Lavochkin-Gorbunov-Gudkov LaGG-3

SERIES 29

Лавочкин-Горбунов-Гудков ЛаГГ-3

By Chuck

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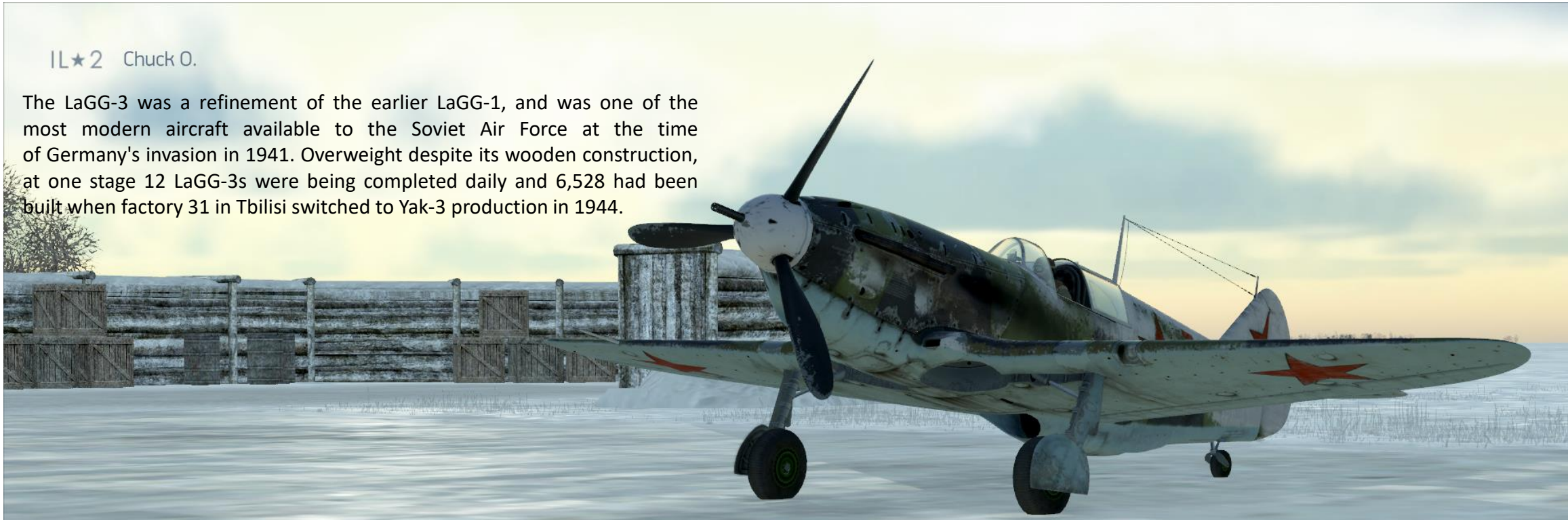
	(Unit)	LaGG-3	Yak-1	La-5	Il-2	Pe-2	Bf.109F4	Bf.109G2	Fw190A3	Ju-87	He-111
TEMPERATURES											
Water Rad Min Max	Deg C	80 100	80 100	- 	80 110	40 100	40 100	40 100	-	60 100-110	40 95
Oil Rad (OUTBOUND) Min Max	Deg C	40 100	40 100	55 75	70 115	-	40 80	40 80	40 110	30 105	35 95
Oil Rad (INBOUND) Min Max	Deg C	-	-	-	40 80	-	-	-	-	-	-
Cylinder Head Temp Min Max	Deg C	-	-	120 200	-	-	-	-	-	-	-
ENGINE SETTINGS											
Takeoff RPM	RPM	2700	2700	2400	2200	2700	2600	2500	2500	2500	2400
Takeoff Manifold Pressure	RU: mm Hg GER: ATA	1050	1050	1150	1150	1050	1.3	1.3	1.3	1.3	1.35
Climb RPM	RPM	2600	2650	2300	2050	2600	2600 30 min	2500	2400	2450 30 min	2300 30 min
Climb Manifold Pressure	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
Normal Operation/Cruise RPM	RPM	1700	1850	2300	1850	2200	2200	1900	2200	2100	2200
Normal Operation/Cruise Manifold Pressure	RU: mm Hg GER: ATA	1020	850	900	850	1020	1.0	1.0	1.1	1.2	1.10
Combat RPM	RPM	2650	2650	2400	2050	2600	2600	2500	2400	2250	2300
Combat Manifold Pressure	RU: mm Hg GER: ATA	1050	1050	1150	1050	1050	1.3	1.3	1.32	1.2	1.15
Emergency Power/ Boost RPM @ km	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
Emergency Power / Boost Manifold Pressure @ 1 km	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
Supercharger Stage 1 Operation Altitude	m	0 2000	0 2500	0 2000	-	0 2000	-	-	-	Auto/man modes	Auto/man modes
Supercharger Stage 2 Operation Altitude	m	2000+	2500+	2000+	-	2000+	-	-	-	Auto/man modes	Auto/man modes
*Landing Approach RPM	RPM	2600	2200	2400	1800	2700	1500	1500	-	2000	2300
*Landing Approach Manifold Pressure	RU: mm Hg GER: ATA	As required	600	As required	600	As required	0.6	0.6	-	0.6	As required
Notes				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
AIRSPEEDS											
Takeoff – Rotation	km/h	190	200	180	190	250	180	180	200	170	150
Optimal Climb Speed	km/h	270	260	250	250	240	280	280	270	230	N/A
Landing – Approach	km/h	200	180	200	200	200	180	180	190	190	200
Landing – Touchdown	km/h	170	150	170	150	160	160	160	150	150	140-150

PART I: THE AIRCRAFT

History



The LaGG-3 was a refinement of the earlier LaGG-1, and was one of the most modern aircraft available to the Soviet Air Force at the time of Germany's invasion in 1941. Overweight despite its wooden construction, at one stage 12 LaGG-3s were being completed daily and 6,528 had been built when factory 31 in Tbilisi switched to Yak-3 production in 1944.

The prototype of the LaGG-3, I-301, was designed by Semyon A. Lavochkin, Vladimir P. Gorbunov and Mikhail I. Gudkov. It was designated LaGG-3 in serial production. Its airframe was almost completely made of timber, with crucial parts processed with Bakelite lacquer. This novel wood-laminate construction was more durable than regular timber, was incombustible, and didn't rot.

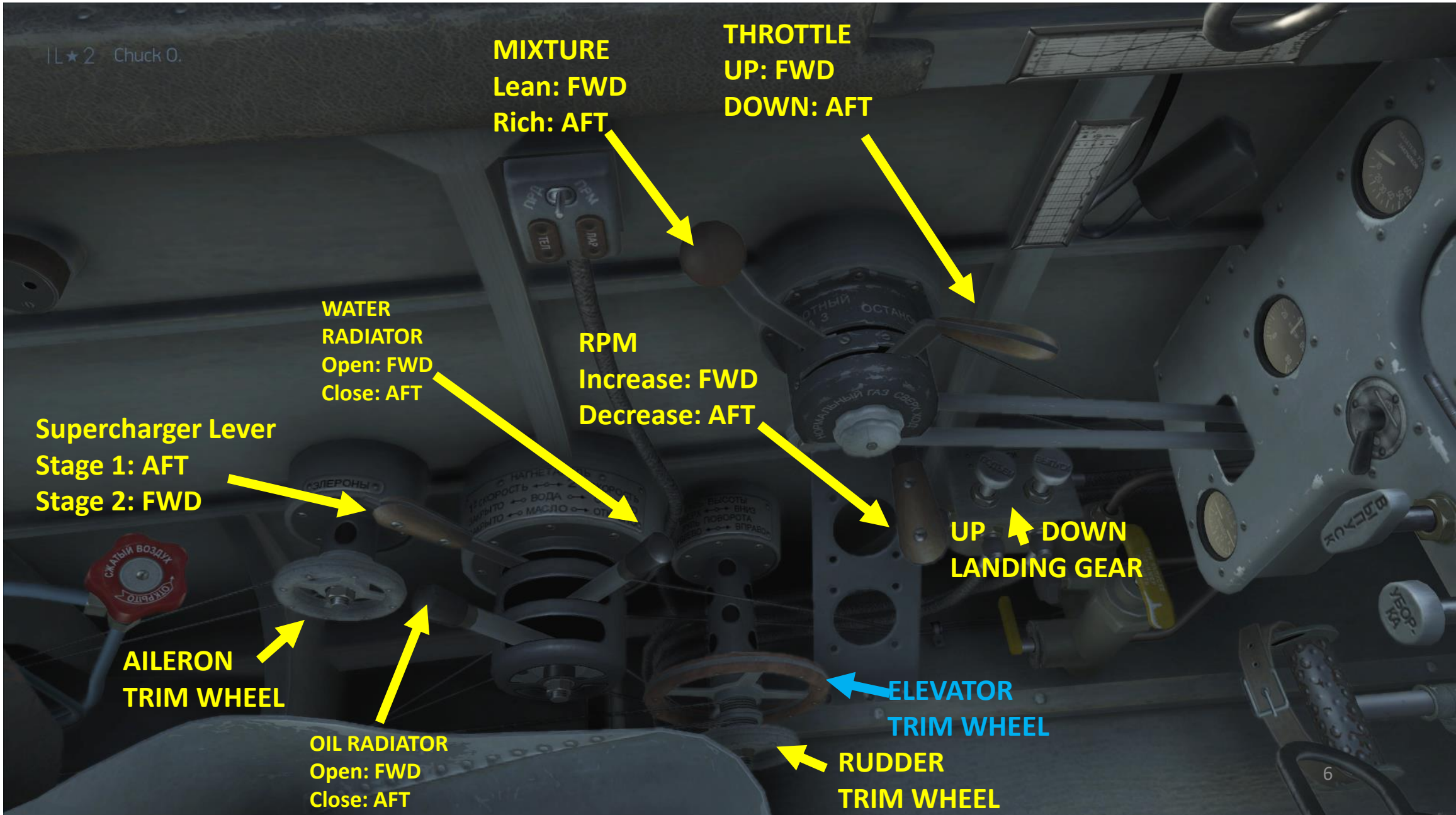
It was, however, much heavier and pilots joked that rather than being an acronym of the designers' names (Lavochkin, Gorbunov, and Gudkov) "LaGG" stood for lakirovanny garantirovanny grob ("varnished guaranteed coffin") due to its performance relative to its opponent's aircraft at the time of its introduction (later variants were more capable). The full wooden wing (with plywood surfaces) was analogous to that of the Yak-1. The only difference was that the LaGG's wings were built in two sections. Even with the lighter airframe and supercharged engine, the LaGG-3 was seriously underpowered, which lead to many performance issues during combat..

The LaGG-3 proved immensely unpopular with pilots. Some aircraft supplied to the front line were up to 40 km/h (25 mph) slower than they should have been and some were not airworthy. In combat, the LaGG-3's main advantage was its strong airframe. Although the laminated wood did not burn it shattered when hit by high explosive rounds. However, the LaGG-3's armament was considered formidable (23 mm or 37 mm cannon).

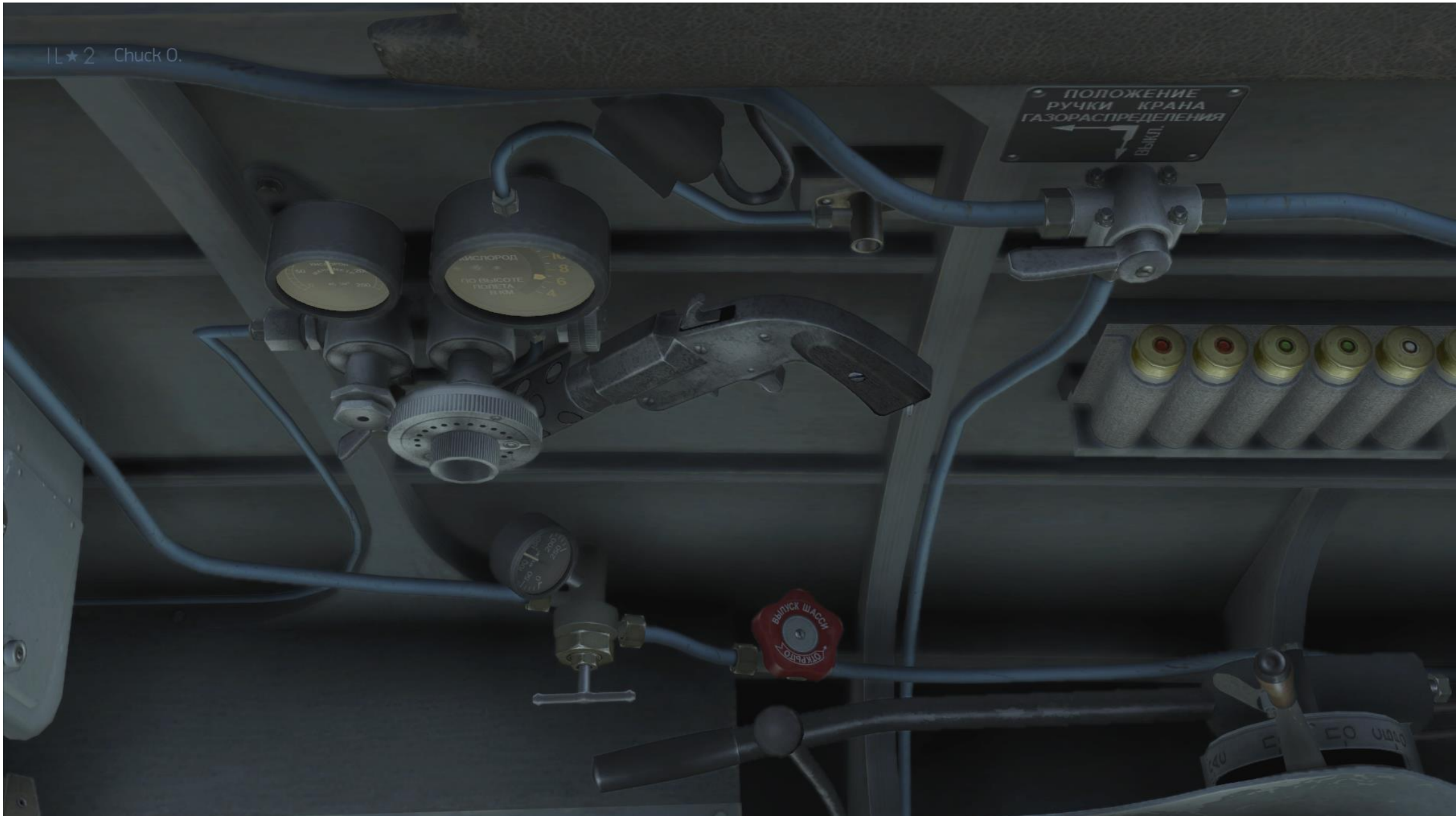
The LaGG-3 was improved during production, resulting in 66 minor variants in the 6,528 that were built. Experiments with fitting a Shvetsov M-82 radial engine to the LaGG-3 airframe finally solved the power problem, and led to the Lavochkin La-5.

The Cockpit

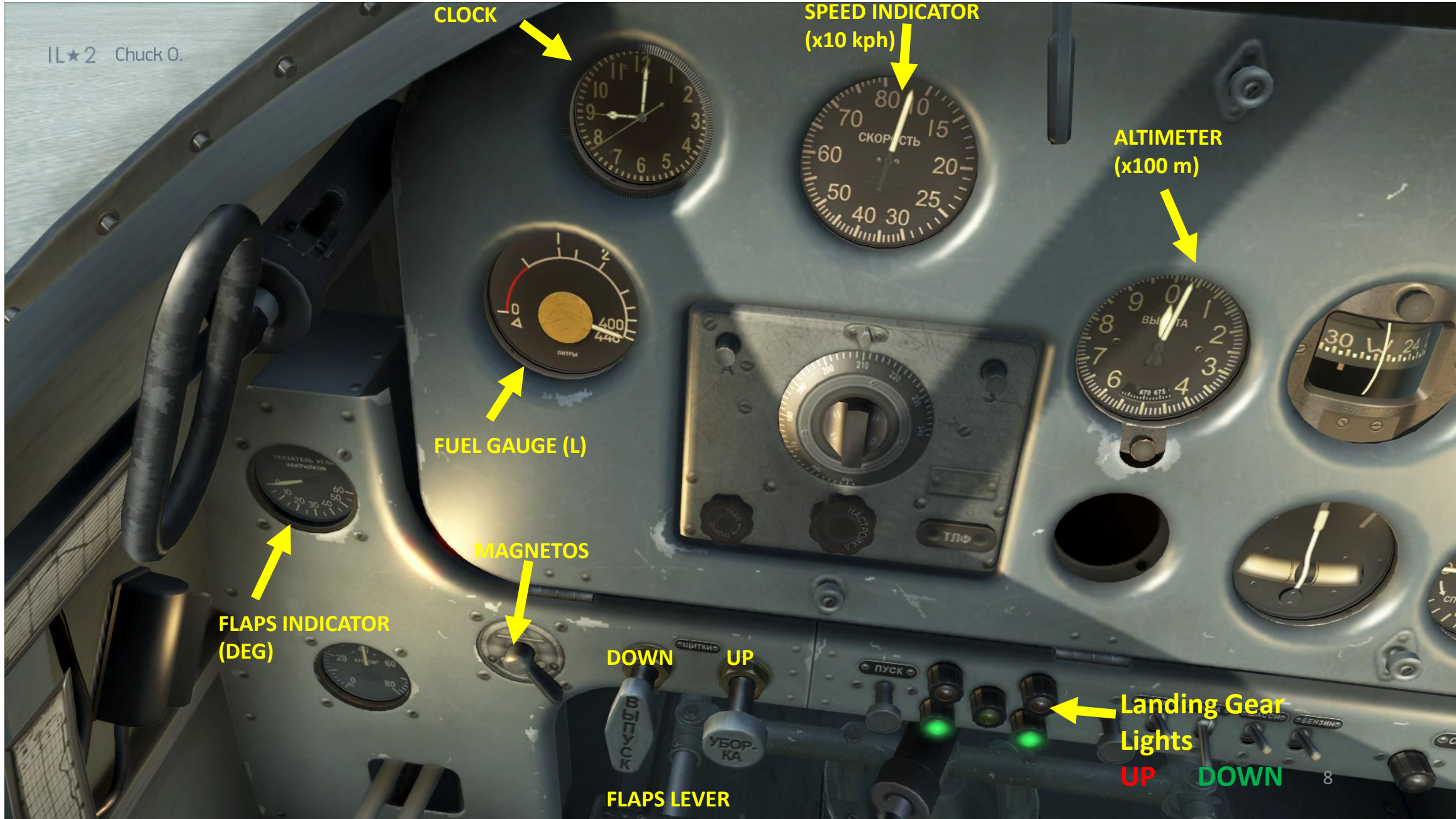
Left Side


MIXTURE
Lean: FWD
Rich: AFT
THROTTLE
UP: FWD
DOWN: AFT
WATER
RADIATOR
Open: FWD
Close: AFT
RPM
Increase: FWD
Decrease: AFT
Supercharger Lever
Stage 1: AFT
Stage 2: FWD
UP
DOWN
LANDING GEAR
AILERON
TRIM WHEEL
OIL RADIATOR
Open: FWD
Close: AFT
ELEVATOR
TRIM WHEEL
RUDDER
TRIM WHEEL

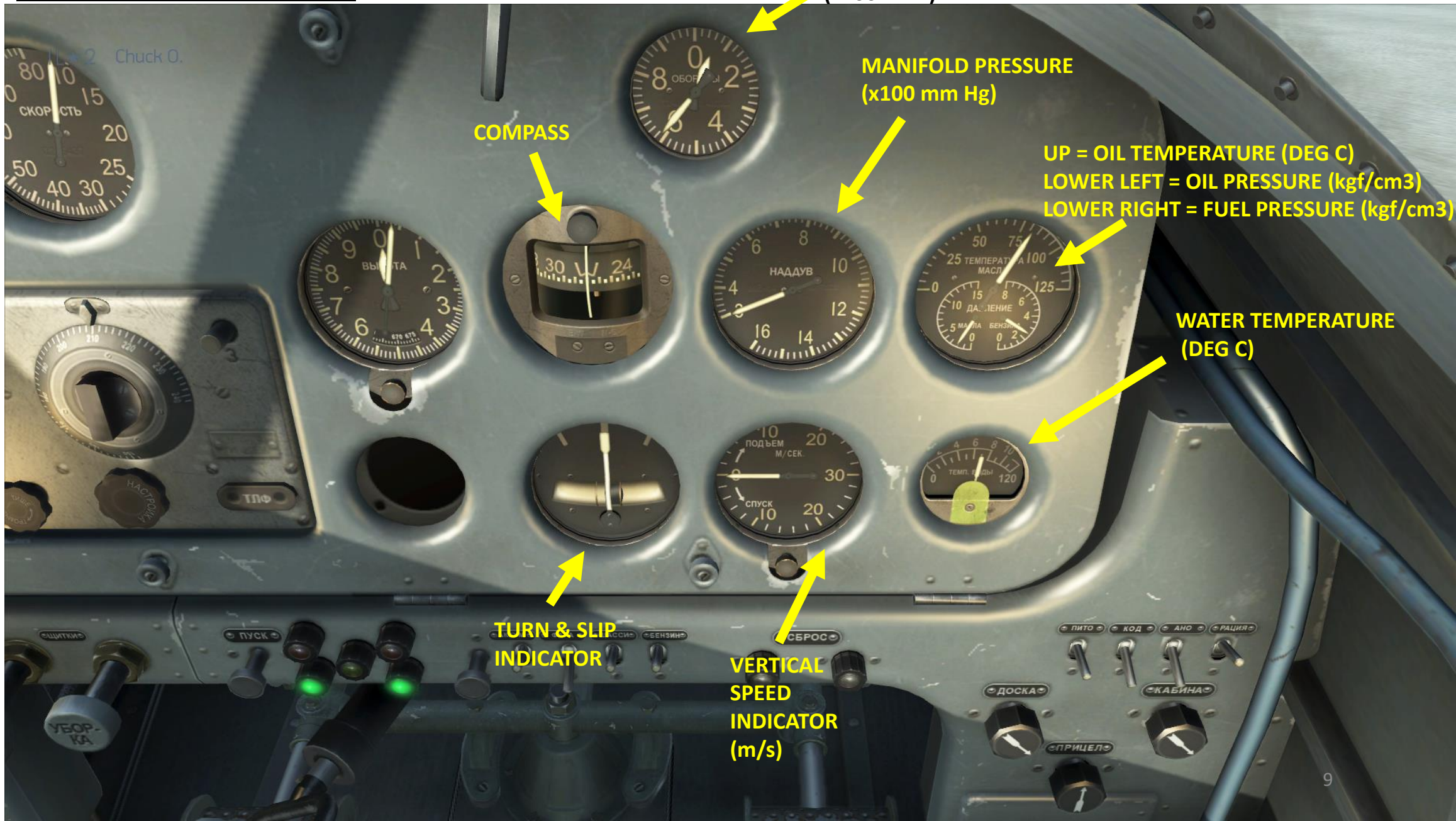
Right Side


IL★2 Chuck O.
ПОЛОЖЕНИЕ
РУЧКИ КРАНА
ГАЗОРАСПРЕДЕЛЕНИЯ
ВЫПУСК ШАССИ

Front Left


CLOCK
SPEED INDICATOR
(x10 kph)
ALTIMETER
(x100 m)
FUEL GAUGE (L)
MAGNETOS
FLAPS INDICATOR
(DEG)
DOWN
UP
FLAPS LEVER
Landing Gear
Lights
UP
DOWN

Front Right


TACHOMETER
(x100 RPM)
MANIFOLD PRESSURE
(x100 mm Hg)
COMPASS
UP = OIL TEMPERATURE (DEG C)
LOWER LEFT = OIL PRESSURE (kgf/cm3)
LOWER RIGHT = FUEL PRESSURE (kgf/cm3)
WATER TEMPERATURE
(DEG C)
TURN & SLIP
INDICATOR
VERTICAL
SPEED
INDICATOR
(m/s)

Wings

MECHANICAL LANDING GEAR INDICATOR
VISIBLE = GEAR DOWN
RETRACTED = GEAR UP

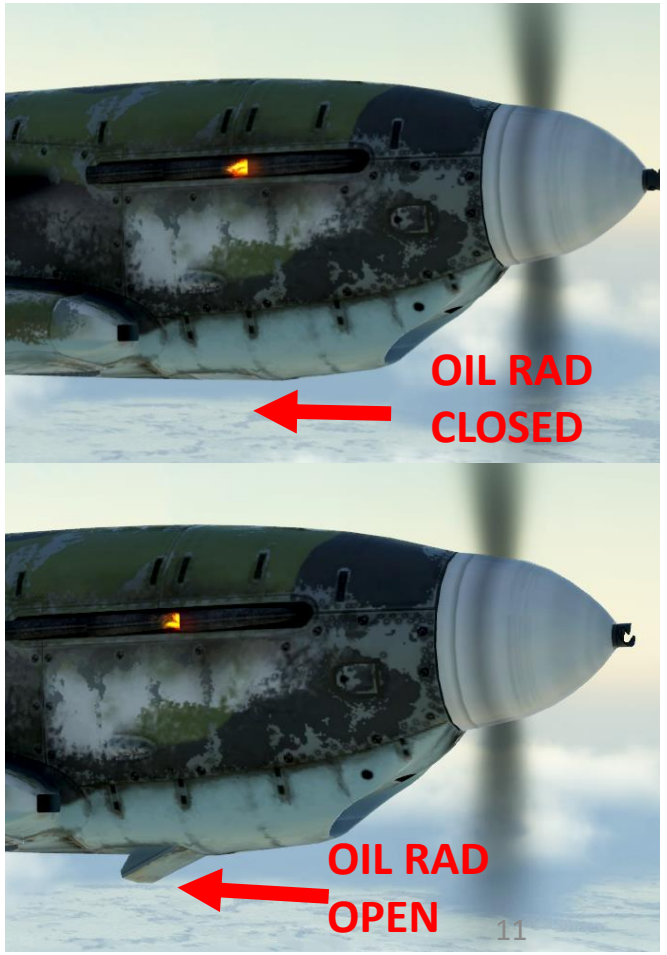
TO SEE THE MECHANICAL LANDING GEAR INDICATORS,
YOU NEED TO OPEN YOUR CANOPY (RALT+C)

Important key bindings

- What you have to cool down your engine are water radiator and oil radiator flaps. Don’t forget to set your controls accordingly.

WATER RADIATOR CLOSED

WATER RADIATOR OPEN



PART II: THE CONTROLS

Important key bindings

- The LaGG-3, like most Russian planes, has a brake system similar to what you would find in your car.
- In order to brake, you need to hold your wheel brake key while you give rudder input to steer your aircraft. Make sure you have adequate mixture, RPM and Manifold Pressure settings or your turn radius will suffer. These factors matter in heavier planes like the Il-2 Sturmovik.

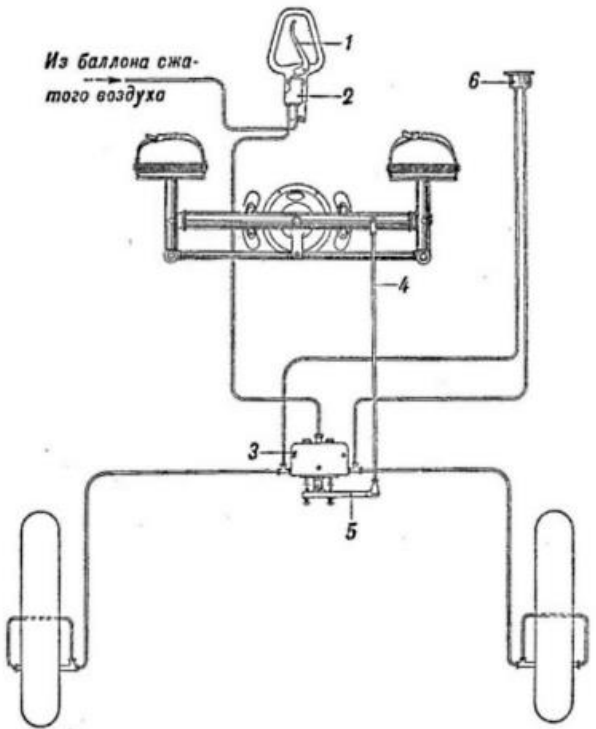


Рис. 61. Схема управления тормозами:
1 — рычаг клапана ПУ-6; 2 — клапан ПУ-6; 3 — дифференциал; 4 — тяга, соединяющая педаль ножного управления с рычагом дифференциала; 5 — рычаг дифференциала; 6 — манометр тормоза.

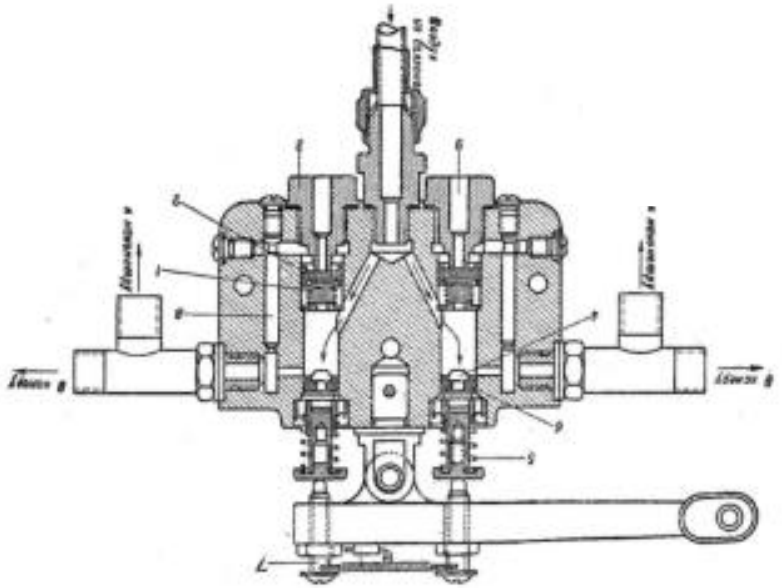
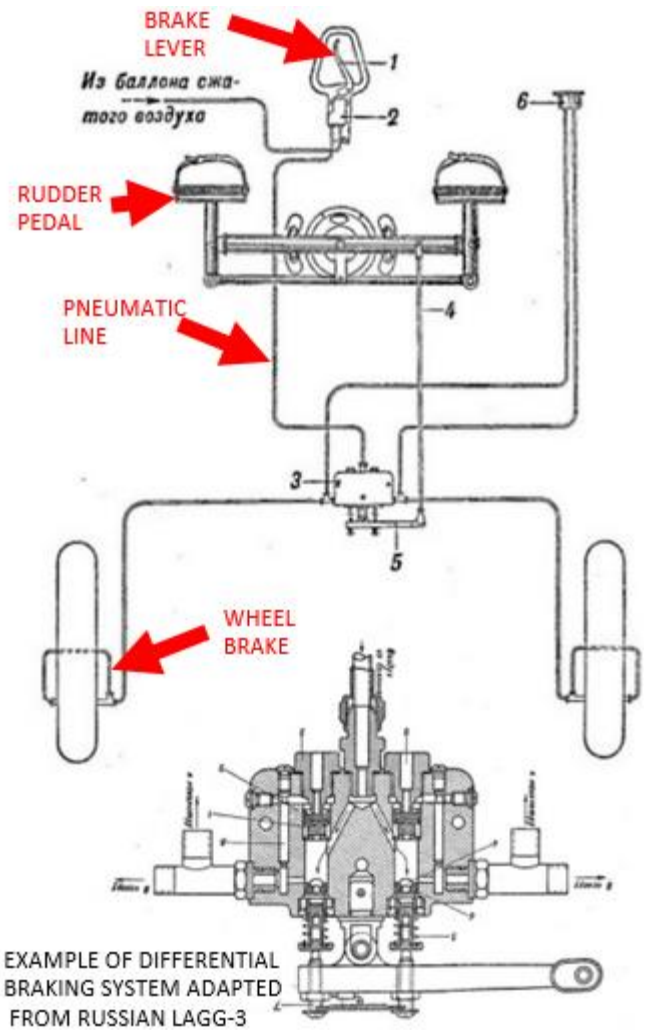


Рис. 62. Дифференциал пневматического управления тормозами:
1 — пружина предохранительного клапана; 2 — манжета предохранительного клапана; 3 — штуцер; 4 — шток поршня управляющего клапана; 5 — пружина управляющего клапана; 6 — манжета поршня; 7 — толкач; 8 — канал, сообщающий тормоз с предохранительным клапаном; 9 — отверстие штуцера предохранительного клапана.



EXAMPLE OF DIFFERENTIAL BRAKING SYSTEM ADAPTED FROM RUSSIAN LAGG-3

PART III: TAKEOFF

- Taking off in the LaGG-3 is straightforward if you follow these steps for a cold engine start.

1) Crack your throttle about 15 %

2) Set your mixture to full rich

3) Close your water and oil radiator flaps

4) Set minimum RPM

5) Ignite (“E” key by default)!

6) Set your flaps to 20 degrees.

PART III: TAKEOFF

7) Wait for your oil radiator temperatures to reach 40 degrees C and your water radiator temperature to reach 80 degrees C.

8) Line yourself up on the runway and lock your tailwheel by pulling your stick back to keep your tailwheel down.

9) Fully open your water and oil radiator flaps.

10) Throttle up full power, max RPM. Correct heading with small rudder input.

11) As soon as you reach 140 kph, center the stick and level out to pick some speed.

12) When you reach 190 kph, rotate gently.

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

PART IV: LANDING

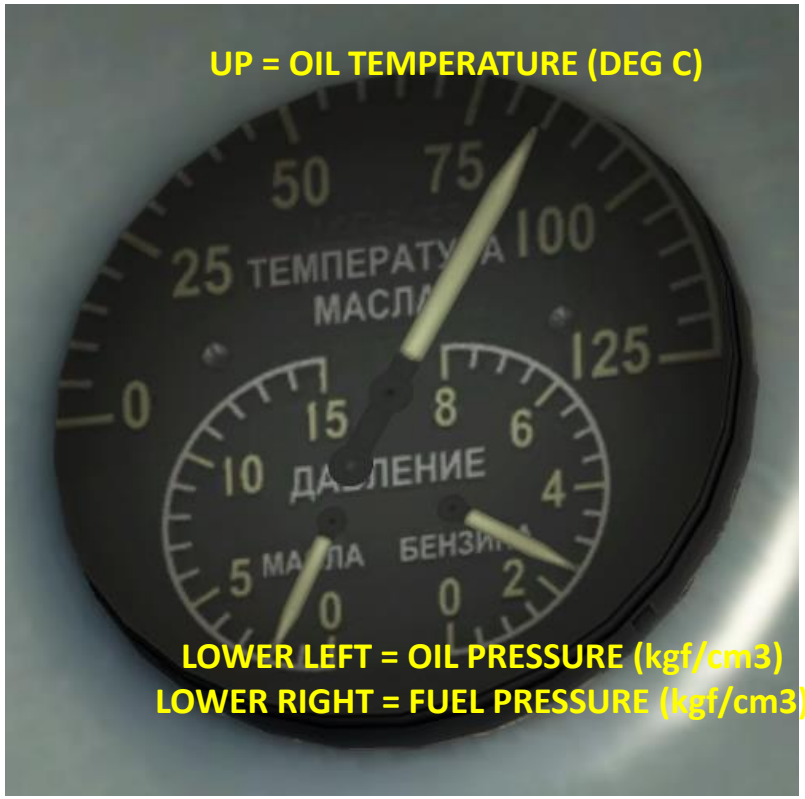
1) Deploy landing gear when going slower than 300 kph.
2) Deploy full flaps when going slower than 250 kph.
3) Set your RPM to 2600 and adjust throttle as required to maintain approach speed at 200 kph.
4) Trim nose down as flaps generate extra lift.
5) Cut throttle when reaching runway and let yourself glide until you touch the ground naturally.
6) Touchdown at 170 kph.
7) Once on the ground, pull back on the stick to lock your tailwheel and tap your brakes.

Powerplant

- The LaGG-3 is powered by the **Klimov M-105.** It is a V-12 liquid-cooled piston engine. The M-105, designed in 1940, drew heavily on Vladimir Klimov‘s experience with the Hispano-Suiza 12Y (license-built as the M-100).
- In addition to a two-speed supercharger, the M-105 had several improvements like two intake valves per cylinder and a counterbalanced crankshaft.
- About 129,000 M-105 and its variants were built. During the war, Klimov's engines were redesignated from "M" (for "motor," engine) to "VK" for the lead designer's initials.

Operating Limits

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



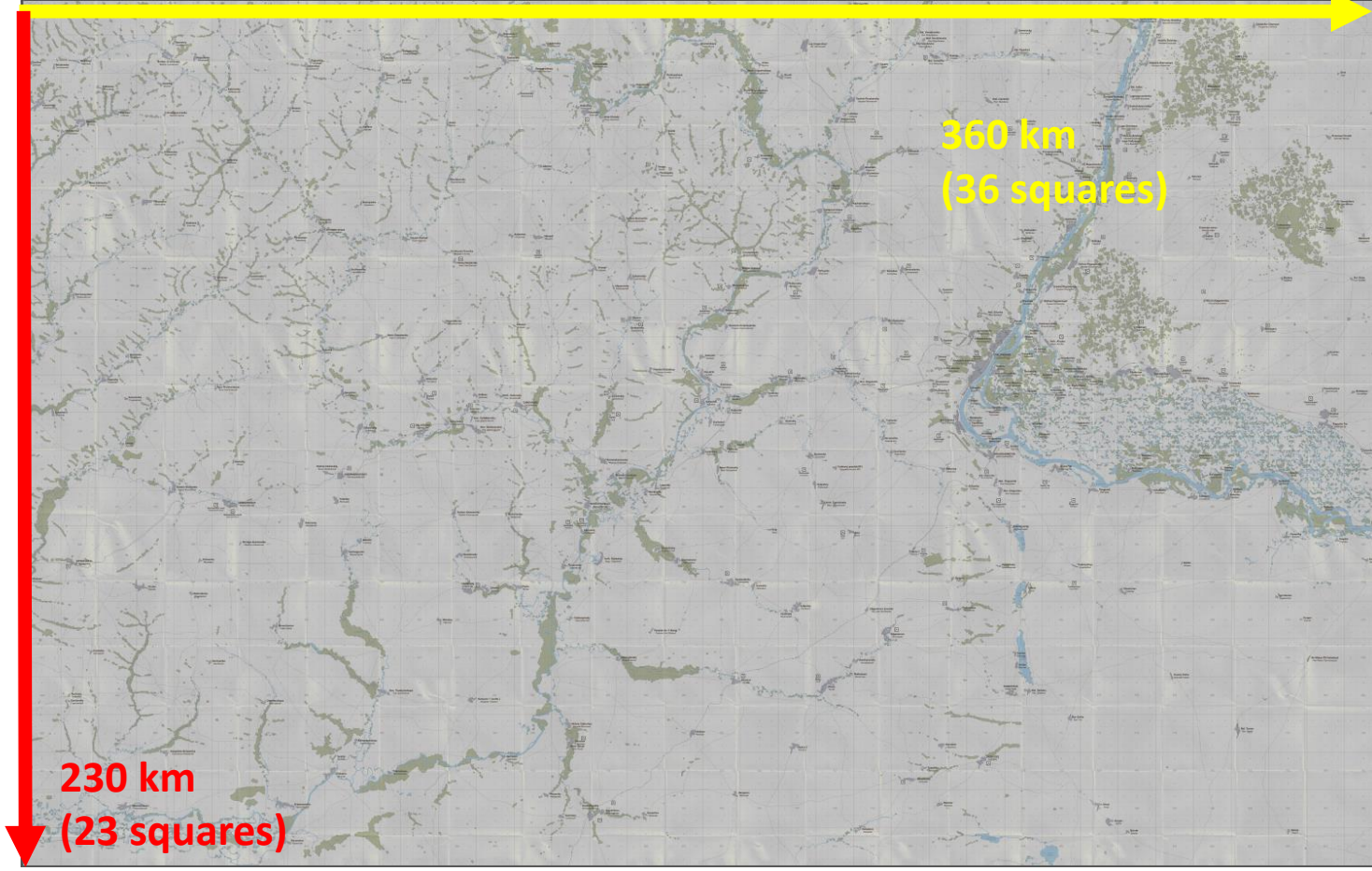
WATER TEMPERATURE (DEG C)

Recommended Settings

- **Pro Tip:** Progressively lean your mixture as you gain altitude in order to gain maximal power.
- **Takeoff**
  - Water and Oil rads fully open
  - Max RPM, Max Manifold Pressure (MP)
- **Climb**
  - Optimal climb speed: 270 kph
  - 2550-2700 RPM
- **Normal Operation (Cruise)**
  - 1700 RPM
- **Combat**
  - 2650-2700 RPM
- **Supercharger** (increases Manifold Pressure @ higher altitudes)
  - Stage 1 below 2000 m altitude. Stage 2 over 2000 m.
  - Lshift + S to toggle supercharger stages

PART VI: AIRCRAFT PERFORMANCE

- Range: 650 km
- Fuel Max Capacity: ~440L
- Endurance: 75 min (1h15)
- Operational ceiling: 10000 m
- Optimal Climb Speed: 270 kph
- Best Climb Rate: 700 m/min
- Turn time: 21-22 s



- Note: Your fuel loadout will impact your aircraft's performance, but also your water and oil radiator flaps, your trim, the air temperature and many other factors. Keeping your speed up without blowing your engine will require a heavy workload that will diminish with practice and experience. 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

- Cold weather conditions modeled in Battle of Stalingrad allow superior engine power in comparison to values obtained for standard atmosphere.
- LaGG-3 is heavier, slower and has overall worse performance than any other fighter in the sim. Be gentle on the elevator and maintain high speed at all times. The LaGG has a great roll rate: use it to your advantage.
- LaGG-3 can take more punishment than the 109. Don't put their cannons to the test, though.
- The LaGG-3 is not an agile plane and bleeds a lot of energy during sustained turns. Your best chance is to fight under 5000 m, which is where the 109s performance are not optimal. Gain energy advantage as soon as you can: the 109 will not want to engage you on even terms. The 109 has slats on his wings that allow him to be much more agile at low speeds than you might think: it can and will probably out-turn you.
- ALWAYS fly with a wingman. Forcing the 109 to bleed his energy is the only way you have a chance against him. However, the LaGG-3 is very potent against enemy bombers.
- Do not attempt to outclimb a 109 unless you have a (very) serious speed advantage.
- Moderate use of flaps during low-speed turns can help you get an angle for a deflection shot.
- Do not engage a 109 in scissors: its slats give him the advantage during low-speed rolling manoeuvers.

MAXIMUM SPEED QMB CONDITIONS (Graph by Matt)