



# L-39

## ALBATROS



# QUICKSTART GUIDE

D I G I T A L   C O M B A T   S I M U L A T O R

## HEALTH WARNING!

Please read before using this computer game or allowing your children to use it.

A very small proportion of people may experience a seizure or loss of consciousness when exposed to certain visual images, including flashing lights or light patterns that can occur in computer games. This may happen even with people who have no medical history of seizures, epilepsy, or “photosensitive epileptic seizures” while playing computer games.

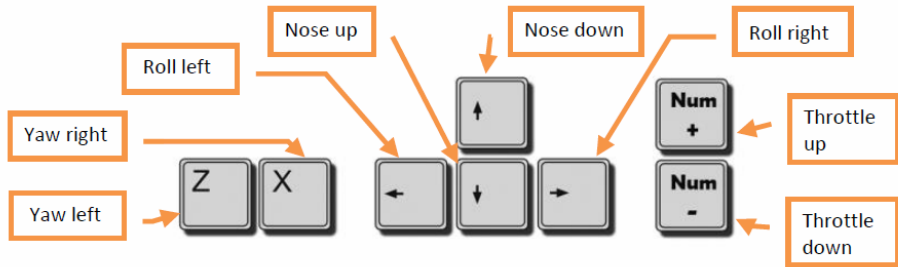
These seizures have a variety of symptoms, including light-headedness, dizziness, disorientation, blurred vision, eye or face twitching, loss of consciousness or awareness even if momentarily.

**Immediately stop playing and consult your doctor if you or your children experience any of the above symptoms.**

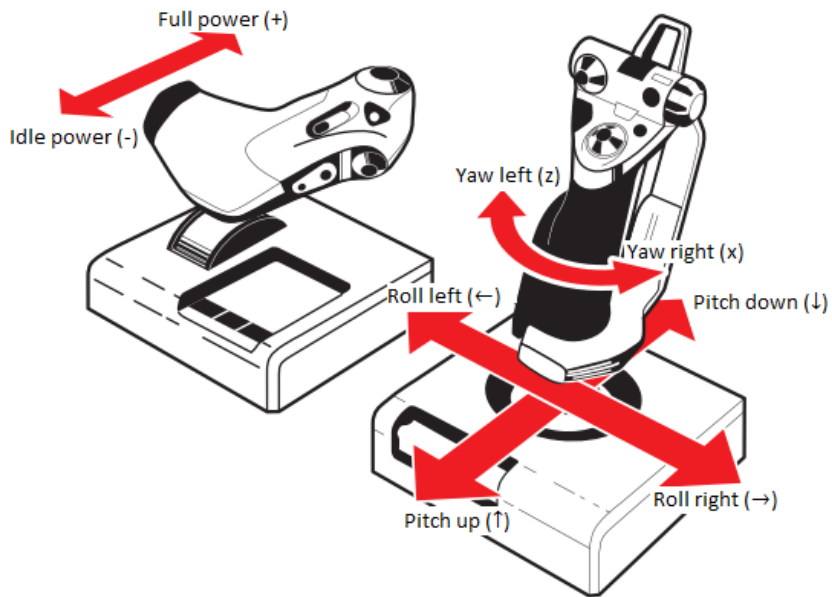
The risk of seizures can be reduced if the following precautions are taken, (as well as a general health advice for playing computer games):

- Do not play when you are drowsy or tired.
- Play in a well-lit room.
- Rest for at least 10 minutes per hour when playing the computer game.

## Keyboard controls



## Joystick controls



# ENGINE START AND FLIGHT

## Cold start

**Automatic engine start procedure is activated by key combination:**  
*[L. Win + Home].*

Engine should be started from the front cockpit, because STOP latch, which allows moving the throttle from the STOP to the IDLE and further, located on the front cockpit throttle only.

Engine can be started using ground power or battery.

### Enable:

- **BATTERY** (Battery) CB, the following signals should go on:
  - ENG. MIN. OIL PRESS.
  - GENERATOR.
  - EMERGENCY GENERATOR.
  - DON'T START.
  - CANOPY UNLOCKED.
  - AIRCONDIT OFF.
  - INV. 3x36V FAIL.
  - master caution panel.

If pressure in the hydraulic system is less than  $100 \pm 5 \text{ kg/cm}^2$  the HYD. SYST. FAIL signal is on.

Voltammeter should indicate not less than 24V.

If ground power is connected, signal with ground equipment icon should be on and voltammeter should indicate 27-29 V.



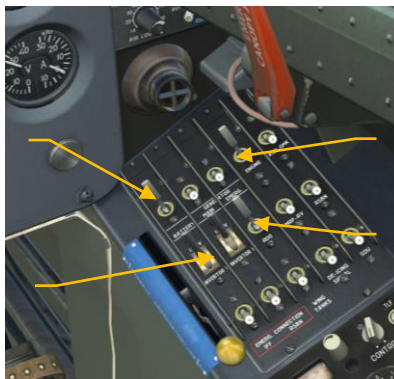
- **ENGINE** CB on main CB panel, as a result signals DON'T START and INV. 3x36V FAIL should go off.
- **115V INVERTOR I** and **115V INVERTOR II** circuit breakers (signal INV. 115V FAIL goes off).
- **RDO CB.**
- **FLT RECORDER.**

**Before engine start pilot must:**

- Set inner and outer NDBs frequencies on RKL-41.
- Set navigation and landing channels on RSBN-5S control panel.
- Set airfield atmospheric pressure on ZDV-30.
- Set required communication channel on R-832M.
- Set MC – GC switch into MC position, N – S switch in N, set the latitude of the airfield.

BATTER

115V INVERTOR - I (II)



ENGINE

RDO

FLT RECORDER



If start is going to be performed with help of ground power, pilot should request ground power connection from the ground crew [\\] (**radiomenu**), [F8], [F2], [F1] (**connect ground power**).

Set the wheel chocks under the main landing gear: [\\] (**radio menu**), [F8], [F4], [F1] (**set wheel chocks**).

Ask permission to start engine [\] (radio menu), [F5], F3] (Permission to start) and once received, disable:

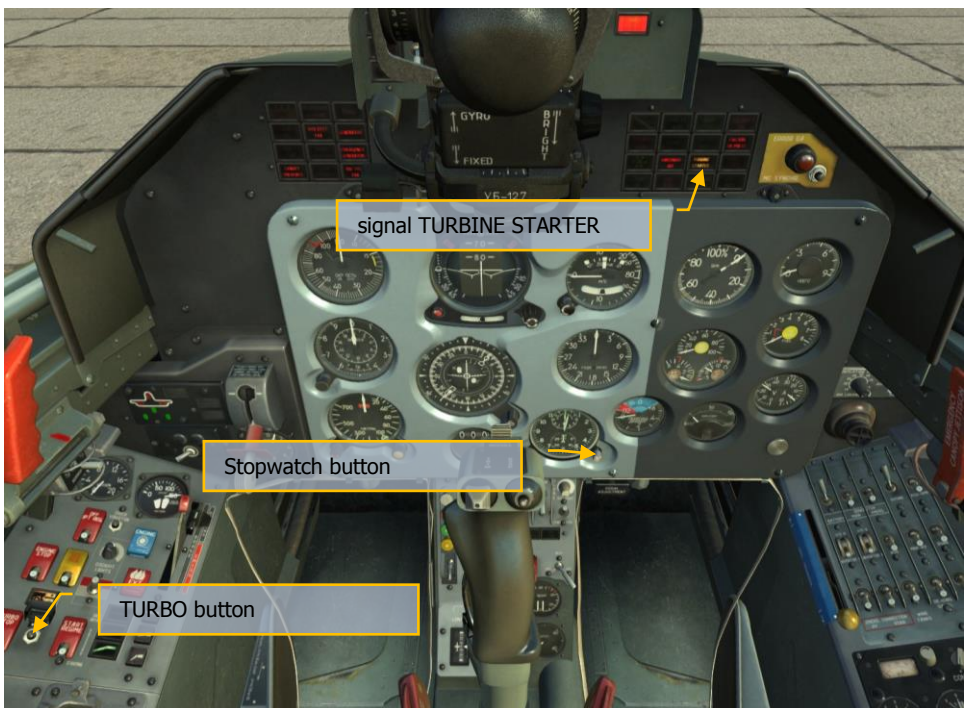
- **115V INVERTOR I CB.**
- **115V INVERTOR II CB.**
- **RDO CB.**

**Perform engine start.**

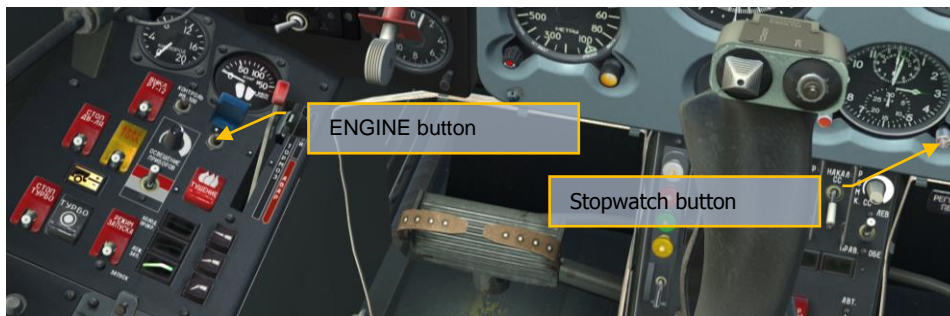
- Make sure that throttle is in STOP position and that DON'T START and INV. 3x36V FAIL signals are off.
- Start Sapphire-5 APU, for that simultaneously press stopwatch button and TURBO button for 1-2 seconds.
- Listen if APU has started and move sight to the caution & advisory lights panel, after 23-24 seconds, TURBINE STARTER signal flashes on. Now the engine can be started.







- Simultaneously press stopwatch button and ENGINE button for 1-2 seconds.



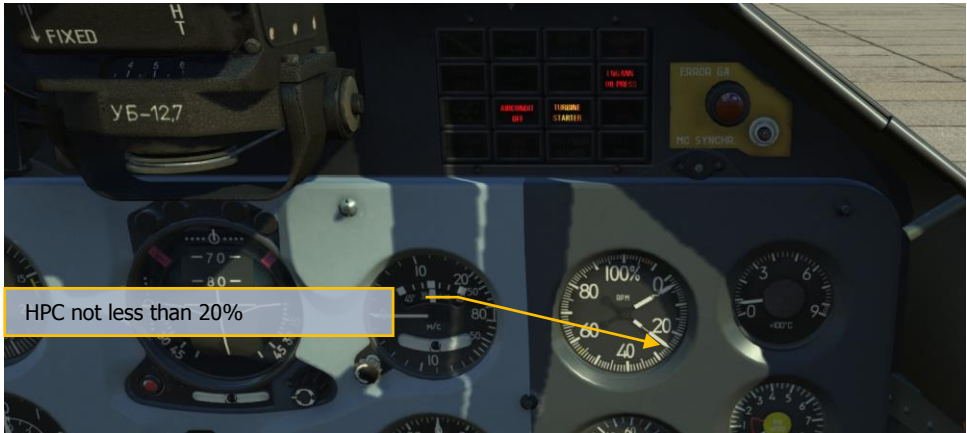
- After 3 – 6 seconds from the moment button was pressed move the throttle to the IDLE position [**RAlt + Home**].



After 3 – 6 sec. set  
throttle to IDLE



- Look at engine RPM gauge, HPC (n1) RPM should increase constantly and at 15<sup>th</sup> second, from the moment the ENGINE button was pressed, should be not less than 20%. From this point LPC (n2) RPM should start increasing as well.

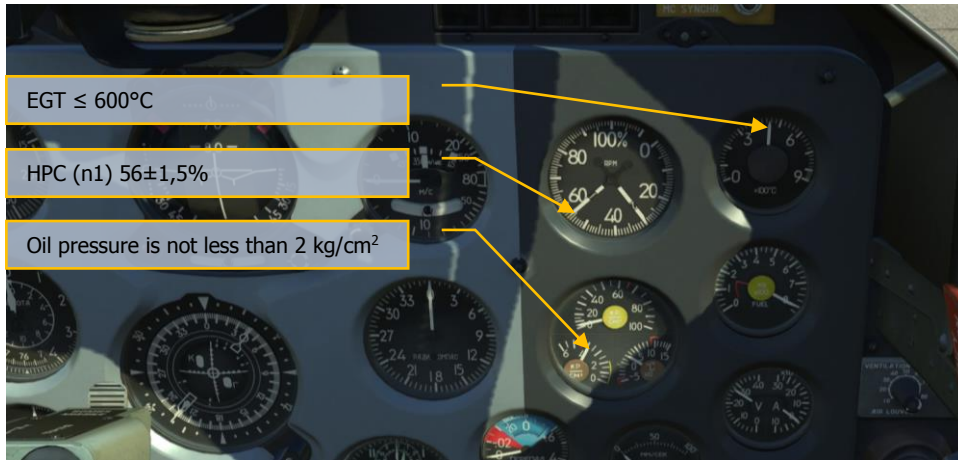


- Look at EGT gauge and as soon as temperature stop increasing, look back at the engine RPM gauge, HPC and LPC RPMs should be gradually increasing and reach values corresponding to IDLE mode.
- Press stopwatch button.



When engine operates at IDLE mode, check:

- HPC RPM should be within  $56 \pm 1,5\%$ .
- EGT should be not more than  $600^{\circ}\text{C}$ .
- Oil pressure is not less than  $2 \text{ kg/cm}^2$ , the ENG MIN. OIL PRESS is off.
- Engine start up time is not more than 50 sec.



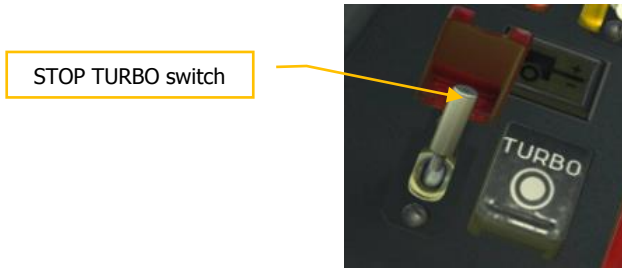
**NOTE:** When HPC RPM reach 41,5—44,5% within 45 seconds, the Sapphire-5 APU automatically shuts off, air starter disconnects, TURBINE STARTER signal goes off, finishing starting cycle. Engine reaches Idle mode (HPC RPM within  $56 \pm 1,5\%$ ;) on its own.

In case of unsuccessful engine start, perform cold rotation of the engine  
 For that set the STARTING – PRESERV. – COLD. ROTAT switch into COLD. ROTAT position.  
 In this case, ignition is disabled and starting and working fuel is not fed to engine.



Cold rotation is used to remove accumulated fuel from the combustion chamber. During cold rotation throttle should be kept in STOP position.

- Press TURBO button for 1 – 2 seconds.
- When TURBINE STARTER signal flashes, press ENGINE button for 1 – 2 seconds.
- air starter spins up the HPC rotor within 45 seconds and automatically disables, turbine Starter switches to idle mode.
- Disable turbine starter by STOP TURBO switch.



- When turbine starter is stopped return the STOP TURBO switch into initial position.
- Set the STARTING – PRESERV. – COLD. ROTAT switch back into STARTING position.
- Re-start the engine.

There is a possibility to do a false start, which is used for preservation and depreservation of fuel lines. During false start pilot performs the same actions as for normal start, except that STARTING – PRESERV. – COLD. ROTAT switch must be in PRESERV position. In this case ignition system is off, but all the starting units trigger in a normal (for engine start) sequence. This function is not implemented in simulator.

**After engine start enable:**

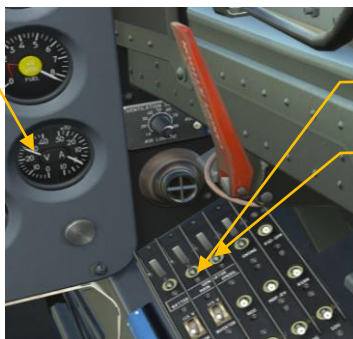
- **GENERATOR MAIN.**
- **GENERATOR EMERG.**

If ground power was used for engine start, give command to disconnect ground power. [\\] **(radiomenu), [F8], [F2], [F2] (disconnect ground power).**

The GENERATOR and EMERGENCY GENERATOR and "Ground power connected" signals go off.

Check that voltage in onboard network is within 27-29V using voltmeter.

V/A - 27 – 29 V



GENERATOR MAIN

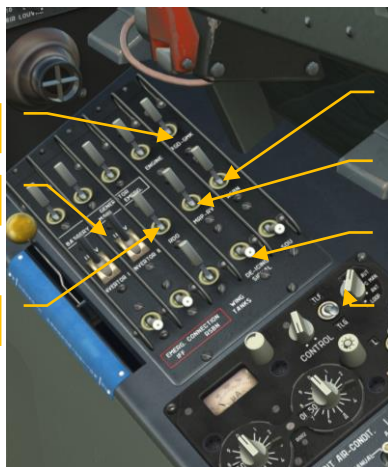
GENERATOR EMERG

- AGD-GMK.
- 115V INVERTOR I, 115V INVERTOR II.
- RDO.
- MRP-RV.
- RSBN (Iskra).
- WING TANKS.
- Operation mode switch on the RLK-41 control panel has to be set to C AUT.

AGD-GMK

115V INVERTOR – I (II)

RDO



RSBN

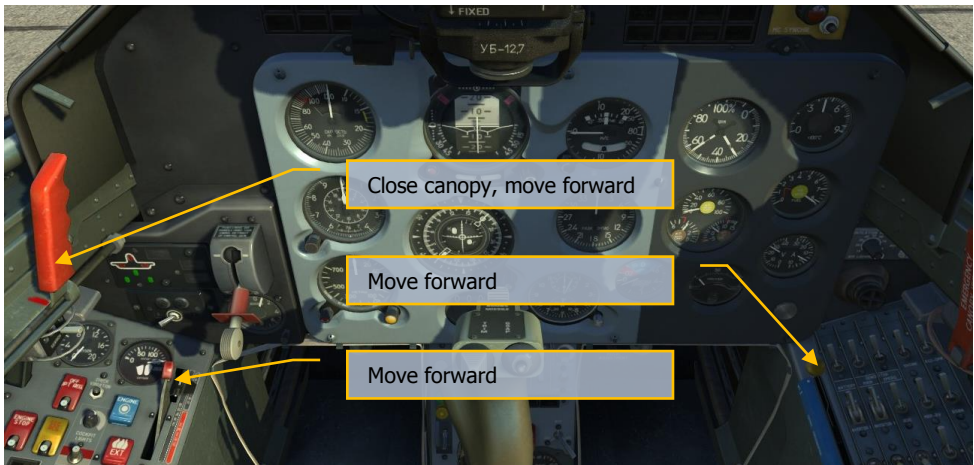
MRP - RV

WING TANKS

RLK-41 - C AUT

- Give Close canopy command \*, [\] (**radio menu**), [F8], [F2], [F1] (**Close canopy**).
- When the canopy is closed, move canopy locks' lever to the far most position, ensure that cockpit is reliably closed and the CANOPY UNLOCKED signal is off.
- Seal the cockpit by moving cockpit pressurization and ECS lever all the way forward, after 30 seconds AIRCONDIT OFF signal goes off. Check pressure difference in the cockpit, read on UVPD (0,02-0,05).
- Set emergency brake lever to the far most position (parking brake).

*\*Note: canopy can be opened and closed by player by pressing: [LCtrl + C].*



## Preparing to taxiing and taxiing

- Extend flaps at 25° [**Shift+F**].
- Press braking lever [**W**].
- Release parking brake.



- Give the "Remove wheel chocks" command to the ground crew [\] (**radio menu**), **[F8]**, **[F4]**, **[F2]** (**remove wheel chocks**).
- Slowly increase engine RPM **[Numpad+]** so that airplane starts rolling. If the front wheel was turned to the side at the start of movement, pilot has to prevent airplane from turning by using brakes.

Turns during taxiing are initiated by deflecting pedals **[Z]**, **[X]** (not less than 50% of full deflection range) together with brake **[W]** usage. To stop turning use short presses of opposite pedal and brake. Take the runway and roll 10-15 m in a straight line to align nose wheel with takeoff direction. Brake wheels **[W]**.

Check that aileron and elevator trimmers are in neutral positions.



If they are not in neutral positions using keys:

- **[RCtrl+]** - elevator trimmer up
- **[RCtrl+]** - elevator trimmer down
- **[RCtrl+]** - aileron trimmer left
- **[RCtrl+]** - aileron trimmer right

set the trimmers in neutral position.

Check if the RKL-41 ADF and the GMK-1AE compass show correct values (if necessary align it). Check that there are no warning signals except the DANGEROUS ALTITUDE.

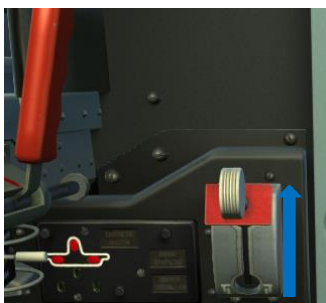
## Takeoff

- Move the throttle all the way forward to the TAKE OFF position, make sure that engine RPM reached takeoff value, release brakes and start takeoff run.
- During the first phase of run airplane must be kept in a straight line with help of brakes, after 60 km/h by rudder. The stick should be in neutral position.
- When speed reaches 150 km/h by smooth stick movement towards yourself (approximately half way back) lift the nose wheel to the takeoff position and keep this position until the airplane is airborne. If the wheel is lifted correctly, the horizon line will be aligned with gunsight pillow.
- At 190-200 km/h airplane smoothly detaches from the ground.





- At height of 20 m and speed of not less than 250 km/h retract landing gear by setting the landing gear control lever in the upper position **[G]**.

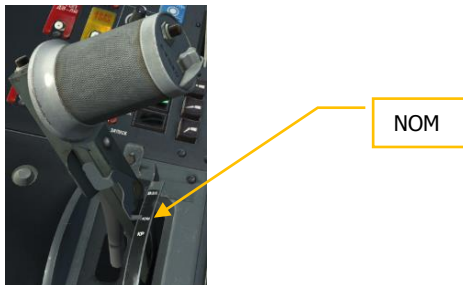


- At altitude of 50-70 meters and speed of not less than 280 km/h retract flaps **[F]**.



***WARNING. At IAS of 310 km/h flaps retract automatically.***

- After flaps retraction, at altitude of 100 m, set engine RPM to NOM mode and continue climbing, increasing speed to 400 km/h.



## Landing approach

- At altitude of 600 m, speed of 350 km/h and distance of 15 km. by maneuvering the airplane align flight direction with runway threshold.



- Decrease engine RPM to 80%, reduce speed to 330 km/h, and extract gears **[G]**.



- At speed of 280 km/h extend flaps at 25° **[LShift+F]**.



- Increase engine RPM to 90%.
- Descent with  $V_y$  3 – 4 m/s, keeping speed of 280 km/h.
- Maneuver airplane so that flight direction is aligned with runway threshold, control altitude and speed.
- At distance of not less than 4 km extend flaps at 44°. **[LCtrl+F]** and set  $V_y$  2 m/s.



- Descent towards runway threshold gradually reducing speed to 230 km/h.



## Landing

At altitude of 8 – 10m by smoothly pulling the stick start flaring with such a descending rate that airplane flares at altitude of 1m. At the end of flaring gradually reduce engine RPM. **[Numpad-]**.

While airplane descends towards the ground by pulling the stick create landing angle so that airplanes lands on two main wheels without parachuting. Airplane lands at speed of 180 km/h.

After front wheel touched the ground start braking by pressing smoothly the brake lever, pedals are in neutral position.

After landing run leave the runway, retract flaps **[F]** and taxi to the parking place.

## Engine shutoff

Automatic engine shutoff procedure is activated by key combination **[L.Win + End]**.

### **When arrived at parking place:**

- Set the throttle to idle mode.
- Move the cockpit pressurization and ECS lever all the way back.
- Set operating mode switch on the RKL-41 control panel set to the OFF position.
- Disable all the CBs, leave only ENGINE CB, BATTERY and FLT RECORDER switches enabled.
- Set throttle to the STOP position **[RAlt + End]**.
- Open canopy locks.
- Give command "Open Canopy" to the ground crew. **[\\] (radio menu), [F8], [F2], [F1] (Open canopy)**.
- After engine RPM pointers reached scale zero, disable all remaining CBs on the main CB panel and disable the FLT RECORDER switch.

# ARMAMENT AND COMBAT APPLICATION L-39C

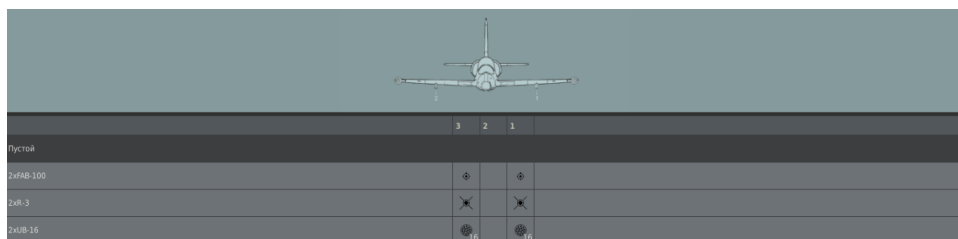
## Aircraft Armament

The L-39C airplane has bomb and missile armament. It has the ASP-3NMU-39 gunsight, FKP-2-2 gun camera and EKSR-46 auxiliary armament.

Armament, gunsight and photo control equipment of the L-39C are used for the following tasks:

- Accurate dive bombing with 50 – 100 kg bombs.
- Accurate S-5 rocket shooting at ground target during diving.
- Shooting R-3S at aerial targets.

**Weapon controls are concentrated on the center panel in front cockpit. Combat button is located on the stick in the front cockpit only.**





## Bombing flights

Before the flight, make sure that the NETW, ARMS and SIGNAL CBs are enabled in rear cockpit.

**Very important phase of dive bombing is arriving at point where turn and dive entry are performed. The accuracy of arriving at this point impacts on dive angle and release speed.**

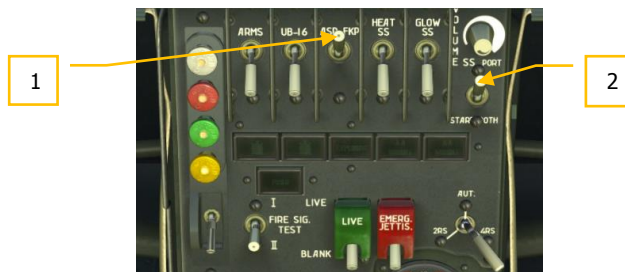
Bombing should be performed at diving angles of 20, 30 и 40 under conditions listed in Table 1.

Table 1.

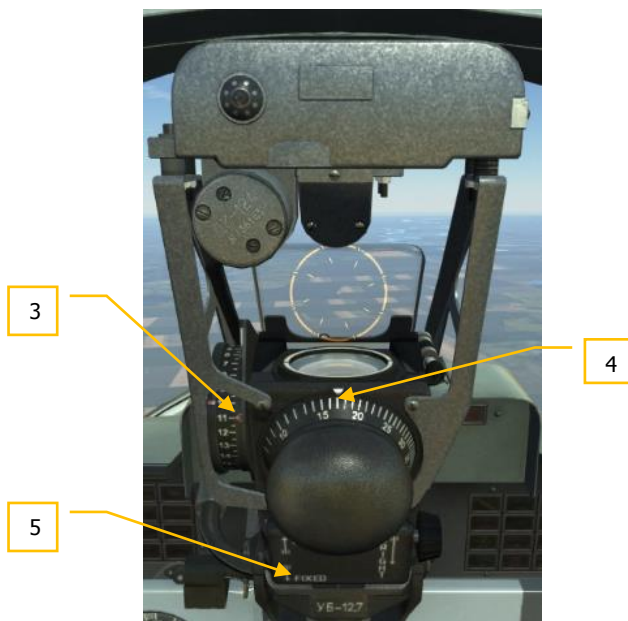
Nº	Parameters	20°	30°	40°
1	Gunsight reflector deflection angle	13°	11°	10°
2	Dive entry altitude at ingress point	1200 m	1500 m	1800 m
3	Dive entry speed at ingress point	440 km/h	350 km/h	300 km/h
4	Release altitude	730 m.	800 m	1100 m
5	Release speed	570 km/h.	550 km/h.	560 km/h
6	RPM	97%	92%	МГ%

**While approaching target:**

1. Enable ASP-FKP CB [LShift+7].
2. Set the desired bombs release mode using the PORT- STARB. BOTH switch [RAlt+RCtrl+RShift+R].



3. Set gunsight reflector to angle corresponding to dive angle and raise the seat to the upper position [**LShift+S** – **raise the seat**, **LAlt+LShift+S** – **lower the seat**] so that one could see the central dot of aiming grid and upper part of the range finding circle. Due to that, habitual view from the cockpit will change.
4. Set the fictitious target base.
5. GYRO-FIXED switch set in the FIXED position. [**LShift+J**].

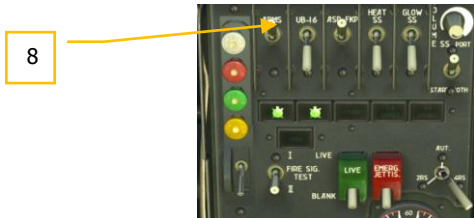


6. Enter minimum distance into gunsight [.]



**Actions in the target area:**

7. Approach target required altitude of and at required speed (see Table 1).
8. Enable the ARMS CB **[LShift+5]**.



9. Ingress maneuver should be performed in such a way that target moved to the required target viewing angle (turn starting point).

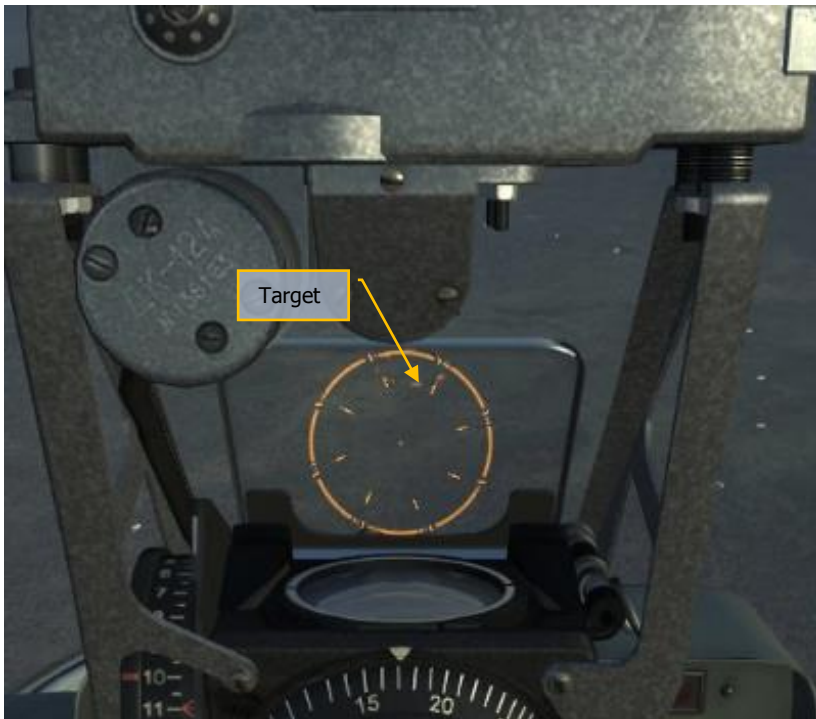




10. At the moment when target reaches required viewing angle, start turning towards attack course with 60-120° roll and simultaneous dive entry.



11. Turn and dive entry should be finished in such a way that aiming grid center is under the target at distance equal to 1 radius of the constant diameter aiming circle.



12. Flip the combat trigger down [**LCtrl+Space**], and while airplane is descending, the central dot of the aiming circle will be moving towards the target, speed and altitude - towards the required release values.

13. When required speed and altitude are reached and central dot is aligned with the target, press the combat trigger (1 second) **[Space]** and release the bombs.



14. Immediately after bombing exit from the dive with G-factor of 4-5 units, simultaneously increasing engine RPM to TAKE OFF.



## Flight for shooting unguided rockets

Before the flight make sure that the NETW, ARMS and SIGNAL CBs are enabled in rear cockpit.

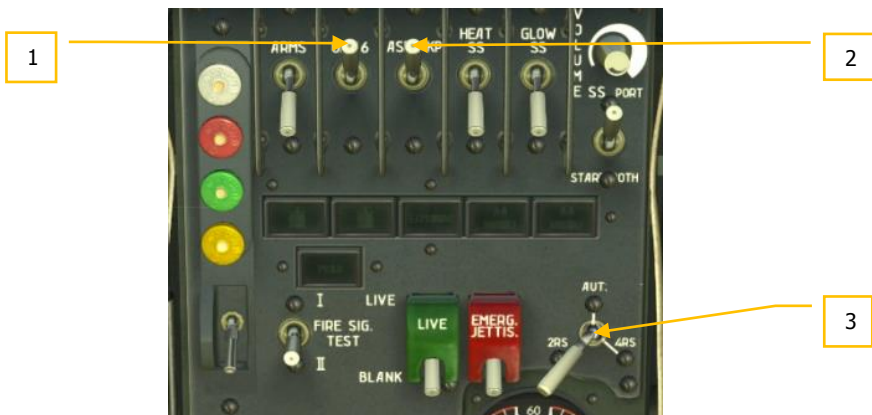
Unguided rockets should be fired at dive angles of 20 and 30° under conditions listed in the Table 2.

Table 2.

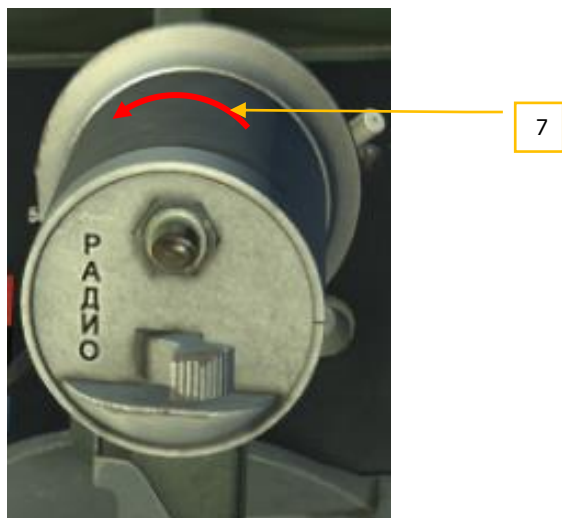
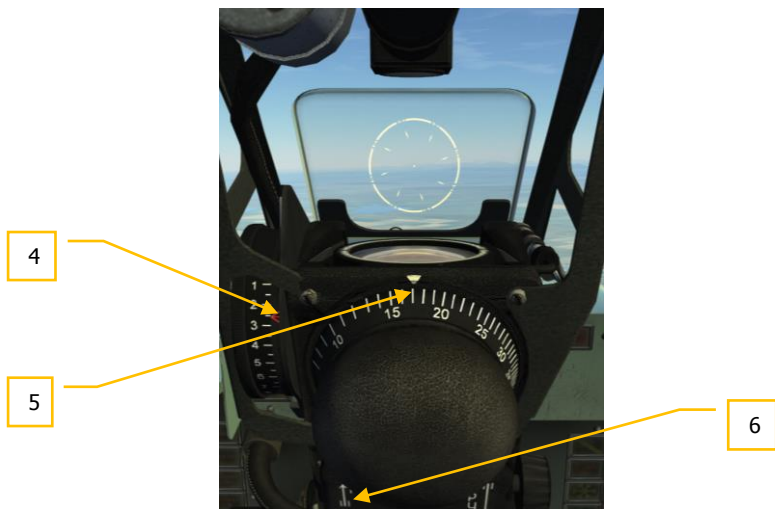
Nº	Parameters	30°	20°
1	Gunsight reflector deflection angle	2,53°	2,30°
2	Dive entry altitude at ingress point	1200 m.	1200 m
3	Dive entry speed at ingress point	300 km/h	400 km/h
4	Shooting altitude	600 m.	500 m.
5	Speed at shooting moment	550 km/h	560 km/h
6	Shooting distance	1200 m	1460 m

While approaching target:

1. Enable UB-16 CB [LShift+6].
2. Enable the ASP-FKP CB [LShift+7].
3. Using the 2RS – AUT – 4RS select desired shooting mode [RAlt+V] – [RShift+V] – [RCtrl+V].



4. Set required gunsight reflector angle corresponding to chosen dive angle.
5. Set fictitious target base.
6. Set the GYRO-FIXED switch to the GYRO position [**LShift+J**].
7. Enter the minimum distance into gunsight [**.]**.



**Actions in the target area:**

8. Approach target at altitude of 1200 m. at required speed.
9. Enable the ARMS CB [LShift + 5].



10. Ingress maneuver should be performed in such a way that target moved to the required target viewing angle (turn starting point).
11. At the moment when target reaches required viewing angle, start turning towards attack course with 60—120° roll and simultaneous dive entry.
12. Turn and dive entry should be finished in such a way that aiming grid center was under the target.



13. Flip the combat trigger down [LCtrl+Space], enter the maximum distance into gunsight [;] As a result, aiming reticle starts moving, reacting on aircraft maneuvers. Align aiming grid center with target's center.

14. While descending, keep central dot of aiming circle on the target.
15. As soon as target fits the circle, formed by the diamonds, press the combat trigger (1 sec) **[Space]** and perform shooting.



16. Immediately after shooting exit from the dive with G-factor of 3-3.5 units, simultaneously increasing engine RPM to TAKE OFF.

## Combat employment at aerial targets

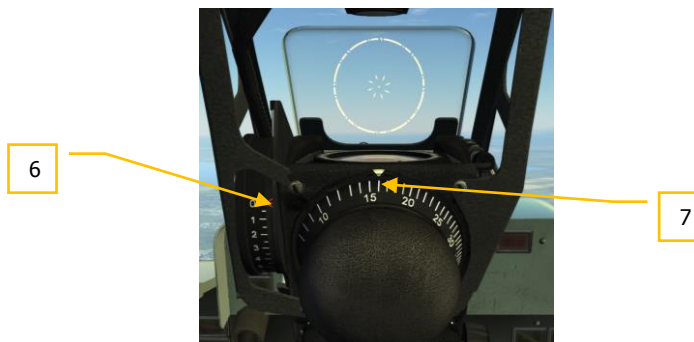
Before the flight, make sure that the NETW, ARMS and SIGNAL CBs are enabled in rear cockpit.

### Before intercept:

1. Enable ASP-FKP CB [LShift+7].
2. Enable HEAT SS CB [LShift+8].
3. Enable GLOW SS CB [LShift+9].
4. VOLUME SS - set the maximum volume.
5. Using the PORT – STARB. BOTH select missile to be launched [RAlt+RCtrl+RShift+R].



6. Set the gunsight reflector angle of 0°.
7. Set the fictitious target base of 16 m.
8. GYRO-FIXED switch is in FIXED position [LShift+J].



9. Enter the maximum range [;].



**Note:** Perform guided missile launch from rear hemisphere at target angles from 0/4 to 2/4, sun bearing should be not more than 20°. Missile firing range is within 1200-2000 m, according to ASP-3NMU-39, closing speed is not more than 200 km/h. Attack exit perform at distance of not less than 1000 m. Launch is allowed when missile seeker lock signal is at maximum level (at allowed launch distance) and G-factor is less than 2 units.

## Intercept:

10. Find a target and prepare for attack: distance - 2000 m, target should be seen at angle of 50 - 60°, altitude difference is 300 - 400 m.
11. Enable ARMS CB [LShift + 5].





12. Turn towards the target with roll angle of 50-60°, when the target reaches gunsight reflector remove roll, flip combat trigger **[LCtrl+Space]**.
13. Aim, by maneuvering aircraft achieve the maximum of the audial signal.
14. NO LAUNCH is off.



***Note: NO LAUNCH signal indicates that allowed G-factor of more than 2 units is exceeded. Missile cannot be precisely pointed to the target.***

15. When target visible size is 3—2 times smaller than the rangefinding circle, launch missile by pressing combat trigger [Space] for not less than 2—2.5 seconds.



16. Exit from attack run.
17. Perform consecutive attack run.

# ARMAMENT AND COMBAT APPLICATION L-39ZA

## Aircraft Armament

The L-39ZA is equipped with bombing, missile, gun and machine-gun armament. It has the ASP-3NMU-39 3 gunsight, FKP-2-2 gun camera and EKSR-46 auxiliary armament.

Armament, gunsight and photo control equipment of the L-39ZA are used for the following tasks:

- Spot bombing from diving with 50- to 500-kg aircraft bombs.
- Aimed fire with rockets of S-5 type on ground targets from diving.
- Launch of guided missiles P-60 (P-3S) on air targets.
- Aimed fire from GS-23 gun on ground targets from diving.
- Aimed fire from PK-3 machine-gun pod on ground targets from diving.

To attach weapons, the L-39ZA is equipped with two outboard pylons L39-M-619, L39-M-620 and two inboard pylons L39-M-639, L39-M-640.

The ASP-ZNMU-39 3 sight installed on the L-39ZA is designed for a 23mm cartridge ballistics of the GS-23L gun. On the contrary, the sight on the L-39C is designed for the 12.7 mm machine-gun cartridge ballistics.

In other respects the ASP-3NMU-39 3 sight is similar to the ASP-3NMU-39.

**Armament controls are arranged in the armament panel, center panel and in the LH side of the front cockpit. The trigger button is located on the aircraft control stick in the front cockpit only.**

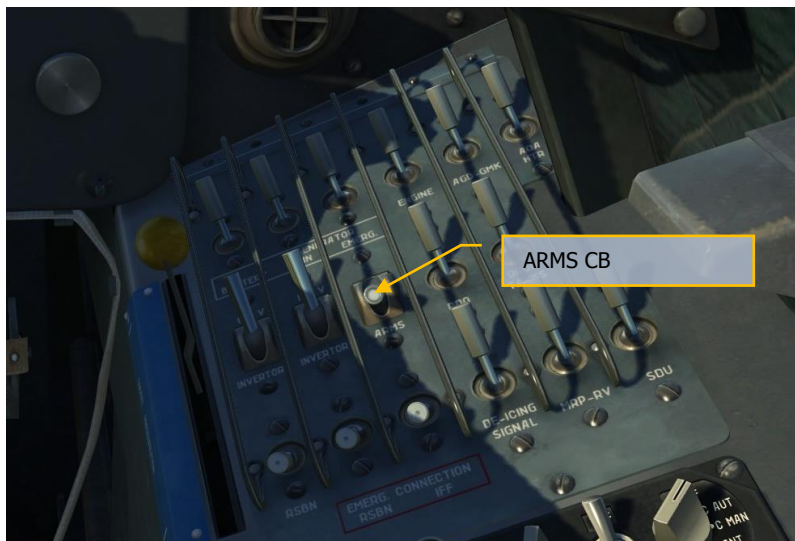
## Bombing flights

Before the flight, make sure that the NETW, ARMS and SIGNAL CBs are enabled in rear cockpit.

Bombing parameters for L-39ZA are similar to those for L-39C.

**Before the target approach:**

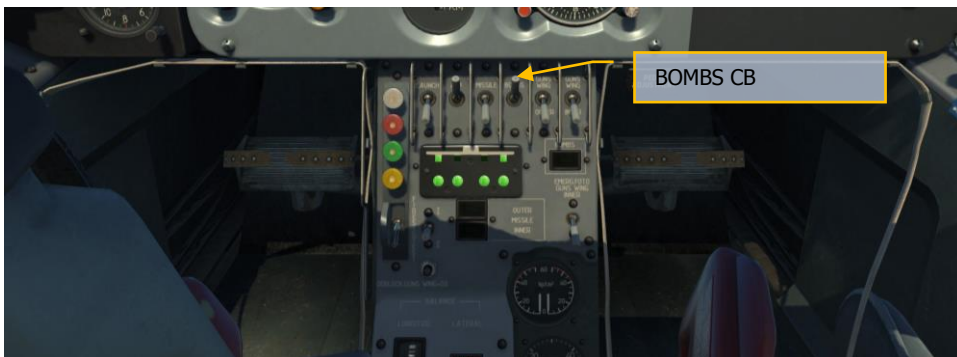
1. Enable the ARMS CB **[RCtrl+3]**.



2. Enable the ASP CB [**LAlt+2**].



3. Set the reflector inclination angle and lift the seat to the upper position in order to see the center sight point and the upper part of the distance measuring circle. Set the fictitious target base.
4. Set the GYRO – FIXED switch to FIXED **[LShift+J]**.
5. Enter the minimum range into the sight **[.]**.
6. Enable BOMBS CB **[LAlt+4]**.

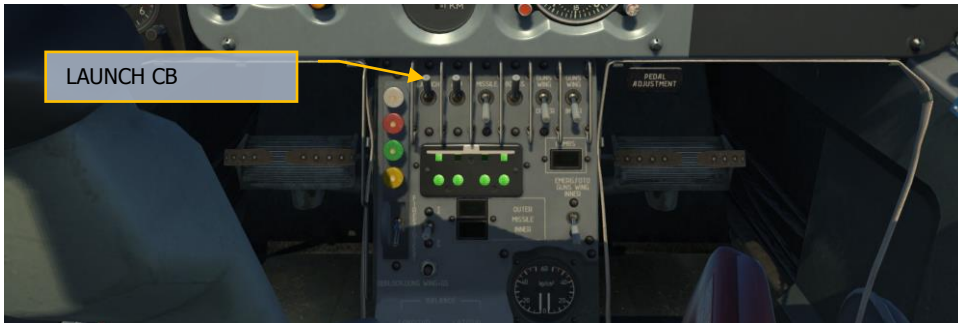


7. Select the pylons using the WEAPON CARRIER buttons.  
**[LShift+6]** — inboard pylons.  
**[LShift+5]** — outboard pylons.
8. Select the BA use mode with the BOMBS TRAIN. – 1 – SALVO switch.  
**[LAlt+LCtrl+LShift+S]** – Up.  
**[LAlt+LCtrl+LShift+X]** – Down.



**Actions in the target area:**

9. Enable LAUNCH CB [LAlt+1].



10. Arrange a target approach maneuver so that the target moves to the specified sight angle.
11. Start a turn to the bombing run with a roll of 60- 120° and simultaneous diving at the moment of target approach to the specified sight angle. Set the specified speed after the diving is established.
12. Finish the turn and the diving so that the sight reticle center is under the target at the distance equal to one radius of the sight reticle circle having a constant diameter.
13. Lift the TB [LCtrl+Space] cap; as aircraft descends, the sight reticle center point will shift to the target, and the speed and altitude will approach the nominal release parameters.
14. Press the TB [Space] and release a bomb when the specified speed and altitude are reached, and sight center point is aligned with the target.
15. Pull out from dive with g-load equal to 4 to 5 with simultaneous acceleration up to the takeoff power.

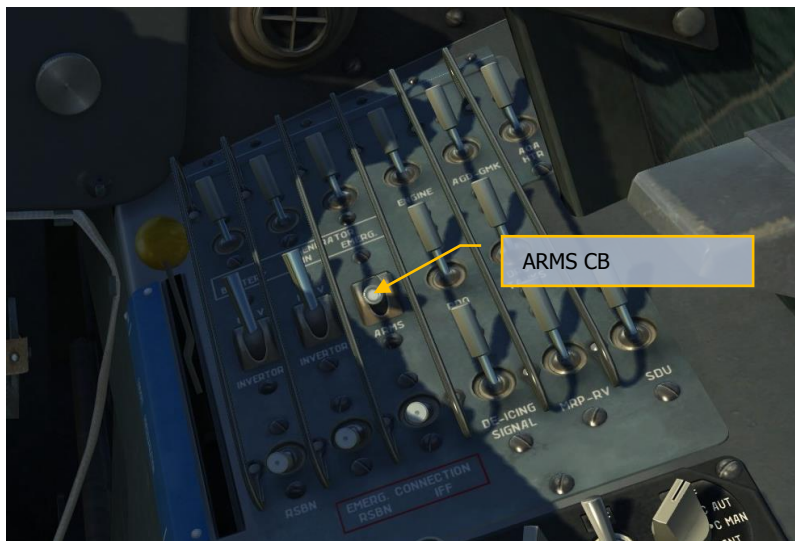
## Rockets firing flight

Before the flight, make sure that the NETW, ARMS and SIGNAL CBs are enabled in rear cockpit.

The L-39ZA firing parameters are similar to the L-39C's.

**Before the target approach:**

1. Enable ARMS CB [**R**Ctrl+**3**].



2. Enable ASP CB [**L**Alt+**2**].

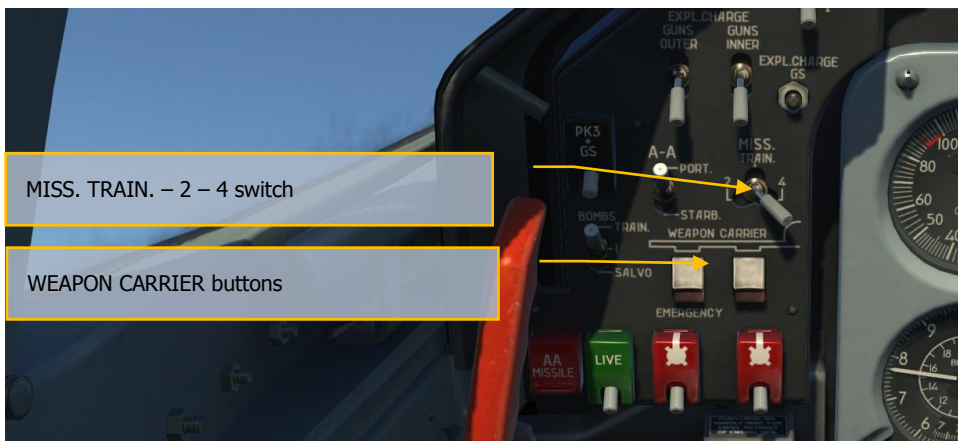




3. Set the sight reflector inclination angle.
4. Set the fictitious target base.
5. Set the GYRO – FIXED switch to FIXED **[LShift+J]**.
6. Enter the minimum range into the sight **[.]**.
7. Enable MISSILE CB **[LAlt+3]**.

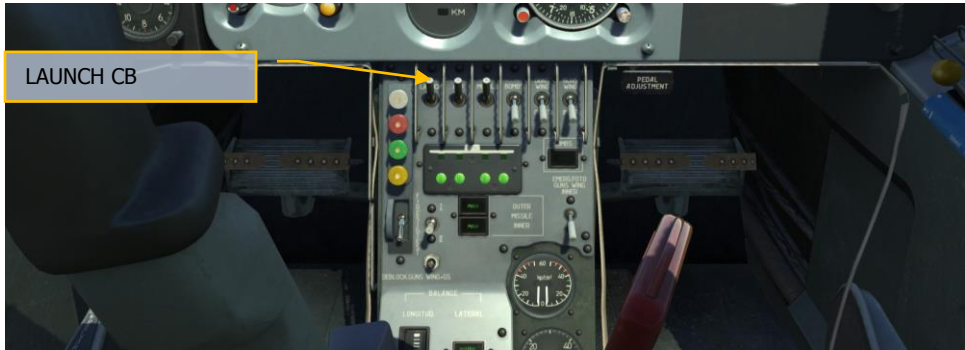


8. Set the firing option via the MISS. TRAIN. – 2 – 4 switch **[RShift+V]** — **[RAlt+V]** — **[RCtrl+V]**.
9. Select the pylons using the WEAPON CARRIER buttons.  
**[LShift+6]** — inboard pylons.  
**[LShift+5]** — outboard pylons.



**Actions in the target area:**

10. Enable LAUNCH CB [**LAlt+1**].



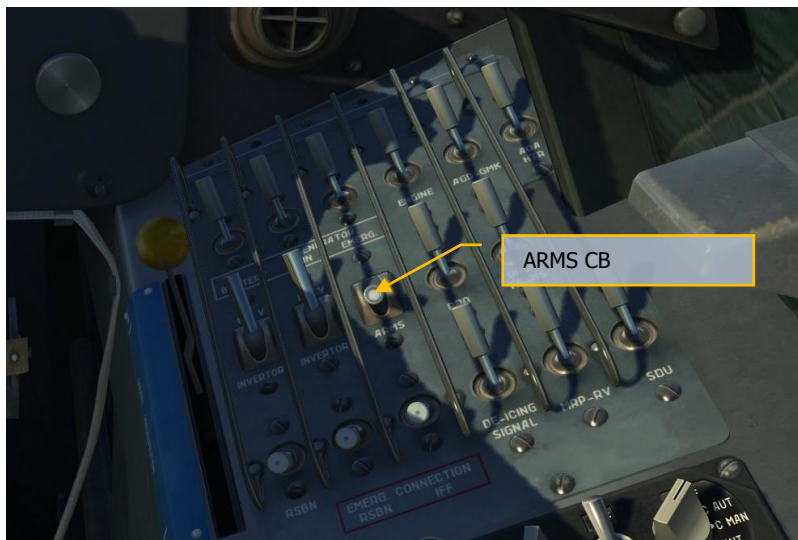
11. Set the GYRO – FIXED switch to GYRO [**LShift+J**].
12. Arrange a target approach maneuver so that the target moves to the specified sight angle (turn starting point).
13. Start a turn to the attack heading with a roll of 60- 120° and simultaneous diving at the moment of target approach to the specified sight angle. During the diving, set the engine speed to idle for the dive angle 30° and to 90-92% for the dive angle 20°.
14. Finish the turn and diving so that the sight reticle center is under the target.
15. Lift the TB [**LCtrl+Space**] cap, enter the maximum range [**;]** into the sight, align the sight reticle center with the target center.
16. Hold the sight reticle center on the target during the dive.
17. When the target fits into the circle formed by the sight reticle rhombi, press the TB [**Space**] and perform the launch.
18. Immediately after the launch, pull out with the g-load 3 to 3.5 and simultaneously accelerate to the takeoff power.
19. After pulling out, enter the minimum range into the sight and commence the next attack maneuver.

## Intercepting air targets

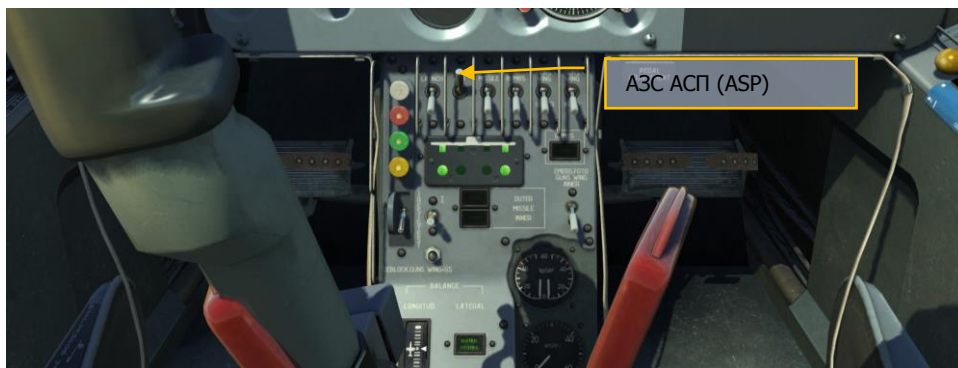
Before the flight, make sure that the NETW, ARMS and SIGNAL CBs are enabled in rear cockpit.

**Before the intercept:**

1. Enable ARMS CB [**RCtrl+3**].



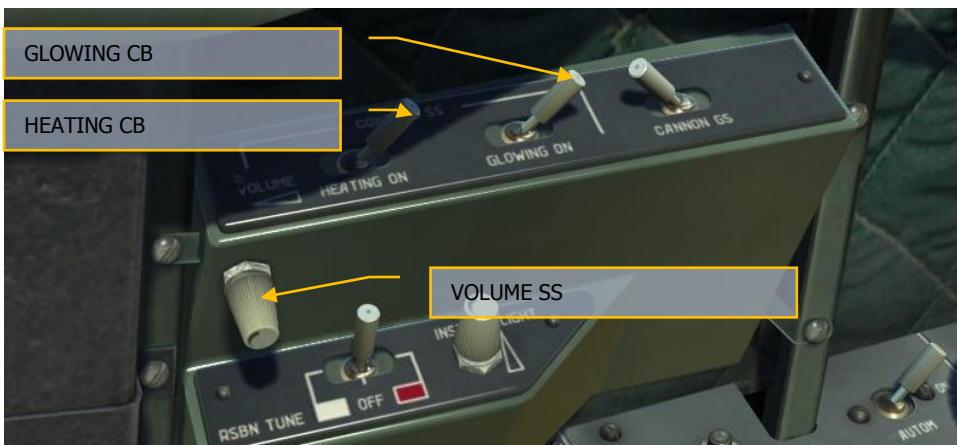
2. Enable ASP CB [**LAlt+2**].



3. Set the sight reflector inclination angle to 0°.
4. Set the fictitious target base.
5. Set the GYRO – FIXED switch to FIXED [**LShift+J**].
6. Enter the maximum range into the sight [**;**].
7. Enable MISSILE CB [**LAlt+3**].



8. Enable GLOWING CB [**LShift+9**].
9. Enable HEATING CB [**LShift+8**].
10. Set the VOLUME SS handle to the max volume.



11. Select a missile to launch using the A-A PORT. – STARB switch [**RAlt+RCtrl+RShift+R**].
12. Press the left WEAPON CARRIER button to select the outboard pylons [**LShift+5**].



### Intercepting:

13. Locate the target and take the initial attack position, range 2000 m, angle of sight to the target 50 - 60°, excessive or deficient altitude 300 to 400 m. Lift the TB cap [**LCtrl+Space**].
14. Enable LAUNCH CB [**LAlt+1**].



15. Perform the corrective turn to the target with a roll of 50 - 60°; remove the roll at target approach to the sight reflector.
16. Perform the sighting, identify the maximum acoustic signal by turning the aircraft.
17. The NO LAUNCH signal shall be off.
18. Launch the missile by pressing the TB [**Space**] at the moment when the visible target dimensions are 2-3 times less than the distance measuring circle diameter.
19. Recover from the attack.
20. Commence the next attack run.

## Firing the GS-23 gun on ground targets

Before the flight, make sure that the NETW, ARMS and SIGNAL CBs are enabled in rear cockpit.

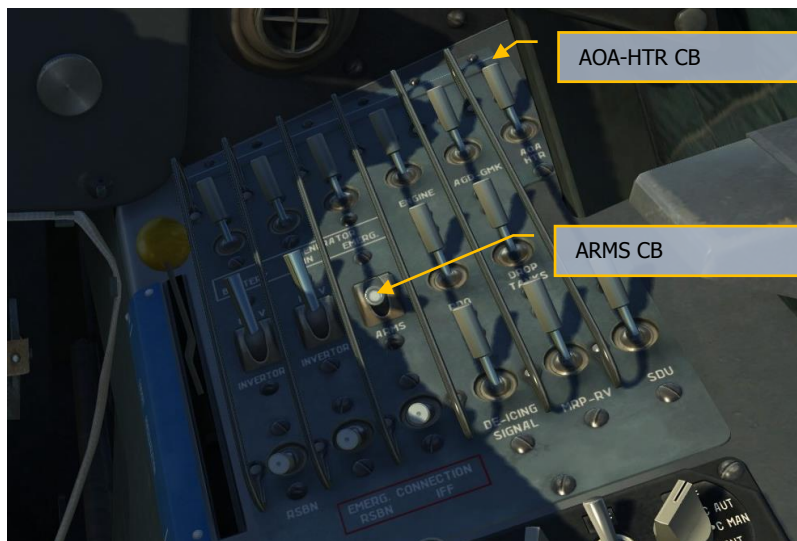
Fire the gun at the 20-30° angle in conditions listed in Table 3.

Table 3.

No.	Parameters	30°	20°
1	Sight reflector inclination angle, degrees	1.38	1.51
2	Target approach and diving altitude, m	1200	1200
3	Target approach and diving speed, km/h	400	400
4	Firing altitude, m	600	500
5	Speed when firing, km/h	600	600
6	Firing range, m	1200	1460

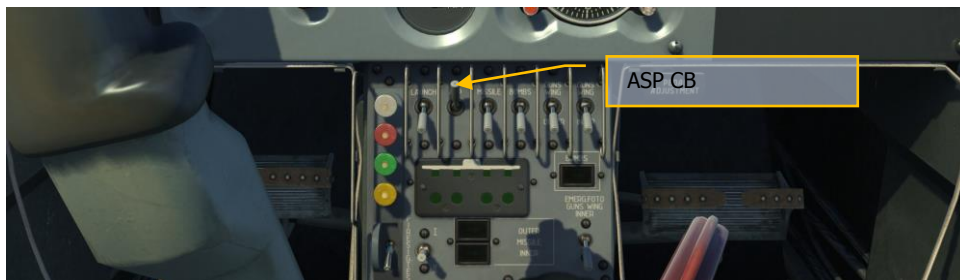
**Before the target approach:**

1. Enable ARMS CB [**R**Ctrl+3].
2. Enable AOA-HTR CB [**R**Shift+6].

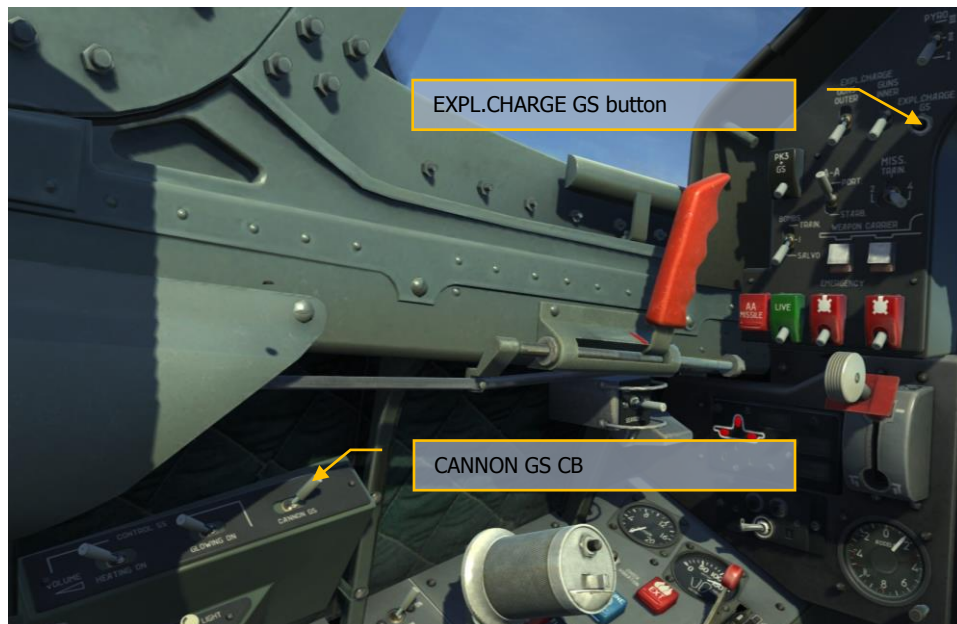




3. Enable ASP CB **[LAlt+2]**.



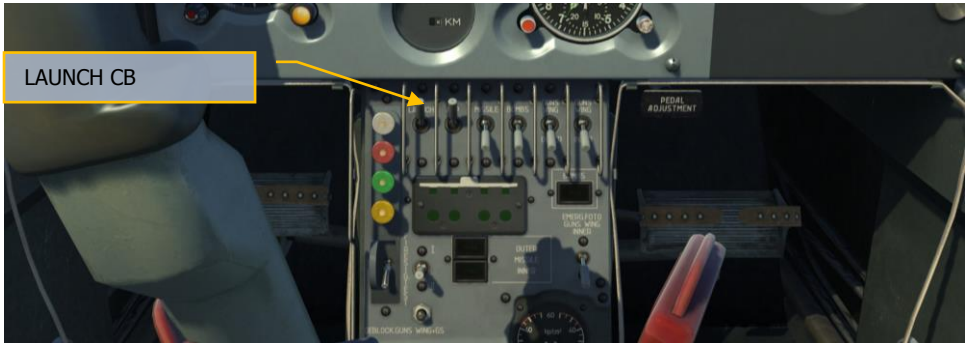
4. Set the sight reflector inclination angle.
5. Set the fictitious target base.
6. Set the GYRO – FIXED switch to FIXED **[LShift+J]**.
7. Enter the minimum range into the sight **[.]**.
8. Enable CANNONGS CB **[LShift+0]**.
9. Press the EXPL.CHARGE GS button to load the gun **[LAlt+LCtrl+LShift+S]**.





**Actions in the target area:**

10. Approach the target at the specified altitude and speed.
11. Enable LAUNCH CB **[LAlt+1]**.



12. Set the GYRO – FIXED switch to GYRO **[LShift+J]**.
13. Perform the target approach maneuver so that the target moves to the specified sight angle (turn start point).
14. Start the turn to the attack heading with a roll of 60—120° and simultaneous diving at the moment of the target approach to the specified sight angle. During the diving, do not decrease the engine speed under 90%.
15. Finish the turn and diving so that the sight reticle center is under the target.
16. Lift the TB **[LCtrl+Space]** cap, enter the maximum range **[;]** into the sight, align the sight reticle center with the target center.
17. Hold the sight reticle center on the target during the dive.
18. When the target fits in the circle formed by the sight reticle rhombi, press the TB **[Space]** and fire.
19. Immediately after the firing, pull out with the g-load 3 to 3.5 and simultaneously accelerate to the takeoff power.
20. After pulling out, enter the minimum range into the sight and commence the next attack maneuver.

## Firing the PK-3 machine-gun pod on ground targets

Before the flight, make sure that the NETW, ARMS and SIGNAL CBs are enabled in rear cockpit.

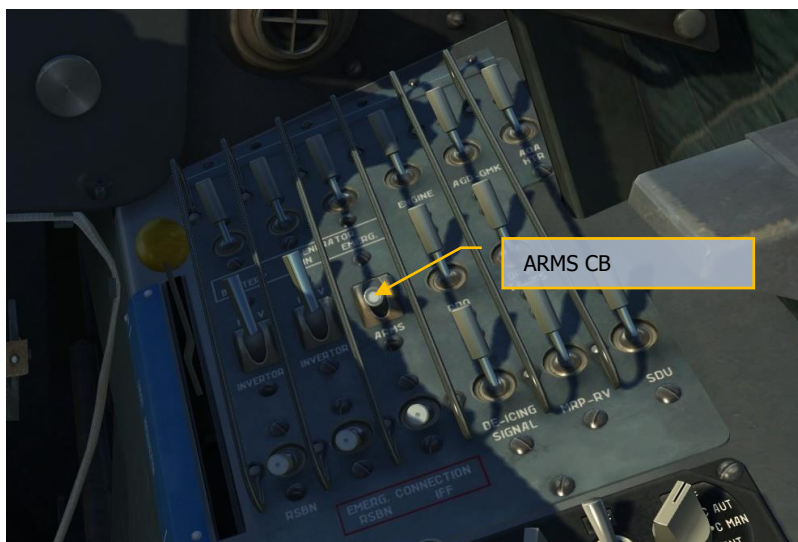
Fire the PK-3 at the 20-30° angle in conditions listed in Table 4.

Table 4.

No.	Parameters	30°	20°
1	Sight reflector inclination angle, degrees	1.38	1.51
2	Target approach and diving altitude, m	1200	1200
3	Target approach and diving speed, km/h	400	400
4	Firing altitude, m	600	500
5	Speed when firing, km/h	600	600
6	Firing range, m	1200	1460

### Before the target approach:

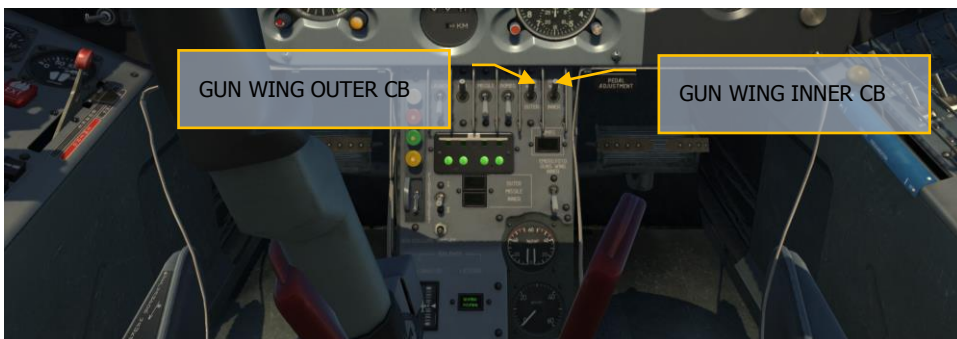
1. Enable ARMS CB [RCtrl+3].



2. Enable ASP CB **[LAlt+2]**.



3. Set the sight reflector inclination angle.
4. Set the fictitious target base.
5. Set the GYRO – FIXED switch to FIXED **[LShift+J]**.
6. Enter the maximum range into the sight **[;]**.
7. Enable GUN WING OUTER CB **[LShift+5]**.
8. Enable GUN WING INNER CB **[LShift+6]**.



9. Switch on the EXPL.CHARGE GUNS INNER switch [**LAlt+LCtrl+LShift+E**].
10. Switch on the EXPL.CHARGE GUNS OUTER switch [**LAlt+LCtrl+LShift+W**].
11. Select the pylons via the WEAPON CARRIER buttons.  
**[LShift+6]** — inboard pylons.  
**[LShift+5]** — outboard pylons.



## Actions in the target area:

12. Approach the target at the specified altitude and speed.
13. Enable LAUNCH CB [**LAlt+1**].



14. Perform the target approach so that the target moves to the specified sight angle (turn start point).

15. Start the turn to the attack heading with a roll of 60- 120° and simultaneous diving at the moment of the target approach to the specified sight angle. During the diving, set the engine speed to 90-92%.
16. Finish the turn and diving so that the sight reticle center is under the target.
17. Lift the TB **[LCtrl+Space]** cap and align the sight reticle center with the target center.
18. Hold the sight reticle center on the target during the dive.
19. When the target fits in the circle formed by the sight reticle rhombi, press the TB **[Space]** and fire.
20. Immediately after firing, pull out with the g-load 3 to 3.5 and simultaneously accelerate to the takeoff power.