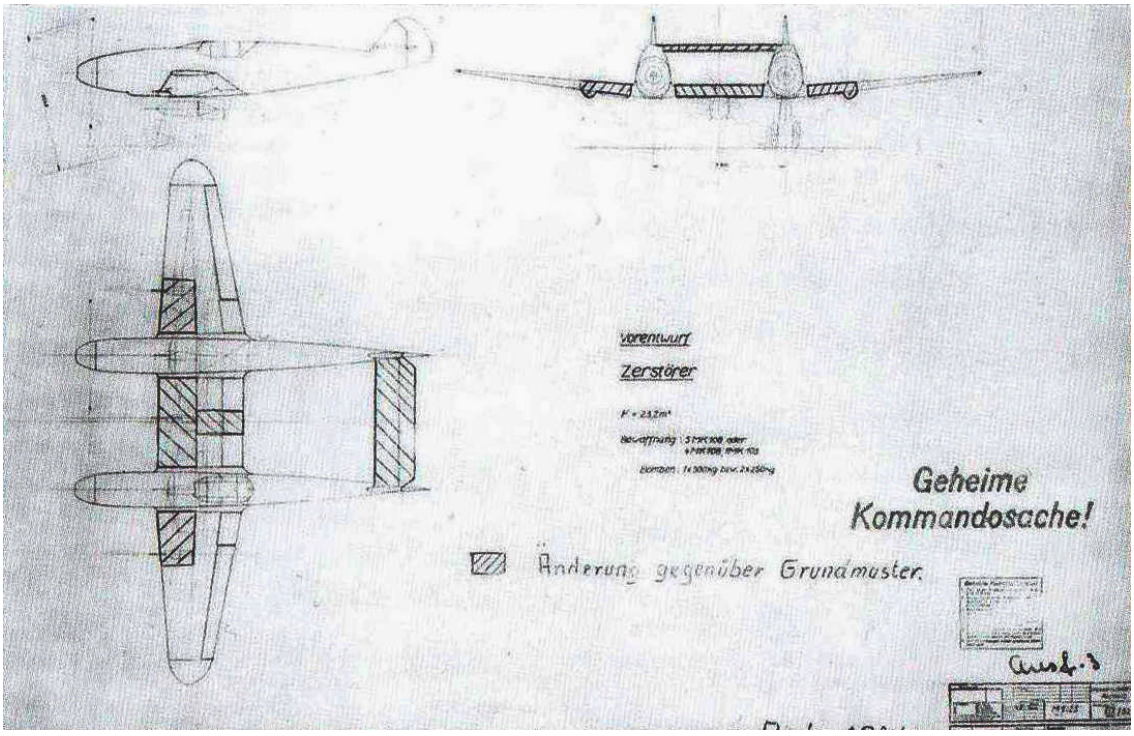
FLIGHT REPLICAS

Messerschmitt
Bf-109Z "Zwilling"

For Microsoft FSX plus Acceleration, FSX Steam Edition, and Lockheed Martin P3D



This is a complex simulation. To get full enjoyment of the aircraft in this package, please read this Manual thoroughly and carefully.

Warning: The manual and models in this package must not be used for real flight training purposes.

History: Bf 109Z-1

There is not a lot of information on this experimental and ultimately un-flown version of the Bf-109. There was a precedent within the Luftwaffe for the joining of existing airframes in order to create a new type, with Heinkel joining together two He-111 bombers in order to create the He-111Z (“Z" also for "Zwilling", the German word for "Twin"). The He-111 was designed to be a heavy transport and glider towing aircraft, and was a successful design much liked by its pilots.

This experimental prototype, intended to be a heavy destroyer rather than a fighter, was based on two Bf-109F airframes joined together by means of a new wing center section and new stabilizer, both of constant chord, in a manner later used by the F-82 Twin Mustang. The right fuselage cockpit was faired over and the pilot flew the aircraft from the left side fuselage.

Additional modifications included moving the main undercarriage hinges further inboard, and subsequent substantial modifications to the outer wings’ forward structure in order to accommodate the repositioned undercarriage plus the Rheinmetall-Borsig Mk 108 30mm canon and ammunition.

Four variants of this aircraft were initially proposed. One was a destroyer armed with five 30 mm (1.18 in) cannon and up to a 1,000 kg (2,200 lb) bomb load, another a fighter-bomber armed with two MK 108 cannon and up to two 2,200 lb. bombs. Both airframes were to be powered by the DB605 engine. A third and fourth were designed on paper and would be similar to the first two airframes but powered by Jumo 213 engines.

Only one Bf 109Z was built (presumably at Regensberg), and it was never flown, having been damaged in its hangar during an Allied bombing raid in 1943. The project was permanently abandoned in 1944.

(source: Wikipedia; although ultimately may have been sourced from Green, W.; Warplanes of the Third Reich, Macdonald and Jane's, 1970. Source therein unknown.)

General Notes:

Notes on this theoretical aircraft:

1. The basic assumption was that, like the He-111Z, changes and modifications would have been kept to the minimum possible (otherwise, I believe they simply would have chosen to make a completely new aircraft design).
2. Despite using the F model as a basis, by late 1943 the later, heavier and better-armored canopy types were standard, and so this type has been used.
3. Later wheels and tires have also been used, given the higher weight of the aircraft and perhaps offering better braking.
4. A flap has also been used in the new center section, as otherwise it seemed that flap surfaces would have been inadequate.
5. The Z is slightly wider than in the drawing, as otherwise there would have been inadequate room in the center section for the Mk 108 canon mounting plus its ammunition box or the standard hard point hardware for a drop tank, etc.
6. Repositioning of the landing gear (which means the hinge points are also lowered in order to keep geometry and fairings in line with the wing lower surfaces) would also have apparently required extended tail wheels in order to have kept the take off angle of attack within margins.
7. Due to the above, the wing center section would have to have a slightly thicker profile than the standard 109 airfoil.
8. Cockpit layout is purely an educated guess, but did take into account the wiring, tubing and linkages required for the particular instruments as much as possible.
9. The twin throttle levers would probably not have allowed the manual prop control rocker switches, and so this function has been left out and is automatic only.
10. The yellow fuel tube that passes through the cockpit was left in place, as it was most likely intended that at some point the 109Z would carry a drop tank and perhaps the functionality was still desired.
11. No extra fuel has been placed in the right-hand fuselage, as it seemed as if it could create balance issues at low fuel levels, given pilot and radio equipment weight in the left fuselage coupled with the torque pull direction. Feel free to experiment.
12. The one existing period drawing shows an extended streamlined fairing replacing the right hand forward canopy, but this has been kept shorter in order to a) not require a new cowling behind the engine, and b) keep fuselage drag more equal between the two fuselages.
13. Wing and center section mounts and fairings for the Mk 108 canons have been taken from period photographs of these installed on a standard Bf-109 wing.
14. Contra-rotating props are not used, as German twin-engine designs did not seem to favour these, and the 109Z is still fully controllable on take off and landing by an experienced 109 pilot.
15. The fuselage registration letters ‘VJ+WE’ have been chosen as they are in close sequence with the experimental V-tailed Bf-109 also built and tested around that time.

Model Notes:

1. Ctrl-E can be used for startup, but to do so the magnetos must be on M1+M2.

2. **Radios**: For ease of use, radios are default versions, and accessed in 2D only, using Shift-1. A Transponder is also added in order to be able to navigate through ATC-controlled simulator airspace.

3. In order to use the **reticulated gun sight** (once switched on), you will need to slide your viewpoint sideways to the right, using Ctrl-Shift-Enter. Ctrl-Shift-Backspace will move the viewpoint left.

4. **Jettisonable canopy**: Once these have been used, the Bf-109 will have to be re-loaded in order to use them again.

5. Although an **uninstall.exe** is provided, it's highly recommended that you **manually** remove the aircraft itself from the 'FSX/P3D ...\Airplanes' folder and leave the other files. The other files take up very little space, and this will prevent unintentional removal of files needed for other Flight Replicas aircraft. If you do use the uninstall.exe, make sure to backup the following gauge (FSX/P3D…\Gauges) and store in a separate folder in case you uninstall the Bf-109G6, in which case it will need to be replaced:

   Bendix_king_radio.dll
   FBGS_XMLSound.dll

6. **Navigation**: the AFN2 gauge operates off of the NAV1 frequency, and its primary use in the simulator is for ILS-type approaches in bad weather or at night, with needles moving accordingly as localizer and glide slope (original needles were for signal direction and strength). The center light will illuminate when over the Middle Marker on approach (as some airfields don't use an Inner Marker). The radio compass header needle operates off of the ADF frequency.

7. Due to the understandably sensitive nature of swastikas, non-swastika versions of the fuselage paint schemes are available in each paint scheme folder.

8. **In Prepar3Dv5, the gun firing effects will not appear in the correct position.** This is because the [SMOKESYSTEM] entry in the aircraft.cfg does not work correctly in v5. The effects also malfunction if attached directly to the model. Hopefully Prepar3D will correct this in the future. The effects have been left in place in order that the sounds and general appearance can be experienced, but if desired they can be cancelled out in the aircraft.cfg by using the double slash. Example (in red):

   // smoke.1=9.63, -5.80, 0, Bf-109Z_cgun.fx

9. **Paint Kits**: If available, these will found on the Flight-Replicas.com 'Downloads' page here: http://www.flight-replicas.com/Downloads.htm

10. **Support**: Please see the last page of this Manual.

The Cockpit

Main Panel

(see labels next page)

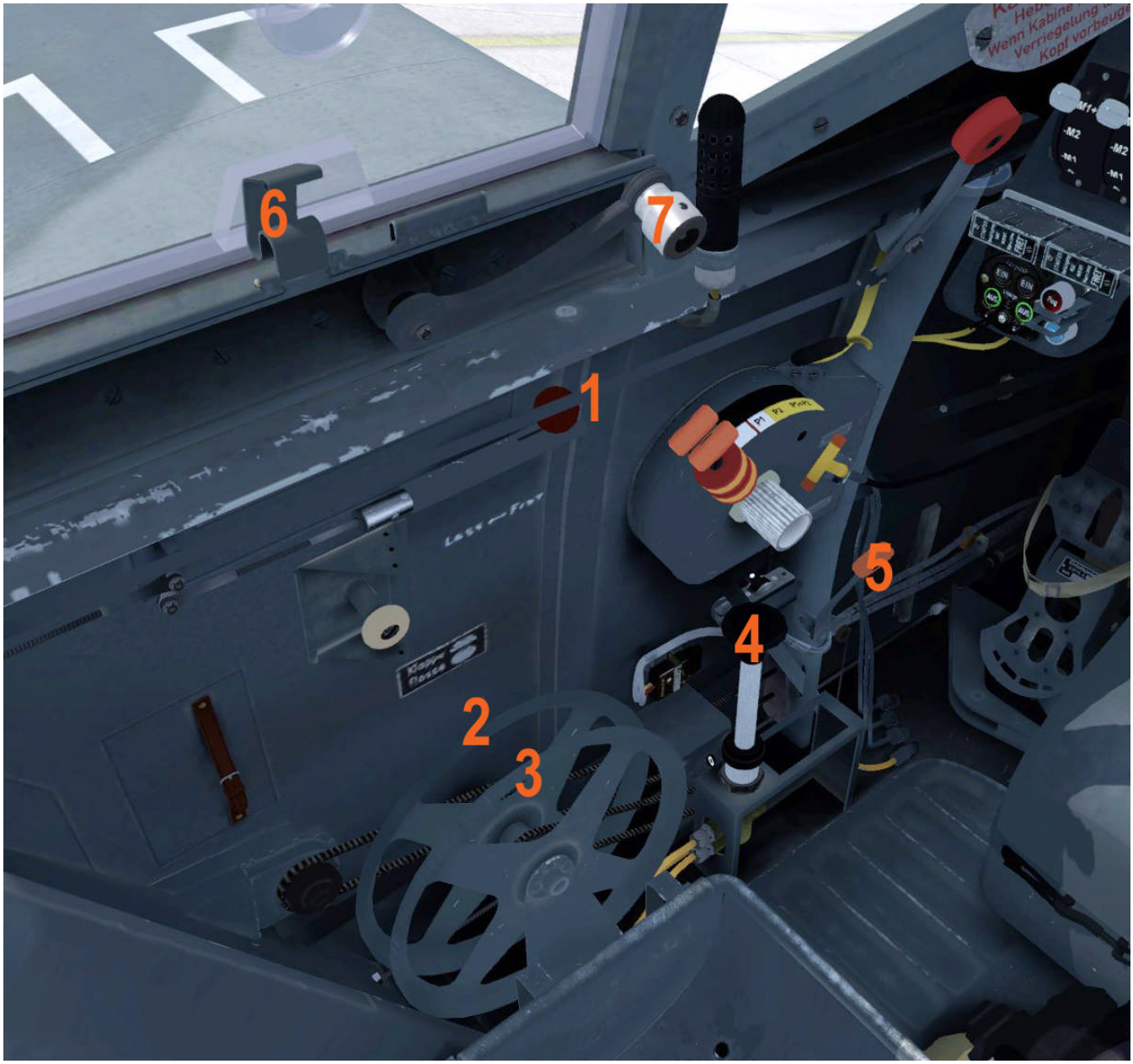
Labels for Main Panel

1. Click spot to add or remove pilot
2. Throttles (orange)
3. Fuel Levers (red and yellow)
4. Cold start oil dilution handle
5. Gear position indicators
6. Gear up/down buttons
7. Start pull-handles (click cover to raise)
8. Canopy jettison
9. Magnetos
10. Emergency electrical system shut off
11. Switch to choose oil and coolant temps
12. Compass and ADF direction finder
13. Altitude (km)
14. Artificial horizon (click ring to cage)
15. Airspeed (km/h)
16. Manifold pressures (ata)
17. RPM
18. Prop pitch indicators
19. Oil and Coolant temperatures (see 11)
20. Fuel quantities
21. Fuel and Oil pressures
22. Fuel level warning lights
23. Windshield wash - inop
24. Emergency gear lowering
25. AFN2 beacon homing gauge*
26. FuG16 radio frequency range selector - inop
27. Switch for coolant flaps (auto/manual/closed)
28. Clock
29. Switch for general armament system
30 Armament system 'on' indicator lights
31. Rounds remaining counters
32. Flip cover to activate gun trigger
33. Revi12D collimated gun sight

*Also functions here as ILS localizer and glide slope indicator, and middle marker light

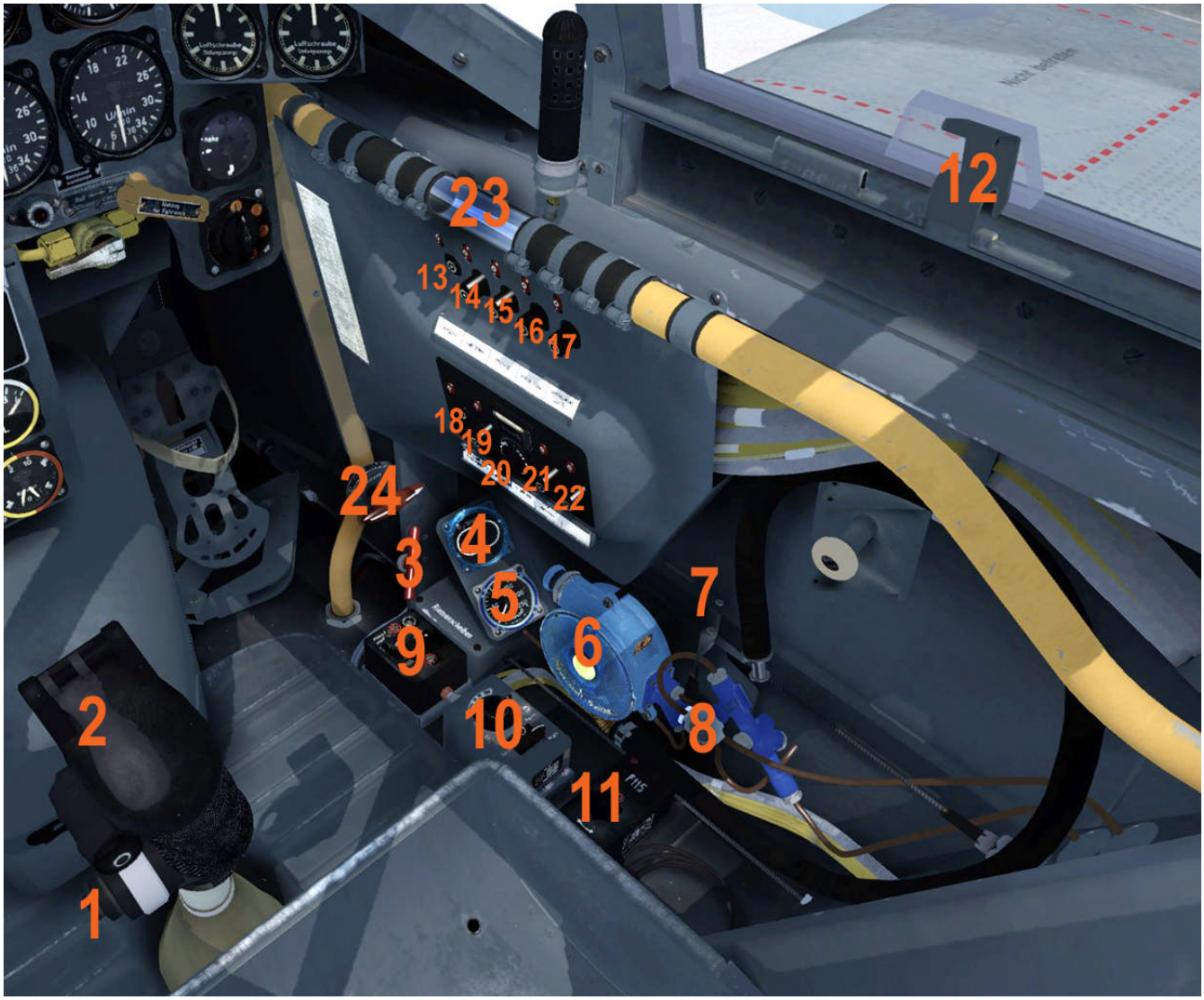
==========

Cockpit Left Side



1. Tail wheel lock
2. Flap wheel
3. Elevator trim wheel
4. Primer pump
5. Emergency engine kill lever
6. Click spot to open window
7. Canopy open lever

Cockpit Right Side



1. Weapon arming button
2. Flip cover to activate gun trigger
3. Drop tank release handle
4. Oxygen amount
5. Oxygen pressure
6. Oxygen regulator
7. Master battery switch
8. Valve to open oxygen flow
9. FuG25 IFF controls
10. AD18(E) Radio volume
11. FBG16 receiver fine tuning.
12. Click spot to open window
13. Generator
14. Fuel pump
15. Pitot heat
16. Revi gun sight power
17. Navigation lights
18. Panel and radio power
19. Audio on/off
20. Cockpit lighting (UV)
21. Glove warmer power
22. Propeller electrical power
23. Drop tank fuel flow indicator tube

Flying the Bf-109Z

Notes:

GENERAL:

While based on the Bf-109 fighter, the 109Z is a different aircraft. Do not expect the aircraft to fly like a fighter! Pay close attention to the flight instructions.

OXYGEN SYSTEM.

1. Before taking off on a high-altitude flight one must ensure that the pressure gauge of the oxygen tank shows at least 150 kg/cm2. If the amount of oxygen is less than this, one must notify the mechanic, who will fill the tank.
2. The oxygen mask is placed on the face and the tube is connected to the oxygen tube of the aircraft.
3. Test the operation of the oxygen system by opening the valve and breathing while checking the movement of the pressure and flow gauges.
4. When climbing above 4000 m, open the valve. If the flow of oxygen isn't normal (breather window is not synchronized with pilot breathing rate), it can be increased by pressing the button in the middle of the "lung", whereupon the tank will release more oxygen (button inop in FSX).
5. If during flight the pressure gauge drops below 20 kg/cm2 one must immediately descend below 4000 m.
6. Upon completion of high-altitude flight (preferably right after descending below 4000 m) the oxygen system valve is closed tightly and the button in the middle of the "lung" is pressed so that the pressure gauge drops to 0.

INSTRUMENT FLIGHT

1. Before taking off on an instrument flight one must ensure the following things:
   - The homing device on the aircraft is working
   - There is a chronometer on aircraft or pilot
   - The aircraft flies straight
   - The altimeter is reset to 0 position.
2. After take-off, trim the aircraft to level flight.
3. The rim of the artificial horizon is turned from "secured" (Fest) position to the left to "open" (Los) position. Check the indication of the artificial horizon and the turn and bank indicator when the aircraft is in level flight.
4. Pitot heat must be turned on before entering a cloud.
5. Upon completion of instrument flight, the rim of the artificial horizon is turned right to "secured" (fest) position.
6. The pitot heat is turned off.

WEAPONS

A. Before take-off:

1. Check that the aircraft has been trimmed to fly straight.
2. Check the gun sight light (reticule) by pressing the gun sight button. The switch is located at the top of the switchboard at the right side wall of the cockpit. Inquire from armourer staff whether the guns are loaded.
3. Familiarize yourself with which buttons and triggers operate the weapons.
4. Ensure that the weapons systems main switch is in down position to avoid firing accidents. It is located below the cockpit windshield on the left side of the ammunition counter.
5. Check that the ammunition counters are showing correct numbers of rounds.

B. Before firing:

1. Switch on the gun sight light.
2. Lift the weapons system switch to up position and check that the red ‘system ready' indicator lights illuminate. Then, press in the hat switch on the left side of the steering column, and check that the ‘guns armed’ white lights illuminate above each round counter. Flip the trigger guard at the top of the control column to activate the trigger. After this, firing may commence.
3. While firing, follow the operation of the weapons from the lights of the ammunition counters below the cockpit windshield.
   - If they show white, the weapon is loaded and ready to fire.
   - If they show black, the weapon is either out of ammunition or has malfunctioned.
   - If a faulty cartridge causes the malfunction, the fault is corrected automatically by letting go of the trigger, whereupon the loading motor will perform a re-load and the weapon is once again ready to fire.

C. After firing:

1. Lift the top trigger guard to cover the firing button.
2. Weapons current switch to down position.
3. Switch off gun sight light.
4. In later models with the Revi16B, the gun sight must be set to resting position by pressing the sight with the right hand and turning to the right and pushing in.

==========

A. Starting

1. Lock canopy in "closed" position.
2. Throttle open approx. 2.5 cm (1 inch) or according to advice from the mechanic.

4. Radiator control to "Open" (Zu) position.
5. Battery switch on.
6. Prime according to advice from mechanic (0-15 times).
7 Electric fuel pump on, approx. 15-30 seconds prior to starting.
8. Magneto switch to M1+2 position, when mechanic gives agreed signal.
9. Pull start handle for engine. Staring order Eng.1 then Eng.2
10. If 10-15 sec. after start-up the oil pressure does not indicate 6-8 kg/cm2 pressure (cold engine), engine must be stopped.
11. Fuel pressure must rise immediately after start, otherwise engine must be stopped.
12. When engine properly started, turn off the fuel pumps (one button for both).

B. Warm-up and run-up

1. Run the engines briefly at 700-800 rpm, trying to keep oil pressure below 8 kg/cm. Full warm up is then done, at 1000 rpm. Test coolant radiator operation, selecting, in order: "Closed" (Zu), "Open"(Auf), "Automatic" (Automatik) and then "Open"(Auf). Leave selector on "Open"(Auf).
2. When oil temperature has risen by 20 degrees and stays below 8 kg/cm, check the magnetos (note: in FSX, ground friction does not always allow full run-up, if correct take-off and landing distances are to be used):
    - Engine to 2300 rpm;
    - Switch to M1 and then M2; rpm's must not drop more than 70 rpm.
    - Then to 2500 rpm (max 2600 rpm) at 1.30 manifold pressure.

C. Taxiing

1. Test brakes after beginning to move.
2. Switch on radio.
3. Taxi using brisk S-turns, paying close attention to what is in front of the aircraft.
6. Extend flaps to 20° (one notch in FSX); stab. trim to +1.

D. Take Off

1. Check canopy locked.
2. Check that tail wheel lock is engaged.
3. Check stab. trim is set to +1.
4. Check flaps are at 20°.
5. Check propeller control is on automatic.
6. Set coolant radiator control to "Automatic"(Automatik)
7. Switch on fuel pumps (one button for both).
8. Immediately after take-off, retract gear.
9. Set engine to 1.15-1.20 manifold pressure and 2300 rpm.
10. When speed exceeds 260 km/h, flaps may be fully raised.
11. Switch off fuel pump.
12. Pull landing gear buttons to ensure fully back.

Note! At initial stages of take off, use brake to control direction. As speed builds, use the rudder. **Do not allow the tail to rise until rudder is effective.**

D. Cruise

1. Manifold pressure to 1.0, rpm to 2000-2100.

E. Approach and Landing

1. Switch on fuel pump.
2. Open coolant radiator shutters
3. Slow aircraft to 300 km/h.
4. Extend landing gear.
5. During glide, lower flaps to 40°.
6. Stab. Trim to –3, or according to feel.
7. Minimum approach speed: 220 km/h
7. At threshold: 190 km/h.

Note! On landing, correct the tendency to swing using rudder at high speeds, then brakes at lower speeds.

G. Taxiing after landing

1. Unlock tail wheel.
2. Switch off fuel pumps.
3. Retract flaps, to 20° or 0°
8. Stab. Trim to 0.
9. Keep both engines running.
10. After leaving runway, switch off radio.

H. Stopping the engines

1. Coolant radiator control to "closed"(Zu).
2. Pull quick stop lever back until engine stops.
3. Switch off magnetos.
4. Switch off battery.

==========

Sounds: Sounds in this package are a combination of default and custom.
Gauges: Gauges in this package are a combination of default and custom.

A big “thank you!" to everyone that helped, especially to John Terrell (Bomber_12th) for his knowledge and truly exceptional eye for detail.

Support:

support@flight-replicas.com

All requests for support must be accompanied by the following information:

1. Place/website where the Messerschmitt Bf-109Z was purchased;
2. Order number;
3. Name used when purchasing; and
4. Date of purchase.

No support will be available without this information.