



DCS Fw 190 D-9 Dora Flight Manual

Dear User,

Thank you for your purchase of DCS: Fw 190 D-9, a simulation of the legendary German World War II fighter, and the fourth installment in the Digital Combat Simulator (DCS) series of PC combat simulations.

Like previous DCS titles, DCS: Fw 190 D-9 features a painstakingly reproduced model of the aircraft, including the external model and cockpit, as well as all of the mechanical systems and aerodynamic properties. Along the lines of our flagship P-51D Mustang title, DCS: Fw 190 D-9 places you behind the controls of a powerful, propeller-driven, piston-engine combat aircraft. Designed long before “fly-by-wire” technology was available to assist the pilot in flight control or smart bombs and beyond visual range missiles were developed to engage targets with precision from afar, the Dora is a personal and exhilarating challenge to master. Powerful and deadly, the aircraft nicknamed the Long-Nosed Dora provides an exhilarating combat experience to its drivers, and a worthy challenge to all fans of DCS: P-51D Mustang.

As operators of one of the largest collections of restored World War II aircraft, we at The Fighter Collection and the development team at Eagle Dynamics were fortunate to be able to take advantage of our intimate knowledge of WWII aviation to ensure the DCS model is one of the most accurate virtual reproductions of this aircraft ever made. Combined with volumes of outside research and documentation, the field trips to the TFC hangar and countless consultations and tests by TFC pilots were invaluable in the creation of this simulation.

The contents of this manual are based largely on actual vintage Fw 190 D-9 manuals of the aircraft’s service era.

With homage to the brave pilots of World War II, we hope you enjoy taking this true Flying Legend to the skies and into the fight!

Sincerely,

The DCS: Fw 190 D-9 Development Team

DCS: <https://www.digitalcombatsimulator.com>

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INTRODUCTION



INTRODUCTION

The D for Dora variant of the famous Fw 190 fighter was nicknamed the Long-Nose by German pilots as well as the Allies. It was a departure from the radial-engine earlier variants and featured a more powerful inline engine, which gave the aircraft its characteristic long-nose shape compared to the iconic Fw 190 A. While experts may still argue about the Dora's looks, the performance gains were obvious. While the earlier variants excelled at lower altitudes but suffered higher up, at the most crucial altitudes where Allied bombers operated, the Long-Nosed 190 could easily match the best the Allies had to offer at all altitudes.

The Focke-Wulf Fw 190 is not just one of Germany's greatest fighter planes; it is perhaps one of the most famous aircraft of the entire Second World War. Featuring many advances and innovations, it broke new ground in terms of pilot comfort, ease of use, and versatility. First appearing in 1941, it was a rude awakening for the Allies, easily outclassing the best Allied fighter of the time, the British Spitfire Mk V. In the skies over France, it had no equal for many months as the British scrambled to produce its answer, the Spitfire Mk IX almost a year later.

An Allied pilot serving on Western and Eastern Fronts, or the Mediterranean, and flying at tree-top level or at the edge of its envelope would be likely to encounter a Fw 190. Nearly 40 variants of the versatile Focke-Wulf aircraft were produced ranging from high-altitude reconnaissance to ground attack aircraft and even night fighters. By late war, the Fw 190 was even used in one of the most eclectic operational aircraft of WWII, the Mistel composite aircraft, where a pilot in a Fw 190 was mounted above a modified twin-engine bomber loaded with explosives, which could later be detached to fly into its target.

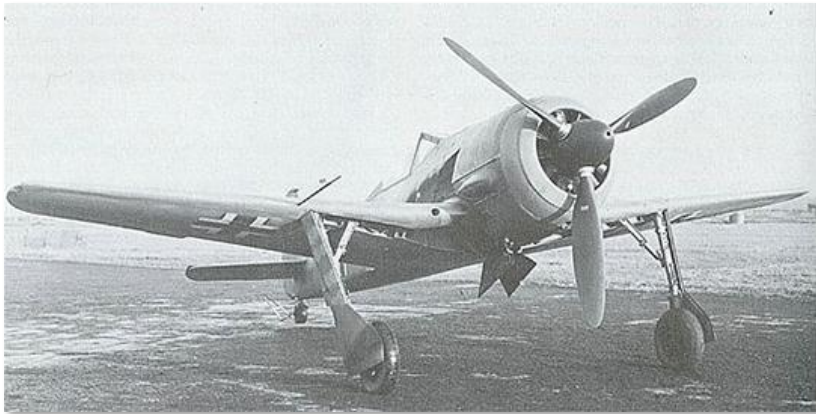


Figure 1: Fw 190 A prototype

The first and the most mass-produced Fw 190 variant was the A series powered by a radial engine. Serving as a pure air superiority fighter, fighter-bomber and ground-attack aircraft, the A series was loved by its pilots and feared by its enemies.

The design work started in 1939. The new aircraft proposed by Kurt Tank, the head of the technical department at Focke-Wulf, was, for its time, groundbreaking. It was a rare attempt to create a radial-engine fighter at a time when most designers preferred inline engines because of their supposed aerodynamic superiority. Unlike its main competitors, the Messerschmitt Bf 109 and the British Supermarine Spitfire, the 190 was not designed for speed but for durability. Its wide landing gear would make it easier to operate from primitive forward airfields, and its sturdy gear struts and shocks could withstand much harder landings. Sturdy airframe, ample armor, and appropriately designed internal systems made the 190 capable of returning home after taking more than a couple of hits. An innovative pushrod control system instead of the conventional cables and pulleys made the controls light and responsive. An industry-first ergonomic cockpit placed all controls at pilot's fingertips, and electrically powered equipment in place of hydraulics made simple push-button operations for gear, flaps, and weapons a reality. These simple cockpit controls and many automated systems made it easier to train new pilots on the Fw 190 in harsh war-time conditions.



Figure 2: Fw 190 A

The work on the D series began in 1942. As the new Junkers Jumo 213 engine offered clear improvements in performance, the decision was made to use it with the 190 airframe. While Kurt Tank, the Fw 190's lead designer, preferred the Daimler-Benz DB 600 series, the engines were already used in Messerschmitt fighters, while a surplus of the Jumo 213 bomber engines were readily available. The brand-new 213, an improvement on the earlier Jumo 211, offered 1,750 hp (1,287 kW) of take-off power that could be boosted up to an astonishing 2,100 hp (1,508 kW) of emergency power with MW-50 injection.

An Fw 190 A-8 airframe was used as a basis for the new D-series design. While the earlier radial engine was air-cooled, the liquid-cooled Jumo 213 required a radiator, which further added to airframe length and weight. Kurt Tank chose to go with a simple annular radiator design. The airframe was strengthened, and both the nose and the tail sections were increased in length by almost 1.52 meters.

The canopy design on the Dora series was changed during the production run. The first production examples used a flat-top canopy used on earlier A-series, the later Doras were upgraded to the advanced rounded-top canopy similar to Allied bubble canopies which offered improved all-around visibility. Other airframe improvements included a smaller streamlined center weapons rack.

While originally intended to serve as a bomber interceptor, changing realities of the war in the air meant that by the time the Dora entered production in August of 1944, it mostly saw combat against enemy fighters or in a ground attack role.

The earliest pre-production variants designated D-0 had the external wing guns removed; this was often reversed and future D variants were produced with the wing guns. Most D-9s intended for lighter anti-fighter role were still built without the outer wing guns, featuring a pair of 13 mm MG 131 machine guns and twin 20 mm MG 151/20E cannons.



Figure 3: Fw 190 D-9

The first production variants were designated D-9; there was no production of any interim designations between D-1 to D-8. The initial D-9 variants were rushed into service without the crucial MW-50 water injection. By December of 1944, all early variants were field-converted to spec. Later production D-9 variants built with the MW-50 at the factory had the tank that could be used for dual purposes, either for the methanol water injection or as an additional fuel tank.

Initial opinion of the upcoming Dora was not very high. Kurt Tank always stated that the D-9 was intended only as an interim stop-gap until a more perfect Ta-152 design could enter production. However, once Luftwaffe pilots got their hands on the stop-gap Long-Nosed Dora, they were pleasantly surprised. Performance and handling were good. When flown by capable pilots, the aircraft was more than a match to Allied fighters.

The Long-Nosed Dora is considered the best mass-produced late-war Luftwaffe fighter. In total, over 700 Doras were produced out of a total Fw 190 production run of over 20,000.

To this day, it remains one of the most recognizable shapes in the skies, and one of the most influential aircraft designs of the entire aviation era.

AIRCRAFT OVERVIEW



AIRCRAFT OVERVIEW

General Description

The Focke-Wulf Fw 190 D-9 fighter aircraft is a single-seat, low-wing monoplane powered by a 12-cylinder liquid-cooled inverted Vee inline Jumo 213 A-1 engine. The engine is equipped with a single stage, two-speed supercharger and an automatic manifold pressure regulator. The engine spins a three-blade constant-speed propeller.

The powerplant consists of a Jumo engine that delivers approximately 1,776 horsepower at 3,250 RPM. This can be further increased to 2,240 horsepower by the use of MW-50 water-methanol injection. Maximum emergency power in level flight is 1,600 horsepower at 3,250 RPM.

The fuselage is a semi-monocoque, all-metal structure. The forward section to the rear of the cockpit has four longerons and a horizontal partition dividing the cockpit from the fuel tank. The rear section of the fuselage is a conventional monocoque structure with light alloy frames. The entire structure is covered with light alloy stressed skin.

The wings comprise an all-metal structure with two main spars. Light alloy Frise-type ailerons with fabric covering are fitted. The split trailing-edge flaps operate electrically and depress 10 degrees for take-off and 60 degrees for landing.

The tail unit is an all-metal tailplane that continues through the fuselage and can be adjusted for incidence. The all-metal stressed skin tailplane is integral with the fuselage. The control surfaces are light alloy with fabric covering.

The armament consists of twin fixed synchronized 13 mm Rheinmetall-Borsig MG 131 machine guns with 475 rounds per gun mounted above the engine cowling, and twin fixed synchronized Mauser MG 151/20 cannons with 250 rounds per gun mounted in the wing roots.

Specifications for the Fw 190 D are:

- Wingspan – 10.5 m
- Overall length – 10.24 m
- Empty weight – 3490 kg
- Loaded weight – 4830 kg
- Wing area – 18.3 m²

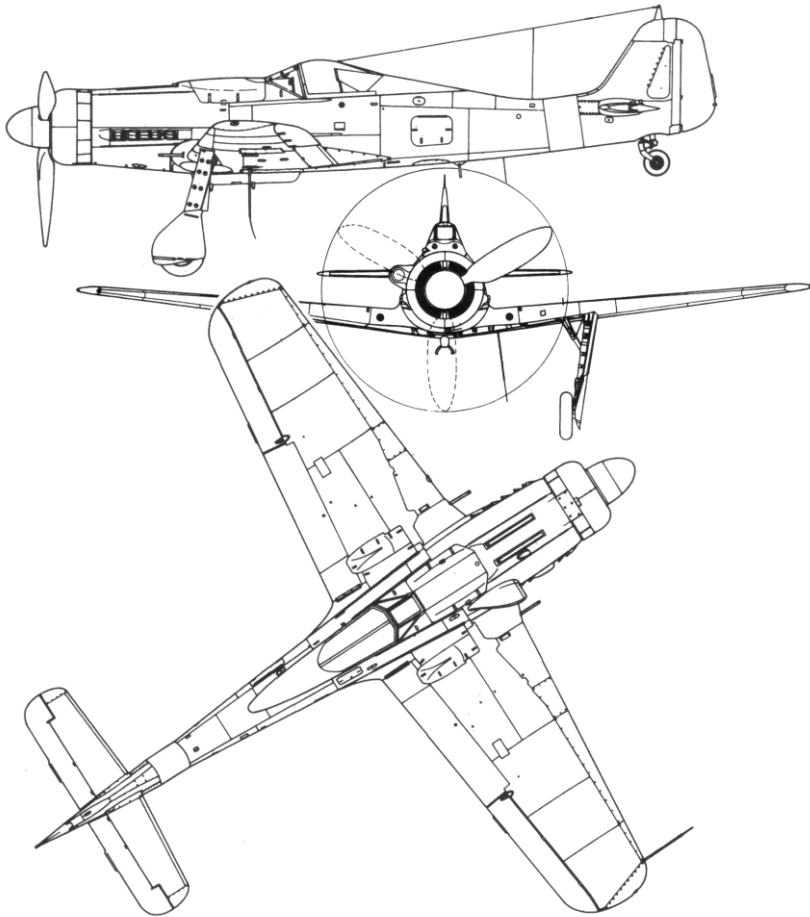


Figure 4: Fw 190 D-9 drawings

Fw 190 D-9 Major Assembly Parts

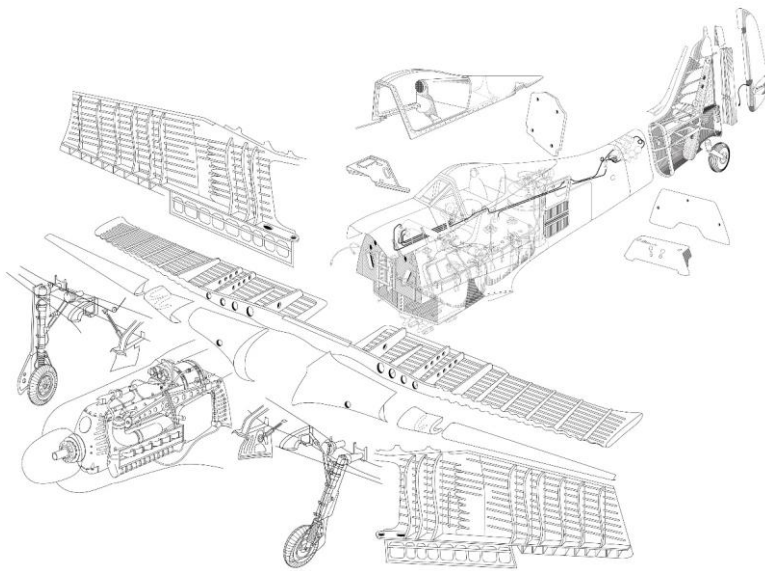


Figure 5: Fw 190 D-9 major assembly parts

Fuselage

The Fw 190 has an all-metal semi-monocoque fuselage. The fuselage is further divided by a partition behind the cockpit that separates the forward portion from the fuel tank. The forward cockpit section has four longerons between the front firewall and the rear bulkhead; the aft section, a conventional monocoque structure, contains shell segments that extend to the rear frame to which the tail section is attached. The entire fuselage is covered with light alloy.

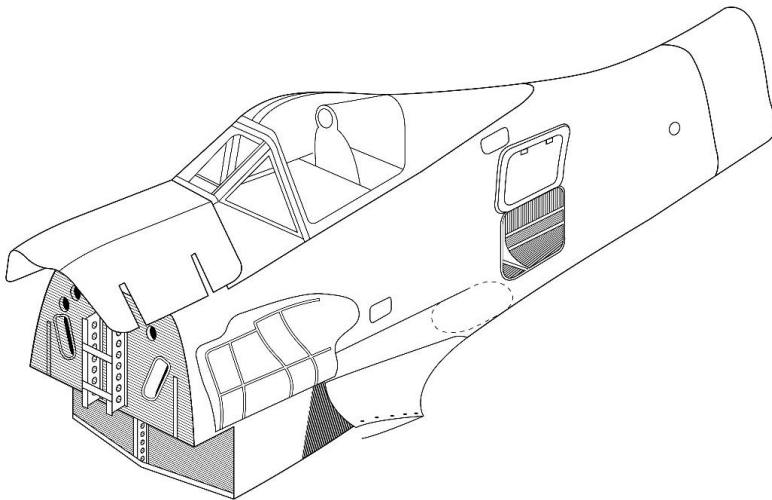


Figure 6: Fw 190 D-9 fuselage

Canopy

The Fw 190 features a bulged plexiglass canopy on ball-bearing rollers. The rollers move along the fuselage upper decking. The front windscreen has a metal frame. The canopy features a piece of head armor protecting the pilot from gunfire from the rear.

The canopy can be opened or closed via a conventional hand crank found on the right-hand side of the cockpit. The canopy can also be jettisoned in an emergency via a jettison lever.

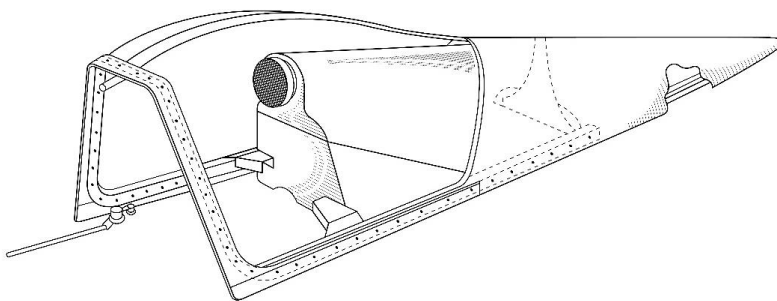


Figure 7: Fw 190 D-9 canopy

Many earlier aircraft designs featured canopies consisting of small glass or Perspex panes in a "greenhouse" framework. That greatly limited visibility to all sides, especially the rear, and created blind spots. Advances in thermoforming that allowed for sheets of plastic to be vacuum-formed into complex shapes however led to a breakthrough in canopy design. Self-supporting bubble-type canopies could now be created, offering greatly improved all-around visibility.

All Fw 190 versions offered such improved views. Initial prototypes and most A-series variants featured the pilot sitting higher up in the fuselage than in many other contemporary aircraft, with only a single metal frame blocking his view where the sliding canopy met the windscreen.

Further advances created an even better solution, first tried on the F-2 ground attack variant of the Fw 190 and quickly adapted to other variants such as the A-8 and F-8. This new canopy used outward bulges on the sides of the cockpit that allowed the pilot to see more of the battlefield to the front and sides. Most useful when attacking ground targets, this also offered clear advantages in air combat. Sometimes incorrectly called a bubble canopy, the new design had more in common with the Malcolm Hood used on later variants of the Supermarine Spitfire and the P-51B and C.

The new bulged canopy also included improved head armor within a reinforced bracing structure.

Both canopy types were used in the D-series of the Fw 190. First production examples shipped with the earlier flat-top canopy. Later production series used the improved bulged canopy design.

Wing

The Fw 190 D-9 has an all-metal monocoque wing with two spars. The main spar runs through the fuselage and connects the two wing panels. The rear spar consists of two sections, each attached to the fuselage.

Horizontally, each wing is divided into the upper and lower shells. The lower shell contains the main spar, while the upper shell contains the rear spar.

The interior of each wing contains the wing guns, the landing gear, aileron and flap controls and drive motors. The wings are further strengthened with wing ribs to which the shells are attached.

The main spar also holds the mounting points for the wing guns and the landing gear.

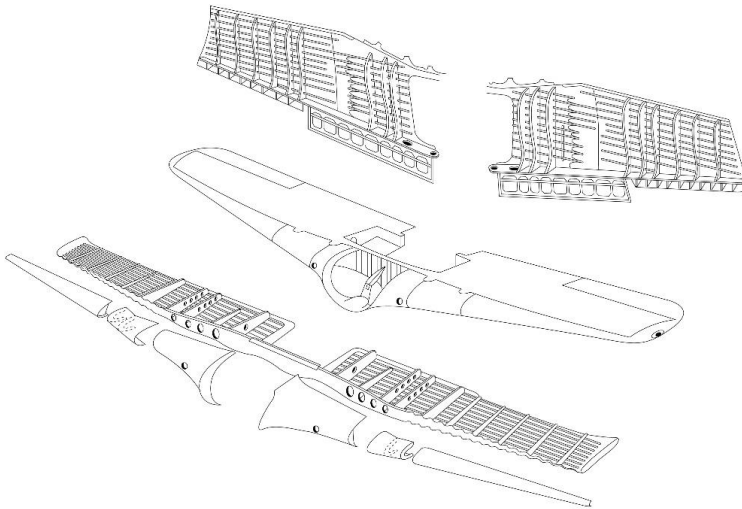


Figure 8: Fw 190 D-9 wings

Tail Section

The Fw 190 D-9 has an all-metal tail unit that contains both the tail unit and the vertical stabilizer. It is attached to the rear fuselage attachment bulkhead.

The main load-bearing section of the vertical stabilizer is a diagonal spar, to which the all-metal horizontal stabilizer and the tailwheel assembly are attached.

The fabric-covered rudder contains a metal frame with a spar and seven ribs. It has both aerodynamic horn balancing and mass balancing. There is also a trim tab; due to the aircraft being generally very stable in flight, the trim tab is only adjustable on the ground.

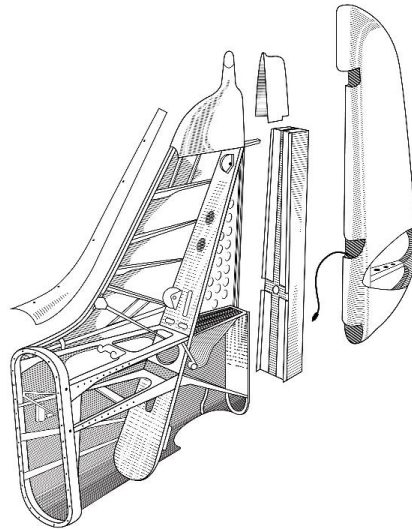


Figure 9: Fw 190 D-9 tail section

Flight Controls

The control unit assembly consists of the horizontal stabilizer and elevators, the vertical stabilizer and rudder, the ailerons, and the flaps.

The Fw 190 D-9 has a conventional control scheme with surfaces that include a vertical stabilizer, rudder, horizontal stabilizer, two elevators, two ailerons, and flaps.

As the Fw 190 D-9 is generally very stable in flight, only the horizontal stabilizer has trim adjustable in flight. Other control surfaces have trim tabs that can only be adjusted on the ground.

The control system for the aircraft is advanced for its age and uses a system of push rods and control cables. Compared to a conventional pulleys and cables system, the controls in the Fw 190 D-9 are lighter and more precise.

The control system uses differential bell cranks that transfer control movement near the center position into finer control surface movement, while control movement is magnified as the controls approach their limit.

The flight stick can be moved forwards and backwards in conventional fashion to control the elevator. It can be moved 20 degrees forward and 21 degrees rearward.

The flight stick can also be moved sideways to control the ailerons in conventional fashion. Aileron deflection is limited by mechanical stops in the control stick mounting base.

Flap position is controlled via pushbuttons on the left-hand side of the cockpit.

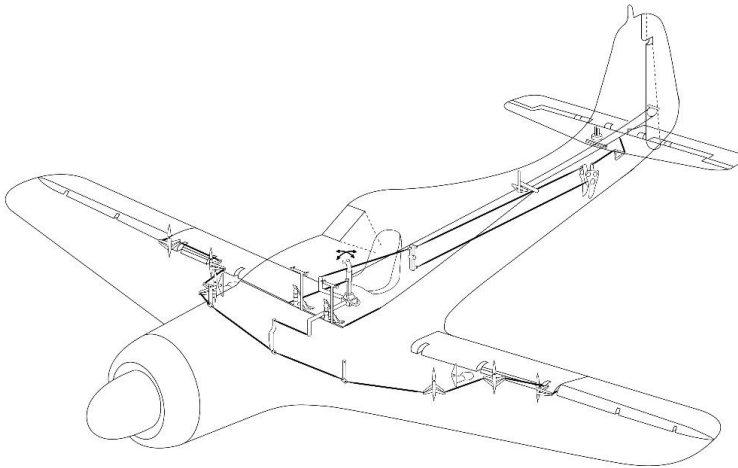
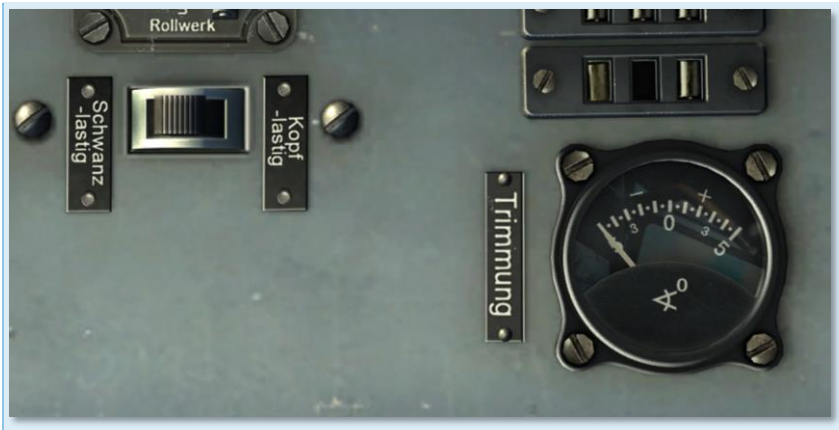


Figure 10: Fw 190 D-9 control cables

The horizontal stabilizer can be adjusted in flight to compensate for changes in aircraft trim. The operation is via an electric motor mounted within the vertical stabilizer.

The horizontal stabilizer trim switch is located on the left-hand side cockpit console. The motor is run as long as the switch is depressed, and until the limit position is reached. The actual position of the stabilizer is shown via the corresponding indicator.



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Figure 11: Horizontal stabilizer trim switch (left) and position indicator (right)

The trapezoidal elevator unit has a symmetrical airfoil.

The horizontal stabilizer is actuated by a spring-loaded switch located on the cockpit's left-hand side and can be moved between +2 and -3 degrees in flight.

The elevator comprises two identical half units, each attached to the stabilizer via pivot bearings. The elevator is aerodynamically balanced as well as mass balanced. The elevator has a trim tab that can only be adjusted on the ground.

The center-mounted fabric-covered rudder has aerodynamic horn balancing as well as mass balancing, and has a trim tab that can only be adjusted on the ground.

Frise-type ailerons made of light alloy with fabric covering are similar to the other control surfaces in construction. They also have mass balancing and a trim tab that can only be adjusted on the ground.

The landing flaps are of the split-type design and are identical, i.e. the right and left landing flap are interchangeable. They are operated electrically and can be set to three positions in flight: cruise, take-off, and landing. The standard take-off setting is 10 degrees of deflection; the landing setting is a full 60 degrees. There are no interim settings available to the pilot.

Landing Gear

The landing gear is of the inward retracting type, with the main wheels being housed ahead of the front spar when raised. The tailwheel is semi-retractable and is interconnected with the main wheels to synchronize retraction which is achieved by electrical means.

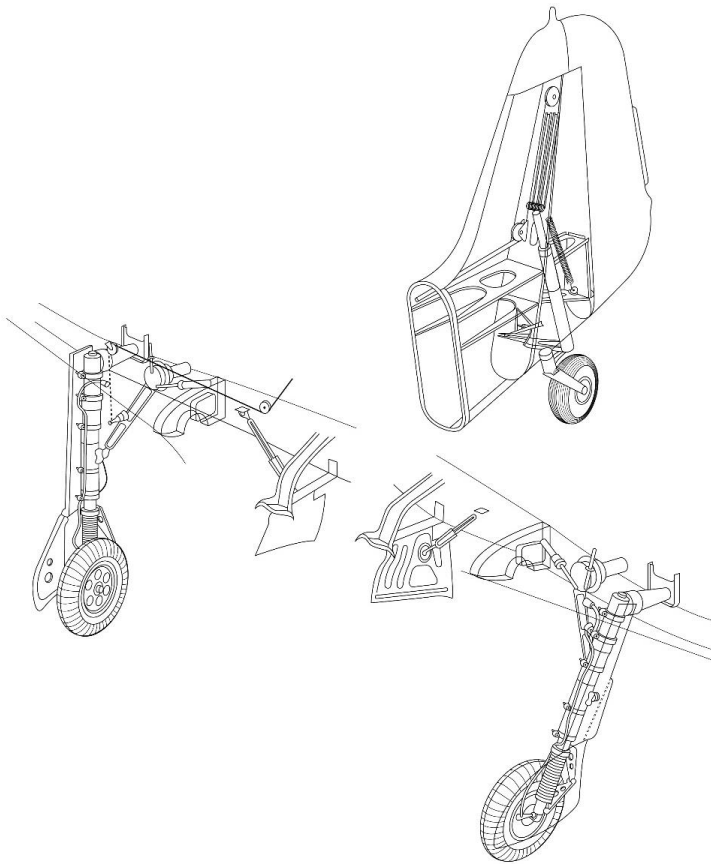


Figure 12: Fw 190 D-9 landing gear

The gear is extended and retracted electrically. A cable attached to the right main landing gear unit also retracts the tailwheel simultaneously with the main gear.

The main gear consists of two shock struts, with a scissors unit connecting the upper and lower shock strut members to absorb torque stresses.

Each main gear strut is operated individually by a drive unit powered by an electric motor mounted on the main spar.

A conventional tailwheel is also provided. It can be rotated 360 degrees and has a centering lock.

Both main gear members are secured in place by powerful locking hooks when retracted. The tailwheel is not locked in the up position, but is held in place by the tension of the retraction cable.

Undercarriage lowering is aided by a drive unit connected to a sealed air jack.

The undercarriage is controlled by simple pushbuttons located on the cockpit's left-hand side.

To raise the landing gear, simply depress the corresponding "Ein" (On/In) button and wait for the operation to complete. Once the gear is locked in position, red lights illuminate on the undercarriage indicator unit.

To lower the landing gear, depress the corresponding "Aus" (Off/Out) button and wait for the operation to complete. Once the gear is fully extended, green lights illuminate on the undercarriage indicator unit.

In case of electric motor failure, the main gear can also be lowered by pulling the emergency gear extension handle. This unlocks the shock struts which can then extend with the help of gravity and sealed air jacks.

The tailwheel is retracted simultaneously with the main gear.

When retracted, the lower half of the tailwheel remains exposed. In case of emergencies, it can be used as a tail skid.

Brake System

The Fw 190 D-9 has hydraulically operated brake shoes on each of the two main wheels. Each has its own hydraulic lines and can be braked individually.

The entire system is conventionally operated via rudder pedals.

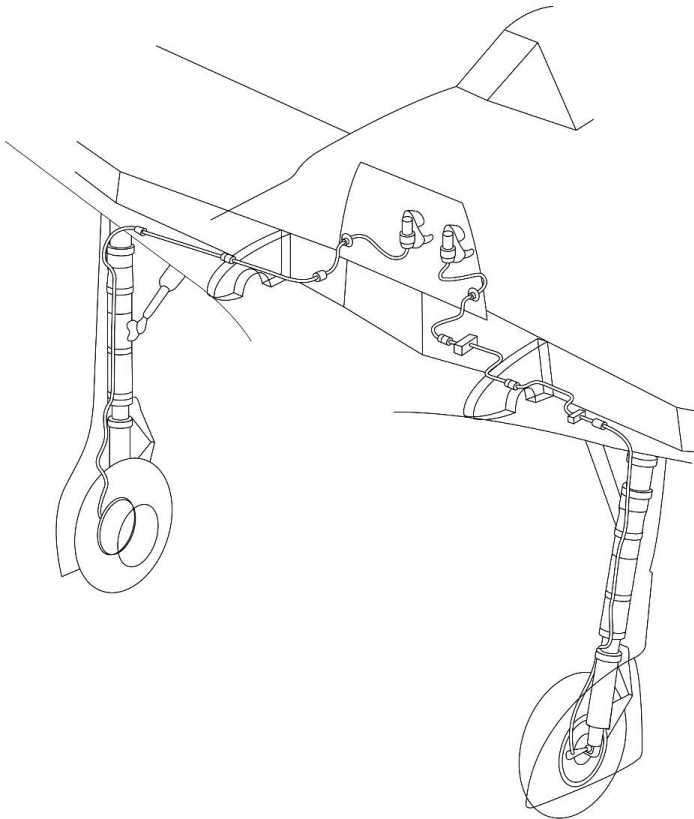


Figure 13: Fw 190 D-9 brake system

Engine

The Fw 190 D-9 is powered by a Junkers Jumo 213 A-1 engine, a 12-cylinder liquid-cooled inverted inline Vee. The Jumo 213 features a single stage, two-speed supercharger and an automatic manifold pressure regulator. The engine drives a three-blade constant-speed propeller.

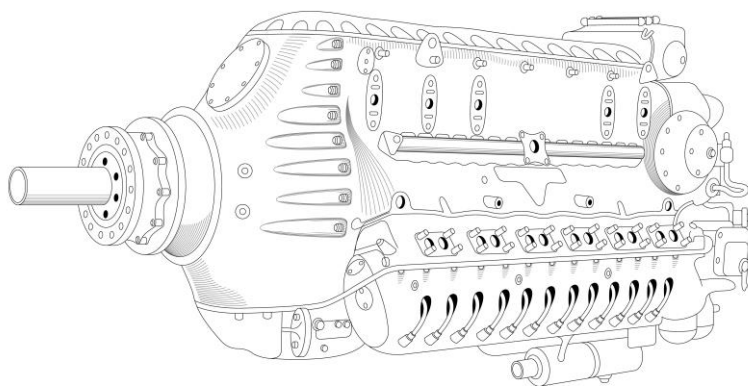


Figure 14: Junkers Jumo 213 A-1

Like most German aero engines, the Jumo 213 did not have a carburetor, but featured direct fuel injection.

Bediengerät Engine Control Unit

The Junkers Jumo 213 engine comes equipped with a "Bediengerät" (engine control unit), which is similar in function to the "Kommandogerät" (command device) used on BMW-801-powered earlier variants of the Fw 190.

The "Bediengerät" is a hydromechanical multifunction integrator that dramatically simplifies engine control. While in most other contemporary aircraft the pilot had to constantly operate a slew of levers to manage throttle level, propeller pitch, fuel mixture, and supercharger stages, the "Bediengerät" takes the majority of the workload away. The pilot simply has to move the throttle lever to set the desired manifold pressure. The "Bediengerät" takes care of the rest, setting all other parameters to allow the engine to properly operate at the desired manifold pressure, given the current flight conditions.

The gauge used to monitor desired supercharger pressure is the supercharger pressure gauge to the right of the front dashboard labeled "ATA" (for "Absolute Technische Atmosphäre", an obsolete unit of pressure).

Additional controls are also available that allow for some engine control unit parameters to be manually finetuned.

Supercharger

The Junkers Jumo 213 engine is equipped with a single stage, two-speed centrifugal supercharger with MW-50 water-methanol injection.

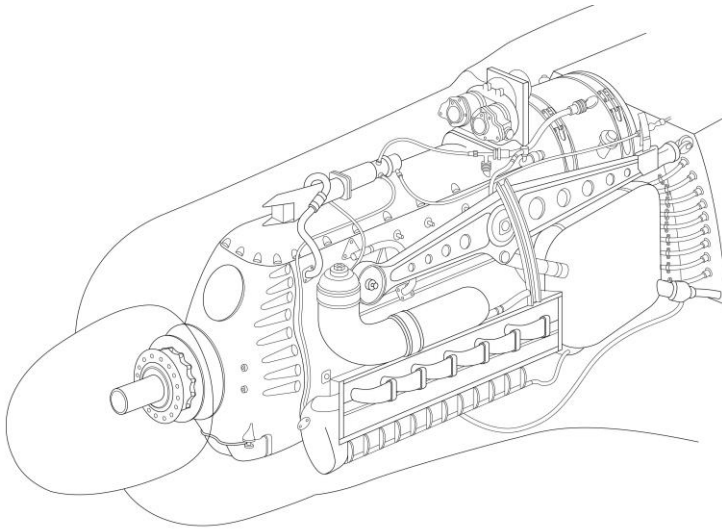


Figure 15: Junkers Jumo 213 A-1 assembly

Critical height is approx. 5500 meters.

MW-50 Water-Methanol Injection

MW-50 (Methanol-Wasser 50) is a 50-50 mixture of methanol and water sprayed into the Fw 190 D-9's supercharger, allowing the use of increased boost pressures.

The MW-50 tank has a capacity of 115 liters (85 kg). The fluid flow is about 160 liters/hour.

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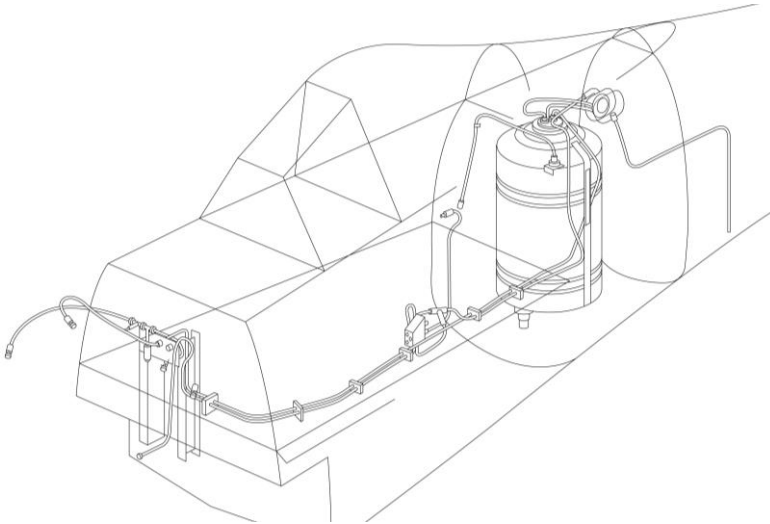


Figure 16: MW-50 system diagram

The primary effect of the MW-50 mixture spray is cooling of the air-fuel mixture.

The secondary effect of the MW-50 mixture spray is its anti-detonant effect, which is how the increase in boost pressure is achieved.

While the secondary boost-increasing effects deteriorate with altitude, the primary cooling effects are still noticeable. Therefore, the MW-50 system can be used to cool down the air-fuel mixture at all altitudes in the event of an emergency.

The boost provided by the MW-50 begins to decrease in power at altitudes above 6,000 meters.

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Figure 17: MW-50 switch

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Figure 18: Water/Methanol pressure gauge

The boost increase provided by MW-50 can be described with the word "incredible".

Turning the system on increases engine power by almost 100 HP due to the fact that a cooler mixture can pull in more air. At the same time it enables much higher supercharger boost levels. In optimal conditions, both effects combined increase engine power by a whopping 350...400 HP.

Please note that the MW-50 tank can also be used to store conventional aviation fuel, in essence providing extra range at the expense of available extra power.

The MW-B4 Selector on the left console is used to set the MW-50 tank status. Please note that incorrectly setting this switch can have catastrophic results, by either feeding the water-methanol mixture into the fuel lines, or spraying aviation fuel into the supercharger.

Propeller

The Junkers Jumo 213 A-1 engine drives a three-bladed VDM VS 111 constant-speed propeller with wood blades. Propeller diameter is 3.5 meters.

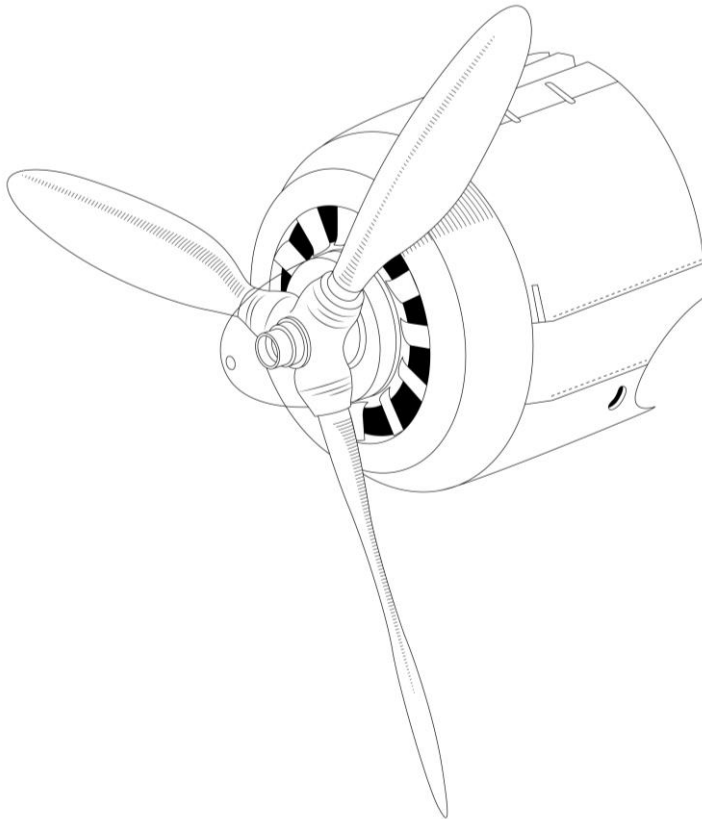


Figure 19: VDM VS 111 propeller

Fuel System

The Fw 190 D-9 has two main tanks, forward (Vorn) and rear (Hinten), both conveniently located below the cockpit floor underneath the pilot's seat. The fuel tanks are self-sealing. Engine-driven pumps feed the fuel into the engine at a normal pressure of 1 to 2 kg/cm². There is also an electrical booster pump in each of the two tanks that prevents vapor lock at altitude, provides improved fuel supply and can serve as a back-up in case of main pump failure.

The tanks have a capacity of 232 liters (172 kg) front (Vorn) and 292 liters (216 kg) rear (Hinten).

The MW-50 tank can be used as an additional fuel tank with a capacity of 115 liters.

The Fw 190 D-9 can also carry an external drop tank under the fuselage with the capacity of 300 liters.

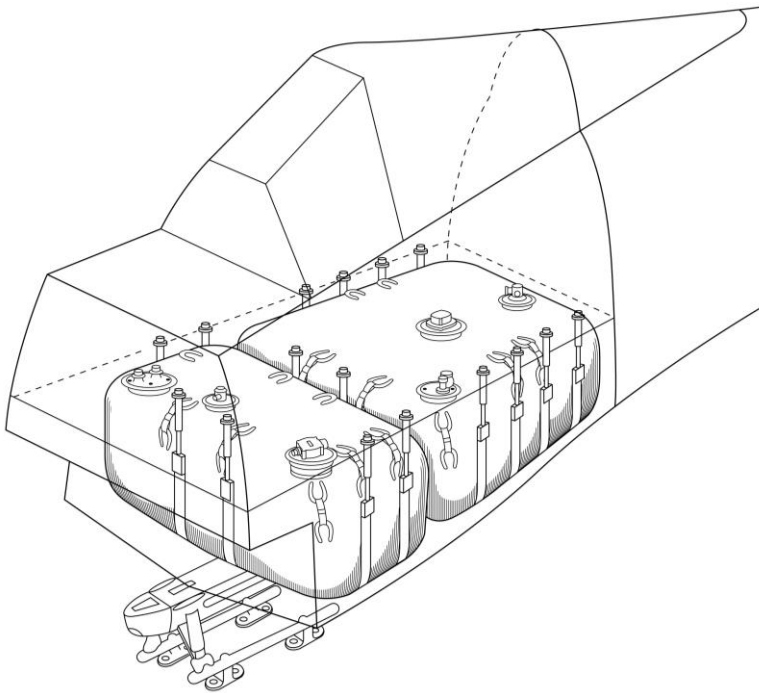


Figure 20: Front and aft fuel tanks

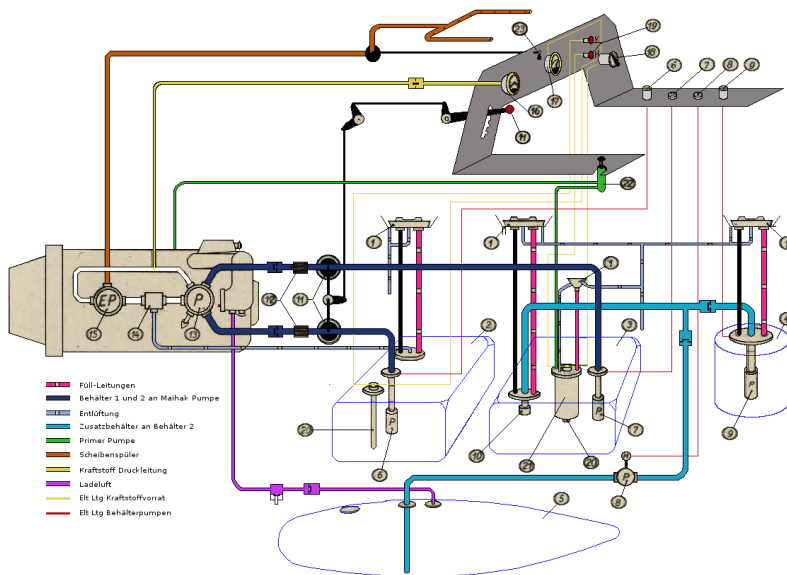


Figure 21: Fuel system diagram

- | | |
|--------------------------------------------|--------------------------------|
| 1. Filling port | 13. Booster pump |
| 2. Forward tank (232 l) | 14. Vapor separator |
| 3. Aft tank (292 l) | 15. Fuel injection |
| 4. Auxiliary fuselage tank (115 l) | 16. Fuel pressure gauge |
| 5. Auxiliary jettisonable tank | 17. Fuel content gauge |
| 6. Forward tank feeder pump | 18. Fuel gauge selector switch |
| 7. Aft tank feeder pump | 19. Fuel warning lights |
| 8. Auxiliary jettisonable tank feeder pump | 20. Fuel level sender |
| 9. Auxiliary fuselage tank feeder pump | 21. Primer fuel canister (3 l) |
| 10. Shutter valve (shuts at 240 l) | 22. Primer pump |
| 11. Fuel selector | 23. Windscreen cleaner |
| 12. Fuel filter | |

The fuel system operates on a simple principle. The internal feeder pumps of the front [6] and rear [7] fuselage tanks feed into the engine's booster pump [13].

When the fuel selector (fuel cock) [11] is set to "Auf", both fuel lines from the forward and rear tanks are allowed to feed fuel to the booster pump. The booster pump draws more fuel than actually needed from both tanks and the surplus is routed back into the forward tank, thereby closing the valve for the forward tank. With this mechanism fuel effectively is drawn only from the rear tank as long as the engine gets enough fuel from it. When the engine pump starts to starve, the forward tank is "opened".

Additional tanks (auxiliary fuselage tank [4] and drop tank [5]) feed into the rear fuel tank. Fuel from the additional tanks flows through two feed lines to the rear tank. These feed lines are connected with a T-joint to the rear tank. Check valves are installed before the T-joint in each of the two lines that prevent the flow of fuel from one auxiliary tank to the other; or, when one of these two tanks isn't fitted, prevents loss of fuel through the unconnected feed line.

Note that the additional tanks won't start feeding the rear tank until the rear tank is at 240 from its 292 liters because of a fuel transfer limit switch ("Umpumpbegrenzer") [10] that regulates the flow of fuel from the auxiliary tanks to the rear tank.

When the rear tank is full, fuel is fed from the rear tank to the booster pump and the closed fuel transfer limit switch does not allow fuel from the additional tanks into the rear tank.

As soon as only 240 liters of fuel are remaining in the rear tank, the transfer limit switch opens and fuel is fed from the selected auxiliary tank to the rear tank.

The auxiliary tank will then continue feeding the rear tank and fuel will be drawn from the rear tank until the auxiliary tank becomes empty. The feeding from the auxiliary tanks to the rear tank will only stop when they are fully emptied. Since there is no gauge for monitoring auxiliary tank contents, the pilot can only notice them being empty when the rear tank fuel level falls below 240 liters.

When additional tanks are used, apply the following procedure:

- Set the fuel cock to „Auf“ (open).
- Set the fuel gauge selector switch to „Hinten“ (rear tank).
- Turn on the rear fuel tank pump by pressing the white E13 („Hinten“) circuit breaker
- When both additional tanks are fitted, the drop tank is emptied first, so that it can be discarded in an emergency.
- When a drop tank is equipped, turn the drop tank pump on by pressing the white E85 („Sonder“) circuit breaker. Fuel is forced from the drop tank to the rear fuel tank by air pressure drawn from the supercharger. This action is aided by the fuel pump which begins to run as soon as the circuit breaker is pressed. When the supercharger pressure is less than that of the surrounding air, the fuel pump alone feeds the fuel to the rear tank.
- When the drop tank becomes empty (rear tank gauge shows less than 240 l), turn off the drop tank feeder pump by pressing the red E85 („Sonder“) circuit breaker and jettison the depleted drop tank.
- When no drop tank is installed, the drop tank fuel pump can be left in the OFF position.
- When the auxiliary fuselage tank is used with B4 aviation fuel, the MW-50/B4 Selector on left side controls must be set to B4. Turning on the auxiliary tank fuel pump by pressing the white E96 („MW-Anlage“) circuit breaker is not necessarily needed, because fuel is fed by compressed air from the supercharger.

As soon as the (bottom) rear tank warning light turns on, there are 10 liters of fuel left in the rear tank and the following steps should be performed:

- Turn on the forward fuel tank feeder pump by pressing the white E14 („Vorn“) circuit breaker
- Set the fuel cock to „Hinterer Behälter zu“ (rear tank closed) to prevent suction of air into the booster pump
- Switch off the rear fuel tank feeder pump by pressing the red E13 („Hinten“) circuit breaker
- Set the fuel gauge selector switch to „Vorn“ (forward tank).

The (top) forward tank warning light indicates 80 liters of fuel remaining in the forward tank, sufficient for approximately 15 minutes flying time.

The engine consumes the fuel from a tank that is open according to the position of the fuel selector.

If drop tanks are used, their fuel pump, in turn, feeds the rear tank.

The pipe that feeds from the drop tank to the rear tank connects to a special limiting valve, mounted in the rear tank. If the plane carries a drop tank, that limiting valve will only open when the rear tank content drops below 240 liters.

At first, no fuel is consumed from the drop tank, because the limiting valve is closed. So, in the beginning, fuel will be consumed from the rear tank, until its level drops to 240 liters. Only then, the limiting valve will open and allow fuel from the drop tank to feed into the rear tank. When the drop tank is empty, the fuel level in the rear tank will drop below 240 liters – this is the indication that the drop tank is empty.

If drop tanks are used, set the fuel selector lever to „auf“, the fuel gauge selector switch to „Hinten“, switch on the rear tank fuel pump by activating the E13 „Hinten“ circuit breaker, and switch on the drop tank fuel pump by activating the E85 „Sonder“ circuit breaker. When the drop tank is empty (rear tank drops below 240 liters), switch off the drop tank fuel pump by deactivating the E85 „Sonder“ circuit breaker. The drop tank can now be jettisoned.

As soon as the rear tank empty warning light illuminates, the fuel level in the rear tank is approximately 10 liters. Switch on the forward tank fuel pump by activating the E14 „Vorn“ circuit breaker, and set the fuel selector lever to „hinterer Behälter zu“ to avoid sucking air in the pumps. Then switch the rear tank fuel pump off and set the fuel gauge selector switch to „Vorn“ so that the contents of the front tank are displayed on the fuel contents gauge.

The front tank empty warning light illuminates when the fuel level in the front tank reaches approximately 80 liters. This amount is sufficient for approximately 15 minutes of flight time.



Figure 22: Fuel selector lever

A single fuel contents gauge is also provided on the front dash. It can be switched to show the contents of the rear or the forward tank at any given time. The fuel gauge selector switch located to the right of the fuel contents gauge can be used to switch between the two modes.



Figure 23: Fuel contents gauge

There is also a fuel pressure gauge that monitors the fuel pressure as fed from the main fuel tank to the engine.

The following two fuel warning lights are provided to indicate low fuel in each of the tanks:

1. Return-to-base warning.

A fuel low level device fitted in the forward tank causes the top red (fuel low) warning light labeled "vorn" to illuminate when the contents of the forward tank fall to 80 liters.

2. Tank switch-over warning ("Umschaltwarnung").

A fuel low level device fitted in the rear tank causes the bottom white (rear tank switch-over) warning light labeled "hinten" to illuminate when the contents of the rear tank fall to 10 liters.



Figure 24: Fuel warning lights (left) and fuel gauge selector switch (right)

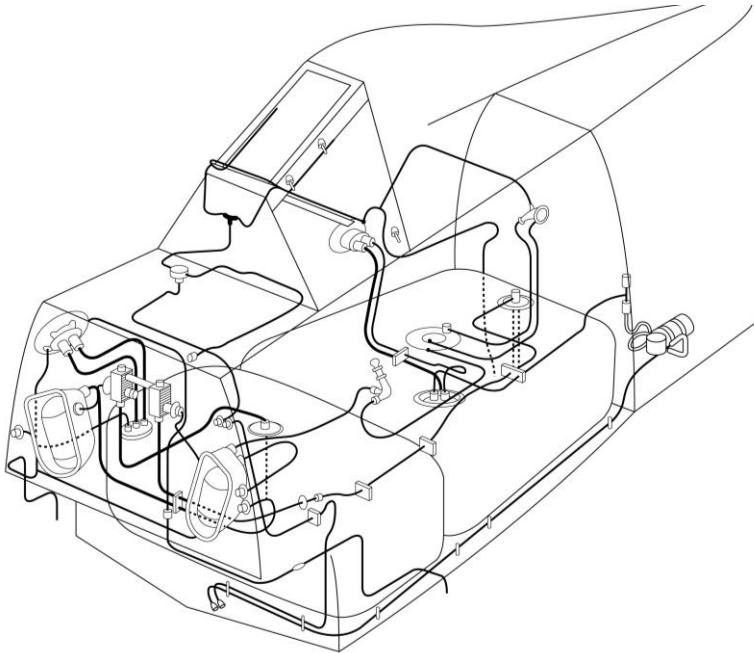


Figure 25: Fuel system

Oil System

A 55-liter oil tank is located in the left side of the engine. There is no air oil cooler - oil is cooled by engine coolant in the special heat exchanger.

Two cockpit gauges are provided, both located on the front dash. The oil temperature gauge monitors the system with the normal operating temperature range of 110...130 degrees Celsius (min. 40°C, max. 135°C). The right-hand side of the fuel and oil pressure gauge monitors the oil system with the normal operating pressure of 5 – 11 kg/cm².



Figure 26: Fuel and oil pressure, coolant temperature and oil temperature gauges

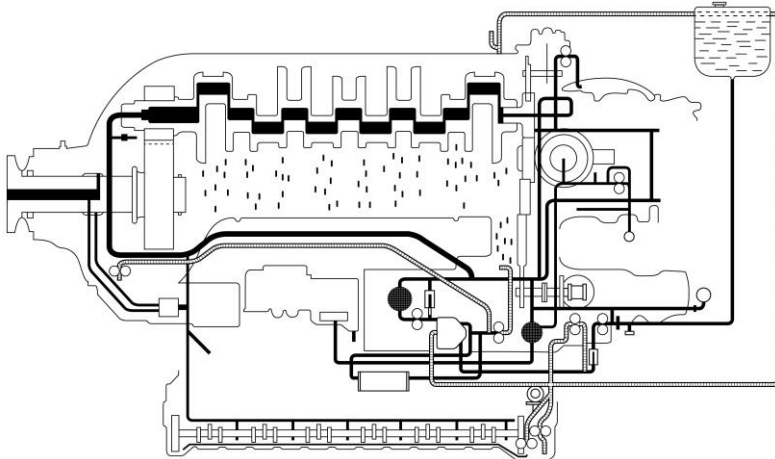


Figure 27: Oil system diagram

Coolant System

The D-series of the Fw 190 uses the AJA 180 annular radiator with a capacity of 115 liters. It is installed in front of the engine.

The Jumo 213 coolant system has both the main system, consisting of the coolant pump, engine, radiator, and the heat exchanger; as well as the secondary system with the secondary flow pump, coolant pump, and the coolant tank. The two systems only interact within the coolant pump.

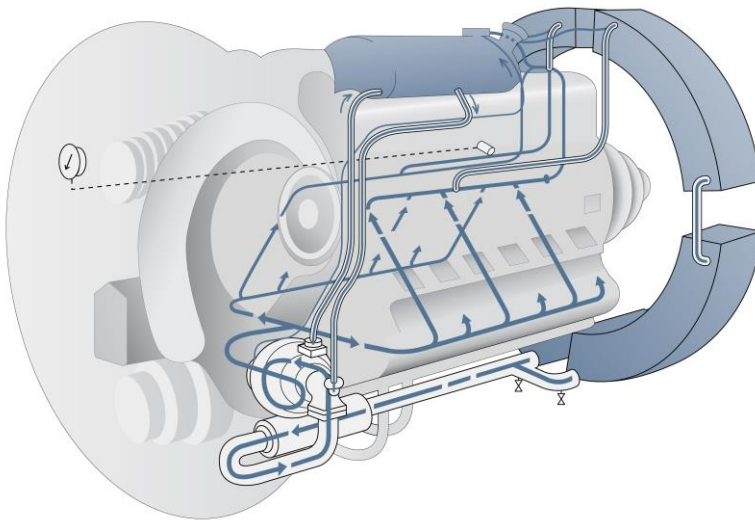


Figure 28: Coolant system diagram

The coolant system attempts to operate at a temperature of about 100 °C at all altitudes. A built-in electric temperature sensor between the engine and the radiator is used to control the temperature.

Proper pressure is required in the cooling system to prevent unwanted vapor formation. Any steam that may occur is separated in the vapor air separator of the coolant pump and then sent to the secondary system coolant tank where it is condensed.

However, if the boiling limit in the coolant tank is exceeded, the pressure begins to rise. Therefore, the pressure and temperature gauges should be watched at all times to avoid overheating and possible engine damage.

DCS [Fw 190 D-9]

To avoid excessive pressure, the cooling system has a pressure-controlled pressure regulating valve which also performs the task of maintaining pressure at greater altitudes via the evaporation of the coolant in the coolant tank.

Electrical System

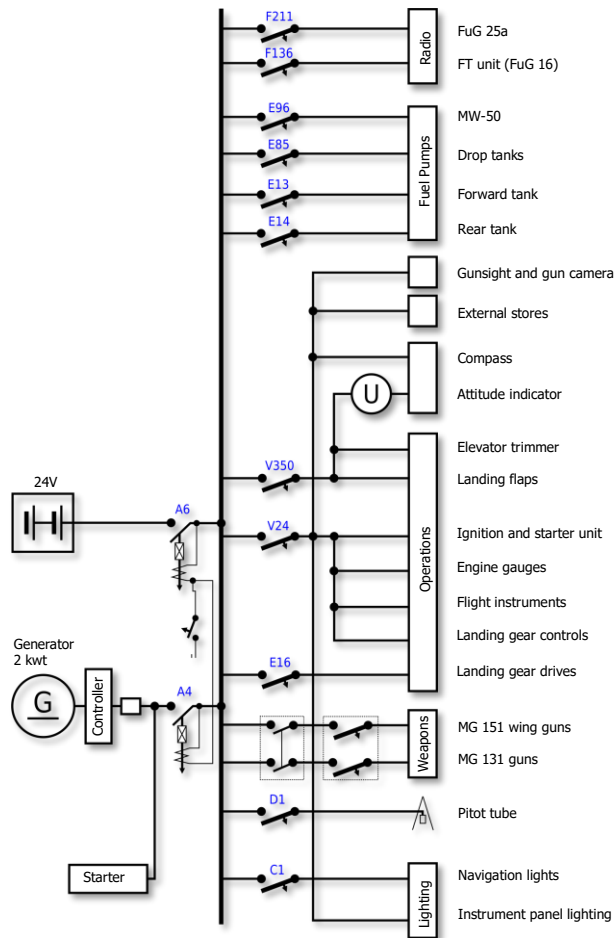


Figure 29: Electrical system diagram

Oxygen System

The oxygen system consists of a cockpit-mounted flow valve with the attached flow monitor, the regulator unit with oxygen hose, and high-pressure lines with pressure gauge, and a set of spherical bottles located in the aircraft tail that contain the oxygen. The bottles are split into separate systems as an additional safety measure.



Figure 30: Oxygen flow indicator and pressure gauge

Opening the flow valve starts the flow of oxygen. Oxygen flows to the regulator unit. The provided flow indicator and the pressure gauge located on the right-hand side of the front dash correspondingly indicate system status.

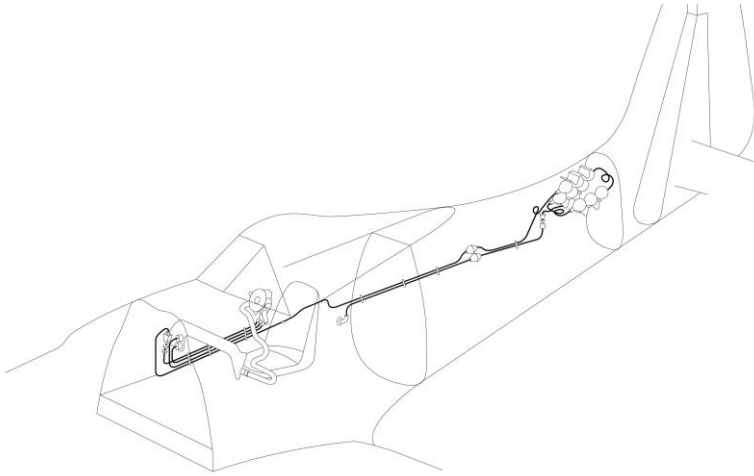


Figure 31: Oxygen system diagram

Radio Equipment

The aircraft is equipped with a FuG 16ZY radio, a specially-designed airborne VHF transceiver. The FuG 16 can be used for in-flight communication and DF homing. The set operates in the frequency range between 38.4 and 42.4 MHz.

The FuG 16ZY can also be set to "Leitjäger" or fighter formation leader mode that allows it to use a special "Y-Verfahren" (ground tracking and direction finding method) via the normal headphones.

The AFN-2 component of the radio set allows easy navigation to ground-based homing beacons, showing both direction and range on one simple dial.

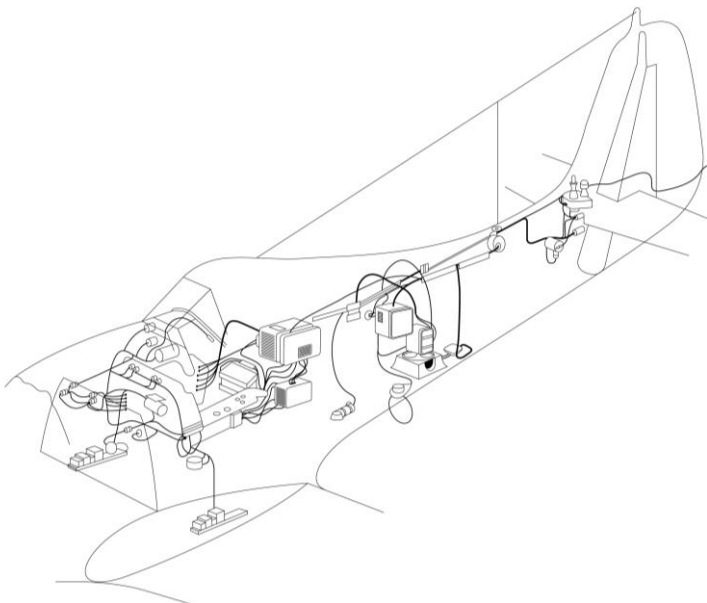


Figure 32: Radio equipment diagram

The FuG 25a "Erstling" (debut) component is one of the world's first Identification Friend or Foe (IFF) units that allows ground-based radar to identify the aircraft as friendly. The unit receives impulses from "Freya" or "Würzburg" radar stations. When enabled and properly set with the day's codeword, the FuG 25a replies with a pre-defined signal that the ground station can process to identify the unit as friendly. The FuG 25a operates in the frequency range of 125 +/-1.8 MHz, with the operating range of up to 100 km.



Figure 33: FuG 16ZY frequency selector, receiver fine tuning control, and volume control

Armor

The Fw 190 D-9 offers plentiful all-around pilot protection that includes an armored headrest, armored seat back, as well as a set of armor plating around cockpit walls.

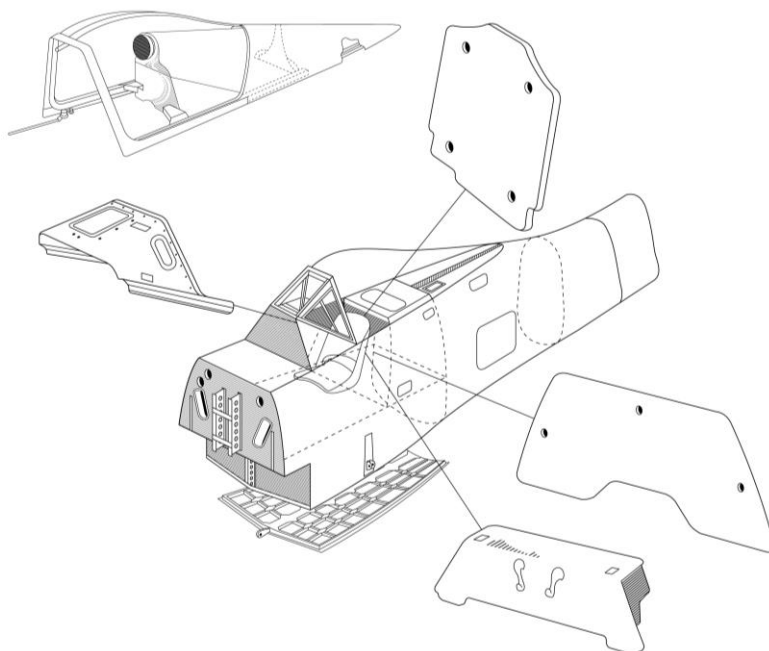


Figure 34: Fw 190 D-9 armor

Armament

The Fw 190 D-9 carries powerful fixed armament that consists of twin synchronized 13 mm Rheinmetall-Borsig MG 131 machine guns above the engine cowling with 475 rounds per gun, and twin synchronized Mauser MG 151/20 cannons in the wing roots with 250 rounds per gun.

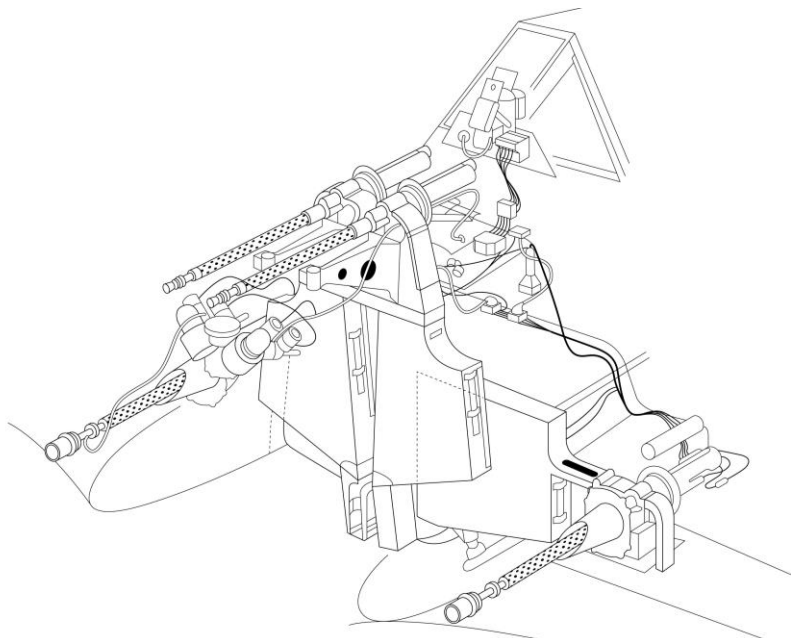


Figure 35: Fw 190 D-9 armament

Cockpit equipment for the armament includes the EZ 42 gunsight as well as the SZKK 4 ammunition counter.

The SZKK 4 ammunition counter is from the SZKK (Schalt-, Zähler- und Kontrollkasten) family of German indicators used on many Luftwaffe aircraft during WWII. While most pilots from other air forces had to estimate the amount of ammunition remaining in their weapons, German pilots had the luxury of seeing the actual amount of ammunition in their stores right in their cockpit.

The Fw 190 D-9 is also equipped with the pioneering EZ 42 gunsight that is roughly equivalent to the well-known K-14 gunsight used on the North American P-51D Mustang.

The design history of the EZ gunsight began before the war, but the Reich Air Ministry continued to focus on conventional reflector sights, installing the ubiquitous Revi (Reflexvisier) sight on most aircraft.

"Einheitszielvorrichtung" (target predictor unit) development remained low-priority until captured US aircraft showed that the Allies had predictor gunsights in operational use. Development took two long years, with first production EZ 42 units delivered in spring of 1944.

803 EZ 42 gunsights were produced in total until production ceased in March of 1945.



Figure 36: Flight stick, trigger, and bomb release button

A conventional flight stick is provided with a conventional trigger that allows the pilot to fire on-board armament as needed.

The stick also contains the bomb release button that can be used to drop the bomb load, or fire the underwing rockets.

COCKPIT

| | | | |
|-----------------|------|-------------|------|
| Russische Jäger | 10,0 | Moskito | 16,5 |
| Spitfire | 11,2 | Beaufighter | 17,7 |
| Mustang | 11,3 | Halifax | 30,0 |
| Hurricane | 12,2 | Lancaster | 30,0 |
| Thunderbolt | 13,4 | Boeing | 31,6 |
| Lightning | 14,8 | Liberator | 33,5 |

Rumpf Rumpf Flügel

Gruppe

Schalter



Nolzug für Bedient-Gelb.

Flügelast
Rumpflast

Achtung
Kompaßeinstellung verstellt sich

COCKPIT

The cockpit in the Fw 190 D-9 was a revolutionary design that attempted to put all levers and instruments easily within reach. It was one of the first examples of ergonomic cockpit design, and can be seen as the early precursor of today's hands on throttle and stick (HOTAS) cockpits.

In stark contrast to its competitor, the Bf 109, the Fw 190 offered its pilot comfortable access to most important controls located easily within reach.



Figure 37: Fw 190 D-9 cockpit overview

The cockpit is divided into three main areas: the front dash that includes the instrument panel and the EZ 42 gunsight; the left-hand side that includes engine controls; and the right-hand side that includes canopy and oxygen controls, weapon controls, and electrical system breakers.

Front Dash Legend

The front dash includes the instrument panel and the EZ 42 gunsight.

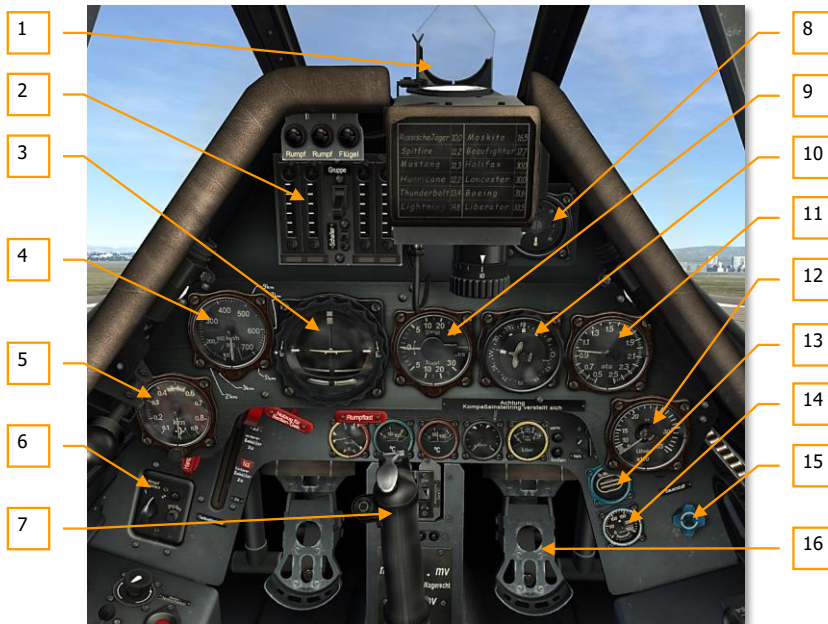


Figure 38: Fw 190 D-9 front dash

1. EZ 42 gunsight
2. SZKK 4 with ammo indicators
3. Artificial horizon / turn & bank indicator
4. Airspeed indicator
5. Altimeter
6. FuG 25a IFF control unit (not implemented)
7. Stick
8. AFN-2 homing indicator
9. Vertical speed indicator
10. Repeater compass
11. Supercharger pressure gauge

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DCS [Fw 190 D-9]

12. Tachometer
13. Oxygen flow indicator
14. Oxygen pressure gauge
15. Oxygen flow valve
16. Pedals

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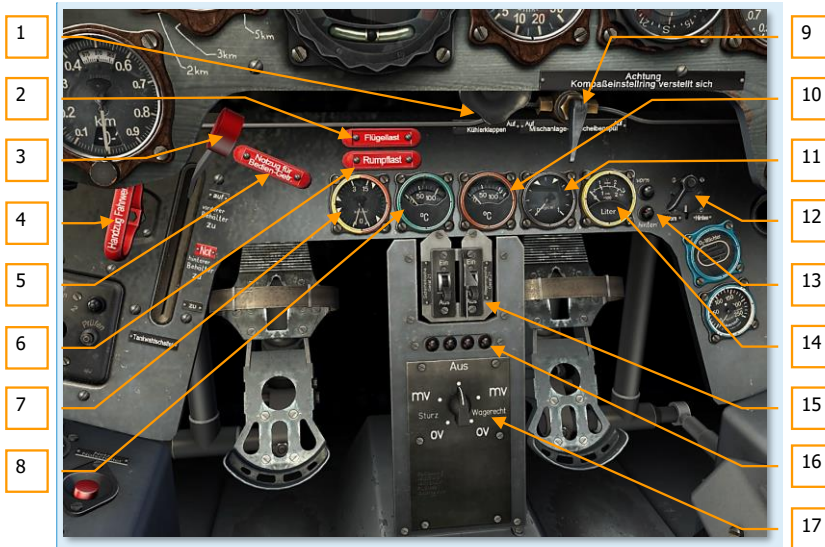


Figure 39: Fw 190 D-9 front dash lower part

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1. Manual radiator flap control
2. Emergency wing load release
3. Fuel tank selector lever
4. Landing gear manual release
5. MBG emergency mode handle
6. Emergency fuselage load release
7. Fuel & oil pressure gauge
8. Coolant temperature gauge
9. Cold start and window rinsing (not implemented)

10. Oil temperature gauge
11. Water/Methanol pressure gauge
12. Fuel gauge selector switch
13. Fuel warning lights
14. Fuel contents gauge
15. 21-cm rocket control unit
16. Disposable load indicator lights
17. Bomb fusing selector unit

Left Side Legend

The left-hand side includes engine controls

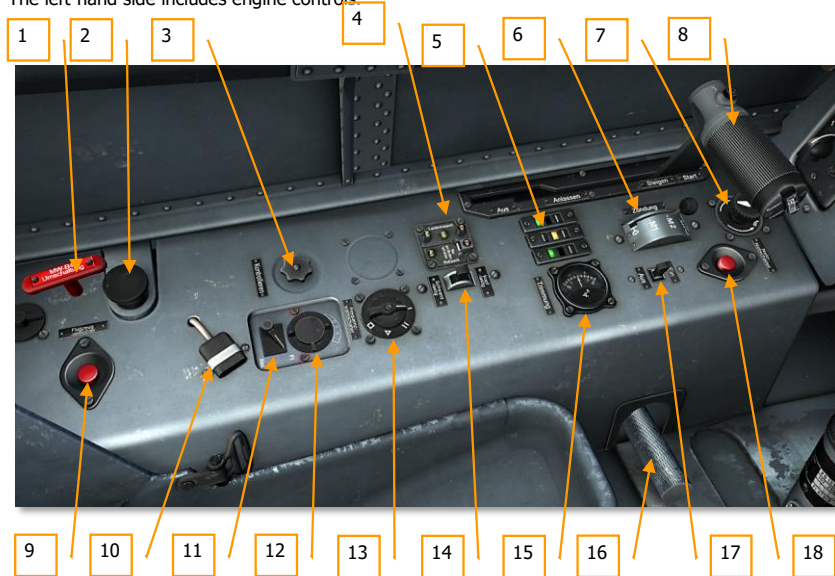


Figure 40: Fw 190 D-9 left side and legend

1. MW-50 tank contents (MW-50 / B4 aviation fuel) selector handle
2. Primer pump handle

3. FuG 16ZY fine tuning
4. Landing gear and flaps actuation buttons
5. Landing gear (left and right) and flaps (center) indicators
6. Ignition (magneto) selector switch
7. Instrument panel lighting dimmer control
8. Throttle lever
9. Radio self-destruction button (not implemented)
10. Heated suit connector (not implemented)
11. FuG 16ZY communications - homing switch
12. Headphone volume control
13. FuG 16ZY frequency selector
14. Horizontal stabilizer trim switch
15. Horizontal stabilizer trim indicator
16. Throttle friction knob
17. MW-50 power switch
18. Electric kill-switch

Right Side Legend

The right-hand side includes electrical system circuit breakers, canopy and weapon controls and a flight clock.

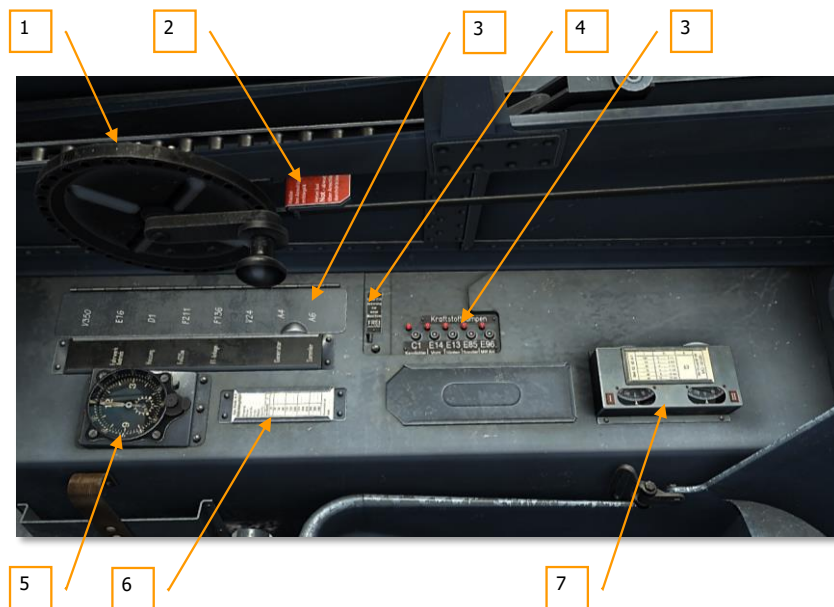


Figure 41: Fw 190 D-9 right side and legend

1. Canopy actuator drive
2. Canopy jettison lever
3. Circuit breaker panels
4. Starter switch
5. Flight clock
6. Compass deviation card
7. EZ 42 gunsight adjustment unit

Front Dash Indicators and Controls

This section will overview in detail all of the indicators and controls located on the front dash.

EZ 42 Gunsight



Figure 42: EZ 42 gunsight

An analog computer in the EZ 42 measures the aircraft angular velocity to automatically plot both bullet drop and target lead for on-board armament.

A target wingspan circle is used to aid in gauging distance to target, a crucial variable for accurate lead calculations. The floating aiming reticle is provided that plots estimated aiming point based on all input parameters.

A powered three-phase turn coordinator gyro provides the necessary computations. The gyro is mounted on the main base frame bracket. The movements of the gyro are transferred to the movements of the gunsight reticle.

A set of controls conveniently located in the cockpit allows the pilot to provide specific input to the gunsight relevant to specific target and flight conditions.

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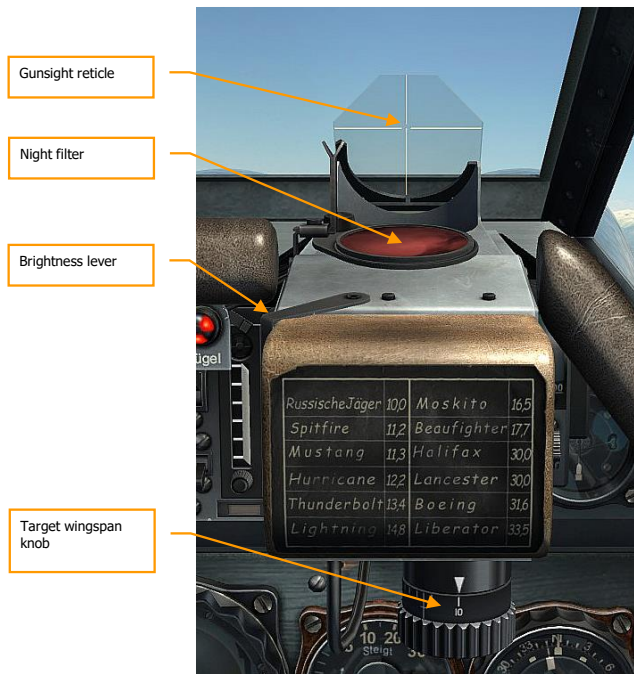


Figure 43: EZ 42 gunsight controls 1

The lower front of the sight panel includes a target wingspan knob, calibrated from 10 to 40 meters. The target wingspan is set to match the expected enemy aircraft wingspan prior to the start of an engagement.

The throttle lever incorporates a twist grip. The grip is attached to the sight by cable and pulleys, ending with a range pulley containing a scale calibrated from 0 to 1000 meters on the right side of the gunsight.

As the grip is turned, the range scale indicator moves to show the set target range.



Figure 44: Throttle lever with twist grip and cable

The EZ42 Justierkasten, a gunsight ballistics adjustment unit, mounted on the right side of the cockpit.

Depending on the current flight altitude, both rotaries I and II of the unit have to be set to the values given in the table located on the front of the unit.

For a given altitude band in column "H" (for "Höhe" - altitude), the columns I and II contain the recommended values for rotaries I and II.

Since in the specific model that is carried in the Fw 190 D-9, column II contains only a single fixed value ("63"), irrespective of altitude, rotary II is protected by a cover and cannot be adjusted by the pilot.

For example, at an altitude of 9 kilometers, rotary I has to be set to the value "68". Rotary II is fixed at "63".

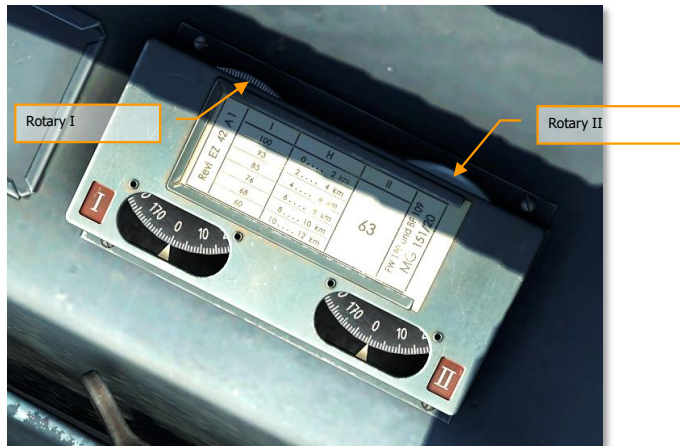


Figure 45: Gunsight ballistic adjustment unit

The throttle twist grip varies the range input into the sight. With the wingspan set, the throttle is used to frame the target with the gunsight reticle circle. This combination (wingspan set and target correctly framed) then produces the range that the sight uses in the calculation of the prediction angle. Added to this are own aircraft turn rates and corrections from the ballistics adjustment unit.

The EZ 42 has a backup iron sight ("Hilfsvision") that consists of both a rear and a front sight.

The rear sight ("Kimme") is a "Y"-shaped pin at the front left edge of the gunsight.

The front sight ("Korn") is the upwards pointing "A"- or arrow-shaped left end of the reflector glass holder.

To point the guns to the target, line up both sights so that the tip of the "A" aligns with the tips of the "Y".

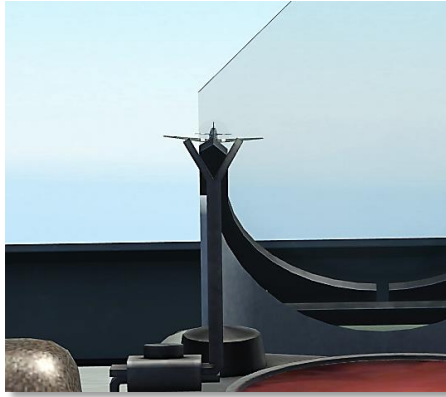


Figure 46: Pointing with the backup iron sight

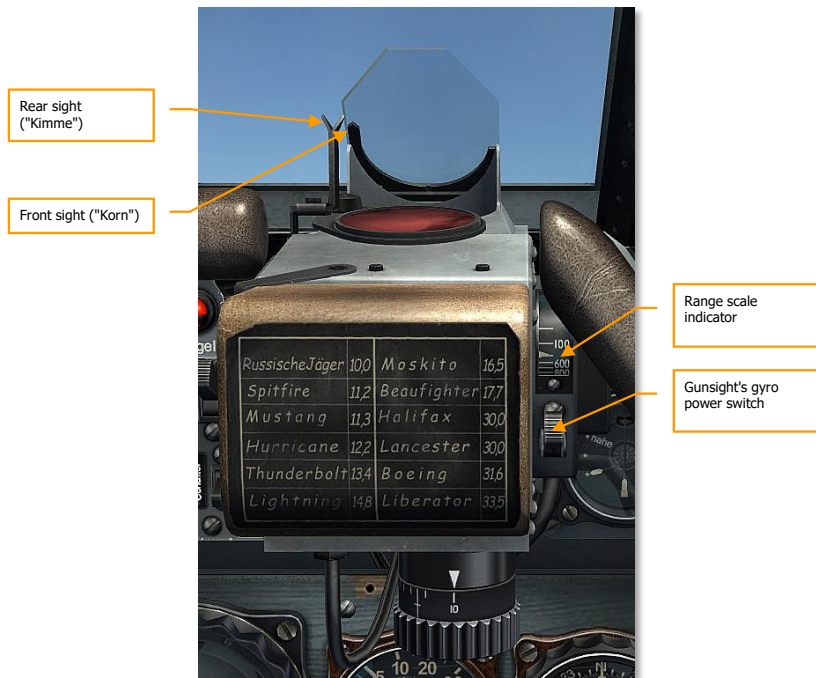


Figure 47: EZ 42 gunsight controls

Instrument Panel

Ammo Indicators

The SZKK 4 shows the ammo stores for each of the four guns. The four vertical banks in the SZKK show the state of, from left to right, the left MG 151, left MG 131, right MG 131, and the right MG 151. In other words, the outer indicators show the ammunition in the outer wing guns, while the inner two indicators show the ammunition in the fuselage guns.

The ammo counters are not directly linked to the ammo stores. Instead, they are reset to full (top) position when the guns are loaded on the ground, and then each mechanical indicator bar is lowered by one notch whenever a weapon is fired.



Figure 48: SZKK 4 with ammo indicators

Notches provided to the side of each indicator show the amount of rounds in the ammo store for each weapon.

White bar portion signifies ammunition in the stores; black bar portion signifies expended ammunition.

Each weapon's breechblock is directly linked to the corresponding indicator on the panel installed above the SZKK 4. Indication is provided by the red lock control lamps, which are labeled "Rumpf" (fuselage) and "Flügel" (wings):

- "Rumpf" for the left and right MG 131 guns
- "Flügel" for the right MG 151 gun.

Note that no electrical lock control lamp exists for the left MG 151 - its weapons status is indicated by the mechanical lock control indicator located on top of its ammunition counter. If the indicator is black, the breechblock is closed. If it is light, the breechblock is open. Flickering of the indicators whenever weapons are fired shows that the gun equipment operates properly. If the lock control lamp remains black or light when the trigger is pressed, a weapon malfunction has occurred.

AFN-2 Homing Indicator

This ubiquitous device was installed in most German aircraft of WWII. In the Fw 190 D-9, the AFN-2 indicator is a part of the FuG 16ZY equipment set.

The AFN-2 indicator allows for easy navigation to ground-based homing beacons, showing both direction and range on one simple dial.

The device has two moving bars that indicate homing beacon information. Each is similar to modern-day equipment, the VHF omnidirectional range – VOR – (vertical bar) and the distance measuring equipment – DME (horizontal bar).

The vertical bar indicates the general direction of the homing beacon in relation to the aircraft's nose.

The horizontal bar indicates the distance from the beacon.

The marker lamp in the center of the indicator will light when flying over aerodrome's near and far NDBs.

As the AFN-2 is a very sensitive instrument, special care to reduce vibrations is used when the indicator is installed in the Fw 190 D-9. It is installed into a separate aluminum sheet attached to the dashboard with rubber screws. This makes the device provide more reliable input; however strong vibrations can still disrupt its operation.

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The frequency of the AFN-2 can be adjusted in the Mission Editor to any desired ILS beacon. By default it is set to 38 MHz.



Figure 49: AFN-2 homing indicator

Airspeed Indicator

A later model of a common Luftwaffe airspeed indicator, the gauge in the Fw 190 D-9 bears a km/h designation on the dial.



Figure 50: Airspeed indicator

The FI 22234 airspeed indicator displays Indicated Airspeed (IAS) and is graduated from 0 to 750 km/h on the main outside range, with the airspeed continuing past the 0 mark for up to 900 km/h. The scale is to 10 km/h from 100 to 750 km/h and to 50 km/h thereafter.

Please note that ranges between 0 to 180 km/h and 750 to 900 km/h overlap. No indication other than common sense is used to determine the airspeed within this overlap.

The handwritten altitude markings (2km, 3km, 5km, 7km, 9km) around the airspeed indicator and their corresponding line markings indicate the maximum allowed dive speed at those heights. Exceeding these limits can damage the aircraft.

Artificial Horizon / Turn & Bank Indicator

Another commonly used Luftwaffe indicator, this gauge manufactured by Askania in Berlin combines a turn/bank indicator and an artificial horizon into one.

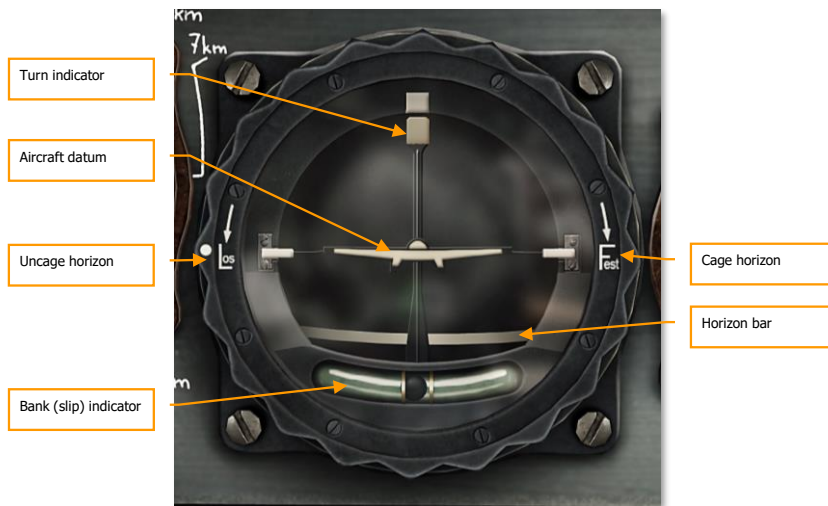


Figure 51: Artificial horizon

The turn-and-bank portion of the gauge is composed of a gyroscope-type turn indicator and a ball-type bank (slip) indicator. The bank indicator is a liquid-filled curved tube in which a free-rolling inclinometer ball changes position according to the direction of the force of gravity and centrifugal force. The bank indicator is used to minimize side-slip by keeping the ball centered between the center reference lines while turning. The limits of the bank indicator are $\pm 35^\circ$.

The horizon bar will indicate pitch up to 60° and bank up to 110° . The top needle of the instrument indicates the angle of bank.

Please note that the artificial horizon bar is locked during aerobatics!

The outer rotary ring is intended for caging/uncaging the artificial horizon. "Fest" is caged and "Los" is uncaged position.

Vertical Speed Indicator

The vertical speed indicator or variometer shows the rate of ascent or descent of the aircraft. The instrument is graduated from 0 to 30 m/s in both positive and negative directions and indicates vertical speed in meters per second. The face is scaled to 1 m/s between 0 and 5 m/s, and to 5 m/s thereafter.



Figure 52: Vertical speed indicator

The variometer is used to maintain a constant altitude when turning and to establish a definite and constant rate of climb or descent when flying on instruments.

Repeater Compass

The repeater compass consists of a rotary compass rose, a current magnetic heading pointer, and a desired heading reference stripe.



Figure 53: Repeater compass

The aircraft symbol with pointer rotates as the aircraft's heading changes. The compass rose can be rotated with the bezel to set the desired magnetic heading.

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Supercharger Pressure Gauge

A standard instrument of R. Fuess in Berlin, as it was found in almost all piston engine aircraft. This device is used to monitor the charge pressure of the engine supercharger.

The gauge is graduated from 0.5 to 2.5 atmospheres absolute. The scale is to 0.02 and 0.1 ata throughout.



Figure 54: Supercharger pressure gauge

Altitude Indicator

The altitude indicator determines the altitude at which the aircraft is flying by measuring atmospheric pressure. The instrument consists of 3 parts; the needle indicates altitude in tens of meters, the lower window shows the kilometer disk, and the upper window shows barometric pressure in Millibar.

The gauge is graduated from fractions of 1 km from 0.0 to 0.99. The scale is 1/100 of a km, or 10 meters, throughout.

The kilometer disk shows even kilometers of altitude, rounded down. The disk can show numbers from 0 to 9, for a total limit from 0 to 9,999 meters.

The information shown by the meters needle and the kilometer disk should be added. For example, if the km disk shows 3 and the needle points at 0.4, the actual altitude is 3400 meters (3 + 0.4 km).



Figure 55: Altitude indicator

Tachometer

The tachometer provides remote indication of engine speed.

The actual speed of the motor is gauged with an electric sensor, and then transmitted to the speed indicator. The absolute maximum permissible speed of the Jumo 213 is 3.300 RPM.



Figure 56: Tachometer

The instrument is graduated from 0 to 3600 and indicates engine speed as Revolutions Per Minute (RPM, in German "Umdrehungen pro Minute" or short "U/min") in hundreds of RPM. The face is scaled to 100 RPM throughout. The normal operating RPM is 1600 - 2400. The maximum normal RPM is 3000.

Please note that, unlike in many Allied aircraft, the tachometer is used to set power in the Fw 190 D-9.

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Manual Radiator Flap Control

The manual radiator flap control is used to control engine cowl flaps.

Please note that the control is obscured by the dashboard and is invisible from a pilot's normal point of view. It is located above and behind the corresponding plaque stating "Zu – Kühlerklappen – Auf" (Closed – Radiator Flap – Open).



Figure 57: Manual radiator flap control

The pilot reached behind the dashboard to operate the knob. Turning the knob clockwise, towards the "Auf" setting, mechanically opens the radiator flap. Turning the knob counterclockwise, towards the "Zu" setting, mechanically closes the radiator flap.

There is no radiator flap position indicator in cockpit.

Landing Gear Manual Release

When the main gear release buttons fail to work, a back-up manual system is provided. The emergency lever can be pulled, which unlocks the shock struts mechanically. This in turn allows the landing gear to extend under its own weight.

The aircraft should be in a generally wings-level attitude for the landing gear to drop.

Please note that the back-up system's spring will usually be sufficient to fully lock the landing gear in the down position. If it fails to do so, the standard gentle rocking aircraft wings for aircraft with hydraulic gear will not work for the Fw 190 D-9.



Figure 58: Landing gear manual release

Fuel Tank Selector Lever

The fuel tank selector lever is used to open or close the forward and rear fuel tanks depending on flight conditions.

The four possible settings are:

- "Auf" (Open) - Both fuel lines to the booster pump are open. Engine can draw fuel from both forward and rear tanks.
- "Vorderer Behälter zu" (Forward tank closed) - Engine can draw fuel from rear tank only.
- "Hinterer Behälter zu" (Rear tank closed) - Engine can draw fuel from forward tank only.
- "Zu" (Closed) - Both fuel lines to the booster pump are closed.

The Fw 190 D-9 can carry four fuel tanks:

1. Optional 300 liter external, jettisonable fuel tank (drop tank) – connected to the rear tank
2. 115 liter MW-50/B4 auxiliary fuselage tank – connected to the rear tank
3. Rear fuselage tank
4. Forward fuselage tank

The system is designed to reduce workload so that the pilot does not have to manage the different fuel tanks in flight - the aircraft takes care of it. When the Fuel Selector lever (fuel cock) is left in the "Auf" position and the necessary fuel pumps are switched on, the fuel system will automatically empty the drop tank, auxiliary fuselage tank, rear tank and the front tank in that order. Note that the corresponding fuel pumps still need to be switched off when a tank is empty to avoid them running dry. The corresponding fuel pumps are switched on/off with the following circuit breakers placed on the right console:

- E13 (Hinten - rear tank fuel pump)
- E14 (Vorn - forward tank fuel pump)
- E85 (Sonder - drop tank fuel pump)
- E96 (MW Anlage – auxiliary fuselage tank pump)



Figure 59: Fuel tank selector lever

If drop tanks are used, their fuel pump, in turn, feeds the rear tank.

When flying with drop tanks, drop tank fuel should be used first. This is achieved by setting the fuel tank selector lever to "vorderer Behälter zu" and switching on the external drop tank fuel pump with the E85 circuit breaker on the right console. Fuel is then drawn from the rear tank. As soon as the rear tank contents fall below 240 l, fuel is constantly being drawn from the drop tank.

When the fuel inside the drop tank is exhausted, the fuel tank selector lever is set to "Auf" and the external drop tank fuel pump should be turned off by popping out the E85 circuit breaker.

The drop tank can then be dropped by pulling the "Rumpflast" (fuselage store) handle.

MBG Emergency Mode Handle

This handle is connected via cable to the aircraft's "Motorbediengerät" (MBG). In normal position the MBG operates in automatic mode. In case of emergency, the handle can be pulled to allow the engine to operate at higher boost pressure than normal.

If at all possible, the handle should be pulled when the throttle is in Idle setting.

Speed control remains automatic.

Please take extra care to watch engine speed and boost. The engine must be loaded only as far as absolutely necessary in "Notzug" mode.

When flying in "Notzug" mode, boost pressure of 1.55 ATA should never be exceeded!

When flying in "Notzug" mode, engine speed of 2,700 RPM should never be exceeded!



Figure 60: MBG emergency mode handle

Emergency Fuselage and Wings Load Release

Pull the necessary handle to jettison any load attached to the fuselage or wing, such as drop tank or bombs.

- "Flügelast" – Jettison wings stores.
- "Rumpflast" – Jettison fuselage stores.



Figure 61: Emergency fuselage and wing load release

Fuel and Oil Pressure Gauge

Typical pneumatic double pressure gauge for fuel and oil, with two independently operating measuring stations and terminals. Manufacturer is the Maximal-Apparatus company, Paul Willmann / Berlin.



Figure 62: Fuel and oil pressure gauge

The gauge is divided into two sections. The left-hand side gauge and needle show fuel pressure in kg/cm^2 . The right-hand side gauge and needle show oil pressure in kg/cm^2 .

The fuel pressure gauge is graduated from 0 to 3 kg/cm^2 . The gauge is scaled to 0.2 kg/cm^2 throughout. Two indicator strips indicate normal operating pressure of 1 – 2 kg/cm^2 . The lower indicator strip shows minimum permissible pressure of 1.3 kg/cm^2 and the upper indicator strip the maximum permissible pressure of 1.7 kg/cm^2 .

The oil pressure gauge is graduated from 0 to 15 kg/cm^2 . The gauge is scaled to 1 kg/cm^2 throughout. Two indicator strips indicate normal operating pressure of 3 – 13 kg/cm^2 . The lower indicator strip shows minimum permissible pressure of 3 kg/cm^2 and the upper indicator strip the maximum permissible pressure of 13 kg/cm^2 .

Coolant Temperature Gauge

The FL 20342 electrical temperature indicator manufactured by Siemens shows the temperature of the coolant fluid. The gauge indicates temperature in degrees Celsius (°C) and is graduated from 0° to 130°C. The face is scaled to 10°C. Normal operating temperature is 70...120°C.



Figure 63: Coolant temperature gauge

Oil Temperature Gauge

The FL 20342 electrical temperature indicator manufactured by Siemens shows the temperature of the oil. The gauge indicates temperature in degrees Celsius (°C) and is graduated from 0° to 130°C. The face is scaled to 10°C. Two indicator strips indicate normal operating temperature of 110...130°C.



Figure 64: Oil temperature gauge

Water/Methanol Pressure Gauge

The FL 20504-1 MW-50 water/methanol pressure gauge indicates mixture pressure in the MW-50 system in kg/cm^2 .

The instrument is graduated from 0 to 1 kg/cm^2 . The gauge is scaled to 0.1 kg/cm^2 throughout. Two indicator strips indicate normal operating pressure of 0.4 – 0.6 kg/cm^2 . The lower indicator strip shows minimum permissible pressure of 0.4 kg/cm^2 and the upper indicator strip the maximum permissible pressure of 0.6 kg/cm^2 .



Figure 65: Water/Methanol pressure gauge

Fuel Contents Gauge

A single FL 20723 fuel gauge is provided for the two main fuselage tanks. The fuel gauge selector switch to the right of the fuel contents gauge can be used to display the contents of the forward or the aft fuel tank.

The instrument shows the contents of the selected fuel tank in hundreds of liters.

As both tanks are of unequal capacity, the instrument has two gauges. The upper gauge is to be used for the aft "Hinten" fuel tank (292 l). The lower gauge is to be used for the forward "Vorn" fuel tank (232 l).

Please note that there is no fuel content information for additional tanks (drop tank or auxiliary fuselage tank).

If additional tanks are used, their fuel pump, in turn, feeds the rear tank.

When drop tanks are used, the fuel selector switch should first be set to "Hinten". The fuel contents gauge will continue to display full for as long as the drop tanks continue to feed the rear tank. Once the drop tanks are emptied, the fuel quantity in the rear tank begins to decrease.



Figure 66: Fuel contents gauge with fuel warning lights

Fuel Warning Lights

While only one gauge is provided for both main fuel tanks, both are equipped with their own fuel warning lights.

The top red (fuel low) warning light labeled "vorn" illuminates when the contents of the forward tank fall to 80 liters.

The bottom white (rear tank switch-over) warning light labeled "hinten" illuminates when the contents of the rear tank fall to 10 liters.

Fuel Gauge Selector Switch

The fuel gauge selector switch is used to switch between the display of the contents of the forward or the aft fuel tank in the fuel contents gauge to the left.

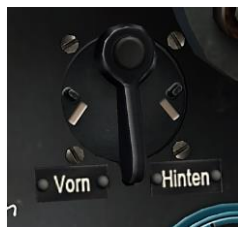


Figure 67: Fuel gauge selector switch

Move the selector switch to "Vorn" to display the contents of the forward fuel tank.

Move the selector switch to "Hinten" to display the contents of the rear fuel tank.

If drop tanks are used, their fuel pump, in turn, feeds the rear tank. When the fuel gauge shows fuel consumption from the rear tank, the drop tank is empty and can be jettisoned.

Oxygen Flow Indicator

The oxygen flow indicator shows the flow of oxygen as it is inhaled and exhaled by the pilot. When the pilot inhales, the blinkers open as oxygen is moved through the system. As the pilot exhales and oxygen stops flowing, the blinkers close.



Figure 68: Oxygen flow indicator

Oxygen Pressure Gauge

The oxygen pressure gauge FL 30496 is located on the bottom right corner of the instrument panel and indicates pressure in the oxygen system. The gauge measures pressure in kilograms per square centimeter (kg/cm^2). The instrument is graduated from 0 to 250 kg/cm^2 and scaled to 10 kg/cm^2 . Normal full pressure of the system is 150 kg/cm^2 . In normal working conditions, oxygen pressure should decrease by no more than 10 kg/cm^2 after 20 minutes of operation.

Note that the oxygen pressure readings can drop as altitude increases due to the cooling of the oxygen tanks. Conversely, the pressure can increase as altitude decreases due to the warming of the tanks. A rapid decrease of oxygen pressure in level flight or during a descent is abnormal and may indicate an oxygen system leak or malfunction.



Figure 69: Oxygen pressure gauge

Oxygen Flow Valve

The oxygen flow valve is used to turn on the flow of oxygen to the pilot.

When the flow valve is opened, the oxygen is first sent to the oxygen regulator located on the right side of the cockpit, just behind the pilot seat. The oxygen regulator has a diaphragm which actuates a valve, permitting oxygen to flow through the regulator, where it mixes with free air in varying amount in accordance with barometric pressure.



Figure 70: Oxygen flow valve

Oxygen Emergency Knob

When increased breathing resistance during oxygen breathing is encountered, press the oxygen emergency knob several times with the right elbow for short durations.



Figure 71: Oxygen emergency knob

Weapons Console

The weapons console installed in the Fw 190 D-9 contains weapon controls and consists of three parts: the top rocket control unit containing two switches for operating underwing 21-cm rockets, four disposable load indicator lights placed below, and the bottom Zünderschaltkasten ZSK 244 bomb fusing selector unit that contains a dial used for fusing bombs. The ZSK 244 is a standard device used on many Luftwaffe aircraft.

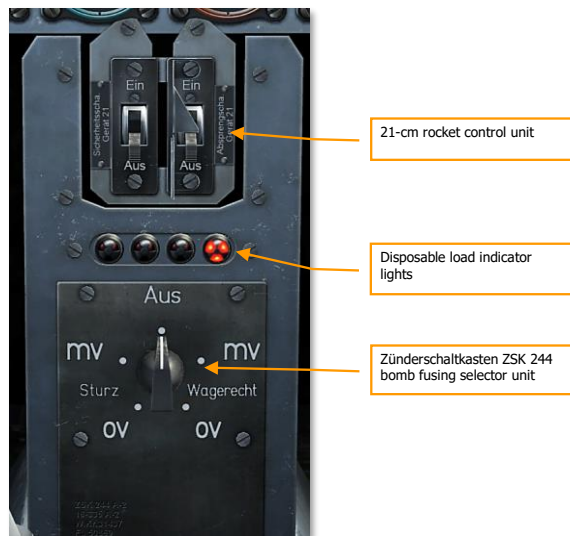


Figure 72: Weapons console

The rocket control panel contains two switches, both marked "Ein" (On) and "Aus" (Off).

The left-hand switch is safety. Set it to "Aus" to disarm the rocket warheads; set it to "Ein" to arm them.

The right-hand switch is jettison. "Aus" is the safe position. Set the switch to "Ein" to enable the blasting mechanism that detaches the rocket housing and their struts from the aircraft wing and restores clean configuration. The safety plate that protects against accidental use of the switch needs to be bent outside before the switch can be placed in the "Ein" position.

The B2 bomb release button located on the main control stick is used to launch both rockets simultaneously.

The ZSK 244 bomb fusing selector unit is very simple in operation. It controls the amount of electrical charge sent from the battery to the bomb fuse. Depending on the switch position, different fusing situations are ensured:

DCS [Fw 190 D-9]

- Set it to "Aus" to disarm the bomb release.
- The two "Sturz" settings on the left-hand side are used for dive bombing.
- The two "Wagerecht" settings on the right-hand side are used for level bombing.
- The "OV" settings stand for "Ohne Verzögerung" (Without Delay), which means the bomb explodes immediately upon contact with the ground.
- The "MV" settings stand for "Mit Verzögerung" (With Delay), which means the bomb explodes after a short delay upon impact.

Therefore, the switch should be set in advance before the bombing run for a proper attack profile.

Left Side Controls

Throttle Lever

The Fw 190 is equipped with a revolutionary Bediengerät device, an early computer that greatly reduces pilot workload. Taking nothing but throttle and barometric conditions as input, the Bediengerät sets the optimal magneto timing, prop pitch, mixture, and engine RPM.

The throttle lever in the Fw 190 D-9 does not merely adjust the manifold pressure. Moving the lever influences nearly all engine and propeller parameters.



Figure 73: Throttle lever

The throttle gate is marked with four standard positions:

- "Aus" (Off)
- "Anlassen" (Engine start)
- "Steigen" (Climb)
- "Start" (Take off)

The throttle lever should be moved according to desired supercharger pressure (shown on the supercharger pressure gauge to the right of the front dashboard, the gauge labeled ATA).

The throttle lever can be fixed in place to maintain desired supercharger pressure by using the throttle lever friction knob located below the throttle lever by the cockpit floor.

The unmarked round button at the base of the throttle is the Push-to-Talk button for radio comms.

Ignition Selector Switch

The ignition selector switch controls the magnetos used to supply power to the engine ignition system and has four possible positions: "0" (Off), "M1" (right), "M2" (left), and "M1+2" (Both).

- "0". The magnetos are turned off.
- "M1". The right magneto is used to start the engine.
- "M2". The left magneto is used to start the engine.
- "M1+2". Both magnetos are used to start the engine.

Normally both magnetos are used to start the engine ("M1+2" setting).



Figure 74: Ignition selector switch

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MW-50 Switch

The MW-50 switch toggles the MW-50 water/methanol injection that greatly increases engine power.

In order to use the MW-50 water/methanol injection, the MW-50 tank pump has to be activated first by pressing in the "E96 MW Anl." circuit breaker on the right console.

In addition to activating the tank pump, the system can be switched on or off with the MW-50 switch.

In the "Ein" position, the system is enabled. During correct operating conditions, the Bediengerät allows the addition of MW-50 into the supercharger and stops the injection when it is no longer necessary. In the "Aus" position, the MW-50 injection is disabled.

Apart from the switch setting, no On/Off indicator is provided; however, system status can be ascertained by watching the supercharger pressure gauge, the water/methanol pressure gauge, and simply by engine sound.



Figure 75: MW-50 switch

Landing Gear and Flaps Indicators

The indicator shows the position of each main gear leg (left and right) and flaps (center) between.



Figure 76: Landing gear and flaps indicators

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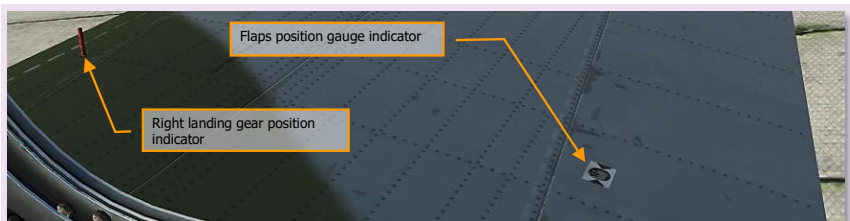
Landing gear indication:

- When the main gear is up, both lights illuminate red.
- When the main gear is down, both lights illuminate green.

Flaps indication:

- Red – flaps up.
- Yellow – flaps in the intermediate, take-off position.
- Green – flaps down.

Mechanical indicators are installed in each wing to indicate landing gear and flap position. The position of each landing gear is indicated by a red pin that is raised when the respective gear is down and lowered when it is up. The position of each flap is indicated by a gauge which can be seen through a hole in the wing and shows actual angle of flap in degrees and movement of flap when actuated.



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Figure 77: Landing gear and flaps mechanical indicators

Horizontal Stabilizer Trim Switch

The horizontal stabilizer trim switch is used to electrically set the rotation angle for the adjustable horizontal stabilizer based on changing trim conditions.



Figure 78: Horizontal stabilizer trim switch

The three-position switch is spring-loaded to the center position. Depress the switch to the up ("Kopflastig" – nose-heavy) or down ("Schwanzlastig" – tail-heavy) positions to change the horizontal stabilizer angle. The actuator motor continues to adjust the angle as long as the button is depressed until the limit is reached, at which time the motor is switched off.

Horizontal Stabilizer Trim Indicator

The indicator shows the current position of the adjustable horizontal stabilizer.



Figure 79: Horizontal stabilizer trim indicator

The gauge is graduated from -5 to +5 degrees, but the operating range is only -3 to +2 degrees of horizontal stabilizer inclination. The scale is to 0.5 degrees throughout.

The normal position is indicated by 0, which actually corresponds to +2 degrees of rotation on the horizontal stabilizer relative to the fuselage centerline.

Landing Gear and Flaps Controls

This set of pushbuttons allows the operation of both the landing gear and the flaps.



Figure 80: Landing gear and flaps controls

The "Rollwerk" set of buttons to the right is for controlling the landing gear. The two available positions are "Ein" (on, up position) and "Aus" (off, down position). Gear position can be monitored with both the electrical indicators and the mechanical indicators on the wings.

To raise the landing gear, retract the safety switch over the "Ein" (Up) button and press the button. The button remains pressed while the gear is in operation and pops up once the gear is raised and locked. The red "Ein" lights also illuminate on the landing gear position indicator. To eliminate the possibility of accidental operation on the ground, the safety switch should be reactivated after raising the landing gear.

To lower the landing gear, press the "Aus" (Down) button. The button remains pressed while the gear is in operation and pops up once the gear is down and locked. The green "Aus" lights also illuminate on the landing gear position indicator.

The "Landeklappen" set of buttons to the left is for controlling the flaps. The three available positions are "Ein" (Up, retracted), "Start" (Take-off, extended 10°) and "Aus" (Landing, extended 60°). Flap position can be monitored with both the electrical indicators and the gauge indicators inside the wings.

To raise the flaps, press the "Ein" (Up) button. The button remains pressed while the flaps are in operation, and pops up once the flaps are fully raised.

To set take-off flaps, press the "Start" (Take-off) button. The button remains pressed while the flaps are in operation, and pops up once the flaps are properly set to the take-off setting.

To fully lower the flaps, press the "Aus" (Landing) button. The button remains pressed while the flaps are in operation, and the flaps are fully lowered to the maximum angle.

FuG 16ZY Controls

The FuG 16ZY control panel has four controls:

- Frequency selector
- Headphone volume control (inside Anschlussdose AD18Y)
- Communications - homing switch (inside Anschlussdose AD18Y)
- Fine tuning knob (inside FBG 16)



Figure 81: FuG 16ZY controls

Frequency Selector

The frequency selector for the FuG 16ZY radio has four positions indicated by symbols. All four positions are locked to specific frequencies before flight. The pilot cannot manually set frequencies beyond the four presets. The presets, in the frequency range of 38.4 to 42.4 MHz, can be set on the ground (in DCS in the "RADIO PRESETS" tab of the mission editor).

The four frequencies are used for communication with different Luftwaffe units.

The "I" position is for the "Y-Führungsfrequenz", or management frequency, and is used for communication within the flight or squadron. It is also used for communication during ground tracking in "Y-Verfahren".

The "II" position is for the "Gruppenbefehlsfrequenz", or group order frequency, and is used to communicate between several flights from different squadrons participating in a single raid.

The "Δ" position is for the "Nah-Flugsicherungsfrequenz", or air traffic control frequency, and is used to communicate with the designated air traffic controller.

The "□" position is for the "Reichsjägerfrequenz", or Reich fighter defense frequency, and is used to coordinate country-wide air defense efforts in large scale raids.

Headphone Volume Control

The headphone volume control is used to adjust headphone volume. Turning the knob clockwise increases volume; turning the knob counterclockwise decreases it.

Communications - Homing Switch

The communications - homing switch can be set to one of two positions, "Ft" ("Funktelefonie" - radio telephony, without "E-Messton") or "Abst." ("Abstimmen" - frequency tuning, for tuning the receiver frequency to the "Y" ground station via "E-Messton").

This switch works in conjunction with the frequency selector. The settings of these two switches determine the operation mode of the FuG 16ZY radio set.

Please see the below table for details.

| <i>Homing Switch</i> | <i>Frequency Selector</i> | <i>Push-to-Talk Open</i> | <i>Push-To-Talk Depressed</i> | <i>Transm</i> | <i>Recvr</i> |
|----------------------|---------------------------|-------------------------------------|-------------------------------|---------------|--------------|
| "Ft" | I | Listen | Talk | I | II |
| "Abst" | I | Homing Listen | Homing Listen+Talk | I | II |
| "Ft" | II, Δ or □ | Listen | Talk | II, Δ or □ | |
| "Abst" | II, Δ or □ | Listen to loop antenna Targeting | Talk | II, Δ or □ | |

Because on the first frequency selector position (I) sending and receiving are conducted at different frequencies, it is not used in this simulation. For communication, use II, Δ or □ selector positions with "Ft" position of communications - homing switch.

The frequencies of all four positions can be assigned in the mission editor's "RADIO PRESETS" tab.

Fine Tuning Knob

The FBG 16 "Fernbedien(ungs)gerät" (remote control unit) is used for fine frequency adjustment within a selected preset.

Right Side Controls

Canopy Crank

The canopy crank can be used to open or close the canopy.

Rotate it clockwise to open the canopy and counterclockwise to close it.

Pulling out the crank handle releases the crank gear so that the canopy can be opened or closed by hand. This mode of operation is not simulated.

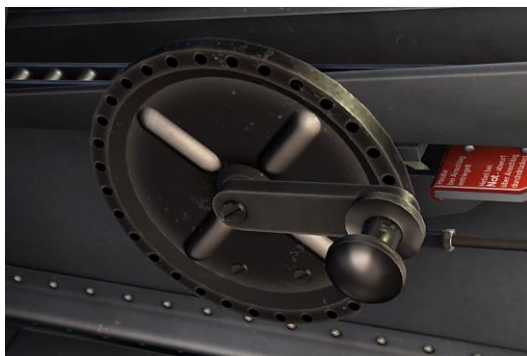


Figure 82: Canopy crank

Flight Clock

The "Junghans Borduhr Bo-UK1" was the standard instrument chronograph for all German aircraft in WWII. The clock is installed at the top of the right-hand console.

You can wind and adjust the clock with the round wind/set knob below.

With the start-stop button on the right you can stop (and restart) the whole clockwork, for example to set the time with the round wind/set knob.

The stopwatch mechanism is started and stopped by pressing the stopwatch button, located directly below the wind/set knob. First press to start, second press to arrest and third press to put it back. Each passing of the sweep second is recorded, up to 15 minutes, on the small register dial.

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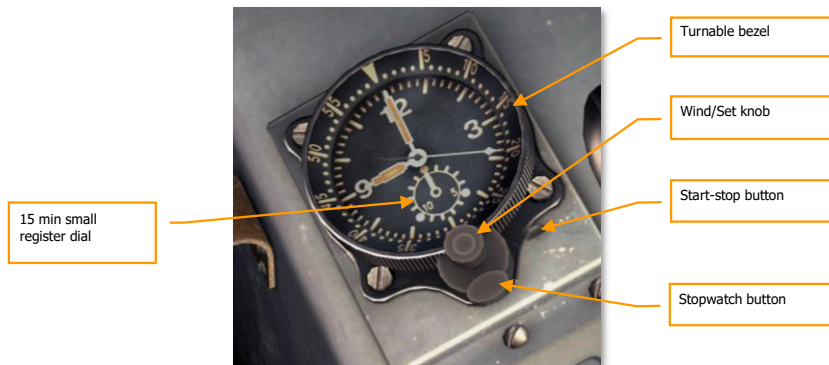


Figure 83: Flight clock

Adjust clock:

- Push down the start-stop button.
- Adjust desired time on wind/set knob with mouse wheel.
- Pull back the start-stop button.

Stopwatch:

- Start stopwatch with first press of stopwatch button.
- Arrest stopwatch with second press of stopwatch button.
- Put it back with third press of stopwatch button.

Circuit Breakers

Most electrical devices in the Fw 190 are operated with and protected by circuit breakers. Circuit breakers are used to manually open and close load circuits. When a short circuit or overload occurs, a circuit breaker automatically breaks the circuit. Thus, a circuit breaker acts both as a switch and an automatic fuse.

Each circuit breaker has two buttons: A larger black button with a white dot that closes the circuit and switches the corresponding device on - and a smaller red button that opens the circuit and switches the corresponding device off.



Figure 84: Circuit breaker cover down

The labels V350, E16, etc. on the cover designate the circuit that is protected by the circuit breaker (in accordance with the circuit diagrams of the Fw 190 D-9). The essential function of the circuit is printed on a plate adjacent to the circuit breaker cover.



Figure 85: Circuit breaker cover up

An additional circuit breaker panel contains circuit breakers for navigation lights and fuel / MW-50 pumps.



Figure 86: Circuit breakers of additional panel

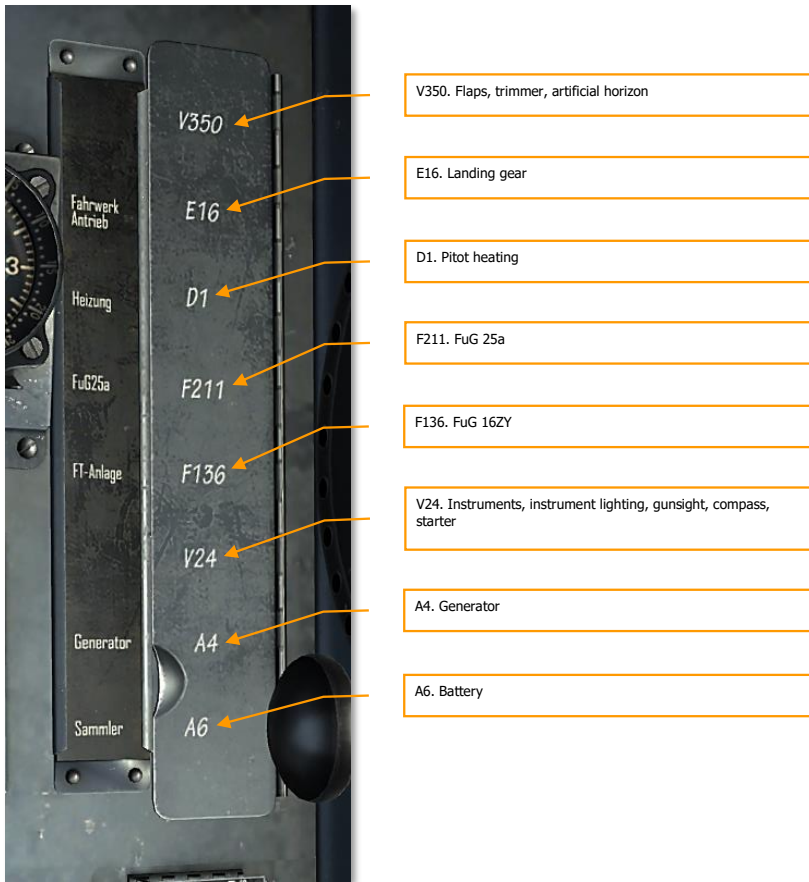


Figure 87: Circuit breaker legend of forward panel

Starter Switch

The starter switch is used to spin up the internal flywheel and to start the engine. The switch is spring-loaded and needs to be held in the down position to spin up a starting flywheel. When the flywheel has reached sufficient rotational speed, by pulling out the starter switch (up position), the spinning flywheel is connected to the crank shaft, which starts the engine.



Figure 88: Starter switch with cover

Kneeboard Map

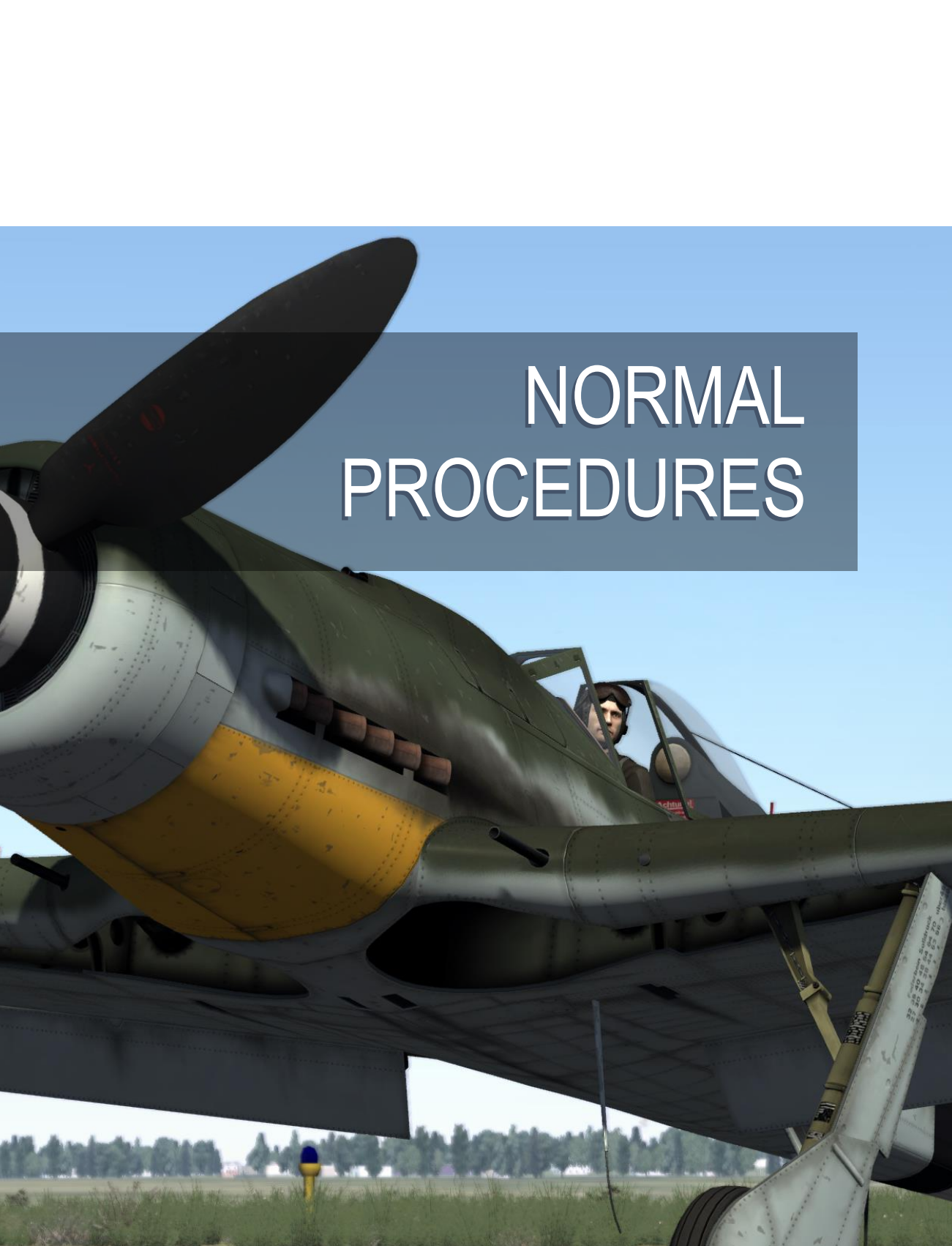
To aid with navigation, a kneeboard map is included in the cockpit. The map can be opened at any time in the cockpit for a quick glance by pressing and holding the [K] command or toggled on and off with the [RShift + K] command. The map displays a plot of the flight plan and is initially centered on the starting waypoint. The [[]] (open bracket) and [[]] (close bracket) commands can be used to change the kneeboard page, which cycles through the flight plan waypoints on the map view and aerodromes database.

Additionally, the [RCtrl + K] command can be used to place a mark point on the map. A mark point indicates the location of the aircraft on the map in the current point in time (like a pencil mark on a paper map).

The kneeboard can also be viewed on the pilot's left leg when the pilot is enabled in the cockpit [RShift + P].



Figure 89: Kneeboard map



NORMAL PROCEDURES

NORMAL PROCEDURES

Preflight Checks and Engine Start

As soon as you enter the cockpit:

- Choose best seating position. This can be adjusted by using [RCtrl + RShift + Numpad8] and [RCtrl + RShift + Numpad2].
- Check if the rudder has full free and correct movement, and that the central rudder pedal position corresponds with the central rudder position.
- Set altimeter to QFE of the takeoff airfield.

Commented [MW17]

Commented [M18R1]

QFE setting knob



- Turn on the oxygen system's side-way valve (on the right lower front panel).

Oxygen flow indicator

Oxygen pressure gauge

Oxygen flow valve



Commented [MW19]

Commented [M20R1]

- On the left side panel, the green "Rollwerk Aus" (landing gear off/out) pushbutton must be pressed, otherwise the landing gear will retract upon powering up of the aircraft's electrical system.



Commented [MW21]
 Commented [MW22]
 Commented [M23R2]

- Turn on all circuit breakers on the forward circuit breaker panel:
 - Flaps, trimmer, artificial horizon [LWin + 1]
 - Landing gear [LWin + 2]
 - Pitot heating [LWin + 3]
 - FuG 25a [LWin + 4]
 - FuG 16ZY [LWin + 5]
 - Instruments, instrument lighting, gunsight, compass, starter [LWin + 6]
 - Generator [LWin + 7]
 - Battery [LWin + 8]
- Check fuel in both tanks with fuel gauge selector switch. To right [RAIt + T], to left [RCtrl + T]



- Ignition (Magneto) selector switch to M1+2 position. To forward [End], to back [RShift + End].



- MBG emergency mode handle in automatic mode. Pushed in position (check). [RShift + M]



- Fuel tank selector lever in "auf" (open, full up) position. Up [T], down [RShift + T].



- Switch on fuel pumps with additional circuit breaker panel:
 - E14 Forward tank fuel pump [RWin + 2]
 - E13 Rear tank fuel pump [RWin + 3]
 - E85 External tank fuel pump if external tank is connected [RWin + 4]
 - E96 MW-50 if necessary [RWin + 5]



- Close canopy. Several times [LCtrl + C].
- Set throttle lever to "Anlassen" (Engine Start / Idle) position. [RAIt + Home]



- Press starter switch about 15...20 seconds to flywheel spin-up. Press and hold [Home].



- After flywheel spin-up pull up starter switch for engine start. Press and hold [RCtrl + Home].
- Set stabilizer trim to 0° (switch and indicator on left side panel).

Stabilizer trim
switch



Stabilizer trim indicator

Commented [MW24]

Commented [M25R2]

Engine Warmup

1. With closed cooling flaps run engine at about 1000...1200 RPM until oil entry temperature reaches 40°C.
2. Slowly increase towards 1800 RPM, until coolant exit temperature has reached 60-70°C.

Stopping the Engine

At 1200 RPM let engine cool down, alternately switching M1 and M2. Keep coolant temperature below 100°C, otherwise danger of thermal evaporation.

In warm weather, open all cooler flaps already during landing flare, when in cold weather during taxiing off. When stationary, retard throttle lever and run engine at 1600-2000 RPM for some time in order to achieve uniform cooling. Stopping above coolant temperature above 120°C will generally lead to coolant fluid loss. Pull throttle lever beyond idle indent position with [RAIt + End] keys, switch off ignition, close fuel shutoff valve.

Taxiing

1. Taxi and take-off with fully opened cooling flaps only. The hand wheel for setting of cooling flaps position is located in the cockpit above the lower front panel. Hold [LAlt + A] for 20

seconds to fully open the cooling flaps. Refrain from unnecessarily operating the hand wheel, especially from stop to stop positions.

2. Avoid power settings below 1,000 RPM. Keep taxi times as short as possible in order to prevent coolant losses by vaporization.
3. When taxiing, first unlock the tailwheel, otherwise it will be impossible to make turns. In order to do so, push flight stick forward by approximately 3 cm.
4. Only after releasing the tailwheel, lock the brakes may be operated for testing purposes, left and right alternatively. Do not operate the brakes for too long.
5. In case the tailwheel does not unlock, it shall be tried to unlock by alternating brake application and simultaneous forward pushing of the flight stick.
6. On line up for takeoff, roll straight ahead for a short distance to ensure the tailwheel is in straight position.
7. The aircraft may have to be taxied below power settings of 1,000 RPM for a short while in order to avoid tire damage through braking heat. Taxiing has to be performed as to keep the usage of brakes down to a minimum; short braking impulses are better than continuous braking.

Commented [MW26]

Preflight Check

Prior to takeoff, perform the following preflight check:

- Primary controls:
 - Controls – Check the stick and rudder controls to ensure they operate without binding. Watch the control surfaces for correct response.
 - Horizontal Stabilizer Trim Indicator – 0



DCS [Fw 190 D-9]

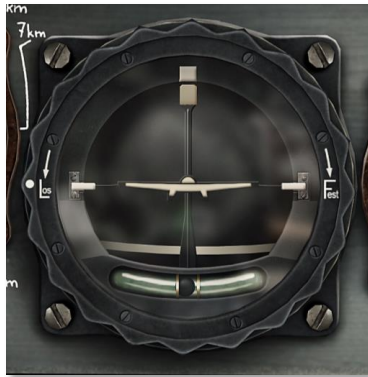
- Instruments and switches:
 - Altitude indicator set.



- Desired heading set.



- Artificial horizon uncaged.



- All instrument readings in desired ranges.
- All switches and controls at desired positions.
- Fuel system:
 - Fuel tank selector lever in Open (Auf) position (full up).
 - Fuel pump's circuit breakers ON.
- Flaps:
 - Flaps set for takeoff, pressed "Start" button.



Takeoff

Follow the below procedure to perform a normal takeoff:

1. In conditions of high humidity and temperatures below 0°, switch on pitot and windshield heating (respectively close circuit breakers for pitot heating, inner windshield heating and outer windshield heating).
2. Switch on both fuel pumps and switch the indicator to the rear tank.
3. In case flight is conducted with an auxiliary drop tank, initially only the rear tank fuel pump and the EP-1 E (drop tank pump) are to be switched on.
4. Set flaps to takeoff position. Push selector switch located on left side panel.
5. Verify take-off position by observing the mechanical indicator on the wing. The electrical indicator only shows full landing or up positions (green or red lights on the left side panel).
6. Pushing the stick forward unlocks the tailwheel, thereby making steering difficult. The best takeoff procedure is to hold the tail down by pulling the stick toward you until sufficient speed for rudder control is attained and then to allow the tail to rise slowly. Some rudder input may be necessary to maintain heading as the tail is lifted and stabilized in a takeoff attitude.
7. Swiftly advance throttle into take-off position. Hold flight stick back with only a light feel, but do not push forward.
8. Take-off distance on the runway without wind effect is approximately 350-400 m.
9. Take-off is at IAS = 170-180 km/h and performed on three points throughout take-off roll. Keep aircraft straight – the aircraft does not have a tendency to break out.
10. During takeoff, engine speed may reach a maximum of 3,300 RPM.
11. Engine power is set according to RPM indicator. Every throttle setting corresponds to a specific engine speed setting, maintained by the hydraulically operated governor.

Power Settings

The MBG emergency mode handle switches the MBG to manual operation by cutting off pressurised oil. In case of MBG malfunction, it allows to proceed flight using the manual throttle valve. Normally, this throttle fully opens at 40 degrees of the throttle giving room for further automatic control. In manual mode, its range is extended up to 90 degrees or full throttle lever range. Due to engine overstressing, the throttle must not be advanced beyond 2700 RPM or 60 degrees of its travel.

Commented [AC27]:

At the latest 3 min after takeoff, reduce to combat power and slightly push flight stick forward.

Throttle position can be fixed by turning the handgrip on the lower left.

| Throttle Position | Power Output | RPM | Permissible Time | Fuel Consumption Liter/hour |
|-------------------|--------------------------------------------|-----------|------------------|-----------------------------|
| 90° command angle | Emergency power (increased take-off power) | 3250 | 3 min | 620 -20 |
| 90° | Take-off, combat and climb power | 3250 | 30 min | 590 +20/-40 |
| 75° | Continuous power | 3000 | constant | 530 |
| 60° | Economy I | 2700 | constant | 375 |
| 47° | Economy II | 2400 | constant | 285 |
| 34° | Economy III | 2100 | constant | 215 |
| 0° | Idle (in flight) | app. 1200 | - | - |
| 10° | Engine stop position | - | - | - |

Retraction of Landing Gear

The landing gear must be retracted at or below IAS = 250 km/h. After takeoff, briefly and slightly apply brakes and retract landing gear.

Push the guarded red operating button on the left side panel to "On" position.

The landing gear has an electrical indicator on the left side panel, and mechanical ones on the upper wings. A colored marker pin retracts upon gear retraction.

Both main landing gears and the tailwheel are retracted when both red control lamps are illuminated. Check the marker pins on the wings.

Only after retraction of landing gear, retract flaps (red button for flaps "On").

Red control lamp illuminates. Also observe the mechanical indication on side of the upper wings (cutout with degrees scale).

Commented [MW28]:

Avoid sudden bursts of power during takeoff! Make it smooth and steady.

Climb

Perform the following steps once a safe takeoff is accomplished:

- Set throttle for climb power, 3,250 RPM.
- Best climb speed is 280 - 290 km/h indicated.
- **Attention!** Desired position for radiator split flaps can be set for 110°C.
- At an altitude of approximately 3,300 +/-200 m, automatic switching from low to high blower occurs noticeably. Avoid cruising or frequent change of altitude around blower switching altitude.
- Raise landing gear by retracting the safety switch over the "Ein" (Up) button and pressing the button. Ensure gear is properly raised and the red "Ein" light illuminates.
- Flaps up with "Ein" (Up) button.
- Check coolant and oil temperatures, and oil pressure.
- After reaching safety altitude, throttle back to 3000 RPM.
- Trim aircraft for climbing attitude as necessary.
- Check all instruments for proper function within normal parameters.

Commented [MW29]

Cruise and Fuel Management

Set coolant temperature to 100°C (regulator setting).

Retard throttle so that resulting power setting is no more than max continuous power, 3000 RPM. Above 7500 m, max continuous power at 3250 RPM is certified.

Automatic rich/lean switching starts operating from 2800 to 2900 RPM.

In order to achieve longer ranges, and to save engine lifetime, choose power settings as possible.

Oil Entry Temperature at max continuous power is 110°C, minimum pressure is 4.5 atü. Maximum temperature (short duration) 130°C, however hereby the presence of oil dilution (cold start) has to be taken into account. Maximum pressure must not exceed 13 atü.

Upon exceedance of maximum temperature, engine power must be reduced.

Coolant Exit Temperature 100°C at all altitudes. Exceptions: During climb 110 (100)°C is permissible, and during takeoff and taxi 130 (120)°C permissible for brief periods of time.

These exceptional values are only valid in case an Erhard coolant regulator valve 2 atü (1.2 atü) is fitted.

Fuel Quantity Measuring. An electrical fuel quantity indicator is fitted to the lower front panel with a selection switch for the forward and rear fuel tanks. There is no fuel quantity indication for the drop tank or the additional fuel tank. Additional fuel is ducted into the rear tank. Recognition of additional

tanks having emptied is by fuel quantity indication dropping below 240 liters in the rear tank, with the fuel quantity indicator switched to the rear tank.

Switching Warning for the rear fuel tank occurs at approximately 10 liters remaining, white lamp illuminates.

Low Fuel Warning in the forward fuel tank occurs at 80 liters remaining, red lamp illuminates. Upon illumination of red lamp, fuel remaining for approximately 15 minutes at economy power setting.

Switching of Fuel Tanks

Without a drop tank, without additional tank, prior engine start:

- Fuel shutoff valve in position "Open"
- Both fuel tank pumps "On"
- Fuel quantity indicator switched to aft tank

In flight:

- Fuel shutoff valve "Open"
- Drawing of fuel is controlled by the switching "On" and "Off" of the fuel tank pumps.
- Monitoring of fuel quantity by observing the selectable fuel tank indicator.
- First empty the rear tank, with the rear fuel pump switched off (only when red lamp illuminates before the white lamp, isolate forward fuel tank with its fuel shutoff valve). Fuel quantity indicator on rear fuel tank.
- When white lamp illuminates, switch both fuel tank pumps to "On". Fuel shutoff valve remains in position "Open".
- Fuel quantity indicator to forward fuel tank.
- When red lamp illuminates, 80 liters remain in forward fuel tank, remaining available flight time approximately 10 to 15 minutes at economy power setting.

With drop tank under the fuselage:

- Fuel shutoff valve "Open"
- Drop tank fuel pump and rear fuel tank pump "On". Forward fuel tank pump "Off"
- At altitudes above 8000 m it may become necessary to additionally switch the forward fuel tank pump on.
- Fuel quantity indicator switched to rear fuel tank
- Once fuel indicator starts showing quantity less than 240 liters, the drop tank is empty.
- Drop tank fuel pump "Off".
- In order to jettison drop tank, pull emergency handle in cockpit.

With additional fuel tank in fuselage:

- Fuel shutoff valve in position "Open"
- Rear fuel tank pump "On". Forward fuel tank pump "Off"
- Additional fuel tank pump "On"
- Fuel quantity indicator on rear fuel tank
- Once fuel quantity in rear fuel tank drops below 240 liters, additional fuel tank is empty.
- Additional fuel tank pump "Off".

With drop tank and additional fuel tank:

- Fuel shutoff valve "Open".
- Drop tank fuel pump, additional fuel tank pump and rear fuel tank pump "On". Rear fuel tank pump "Off".
- Fuel quantity indicator switched to rear fuel tank.
- When fuel quantity indicator starts showing fuel less than 240 liters, drop tank and additional fuel tank are empty.
- Drop tank fuel pump and additional fuel tank pump "Off".
- **Attention!** When there is danger of incoming fire, the drop tank has to be jettisoned, and the drain of the the unprotected additional tank into the fuselage has to be pulled.

High Altitude Flight

During high altitude flight check oxygen flow in short intervals. Oxygen pressure gauge is located on the right side of the lower front panel next to the O2 guard. Start breathing oxygen at an altitude of 4000 m.

Night Flight

In case of too bright illumination of instruments and warning lamps are too bright, reduce brightness with obfuscator (on left side panel).

Prior take-off it is especially important to ensure proper stabilizer trim setting at 0°.

Special Flight Maneuvers

Glide

- Engine speed at idle 1200 +/-50 RPM.
- During longer periods of glide, advance throttle repeatedly to prevent spark plug fouling.
- Coolant exit temperature must not fall below 60 °C.
- Switching from high to low blower occurs automatically at 3300 +/-300 m.

Dive

- Dive speeds for fighters and fighter-bombers equipped with airspeed indicator FI 22234.
 - at 9 km altitude IAS = 500 km/h
 - at 7 km altitude IAS = 600 km/h
 - at 5 km altitude IAS = 700 km/h
 - at 3 km altitude IAS = 800 km/h
 - at 2-0 km altitude IAS = 850 km/h
- Engine speeds of 3300 RPM as short period maximum must not be exceeded.

Inverted Flight

No inverted flight, engine lubrication system is unsuitable. However, all aerobatic maneuvers may be performed, even if briefly leading through inverted flight.

Landing

- Reduce speed to approximately 300 km/h.
- Extend landing gear. Push button switch on left side panel or pull the landing gear pull lever (on left side of the lower front panel), until the landing gear is properly unlatched.
- Mechanical indicator pins appear upon extension. The landing gear is only completely extended when the white bar (red arrow pointing to it) is visible.
- Extend landing flaps between IAS = 300 and 220 km/h.
- Observe signal lamps. Do not exceed IAS = 300 km/h with extended flaps.
- Trim aircraft tail-heavy as necessary (push button for flaps respectively toggle switch for elevator trim on left side panel).
- Approach speed IAS = 220-220 km/h
- Touchdown at IAS = 170 km/h

- Pull back flight stick upon landing
- Retract flaps after rolling-out.
- Never hold the flight stick back when intending to make a turn so that tailwheel has free movement.

Engine Shutdown

Open cooling flaps fully, in warm outside conditions during approach, in cold weather during taxi, run engine at 1800 RPM for some time, hereby monitoring coolant temperature - must not be above 130°C, otherwise allow engine to run longer in order to cool down.

Retard throttle to stop position. Switch off ignition, fuel pumps, close fuel shutoff valve, and press the aircraft electrical power off switch.

Flight Emergencies

Go Around

- Go around with fully extended flaps.
- Retract landing gear.
- Only retract flaps to take-off position when at sufficient altitude and with sufficient airspeed. Note that the aircraft tends to fall slightly upon retraction of flaps.
- Operation as during normal departure.

Failure of the Landing Gear Drive

- Use emergency landing gear release in case of failure of the electrical drive. Operation as during normal operation.
- In case gear does not extend, push nose down and then recover sharply. Observe the mechanical indicator.
- In case gear does still not extend, proceed as follows:
 - Check if landing gear switch is set to "Off".
 - If yes, pull manual gear handle once again.
 - If this is not successful:
 - Open circuit breaker for landing gear drive (right side panel) and once again pull manual gear handle.
 - Make side slip maneuvers to extend landing gear.
 - Check that white marking on landing gear pins is visible.

- In case these procedures do not result in success, retract landing gear and carry out a belly landing.
- However, a single wheel landing is also possible, in this case touch down as for a normal landing but keep the aircraft level as long as possible with aileron input. Usually the propeller and wing tips will receive damage.

Power Plant Failure

- In case of a failure of engine regulator automatics, retard throttle towards idle as much as possible and pull emergency pull to the right of the fuel shutoff valve. Keep engine power to as little as possible in order to avoid engine stresses.
- When emergency pull is pulled, engine speeds higher than 2700 RPM are prohibited.
- In case of falling oil pressure indication, landing has to be carried out immediately, if possible.
- In case fuel vapors enter the cockpit, switch off fuel tank pumps, don oxygen mask and slightly open the canopy. Report leakage after landing.
- In case of a failed fuel pump, flight may continue to the next airfield at low RPM, using both fuel tank pumps.

Emergency Weapons Drop

Operate bomb emergency release handle on the lower front panel. The lever is returned to the original position by spring load forces upon release of the handle.

Emergency Landing in case of Engine Failure

- At low altitude, immediately pull up the airplane until IAS has reduced to approximately 300 km/h.
- Retard throttle to quick stop position
- Switch off ignition
- Set fuel shutoff valve to "Closed"
- Open canopy to the last cog. Latch cradle (canopy does not fly off in flight!)
- Extend landing gear at airfields only - otherwise danger of flipping over
- Fully extend flaps, trim aircraft tail-heavy
- Operate aircraft electric system off switch to "Off"

In unfavorable terrain, perform emergency landing with landing gear up.

Sliding distance on belly landings approximately 150-200 m. If there is sufficient space, do not extend flaps as this causes damage to the propeller. Perform the landing as in a glider.

The aircraft's behavior is completely harmless during belly landings.

Starting from high altitude it makes sense - in order to be able to cover a greater distance - to only extend the gear and flaps when it is assured that the chosen landing airfield can be reached.

Ditching

Ditching should be avoided as much as possible, since after 2-3 bounces the aircraft will sink over the nose immediately. Prior to ditching, the canopy has to be always jettisoned.

Landing without Flaps

- In case of a failure of the flap drive, it has to be noted that the aileron will become more sensitive on landing.
- The touchdown speed will increase by approximately 35 km/h. Since this differs greatly from airplane to airplane, it is recommended to establish the stall speed at high altitude with idle power setting (should result in speed of about 195 km/h), and add to this speed about 20 km/h to determine touchdown speed.
- The landing distance increases in this case from 600 m to about 850 m.

Parachuting

- As far as flight altitude is available and aircraft remains controllable, reduce speed as much as possible.
- If possible:
 - Operate electrical system "Off" switch
 - Switch off ignition
 - Close fuel shutoff valve
- Push the canopy emergency jettison lever at the punched disc. The canopy is jettisoned immediately by explosive cartridge. Prior to this, the canopy shall however be completely closed, or under no circumstances be open more than 300 mm (check marking!).
- Attention! Canopy emergency jettison is secured by securing wire!
- The canopy can also be manually opened (latch hand crank at the last cog position). This method is preferable when there is sufficient time and slow flight (below 300 km/h).
- Unfasten seat belt, strongly kick flight stick forward with foot, pilot is thrown clear of aircraft.

Commented [MW30]

COMBAT EMPLOYMENT



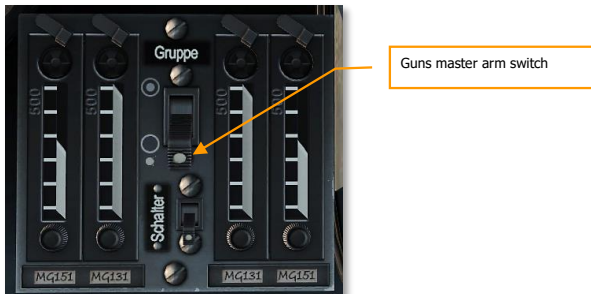
COMBAT EMPLOYMENT

In this section, we will overview weapons employment procedures for the Fw 190 D-9.

Guns

Use of the guns in dogfight and aiming a target with the EZ 42 gunsight.

1. Turn on the guns master arm switch [C].



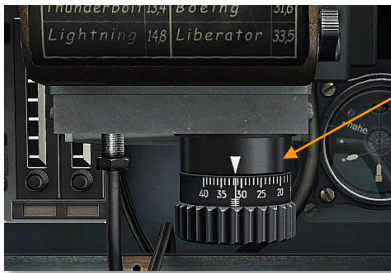
2. Turn on the gyroscope of the EZ 42 gunsight by pushing the gyro power switch upwards [M]. Note that the gyro needs an appropriate initial time of 1.5 minutes, otherwise the suitable derivative cannot be adjusted correctly.



Commented [M31]:

3. At the first sighting of an enemy plane, immediately adjust its wingspan with the target wingspan knob, increase [.] , decrease [/]. Pay attention to adjust as precisely as possible.

Commented [M32]:



Target wingspan knob

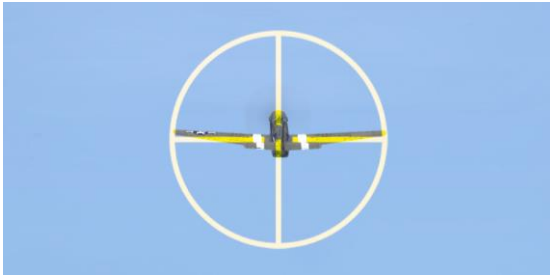
The following three wingspan values are indicated with special markings on the target wingspan knob:

1. Average wingspan of single-engine fighter: 11.5 m.
 2. Average wingspan of twin-engine aircraft: 16.5 m.
 3. Average wingspan of four-engine bomber: 31.8 m.
4. Set the range to target via twist grip on the throttle. Increase [;], decrease [/].



Twist grip

Fly the aircraft so that the target appears within the reticle circle and rotate the throttle twist grip until the diameter of the reticle circle corresponds to the target size.



Continue to frame the target with the reticle circle by rotating the twist grip as range changes. Track the target smoothly for one-two second(s); then fire.

Bombs

Releasing Bombs

The following is a standard procedure for releasing bombs:

1. Set the range to target to 0 with the twist grip on the throttle to fix gunsight reticule. Increase [↑], decrease [↓].



Twist grip for range selection

2. Set the bomb selector switch to the proper profile and delay position – to the left [LShift + B], to the right [LCtrl + B].



Bomb fusing selector unit

3. Press the bomb-rocket release button [RAlt + Space] on the control stick to release bombs.

Note. Bombs may be released when the aircraft is in any pitch attitude from a 30-degree climb to a vertical dive.

Do not release bombs when you are sideslipping more than 5 degrees in a vertical dive. Doing so may collide a bomb and the propeller.

Emergency Bomb and Drop Tank Release

The bombs may be jettisoned with the jettison fuselage stores handle, located below the main instrument panel.

"Rumpflast" - Jettison Fuselage Stores [LCtrl + R].



Rockets

Besides the bombs, the Fw 190 D-9 can also carry unguided rockets of two models: R4M and BR 21 (also called Werfer-Granate 21). Both rocket types are mounted under the aircraft's wings.

- The R4M is a 55-mm diameter anti-aircraft rocket. The rocket's warhead contains a 520 g charge of hexogen. The R4M is equipped with a contact fuse, so, maximal efficiency of R4M rocket launch is achieved by using the salvo mode. Fw 190 D-9 can carry 26 R4M rockets.



- BR 21 is a heavy 210-mm diameter anti-aircraft rocket weighing about 110 kg. It's fitted with a 40 kg warhead that contains a 10 kg charge. The BR 21 rocket is equipped with a time fuse designed to detonate the warhead at certain distance from the carrier. Fw 190 D-9 can carry two rockets of this type.



The R4M and BR 21 rockets can also be used against ground targets, however, originally they are not intended for such purposes.

Launching Rockets

Below is a standard procedure for launching rockets:

1. Set the range to target to 0 with the twist grip on the throttle to fix gunsight reticule. Increase [R], decrease [L].



Twist grip for range selection

2. Turn on the main rocket switch [Shift + O], located in the top of the weapon console.



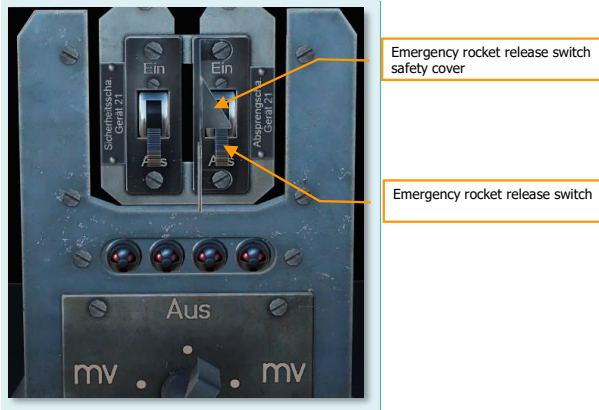
Main rocket switch

3. Press the bomb-rocket release button [RAIt + Space] on the control stick to launch rockets.
 - If firing R4M rockets, each press of the release button will launch one pair of rockets.
 - If firing BR 21 rockets, each press of the release button will launch one rocket.

Emergency Rocket Release

The rockets may be emergency jettisoned with the rocket emergency release switch, located to the right of the main rocket switch. The switch is guarded by the safety cover. To open the cover, press [LShift + K].

Emergency Rocket Release Switch [LShift + I].



Commented [PW33]

RADIO COMMUNICATIONS



RADIO COMMUNICATIONS

There are two optional modes of using the radio that depend on the "EASY COMMUNICATION" OPTION under the GAMEPLAY tab. This setting also determines the key commands used to access the radio menu in-game.

Because the radio of the Fw 190 D-9 is limited to 4 channels, you will only be able to communicate with entities whose frequencies are loaded in your radio. Radio frequencies are loaded in the mission editor by the mission designer and should be made available as part of the mission briefing.

Easy Communication is enabled

The radio communications window is accessed by a press of the [↵] backslash key (this is for US keyboards, other language keyboards may vary). After the command selection the radio or interphone will be selected (if required) and tuned (if required) automatically. Also [↵] key will close radio command menu.

When the radio menu is displayed, recipients are color-coded as follows:

- Recipients on which at least one of the radios is tuned to are colored white.
- Recipients on which at least one of the radios can be tuned to but is not currently on the correct frequency are colored gray.
- Recipients that cannot be contacted due to range or terrain masking / earth curvature are colored black.

Each will also have their modulation / frequency listed. When you select a recipient, the appropriate radio will automatically be tuned to communicate with the selected recipient.

When Easy Communications mode is enabled, the following "quick" command shortcuts are also available:

[LWin + U] Request AWACS vector to home plate.

[LWin + G] Command flight to attack ground targets.

[LWin + D] Command flight to attack air defense targets.

[LWin + W] Command flight to cover me.

[LWin + E] Command flight to proceed with the mission and return to base.

[LWin + R] Command flight to proceed with the mission and rejoin.

[LWin + T] Command flight to open/close the formation.

[LWin + Y] Command flight to rejoin the formation.

Easy Communication is not enabled

When Easy Communications mode is OFF, the Push To Transmit (PTT) button [RAIt + \] is used to open the radio command panel. The PTT button opens and closes the radio communications window for the currently selected radio.

When recipients are displayed, there is no color-coding of availability and no listing of their modulation / frequency. This is the more realistic play mode and requires you to know the correct modulation / frequencies for each recipient and you must manually enter the frequencies on the correct radio.

Radio Communications Window

Top level recipient list:

If using "Easy Communications", recipients not present in the mission will not be listed.

F1. Wingman...

F2. Flight...

F3. Second Element...

F4. JTAC...

F5. ATCs...

F8. Ground Crew...

F10. Other...

F12. Exit

Hotkeys will also be available to directly issue any command in the structure. These can be found in Input Options.

To exit radio communications, you can also press the ESC key.

F1 Wingman

Upon selecting F1 Wingman from the main radio communications window, you have the option to select the basic type of message you wish to send to your number 2 wingman. These are:

F1. Navigation...

F2. Engage...

F3. Engage with...

F4. Maneuvers...

F5. Rejoin Formation

F11. Previous Menu

F12. Exit

F1 Navigation...

The Navigation options allow you to direct where your wingman will fly to.

F1 Anchor Here. Your wingman will orbit at its current location until you issue a Rejoin command.

F2 Return to base. Your wingman will return to and land at the airbase designated in the flight plan.

F11 Previous Menu

F12 Exit

F2 Engage...

The Engage options allow you to direct your wingman to attack a specific type of target. After issuing the order, the wingman will attempt to locate the specified target type and attack it.

F1 Engage Ground Targets. Wingman will attack any enemy ground unit it can locate.

F2 Engage Armor. Wingman will attack any tanks, infantry fighting vehicles, and armored personnel carriers it can locate.

F3 Engage Artillery. Wingman will attack any tube artillery or multiple rocket launchers that it can locate.

F4 Engage Air Defenses. Wingman will attack any enemy anti-aircraft artillery and surface to air missile units that it can locate.

F5 Engage Utility Vehicles. Wingman will attack all supply, transport, fuel, power generation, command and control, and engineering units it can locate.

F6 Engage Infantry. Wingman will attack hostile infantry units. Note that the infantry units are very difficult to detect unless they are moving or firing weapons.

F7 Engage Ships. Wingman will engage enemy surface combatants. Note that most surface combatants are heavily armed and that your aircraft is not well-suited to attacking such targets.

F8 Engage Bandits. Wingman will engage any enemy fixed-wing and rotary-wing aircraft it can locate.

F11 Previous Menu

F12 Exit

F3 Engage With...

Whereas the F2 Engage command allows you to give basic orders for your wingman to attack a target type, the F3 Engage With set of commands not only allows you to determine target type, but also the direction of attack and what weapon type to use. This is done in a tiered manner by first selecting target type, then weapon type, and finally the attack heading. The wingman will then attempt to locate targets of the specified type and attack them according to your specified weapon and attacking heading. While the F2 Engage options are fast to issue, the F3 Engage With options provide much greater control.

Target Type. These options mirror those of the F2 Engage orders and allow you to determine the type of ground target you want your wingman to engage.

F1 Engage Ground Targets. Wingman will attack any enemy ground unit it can locate.

F2 Engage Armor. Wingman will attack any tanks, infantry fighting vehicles, and armored personnel carriers it can locate.

F3 Engage Artillery. Wingman will attack any tube artillery or multiple rocket launchers that it can locate.

F4 Engage Air Defenses. Wingman will attack enemy anti-aircraft artillery and surface to air missile units that it can locate.

F5 Engage Utility Vehicles. Wingman will attack all supply, transport, fuel, power generation, command and control, and engineering units it can locate.

F6 Engage Infantry. Wingman will attack hostile infantry units. Note that the infantry units are very difficult to detect unless they are moving or firing weapons.

F7 Engage Ships. Wingman will engage enemy surface combatants. Note that most surface combatants are heavily armed and that your aircraft is not well-suited to attacking such targets.

Weapon Type. Once you have selected the target type, you will be given a list of weapon types that you want your wingman to engage the target with. These include:

F2 Unguided Bomb...

F4 Rocket...

F6 Gun...

F4 Maneuvers...

Although your wingman will generally do a good job of knowing when and how to maneuver, there may be times when you want to give him/her a very specific maneuvering order. This could be in response to a threat or to better set up an attack.

F1 Break Right. This command will order your wingman to make a maximum-G break to the right.

F2 Break Left. This command will order your wingman to make a maximum-G break to the left.

F3 Break High. This command will order your wingman to make a maximum-G break high.

F4 Break Low. This command will order your wingman to make a maximum-G break low.

F7 Clear Right. Your wingman will perform a 360-degree turn to the right of the current flight path while searching for targets.

F8 Clear Left. Your wingman will perform a 360-degree turn to the left of the current flight path while searching for targets.

F9 Pump. Your wingman will perform a 180-degree turn from its current heading and fly 10 nm. Once reached, it will turn 180-degrees back to the original heading.

Commented [AC34]:

F5 Rejoin Formation

Issuing this command will instruct your wingman to cease its current task and rejoin formation with you.

F2 Flight

Upon selecting F2 Flight from the main radio communications window, you have the option to select the basic type of message you wish to send. These are:

F1 Navigation...

F2 Engage...

F3 Engage with...

F4 Maneuvers...

F5 Formation

F6 Rejoin Formation

F11 Previous Menu

F12 Exit

F1 Navigation...

The Navigation options allow you to direct your flight where to fly to.

F1 Anchor Here

F2 Return to base

F11 Previous Menu

F12 Exit

These commands mirror those of the Wingman Navigation commands, but apply to all flight members.

F2 Engage...

The Engage options allow you to direct your flight to attack a specific type of target. After issuing the order, the flight will attempt to locate the specified target type and attack it.

F1 Engage Ground Target

F2 Engage Armor

F3 Engage Artillery

F4 Engage Air Defenses

F5 Engage Utility Vehicles

F6 Engage Infantry**F7 Engage Ships****F8 Engage Bandits****F11 Previous Menu****F12 Exit**

These commands mirror those of the Wingman Navigation commands, but apply to all flight members.

F3 Engage With...

These commands mirror those of the Wingman Engage With commands, but apply to all flight members. These commands work the same as the Wingman Engage With commands described above.

F4 Maneuvers...**F1 Break Right****F2 Break Left****F3 Break High****F4 Break Low****F7 Clear Right****F8 Clear Left****F9 Pump****F11 Previous Menu****F12 Exit**

These commands mirror those of the Wingman Maneuvers commands, but apply to all flight members.

F5 Formation

From the Formation menu, you can select the formation that the flight will fly in relation to you as the flight leader.

F1 Go Line Abreast**F2 Go Trail****F3 Go Wedge****F4 Go Echelon Right****F5 Go Echelon Left****F6 Go Finger Four****F7 Go Spread Four**

- F8 Open Formation**
- F9 Close Formation**
- F11 Previous Menu**
- F12 Exit**

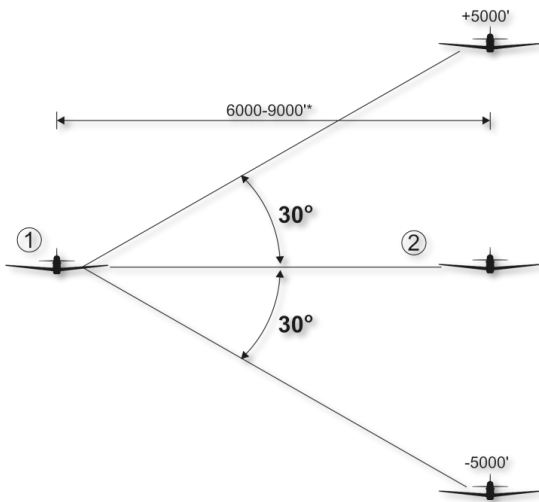
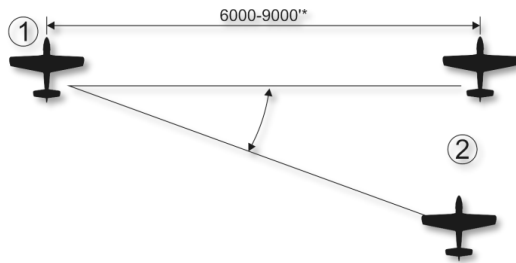


Figure 90: F1 Go Line Abreast

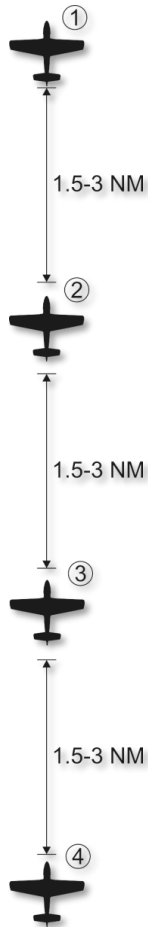


Figure 91: F2 Go Trail

Position may be modified within a 4000-12,000' envelope by flight lead.

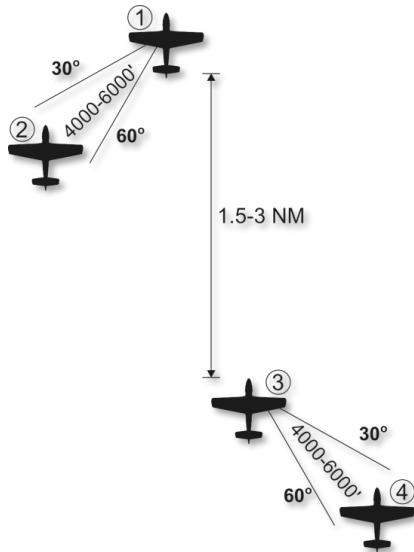


Figure 92: F3 Go Wedge

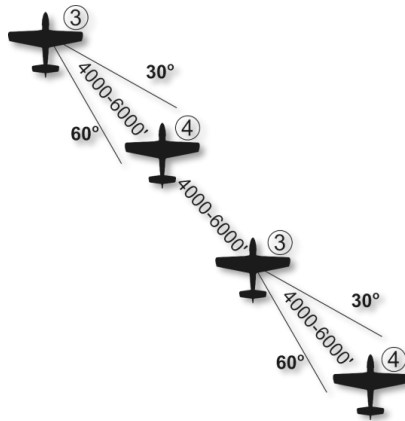


Figure 93: F4 Go Echelon Right

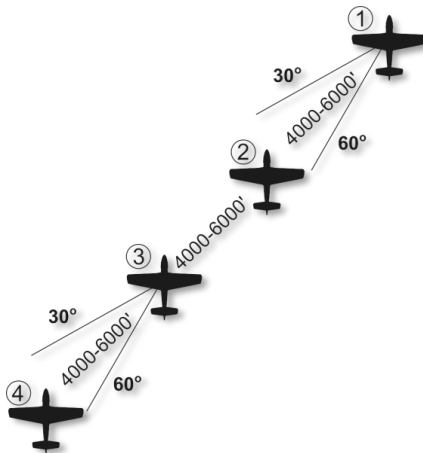


Figure 94: F5 Go Echelon Left

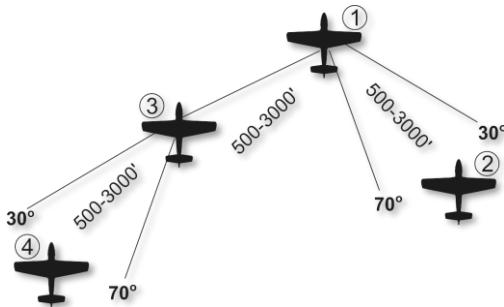


Figure 95: F6 Go Finger Four

Position may be modified within a 4000-12,000' envelope by flight lead.



Figure 96: F7 Go Spread Four

Position may be modified within a 4000-12,000' envelope by flight lead.

F8. Open Formation. Increase the distance between each aircraft in the current formation.

F9. Close Formation. Decrease the distance between each aircraft in the current formation.

F6 Rejoin Formation

Issuing this command will instruct your flight to cease their current task and rejoin formation with you.

Flight Member Responses

After sending a radio message to any of your flight members, you will have one of two responses:

Flight number of responder (2, 3, or 4). When a flight member will carry out the order, it will respond simply with its flight number.

(Flight member number) unable. When a flight member cannot carry out the order, it will respond with its flight number following by "unable". For example: "2, unable".

F5 ATC

The Air Traffic Control (ATC) system of this simulation is context sensitive to the location of your aircraft: on the parking ramp or runway/airborne.

Because the FuG 16 AM radio of the Fw 190 D-9 is limited to 4 channels, you will only be able to communicate with entities whose frequencies are loaded in your radio. Radio frequencies are loaded in the mission editor by the mission designer and should be made available as part of the mission briefing.

Each aerodrome's tower has several radios in different radio bands for radio communication with aircraft of different types.

ATC communication frequencies for Fw 190 D-9 radio band:

Anapa-Vityazevo: 38.40 MHz

Batumi: 40.40 MHz

Gelendzhik: 39.40 MHz

Gudauta: 40.20 MHz

Kobuleti: 40.80 MHz

Kutaisi (Kopitnari): 41.0 MHz

Krasnodar Center: 38.60 MHz

Krasnodar-Pashkovsky: 39.80 MHz

Krymsk: 39.0 MHz

Maykop-Khanskaya: 39.20 MHz

Mineralnye Vody: 41.20 MHz

Mozdok: 41.60 MHz

Nalchik: 41.40 MHz

Novorossiysk: 38.80 MHz

Senaki-Kolkhi: 40.60 MHz

Sochi-Adler: 39.60 MHz

Soganlug: 42.0 MHz

Sukhumi-Babushara: 40.0 MHz

Tbilisi-Lochini: 41.80 MHz

Vaziani: 42.20 MHz

Beslan: 42.40 MHz

Parking Ramp Start

Before you can communicate with ATC/Ground Control to get permission to start your engine, you first need to have your radio up and running.

With the radio now operating, press **[N]** or **[RAIt + N]** to bring up the radio menu and then press **[F1]** "Request Engine Start".

If you have wingmen, they will also now start their engines.

After the aircraft has been started and configured, select **[F1]** "Request taxi to runway". Once you receive permission, you can taxi to the "hold short" area of the taxiway - the area on the taxiway just short of entering the runway.

If you have wingmen, they will also now taxi to the runway.

When at the hold short area, press **[N]** or **[RAIt + N]** and **[F1]** "Request take off". When permission is granted, you can taxi on to the runway and take off.

Runway and Air Start

If you are not starting from the parking ramp, you can access ATC by pressing the **[N]** or **[RAIt + N]** key. Upon doing so, you can select **[F5]** "ATCs".

If you are using "Easy Communications", a list of airfield ATCs are listed along with their contact frequencies. Select the airfield ATC you wish to contact. If not using Easy Communications, you will first need to push the channel button of the assigned ATC frequency you wish to land on the radio.

Once the airfield ATC is selected, you can either send them an "Inbound" message to indicate that you intend to land there, or an "I'm lost" message that will result in the ATC providing you guidance to reach the airfield.

When you select "Inbound", the ATC will respond with the following information:

- Heading to fly to reach landing initial point.
- Range to landing initial point.
- The QFE, or atmospheric pressure at the airfield elevation.
- Which runway to land on.

You can then radio:

- "Request landing" indicates your intent to land at the directed runway.
- "Abort landing" indicates that you will not be landing at the directed runway.
- "I'm lost" requests navigation assistance to reach the airfield.

If you've requested landing and are on final approach, radio request landing a second time and ATC tower control will provide permission if the runway is clear. It will also provide wind direction and speed.

After you have landed, proceed to the parking area and shut down the aircraft.

F8 Ground Crew

After landing at a friendly airfield and taxiing to a parking ramp, you can communicate with the ground crew for rearming and refueling by pressing the [\[F8\]](#) option to display the Ground Crew menu.

SUPPLEMENTS

Airbase Data

| Airbase | Runway | TACAN, channel | ILS | Tower comm frequencies, MHz |
|-----------------------------------------|-----------------|-------------------|----------------------------------------|--------------------------------|
| UG23 Gudauta - Bambora (Abkhazia) | 15-33, 2500m | | | 209.00/130.0/40.20/4.20 |
| UG24 Tbilisi - Soganlug (Georgia) | 14-32, 2400m | | | 218.0/139.0/42.0/4.65 |
| UG27 Vaziani (Georgia) | 14-32, 2500m | 22X (VAS) | 108.75 | 219.0/140.0/42.20/4.70 |
| UG5X Kobuleti (Georgia) | 07-25, 2400m | 67X (KBL) | 07 ILS - 111.5 | 212.0/133.0/40.80/4.35 |
| UGKO Kutaisi - Kopitnari (Georgia) | 08-26, 2500m | 44X (KTS) | 08 ILS - 109.75 | 213.0/134.0/41.0/4.40 |
| UGKS Senaki - Kolkhi (Georgia) | 09-27, 2400m | 31X (TSK) | 09 ILS - 108.9 | 211.0/132.0/40.60/4.30 |
| UGSB Batumi (Georgia) | 13-31, 2400m | 16X (BTM) | 13 ILS - 110.3 | 210.0/131.0/40.40/4.25 |
| UGSS Sukhumi - Babushara (Abkhazia) | 12-30, 2500m | | | 208.0/129.0/40.0/4.15 |
| UGTB Tbilisi - Lochini (Georgia) | 13-31, 3000m | | 13 ILS - 110.3 31 ILS - 108.9 | 217.0/138.0/41.80/4.60 |
| URKA Anapa - Vityazevo (Russia) | 04-22, 2900m | | | 200.0/121.0/38.40/3.75 |
| URKG Gelendzhik (Russia) | 04-22, 1800m | | | 205.0/126.0/39.40/4.00 |
| URKH Maykop - Khanskaya (Russia) | 04-22, 3200m | | | 204.0/125.0/39.20/3.95 |
| URKI Krasnodar - Center (Russia) | 09-27, 2500m | | | 201.0/122.0/38.60/3.80 |
| URKK Krasnodar - Pashkovsky (Russia) | 05-23, 3100m | | | 207.0/128.0/39.80/4.10 |

[Fw 190 D-9] DCS

| | | | | |
|-------------------------------|-----------------|--|----------------------------------------|------------------------|
| URKN Novorossiysk (Russia) | 04-22, 1780m | | | 202.0/123.0/38.80/3.85 |
| URKW Krymsk (Russia) | 04-22, 2600m | | | 203.0/124.0/39.0/3.90 |
| URMM Mineralnye Vody (Russia) | 12-30, 3900m | | 12 ILS - 111.7 30 ILS - 109.3 | 214.0/135.0/41.20/4.45 |
| URMN Nalchik (Russia) | 06-24, 2300m | | 24 ILS - 110.5 | 215.0/136.0/41.40/4.50 |
| URMO Beslan (Russia) | 10-28, 3000m | | 10 ILS - 110.5 | 220.0/141.0/42.40/4.75 |
| URSS Sochi - Adler (Russia) | 06-24, 3100m | | 06 ILS - 111.1 | 206.0/127.0/39.60/4.05 |
| XRMF Mozdok (Russia) | 08-27, 3100m | | | 216.0/137.0/41.60/4.55 |

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| | Roberto Carcano | Nathaniel Williams |

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|---------------------|-----------------------|-----------------------------|
| Aquila | Carlos Siordia | Ross Francis |
| Groth | jrbatche | renderstop |
| Ken Holbert | Carlos Ferrer | Marco Mossa |
| Gregory Prichard | NoOneNew | Mark Tuma |
| Vicente Herrera | andrey112 | Marc |
| Joshua McQuinn Cook | Steve Boyd | Apex |
| Liam Williams | Lhowon | Aivaras Staniulis |
| KuVaNi | craig sweetman | martin costa |
| Antonyuk Dmitry | Alex Murphy | Aidan Jabs |
| Jean Charles Baudry | Ian Rademacher | gunter113@yandex.ru |
| Bernard McDavitt | Jeremy David Keelin | Mitja Virant |
| Emil Novák | sotosev | Scott Daniels |
| 315_Piotras | Geofray | P A KAFKAS |
| Daniel Groll | ADRIAN | Jani Petteri Hyvärinen |
| Martin Seiffarth | Joona Järviö | Christian Schwarz |
| Ross Hamilton | Silverado | Paul Haase |
| Alexandre Jacquin | Neil Gardner | Chris Miller |
| William Stover | Louie Hallie | Teun van Dingenen |
| Huber Werner | Jonas Weselake-George | Edward Billington-Cliff |
| Arnel Hadzic | Scott Kullberg | Brendon McCarron |
| Koz Myk | Bryce Johnson | Mathias Munkelt |
| Greg | Przemek Ptasznik | Jorge Manuel Caravaca Vidal |
| Trevor Abney | _Shkval_ | KosiMazaki |
| Chris | Miguel Coca | Kyle Fulton |
| Torben Porsgaard | Ján Pitor | Jacobo Rodriguez |
| Mircea Schneider | Leonard Burns | Niels Hille Ris Lambers |
| Jordan Moss | Jonathan Howe | felix heine |
| Keijo Ruotsalainen | Peter Jensen | Bloom |
| Caldur | Teodor Frost | SlipBall |
| thom burt | Tommy Pettersson | Knut Erik Holte |
| German | Alberto Loro | |

DCS [Fw 190 D-9]

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| Matthew Wohlford | Anjelus | Guillaume Couvez |
| Ace Rimmer | Ilya Feldshteyn | Alexander Barenberg |
| Tom Gillespie | Dver | Manuel Maria Alfaro Gomez |
| Matthew Dalessandro | Tomas Munoz | Terence Ziegler |
| Mark Jedrzejczak | David | Kusch |
| James Russell | Festari Diego | Shai Lum |
| Alexander Gebhardt | Lasse Nystuen Moen | Julien Godard |
| Chris Abele | Jack Noe | Maurice Hershberger |
| Miroslav Koleshev | Jerry Brown | Tobias |
| podvoxx | Tor-Martin Trollstøl | Fedorenko Oleg |
| Adam Tomczynski | Joshua Fowler | ami7b5 |
| Robert Curtin | Barry Spencer | William Belmont |
| Robert Toldo | Michael Maddox | Andy Wishart |
| Mike Leviev | Marcus Koempel | Sean Colvin |
| Steve Dozniak | Christian Reichel | Lewis Luciano |
| Peter | Frank Schwerdel | clement epalle |
| antonello | Bogdan Ghica | Samuel |
| Kenneth Gustafsson | Pierre-Alain Séguier | Dennis Ejstrup |
| Joel Rainsley | Evan McDowell | Michal |
| John A. Turner | Alex Huber | opps |
| Pascal Fritzenwanker | Willem Erasmus | nuclear |
| yendysl | Dmitry Schedrin | Tobais Hassels |
| Nestor Sanchez | Jordan Pelovitz | Lefteris Christopoulos |
| Joshua Miller | Philippe VINCENT | Dave Pettit |
| Ryan Pourroy | Josselin BEAU | Nikolaos Mamouzelos |
| Alexey Ershov | Nicholas Prosser | Karsten May |
| Tim Vleminckx | Manuel | DailyDozo |
| Trasric | Sebastian Baszak | snagov |
| Aaron Sotto | Marcus | anthony milner |
| Jeremy Loudon | Fred de Jong | ALBERTO MARTIN SANTOS |
| Michael Barker | AndyJWest | |

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| Blarney DCS | Daryl | Bernhard Dieber |
| Kael Russell | Kornholio | Evgeniy |
| Collin Brady | Paolo Pomes | PhoenixPhart |
| Matthew Flanigan | Simulatu | Jonathan Marsh |
| Mátyás Martinecz | Mytzu | HellToupee |
| Tioga | Sebastian Hernandez | Tomas Lindahl |
| Ross David Hunter | ILYA GRYAZNOV | avner rev |
| SYN_Skydance | Blackmind | Theodoros Montesantos |
| Alex Sabino | Kyle Knotts | Jean-christian Ayena |
| Zaghoul Othmane | Tongp | Andrea Cavalli |
| Christian Kistler | Teapot | Alfonso Garcia Martinez |
| Jakub Komarek | Noah N. Noah | Alberto Minardi |
| Fraser Reid | Catseye | Chris West |
| Oskar Hansson | SATANA667 | PHOENIX Interactive |
| Dimitrios Vassilopoulos | Jazz_35 | Ross Goodman |
| James Franklin Lassiter | Neil Walker | MaP |
| Ilya Golovach | Leszek Markowicz | Miroslav Kure |
| Sean P. Burt | Christelle JESTIN | Vadrin |
| Grigori Rang | pierre burckle | hdbam |
| Jermin Hu | Rami Ahola | Peter Fischbach |
| PopoidAndroid | Sonia Holopainen | Carl Jamz Chivers |
| Richard | alfred demauro | Jouvet Laurent |
| Joshua Gross | Sylwester Zuzga | Frank Hellberg |
| Mitja Zadavec | Reinhard Seitz | gabsz84 |
| Michiels Jorik | Jerzy Kasprzycki | benoit |
| Alexey Polovets | Christian Pintatis | Torsten Writh |
| Eric Fath-Kolmes | David | Gianluca Giorgi |
| TinfoilHate | Michael | Waldemar |
| Nicolas Piché | Vincent | Force_Majeure |
| Andrew Devine | Matt Crawford | Bob Radu |
| Jens Langanke | Sacha Ligthert | alon oded |

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|----------------------|--------------------------|-------------------------|
| Christopher Phillips | Mor Rotholtz | Uros Karamarkovic |
| lighthaze | Cristian Marentis | Richard Whatley |
| Christopher Mosley | Jochen Baur | Rick Keller |
| Ray Dolinger | Robert Dvorak | SolomonKane |
| Gordon McSephney | Sam "Mainstay" Valentine | Test |
| Rincevent | Marijn De Gusseme | Leonard Giesecker |
| Nicola | Vladimir Yelnikov | Paradox |
| Maxim | Bosko Djuricic | Torashuu |
| Davidov Vitaliy | Csaba Moharos | Jim Herring |
| Robert Morris | Useless | Colin Inman |
| Mikplayeur | James Smith | John Brantuk |
| Ian Taylor | Thomas Beuleke | Phoenix |
| Richy | Paganus | HR_colibri |
| Patrik Lindström | Darrell Swoap | Gregory Finley |
| jens bier | Roland Peters | William J. Bryan Sr. |
| Sakari Pesola | Stephen Barrett | Tim Julkowski |
| James Cleeter | Andrew Deng | Thomas Weiss |
| Christer Arkemyr | Ian caesar | David Terry |
| Richard Baas | matej renčelj | William Herron |
| Tomasz Karpiuk | Mikko Pulkkinen | Brendon |
| Kari Suominen | Paul R Kempton III | Gert Wijbrans |
| Norm Loewen | Federico Delfanti | rick andersen |
| Arjuna | Matt Parkinson | Andrew Fenn |
| tintifaxl | Bobby | David Stewart |
| Alejandro Montero | OhioYankee | gavin clunie |
| Connor | Rick Benua | Makoto Hakozaki |
| Paul Sims | Chris Ellis | Andrew Jennings |
| Ricardo Madeira | Keyser | Johannes Mueller-Roemer |
| Runar Aastad | Kirk Worley | Moritz Brehmer |
| Chawin | Gwyn Andrews | Shadow Stalker |
| Christian Taust | Nuno Silva | Nils Hansen |

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|---------------------|------------------------|-----------------------|
| Torbjorn Pettersson | Sven R. | Scott Willtrout |
| Nosov Evgeniy | Aladrius | Barry Drake |
| Andreas Macht | Lukas Erlacher | Jeremy Zeiber |
| Sputi | Jon webster | Jimbox |
| Agnar Dahl | Tomi Junnila | Alan Sharland |
| Antal Bokor | FF1 | John Johnson |
| Jacob Røed | Torstein | Jacob Shaw |
| harinalex | Jared Winebarger | Keith Hitchings |
| Milan Šimundža | beikul | David Dunthorn |
| Christian Richter | Torsten Schuchort | Wyatt Moadus |
| Dave Webster | Caleb Keen | Eric Young |
| Alekseev Valentin | BOSCHET | Andrew Heimbuch |
| Sean Taylor | Mark | Bryce Whitlock |
| Balázs Lécz | Andrew Bartlett | Erik Schanssema |
| Rod Middleton | Neil Vennard | David Campbell |
| Karl Bertling | Pasi Yliuntinen | Wonderbread |
| Paul Mikhail | Declerieux | Kocso Janos |
| Alex Turnpenny | Jeremy Gates | Austin Mills |
| CiderPunk | Anonymous | Joseph Geraghty |
| Bryn Oliva-Knight | Eric Gross | Jukka Blomberg |
| Eun-Tae Jeong | Chezzers | David Abreu |
| Jürgen Bischoff | eyal shamir-lurie | Steam |
| Emmanuel Tabarly | Baytor | airy@163.com |
| Takayuki | Matthias Lütke-Wenning | Tere Sammallahti |
| Geoffrey Lessel | Brian Fee | Alexander Zhavoronkov |
| Matt Huston | Truls Jacobsen | Jeremy David Tribe |
| coriolinus | Martin Sanders | Ron Lamb |
| John Trimble | Guido Bartolucci | Gregory Choubana |
| Tòfol Jordà Chordà | Sam Yeshanov | Ken Cleary |
| Benjamin Roser | Sebastian Lindmark | chev255 |
| ciaran coyle | Bob Denhaar | Stuart Walton |

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|-----------------------|--------------------------------|-------------------|
| James Jones | f0uiz | Craig Martin |
| Jordan Cunningham | Markus Narweleit | blackjack04 |
| Andrew Gibbons | Tomik | Andrew Dean |
| Erik | Lassi Miettunen | kongxinga |
| Pasbecq | Hagan Koopman | Warren Evans |
| Koop de Grass | James Goodwin | Roberto Mejia |
| Stephen Clark | L F Loxton | Jason Perry |
| Keith Ellis | David Irving | Ryan |
| Mike L | Jeff Petre | Paul Turner |
| John Boardman | Hugo Saint Martin | Alejandro |
| Ben Rosenblum | Guillaume Houdayer | hansentf |
| Hasanka Ranasinghe | Richard Orädd | John A. Edwards |
| Andrew Hickman | Emir Halilovic | Michael Turner |
| SonixLegend | HAYEZ JF | Simon József |
| Michael Anson | Thomas LaGoe | Christoph Gertzen |
| Jim Oxley | Tore Fagerheim | Javier Díaz Ariza |
| Thomas Nesse | Igor Kharlukov | Nico Heertjes |
| Philippe-Olivier Dubé | Peter Brooks | Chris Thain |
| Roland Reckel | Adam Navis | Jeff McCampbell |
| Mikael Harju | James dietz | UsF |
| Kevin Witt | siva | taratuta |
| Markus Berella | Andy McIntyre | Tommy Tomaszewski |
| Bodhi Stone | Jordi Haro | subject to change |
| Toni Wasama | Thomas Guiry (tf_t4trouble) | Vladimir Škorić |
| Bob Petrone | Kevin M. (tf_Stryker) | philux |
| Tim Hawkins | Larry Jones | Rune Hasvold |
| Martim Avelino Geller | Joonas (tf_Wraithweave) | MichaelB |
| RJ Stevens | Michael Olsen | Nacho |
| Uri Ben-Avraham | Mark Wallace | David Catley |
| Andrej Jesenik | Adam Chan | Gareth Morris |
| Andrew Wagner | | Andrii |

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|------------------------------|-------------------------|-------------------|
| Leon Grave | Andy Cannell | Raj János |
| gkohl | Henrik Friberg | Andrew |
| Dale Jensen | Tom Shackell | Daniel O'Sullivan |
| Andrew Aldrich | Anthony Smith | rhinofilms |
| Denis P | Lorenzo Manzoni | Christopher Miner |
| Filip Kraus | Ant Paul | Richard McKeon |
| Henning | Tim Ireland | David Savina |
| Valeriy Nabatov | Mustisthecat | Jason Chang |
| ChenTing | Roberto Elena | Ian Hughes |
| John J Tasker | Ignacio Mastro Martinez | Barry Colegrove |
| Matthew Deans | vbf12daduck | Oliver Hooton |
| Stephen Botti | Tyler Thompson | Raptor007 |
| Rony Shtamler - IAF.RonyS | bichindaritz | Eamonn McArdle |
| Alper Mat | Joen | Mark Sewell |
| Gunther Mueller | Luis Miguel Lopes | Patrick Pfeiderer |
| Antvan | Graeme Hindshaw | David Stiller |
| Matthew Lindley | Dominik N. | Ammo Goettsch |
| Christian Koller | tessore | Ian Marriott |
| Matthew Morris | James Pyne | Francesco Kasta |
| Kevin Francis | Jacob Holmgren | Dale Winger |
| rami veiberman | yoel lavi | Claes Wiklund |
| Check Six | Brent Wardell | liweidavid2006 |
| Fred Golden | Steven Newbold | Gareth Williams |
| Karel Perutka | Jacob Babor | William Deal |
| Marc Heitler | Modulus | Rob Umpleby |
| Michael Fielding | Pieter Hofstra | Deadman |
| Jared Thomas | Andreas Monz | Simmy |
| John Mathews | Krueger | brian mandeville |
| Erdem Ucarkus | Paul Mulchek | Chris Wuest |
| Ed Curtis | Colin Coulter | Alex Hughes |
| | Chui Yin Ho | michael waite |

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| Yama | tony lafferty | Flying Colander |
| Robert Elliott | gordon vembu | Bryan Nogues |
| Adrian Putz | Erik Weeks | Eivind Tollerød Fosse |
| David Bray | John | Andrew Blinkin |
| Angel Francisco Vizcaino Hernandez | robin vincent | Bob Bent |
| Aleksander Yatsenko | Enrico Zschorn | Arvid Weimar |
| Stephen Ryan | Karsten | Aginor Chuain |
| Scott Hackney | Oscar Stewart | Christoffer Wærnbring |
| Tim Kelly | Simon Harrison | Cikory |
| Tuan Nguyen | Ratnikov Maksim | Colonel Skills |
| Dharma Bellamkonda | Vladimir Domin | Edwin van Walraven |
| Stuart Campbell | Scott | Bruce M Walker |
| gor7811@hotmail.com | DERRICK HILLIKER | Lawrence Bailey |
| Rudo Sintubin | Mike Bike | Robert Birnbaum |
| Oleg Antoshenko | Nicolas Rolland | Frank Kreuk |
| msalama | Brenden Lake Musgrave | Trindade |
| Andreas Bech | Basil Yong Wei Hee | Roland Galfi |
| Michael Baldi | Volker Saß | Alexander |
| Steve Poirier | Ronnie Postma | Danilo Perin |
| Vitalii Podnos | John Flain | Daniel Rozemberg |
| Havner | Evgeny_RnD | Christoph Mommer |
| David Friend | Paul Browning | David Morrell |
| MolotoK | Andrew Garst | Rickard Sjöberg |
| Alex Hitrov | Vespero | Andre Schulze |
| Frank Townsend | Eric Anderson | Josse Aertssen |
| Boris Schulz | Lavi | Roger Buchser |
| Sam Lion | Robert | Daniel Beltran Gonzalez |
| LAI JINGWEN | VIDAL Frank | Darren Furlong |
| Vincent | Jon H | Patrick Naimo |
| Luke Lewandowski | kamek25 | Mark Lovell |
| | Skorak | Benedict Hurkett |

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|----------------------|-------------------------------------|------------------|
| Victor Gil | Kristofer Crecco | Gerald Jarreau |
| Markus Nist | Honza Lehky | Ben Hollinsworth |
| Christian R. | Anthony Sommer | Andrej Babis |
| Gregory D. Olson | Jonathan Mulhall | Kai Törmänen |
| Marek Radozycki | Kåre Kristian Amundsen | Gerhard Neubauer |
| Duroyon | assaf miara | [3rd]KaTZe |
| Pavel Osipov | Rodrigo Mejía | Anatoly Yakubov |
| dahitman | Tore Torvik | Jason Cotting |
| Tom | Jether Pontes | Mrgud |
| Christopher Hibberd | Amos Giesbrecht | Alex Cameron |
| John Small | Toby Rushton | Ian Jones |
| Robert Nigel Jamison | Joonwook Park | Alan Dougall |
| phill davies | UriiRus | Thomas Fisher |
| Robin Senkel | Cecrops | Tim Rawlins |
| Joseph W Scupski | Brian Kiser | Space Monkey |
| KeithKar | ALEXANDER ALEKSEEV | Steve Klinac |
| Peter Schmecker | Victor "Dream Traveller" Buttaro | Kurt Reimann |
| Drovek | Glen Reed | Luke Griffin |
| Joona V | Steven Rushworth | Samuel Morrissey |
| Ville Vuorinen | Andrew Broadfoot | John Smalley |
| Nir | Olivier Kozlowski | Chris Weerts |
| Pavel Škoda | Matthew Hill | Mr John C Smith |
| Jeremy Lambert | Gestl Guenther | Hugh Man |
| Heillon | Thomas Hegman | Michael Parsons |
| Eli Havivi | Vit Prokop | Dimitri Apostola |
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| Christian Koppe | EAF51_Walty | Ian Smuck |
| Helio Wakasugui | Evgeniy Troitskiy | Norbert Röhr |
| sterfield | Tom Humplik | Martyn Downs |
| Andy Davidoff | Steve Rizor | Hideki Mori |
| ALLAIN | | Akin |

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| javierlarrosa | DUPONT Philippe | Alcaudon101 |
| Ross Clunie | Varun Anipindi | James Harrison |
| Eric Howe | Aku Kotkavuo | kyle sinclair |
| Alexey_K | Andrew Olson | JUERGEN |
| Tuomas Virtanen | Charles Burns | Jose Angel Gomez |
| Keith Bedford | Ken Peterson | PA_Hector |
| J.D. Cohen | colin scutt | Andrew Stotzer |
| Gavin Crosbie | steve lecount | Charles M. Wilsenach |
| bupbup | Tamir Katz | Kyle Hannah |
| Vieillefont Antoine | Timo Hiltunen | Anton Grasyuk |
| Goat Yoda | Istvan Takacs | Saxon66 |
| Nicholas Bischof | michael tardio | Joseph Noe |
| David Schroeder | Chris H. Hansen | Ryan Peach |
| Jonathon Walter | Sebastian Schöder | Trevor Burns |
| urvuy | Gregory Morris | Uwe Mueller |
| Ronny Karlsson | Matthew | Hypothraxer |
| Anthony Portier | Egor Melnikoff | Eyal Haim |
| Wes Snyder | ismailaytekarslan@gmail.com | makabda |
| KitSAILGoode | Michael Jenneman | Nir Bar |
| Campbell McGill | Andrew Paull | Jim Arentz |
| Nick Wright | Brett Goldsmith | Paul Lucas |
| Bruce | Jacques O'Connell | Muli Ivanir |
| daisuke sato | Curtis | MTShelley |
| Juanfra Valero | Adrian Borodi | Juha Liukkonen |
| vella | Pekka | Conor Bradley |
| Anthony | Lenny Cutler | Orion Robillard |
| Taproot | Shimon Okun | John Burgess |
| HansHansen | Tarasyuk Yuriy | Tom Strand |
| Ivan | Brayden Materi | Jeremy Bartos |
| Derek Barnes | Marc Michault | lowellsil |
| peter winship | | Johan Waldemarsson |

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| Nigel Patrick Holmes | mp | Mazin Ibrahim |
| EagleTigerSix | Kenneth Bear | Peter James Taylor |
| Timothy Bauer | Jenei Béla | Theo |
| Zetexy | Ian Cockburn | Toni Uusitalo |
| Ha Za | Andreas Demlehner | Leandro Medina de Oliveira |
| Gabriel Venegas | OSCAR LUIS GALVEZ CORTES | MgFF |
| Shuyang leung | Peter Svensson | Caleb E. Farris |
| Jing Wang | Brillet Thomas | Chad David |
| Grant Marchant | Brad Hawthorne | Thelmos |
| Hen Shukrun | Kjetil Lavik | David Mann |
| ric | Ian Todd | Burgin Howdeshell |
| ian d | Leonas Kontrimavicius | Tomas Hridel |
| Peden Harley | Christian Bretz | Berno |
| DAVID CARLISLE | Koh Desmond | Mario Hartleb |
| Gabriel Glachant | Daniel | Gary Dills |
| Aries The Destroyer | Paul Thompson | Christopher Vance |
| Jan Kees Blom | Joshua | Rainer Schweers |
| Arto Rajajärvi | Tom Johnson | Stephen Lynn Flores |
| Alexandr Petak | Edward A. Dawrs | Stephen Higginbotham |
| MrBoBo | Gerald Gassenbauer | Tim |
| Roger Owen | RJW Scharroo | groovy |
| Tacno | Robin Norbistrath | Matt Berndt |
| Jack Beck | GUMAR | Colin Muir |
| Valentin Loginov | Neville Wakem | Andrew Thomson |
| Abc | Carsten Vogel | Christopher Lamb |
| Ivan Čavlek | Robert Ormes | CHO SUNG BAE |
| jensl | captncrunch240 | Ivan Fedotov |
| Martin Eriya | Nico Henke | Sita |
| Enrique Alonso Benítez | Chaussette | Alistair Stuart |
| Kevin Beswick | Ivan_st | Dominik Schulz |
| Borek Fanc | | |

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| Simon Picken | Veli-Matti Paasikivi | Robert Walters |
| Jan Jaap Schreur | Juan Carlos Morote Martin | Jarrod Ruchel |
| Christian Mundt | Alvio Costantini | Brian Carlton |
| Sven G. | Aaron Fess | Field Manar |
| Williame Laurent | Nicholas Wagner | Eric Turner |
| Matthew Johnson | Aleksey Vlasov | John Phelps |
| NoS | beda | Takku |
| Derek Hatfield | Jim Barrows | Matt Olney |
| LordLobo | Erik Dahlbäck | JetBane |
| Reece Heinlein | steve smith | Michael Grzybowski |
| Crimea_MULTI | Spencer Miller | Johan Lind |
| Barry Matthew James | Maik Baumert | Justin Smithson |
| Vincent Eysel | David Frees | Paul Cook |
| Asier García | Andrew McCann | Zach Brown |
| Allan Renwick | Celso Lopez | Kyle |
| Lukas Vok | Sebastian Grant | Brendan Clary |
| Amraam | David Gray Castiella | Brian Charles |
| Keith Mercer | Martin Thomas | Rick Miles |
| Tekray | Andrew Suhren | Admir Nevesinjac |
| Chris Benson | Waide Tristram | JanP |
| Joshua Smith | cliff clark | Gavin |
| Toni Talasma | Charles Conley | Zhou Lingshu |
| Stuart Andrews | Kim Johnstuen Rokling | Carl F Altrock |
| Robert Mahon | Lars Lie | Bieringa |
| James Faraca | Hans Liebherr | Konstantin Kharin |
| Jan Beissner | Ola Nykvist | Phil Barker |
| Stephan Gako | Karl "Light" Akkerman | chris birkett |
| Tony Buman | Andreas Schmidt | Shane Sigley |
| Mark Hickey | Julio Cesar Cardoso | Manuel Pace |
| Leonid Dreyer | Thomas Mitchell | Gregg Cleland |
| Martin Kubani | Tripp | Charles Hill |

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| Ofer Raz | Gleb Ivanovsky | Sandra Walsh |
| Kotaro Asada | Stephan Kerkes | Florian Gehrke |
| Zlatko Birtic | Eric | Christian Kreuter |
| Andrew Smith | Alexey | Stefan Meier |
| juan jose vegas repiso | Radu Gabriel BOIAN | Michael Long |
| Henrik Stavnsjoj | Frederic GEDEON | Phil Hawes |
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| Jukka Karppinen | Julian C Oates Jr | Nicolae Buburuzan |
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| Phil | Kieran Vella | Jan Baßfeld |
| Teppo | Glenn Lilley | Mod-World |
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| callsignalph | trashcutter | Viktor Friesen |
| Luke Campbell | Beot | Daniel Boontje |
| chedal-bornu sebastien | Mark Gordon Cochrane | Benjamin Böhm |
| Tim Huthsteiner | Joel Anthony Palaszewski | Fabian Wiesner |
| Ryan Heseltine | Rydén | Manuel Santiago Melon |
| emanuele garofalo | Mark David Cleminson | Guntin |
| Branton James Elleman | James Freer | Mark McCool Jr |
| Kim Ahlin | Jhusdhui | Tim Krieger |
| Chris Engel | steven connolly | Andreas Wagner |
| David Grundmann | Jonathan Rolfe | marco meyndriesch |
| Paul Grint | marly fabien | Karst van der Ploeg |
| Oliver Bennett | Stephen Wilson | Markus Bössinger |

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| Martin Durech | Sándor Balikó | Jarad Clement |
| Michiel Erasmus | Robert Culshaw | James William Read |
| Marcus Holm | sydost | Jason Smith |
| jesus gonzalez | Kenneth P. Kaiser | Matthew Martin |
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| Krzysztof Nycz | Antti Kauppinen | Mathias Rüdiger |
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| Ron Levy | Mate Majerik | Douglas Ally |
| Matej Jelovcan | Steven Bodenstab | James Monson |
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| Andrew | Martin Privoznik | Martin Hoffmann |
| chris payne | Charlie Glenn | Francisco Bercianos |
| Connor | Rolf Geuenich | Michael Hart-Jones |
| joe troiber | Anthony Echavarria | Olaf Binder |
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| Pedro | Andrew Webb | Nick Walsh |
| Roman | AaronAsh | Remon |
| Steve | Etienne Brien | Tomas Friberg |
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| Sergey | Nikolay | Greg Bell |
| Adam Schneider | Ryan Doppke | George Succar |
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| William Clark | Nick Yudin | Thomas Leitner |
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| Richard Hickerson | Ben Jarashow | Paul Miller |
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| Jeff Zhou | Magnus Andersson | David Miles |
| Joseph Piasecki | Randy Erwin | Kim Fast |
| KS | ivdadrelbul | Martin Støyl |
| Michael Landshman | Sergey Mozheyko | Michael Walker |
| ROSS_Borman | Dalminar | Mattia Garuti |
| Jack Wilson | Michael Petrarca | Mark Shephard |
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| Daryll Chupp | Ilia | Sean Tudor |
| James Nielsen | Brian Lanham | WhiskeyBravo |
| Tobias A | Denis Winters | Michael Lajeunesse |
| Alexander Vasilyev | jameson | Chris Madera |
| Jared Fast | David Gregory | Dmitry Khonin |
| The Shoveler | Antonio Manuel Ortiz Seguel | Franciscus Berben |
| Hrvoje Topličanec | Thomas Harkless | Bo Henriksen |
| k05 | Jeff Dodson | Martin Moráček |
| Roland Schulpen | hangar16 | wuffman |
| Azametric | | |

DCS [Fw 190 D-9]

| | | |
|--------------------|----------------------|-------------------------------|
| Ian Bishop | Juan Soler Huete | Andy Toropkin |
| M. Zychon | Robert Haynes | Joonas Savolainen |
| ANV | David Southall | Matthew Kozachek |
| JeepRazdor | weisse13 | David Egerstad |
| Viacheslav | ROGIER | Deascii |
| Conrad Lawrence | ugo cozza | Michael Ditter |
| David Ordóñez | PH | shurke |
| Jim Allison | Alexander Orevkov | Bochkarev Leonid |
| kcstokes | Wienerschnitzel | James D Brown |
| Christopher Scarre | TerminalSaint | Aaron Pratt |
| Andrey ScorpyX | Derinahon | Tom Summers |
| Vadim Adel | Pablo M Derqui | Miguel Angel González Domingo |
| Hasse Karlsson | Steve Chatterton | Aapef |
| Gary F. Tinschert | David Tydeman | Matthijs |
| Gary Edwards | Daniel Holst | Michael Miles |
| Josh lee | Jochen Hamann | Zinoviy Khutoryan |
| Alex6511 | gary doiron | Paul Tricker |
| Helldiver | David DuBois | Tomasz Szulc |
| Danny Vanvelthoven | Robin Harroun | Gabor Buzasi |
| Emilio Londono | Kev | Michiel Jongenelen |
| Angustimus | Sideris Fotis | Nicklas Sjöqvist |
| Jeffrey Gumbleton | Konstantin Dibrov | Kimmo Eklund |
| Bill | Peter Baltzer Hansen | Bertrand Heurtefeu |
| Troy Nakauchi | Alex | Brian Lee Faul |
| Jaron Taylor | Peter Wiklöf | Ilja Osovin |
| Steve Cook | Bogart Hall | Josh McLloyd |
| Kenneth Knudsen | Steven Myall | robert peterson |
| Angus MacQueen | DAVID R COLEY | Robert Noke |
| Ramsay Beshir | Charles Jesch | Don Menary |
| MarkHawk | cv | Patman DM |
| Miguel Arias | Gary Lisney | |

| | | |
|-------------------------|-------------------|-----------------------------|
| Paul Dyer | Carl Meyers | Victor99 |
| Adam Jasiewicz | Robert Zuk | Matthew Fortino |
| Antti Kalliomäki | Aleksei Ivanov | Gabe Garcia |
| Juergen Dorn | Niklas Nordgren | Jacob Ellis |
| Simon Aplin | apollo01 | Jarred Nation |
| Göran Wikman | Anton Ottavi | Jip sloop |
| Kristian Wall | Richard Mater | Mahler |
| Mikal Shaikh | saif ghadhban | Mark Trenda |
| Saad Eldeen Bahloul | Michael Rezendes | Logan Lind |
| antonio dasilva | Yuke kaito | karl bullard |
| Felix Mueller | Siv | Broodwich |
| Christopher D. Chambers | Matjaž Mirt | Aleksandr Kochelaev |
| Jason | Ching-Ling Hsu | Edwin Szekely |
| Alan Wade | PbICb | Eee3 |
| Jason Michl | Giedrius Balynas | Ivan Kolincak |
| Cory Parks | Joshua Kozodoy | Per-Erik Linden |
| Markus Wohlgenannt | Mauro Arguelles | Magnus Innvær |
| jaosn | Kenneth Wong | Michael Rochon |
| donald dewulf | Robert Roberge | Alan_Grey |
| Thomas Berg | Max Michaelis | Nicolae Soanea |
| Patrick Barnhill | Jan-Erik Saxevall | Alfredo Laredo |
| David Setchell | FFalcon | jim alfredsen` |
| Henric Ceder | Robert M | Shawn Vowell |
| Zachary Layne | Fredrik Sjöborg | Scott Eckrich |
| Terry Scott | Matthew Schneider | Vasco Charles Morais-Boulay |
| Tyler Krebs | Andrey Dvornik | Petter Lausund |
| TerribleOne | Sergey Nikishin | Ben Birch |
| Dakpilot | Eric Dickerson | Pete Jockel |
| Pablo Alvarez Doval | Maxim Gromada | Rick Dodge |
| Jacob Williams | Daniil | william neil harding |
| Mark Linnemann | ALFA_49 | |

| | | |
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| Steven Adasczik | Martin | Bucic |
| Pavel Diachkov | Alex | West |
| AlexPX | Tom | Kevin Reuter |
| Demon | Vilir | Steven Aldridge |
| Ian Persson | Daniel Gestl | Scott Withycombe |
| James Stephen | Marc-David Fuchs | Capgun |
| Terry | Jose Manuel | Thomas Cofield |
| Aram | | Alexey Ibragimov |
| Jefferson Santos | | Blackwolf_927 |
| RvGils | | Daniel Vukmanich |
| Michael Sprauve | | Nicholas Landolfi |
| Jan Ctrnacty | Rayvonn Core | Arrie |
| Gene Bivol | enrique colome | Mathew Crane |
| Julian Gaffney | TrailBlazer | Tom Tyrell |
| Charmande | pavlich | Evan Kosnik |
| Mehth | Lawry Playle | John Hannan |
| John Huff | Michael G Ribordy | Tim Chapman |
| NATALYA DOLZHENKO | modernatomic | jim crimmins |
| Charlie Brensinger | Iain Colledge | Rodney Neace |
| GREGOIRE | Carlos Garcia | Polaris Bluestar |
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| David Whitehead | D. Reveal | Olaf Walter |

Silver Backers

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| Kyle Rudnitski | Daryl J. Lloyd | baikal.68@mail.ru |
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| Stefan Bohn | Vaclav Danek | Sorin Secu |
| andrew norgrove | Lanzalaco Salvatore | Joe Dionisio |
| Tibor Kopca | Janusz | Warmoer |
| Mario von Thenen | Knut Hanssen | Johan Törnault |
| Pedro Mellado | Ljas | Mark Siminowski |
| Andrew Payne | Thomas Falmbigl | James Sterrett |
| Graham Smart | Michael Heron | Michael C Ringle |
| Aviad Tobaly | Ville Ilkka | Ryan Denton |
| Tyler Moore | David O'Reilly | James F Miller |
| Allan Spears | Stephen Morrison | Dalton Miner |
| Jens Kadenbach | Royraiden | James Cook |
| Dave Kelly | Torsten Tramm | Mike O'Sullivan |
| Nick | Ken Biega | Andres Riaguas |
| Ian Seckington | Andrew Brown | Antonio Ruotolo |
| James Cross | David Levy | Joseph Krueger |
| Mikko Laukkanen | Karsten Borchers | Chris Payne |
| Fangqiu Zhu | Jerry Frost | Carl Lyles |
| Austin Moses | Michal BIZON | Korotky Vadim |
| Richard Harris | James Phelan | Kenneth Avner |
| Kevin Garrett | Kiefer Jones | Mason Flake |
| Gregory Foran | Sigurd Hansen | Ryan Yamada |
| Penpen | Jorin Sheaffer | oat03001 |
| Prvt.SNAFU | Robert Ian Charles Fellows | g_nom21 |
| Mark Watson | Måns Gotare | davisballen |
| DarKcyde | Ashley Ellis | ian leslie finlay |
| Keith Young | Wade Chafe | Kaijev |
| Scruffy | Jonathan Lim | PakoAry |
| Mark Delahay | Eduardo Gutiérrez García | Evert Van Limbergen |

DCS [Fw 190 D-9]

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|-----------------------|---------------------|--------------------------|
| Jeff Kerian | ApeOfTheYear | Paul Cucinotta |
| Christoph Jaeger | Famin Viacheslav | Robert Conley III |
| Devin Ragsdale | Vit Zenisek | Sean Walsh |
| José Oltra Martínez | William Pellett | Trevor Tranchina |
| Steve Harmer | Victor Nakonechny | Thomas Fuchs |
| David McCallum | Nurbol | George Neil |
| Sebastien Clusiau | Tobias Kiedaisch | Kyle Colyer |
| Jordan Marliave | Sam Carlson | W. Duncan Fraser |
| Michael Riley | John Nespeco | Joe Veazey |
| Stefan V | DJB | San Mecit Erdonmez |
| JST | Jakob Boedenauer | tough boy |
| Bas Weijers | Glen Murphy | Ian Buckler |
| Jonathan Clarke | Tempered | Jamie Denton |
| Matti Lund | DDB | Marek Ratusznik |
| Roman Frozza | Jacob Eiting | gerard o'dwyer |
| sdpg_spad | Joshua Blanchard | Chris Osterhues |
| lemercier cedric | James L. Rumizen | Yukikaze |
| Arcady Chernavin | Mdep5809 | Ishtmail |
| Duncan Hewitt | Dr. Stefan Petersen | Mark McRae |
| Jim Valentine | DanMe | Bruce Wilson |
| Ye91 | Bruce Mackay | Axion |
| Wasserfall | Nick Iassogna | Alexandre Tellier Talbot |
| Marcelo Tocci Moreira | Tim Collins | MK |
| Youngmok Rhyim | Scott Heimmer | Chance |
| Hassel Krauss | Drew Pedrick | Alain Becam |
| Matthew Walker | Christopher Nee | Roman Kolesnikov |
| Aleksey Kopysov | Viktor Baksai | Jake O'Mahony |
| ivan decker | Brad Ernst | Oliver Sommer |
| Juliano Simoes Haas | Glenn Pechacek | Forest Faltus-Clark |
| Daniel Agorander | Stephen M Zarvis | War4U |
| Nick Mowbray | John Vargas | Angel Morata |

| | | |
|--------------------|----------------------------|------------------------------------|
| Fredrik Petersson | Arto Santasalo | Ross White |
| Totoaero | Lunovus | Martin Scholz |
| garengarch | Steve Gentile | Micha Tanny - a.k.a IAF_Phantom |
| Jeroen Gommans | Robert Cannon | Bjarne Stig Jensen |
| paul green | Colin | Colin Rowland |
| Shannon Craig | Jeffrey A Bannister | Craig Gillies |
| Sergey Ravicovich | Jeffrey Walsh | Jez Brown |
| chardon | Brett Bodi | Massimiliano bonin |
| Tim Mitchell | Bearcat | Runefox |
| Bjoern Wiederhold | Jason Brown | Ian Keenan |
| Adrian Havard | Stephen Hulme | Dan Randall |
| Christoph N | Sheldon cannon | Michael Illas |
| Stefan Jansen | Daniel Dillman | Otto Conde de Resende |
| sdo | Nicolas Belanger | Robert Holleman |
| robert kelly | Alanthegreat | Jukka Huhtiniemi |
| Adam Elfström | Christopher Ryan Kelley | Alexander Henriksson |
| Takahito Kojima | George Inness | oyvindf11@gmail.com |
| Masset | Tim Hay | Aaron Anderson |
| Peter Solbrig | Jeffrey Miller | Dominik Merk |
| Aaron Zmarzliniski | Mike Todd | Ori Pugatzky |
| Remco | ryan brantly | michael |
| Nick Vamis | Vit Premyslovsky | Benjamin Frost |
| Frerk Schmidt | Scott Beardmore | Crimson Machete |
| David Weaver | Ray West | Hansang Bae |
| Sergey Velikanov | Iran Fernandes de Oliveira | Eric Staton |
| Sherif Hosny | David Craig | Wang Feng |
| Nils Thiel | Jason Reynolds | Rob Brindley |
| Tim Wopereis | Anthony Chant | Thomas Ruck |
| Torsten Tramm | Jinder Greewal | Brian Scott Pagel |
| Jeroen Wedda | Conrad Smith | Insy |
| Adam Murray | Andrew Fudge | |

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|--------------------|-------------------|---------------------|
| kevman | Patrick O'Reilly | AKuser99 |
| Reinhard Eichler | Mark Gaffney | Matthew Enloe |
| Leif Lind | jeremy | Sega Dreamcast |
| ATAG_Old_Canuck | Cian Quigley | Jean-Pierre Weber |
| Robert Bähr | Paul Adcock | Peter Scaminaci |
| Iker ulloa | Greg Huffman | Yaniv Harel |
| RF | Tom Bies | Eric Keith Robinson |
| Peter Bartlam | Tim Morgan | David Horkoff |
| Jasper Hallis | Igor K. | Craig Brierley |
| Jordan Forrest | kurnz | Kenneth Sapp Jr. |
| fedja | Benjamin de Rohan | Jack Gurley |
| Jonathon Kinnin | Sébastien Vincent | Titus Ou |
| Rey | Roy Woodworth | Ron Cassinelli |
| Berkes Attila | Nick Maurette | Kestutis Zilys |
| hansen | Michael Benton | Gary N. Peden |
| Scott Gorrng | Qi Huo | Joe Troiber |
| Sebastian Riebl | jamie | Brian Kanen |
| Axel Haake | Blake Cetnar | Ron Brewster |
| Martin Winter | Drum_Tastic | Alexey Slavutskiy |
| greco bernardi | Douglas Watson | Michael Smith |
| Elfin | Zappatime | Hammed Malik |
| Martin Gronwald | Matt Engelhart | Eric Koepp |
| oldracocon | Edward Kiervin | Timothy J. Burton |
| William Skinner | dennis worley | Dennis Camosy |
| Johan Soderholm | Michael Rishel | John Lynn |
| Khaydanov Yuriy | Scott Fligum | Tien Brian |
| Boomerang | Mark A. Kirkeby | Colin McGinley |
| Alex "Razorblade" | Tom McGurk | Gerald Gong |
| Alexander Casanova | Paul Hughes | Ryan Thomas Jaeger |
| Jared Sorensen | Charlie Orchard | Jason Deming |
| Adam | Edward Winsa | William S. Ball |

| | | |
|--------------------|--------------------------|--------------------------|
| Eponsky_bot | Daniel Erlemeyer | Rick Zhang |
| Ronald Hunt | Kent-Ruben Elvestrand | Jiong Zhang |
| Michael Jochim | brimen | Gary |
| Arthur Changry | Heinz-Joerg Puhmann | Allan Taylor |
| Jamees Hancock | jcenzano | Bennett Ring |
| Richard Stinchcomb | roman | Bastiaan Jansen |
| Charles Savas | Jason Montleon | Libor Stejskal |
| Chris H | Falco | David Maclean |
| Wayne Berge | Marco Landgraf | Sokolov Andrey |
| Wes Murks | tkmr | Chris Schultz |
| Russ Beye | Brandt Ryan | Zaxth - Weresheep of Sin |
| Juris L Purins | Andrew Spanke | desert eagle540 |
| mike richgruber | Matt Lind | Paul Walker |
| kurt Weidner | Bryan Baldigowski | Mitchell Sahl |
| Karfai Michael Yau | Chris Cantrell | Cornay Sinac |
| Geoffery Jensen | Daniel Marsh | Markus Sohlenkamp |
| Thomas Dye | Benjamin Freidin | Stanislav Sereda |
| Robert Schroeder | Chris C | Paul Elton |
| Leon Higley | SimFreak | Hans-Joachim Marseille |
| Tobalt | Manuel Ramsaier | Rae |
| Braden Johel | Olivier Anstett | Nyary Laszlo-Carlo |
| Seeker37 | Tor Stokka | Conny Näslund |
| Polar | Kirk Lange | Kevin Clarke |
| Alex Pekarovsky | Timo Wallenius | Vaz |
| airdoc | Christoph Jungmann | Erich Kreiner |
| Barry Maunsell | David Penney | Axel Miedlig |
| Peter Reinhard | alfonso cordoba aguilera | Jörgen Toll |
| Maler | Flagrum | Euan Arthur Emblin |
| Todd Bergquist | Edin Kulelija | Jose Luis Navarro Reus |
| James Schlichting | Iván Pérez de Anta | Graham Wilson |
| Peter Krause | Col Shaw | Ian Kaiser |

| | | |
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| Peter Stephenson | Jon Isaacs | Dave Reichard |
| Christian Gomolka | Eldur | |
| Michael Umland | Feldmann | |
| Lawrence Lester | Matthew Horrigan | |
| Dave Farr | Doug Elliott | |
| Hannu Heino | Espen Hundvin | |
| Neil Merrett | Mark Clark | |
| Christopher Ludgate | Einar Oftebro | |
| Markus | Danny Stevenson | |
| Mark Thorp | pedro | |
| Darrell Herbert | Cory Avery | |
| Alfredo Croci | Shaun Cameron | |
| Tyler Gladman | Iffn | |
| Julian Urquizu | Ante Turkovic | |
| John Regan | Ashley Bennett | |
| Joel Opendriens | George Bonner | |
| Stewart Forgie | Greg Appleyard | |
| Vendigo | Anton Quiring | |
| Sean Buchanan | Mhondo | |
| Snowhand | Sandalio | |
| Frenzy | Kristian V Meyer | |
| Wayne Adams | Andres | |
| Jukka Rouhiainen | Julian | |
| Sam Wise | David Challis | |
| Keith Bumford | Brad Rushworth | |
| Sonid Salissav | Alon Tall | |
| Bradford Julihn | TRESPASSER | |
| Kirin | Matt Miller-Fewer | |
| Emil Philip | MARCELO TAKASE | |
| Joel Docker | James Roy | |
| Tino Costa | Boris G | |
| | | Gold Backers |
| | | Phantom88 |
| | | Or Yaron |
| | | Måns Serneke |
| | | Polaris Penguin |
| | | Marius Backer |
| | | Peter Fritz |
| | | Joan Sabater |
| | | Jim Van Hoogevest |
| | | Sergey Ipolitov |
| | | Joseph Anthony Elliott |
| | | Tony Webber |
| | | LP |
| | | Akshay Tumber |
| | | Celtik |
| | | J.J. Wezenberg |
| | | JiriDvorsky |
| | | Oliver Scharmann |
| | | Jostein Kolaas |
| | | Karl Asseily |
| | | Hans Heerkens |
| | | Kevin Hürlimann |
| | | Reinhard Zeller |
| | | Brad Stewart |
| | | AJD van der Valk |
| | | Erik Nielsen |
| | | Thomas Bakker |

| | | |
|------------------|---------------------------|----------------------|
| Harry vandeputte | Carlos Henrique Arantes | Pizzicato |
| Martin Janik | Theodoro | Christopher Foote |
| Luís Ferreira | Zamaraev Anton | Robert Shaw |
| Carl Johnson | Vladislavovich | Gregory Daskos |
| bounder | Max dahmer | Salvador |
| Sven Bolin | auo74 | Jason Story |
| Michael Gaskell | Torian | Scott |
| Nezu | Arno Hasnaes | Secret Squirrel |
| Kevin Vogel | Murray Thomas | Pier Giorgio Ometto |
| Laivynas | Ron Harisch | William Forbes |
| JANIN Elie | Dean Gardiner | Griffith Wheatley |
| Mikko Räsänen | Stanislav | Donald Burnette |
| Maxim Lysak | Christian Noetzli | Duncan Holland |
| klem | HoperKH | Karl Miller |
| Ian Linley | Johannes Wex | Fabian Kraus |
| Jaws2002 | G W Aldous | Miquel Tomàs Homs |
| Martin Heel | Steve Butler | Ulrik Svane |
| desruels jean | Sergey Goretsky | Christopher Ruse |
| Tom Lewis | Nathan | Goanna1 |
| Michal Slechta | Daniel Clewett | Dean Christopher |
| Joakim Söderman | Drew Swenson | Fortomaris |
| Matt Skinner | DragonShadow | Stephen Turner |
| Mattias Svensson | Andreas Bombe | charger-33 |
| Frank Zygor | Mario Binder | Roy Enger |
| Mysticpuma | Greg Pugliese | Ian Grayden |
| Andrey | Richard Williams | Buster Dee |
| Steven Mullard | Phil Rademacher | Antonio Salva Pareja |
| Kaiser | Gershon Portnoy | Robert Staats |
| Michael Leslie | Alexander Vincent | John McNally |
| Stewart Sayer | Nicholas Sylvain-Obsidian | Håkan Jarnvall |
| | Tormentor | |
| | Zoltann | |

Platinum Backers

| | | |
|-----------------------|----------------------------|-----------------------------|
| Kevin Gruber | CAHUC Fabien | Luke Scalfati (tf_neuro) |
| Ilkka Prusi | Andrew Gluck | Chivas |
| Ryan Power | Zinj Guo | Charles Ouellet |
| David Vigilante | Stephen Ptaszek | Harald Güttes |
| Adam Del Giacco | MACADEMIC | Chekanschik |
| Patrick | Ariel Morillo | Kodoss |
| Richard Boesen | Michael Vrieze | Brad Edwards |
| Mike Williams | Aaron Kirsch | dgagnon99 |
| Robert Cattaneo | Hen | Sam Higton |
| Alvin Pines | Shawn Godin | =tito= |
| JOSHUA C SNIPEs | G W Aldous | Rémy "Skuz974" STIEGLITZ |
| Ole Jørgen Hegdal Lie | Michael Brett | Andreas Gruber |
| Ethan Peterson | Tom Lucky Klassen | William Denholm |
| Jim Magness | KDN | 322Sqn_Dusty |
| AirHog71 | Brian Thrun | theoretic |
| Ralph Mahlmeister | Martin Jaspers | AndK |
| Les Hillis | John Guidi | Mike Abbott |
| Dieter | Tom Galloway | Aníbal Hernán Miranda |
| Sean Trestrail | Ian | Trond Bergsagel |
| Johanan | Dimitrios Syrogiannopoulos | Geoff Stag |
| Atle Fjell | Ryohei Yoshizawa | Alexander Osaki |
| Eric W Halvorson | TC1589 | Nirvi |
| DavidRed | Federico Franceschi | M. Carter |
| Grant MacDonald | mike parsell | David Block |
| Richard Ashurst | HolyGrail FxFactory | Alexis Musgrave |
| David Stubbs | Chad Owens | Necroscope |
| Stefano Dosso | Bobby Moretti | Mike Bell |
| KLEPA | Melanie Henry | Richard Skinner |
| | Christoffer Ringdal | Palmer T Olson |
| | Ilya Shevchenko | Caulis Brier |
| | Soeren Dalsgaard | |

michael addabbo
Krupi
Christian Knörndel

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Etienne Boucher

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