EAGLE SOARS

For the Hangar 10 collection in Germany, the long-awaited return to flight of its FW 190 project is a major milestone — and the latest of its restorations to incorporate new technology in the name of safety and sustainable operation

WORDS AND PHOTOGRAPHY: RICHARD PAVER

For any collection focused on German Second World War aircraft, a Focke-Wulf Fw 190 is essential. Hangar 10, based at Heringsdorf airfield on the north German island of Usedom, already had an impressive fleet of wartime Luftwaffe types. It has now been enhanced with a representative of this outstanding fighter.

The A-8 model has been restored by MeierMotors at Bremgarten from some original parts and the wreck of Flug Werk FW 190A-8/N F-AZZJ, delivered to Bremgarten following its ditching off Hyères, France, in 2010. The new-build machine's Shvetsov ASh-82 engine was a total loss, having suffered major saltwater damage, but the airframe was rebuildable and Hangar 10 decided to take on the project.

The FW — for Flug Werk, as opposed to Fw for Focke-Wulf — 190 wreckage was initially placed into storage at Bremgarten as MeierMotors had other restorations under way for Hangar 10. The project thus began in 2014. The whole aircraft was stripped down to its most basic components and rebuilt to zero-time, as-new standard. By the end of 2014 much progress had been made on the fuselage and tail. Efforts moved on during 2015 to the wings, the front end and the engine mount, while fitting-out and painting started in early 2016, and assembly of the wings and fuselage took place the following year.

MeierMotors used authentic Fw 190 structural and wing drawings, while efforts were made to complete the interior with original Focke-Wulf fittings and not those that came with the wreckage. Many genuine Fw 190 components were acquired and incorporated into the restoration. Good examples are the flap linkages and pushrods, which are all original, as are the instrumentation and most of the other items involved in the cockpit fit-out.

During 2018 the electrical systems were completely replaced in accordance with wartime wiring diagrams, using Focke-Wulf plugs, switches and relays. A great deal of sheet metal work was done and all hydraulic, oil and fuel systems replaced. The aircraft was ready for engine runs in April 2019. Initial test flights were carried out at Bremgarten in April and July by Klaus Plasa.

ABOVE:
Klaus Plasa flying Hangar 10's FW 190 D-FWAA over the Baltic Sea near Heringsdorf, showing well the fighter's JG 1 markings, including the characteristic black-and-white cowling.

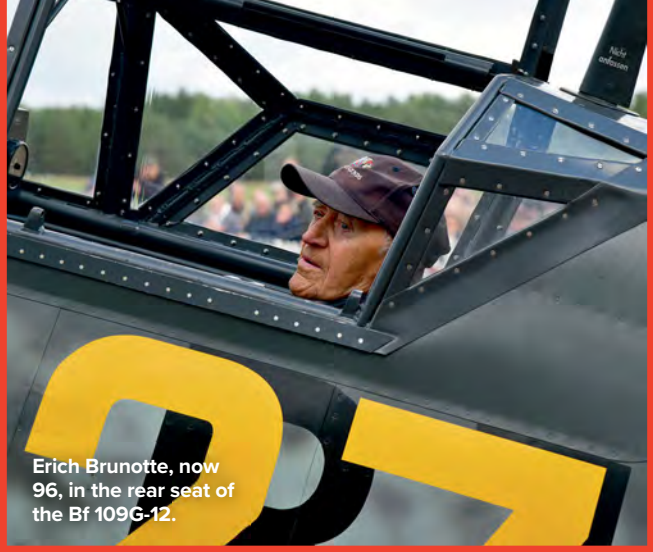
ABOVE: A magnificent Luftwaffe echelon, as the FW 190 is joined by the two Hangar 10-owned Bf 109s, the G-14 and G-6. They were in the respective hands of Messerschmitt Stiftung pilot Volker Bau and Mikael Carlson, the latter checking out in the G-6 during the fly-in weekend.

For its fly-in on 27-29 September, Hangar 10 made a particular effort to have its newest warbird fully serviceable and on display. Only 10 days beforehand it was still at Bremgarten with an oil cooler problem which prevented a transit flight. The Hangar 10 team, led by Martin Glockner, arranged for the FW 190 to be dismantled and transported by road to Heringsdorf, where it was reassembled on 20 September. The oil cooler was rebuilt by Michael Rinner just in time for the fly-in. Cracking had occurred due to the internal pressure being beyond the original design specification, but this was successfully solved.

Klaus Plasa flight-tested the aeroplane at Heringsdorf and all involved were delighted to present the FW 190 as the star of the show. Several different formation flights were arranged, including the very rare sight of two Bf 109s with the FW 190. It is believed to have been the first time such a combination had flown together in Germany since World War Two. Hangar 10 is planning further unique formations for 2020.

> ***“Hangar 10 was keen to paint the 190 as a JG 1 aircraft as it provides a link with Heringsdorf”***

The aircraft has been finished in standard Luftwaffe day fighter camouflage and represents Fw 190A-8 Werknummer 170389 ‘Yellow 4’ of Jagdgeschwader 1. In 1944 JG 1 was given the name ‘Oesau’ in honour of its sixth commanding officer, Walter Oesau, a 125-victory ace who was shot down that May. D-FWAA wears the unit’s ‘Winged 1’ emblem on the forward fuselage. The red band on the rear fuselage is



Erich Brunotte, now 96, in the rear seat of the Bf 109G-12.

FROM PAST TO PRESENT

In addition to the aircraft, the other star of the Hangar 10 fly-in weekend was former Luftwaffe ace Feldwebel Erich Brunotte who flew Bf 109s and Fw 190s over the Eastern Front and notched up 33 aerial victories. Brunotte flew with 13./JG 51 in 1944-45, completing his last mission on 3 May 1945. On the Saturday of the Heringsdorf event Erich was given a flight in the two-seat Bf 109G-12 with Klaus Plasa.

While the Bf 109G-12 has gone to the Manching-based Messerschmitt Stiftung (Foundation), Hangar 10 has entered into an agreement to provide that organisation with pilot training services. The G-12 has thus remained at Heringsdorf, to be operated by Hangar 10 and convert new pilots onto the type. The Stiftung has in recent years suffered several landing and take-off accidents to its Bf 109s, and this new arrangement is working very well. Heringsdorf has both hard and grass runways and unrestricted airspace, enabling uninterrupted training to take place.

In addition to the German warbirds, Hangar 10 flew its Spitfire XVIII, TP280/D-FSPT, and TF-51D Mustang D-FUNN during the weekend. The collection is actively involved in trading aircraft in order to provide the capital for new projects, which has led to both the T-6 and Yak-9 being sold. There are some exciting prospects for 2020, so watch this space.

A pre-flight discussion between chief pilot Klaus Plasa (right) and Hangar 10's Volker Schülke.

also representative of JG 1, having been applied in the later war years to the unit's fighters used in the defence of the Reich. By the end of 1943, fighter squadrons so deployed were given a coloured fuselage band. Up to that point these markings were common only on fighters engaged on the Mediterranean and Russian fronts, which had white and yellow ones respectively.

Hangar 10 was keen to paint the FW 190 as a JG 1 aircraft because it provides a unique connection with Heringsdorf airfield, originally known as Garz after the local village. The Luftwaffe moved in during 1935 and developed it into a key fighter station. It was also

TOP: Work well under way on the FW 190 in MeierMotors' Bremgarten workshop during August 2016.

MIDDLE LEFT: Many original instruments and other period items are incorporated into the 190's cockpit. Just visible at left, above the attitude indicator, is one of the modern additions in the form of the flight test display unit.

MIDDLE RIGHT: On top of the cockpit coaming, easily visible by the pilot, sits the display for the engine data interface unit. The lights turn amber or red if the oil temperature, oil pressure or fuel pressure go out of limits. VIA HANGAR 10

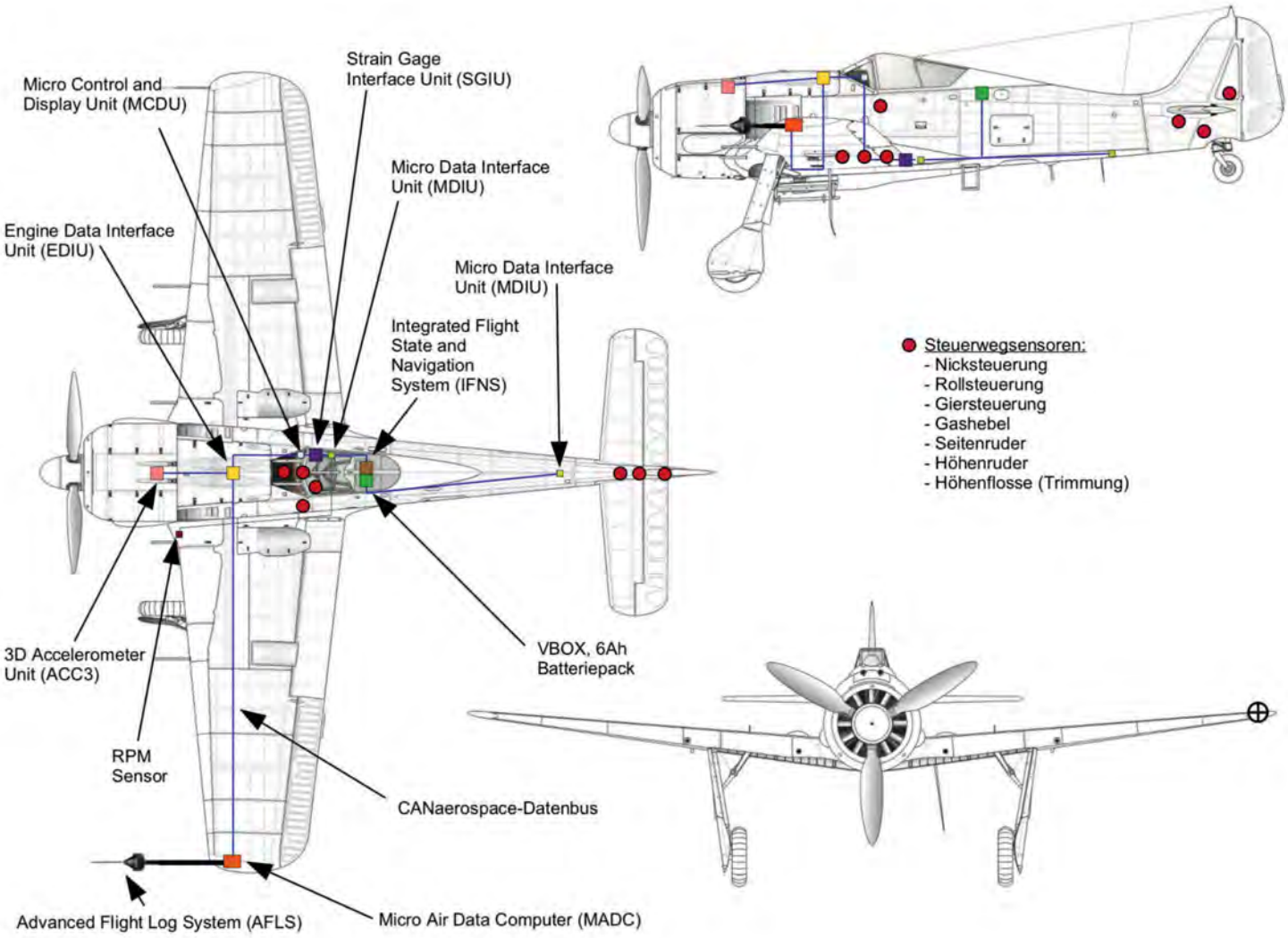
ABOVE: The Shvetsov ASh-82T engine and cooling system installation has undergone a lot of work to ensure reliable operation.

used for experimental flying from 1942-44, air-launched guided weapons being tested. Elements of Kampfgeschwader (KG) 100 were based there in 1943 and '44, this being the pioneering bomber wing which used unpowered precision-guided munitions. JG 1 was stationed at Garz between February and April 1945, when its fighters were very active defending the Baltic coast from the Soviet advance. Before the end of hostilities JG 1 moved to Parchim and re-equipped with the Heinkel He 162 jet.

Garz became a Soviet fighter base post-war, providing protection for the Soviet Navy Baltic fleet. An extensive military training ground incorporated much of the airfield plus further land to the east on the Polish border. In the mid-1970s a new and realigned main runway was laid, and the airfield was renamed Heringsdorf. Today the Hangar 10 collection is housed in a World War Two Luftwaffe hangar which has been extensively modernised and extended with new offices, workshops, a restaurant, visitor centre and apartments for visiting pilots. Close by is another wartime hangar which is used for storage.

The FW 190 is currently fitted with another new 14-cylinder ASh-82T engine. However, a genuine BMW 801 is under rebuild with Michael Rinner in Austria and will be installed in either late 2020 or early 2021. The specially adapted exhaust pipes from the Shvetsov unit have flattened outlets, which improve cooling and produce a wonderful sound. Additional oil coolers sit in the wing root, with the air inlet from a vent in the wing leading edge. Rinner and his team have rebuilt the oil coolers in order to get the aircraft running at the correct temperatures. On the original BMW 801 the oil cooler reservoir design was ingenious, the reservoir being incorporated into the engine cowling with an oil cooler ring just aft of it. This lessened aerodynamic drag and greatly boosted oil cooling efficiency. During the war new BMW engines were supplied to fighter units with the cowlings already fitted, making engine changes easier.

On the ASh-82 in the Hangar 10 aircraft, a front oil reservoir is incorporated into the engine cowling as per the original design, but it doesn't have the front oil radiator. Instead there are two



ABOVE:
A diagram showing the extent of the new digital systems incorporated into the FW 190.
VIA HANGAR 10

separate radiators in the gun bays at each wing root. These are ventilated by ram air going through the former gun barrel openings, connected to the radiators via tubular ducting.

To develop innovative engine management systems, Hangar 10, led by Volker and Johannes Schülke, has worked in partnership with Michael Rinner and his staff at Rinner Performance Engines, and Heinz Dachsel and colleagues at Dachsel Flugmotoren. Rinner is an expert in Daimler-Benz V12 powerplants and has his workshop in the Austrian state of Carinthia. Dachsel specialises in bench-testing aircraft engines, and is based near Munich where his firm acquired the engine test facilities of Hanns Häusler Flugmotoren.

For 2020, Hangar 10 has planned some more extensive test flights by the FW 190 using the Stock Flight Systems flight performance management system. Designed and built by Michael Stock, it has been used on all three Hangar 10 Bf 109s and will be installed in the 190 next spring. To allow a detailed analysis of the aircraft's characteristics throughout its flight envelope, a data probe will be fitted to the port wing to record angle of attack, air speed, altitude, air temperature and yaw. In addition, Stock has developed for Hangar 10 a sophisticated CANaerospace digital flight data acquisition and recording system, or CDARS. It too will be incorporated into the 190, with sensors attached to the flight controls to record control inputs, and cameras inside the cockpit monitoring the flight instruments.

> ***"A genuine BMW 801 engine is under rebuild in Austria and will be installed in 2020 or 2021"***

Once the flight test programme for the three Bf 109s was finished at the end of 2018, Hangar 10 and Stock continued to improve the CDARS in readiness for fitting to the FW 190. One of the biggest changes was the addition of a new engine monitoring system, known as the engine data interface unit (EDIU). The ASh-82T is now instrumented to record throttle position, propeller rpm, oil pressure, oil temperature and fuel pressure. The on-board computer records this data throughout each flight for subsequent downloading. An extra cockpit panel right in the pilot's line of sight has amber and red warning lights which illuminate in the event of an engine problem being detected.

The system reduces the pilot's workload, allowing them to concentrate on flying and navigation, and provides far better advance warning of possible engine problems, well before the traditional analogue instrumentation would. It will be used throughout the test programme and will remain on the aircraft after that as it is an excellent safety measure.

ABOVE: 'Yellow 4' off the coast of Usedom. The FW 190 is now reported as flying much more predictably than the early Flug Werk airframes did.

Additional digital equipment designed by Hangar 10 and Stock assists the pilot in conducting flight test profiles with far greater accuracy, safety and efficiency. A dedicated flight test display unit, measuring just 85mm by 65mm, is installed directly on top of the attitude indicator. A rotary switch, still operable while wearing flying gloves, allows one to select a specific manoeuvre and the system provides precise guidance on how to fly it, displaying the relevant parameters and required limits.

The FW 190 is a very good example of Hangar 10's underlying philosophy, which involves restoring aircraft to original condition and at the same time using today's digital tools to carry out a flight test programme to the highest safety standards. The combination of 75-year-old technology with digital flight management and recording systems is unique in warbird restoration today.

And what of the flying characteristics? Hangar 10 chief pilot Klaus Plasa says, "When Fw 190s were delivered to the front line, it is well-known that they always required the ailerons and other control surfaces to be adjusted by the crew chief to the liking of the pilot, as each aircraft had different flying qualities and none were the same. This is still very much the case for all the restored 190s that I have flown — today, no Fw 190 flies the same as any other.

"The very early Flug Werk versions did certain unexpected things to the pilot, rather than the other way around. This was because they had too much structural flexibility and when in high-g manoeuvres their aerodynamic behaviour suddenly changed. This structural weakness was very unsettling for the pilot as the behaviour of the aircraft was both unpredictable and very difficult to handle. Later versions were improved dramatically, and Hangar 10's latest addition, which has been rebuilt as a genuine Fw 190, flies extremely well. It is very stable and solid in all manoeuvres and clearly many lessons have been learnt.

"As always when breaking in a new aircraft and engine, my eyes are glued to the engine parameter indicators and the pure 'stick and rudder' flying comes second. The Stock Systems EDIU helps a great deal and any new technology that can ease pilot workload in the test regime is very welcome. In the case of the Hangar 10 aircraft it became clear very soon that the biggest improvement over all the other 190s is the effectiveness of the redesigned oil cooling system. On the aircraft's second flight at Bremgarten in April we had a major oil pressure problem in flight, but I put it down safely. Since then the combined Rinner/Meier/Hangar 10 team has worked very hard and successfully overcome this, and the aircraft now flies beautifully.

"On each sortie we are learning more. I am not saying that for ASh-82 powered FW 190s we have now reached the end of development, as the aircraft has been improved every day it has been flown. There is of course always room for further improvements and that is what makes the test-flying of these machines so interesting and rewarding in the long run.

"The next, biggest, step will of course be the fitting of a genuine BMW 801. Now, what do you think: am I really longing for the day that Michael Rinner and Volker Schülke's team have the BMW 801 ready? You bet I am!"