

# Messerschmitt Bf.109 F-4

*"FRIEDRICH"*



By Chuck

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	(Unit)	LaGG-3	Yak-1	La-5	Il-2	Pe-2	Bf.109F4	Bf.109G2	Fw190A3	Ju-87	He-111
<b>TEMPERATURES</b>											
<b>Water Rad Min</b>	Deg C	80	80	-	80	40	40	40	-	60	40
<b>Max</b>		100	100		110	100	100	100		100-110	95
<b>Oil Rad (OUTBOUND) Min</b>	Deg C	40	40	55	70	-	40	40	40	30	35
<b>Max</b>		100	100	75	115		80	80	110	105	95
<b>Oil Rad (INBOUND) Min</b>	Deg C	-	-	-	40	-	-	-	-	-	-
<b>Max</b>					80						
<b>Cylinder Head Temp Min</b>	Deg C	-	-	120	-	-	-	-	-	-	-
<b>Max</b>				200							
<b>ENGINE SETTINGS</b>											
<b>Takeoff RPM</b>	RPM	2700	2700	2400	2200	2700	2600	2500	2500	2500	2400
<b>Takeoff Manifold Pressure</b>	RU: mm Hg GER: ATA	1050	1050	1150	1150	1050	1.3	1.3	1.3	1.3	1.35
<b>Climb RPM</b>	RPM	2600	2650	2300	2050	2600	2600 30 min	2500	2400	2450 30 min	2300 30 min
<b>Climb Manifold Pressure</b>	RU: mm Hg GER: ATA	1020	1050	1150	1050	1050	1.3 30 min	1.3	1.3	1.25 30 min	1.15 30 min
<b>Normal Operation/Cruise RPM</b>	RPM	1700	1850	2300	1850	2200	2200	1900	2200	2100	2200
<b>Normal Operation/Cruise Manifold Pressure</b>	RU: mm Hg GER: ATA	1020	850	900	850	1020	1.0	1.0	1.1	1.2	1.10
<b>Combat RPM</b>	RPM	2650	2650	2400	2050	2600	2600	2500	2400	2250	2300
<b>Combat Manifold Pressure</b>	RU: mm Hg GER: ATA	1050	1050	1150	1050	1050	1.3	1.3	1.32	1.2	1.15
<b>Emergency Power/ Boost RPM @ km</b>	RPM	2700	2700	2400 10 min max	2200	2700	2700 1 min max	2500	2600 7-8 min max	2600 1 min max	2400 1 min max
<b>Emergency Power / Boost Manifold Pressure @ 1 km</b>	RU: mm Hg GER: ATA	1050	1050	1150 10 min max	1150	1050	1.42 1 min max	1.3	1.42 7-8 min Max	1.4 1 min max	1.35 1 min max
<b>Supercharger Stage 1 Operation Altitude</b>	m	0 2000	0 2500	0 2000	-	0 2000	-	-	-	Auto/man modes	Auto/man modes
<b>Supercharger Stage 2 Operation Altitude</b>	m	2000+	2500+	2000+	-	2000+	-	-	-	Auto/man modes	Auto/man modes
<b>*Landing Approach RPM</b>	RPM	2600	2200	2400	1800	2700	1500	1500	-	2000	2300
<b>*Landing Approach Manifold Pressure</b>	RU: mm Hg GER: ATA	As required	600	As required	600	As required	0.6	0.6	-	0.6	As required
<b>Notes</b>				Open Oil Radiator at all times	Close Oil radiator in combat	Flaps 30 on Takeoff & 15 on Landing			Lock tailwheel on takeoff	No Abrupt Throttling	Eng. very sensitive to ata/rpm
<b>AIRSPEEDS</b>											
<b>Takeoff – Rotation</b>	km/h	190	200	180	190	250	180	180	200	170	150
<b>Optimal Climb Speed</b>	km/h	270	260	250	250	240	280	280	270	230	N/A
<b>Landing – Approach</b>	km/h	200	180	200	200	200	180	180	190	190	200
<b>Landing – Touchdown</b>	km/h	170	150	170	150	160	160	160	150	150	140-150

## History



The Messerschmitt 109 was a German fighter aircraft designed by Willy Messerschmitt and Robert Lusser during the early to mid-1930s. It was one of the first truly modern fighters of the era, including such features as all-metal monocoque construction, a closed canopy, a retractable landing gear, and was powered by a liquid-cooled, inverted-V12 aero engine

The Bf 109 was the most produced fighter aircraft in history, with a total of 33,984 airframes produced from 1936 up to April 1945. Originally conceived as an interceptor, later models were developed to fulfill multiple tasks, serving as bomber escort, fighter-bomber, day-, night-, all-weather fighter, ground-attack aircraft, and as reconnaissance aircraft. Through constant development, the Bf 109 remained competitive with the latest Allied fighter aircraft until the end of the war.

The second major redesign during 1939–40 gave birth to the F series. The "Friedrich" saw a complete redesign of the wings, the cooling system and fuselage aerodynamics, and was powered by the 1,350 PS (1,332 HP) DB 601E (F-3 and F-4). Considered by many as the high-water mark of Bf 109 development, the F series abandoned the wing cannon and concentrated all armament in the forward fuselage with a pair of synchronized machine guns above and a single 15 or 20mm Motorkanone-mount cannon behind the engine, the latter firing between the cylinder banks and through the propeller hub. This configuration was used by all subsequent variants.



# PART I: THE AIRCRAFT

## The Cockpit

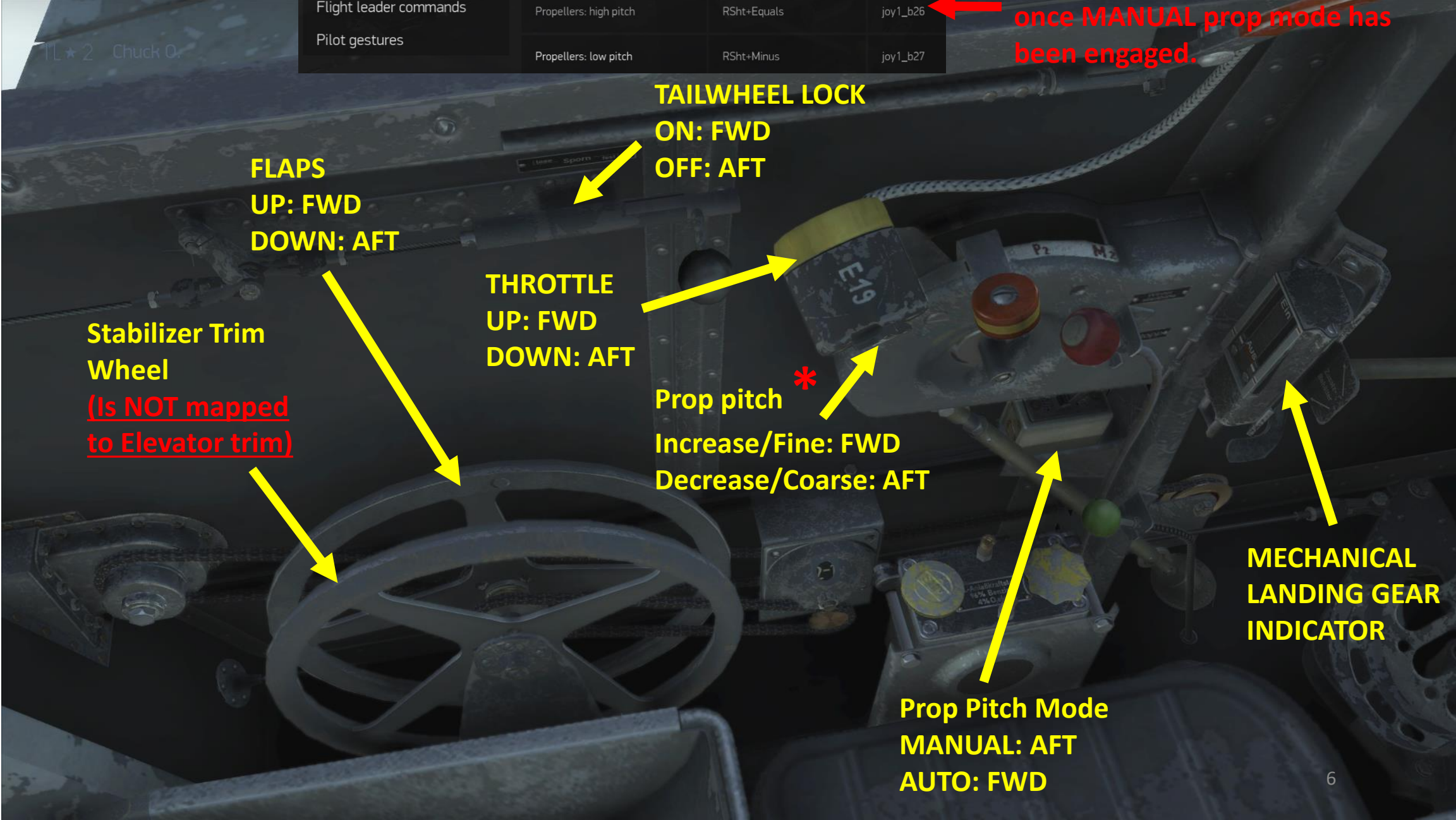


# PART I: THE AIRCRAFT

## Left Side

Engine controls	Switch propellers pitch control mode: manual/auto	RSht+P	joy1_b25
Weapons controls			
Flight leader commands	Propellers: high pitch	RSht+Equals	joy1_b26
Pilot gestures	Propellers: low pitch	RSht+Minus	joy1_b27

**\* Prop Pitch can only be modified once MANUAL prop mode has been engaged.**



**FLAPS  
UP: FWD  
DOWN: AFT**

**TAILWHEEL LOCK  
ON: FWD  
OFF: AFT**

**THROTTLE  
UP: FWD  
DOWN: AFT**

**Stabilizer Trim  
Wheel  
(Is NOT mapped  
to Elevator trim)**

**Prop pitch \*  
Increase/Fine: FWD  
Decrease/Coarse: AFT**

**Prop Pitch Mode  
MANUAL: AFT  
AUTO: FWD**

**MECHANICAL  
LANDING GEAR  
INDICATOR**



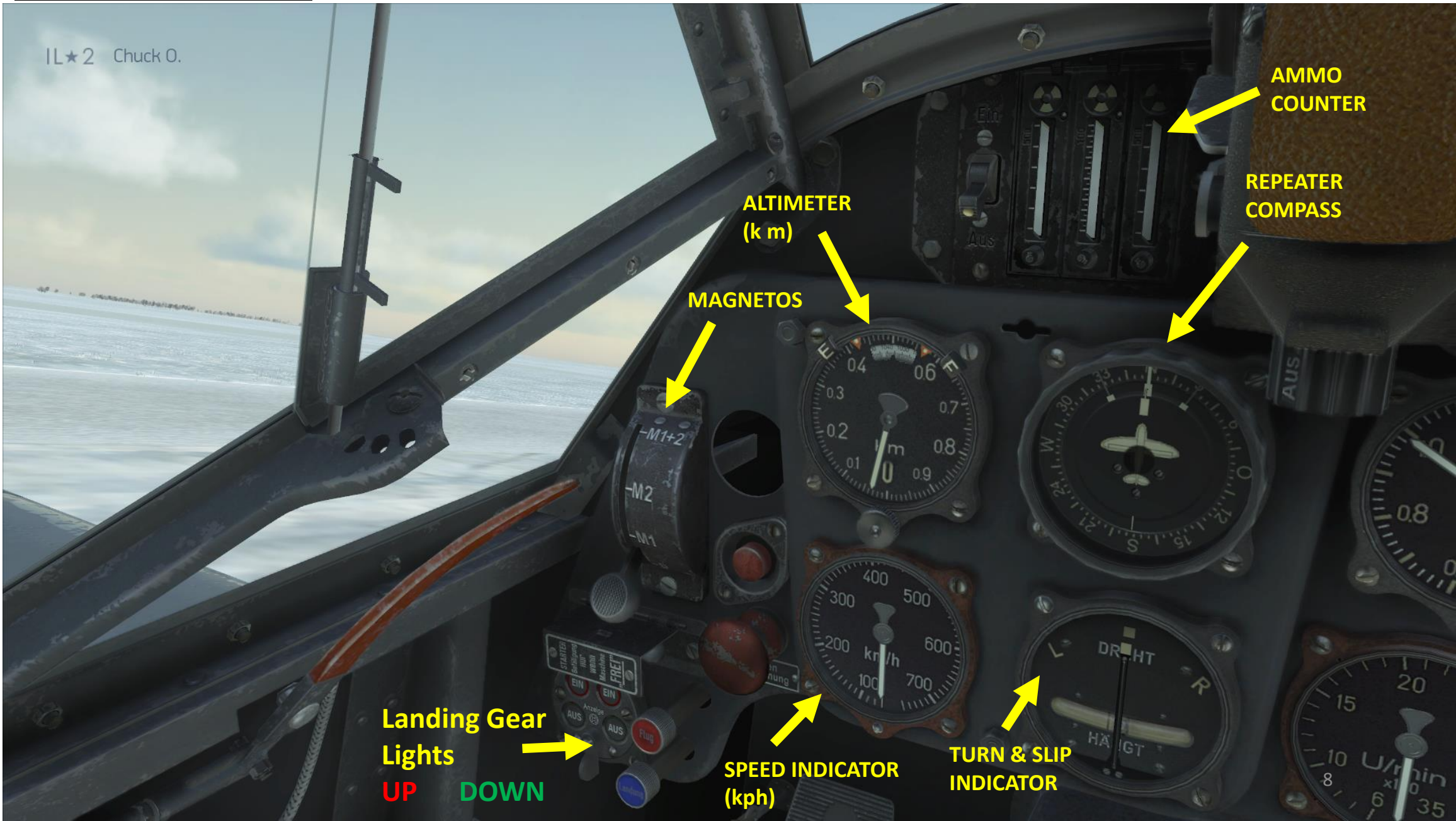
# Right Side



**RADIATOR FLAPS  
CONTROL**  
Open: RIGHT  
Close: LEFT  
Auto: UP  
Rest: DOWN

# PART I: THE AIRCRAFT

## Front Left





# PART I: THE AIRCRAFT

## Front Right



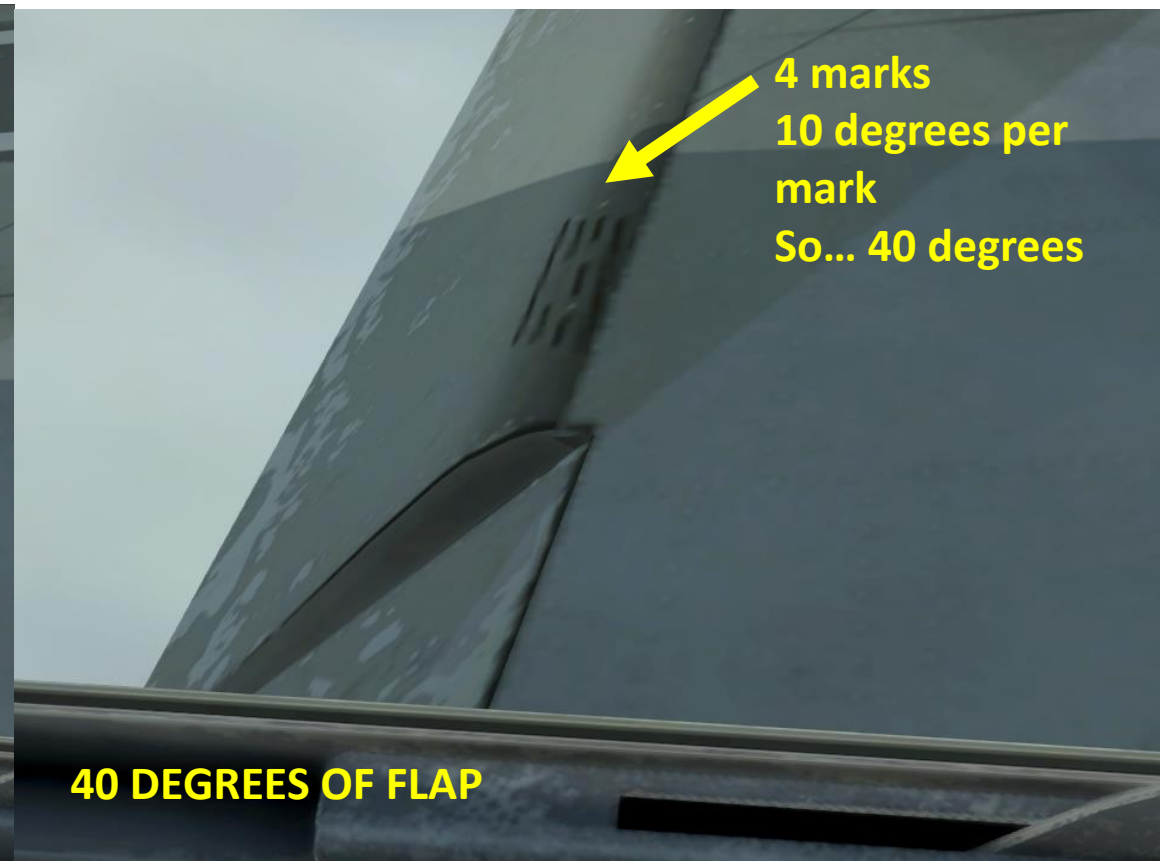
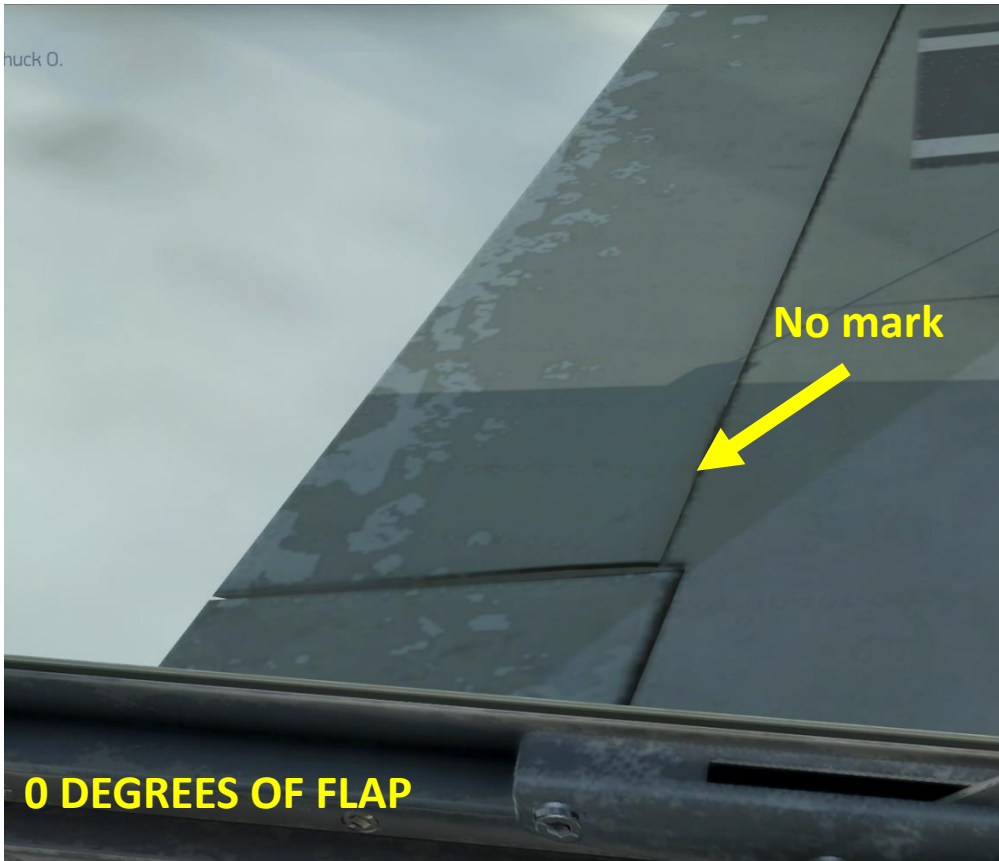
## Important key bindings

- The Bf 109 has automated radiator controls, so you do not need to think about them.
- You can control your prop pitch (which will affect your RPM), but only if you have engaged the MANUAL PROP PITCH mode. Make sure you have a key to it. Changing prop pitch manually is by no means necessary, but it can allow you to fine-tune your RPM setting and gain a marginal gain in performance as the AUTO mode already does that for you.
- Unlike in Russian aircraft, you do not control your mixture setting in the 109.
- In AUTO PROP PITCH mode, your RPM will be automatically adjusted in function of your ATA (Manifold Pressure) input.

Engine controls	Switch propellers pitch control mode: manual/auto	RSht+P	joy1_b25
Weapons controls			
Flight leader commands	Propellers: high pitch	RSht+Equals	joy1_b26
Pilot gestures	Propellers: low pitch	RSht+Minus	joy1_b27

# Important key bindings

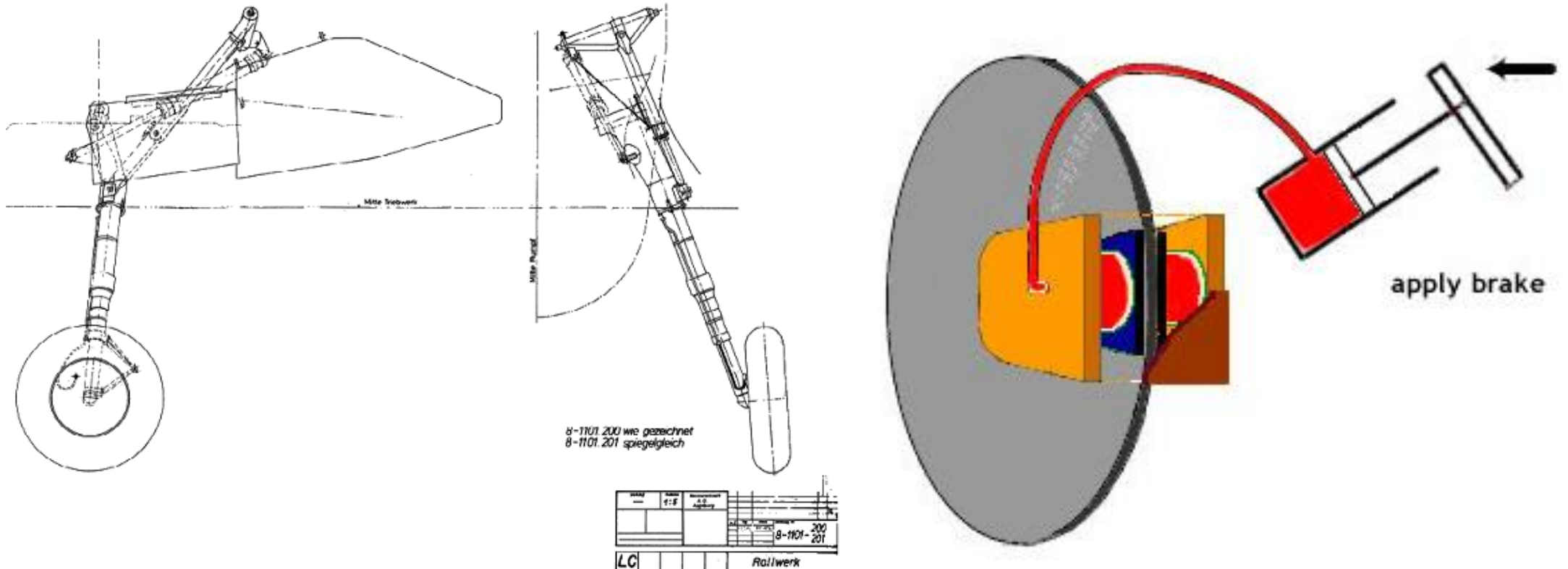
- You can judge know approximately how much degrees of flaps are deployed by looking at “black marks” on the wings next to the junction between the trailing edge of the wing and the flap itself. One “notch” equals 10 degrees.





# Important key bindings

- The Bf.109, unlike most Russian planes, has a “toe brake” or “heel brake” system, which is linked to each individual wheel of your landing gear.
- In order to brake, you need to hold either your left or right wheel toe brake key to steer your aircraft.
- The main landing wheel brake system employs hydraulically actuated disc-type brakes. Each brake is operated by individual master brake cylinders located directly forward of the instrument panel. The brakes are selectively controlled by means of toe pedals incorporated into the rudder pedal assembly.



# PART III: TAKEOFF

- Taking off in the Bf.109 is straightforward if you follow these steps for a cold engine start.
  - 1) Crack your throttle about 15 %
  - 2) Set your prop pitch mode to “AUTO”
  - 3) Ignite (“E” key by default)!
  - 4) Wait for your oil temperature to reach 40 degrees C
  - 5) Taxi to the runway (unlock tailwheel, LShift+G by default)
  - 6) Set your flaps to 20 degrees (2 notches on the wing).

# PART III: TAKEOFF

7) Set your prop pitch mode to AUTO. If you set it to MANUAL, put the prop pitch needle in the 12:00 position.

8) Lock your tailwheel once lined up on the runway (LShift+G by default)

9) Throttle up to 2500 RPM @ 1.3 ATA. Correct heading with small rudder input.

**CAUTION: DO NOT EXCEED 1 MINUTE AT FULL POWER (2700 RPM/1.42 ATA)**

10) As soon as you reach 120 kph, center the stick and level out to pick some speed.

11) When you reach 180 kph, rotate gently.

12) Once you are up in the air, retract flaps, pull your gear up and start climbing. Adjust manifold pressure accordingly (see engine management in part V).



# PART IV: LANDING

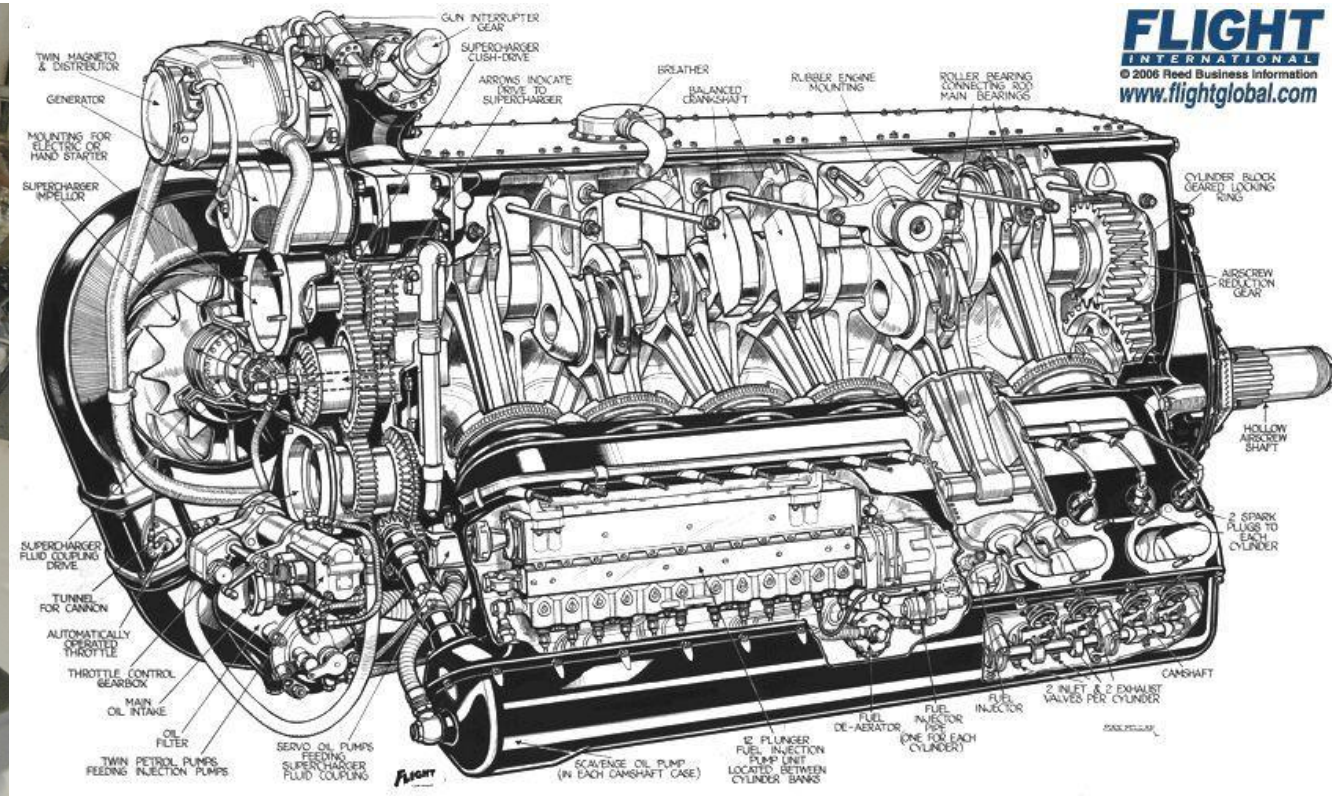
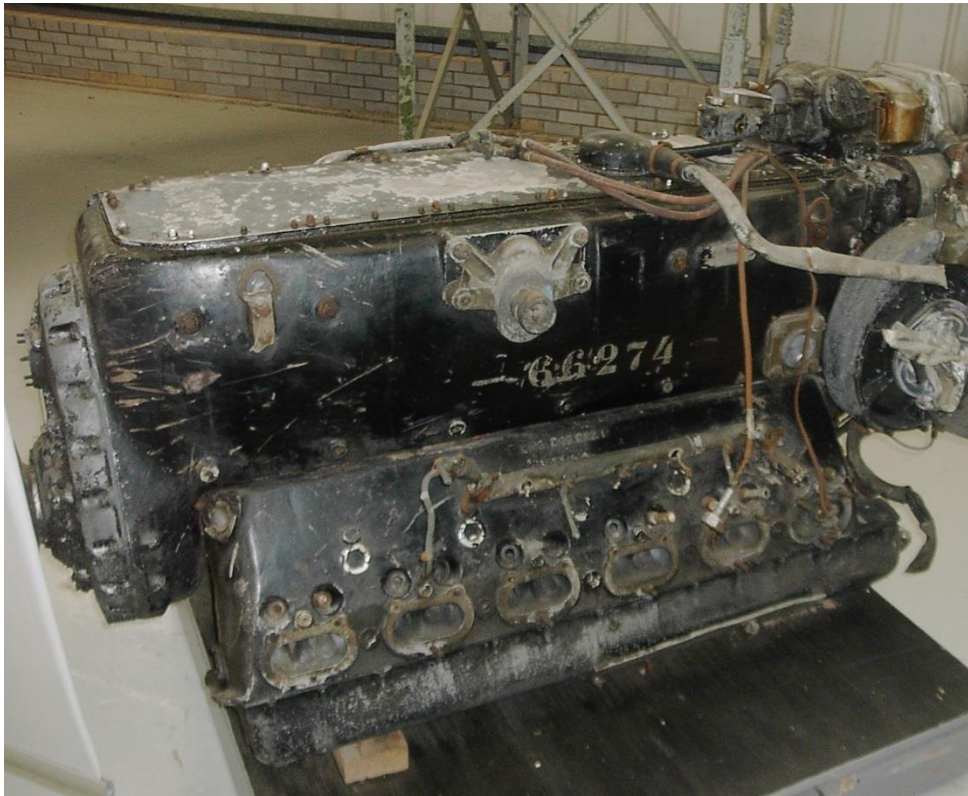
- 1) Deploy landing gear when going slower than 350 kph.
- 2) Deploy flaps 20 degrees when going slower than 250 kph.
- 3) Set your prop pitch to AUTO or set the needle at 11:30 in MANUAL mode. Throttle as required to maintain approach speed at 180 kph. Recommended engine setting is 1500 RPM @ 0.6 ATA.
- 4) Trim nose down as flaps generate extra lift.
- 5) Cut throttle when reaching runway and start a gentle, but firm flare.
- 6) Touchdown at 160 kph.
- 7) Once on the ground, pull back on the stick to lock your tailwheel and tap your brakes.





# Powerplant

- The Bf.109 F-4 is powered by the **Daimler-Benz DB 601**, a liquid-cooled inverted V-12 engine. The DB 601A-1 was a development of the DB 600 with direct fuel injection. The DB 601Aa was licence-built in Japan by Aichi as the Atsuta, by Kawasaki as the Ha-40, and in Italy by Alfa Romeo as the R.A.1000 R.C.41-I *Monsona*.



# Operating Limits

- Min coolant temperature: 40 deg C.
- Max coolant temperature: 100 deg
- Min oil temperature: 40 deg C.
- Max oil temperature: 80 deg C.

COOLANT EXIT TEMPERATURE (DEG C)



OIL INTAKE TEMPERATURE (DEG C)



# Recommended Settings

- Do not exceed 1 minute at full power (2700 RPM & 1.42 ATA). Ever.
- Takeoff
  - 2600 RPM, 1.3 ATA
- Climb
  - 2600 RPM, 1.3 ATA, speed 250-350 kph (30 min max)
- Normal Operation (Cruise)
  - 2200 RPM, 1.0 ATA
- Combat
  - 2600 RPM, 1.3 ATA
- Landing
  - 1500 RPM, 0.6 ATA



# PART VI: AIRCRAFT PERFORMANCE

- Range: 880 km
- Fuel Max Capacity: ~400L
- Endurance: 105 min (1h45)
- Operational ceiling: 12000 m
- Optimal Climb Speed: 280 kph
- Best Climb Rate: 1000 m/min
- Turn time: 19-20 s
- Note: Your fuel loadout will impact your aircraft's performance, but also your weapon loadout. Performance data often being subject to many factors (test conditions, state of aircraft (captured vs factory fresh), etc.), these numbers are to be taken with a grain of salt. Just like today, aircraft performance can and will vary between the real values and the values that you get on paper.



## PART VI: AIRCRAFT PERFORMANCE

- Addition of slats helps slow speed handling, but will not help you turn better at higher speeds.
- Given enough speed, the Bf 109 will outclimb anything the Russians send at you. Use it to your advantage.
- Turn performance is decent, but very risky. Competent Yak-1 pilots WILL out-turn you if you fight in the horizontal plane. Stay vertical and use the sun as cover.
- Be smooth when pulling the stick: you will maintain airspeed.
- Bf.109 is an aerodynamic marvel of engineering, but it can bleed airspeed if you try to play the Yaks' "turn n' burn" game. Stay high, stay fast. You should fly it like a high-speed energy fighter and use boom and zoom tactics.
- The 109 is very fragile: take that into consideration when you think about going head-on with an Il-2 Sturmovik and its Hun-hungry 37 mm cannons.



PART VI: AIRCRAFT PERFORMANCE

MAXIMUM SPEED  
QMB CONDITIONS  
(Graph by Matt)

