

Yakovlev Yak-1 ✪ Яковлев Як-1

SERIES 69



By Chuck

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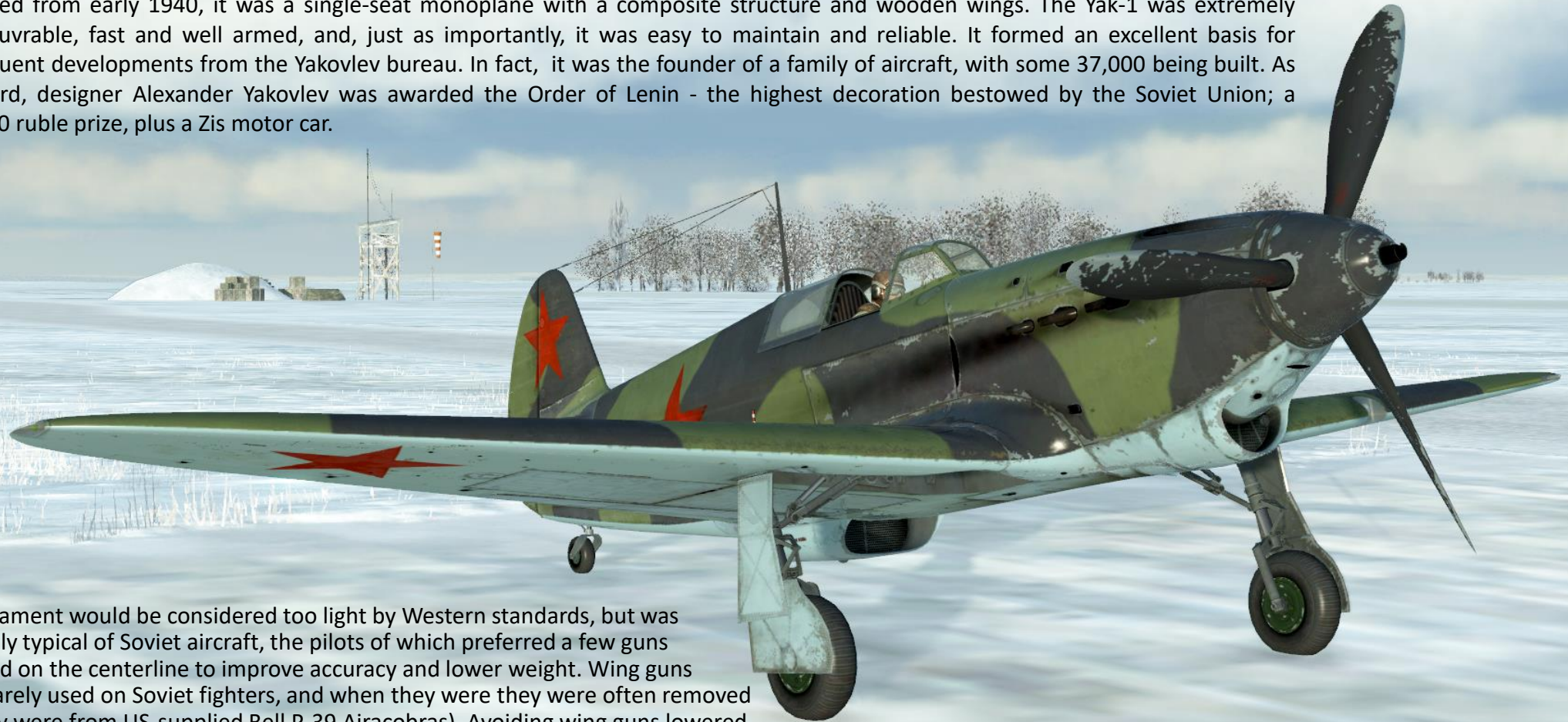
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	(Unit)	LaGG-3	Yak-1	La-5	Il-2	Pe-2	Bf.109F4	Bf.109G2	Fw190A3	Ju-87	He-111
TEMPERATURES											
Water Rad Min	Deg C	80	80	-	80	40	40	40	-	60	40
Max		100	100		110	100	100	100		100-110	95
Oil Rad (OUTBOUND) Min	Deg C	40	40	55	70	-	40	40	40	30	35
Max		100	100	75	115		80	80	110	105	95
Oil Rad (INBOUND) Min	Deg C	-	-	-	40	-	-	-	-	-	-
Max					80						
Cylinder Head Temp Min	Deg C	-	-	120	-	-	-	-	-	-	-
Max				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
AIRSPEDS											
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

History

IL★2 Chuck O.

Produced from early 1940, it was a single-seat monoplane with a composite structure and wooden wings. The Yak-1 was extremely manoeuvrable, fast and well armed, and, just as importantly, it was easy to maintain and reliable. It formed an excellent basis for subsequent developments from the Yakovlev bureau. In fact, it was the founder of a family of aircraft, with some 37,000 being built. As a reward, designer Alexander Yakovlev was awarded the Order of Lenin - the highest decoration bestowed by the Soviet Union; a 100,000 ruble prize, plus a Zis motor car.

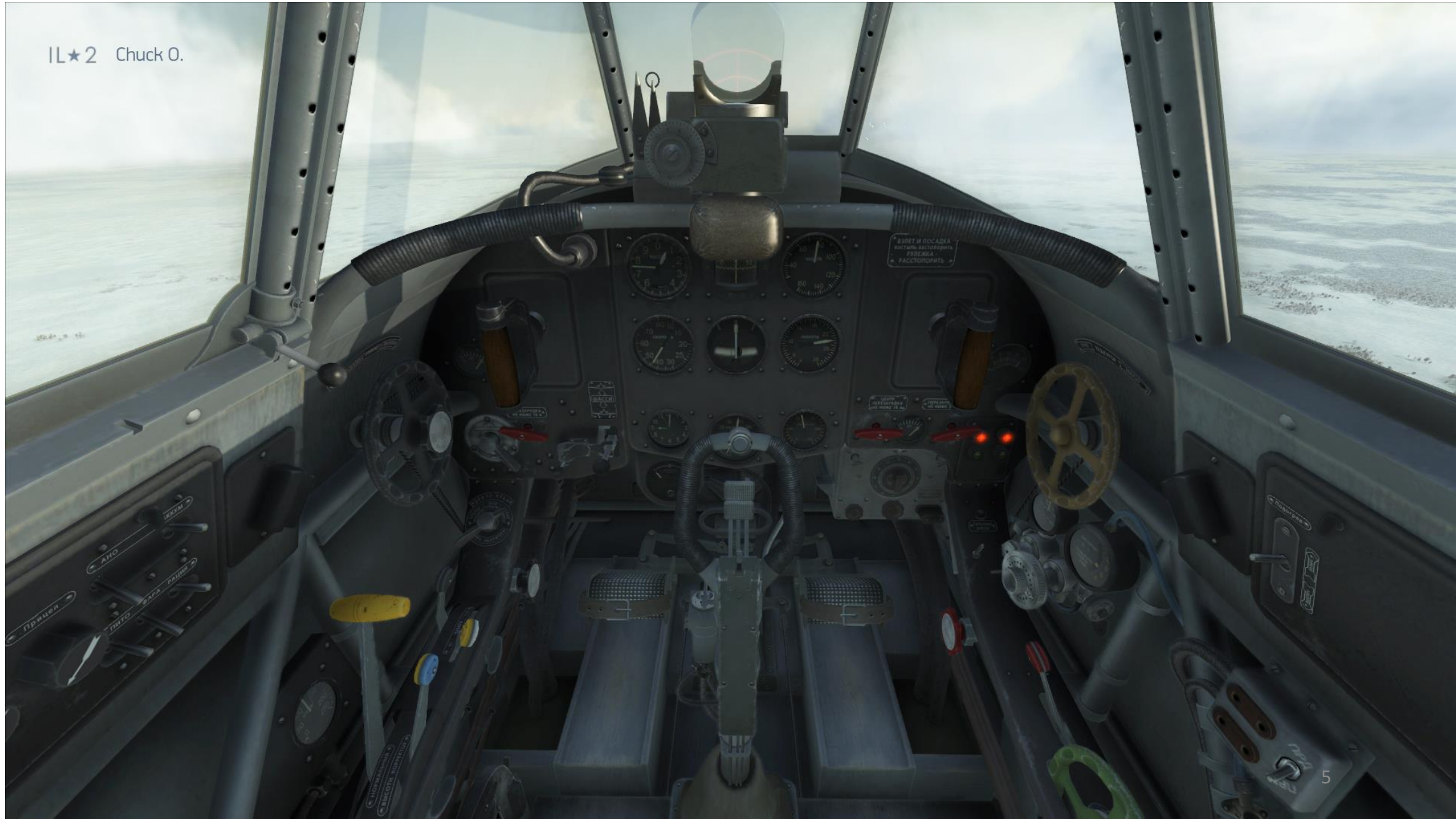


Its armament would be considered too light by Western standards, but was perfectly typical of Soviet aircraft, the pilots of which preferred a few guns grouped on the centerline to improve accuracy and lower weight. Wing guns were rarely used on Soviet fighters, and when they were they were often removed (as they were from US-supplied Bell P-39 Airacobras). Avoiding wing guns lowered weight and demonstrably improved roll rates (the same was true with the Bf 109F). The US and Britain considered heavy armament and high performance necessary even at the cost of reduced agility, while the Soviets relied on the marksmanship of their pilots coupled with agile aircraft.

The importance of this type in World War II is often underestimated. Soviet naming conventions obscure the fact that the Yak-1 and its successors — the Yak-7, Yak-9 and Yak-3 — are essentially the same design, comparable to the numerous Spitfire or Bf 109 variants. Were the Yaks considered as one type, the 37,000 built would constitute the most produced fighter in history.

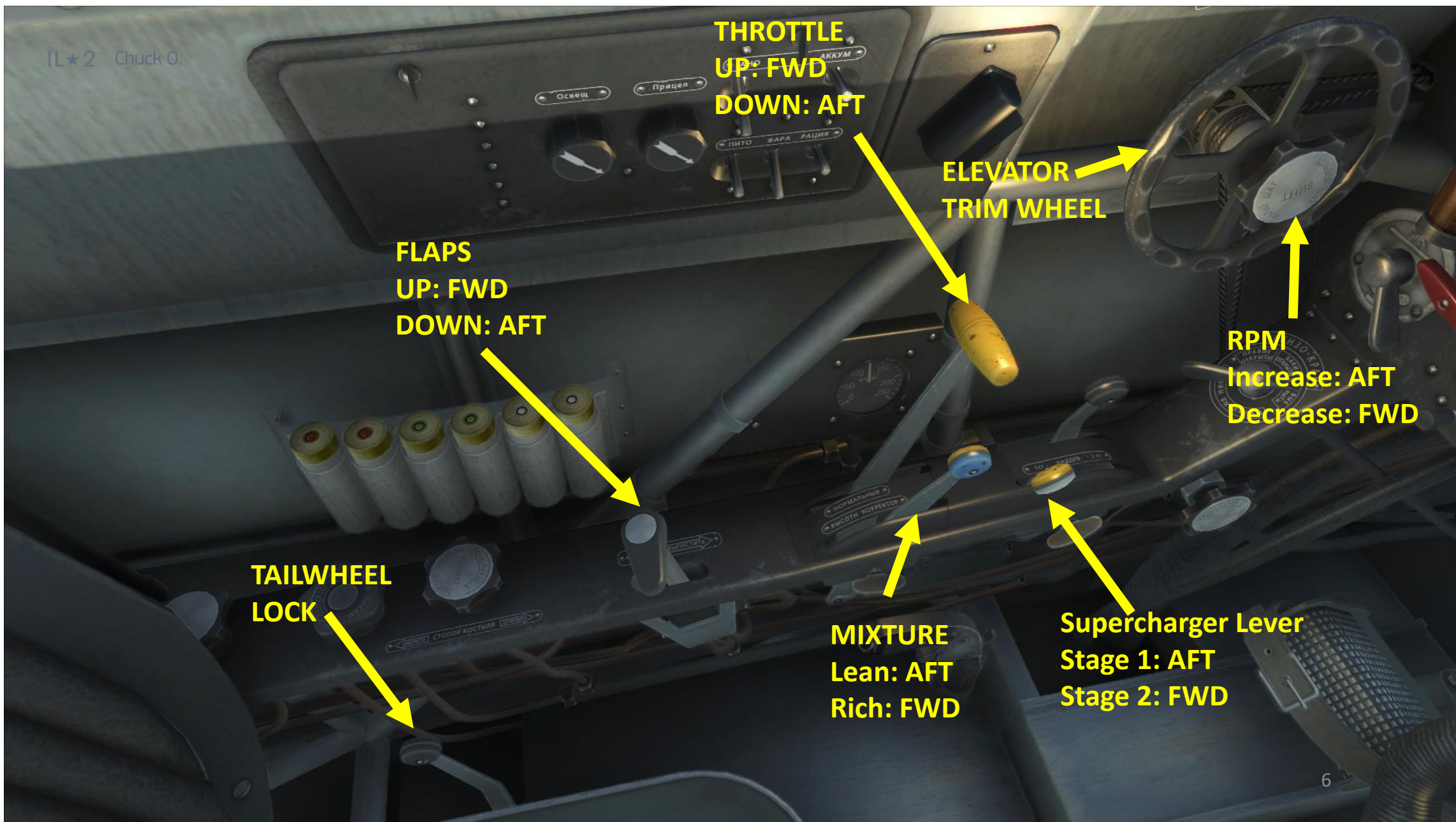
PART I: THE AIRCRAFT

The Cockpit



PART I: THE AIRCRAFT

Left Side



THROTTLE
UP: FWD
DOWN: AFT

**ELEVATOR
TRIM WHEEL**

FLAPS
UP: FWD
DOWN: AFT

RPM
Increase: AFT
Decrease: FWD

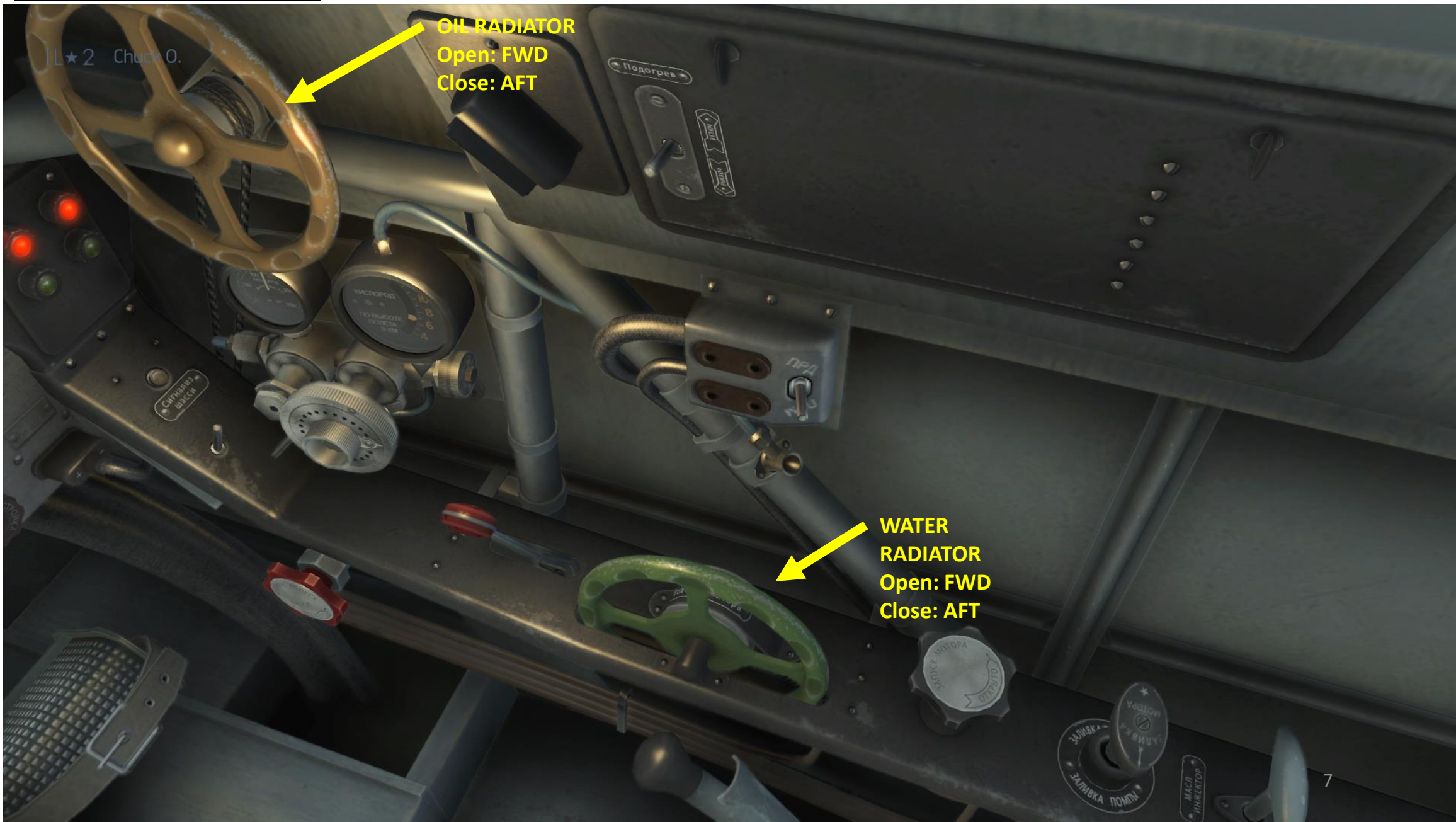
**TAILWHEEL
LOCK**

MIXTURE
Lean: AFT
Rich: FWD

Supercharger Lever
Stage 1: AFT
Stage 2: FWD

PART I: THE AIRCRAFT

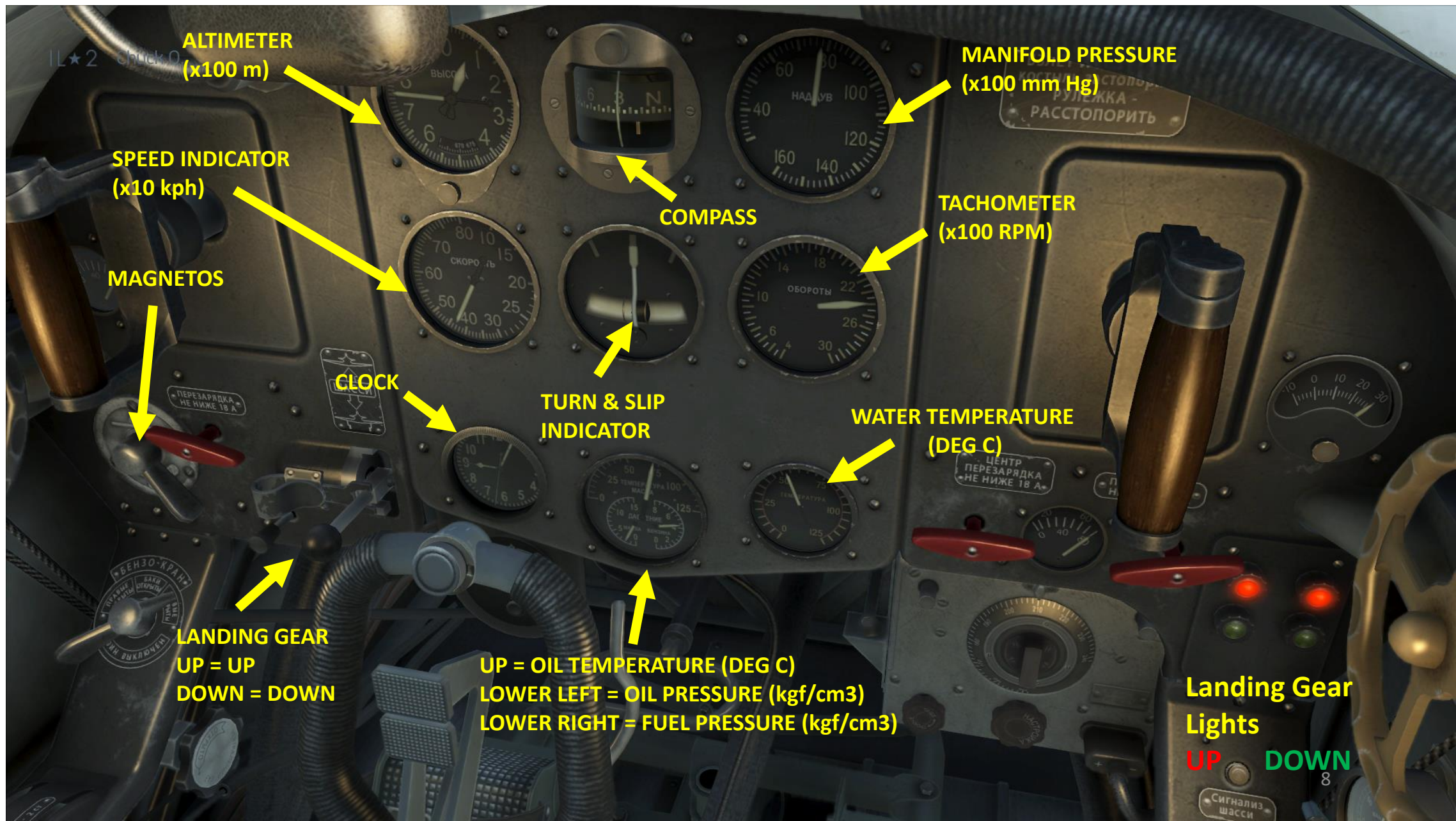
Right Side



PART I: THE AIRCRAFT

Front

- RPK-10 RADIO HOMING COMPASS CURRENTLY NOT IMPLEMENTED IN COCKPIT.
- See Pe-2 Guide for Blind Approach Tutorial for the RPK-10



PART I: THE AIRCRAFT

Wings

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



FUEL GAUGE FOR EACH WING
SHOWS THE LAST 80 LITERS AVAILABLE (RESERVE).



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 Yak-1, 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.

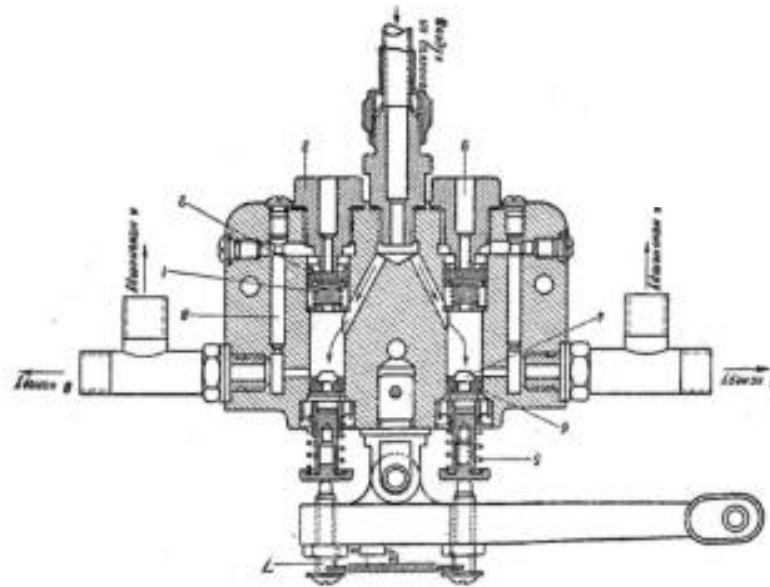
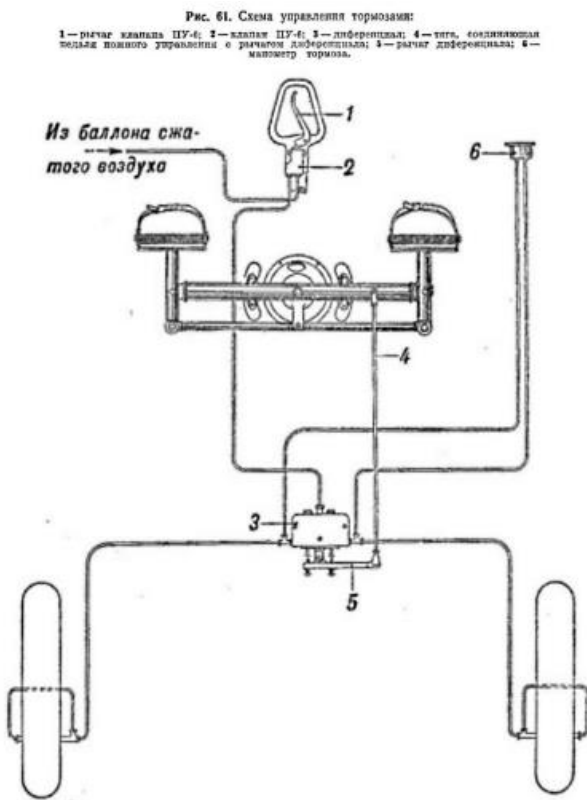
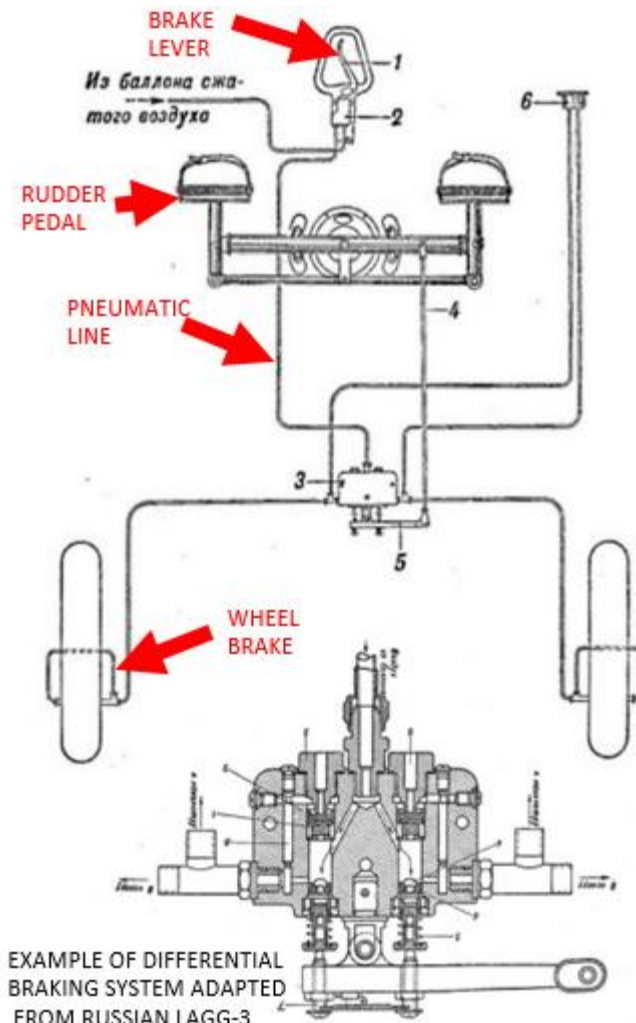


Рис. 62. Дифференциал пневматического управления тормозами:

—пружина предохранительного клапана; 2—магнета предохранительного клапана;
—штуцер; 4—пiston поршня управляющего клапана; 5—пружина управляющего клапана; 6—магнета поршня; 7—толкатель; 8—канал, обеспечивающий тормоз с предохранительным клапаном; 9—отверстие штуцера предохранительного клапана.



PART III: TAKEOFF

- Taking off in the Yak-1 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 in the UP position.

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 pressing “LCtrl+G” and 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 200 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 flaps when going slower than 250 kph.
- 3) Setting your RPM to 2200 and your manifold pressure to 600 mm Hg on approach is recommended. Adjust throttle as required to maintain approach speed at 180 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 150 kph with a 3-point attitude.
- 7) Once on the ground, pull back on the stick to lock your tailwheel and tap your brakes.



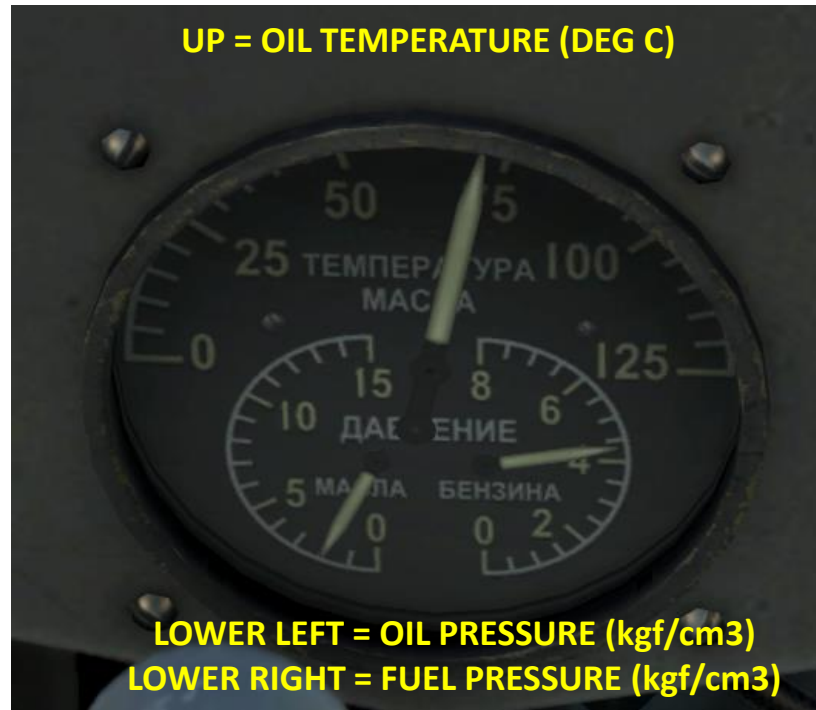
Powerplant

- The Yak-1 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: 250 kph
 - 2600 RPM
 - 1050 mm Hg Manifold Pressure
- **Normal Operation (Cruise)**
 - 1850 RPM
 - 850 mm Hg
- **Combat**
 - 2650 RPM
 - 1050 mm Hg
- **Supercharger** (increases Manifold Pressure @ higher altitudes)
 - Stage 1 below 2500 m altitude. Stage 2 over 2500 m.
 - Lshift + S to toggle supercharger stages



PART VI: AIRCRAFT PERFORMANCE

- Range: 700 km
- Fuel Max Capacity: ~410L
- Endurance: 90 min (1h30)
- Operational ceiling: 10000m
- Optimal Climb Speed: 260 kph
- Best Climb Rate: 800 m/min
- Turn time: 19 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.

- Cold weather conditions modeled in Battle of Stalingrad allow superior engine power in comparison to values obtained for standard atmosphere.
- Yak-1 is lighter than the LaGG-3 and has much better acceleration even if it has the same engine.
- Yak-1 can take more punishment than the 109. Don't put their cannons to the test, though.
- The Yak is an agile plane and bleeds little energy during sustained turns. Under 5000 m, which is where the Yak excels, the 109 will not want to engage you on even terms. The Yak will have a slight advantage at low altitude levels and in tight turn fights. Don't get cocky though: the 109 has slats on his wings that allow him to be much more agile at low speeds than you might think.
- Do not attempt to outclimb a 109 unless you have a serious speed advantage.
- Moderate use of flaps during low-speed turns can help you get an angle for a deflection shot.
- Be very careful if you engage a 109 in scissors: its slats give him the advantage during low-speed rolling manoeuvres.

PART VI: AIRCRAFT PERFORMANCE

MAXIMUM SPEED QMB CONDITIONS (Graph by Matt)

