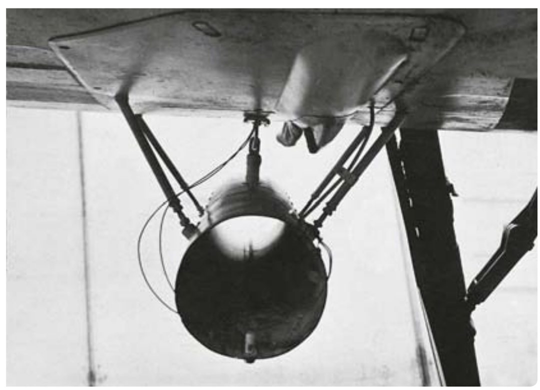

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TOP ***Focke-Wulf Fw 190A-5 WNr 1372, "White 4", was used extensively for static firing trials, and is seen here with its tail jacked up and a W.Gr.21 mortar attached to the starboard wing.*** **ABOVE LEFT & RIGHT** ***The aerial mortar was a relatively simple device that could propel a projectile at a comparatively low velocity over a short range.***

Geyer remembered: "Unlike other missiles, the 21cm Werfer, which came to us from the Army, was not equipped with fins or stabilisers. Rather, this weapon was stabilised by its own spin, which, in turn, was created by the blast from initial ignition and the subsequent velocity. The 21cm shell turned two or three times per second after leaving its launch tube, but speed increased rapidly thereafter.

"We observed that the shell did not run straight to its intended target, but rather spiralled, and therefore often missed the target. To overcome this, the manufacturer built in a time fuze intended to detonate the shell at a pre-set time. We usually fired the weapon from a range of 400m [1,300ft] and from our experience with it, we were able to set the fuze correctly, compensating of course for the approach-speed of the target. However, the closer to the target you were, so the greater the blast and the success of the weapon."

One W.Gr.21 rifled mortar launching tube, measuring 1·3m (4ft 3in) in length, was suspended from beneath each underside wing surface of an Fw 190A-4/R6 by means of four bracing lugs and a central hook with a suspension bracket. Three retaining springs, located near the rear end of the tube, held the 112kg (245lb) shell with its 40kg (88lb) warhead in place and a screw-bolt, also at the rear end of the tube, prevented the shell from sliding out. In an emergency, the launching tube could be jettisoned by activating an electrically-primed explosive charge which severed the central hook.

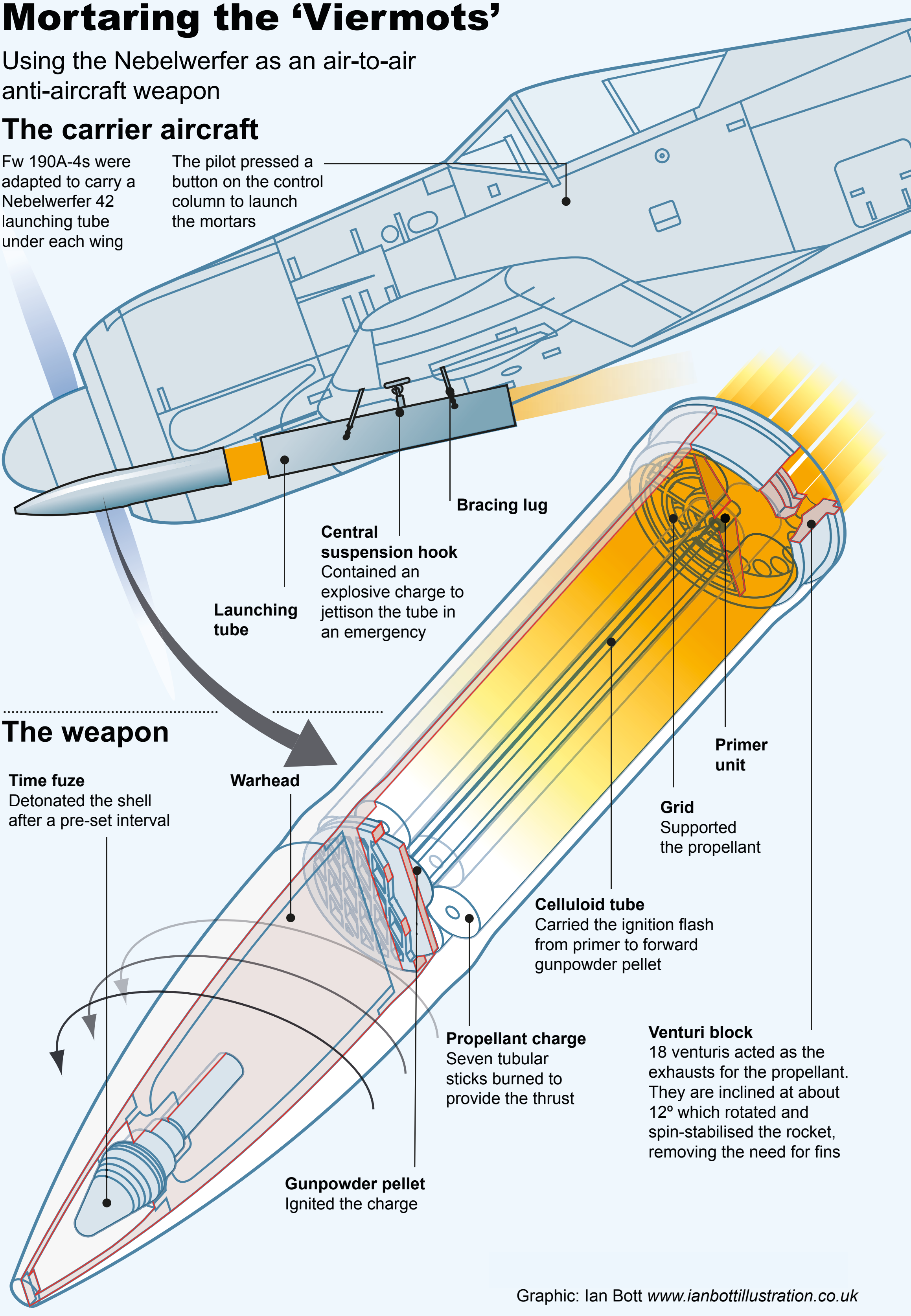
The mortars were controlled from an armament panel in the cockpit containing two armament switches and a Revi 16B reflector sight. Two

Mortaring the ‘Viermots’

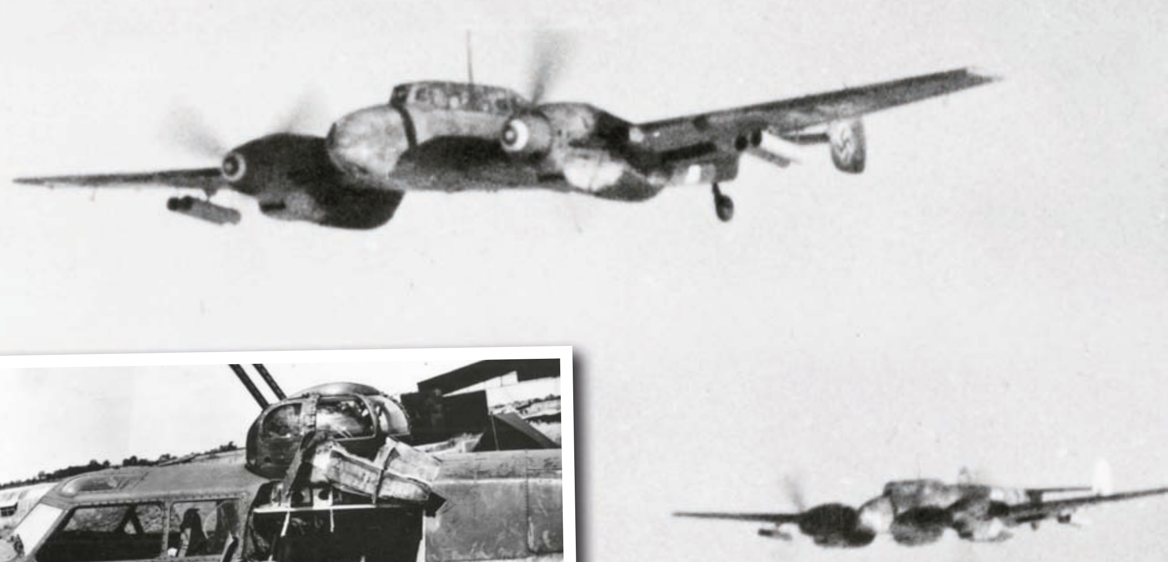
Using the Nebelwerfer as an air-to-air anti-aircraft weapon

The carrier aircraft

Fw 190A-4s were adapted to carry a Nebelwerfer 42 launching tube under each wing



Graphic: Ian Bott *www.ianbottillustration.co.uk*



ABOVE ***A pair of Messerschmitt Bf 110G-2s of ZG 76 fitted with twin mortar sets on each wing head off in search of prey.*** **LEFT** ***The damage inflicted on B-17F 42-29997*** **The Sack** ***of the Eighth Air Force's 379th Bomb Group, by a W.Gr.21 during a raid on Kassel and Oschersleben on July 28, 1943. The blast from the mortar caused the bomber's oxygen bottles to explode, but the Fortress managed to return to the UK safely.***

AUTHOR'S COLLECTION x 2

spin-stabilised shells were fired simultaneously when the pilot depressed a button on his control column. As Geyer states, the mortar shells were fitted with a time fuze, pre-set before delivery to an operational unit and not subsequently adjusted. In theory the firing range was therefore fixed and the weapon's low velocity meant that, to be effective, it had to be aimed 60m (200ft) above its target and a shell had to detonate within 28m (90ft) of a bomber.

The *Ofenrohr* (stovepipe), as the Germans came to call it, was used in numbers for the first time operationally on July 28, 1943, during American raids on Kassel and Oschersleben, and results were acceptable in as much as fragmentation from blast did break up the bombers and a number were claimed destroyed as an indirect result. In a report prepared in late August 1943, US Eighth Air Force HQ warned that the mortar appeared "to be the most dangerous single obstacle in the path of our bomber offensive".

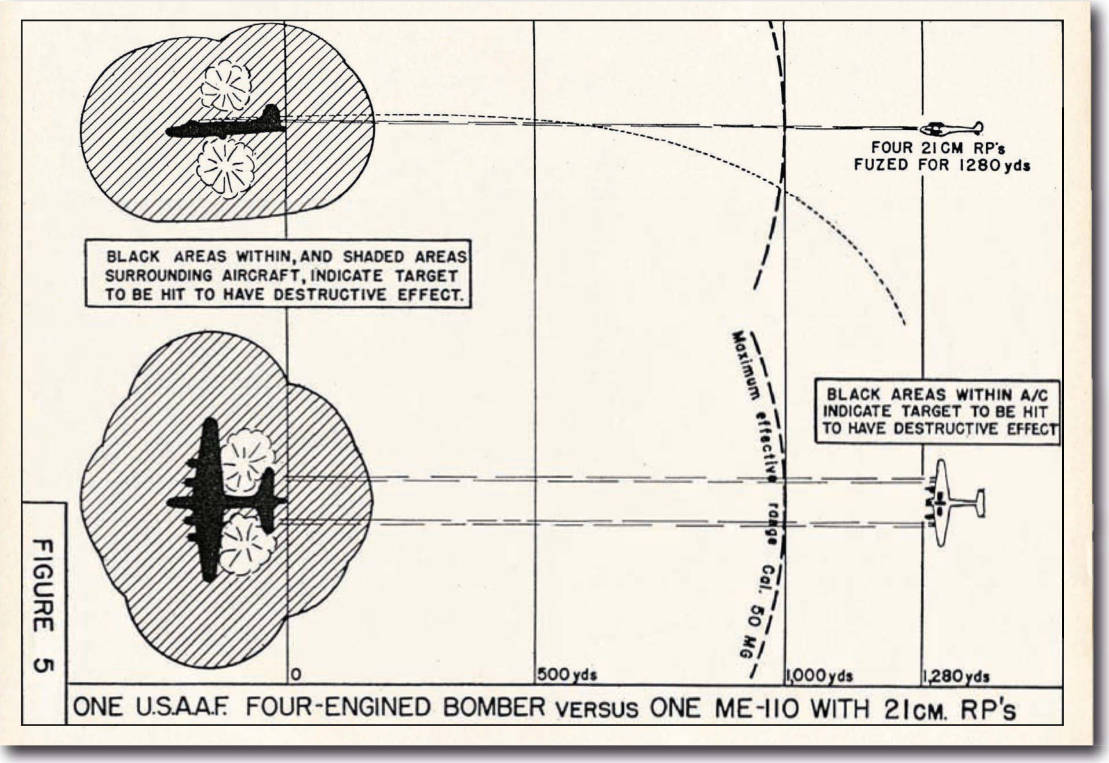
Owing to the limited ground organisation at Wittmundhafen, E.Kdo 25 was relocated 95 miles (150km) south to Achmer in early October 1943. From there, Geyer claimed another victory with the Kommando when he shot down a Consolidated B-24 from a group belonging to the US 2nd Bombardment Division (BD), between Münster and Osnabrück on the 8th.

As the enemy formation made its return from a raid on Vegesack, Geyer took off from Achmer leading a flight of three Fw 190s, each fitted with two W.Gr.21 mortars. Attacking the Liberators from the rear, Geyer fired his mortars at one bomber, but realised only one of his launch tubes was functioning. As he jettisoned both tubes, he noticed that the B-24 had tipped away from its formation and was falling through the sky. Geyer pursued it and opened fire with several long bursts from his 20mm MG 151/20 cannon, following which he observed "considerable damage to the fin assembly and heavy smoke coming from the inner starboard engine. But right then several [North American P-51] Mustangs suddenly rushed down on us and I gave the order to evade. One of my wingmen had also succeeded in shooting down a B-24 using his mortars".

The mortar was perhaps used to its greatest effect against the infamous American mission to Schweinfurt on October 14, 1943, during which 62 Viermots were shot down, many as a result of being dispersed from their formations by the use of the mortar.

Increasing effectiveness

"Stovepipes" were also fitted to Bf 109G-6s of IV./JG 3, I., II. and III./JG 53, I. and III./JG 77 and I./JG 5 and used to varying effect in the Mediterranean



AUTHOR'S COLLECTION

ABOVE ***This official USAAF diagram from 1944 shows the required area around a B-17 in which an aerial mortar bomb had to explode in order to have a destructive effect when fired by a Bf 110 carrying four "stovepipes" at a range of 1,280yd. Note how the attacker could fire while remaining outside the range of the bomber's rear guns.***

and Rumania from August 1943 until early 1944. Other Bf 109s of 7./JG 3, 5./JG 11, 2./JG 27 and 6./JG 51, similarly equipped, operated in the defence of the Reich. A number of Bf 110G-2/R-3s of ZG 76 and Me 410As of ZG 26 carried pairs of twin mortar sets, specially assembled by the *Maschinenfabrik* in Donauwörth, in addition to an array of cannon and machine-guns, to operate as heavily-armed bomber-destroyers.

On October 10, 1943, Maj Karl Boehm-Tettelbach led the Bf 110s of ZG 76, together with Me 410s of III./ZG 1, against B-17s of the 3rd BD during an attack on the marshalling yards at Münster. The Division left England without escort owing to bad weather and had already been mauled by single-engined fighters, but the 14th Combat Bombardment Wing (Heavy) was particularly badly hit near Münster when the mortar-armed Zerstörer undertook a mass attack from the rear, inflicting considerable damage. As the American post-mission synopsis recorded:

"The fighters appeared to stay out of range, Me-110s [sic] firing at formation with long-range weapons slung under each wing and lobbing explosive . . . attacked from 800–1,000yd firing rockets from under each wing (two distinct puffs were seen from each ship). Their formation resembled our defensive formation."

Furthermore, Bf 110s were seen to "hit a B-17 by rocket, tail came off, 'plane broke in two. It then collided with another B-17 near Saerbeck. Both went down. No 'chutes".

Nine Zerstörer were lost during the Münster raid, but this was exceptional; losses usually ran at five to ten per cent per mission and success levels were considered good, not just if bombers were shot down, but also where formations were scattered and disorganised, leaving them prey to the single-engined fighter units.

Although further intensive trials continued under E.Kdo 25 until mid-1944, with the aim of improving the W.Gr.21 in terms of strength, weight, functioning and operational longevity, it was found that the launch tubes robbed German fighters — particularly the heavier Bf 110 — of their performance and made them vulnerable to Allied fighters. Senior Luftwaffe fighter commanders recognised the psychological effect of the mortars on enemy bomber crews, but equally that when fitted to the Fw 190, a loss in speed of some 40–50km/h (25–30 m.p.h.) was incurred, as well as a loss of ceiling and manœuvrability. There was also a lack of a range-measuring device and therefore an inability to control the point of detonation.

Over the Italian front on January 30, 1944, the Staffelkapitän of 2./JG 77, Hptm Armin Köhler, flying a Bf 109, recorded how, on one mission

EN ARCHIVE VIA AUTHOR x 3

TOP ***A dramatic photo capturing the moment a mortar is launched from "White 4" during a static test at Barth in early 1944.*** **ABOVE LEFT** ***The results — "White 4" suffered major blast damage to the trailing edge of its wing and control surfaces, although it was repaired and used again.*** **ABOVE RIGHT** ***A close-up of a "twin-stovepipe" fitted to an Me 410. The primary objective was to break up bomber formations rather than destroy individual aircraft.***

against American bombers over Udine, "I take hits in the starboard wing and the [W.Gr.21] tube is shot away". The next day, when the Allied bombers returned, Köhler complained that "the mortars overshoot".

The "Parthian shot"

Meanwhile, back in the Reich, Horst Geyer was overseeing another development for the W.Gr.21 — a rearward-firing version. In February 1944, following a suggestion made by *Stabsingenieur* Reyle of the RLM's Technical Office, Geyer noted that initial ground tests with a rearward-firing mortar had yielded "positive results", although further — presumably airborne — tests still had to be undertaken. "This installation is ready to go," he recorded, "and it is expected that with little effort, the W.Gr.21 used this way will be much more advantageous compared to the previous attack methods used."

The intention was that a pilot would fire the mortar, known as the *Krebsgerät* (Crab Device), after he had made a firing pass using forward armament against a bomber formation and was in the process of passing through the enemy Pulk. The fuze would be set to detonate at 1½–2sec after the weapon was fired, giving sufficient time for the carrying fighter to fly ahead and clear. There was a plan to make the tube jettisonable after firing but it is not thought this was ever followed through with. It was hoped that a rearward-firing mortar would achieve surprise in the manner of a "Parthian shot", a military tactic made famous by ancient Iranian Parthian archers, who, while retreating on horseback at full gallop would turn their bodies back to shoot at the pursuing enemy.

In May 1944 Galland ordered that 20 Fw 190A-8s be fitted with the Krebsgerät, while Obst Hannes Trautloft, Inspector of Day Fighters, required one Me 410 to be installed with the rearward-firing

AUTHOR'S COLLECTION

LEFT ***Willi Unger of 12./ JG 3, based at Barth in May 1944, poses with his Fw 190A-8/R-2, "Yellow 17", which has been fitted with a single rearward-firing 21cm mortar, or*** **Krebsgerät*****, for use against enemy bombers. Unger was unimpressed with the device and complained that it robbed his fighter of speed and agility.***

BELOW ***In early February 1945 the Me 262-equipped*** **Stabsstaffel** ***of JG 7 undertook trials using W.Gr.21 mortars and later 55mm R4M rockets. Here a pair of Me 262A-1as are seen at Brandenburg-Briest or Parchim fitted with mortar tubes.***

mortar for trials with the Zerstörerstaffel of E.Kdo 25. On the one occasion the weapon was fired, the Me 410 suffered from a strong blowback, thick smoke filled its cockpit and its hydraulic system was severely damaged. Despite this, by July 15, 1944, it was planned to have 60 Krebsgeräte ready for installation into Fw 190s, with 16 fighters of E.Kdo 25 fully fitted out by August 15. A new automatic optically-controlled firing mechanism, known as the *Wurzen*, was also being worked on by the HASAG company in Leipzig. By the end of August, however, Geyer recorded that only one Fw 190 had been fitted with the automatic device.

In the meantime, in May 1944, pilots of the Fw 190-equipped 12./JG 3, while based briefly at Barth, had attempted trials with a single rearward-firing 21cm mortar tube. Just four of the Staffel's aircraft were installed with Krebsgeräte fitted beneath their centre sections, but they proved unreliable mechanically. The additional armour already installed in the unit's Fw 190A-8 *Sturmjäger* affected performance, and at least one pilot who tested the weapon in combat, *Unteroffizier* Willi Unger, reported that the Krebsgerät simply caused a further deterioration in the fighter's speed and manœuvrability. By late September, trials with both E.Kdo 25 and other operational units seem to have petered out.

By late 1944 the W.Gr.21 had all but disappeared from Luftwaffe use, although in March 1945 a small number of Messerschmitt Me 262A-1a twin-engined jet fighters of the *Stabsstaffel* and III./JG 7 were fitted with mortars in a brief — and ultimately fruitless — experiment.

Throughout this period, as increasing tonnages of Allied bombs rained down on the German homeland, Horst Geyer had many other weapons projects to attend to; and if conventional weapons were proving insufficient to deal with the bombers, then he was ready to look at other much more ambitious ideas . . .

Next time: *E.Kdo 25 continues to investigate ever more desperate — and increasingly bizarre — concepts to turn back the overwhelming tide of Allied bombers, including artificial air squalls generated by explosives, "fire clouds" dropped from above and sharpened steel cables dragged into enemy bomber formations.*

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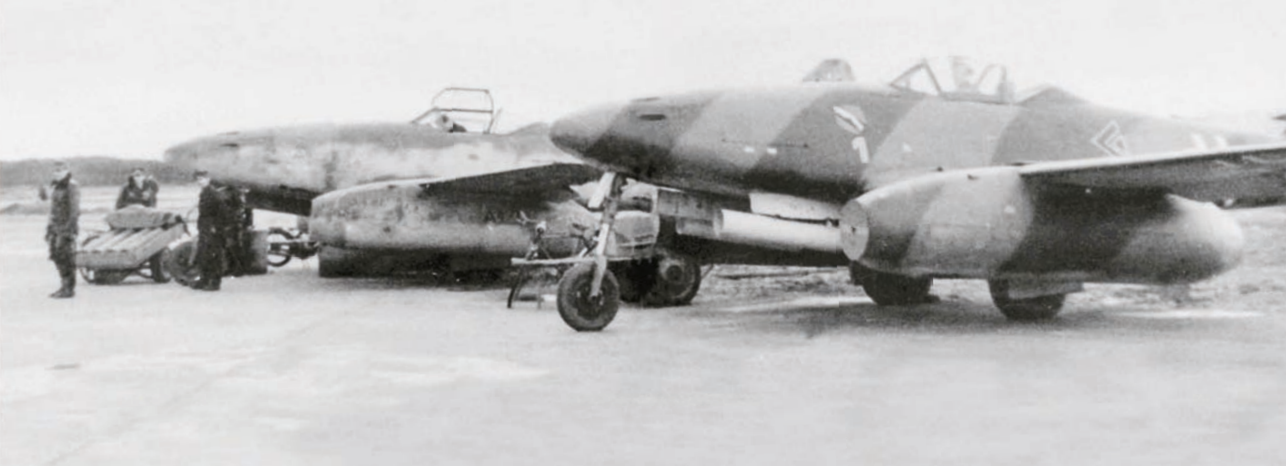
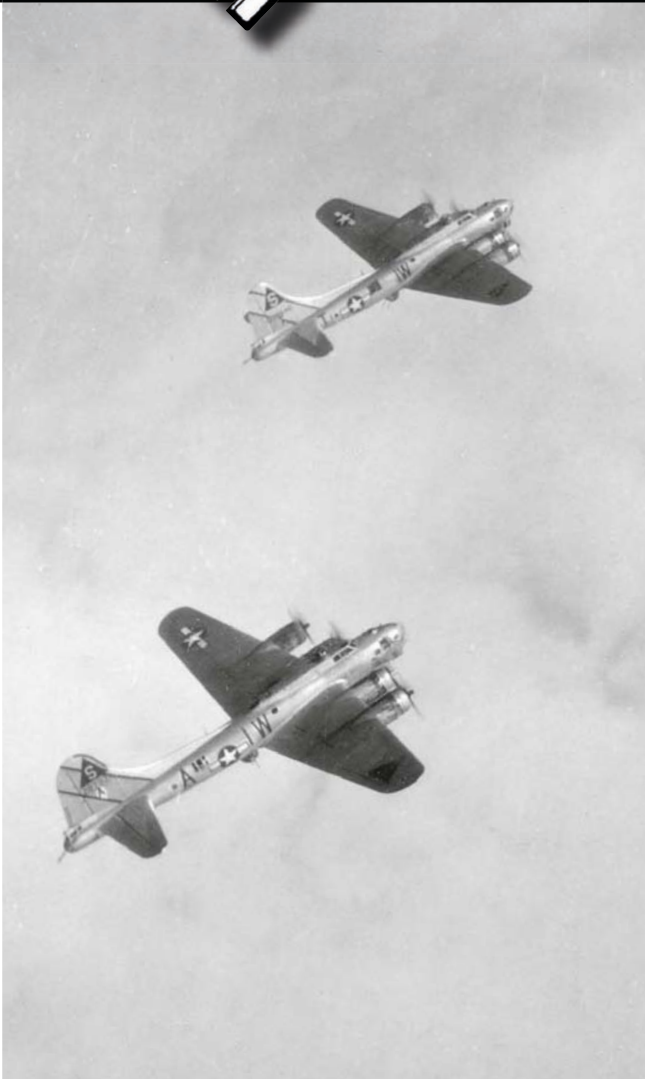


Defending the Reich

Part 2: "If something looked hopeful . . ."

Continuing his three-part series on the wartime activities of specialist Luftwaffe unit *Erprobungskommando 25*, tasked with developing methods to counter the Mighty Eighth's relentless daylight bombing of the Fatherland, **ROBERT FORSYTH** details the unit's exploration and development of artificial air squalls, cable-bombs and "fire-clouds"



AS RELATED IN *Defending The Reich — Part 1: Rockets, Stovepipes and "The Crab Device"* in *TAH17*, Luftwaffe unit *Erprobungskommando 25* (E.Kdo 25 — Test Command 25) was formed during the spring of 1943 at Wittmundhafen specifically to devise and assess experimental aerial weaponry intended to combat USAAF four-engined bombers which, from that time, were engaged in an increasingly intensive daylight strategic air campaign against the Third Reich.

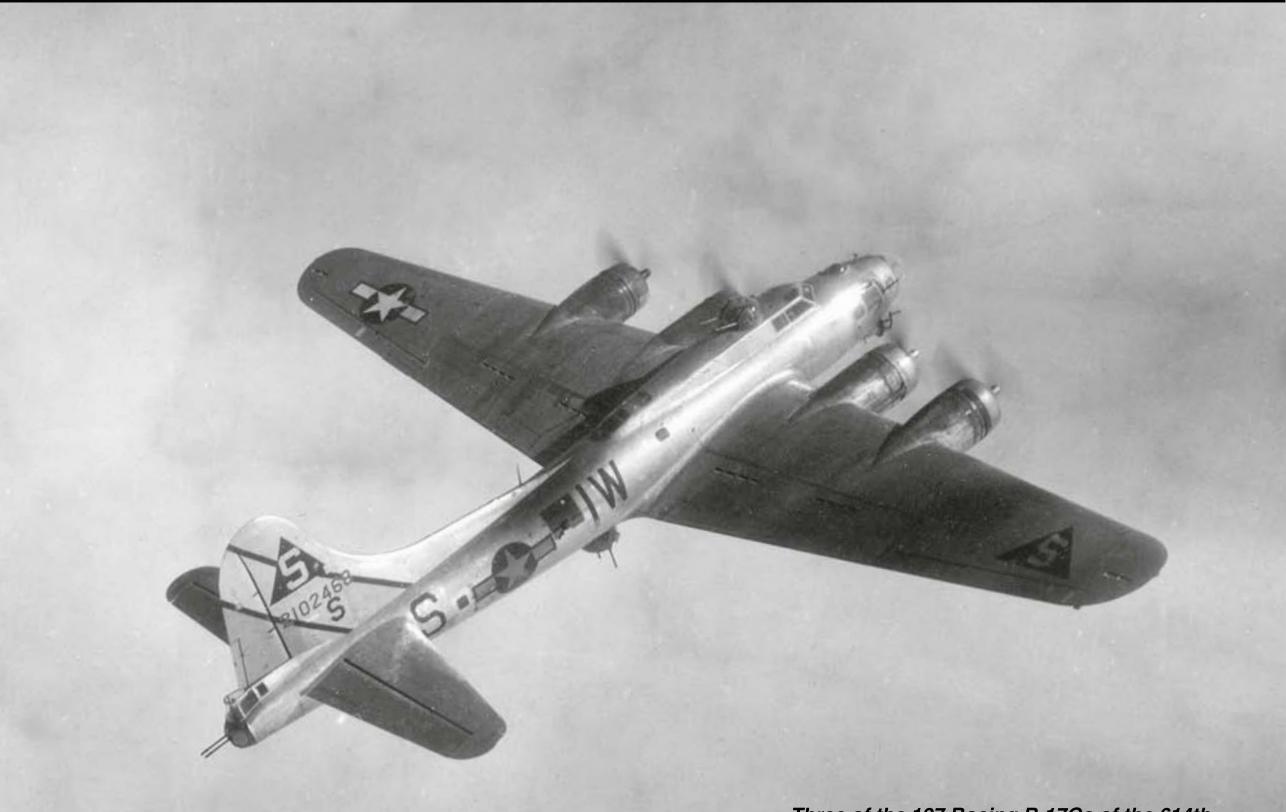
According to *Hauptmann* Horst Geyer, former commander of the unit, "E.Kdo 25's main brief was to develop and test new, effective weapons with which to bring down heavy bombers. We tried many things, but the ideas did not always originate from within. We received many letters and proposals from civilians, from companies and manufacturers, from other branches of the armed services and also from the Luftwaffe testing centre at Rechlin; 'Why don't you try this, or that?' and so on.

"All suggestions were investigated and if something looked hopeful, then we proceeded with trials. We were basically free to do what we liked, buy what we liked, design what we liked and test what we liked. But it fell to me to report everything to *Generalleutnant* [Adolf] Galland, *General der Jagdflieger* [Commanding General of Fighter Forces], and the *Erprobungsstelle* [Test Establishment] at Rechlin."

Nothing was considered too imaginative, bizarre or beyond consideration. One radical suggestion came from Dr Wendland of the design

AUTHOR'S COLLECTION

LEFT *Adolf Galland (far left) confers with Oblt Franz Frodl of E.Kdo 25 at Achmer in November 1943. Horst Geyer is second from right, and beside Galland is Hans-Günther von Kornatzki, CO of* Sturmstaffel 1*, the Fw 190s of which would have been fitted with the weapons devised and tested by E.Kdo 25.*



Three of the 127 Boeing B-17Gs of the 614th Bombardment Squadron, 401st Bombardment Group, sent from Deenethorpe to bomb oil refineries at Molbis, near Leipzig, on March 17, 1945. Nearest the camera is serial 42-102468, coded IW-S, which completed some 106 missions over Europe. Erprobungskommando 25 *was established specifically to find effective ways of disrupting such formations and destroying the USAAF's devastating bombing capability.*

PHILIP JARRETT COLLECTION

Focke-Wulf Fw 190A-5 WNr 181729, "White 42", as operated by E.Kdo 25 at Achmer, near Osnabrück, in the early summer of 1943. Note the W.Gr.21 mortar tube attached to the underside of the wing, as covered in the first part of this series. The camouflage finish is RLM 74 Graugrün and RLM 75 Grauviolett over RLM 76 Lichtblau, with a black flash with thin white edging applied over the exhaust area. Artwork by TOM TULLIS © 2017

department at the Focke-Wulf aircraft company at Bad Eilsen, on March 8, 1944, in which he proposed to destroy enemy bomber formations by means of artificially-generated gusts or squalls of air. These were to be created by the "combustion of fuels in the atmosphere". Wendland envisaged replicating the levels of natural energy contained in the "storm clouds of nature" — around 6·5kcal to 1kg of air — which created updraughts of speeds of more than 25m/sec (82ft/sec). If combustion could occur without excess air, enormous energy — up to 680kcal to 1kg of air — could be produced. Wendland proposed producing such energy by blasting volatile explosive fuels directly into the atmosphere from specially designed external tanks, one of which he proposed fitting to a Junkers Ju 88, or smaller versions under each wing of a Focke-Wulf Fw 190.

According to Wendland, "the ignition of such fuels in the atmosphere would produce updraughts of tremendous strength. Aircraft which have less resistance to gust, for example bombers, would suffer extreme flows of wind on their wings, of sufficient strength to cause rupture of the airframe". However imaginative Wendland's proposal may have been, it did not progress beyond report stage.

Other ideas did. Between June 1943 and August 1944 E.Kdo 25 tested a range of special weapons including towed bombs, cable-bombs and the mounting of batteries of upward-firing 21cm mortars into a Heinkel He 177 bomber. In February 1944, following a proposal from Oberst Edgar Petersen, *Kommandeur der Erprobungsstellen*, and from a member of E.Kdo 25, the spraying of fouling chemicals into engines and on to windscreens was explored. The latter proposal became the subject of much debate and examination; and to this end, a salvaged engine from a downed USAAF bomber was sent to the chemical firm of I.G. Farben, which was instructed to conduct experiments with prospective chemicals. Geyer recalls:

"One member of the unit had contacts with the I.G. Farben company and he worked with them on trials designed to clog up an aircraft engine using certain chemicals; but they found that the quantity of chemicals needed to 'kill' one engine was too great; to have brought down a four-engined bomber would have been impossible."

Ozone bombs and Plexiglas killers

Indeed, by June 1944 Geyer had noted that all efforts in this direction had so far proved unsuccessful. The Kommando also consulted Dr von Harz of the research laboratories at the chemical and weapons company Dynamit Nobel AG in Troisdorf. The doctor advised the officers of E.Kdo 25 that the agents available did not possess sufficient energy to destroy an engine. It had been suggested that the use of ozone (a powerful naturally occurring oxidant formed in the earth's atmosphere) could damage the engines of enemy aircraft, but Geyer conceded that harvesting ozone was extremely difficult; and that, in any case, there were no devices available to carry and spray the required quantities of the substance, other than at the *Deutsche Versuchsanstalt für Luftfahrt* (DVL — German Research Institute for Aviation) at Berlin-Adlershof, where he recommended any further testing should be undertaken.

Geyer further recalled that "tests were also carried out at Rechlin with chemicals designed to spray over cockpit and gun turret Plexiglas — to adhere to it and to mask it but not, necessarily, to destroy it. Civilian laboratory researchers analysed fragments of windshields from shot-down [Boeing] B-17s and [Consolidated] B-24s in an effort to determine the manufactured composition of the Plexiglas. They subsequently developed certain types of chemicals in liquid and powdered form which could be dispersed over the glass. Rechlin then asked us to conduct trials using an Fw 190 and we found that, depending on which kind of chemicals were being used, it was not necessary to use large quantities".

The spray-nozzle droptank

Based on an original German document, this sketch shows the basic configuration of a spray-nozzle droptank, which could contain volatile explosive fuels or Plexiglas-dulling chemicals which would be sprayed into oncoming bomber formations.

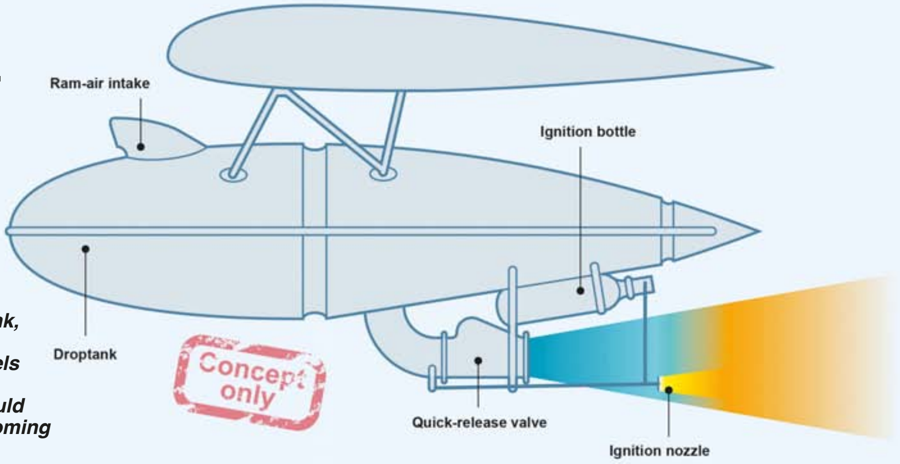


ILLUSTRATION BY IAN BOTT / WWW.IANBOTTILLUSTRATION.CO.UK

Geyer recalls a group of chemists visiting the airfield one day to deliver a sample of one such "white liquid", which was duly sprayed over a large piece of Plexiglas. He explains:

"As soon as the liquid hit the glass, you 'went blind' — you couldn't see anything in front of you. But I wasn't sure about it and I sent a report to Galland, warning him that, if necessary, American bomber crews would attempt to break their windshields if they were sprayed, thus nullifying the effect. Galland understood what I was saying. But Goering also grew worried about the idea and instructed Galland not to pursue it, as he was concerned that the enemy would employ the same methods against us".

Geyer does remember one Fw 190 being fitted with underwing tanks with valves designed to eject a chemical spray. The valves were of an open-or-shut, one-use only, jettisonable type and were intended to be used during a head-on attack against an enemy bomber formation. The Fw 190 would make a standard approach using cannon and pass over the formation with the pilot opening the valves of the tanks to spray the American aircraft. No such operations were ever performed, however.

The original drag-and-drop

Another concept developed at Rechlin came in the form of towed bombs. Experiments commenced in August 1943 using a Heinkel He 111 to tow box- and ring-ended SC10 10kg (22lb) bombs through the air. Trials were conducted over open moorland using steel cable of 2·5mm (0·1in)-diameter with a length of 60m (200ft), trailing down to 21·5m (70ft), the Heinkel flying at a speed of 350km/h (215 m.p.h.).

A second test was made with high-tensile-strength carbon-steel piano wire of 1mm (0·04in)-diameter, 100m (330ft) in length, trailing to 25·5–32·5m (84–106ft). In order to prevent the trailing bomb from striking the fuselage or tail of the carrier aircraft during the first test on August 24,

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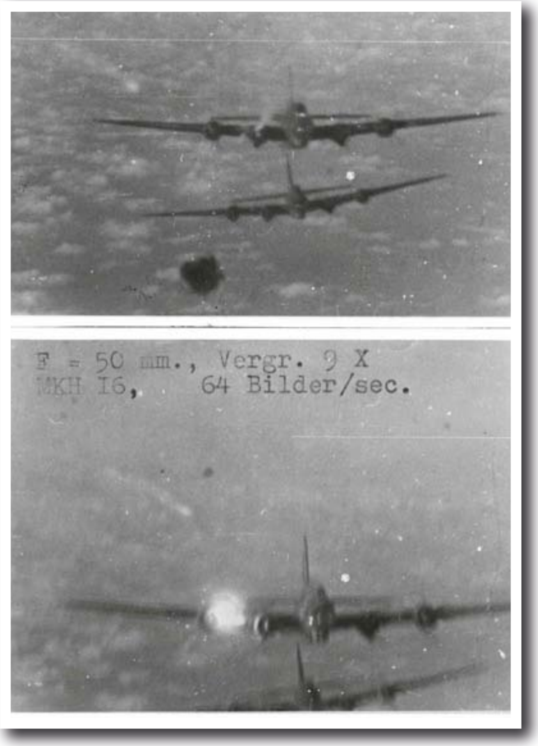
ABOVE ***Franz Frodl shows a selection of trial cable bombs and weights to a group of officers, including*** **Oberst** ***Johannes Trautloft (third from left), former*** **Kommodore** ***of fighter unit JG 54 and soon to be appointed*** **Inspekteur der Tagjäger** ***(Inspector of Day Fighters), during a visit to Achmer in November 1943.***

1943, the Heinkel flew at 240km/h (150 m.p.h.), and the practice bomb was fitted to steel cable and at first fed out from the fuselage manually to a length of 2m (6ft 6in). This "proceeded flawlessly", and after some further observation the cable was unspooled to a length of 60m. Again, there were no problems, and the cable was reeled back into the aircraft by hand.

Subsequent experiments were conducted



AUTHOR'S COLLECTION

LEFT ***These two gun-camera stills from an Fw 190 capture the outer starboard engine of a USAAF B-17 exploding during a frontal attack. By 1943 E.Kdo 25 was investigating and testing the use of various types of cable bomb and detonating cord for deployment against the*** **"Viermots"*****. It was hoped that such items would cause havoc among enemy bomber formations.***

using piano wire. It was found that when the aircraft changed course, the wire at first swung erratically, but after 5–10sec of continued flight it straightened again. The recovery and reeling back of the practice bomb to the aircraft went without problems at speeds up to 220–250km/h (137–155 m.p.h.), except on one occasion when the bomb was caught in the slipstream of the port engine, flailing in the air some 20m (65ft) from it and only narrowly avoiding striking the aircraft.

In other tests with piano wire the bomb was suspended to a length of 200m before it was judged to be "still". But after a few seconds the cable swung to one side, before swinging out into ever-increasing arcs until there was a continuous circling motion covering an area some 50–70m (165–230ft) in diameter. At this point, the wire was cut and the bomb fell on to the moorland.

By the end of August 1943, despite the erratic and hazardous nature of these initial experiments, there was sufficient belief in the principle of towed bombs to develop an automatic reeling and cutting device based on a cable drum for installation within a carrier aircraft. In late September 1943, however, the Erprobungsstelle at Rechlin delivered an experimental 10kg (22lb) "sharpened-cable bomb" to E.Kdo 25 for fitting to an Fw 190, with the objective of deploying such a weapon against American bomber formations. Rechlin had originally tested the 2·5mm (0·1in)-diameter twisted-steel-cable bomb with a view to using it against high-tension electric power cables and telephone lines in enemy territory but, in an echo of Goering's concerns over the use of chemical sprays, such plans were abandoned when the *Oberkommando der Luftwaffe* (OKL — Air Force High Command) voiced concern that the appearance of German aircraft in the sky trailing sharpened steel cables could incite the enemy to adopt similar measures over Germany.

Curiously, it was representatives from the German Police & Postal Ministry who suggested that the cable offered an opportunity for aerial deployment. They envisioned cables being dragged into enemy bomber formations and dropped on to bomber engines. To this end, the Erprobungsstelle also furnished E.Kdo 25 with the salvaged wing section of a B-24 Liberator on which it could conduct ground tests.

The technical personnel of the unit devised a means by which a cable of 100–400m (330–1,300ft) in length could be stowed in a specially adapted cylindrical metal container, with the 10kg "bomb" — effectively just a weight added to the end of the cable to provide momentum — left outside the casing. The whole apparatus was then attached to a fuselage-mounted ETC 50 bomb rack.

Geyer recalls: "At first we undertook tests with a very small 'bomb' — about the size of a man's fist, with no charge or blast — attached to a length of 400m 2–3mm [0·08–0·12in]-diameter twisted-steel cable, which was extremely sharp. You could easily cut your hand on it".

It was planned to approach an enemy formation from the front and about 500m (1,600ft) above. The "bomb" would be freed on impact with a bomber by means of a weak link in the cable and the container would be jettisoned. The fighter would then exit flat over the bombers and subsequently be available to operate in a conventional role. One limitation was the fact that once the cable had been released, it could not be reeled in again; so, if a release were made in error, the cable might have to be dropped into friendly territory.

Into action

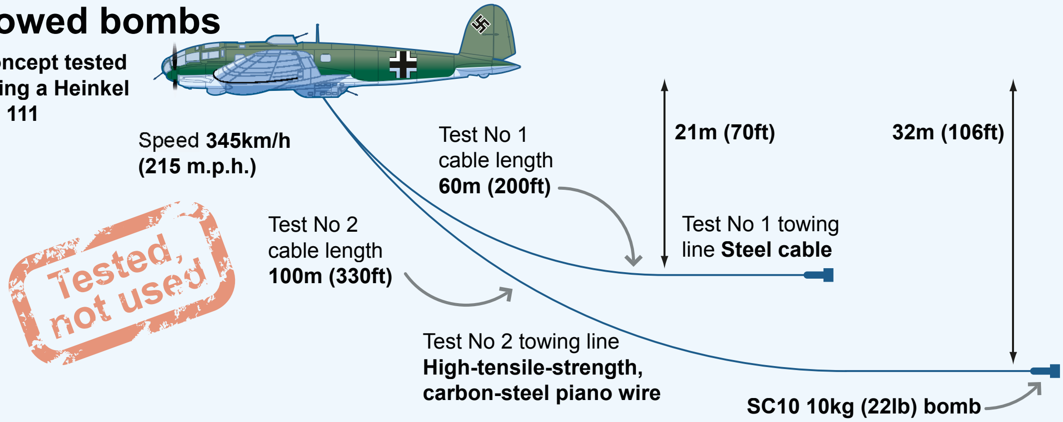
Having moved to Achmer, E.Kdo 25 conducted further tests with the sharpened-cable bomb, with Horst Geyer flying several trial flights against the wing of the Liberator in order to assess the damage the cable would inflict. These tests proved disappointing, as Geyer recalls:

"Some tests were made with a weight and others without, but approach and correction became very difficult. The wing of the old B-24

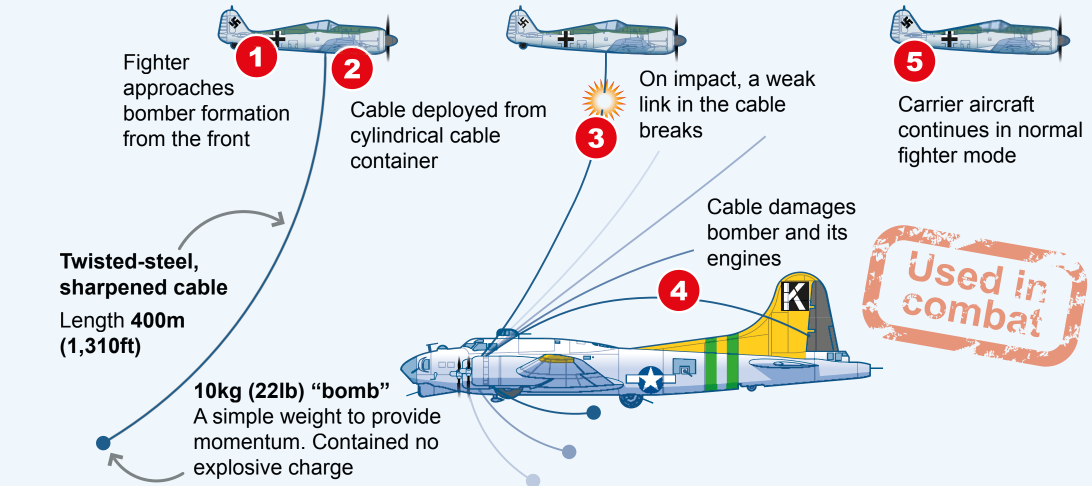
From cable bombs to fire-clouds

Concepts for aircraft-towed weapons conceived for the Luftwaffe, to be tested by E.Kdo 25

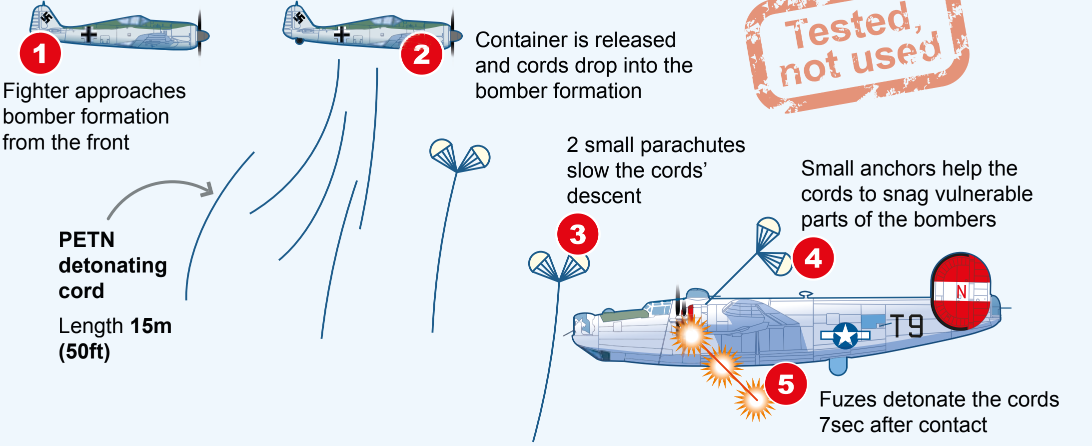
Towed bombs



Cable bombs



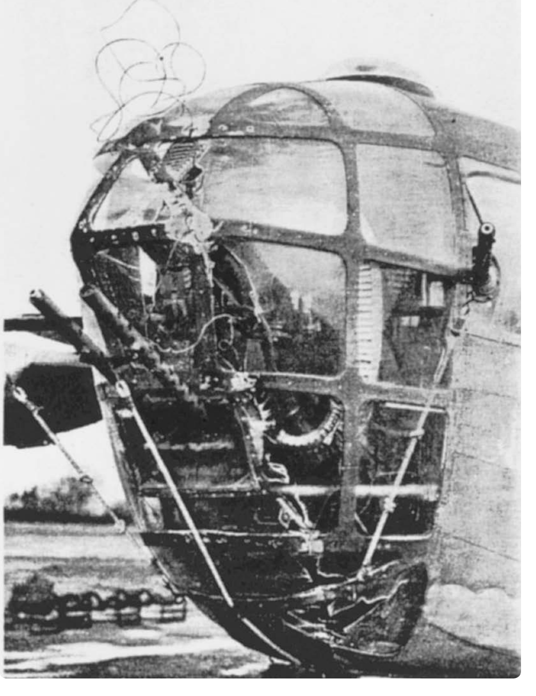
The "fire-cloud"



Graphic: Ian Bott *www.ianbottillustration.co.uk*

AUTHOR'S COLLECTION x 2

ABOVE ***Another photograph taken during Johannes Trautloft's visit to Achmer in November 1943. Seen second from left in this picture is*** **Oberstleutnant** ***Edu Neumann, who had led fighter unit JG 27 in North Africa and the Mediterranean before being appointed to the staff of the*** **General der Jagdflieger.**



RIGHT ***Steel cable tangled around the nose of a Consolidated B-24 of the 44th Bombardment Group on its return to its base at RAF Shipdham in Norfolk from a raid on Emden on December 11, 1943. The cable was probably dropped from an aircraft belonging to E.Kdo. 25. The bombardier and navigator aboard the Liberator were injured but the aircraft was still flyable.***

was placed on a specially-constructed wooden cradle. I flew several trials against [it] in an Fw 190 to assess the damage inflicted, but the cable just kept swinging about and didn't hit the target.

"The 400m cable was carried in a cylindrical container beneath the Focke-Wulf's fuselage and was opened at a height of 500m on the approach to the target. The bomb came free on impact with the target and the cable was released later while over open countryside. The device was made so that it could be fitted to virtually any aircraft."

Undaunted by the results of the trials, E.Kdo 25 reported the weapon operationally ready in the first half of October 1943. There it seems further work stopped until December 11 that year, when the US Eighth Air Force despatched 437 B-17s and 86 B-24s to bomb aircraft-industry targets at Emden under strong fighter escort. As the B-24s of the 44th Bombardment Group approached the target, an Fw 190 trailing a length of steel cable "with a weighted object on the end" was seen to make a head-on approach towards the formation, followed by a shallow dive from slightly above. The German fighter was then seen to release the cable which impacted with a B-24, entwining itself around the bomber's nose. The cable injured the bombardier and the navigator. Shortly after this attack, the Liberator's starboard bomb-bay door blew in and was torn away in the slipstream. American technical personnel later assumed this was as a result of the cable weight smacking against the aircraft.

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ABOVE ***With bomb doors open in preparation for their arrival over Koblenz, the target of the day, B-17Gs of the 401st BG maintain a tight bombing pattern. The distinctive white "Mickey" radar housing that replaced the ball-turret on "pathfinder" B-17s to accommodate the American H2X radar system is just visible on the nearest B-17, serial 44-8153 of the 612th BS.***

The B-24 was able to return to base and the cable was removed and taken away for scientific analysis. This showed the cable to have been 3·8mm (0·15in) in diameter and made up of five wires wound around a single core wire. The individual wires were square (1·2mm/ 0·05in side) and the pitch on the outside wires approximately 19mm (0·75in). Chemical analysis tests showed the wire to contain the following elements: carbon 0·55 per cent; manganese 0·5 per cent; silicon 0·2 per cent; nickel, less than 0·01 per cent; sulphur 0·034 per cent; chromium 0·1 per cent; phosphorus 0·031 per cent; molybdenum, not found. Two days after the raid on Emden, German radio broadcasts proclaimed that this new weapon had been used against the American formations "with devastating effect".

The Eighth Air Force reported sightings of Fw 190s and Ju 88s trailing cables through bomber formations on at least three more occasions in December 1943 and January 1944 during raids on Bremen and Oschersleben. However, USAAF Intelligence was not perturbed and reported:

"The conclusion to be reached after a study of reports is that although the attacks with cable bombs are becoming more frequent, they are not particularly dangerous. Even though large bombs may be carried, the question of aiming them restricts their effectiveness; plus the fact that aircraft trailing these cables must come into range of the bombers' guns, thereby making themselves very vulnerable targets. Even when the bombs reach their target, their effectiveness, so far as is known from the single attack in which a 'plane was hit, is relatively light.

"The restriction of aiming, vulnerability of carrier aircraft and limiting of its manœuvrability seem to indicate that at present, the bomb-on-cable tactic will not be a successful counter-measure against Allied bomber formations."

After mid-January 1944 further experiments were indeed stopped, although theoretical proposals for cable-bombs were still being drawn up by the DVL at Adlershof in March of that year, when Dr-Ing Ulrich Schmieschek proposed using Messerschmitt Bf 109 fighters equipped with steel cables of 1,000m (3,300ft) in length carrying 50kg (110lb) or even 200kg (440lb) bombs for use against enemy formations. The bombs were to be ignited electrically by the pilot at the optimum moment of approach towards a *Pulk* (formation of bombers).

In September 1944 Dr-Ing Walter Wundes of the Gothaer Waggonfabrik of Gotha put forward a proposal for a method to destroy an enemy bomber by means of "a bomb towed on the end of a wire cable towards the path of an oncoming enemy aircraft. Upon the impact of the enemy bomber with the cable, the explosive charge would be forced by its momentum towards the bomber and explode. The wire cable would be released from the tow aircraft at the moment the enemy aircraft makes contact with the cable".

Questioned after the war, Adolf Galland stated that two unconfirmed victories had been claimed

Generalleutnant *Adolf Galland, commander of the Luftwaffe, inspects a line-up of Messerschmitt Me 410s of E.Kdo 25 at Achmer in November 1943. The aircraft nearest the camera is fitted with a 37mm Flak 18 cannon, which the unit was then evaluating as a potential weapon against daylight bomber formations.*

AUTHOR'S COLLECTION

using cable-bombs. However, experiments had been stopped because "the bombs tended to trail behind the Fw 190 rather than hang down, because the bomb swung about too much and because the fighter aircraft had to come very close to the bombers to achieve victories".

The dropping of steel nets was also considered, but never adopted. Geyer believed that the weight of such nets would have slowed the carrying aircraft down considerably and made it an easy target for enemy escort fighters.

The fire-cloud

As a variation upon a theme, another idea tested by the Kommando during the summer of 1944 was the use of *Nitropentaschnur*, or 15m (50ft)-long strips of detonating cord, which were to be dropped on enemy formations in clusters. More widely known as PETN cord (a modern US Marine Corps version of which is seen **ABOVE RIGHT**), Nitropentaschnur was made from Pentaerythritol tetranitrate. This form of explosive compound, similar to nitroglycerin, was first manufactured in 1894 by the Rheinisch-Westfälische Sprengstoff AG of Cologne, with production commencing in 1912. It saw use by German forces during the First World War, and during the Second formed a component in ammunition used in the Luftwaffe's MG FF/M series of cannon, as well as in the *Minengeschoss* high-explosive shell.

The rear fuselages of a small number of E.Kdo 25's Fw 190s were fitted with specially designed containers manufactured by the Max Baermann engineering firm at Köln-Dollbrück. These containers could carry 20 lengths of 15m-long cord. The plan was that a frontal approach would be made against a bomber Pulk, and as the fighter passed through the enemy formation, the container would be released and the cords would drop down on to the bombers, the flight of each piece of cord being arrested by two small parachutes. They would either become wrapped around propellers or strike the metal of the enemy machines to hook and embed themselves into their panels with the aid of small sharp-clawed

USMC

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ABOVE ***A perfect target for a Luftwaffe fighter armed with*** **Nitropentaschnur*****, tested by E.Kdo 25 during the summer of 1944. The concept was to attack the bomber*** **Pulk** ***from the front and above, and drop lengths of hooked explosive cord into it; the cords would be slowed by parachutes and explode after attaching to the bombers with their clawed anchors.***

"anchors". The fuzes were set to detonate 7sec after contact with an enemy aircraft.

Initial test flights against static targets on the ground demonstrated flawless opening of the containers and discharge of the Nitropentaschnur cord, but it was also found that the fuze delay was too short and it was recommended that the period be extended to 20sec. Furthermore, it was believed that a load of 20 cords would be insufficient and would have little effect, simply scattering harmlessly through an enemy formation. In cases where the anchors managed to embed themselves in the metal of the static test targets, it was observed that while the outer metal skin was punctured, the cord had failed to entwine itself around any parts and thus would fail to detonate.

In March 1944 E.Kdo 25 had transferred to Parchim, and during the ensuing summer underwent changes in structure. In June the unit's *Kampfstaffel* (bomber squadron) moved to Tarnewitz briefly, before moving again to Finow. At the end of July, Horst Geyer was reassigned to take command of E.Kdo 262, the Me 262 test and evaluation unit at Lechfeld, while E.Kdo 25 was redesignated *Jagdgruppe 10* (Fighter Group 10) and placed under the command of *Major* Georg Christl, a holder of the Knight's Cross and former commander of *Zerstörergruppe* III./ZG 26.

In September 1944 Christl noted that "further experiments with Nitropentaschnur has revealed new factors. Dropping tests with 60m [195ft]-long detonating cords [have proved] inconclusive owing to technical deficiencies with the parachute system. When the length of the cords is extended from 15m to 60m, the number of cords carried in the container has to be reduced from 20 to seven, thus meaning that the additional cords would have to be transferred to suspended external holders in a further development.

"Since the fundamental problem of looping the cord around aircraft components has still not been resolved . . . it does not seem promising to continue with further tests based on the [negligible] measure of success so far achieved."

But where attempts with cable-bombs and fire-clouds may have failed, in another experiment, a far more powerful, potent and advanced weapon was promising to inflict considerable damage on the USAAF's bombers . . .

Next time: *E.Kdo 25's efforts to find effective ways of bringing down the ever-increasing waves of Allied bombers pummelling the Reich continue with the development of the* Zellendusche *system — an optically-controlled upward-firing cannon designed to rip into the bellies and wing fuel tanks of the enemy's "Viermots".*

Defending the Reich

Part 3: The SG 116 Zellendusche

In the concluding part of his series on the activities of Luftwaffe weapons specialist unit *Erprobungskommando 25*, **ROBERT FORSYTH** takes a look at the unit's experiments with the SG 116 *Zellendusche* — a battery of recoilless optically-triggered 30mm cannon fitted vertically into a fighter's fuselage to fire upwards into the belly of a USAAF bomber

IN THE SUMMER of 1944, as part of its continuing efforts to devise weapons with which to shoot down the Boeing B-17 Flying Fortresses and Consolidated B-24 Liberators of the USAAF's strategic bomber forces based in the UK and Italy, *Erprobungskommando 25* (E.Kdo 25 — Test Command 25), the Luftwaffe's specialist anti-bomber weapons development unit, worked with several leading German arms manufacturers on radical and technologically advanced forms of air-to-air armament.

The unit had been formed in northern Germany in April 1943 and by June 1944 was based at Parchim, an airfield roughly halfway between Hamburg and Berlin, under the command of *Hauptmann* Horst Geyer. The unit worked closely with the two test centres operated by the *Reichsluftfahrtministerium* (RLM — German Air Ministry) at Rechlin (aircraft) and Tarnewitz (armament). It was at Parchim that E.Kdo 25 undertook tests with the SG 116 *Zellendusche* (SG for *Sonder Gerät* — Special Apparatus; *Zellendusche* — Cell Shower), a recoilless single-shot 30mm-calibre weapon based around the barrel of an MK 103 cannon fitted to a breech block, which was intended to be fired upwards as an SG 116-equipped fighter passed below a bomber. Conventional fighter attacks against heavy four-engined bombers (or *Viermots* in Luftwaffe parlance) using machine-guns and cannon were usually mounted from behind or directly ahead of an enemy formation. In attacking from the rear, the fighter risked drawing the combined defensive firepower of several 0·50in Browning machine-guns mounted in the bomber's dorsal turret, ball turret and tail and waist-mounted gun positions as it passed through the formation to make its exit. In attacking from the front, although the intensity of the defensive guns was not so strong (even allowing for the twin-gun Bendix "chin-mounted" turrets on the later B-17G), the combined closing speed of the fighter and the bombers, as well as the narrower and much more challenging target profile, meant that the chances of shooting down a bomber was often beyond the capability of all but the most skilful *Experten*.

The tactical logic behind the SG 116 was that by approaching from the front and below a target, the fighter could avoid the collective mass of a formation's defensive firepower, while the bomber's underside presented a much larger, and closer, target to hit. Furthermore, the technology incorporated into the weapon meant that aiming depended more on the sighting apparatus than the human eye and the skill of deflection shooting needed with conventional guns. Geyer recalled:

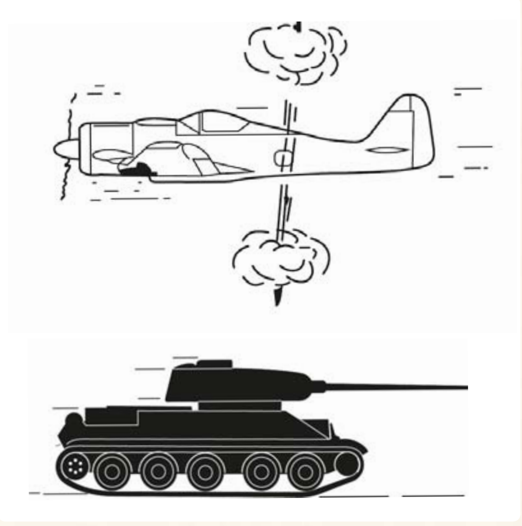
"The intention was to make a frontal approach, fly under an American bomber and release the shot, which was fired by means of an explosive charge built into the base of the tube designed to be mounted into the side of a [Focke-Wulf] Fw 190 fuselage. The intention was good, and the aiming technology impressive. We believed that with such a weapon we could inflict fatal hits on the bombers' wing fuel tanks."

The SG 116 was developed by Rheinmetall-

VIA AUTHOR

ABOVE Hauptmann *Horst Geyer, commander of* Erprobungskommando 25 *(E.Kdo 25), the Luftwaffe's specialist anti-bomber weapon testing and evaluation unit, talks with his officers. Geyer had flown with fighter unit Jagdgeschwader 51 during the Battle of Britain and was later involved with the operational acceptance trials of the Heinkel He 162. The author interviewed Geyer at his home in Ahrensburg in 1990.*

BELOW *The SG 113A was conceived as an aircraft-mounted anti-tank weapon, the upper-facing surfaces of a tank being the most vulnerable — and the hardest to score a direct hit on from an aircraft approaching at an oblique angle. A radar-activated electro-magnetic cell would trigger the recoilless cannon.*



MAGGIE NELSON

Borsig as a "reversed" progression of its 7·7cm SG 113A airborne recoilless anti-tank weapon, which comprised a vertically-mounted barrel, loaded with a 45mm armour-piercing shell, fitted into the fuselage or wings of an Fw 190. A radar installed in the aircraft would detect the echo impulse given off by a tank moving on the ground, which triggered the weapon. The shell would be fired downwards at the tank, with success at hitting the target assured at a range of 200m (650ft). The weapon had a high muzzle velocity because of the mass of its counterweight.

Anti-tank to anti-bomber

The RLM showed a keen interest in the weapon's potential for other uses and a specification order was issued to Rheinmetall-Borsig to develop a similar weapon for anti-bomber work. This was to be of 30mm calibre, firing a shell with tracer at a velocity of 860–900m/sec (2,820–2,950ft/sec). Tactically, it was envisaged than an Fw 190 would take up a position directly astern of a bomber (apparently regardless of defensive fire from the latter's tail gunner), attempting at the last moment to fly immediately below the bomber and within 50m (160ft) of it. When it was suggested by Allied intelligence officers to a former pilot of E.Kdo 25 that this represented a rather dangerous tactic, the German replied that the SG 116 was viewed as being "in the nature of an inventor's experiment".

The resulting weapon was developed in a very short time using stocks of MK 103 cannon

ABOVE ***Luftwaffe armourers load the ammunition for an MK 103 cannon fitted to a Henschel Hs 129. The MK 103 was intended principally for combat at ranges beyond 1,000m (3,300ft) and was considered good for operations against enemy bombers. It was the most sophisticated of the 30mm range of weapons used by the Germans.***

barrels. The Rheinmetall-Borsig MK 103 was a 30mm automatic gas-operated air-cooled belt-fed aircraft cannon. The gun had an official rate of fire of 420–450 rounds per minute, and, although attempts were made to increase this to 600 rounds per minute, such efforts resulted in poor performance and damage to several parts.

The SG 116 consisted of a rifled MK 103 barrel without a finished chamber, into the breech block of which was fitted an electronic detonating device. The breech block was connected to the barrel by means of threads and secured against rotation by a spring. The complete round consisted of the 30mm shell, a cardboard case in which was loaded the propulsion charge, a contact ring (which connected to the detonating device) and a counterweight. Three barrels were to be fitted on the port side of the fuselage of an Fw 190, the forward barrel being just aft of the point where the rear of the cockpit joined the fuselage when the canopy was closed. The distance between each barrel was about 15cm (6in). The barrels pointed aft, but were slightly displaced from the parallel, the furthest forward being set at an angle of 74°, the next at 73° and the third at 72·5° to the horizontal axis of the aircraft. They projected about 50cm (20in) above and 25cm (10in) below the fuselage. In most cases where this arrangement was installed, the fighter's two outer-wing 30mm cannon were removed.

After being activated by the automatic firing mechanism the charge was ignited, propelling the shell and counterweight in their opposite directions. By regulation of the travel with the differential in weight, recoil was avoided as the shell and the counterweight left the weapon simultaneously. The weapon was to be activated and fired automatically using a photo-electric cell, or *Magisches Auge* ("Magic Eye"), developed under the supervision of Dr P. Hackemann and Dr R. Schwetzke of the *Institut für Waffenforschung* (Weapons Research Institute) at the *Luftfahrtforschungsanstalt* (Aircraft Research Institute) *Hermann Goering* in Braunschweig.

This optical device was built into the fuselage immediately forward of the barrels and comprised four reduction lenses placed one below the other, with a photo-electric cell fitted to the lowest lens. This was connected to a solenoid on which a contact arm functioned. When the photo-electric cell was activated by an image in the lens, the solenoid was energised and the circuit to the barrel-firing gear completed. The diameter of the external part of the Magic Eye was 8cm (3in). The maximum range from the target aircraft at which the Magic Eye was sufficiently sensitive to operate the firing gear was around 55m (180ft).

Trials begin

In late June/early July 1944 E.Kdo 25 began trials with the weapon at Parchim. Geyer recorded:

"On July 1, 1944, *General* [Adolf] Galland, the commander of our fighter forces, and some of his staff made an inspection trip to Parchim and we demonstrated the weapon using an Fw 190 fitted with three such tubes mounted immediately behind the cockpit, each loaded with a 30mm mine shell. We put an NCO pilot into the specially rigged fighter and arranged for an Fw 58 Weihe to fly simultaneously overhead, about 200m [650ft] above the Fw 190.

"The Weihe was to tow a target drogue. The Fw 190 flew in very low, about 100m [330ft], so that we on the ground could observe the weapon being used to its full effect. In the interests of safety, and because the Fw 190 was not a large

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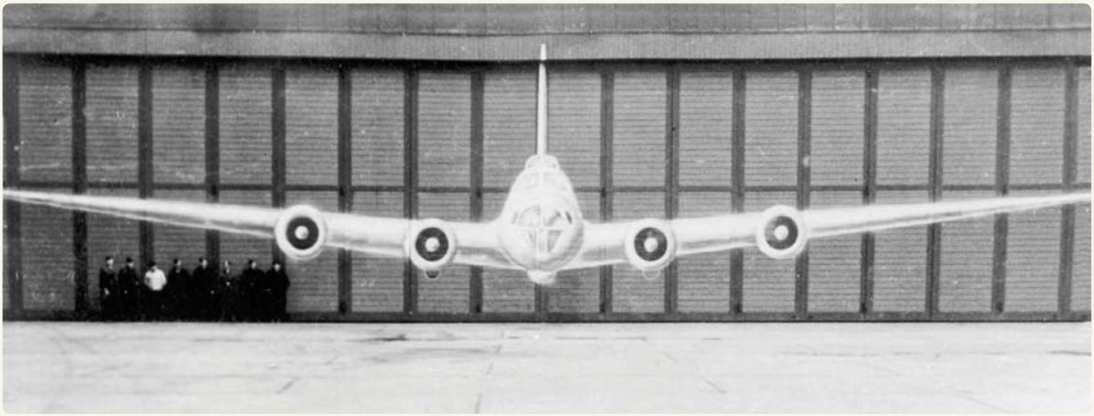


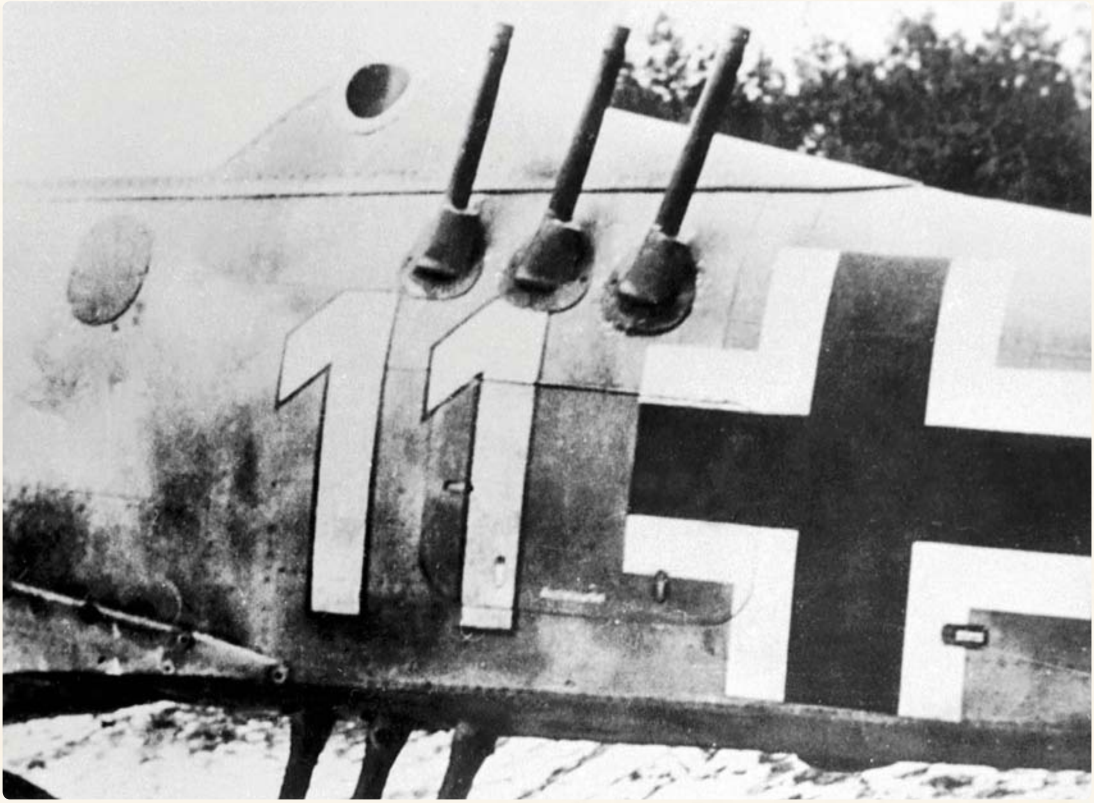
VIA AUTHOR

VIA AUTHOR

TOP RIGHT & LEFT ***Three Focke-Wulf Fw 190s were used to test the SG 113A anti-tank weapon system, two launchers per wing being installed to fire downwards. Perhaps unsurprisingly, the system was found to be cumbersome and inaccurate and was never used in action.***

ABOVE ***The*** **Jagdflieger** ***defending the skies over the Fatherland during 1943–44 were never allowed to forget their prime enemy. Here, a life-size frontal view of a B-17 has been painted on to hangar doors for gunnery training. The line-up of mechanics to the left lends a sense of scale.***

LEFT Major ***Georg Christl, E.Kdo 25's commander from July 1944, is seen here furthest left in field cap. Christl took command of the unit when Horst Geyer, furthest right talking to Adolf Galland (in long coat), was posted to experimental jet unit E.Kdo 262.***



VIA AUTHOR

ABOVE ***The three 1.6m (5ft 3in)-long 30mm cannon barrels of an SG 116*** **Zellendusche** ***automatic recoilless anti-bomber device installed in the fuselage of Fw 190 "White 11" in mid-1944. If a mass is discharged to the rear of a gun at the same instant that a shell is fired forward from the barrel, the reaction of one will balance out the other.***

aircraft, we developed a firing system designed to allow the pilot to fire only one tube at a time, thus minimising and avoiding the risk of any blast damage from all the tubes firing at once. Unfortunately, however, the NCO made a mistake and fired all the tubes simultaneously.

"There was a loud explosion in the air with a huge cloud of smoke. Then, emerging from the smoke came the Weihe, flying gracefully on, undamaged. However the Fw 190 was destroyed in the process. Fortunately the pilot got out; but, like the Weihe, the drogue was also untouched. The pilot of the Fw 190 landed by parachute and limped up to Galland and me. He pulled off his flying helmet and his first words were 'Permission to have a cognac, Herr General!'".

In July 1944 Geyer departed E.Kdo 25, his position as *Kommandoführer* being taken by *Major* Georg Christl, a Knight's Cross-holder who had previously commanded the Messerschmitt Bf 110-equipped III./ZG 26. By the beginning of August, E.Kdo 25 had been redesignated *Jagdgruppe 10* (J.Gr.10 — Fighter Group 10). The unit, as with E.Kdo 25, was listed as comprising a *Stab* flight and three *Staffeln,* and had a nominal strength of 52 aircraft, although whether this strength was ever reached is debatable.

By August 22, 1944, J.Gr.10 had commenced fitting the photo-electric cell, which, by that time was under manufacture as the *Wurzen* by the *Hugo Schneider Aktiengesellschaft Metallwarenfabrik* (HASAG) in Leipzig, into 19 of its Fw 190s at Tarnewitz. Trials were also conducted using a Heinkel He 177 of the *Kampfstaffel* (Bomber Squadron) as a "target", but these proved unsuccessful and, for the time being, further development was dropped while the various parties involved in the weapon's manufacture went back to the drawing board. By September 18 the same year the decision had been taken not to use the SG 116 operationally until greater accuracy could be assured, although the fitting of the optical devices was nearing completion.

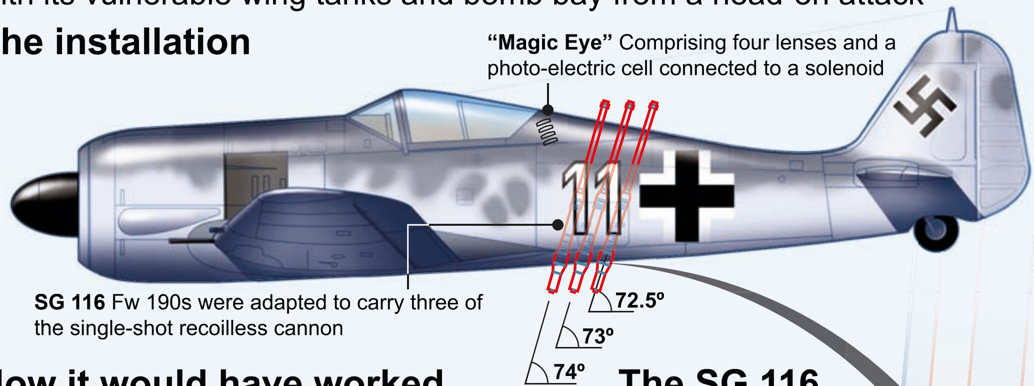
On September 26, 1944, the commander of the RLM's Technical Office calculated that in a pass below a bomber at 50m (160ft) a fighter equipped with five SG 116 barrels could achieve three hits on its target. He further calculated that if 12 barrels were fitted to a Messerschmitt Me 262 jet interceptor, a type which had recently made its operational debut in the West with E.Kdo 262 (to which Horst Geyer had been posted as commander), then a pass at 50m would ensure 12 hits, and six hits at 100m (330ft).

In his monthly work report for September 1944, Christl admitted that the automatic triggering

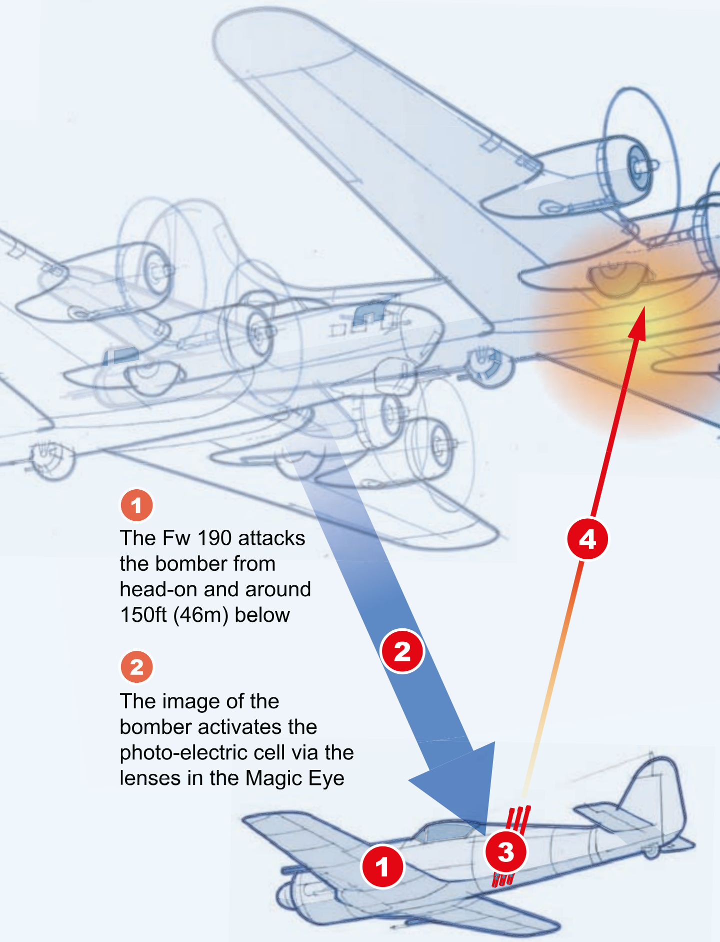
The SG 116 Zellendusche (“Cell Shower”)

An attempt to solve the problem of targeting a bomber’s exposed underside with its vulnerable wing tanks and bomb bay from a head-on attack

The installation



How it would have worked



1 The Fw 190 attacks the bomber from head-on and around 150ft (46m) below

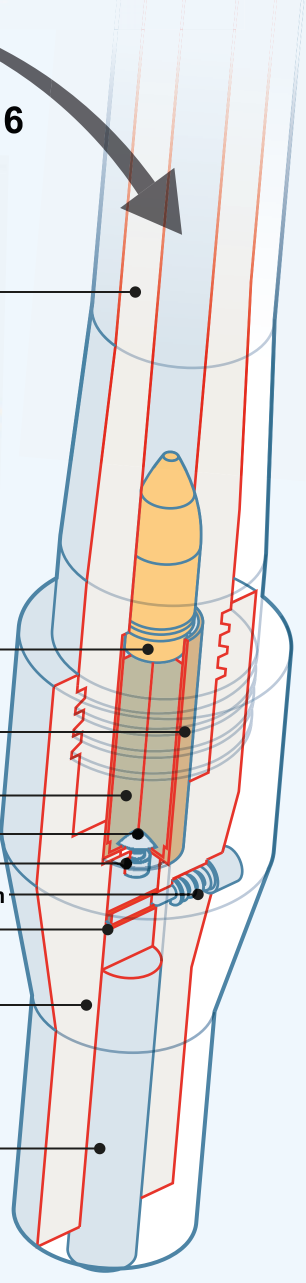
2 The image of the bomber activates the photo-electric cell via the lenses in the Magic Eye

3 This energises a solenoid, completing the circuit to fire the weapons

4 The weapons are positioned so that their shells impact the bomber at its most vulnerable points

Graphic: Ian Bott *www.ianbottillustration.co.uk*

The SG 116 in detail




PHILIP JARRETT COLLECTION

ABOVE ***A Flying Fortress opens its bomb doors to deliver another devastating load on the German homeland, this time Cologne, during a raid by more than 1,000 USAF bombers on January 7, 1945. By this time the Allied bomber forces were operating over the Reich with very little resistance from a critically weakened Luftwaffe fighter force.***

device of the *Zellendusche* was not proving reliable. However, in ground tests it was found that when fired at a wing salvaged from a crashed B-17 from a range of 60m (200ft), the equipment and detonator functioned correctly, at a velocity of 845m/sec (2,770ft/sec).

In the air, tests using the SG 116 were conducted against an Fw 58 and an He 177 which had been equipped with specially constructed automatic steering devices. At a predetermined point the pilots of the aircraft baled out and the aircraft flew on unmanned, at which point the Fw 190s attacked at an altitude of 1,000m (3,300ft) against the Focke-Wulf and at 6,000m (19,700ft) against the Heinkel. It was noted that problems arose at heights in excess of 6,000m, at which point the automatic triggering device became too sensitive, prone to premature and random firings. The Weihe was hit and damaged, but the Heinkel flew on undamaged and is thought to have crashed into the Baltic as planned. The results in the air varied wildly with the optimistic results calculated by the Technical Office.

Gearing up for action

By the end of the first week of October 1944, 18 of J.Gr.10's Wurzen-fitted Fw 190s had returned to the Gruppe's base at Parchim from the *Erprobungsstelle* [Test Establishment] at Tarnewitz, where the circuitry work was completed. One machine remained at Tarnewitz, along with one of the E-Stelle's Focke-Wulfs, which were to take part in further firing trials against a Heinkel 177. These resulted in only one Fw 190, equipped with five barrels, firing two shots, both hits, but with three barrels suffering misfires. The other Fw 190 remained earthbound owing to technical faults.

Trials continued until the end of December 1944, seeing the introduction of a series of revisions and enhancements to the weapon and its firing system, but nothing more materialised in terms of operationally ready equipment. By that stage of the war the Allied air forces had established air supremacy over what remained of the Western Front, and the USAAF's bomber groups and their fighter escorts were operating with increasing impunity over the Reich. In reality, JG 10 (the unit had, on paper, been upgraded from a *Gruppe* to a *Geschwader*) was little more than an *Einsatzschwarm* (small operational section of aircraft), although it continued to test a variety of equipment and armament. It moved successively to Erfurt-Bindersleben, Langensalza, Finsterwalde, Jüterbog-Waldlager, Delitzsch (near Bitterfeld) and Salzwedel.

By April 1945, what remained of JG 10 had assembled at Redlin. From there, the unit's flying and technical personnel journeyed by road south, heading for Schöngau in Bavaria, which they reached in the last few days of the war to await surrender to the US Army. In early May, those elements which remained at Redlin took off in the direction of Lübeck, but were captured before they had reached Schwerin.

SG 116 Zellendusche data

Calibre	30mm (1·2in)
Muzzle velocity	860m/sec (2,822ft/sec)
Muzzle velocity of counterweight	200m/sec (656ft/sec)
Weight of weapon	28kg (62lb)
Length of weapon	1,600mm (63in)
Weight of projectile	315g (11oz)
Length of projectile	140mm (5½in)
Weight of explosive	72gm (2½oz)
Weight of counterweight	1·35kg (2·98lb)
Weight of complete round	1·8kg (4lb)
Firing system	Electrical
Type	High-explosive