User Guide

IL-2 Sturmovik: 1946
v.4.13

In memoriam
Martin "Boose" Vrábel

New AI planes

- Aichi E13A floatplane
- He-177 A-3
- Ju 88 A-1
- Ju 88 A-5
- Ju 88 A-6
- Ju 88 C-2

New Flyable Planes

- B-24D-140-CO
- IK-3
- Ju 88 A-5 Late
- Ju 88 P-1
- N1K1-J
- N1K1-Ja
- N1K1-Jb
- SB 2M-103

New plane external models

- P-40E (with 17 default skins)
- P-40E M-105 field mod.

New ground units

- 2cm Flak 38 Vierling
- Skoda Pa.II 'Zalva' armored car (MG and radio version)
- Jagdtiger
- M10 tank destroyer: early and late (late comes with closed and opened hatch)
- M36 tank destroyer with closed an opened hatch
- 2cm Flak 38 Vierling
- Type 94 tankette (Japanese)
- US AA trailer (quad cal50)
- Regimental Gun 76mm
- ATG 45 mm (1942)
- Soviet river gun boat Smolensk

New features

- Total overhaul of most bombsights
- Added new 'realistic bombing' difficulty option to toggle between realistic/simplified bombsight inputs
- Bomb release mode keys added
- New bombardier & co-pilot position that can be manned in online coops
- Added momentum from asymmetric bomb loadouts
- Rocket release mode key added
- Course autopilot added to Luftwaffe planes
- Added working PDI lights (red, green white) to many Russian bomber pits
- Ordinance camera added
- Added target height to minimap ground targets
- Added gunner's multifunction key. Used for opening hatches, canopies, raising & lowering guns.
- Added gunner reloading if gun has magazines
- FMB showing proper skin of ground objects depending on the World.camouflage
- Added FMB scrolling between different units in object windows for chiefs

- Added bombardier cockpits for all Pe-2 variants
- Added QMB option for player to chose his position in the flight
- New IJA, IJN, Dutch, USN & USMC regiments
- Added Icon settings to GUI Misc
- Added option that Icon range can be shown in meters or feets
- Added differential brakes
- Added over 100 new loadouts for Russian planes including RRAB cluster bombs and flares
- Bomb loadouts added to Doras
- New loadouts added to Ju-88 A-4
- New rear gun station added to Ju-88 A-4
- New 3D meshes for some British bombs
- Added new conf.ini option Use3RendersUI=1 that will render UI with 1/3 width.
- Added new misc option for rendering info HUD at the bottom of the screen.

New map

- New Britain & New Guinea (September 1943)
- New Britain & New Guinea (June 1944)
- Svalbard
- Tobruk

Map fixes

- Normandy
  - Bridge E of Eterville village fixed
  - Houses on the railroad removed in the Eterville village
- Kursk
  - Number of bridges and crossings fixed
- Kurland
  - Fixed couple of bridges and one stay/taxi waypoint near Libau
- Italy_DF
  - Missing railroad east of Napoli finally constructed
- Kiev
  - Rail/road crossing south of Ovruch fixed
  - Country bridge east of Ovruch changed to correct railroad bridge
- Kurland
  - 3 country bridges added southeast of Goldingen
  - Rail bridge near Rosne changed to correct country bridge
  - 2 missing highway bridges east of Schaulen built
- Moscow
  - Bridge south of Povarovo changed from country to railroad
- Smolensk
  - Bridge northeast of Gorodok running over meadow removed
  - Rail bridge west of Mstislavl changed to country bridge

New missions & campaigns

- Updated Coral Sea QMB missions
- RU campaign
  - La-5FN "Uprising 1944"
  - I-16, I-16bis, I-153 "Khalkhyn Gol 1939"
- DE campaign
  - Ju-88 A4 "North bomber"
- SK campaign:
  - B-534 "Little War"
  - B-534 "Polish campaign"
- SK single missions

- B-534 "Little War" (7 missions)
- B-534 "Polish Campaign" (5 missions)
- Bf-109 G6 "Last fight" (1 mission)
- La-5 FN "Uprising" (9 missions)
- US single missions
  - B-24D-140-CO "Anti-Submarine Hunt" (1 mission)

New skins

- 5 new SM.79 default skins
- 5 new Tempest default skins
- 27 new P-47 default skins (USAAF, RAF CBI, USSR)
- 100+ user skins (BMP)

Other fixes & tweaks

- Fix for the "FM" bug that can cause wingless plane to fly normally
- Fixed FM bug that caused two separate flights crash after certain plane was removed from formation
- Fixed bug with engines that caused RPMs to increase rapidly when engine selections were changed
- Fixed IL-4 engine DM bug that would cause left engine damage when right engine was shot
- Fixed very old online bug that caused wrong visual animation of engine states (with 2 or more engines)
- Fixed bomb delay bug. Old style delay (without fuzes) was not staying on UI
- Engine DM tweaks for Spit, P-51, P-47 & P-40. Added missing bullet energy reductions and tweaked damage probabilities
- New Ho-3 cannon belting
- Fix for AI taxing takeoff bug in coop
- Engine DM fix so that pilot doesn't get BBQed if engine is behind pilot
- Increased minimum alive time of many MG & cannon rounds
- Fixed player taxing bug with autopilot
- Fixed NTRK & bomb bay door bug that caused doors to randomly close during playback
- Fixed beacon selection bug
- Added missing Emily nose cap
- Fixed Ki-43 nav lights
- Fixed B5N FM bug that caused AI to fail torpedo run if waypoints were set too high
- Adjusted the negative G limit when redout is starting to happen
- Changed the stock "loiter here" order so that it can be issued to player's own flight so that other planes stop following player.
- Removed old bomb explosion randomization that might leave unit close to explosion alive and kill another unit much further from explosion

Bombsight changes

All bombsights except of those in SM.79 & TB-3 are remade. Main problem with the old sight and bombing accuracy was that there was no way to align sights to true vertical. Bombing runs must be made under level stabilizer which never keeps the plane at perfect zero pitch. Normally level stabilizer flies the plane at about +3 deg. pitch and old bombsights were calibrated roughly to this fixed pitch. But the pitch was never constant since elevator trim, speed, loadout and individual aircraft FMs had effect on this. Three degree aiming error at 5000m means ~250m error in bomb hits on ground.

In 4.13 the Norden, Lotfe & BZG-2 sights are automatically gyro stabilized and OPB/Type 90 sights can be manually aligned to true vertical. This eliminates the aiming error caused by the plane's pitch up/down. In addition each sights gets automatically calibrated based on the bombs that the plane carriers because each bomb has slightly different ballistics.

To fully take advantage of the new 4.13 bombing features, player should map following 12 new keys:

- ○ Sight Turn Left / PDI Light Left / Course Left
- ○ Sight Center / PDI Light Center / Course Ahead
- ○ Sight Turn Right / PDI Light Right / Course Right
- ○ Toggle Norden Bombsight Clutch
- ○ OPB Bombsight Tilt Left
- ○ OPB Bombsight Tilt Right
- ○ OPB Bombsight Tilt Forward
- ○ OPB Bombsight Tilt Back
- ○ Toggle OPB Bombsight Stopwatch
- ○ Toggle Bomb Release mode
- ○ Toggle Bomb Train Amount
- ○ Toggle Bomb Train Delay

BZG-2 (He-111 H-2)

The BZG-2 bombsight reticle may be familiar to IL-2 players since previously it was incorrectly used as Norden & Lotfe reticle. Now this familiar looking bombsight behaves very differently than before. BZG-2 does not have speed & alt inputs. Instead the bombsight has mechanism to find correct drop angle based on fixed landmarks.

BZG-2 operation:

1. Establish course to target. Pilot can use the old compass/course heading plus & minus keys to set needed course to the Patin compass and "kurskreisel". When course autopilot (old level stabilizer key) is engaged, the plane will turn to selected course and maintain it. This is also very convenient for navigation.

2. Look through the bombsight optics as bombardier. Bombardier can use the new bombsight keys "course left" and "course right" keys to make very small and accurate corrections to plane's course. "Course ahead" key is just for convenience and it will set the Patin/kurskreisel course immediately to current heading. It should be only used before engaging the course autopilot.

3. Eliminate wind drift with bomb sight drift keys if needed. There should be no sideways movement.

4. Keep steady speed and take following measurement to find correct drop angle.

5. Adjust bombsight elevation angle so that the dual triangle mark (1) points to correct alt reading (values at the inner ring). 30 means 3000 meters. In the screenshot below the elevation angle is set to 3000m.

6. Wait until a suitable fixed landmark appears at the reticle. This landmark cannot be your actual target because this procedure needs to be made well before you reach your actual target. Landmark should be selected from near sea level to have most precise measurement. For example shorelines are good landmarks.

7. When the center of crosshair drifts over usable landmark, turn on the bombsight automation (with the old key you should have already mapped).

8. When the bombsight automation is turned on, you should see the hollow triangle (4) moving clockwise. It shows the drop angle you need to use and it will keep on moving until the bombsight automation is turned off.

9. Start reducing the elevation angle so that the dual triangle mark (1) moves clockwise. Reduce the angle until it reaches the fixed black triangle (2) at the end of the altitude scale. Alternatively this whole process can be made at the shorter secondary scale (at 6 o'clock of the reticle) using larger elevation angles. In this case you need to reduce the elevation angle until the mark (1) meets the fixed black triangle (3).

10. When you have reduced the elevation angle so that triangle mark (1) is at the correct end marker (2) or (3), you just need to wait until the very same landmark you selected is under and center of the crosshair again. When this happens, turn off the bombsight automation to stop the drop angle marker (4) movement.

11. Now you have established the correct drop angle for your current speed & alt. Adjust the elevation angle so that markers (1) and (4) meet and your bombsight is set to the correct drop angle.

12. Drop bombs manually when the target appears at the center of the crosshair.
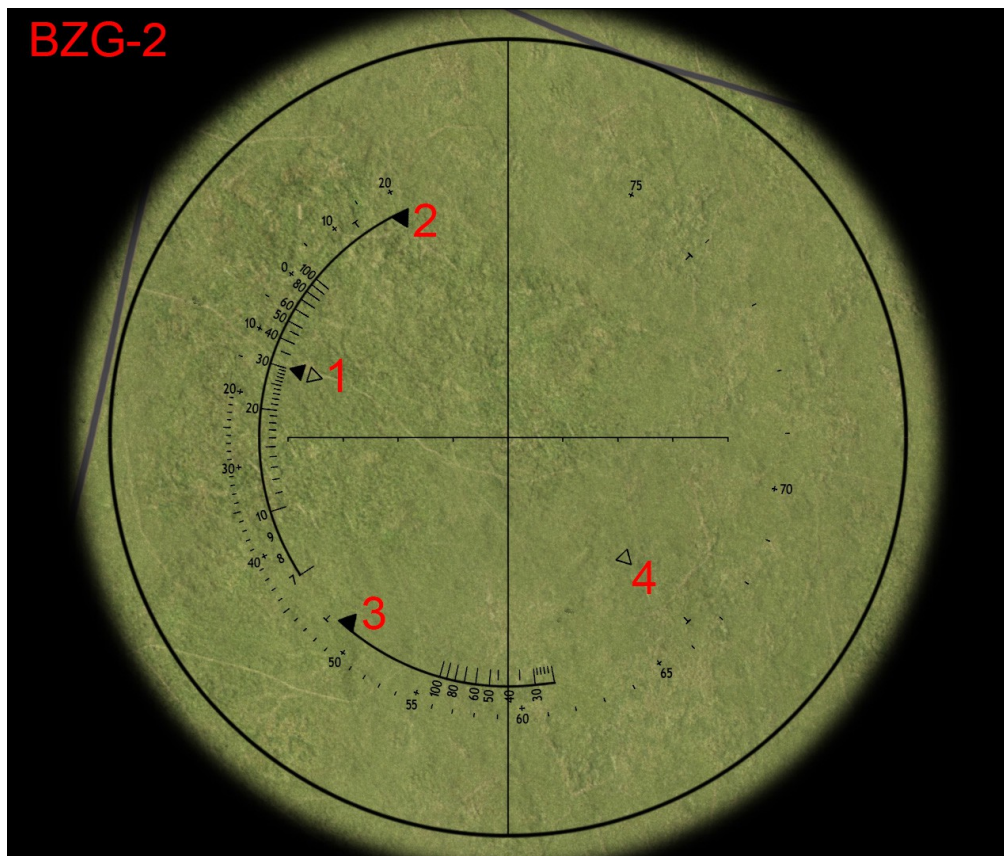
Lotfe (He-111 H-6, Ju-88 A-4, Ar-243)

Lotfe bombsight is very much like the old one except the old incorrect BZG-2 reteicle has been changed to correct Lotfe reticle.

Lotfe operation:

Steps 1 to 3 are same as with BZG-2

4. Set current alt to the Lotfe with increase/decrease sight altitude keys.

5. Set current speed (TAS) to the Lotfe with increase/decrease sight velocity keys. Notice that this doesn't need to be accurate. Check the speed in IAS and take an TAS estimate highter than IAS.

6. Change the sight elevation angle so that the target is at the center of the crosshair.

7. Engage bombsight automation. Now the elevation angle starts to decrease constantly.

8. Use increase/decrease sight velocity keys to adjust the elevation angle decrease rate so that the target remains stationary under the crosshair.

9. Bombs are released automatically when the fixed elevation angle marker (1) and drop angle marker (2) meet.
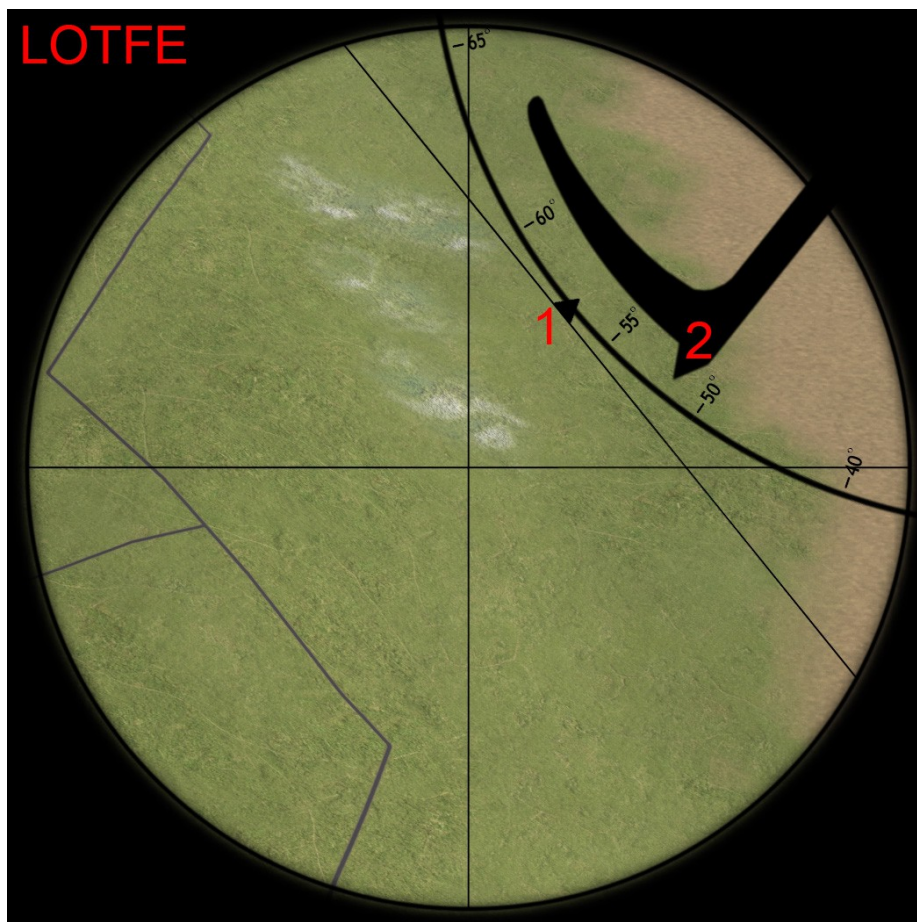
Norden (B-24, B-25, A-20C)

Norden reticle is just a simple crosshair like in Lotfe but without the current angle & drop angle indicators. Operation is also the same, but Norden interacts different way with the bomber's

autopilot. Norden has two main parts. The bombsight base (also called stabilizer) and the bombsight head which is mounted on top of the base. The head can be rotated left & right with the new "sight turn left" and "sight turn right" keys. Head movement is directly linked to the bomber's C-1 autopilot. When C-1 autopilot is turned on (old level stabilizer key), the plane will fly straight and level when the head is centered. If head is rotated to right, plane will keep turning right until the head is centered again.

New "toggle Norden bombsight clutch" key is used to clutch (lock) the head to the horizontal gyro at the base. When clutch is on, the bombsight head tries to maintain it's current heading. When clutch is off, head can be rotated freely.

Norden operation:

1. Increase the sight elevation with "increase sight distance" key and use "sight turn left" and "sight turn right" keys as bombardier to find the target.

2. Put crosshair over the target and engage bombsight clutch. Now target remains stationary under crosshair when plane turns.

3. Turn C-1 autopilot on (old level stabilizer key). Plane starts to turn towards the target. In case the autopilot is damaged and non-functional, the pilot should perform the turn manually so that PDI needle is centered.

4. Eliminate wind drift after the plane has turned towards target and flying straight and level. If plane is drifting to right, apply positive drift angle with "sight drift to right" key. This means that the plane will actually turn to left against the wind while the crosshair stays over the target.

5. When the clutch is engaged, the bombardier can make very small and accurate course corrections with the sight turn left" and "sight turn right" keys. Course corrections should not be made just prior to bomb release.

6. Rest of the steps are same as Lotfe steps 4 to 9.


OPB-1 (SB-2, Pe-2, IL-4)

OPB-1 basic functionality has stayed same but now player has ability to align the sight to true vertical. Player should map four new keys to do this. "OPB bombsight tilt left", "OPB bombsight tilt right", "OPB bombsight tilt forward" and "OPB bombsight tilt back". Pressing and holding these new keys will tilt the bombsight and move the bubble. Bombardier should always keep the bubble centered during bombing run.

OPB-1 operation:

1. Establish course to target. Increase the sight elevation with "increase sight distance" key to search the target in front of the plane. Bombers that have OPB-1 sight do not have any autopilot that bombardier could control with the bombsight. Therefor the pilot needs to do the course changes by turning the plane. In offline play you obviously are the bombardier and pilot at the same time, so you need to turn on the level stabilizer (even the planes didn't have one) to be able to perform successful bombing. You can make small course changes with rudder trim keys while looking through the scope.

2. If you are flying as bombardier online and someone else is flying as pilot, you can signal the pilot to turn left, right or level the plane with new "PDI light left/right/center" keys. Pressing these keys will light a lamp in pilot's cockpit showing him which way to turn.

3. Eliminate wind drift if needed. This is little more difficult than with Lotfe & Norden since there is no autopilot to make the required course change. You need to turn the plane against the wind and use "sight drift to left/right" keys to turn

4. Set current alt to the OPB-1 with "increase/decrease sight altitude" keys.

5. Set current speed (TAS) to the OPB-1 with increase/decrease sight velocity keys. This should be as accurate as possible. There is a new tool to determine TAS with the bombsight. More about that later.

6. Black triangle marker (1) indicates the bombsight calculated drop angle and hollow marker (2) your current bombsight elevation angle. Change the elevation angle with "increase/decrease sight distance" keys so that the hollow marker (2) overlaps with the angle marker (1).

7. Release bombs manually when the target is under the crosshair and the two markers are overlapped. Make sure that your sight was aligned correctly and bubble is centered before releasing the bombs.
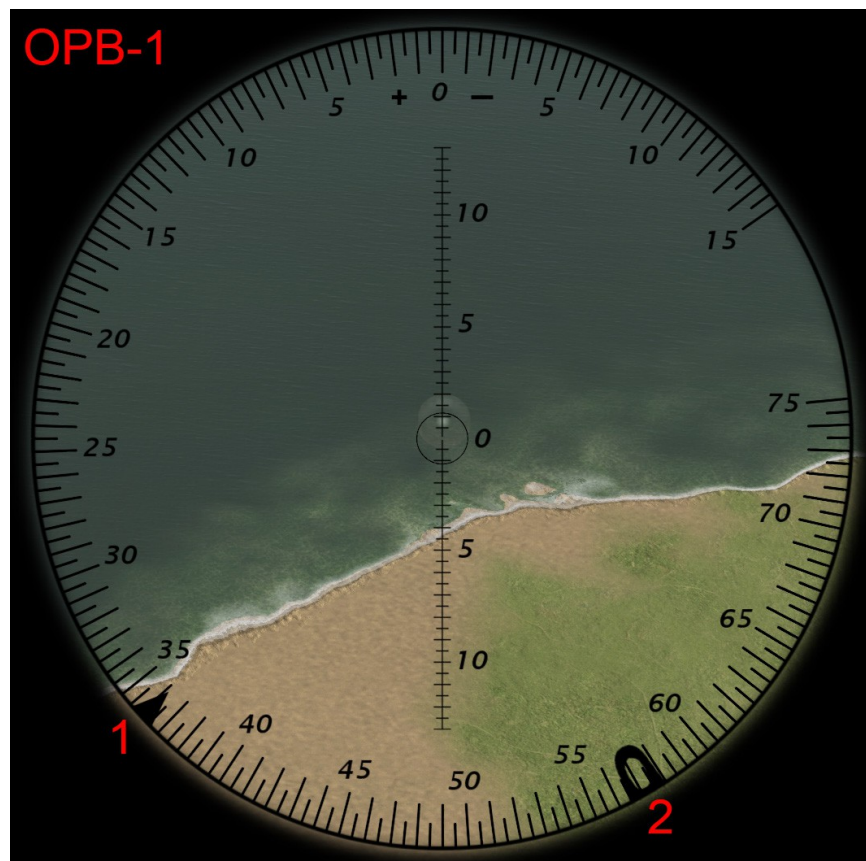
OPB-2/Type 90 Mk1 (Pe-8, G4M, B5N, D3A)

OPB-2 and Type 90 sights both have the same align procedure that OPB-1 has. Bombardier should always keep the bubble centered with the "OPB bombsight tilt" keys. These sights do not have the angle indicators like OPB-1. Operation of these sights is based on the "Boykow effect" (http://www.google.com/patents/US1703386).
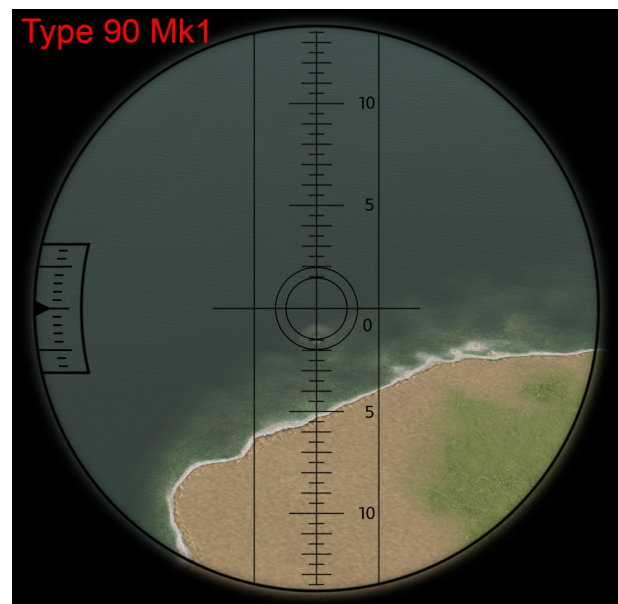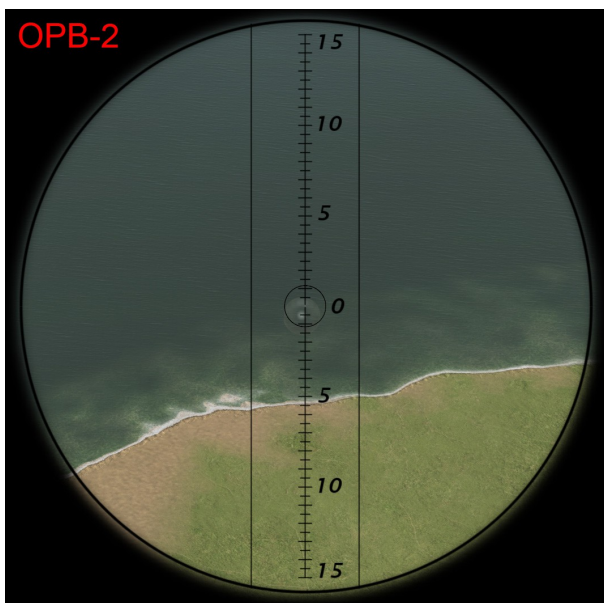
OPB-2/Type 90 operation:

Steps 1 to 5 are same as with OPB-1

6. When bombardier adjusts either sight alt or speed setting, the HUD log will show a pre-set angle sightings value (P.A.S.). This is the sight elevation angle value that needs to be used when starting bombsight

automation.

7. Set correct alt & speed to the sight and observe what is the P.A.S. value shown on HUD. Make sure that your sight was aligned correctly and bubble is centered.

8. Set the sight elevation angle to exactly same value as your P.A.S. value.

9. When target is directly under the centered bubble, turn on the bombsight automation. Now the elevation angle starts to decrease and target drifts upwards under the reticle. It looks wrong if you are used to bomb with Norden or Lotfe, but it is desired effect.

10. After few seconds the sight elevation angle decrease stops and targets starts to drift back down towards the center of crosshair.

11. When the target hits again the center of the crosshair, drop the bombs manually.

OPB & Type 90 chronograph utility to find TAS

OPB-1, OPB-2 and Type 90 sights all have chronograph utility that can be used to calculate true air speed (TAS). You need to have a new key "Toggle OPB Bombsight Stopwatch" mapped to use this.

Operation:

1. Align the bombsight properly so that bubble is centered

2. Set your current alt to bombsight

3. Set bombsight elevation angle to **+13** deg.

4. Wait until a good fixed landmark appears at the center of the crosshair. It is best to use landmarks near sea level. Shorelines for example.

5. Press "Toggle OPB Bombsight Stopwatch"

6. Decreace elevation angle all the way back to **-15** deg. You can do this slowly tracking your landmark at the same time or by decreasing the angle straight to -15 deg.

7. When the elevation angle is at -15 deg. and your selected landmark it at the

middle of the crosshair again, press "Toggle OPB Bombsight Stopwatch" again. Now the HUD log will show you the calculated TAS. This info is also visible in the TAB menu.

Bomb release modes

New key called "Toggle Bomb Release mode" will toggle between different modes available for used aircraft. Modes depend of used aircraft and bomb loadout. If bomber has a device called intervalometer, a release mode called "train" is available. If aircraft has bombs attached to both fuselage and wings, you will get separate modes for releasing bombs in pairs or singles first from wings or first from fuselage.

If plane has intervalometer, then mode "train" is selected by default. Train mode also uses two extra keys. "Toggle Bomb Train Amount" and "Toggle Bomb Train Delay". With these keys you can select how many bombs are released and what is the delay in milliseconds between releases. Available options depends of the used bomber.

Tips for bombardier

- Don't forget to take bombs with you :) It is really frustrating to fly long way only to realize over the target that you don't have any bombs onboard.

- Don't forget to open bomb bay doors at the beginning of the bombing run. If you open them at the middle of run after you have set the speed to bombsight, you will get a small error since opening bomb bay doors will cause little extra drag and slow down the bomber.

- If the mission has ground attack target waypoint, you can see the target height in minimap when you zoom close enough. It is labeled "TrgH". You should subtract target height from your own altitude when entering alt to bombsight.

- Normally you drop all the bombs to single target unless you are planning to bomb a secondary target also. If bomber has intervalometer, then bombing mode "train" is selected by default and all bombs will be released by default. In train bombing mode you want to release the bombs little earlier than a single bomb would be released. Most optimum situation is that the middle of the bomb train hits the target. You need to adjust delay between bomb releases to control the length of the train and distances between bomb hits.

  FORMULA FROM MONGUSE HERE

Realistic bombing difficulty option

4.13 patch includes a new difficulty option called "Realistic Bombing". When the option is enabled, all the bombsights function as described above. Since the new sights can be little difficult to master, we have included a simplified bombing mode. When the "Realistic Bombing" option is turned off, all the bombsights will always have the correct alt & speed inputs automatically. So bombardier don't need to care about speed or alt and he can simply concentrate putting the bomber on correct course and releasing the bombs when target is under crosshair.

Bombsight elevation angle controls still work normally, so bombardier needs to start the bombsight automation normally with Norden & Lofte. With rest of the sights bombardier needs to set the fixed bomb drop angle manually. Pressing the bombsight automation key will immediately set the correct angle. This applies to BZG-2, OPB-1, OPB-2 & Type 90 sights.

Gunner Multi Function key

4.13 patch adds a new key called "Gunner Multi Function". This key will perform various actions depending where it is used. Used functions:

- B-24D ball turret: Raise and lower the ball turret

- B-24D waist guns: Open and close the waist gun hatch
- SB-2 top gun: Raise and lower the top gun
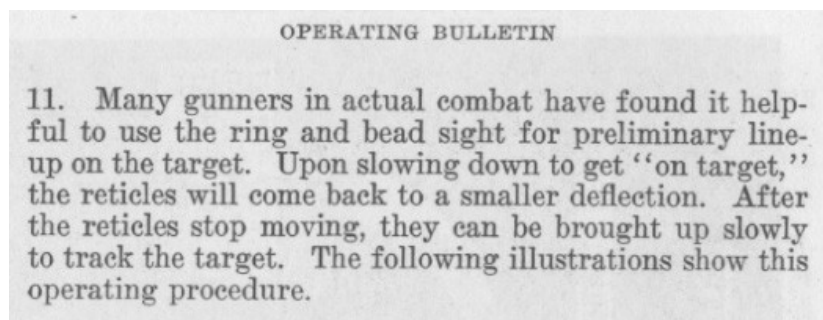- SM.79 top and bottom guns: Open and close the hatch

B-24 ball gunner's K-4 sight

B-24D-140-CO ball turret has unique K-4 gunsight that requires some explaining. The K-4 is automatic computing sight that shows the gunner how much lead he should take when firing at enemy planes. Sight needs two inputs to show the estimated lead. Target wingspan and distance to target. Use the old "Sight Drift to Right/Left" keys to input target wingspan (in feet) into the sight. Then use either the "Increase/Decrease Sight Distance" keys or mouse wheel to input the target distance to the sight. When adjusting the distance you don't really need to know or estimate the distance. Adjusting distance moves the two short lines on both sides of the longer center line. In order to set the correct distance, you simply need to "frame" the target aircraft so that the it's wingspan matches the space between the lines.
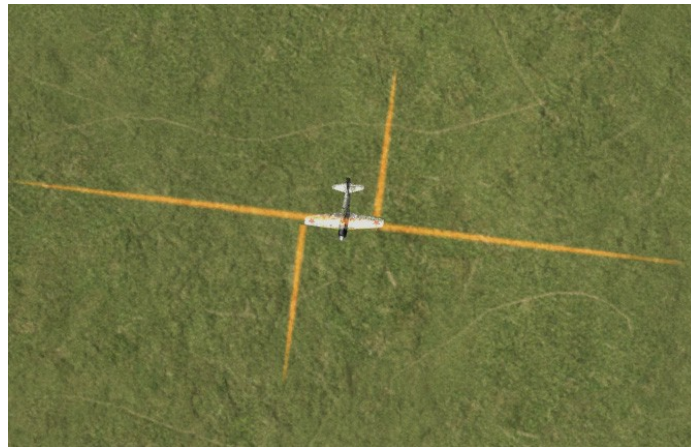
When wingspan is set correctly and target is "framed" correctly like in the above pic, the K-4 knows the distance to the target. Now as you move the gun at steady rate (which is pretty hard with mouse), the reticle starts to lag behind the iron sights indicating the amount of lead you need to take in order to hit the target.

The bombsight automation key will toggle the iron sights on/off and reticle on/off. Here is a small tip from the K-4 manual.

OPERATING BULLETIN

11. Many gunners in actual combat have found it helpful to use the ring and bead sight for preliminary line-up on the target. Upon slowing down to get "on target," the reticles will come back to a smaller deflection. After the reticles stop moving, they can be brought up slowly to track the target. The following illustrations show this operating procedure.

Bombardier position and online coops

Bombardier positions are made accessible to non-pilot players in online coops. Bombardier position can be manned like any gunner position and bombardier can operate all needed controls. German & US bomber crew needs to communicate together when to hand over the plane controls to bombardier and back to pilot (engaging course autopilot), but Russian planes do not have the level stabilizer available if human bombardier is present and realistic bombing is enabled. Russian bombardier needs to use the PDI lights and signal the pilot how to turn the

plane.

Co-pilot position and online coops

Co-pilot positions are also made accessible to non-pilot players in online coops. Pilot can for example ask co-pilot to take controls while he steps out for a smoke. Any other player other than the pilot can also take control of the plane in case the pilot dies.

This feature is a tricky one to implement smoothly since there is two players controlling same aircraft at the same time. In real life the controls would be mechanically linked, but obviously this is not the case here. Joysticks (specially old ones with potentiometers) can cause unwanted input even they are not moved at all. In order to prevent unwanted inputs, pilot has a new key called "Toggle Co-pilot Privileges" that will toggle through four

Co-pilot Mode: Dual – This allows full controls for both pilot and co-pilot
Co-pilot Mode: Full – This allows full controls to co-pilot while pilot can only use control keys
Co-pilot Mode: Buttons only – Full controls to pilot and co-pilot can only use control keys
Co-pilot Mode: Blocked – Co-pilot controls fully blocked.

Also please note that the smoothness of co-pilot's controls is very sensitive to ping. Bad ping will cause laggy controls.

Cockpit guide

B-24D-140-CO

NOTE REGARDING THE USE OF THE B-24: This aircraft historically operated from large airbases, with typical runway length of 6000 feet (~1800 meters). Solomons maps excluded, there are few suitable airfields which would allow the safe use of B-24s with both maximum fuel and bomb loads. For this reason, we suggest the possible solutions to mission builders and pilots alike:

- use reduced fuel loads
- use reduced bomb loads
- make each AI B-24 take-off from the start of the runway using the taxi-to-takeoff feature
- make AI B-24 flights to spawn in the air rather than on the ground
- extend the stock runways with new plates if possible

1   Pilot Fixed Nose-Gun Trigger
2   Oxygen Content and Flow
3   Hydraulics. Left: Engine Pump Pressure (Engine 3 Only)
        Below: Storage Accumulators
4   Autopilot Calibration (Rudder)
5   Vacuum (Engine 1 and 2 Only)
6   Camera, Bomb Doors, and Bomb Release Indicator
7   Free Air Temperature
8   Pilot Direction Indicator (PDI) and Autopilot
        Calibration Lamps (Elevator, Aileron)
9   Flap Position
10   Landing Gear Down and Locked
11   Altimeter
12   Airspeed Indicator
13   Compass (Directional Gyro)
14   Turn and Bank
15   Landing Approach Marker Beacon
16   Vertical Speed Indicator (Variometer)
17   Artificial Horizon

18   Clock
19   Radio Compass and Propeller Pitch Hi/Low Limit
20   Turbosuperchargers
21   Throttles
22   Mixture, 4-Position (Shown in Idle-Cutoff)
23   Manifold Pressure (Engine 1 and 2)
24   Manifold Pressure (Engine 3 and 4)
25   RPM (Engine 1 and 2)
26   RPM (Engine 3 and 4)
27   Fuel Pressure (Engine 1 and 2)
28   Fuel Pressure (Engine 3 and 4)
29   Oil Pressure (Engine 1 and 2)
30   Oil Pressure (Engine 3 and 4)
31   Head Temperature (Engine 1 and 2)
32   Head Temperature (Engine 3 and 4)
33   Oil Temperature (Engine 1 and 2)
34   Oil Temperature (Engine 3 and 4)
35   Compass (Magnetic)
36   Propeller Fast Feather

SB 2M-103

1. PDI lights (Pilot Direction Indicator)
2. Clock
3. Artificial horizon
4, 5. Tachometers

6. Airspeed indicator
7. Turn and bank indicator
8. Vertical Speed Indicator (Variometer)
9, 10. Manifold pressure indicators
11. Voltmeter
12. Gyro compass
13. Flaps position indicator
14. Altimeter
15, 16. Water temperature indicators
17, 18. Fuel pressure indicators
19, 20. Oil pressure indicators
21. Landing gear lights
22,23,24,25. Fuel level indicators
26, 27. Oil temperature indicators
28. Compressed air pressure gauge
29. Magneto switches
30. Magnetic compass
31. Oxygen regulator

IK-3
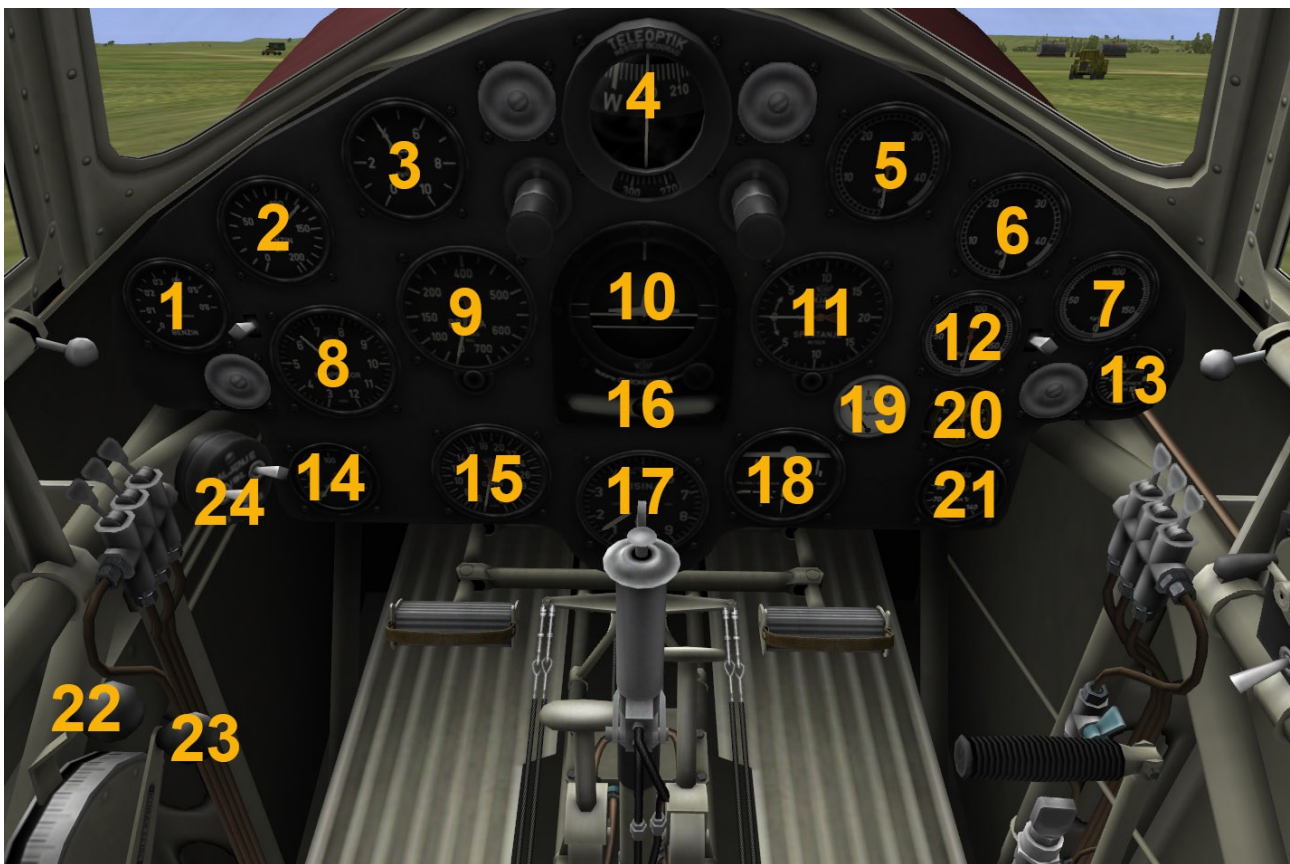
1. Fuel pressure
2. Fuel quantity
3. Oil pressure
4. Compass
5. Main hydraulic pressure
6. Emergency pressure
7. Brake pressure
8. Manifold pressure
9. Airspeed
10. Artificial horizon

11. Variometer
12. Emergency pressure
13. Altimeter (backup)
14. Oil temperature
15. RPM
16. Bank indicator
17. Altimeter
18. Landing gear, flaps and pitch indicators
19. Starter pressure
20. Clock
21. Water temperature
22. Throttle
23. Pitch
24. Magneto switches

N1K1-J

1. Airspeed indicator
2. Rate of climb indicator
3. Altimeter
4. Clock
5. Manifold pressure indicator
6. Exhaust gas temperature indicator
7. Route gauge
8. Magneto switch
9. Engine tachometer
10. Turn and bank indicator
11. Artificial horizon
12. Cylinder temperature indicator
13. Inclinometer
14. Dual methanol quantity indicator
15. Flap goniometer
16. Fire extinguishing device

17. Exterior temperature indicator
18. Oxygen quantity indicator
19. Compass
20. Oil(left) and fuel(right) pressure indicators
21. Oil temperature indicator
22. Landing Gears position indicator
23. Fuel quantity gauge (1)
24. Fuel quantity gauge (2)

Daidalos Team would like to thank following people:

*** TODO: many still missing ***

Algy L13 - Khalkhyn Gol campaign
choisek – E13A
Emel - New P-47 default skins
HBPencil - New Tempest default skins
Indy L13 - Slovakia single missions
Italo - New SM.79 default skins
Juri JS - New IJA, IJN & Dutch regiments
JV69_Bada – Tobruk map
Motorhead - New USN & USMC regiments
wheelsup_cavu - Updated Coral Sea QMB missions
Y2T – Ju-88 variants and Lotfe, BZG, OPB sight changes.

Thanks alot also to anyone, we may have forgotten!

daidalos.team@gmail.com