

IL★2 STURMOVIK

BATTLE OF STALINGRAD

User Manual



Ver. 1.011 Rev.1

1C GAME STUDIOS

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STUDIOS



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1.0 INSTALLATION & REGISTRATION

IL-2 Sturmovik: Battle of Stalingrad (IL-2: BOS) is a state-of-the-art PC combat flight-simulation title. There are a few different ways in which you can obtain and get started with a copy of the game. Every copy of IL-2: BOS can have additional content added to it by purchasing content (e.g., airplanes) from the game's official store page (<http://il2sturmovik.com/store/>). The only difference between the different versions of IL-2: BOS is what content is included with your copy. All versions of IL-2: BOS are fully compatible with each other, and all the features and base content are identical.

The different paths to owning IL-2: BOS are simple and easy to follow. The important thing to remember is IL-2: BOS is a modular system which allows users to add content individually, as it uses key codes to determine access to content you have purchased. We use an unlock system, not a downloadable content system like other games. Every user receives the same updates and content at the same time. As a result, you only need to install IL-2: BOS one time and register one User Account. All your purchased content is connected to your User Account, not the particular install on your computer. In this way, you can have IL-2: BOS installed on multiple computers. All you need to do is login online once to unlock your content. It is a very flexible system.

It is important to remember your IL-2: BOS User Account includes the login and password for both the game AND the official website where you can purchase additional content. This connects your purchased content with the game itself and identifies what content you own.

Note: *In order to complete the registration process and activate any version of IL-2: BOS, you must be connected to the Internet. This process ensures you have a legal copy of the game and registers you for the IL-2: BOS official website and community forum. Your login and password information also grants you access to the IL-2: BOS Store, where you can purchase additional aircraft and other content. These purchases are automatically added to your User Account and unlocked the next time you launch the game. To successfully unlock your purchases, you must log in at least once with the Login Online option.*

The different paths to owning and playing IL-2: BOS:

Digital Copy – Purchase a digital copy from the IL-2: BOS Store (<http://il2sturmovik.com/store/>). This is a popular way to purchase the game without having to travel to a retail location. Currently there are two versions of the game available for digital download – the Standard Edition and the Premium Edition. The primary difference between the two editions is the number of player-flyable aircraft.

Premium planes can be purchased and added to your Standard Edition digital copy. This is the easiest way to move beyond the Standard Edition and experience more of what IL-2: BOS has to offer. Every copy of IL-2: BOS is a full copy of the game, so you are allowed to add new content to your Standard Edition copy any time you want. This can be an inexpensive way to add content. All you need to do is visit the IL-2: BOS Store (<http://il2sturmovik.com/store/>) and purchase the content of your choosing. The content will be automatically added to your User Account and unlocked for you next time you play IL-2: BOS. **(See Section 1.1)**

Note: *If you buy the game from the IL-2: BOS Store, any premium planes you buy must be bought there as well. You cannot buy the planes as downloadable content (DLC) on Steam separately if you do not own the Steam version of the game.*

Digital Steam Copy – Steam is an internet-based software distribution platform that provides a storefront for purchasing gaming software titles, including IL-2: BOS. Currently there are two versions of the game available for digital download from Steam – the Standard Edition and the Deluxe Edition. These versions of the game can be purchased by visiting <http://store.steampowered.com/app/307960/>. **(See Section 1.2)**

Additional content can be added to your digital Steam Standard Edition by visiting <http://store.steampowered.com/app/307960/>. This content will be automatically added to your User Account and unlocked the next time you play IL-2: BOS.

Note: *If you buy the Steam version of the game, any premium planes you buy must be bought there as well. You cannot buy the planes as DLC from the IL-2: BOS Store separately if you do not own the non-Steam version of the game.*

Retail Steam Copy - Purchase a physical retail copy for a store and install from the DVD disk. This is the traditional way of purchasing a PC game. Your retail box may have come with some additional printed materials inside. Buying a retail copy is popular with those users who do not have a fast Internet connection. Once you have installed the game, you will need to activate it on Steam. **(See Section 1.3)**

As with the digital Steam version, additional content can be added to your digital Steam Standard Edition by visiting <http://store.steampowered.com/app/307960/>. This content will be automatically added to your User Account and unlocked the next time you play IL-2: BOS.

Note: *If you buy the Steam version of the game, any premium planes you buy must be bought there as well. You cannot buy the planes as DLC from the IL-2: BOS Store separately if you do not own the non-Steam version of the game.*

Digital Copy From A Third-Party Retailer – the process of purchasing a digital copy of the game from a third-party retailer is similar to purchasing the game through the official IL-2: BOS Store. The key difference is the game must be activated through your Steam account.

Please identify which path you are going to follow and skip to the appropriate section below to learn how to install and activate your copy of IL-2: BOS or add new content from the IL-2: BOS Store. In addition, please note the following guidelines about activating content for the game:

- It is possible to activate only one game key and one key for each premium plane per user account.
- It is not possible to "improve" the Standard Edition by purchasing and activating a Premium Edition.
- It is not possible to activate a key that has already been activated on another account.

- It is only possible to activate keys for premium planes after activating the game itself.

1.1 Installing and Activating the Digital Version: To install the digital version of IL-2: BOS, you will need the activation key code and to have downloaded the installation executable file. Installation of the digital copy is rather simple, but you need to follow the steps below to ensure proper installation.

1. Register an account using your personal e-mail address and a secure password. You may also use your Google+ or Facebook account information to speed up the process: (Figure 1.1.1)



The screenshot shows the IL-2 Registration page. At the top, there's a link to 'Save your time and register using data from your social network account' with icons for Google and Facebook. Below that, there are fields for 'Username' (containing 'JohnDoe'), 'Email' (containing 'Email@Email.email'), 'Password' (containing '*****'), and 'Password confirmation' (containing '*****'). Below these fields, a note says 'Enter the same password as above, for verification.' At the bottom, there's a link to 'User agreement' and a red 'Create account' button.

Figure 1.1.1

2. Confirm your registration and log in to your account: (Figure 1.1.2)



The screenshot shows the IL-2 Login page. It features a 'Login' button at the top right. Below it are fields for 'Email address' (containing 'Email@Email.email') and 'Password' (containing '*****'). There's also a 'Remember me' checkbox, a 'Forgot your password?' link, and a 'Contacting Customer Support' link. At the bottom left is a 'Login' button, and at the bottom right are links for 'Forgot your password?', 'Contacting Customer Support', and 'Need an account? Register now!'

Figure 1.1.2

3. Enter your desired nickname and a squad tag, if you have one. You can change this later at any time: (Figure 1.1.3)



The screenshot shows the IL-2 Account page. It has a 'Username' field containing 'johnDoe'. Below it is a 'Squad tag' field containing 'jd1'. A note says 'Use Latin letters, digits, hyphen-minus, comma, period, equal, slash, square brackets and underscore (not at beginning)'. There's a 'Newsletter language' dropdown set to 'English', a checked 'Send me news and information' checkbox, and two buttons at the bottom: 'Update' and 'Change password'.

Figure 1.1.3

4. You will need to activate your **Key Code** once you have created a User Account and purchased your selection. This unique key code will unlock all of the content that is included in the version you purchased. To begin the activation process, first log in to your personal account, and then navigate to the **Profile** page (<https://il2sturmovik.com/account/>): (Figure 1.1.4)

Note: the following steps are also used to activate premium plane purchases made through the IL-2: BOS Store.



Figure 1.1.4

5. Open the **Purchases** tab and ensure you are logged in to a proper account and have a paid order that confirms a successful purchase of IL-2: BOS: (Figure 1.1.5)

The screenshot shows the "PURCHASES" page. The sidebar on the right has a red background with white text: Account, Purchases (which is highlighted), License keys, and Download. The main content area shows a single purchase entry:

Order ID	Payment date	Product name
XooXooXo-xXxx-XoooX-xxxxX-xXXXXxXooX	July 26, 2013, 10:48 a.m.	Pre-Order IL-2 Sturmovik Battle of Stalingrad Standard Edition

A note at the bottom states: "If you don't see your paid order listed immediately after completion, please do not panic. It takes a few minutes to process the order and post. If after 10-15 minutes it still does not appear, please contact Customer Support."

Figure 1.1.5

6. Proceed to the **License keys** section. If you are ready to bind the key to your profile, skip to the next step. If you want to send your key code as a gift to another player, click the blue **Send gift** button. A pop-up window will appear; enter the recipient's e-mail or nickname in the form, and then click **Send**: (Figure 1.1.6)

The screenshot shows the "LICENSE KEYS" page. The sidebar on the right has a red background with white text: Account, Purchases (which is highlighted), License keys, and Download. The main content area shows a table of license keys:

Product name	Type	Key
Pre-Order IL-2 Sturmovik Battle of Stalingrad Standard Edition	purchase	XXXXX-XXXXX-XXXXX-XXXXX-XXXX
Premium Aircraft La-5 (series 8)	gift	YYYYY-YYYYY-YYYYY-YYYYY-YYYY

A modal window titled "Send gift" is open, containing a text input field with the placeholder "Enter recipient's nickname or email who is registered on our site/forum" and a "Send" button below it.

Figure 1.1.6

7. Activate your license by pressing the blue **Activate** button to the right of the key code: (Figure 1.1.7)

The screenshot shows the "LICENSE KEYS" page. The sidebar on the right has a red background with white text: Account, Purchases (which is highlighted), License keys, and Download. The main content area shows a table of license keys:

Product name	Type	Key
Pre-Order IL-2 Sturmovik Battle of Stalingrad Standard Edition	purchase	XXXXX-XXXXX-XXXXX-XXXXX-XXXX
Premium Aircraft La-5 (series 8)	gift	YYYYY-YYYYY-YYYYY-YYYYY-YYYY

A modal window titled "Key Activation" is open, containing a text input field with the placeholder "Enter the key" and an "Activate" button below it.

Figure 1.1.7

8. Congratulations! You are now a rightful owner of your IL-2: BOS game copy: (Figure 1.1.8)

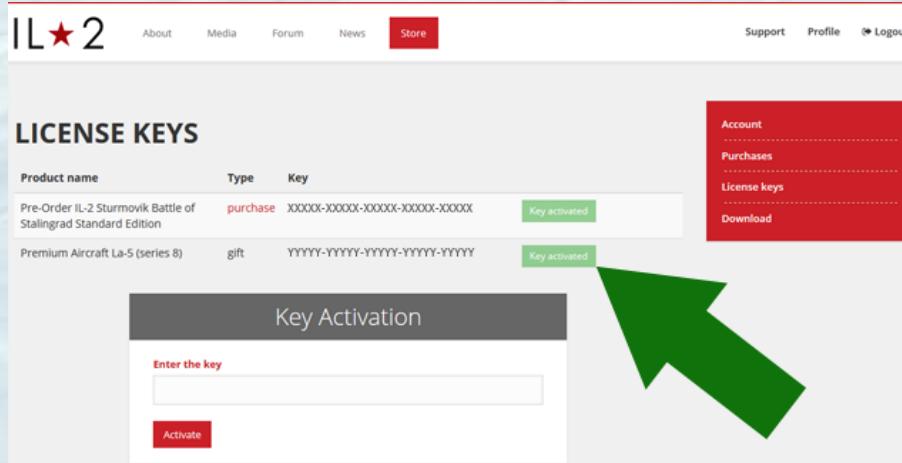


Figure 1.1.8

9. The **Download** tab will appear once the key is activated. Clicking on this button will take you to the page from which you can now download the game client installer, which by default is called **IL2_setup.exe**: (Figure 1.1.9)

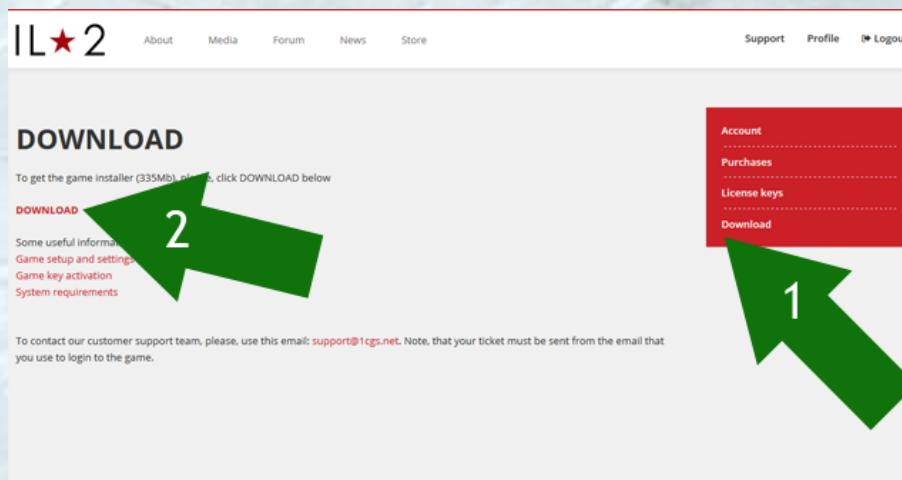


Figure 1.1.9

10. Double-click on the game client installer file once it has downloaded. Follow the prompts on the screen to complete the installation of the game. Once installation is complete, a shortcut to the IL-2: BOS Game Launcher will be placed on your desktop.

Note: you must use the "Administrator" account in Windows in order to install the game correctly. If using Windows 7 or Windows Vista, you should disable User Account Control (UAC) during installation. Otherwise, Windows may not allow you to install all files, and you will receive an error message.

11. Once the game files have been installed, some **additional Microsoft components** (.Net Framework, Visual C++ Redistributable, DirectX 9.0c etc.) will also be installed. These are required to be installed or the game will not run. They will not harm your computer and are only used to run the game.
12. Run the **IL-2: BOS Launcher** by double-clicking on the **IL-2: BOS shortcut** placed on your desktop. When you open the Launcher for the first time (and every time thereafter), the game will automatically check for any updates to the game; if there are any new updates, the game will automatically download and install them. Follow the prompts on the screen to complete the updating of the game.
13. After you have selected your settings and checked the news you can launch the game by clicking on the **PLAY** button, once the installation and update process is complete.

1.2 Activating the Digital Steam Version: to activate IL-2 Sturmovik: Battle of Stalingrad on your computer, first ensure Steam is running and the game has been installed, and then follow the proceeding steps:

Note: your **IL-2: BOS key**, if purchased at the game's official website, cannot be activated within Steam.

1. Start the game from Steam. You will notice a pop-up message with the CD key listed. Copy this key to your computer's clipboard, because it will be needed to activate your game's copy at <http://il2sturmovik.com/>.

Once at the main login screen, click on **New user registration** (if you do not yet have an IL-2: BOS account): (Figure 1.4.1)

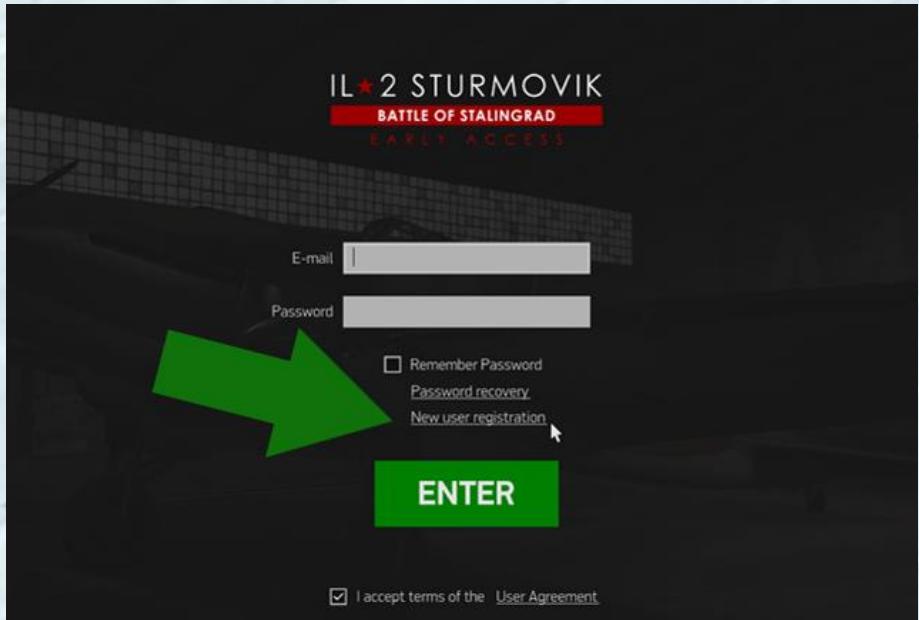
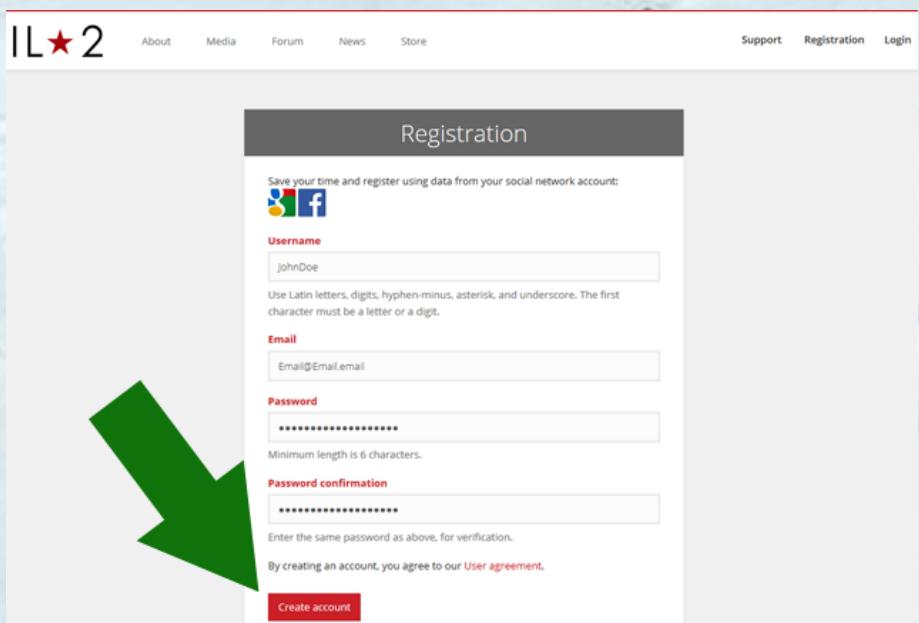


Figure 1.4.1

2. Register an account using your personal e-mail address and a secure password. You may also use your Google+ or Facebook account information to speed up the process: (Figure 1.4.2)



The screenshot shows the IL-2 Sturmovik: Battle of Stalingrad Login page. It features a large green arrow pointing from the right towards the login form. The form includes fields for 'Email address' (set to 'Email@Email.email') and 'Password' (a series of dots). There is a 'Remember me' checkbox, a 'Login' button, and links for 'Forgot your password?', 'Contacting Customer Support', and 'Need an account? Register now!'. The top navigation bar includes links for 'About', 'Media', 'Forum', 'News', 'Store', 'Support', 'Registration', and 'Login'.

Figure 1.4.3

3. Confirm your registration and log in to your account: (Figure 1.4.3)

The screenshot shows the IL-2 Sturmovik: Battle of Stalingrad Account settings page. It features a large green arrow pointing from the left towards the account details. The account details section includes fields for 'Username' (set to 'johnDoe'), 'Squad tag' (set to 'w0l'), and 'Newsletter language' (set to 'English'). There is a checkbox for 'Send me news and information', and buttons for 'Update' and 'Change password'. On the right, there is a sidebar titled 'Account' with sections for 'Purchases' and 'License keys'.

Figure 1.4.4

4. Enter your desired nickname and a squad tag, if you have one. You can change this later at any time: (Figure 1.4.4)

The screenshot shows the IL-2 Sturmovik: Battle of Stalingrad License Keys page. It displays a small window for the IL-2: BOS key purchased on Steam. The window shows the key code: 'IL2BOS-1234567890123456789012345678901234567890'. The background shows the IL-2 Sturmovik: Battle of Stalingrad game interface with a plane flying over a city.

5. Open the LICENSE KEYS tab. You will see a small window for the IL-2: BOS key that you have purchased on Steam: (Figure 1.4.5)

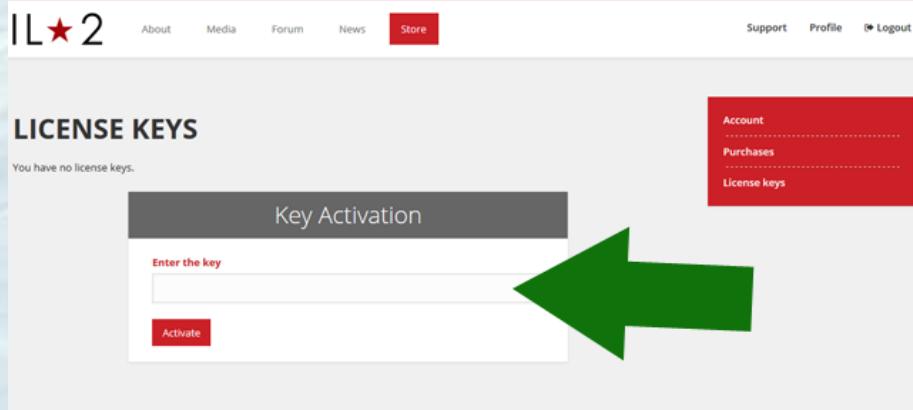


Figure 1.4.5

6. Switch back to the Steam app window, and open the LIBRARY. Using your right mouse button, open the context menu and copy the CD key for IL-2: BOS: (Figure 1.4.6)

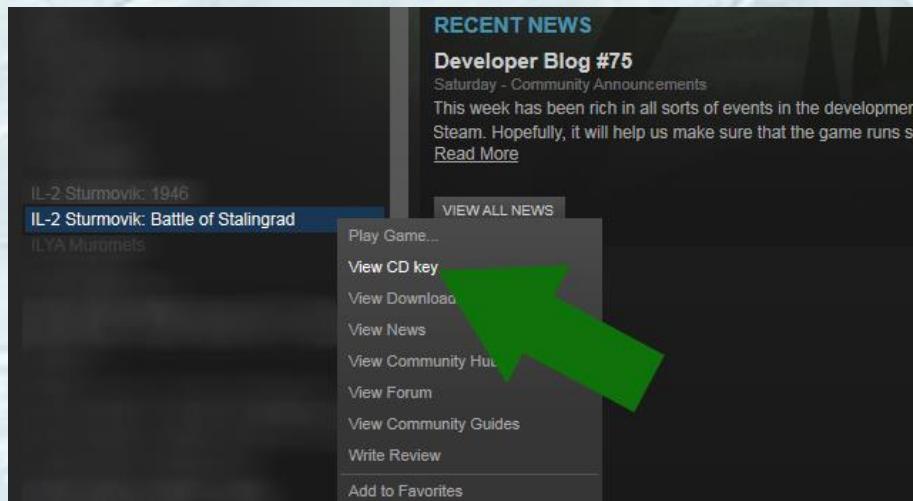


Figure 1.4.6

7. Paste your key into the **Key Activation** blank field. If you have purchased the Digital Deluxe version, first activate your core game key, and then activate your codes for the DLC planes: (Figure 1.4.7)

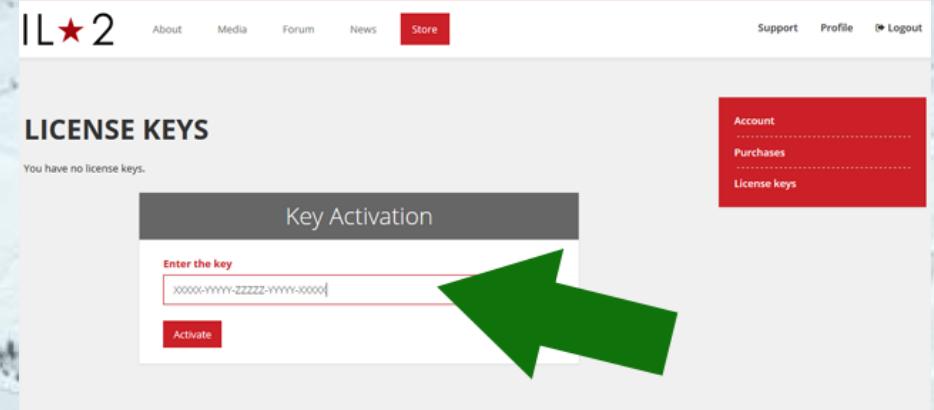


Figure 1.4.7

8. Congratulations! You have completed the activation process, and now you can play IL-2 Sturmovik: Battle of Stalingrad!: (Figure 1.4.8)

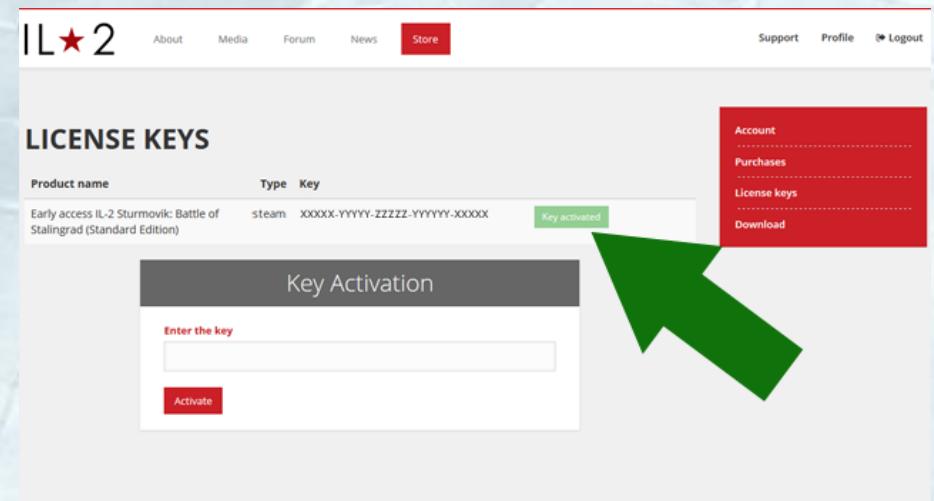


Figure 1.4.8

If you wish, you can add downloadable content (such as airplanes) to your Steam install and build up your Standard Edition copy of the game at your own pace. To do this, you must purchase the content directly from the Steam Store at <http://store.steampowered.com/app/307960/>. Once you complete your purchase, you will then activate the DLC at <http://il2sturmovik.com/> as described below to make it available in the game:

1. Select IL-2 Sturmovik: Battle of Stalingrad in your Steam Library, and then click on **CD Key** on the right-hand side of the screen. A small window with your game and DLC CD keys will pop up.

Select the DLC you want to activate and click on the **COPY KEY TO CLIPBOARD** button: (Figure 1.4.9)

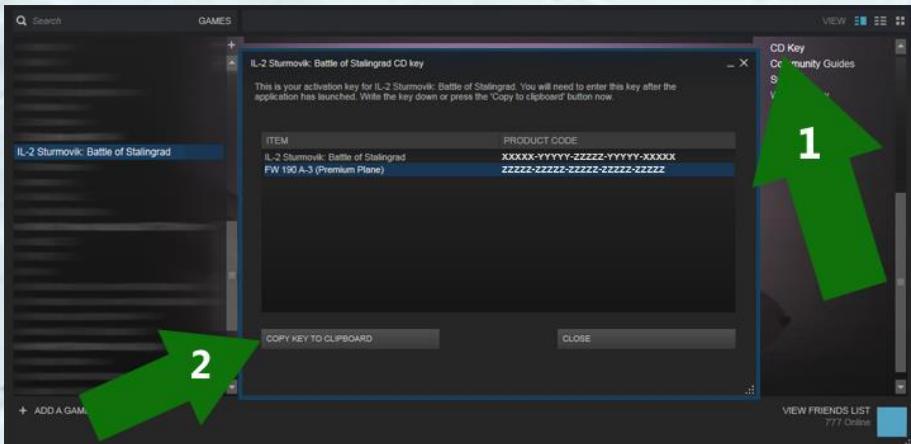


Figure 1.4.9

2. Navigate to the official <http://il2sturmovik.com/> website and log in to your personal profile that you used to originally activate the game: (Figure 1.4.10)

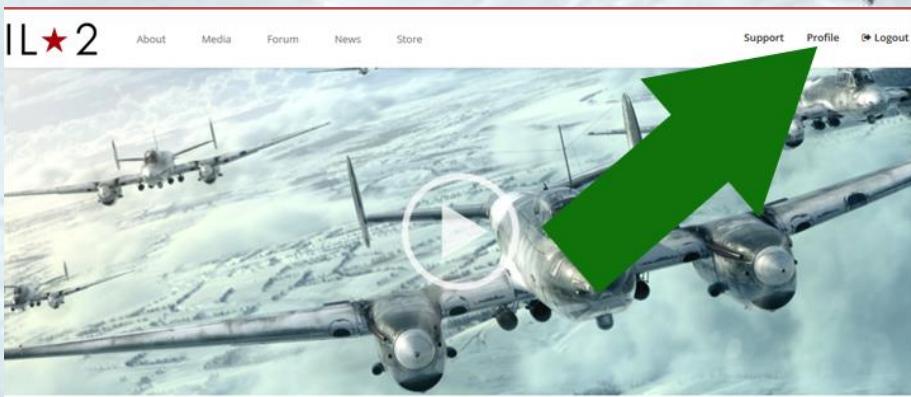


Figure 1.4.10

3. On the Profile page, click on the **License keys** tab to start activation: (Figure 1.4.11)

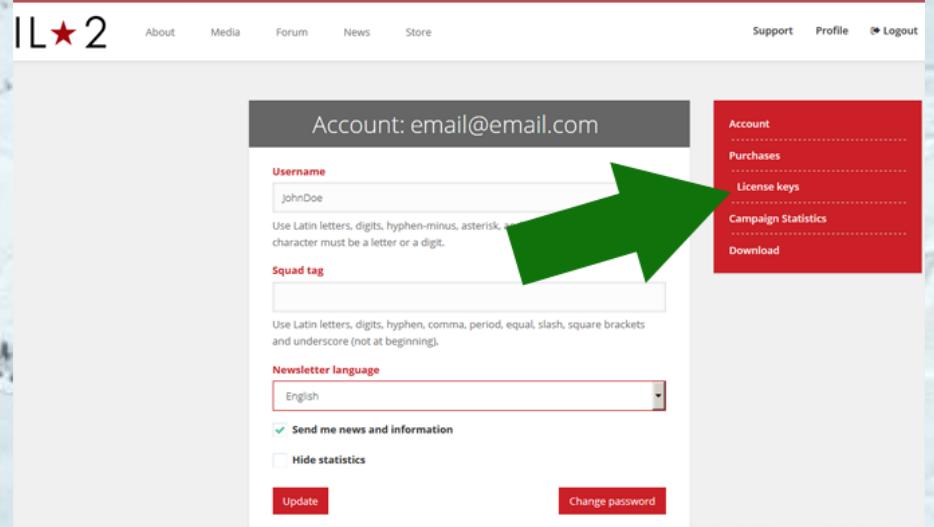


Figure 1.4.11

4. Paste your DLC CD key into the **Key Activation** field and click the **Activate** button: (Figure 1.4.12)

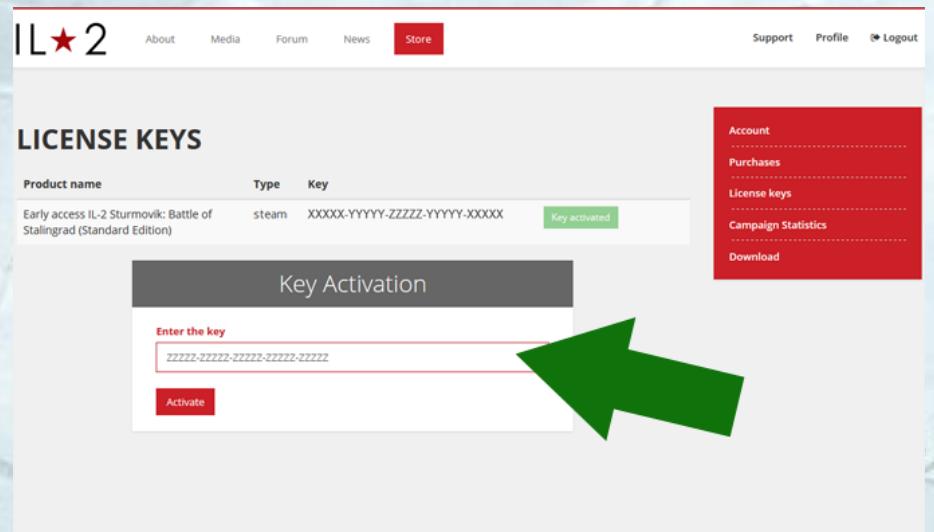


Figure 1.4.12

5. Congratulations! You have successfully activated your DLC. The next time you log in to IL-2: BOS the new content will be automatically available: (Figure 1.4.13)

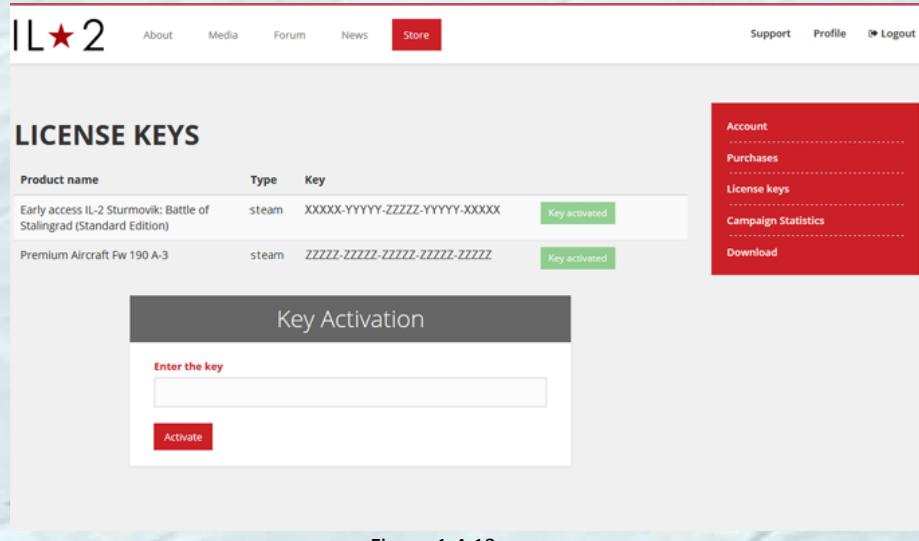


Figure 1.4.13

1.3 Installing and Activating the Retail Steam Version: you will need a DVD-ROM drive to install the Retail (DVD) version of IL-2: BOS. Installation of IL-2: BOS from a DVD is rather simple, but you need to follow the steps below to ensure proper installation.

Note: you must use the “Administrator” account in Windows in order to install the game correctly. If using Windows 7 or Windows Vista, you should disable User Account Control (UAC) during installation. Otherwise, Windows may not allow you to install all files, and you will receive an error message.

1. Purchase the DVD version of IL-2: BOS from a retail store.
2. Put the DVD in the drive, and the auto-play feature of your disk drive should automatically execute the **IL2_BOS_Setup.exe** file. If this does not happen, open the contents of the DVD disk via **My Computer** and then double-click on **IL2_BOS_Setup.exe**. Follow the prompts on the screen to complete the installation of the game. Once installation is complete, a shortcut to the IL-2: BOS Game Launcher will be placed on your desktop.
3. Once the game files have been installed, some **additional Microsoft components** (.Net Framework, Visual C++ Redistributable, DirectX 9.0c etc.) will also be installed. These are required to be installed or the game will not run. They will not harm your computer and are only used to run the game.
4. Run the **IL-2: BOS Launcher** by double-clicking on the newly-created shortcut placed on your desktop. Once you open the Launcher for the first time (and every time thereafter), the game will automatically check for any updates to the game; if there are any new updates, the game will automatically download and install them. Follow the prompts on the screen to complete the updating of the game.

Tip: You can bypass running the launcher every time you want to play by creating a shortcut to the **IL2.exe** file located in the installation folder on your hard drive.

5. After you have selected your settings and checked the news you can launch the game by clicking on the **PLAY** button, once the installation and update process is complete.
6. Once you have successfully launched the game for the first time, you will be presented with the **User Account Login** screen. At this point, you will need to activate your copy of the game or enter your user account info if you already have it. Click **New user registration** and then follow the instructions in Section 1.2 to create a **User Account**. You will be taken to our website for this process. Fill in all fields in the registration form. Please be careful when choosing an e-mail address and password for your User Account, as this information will be needed in the future when accessing the game and services on the official IL-2 Sturmovik: Battle of Stalingrad website and discussion forums.
7. Once you have created a User Account you will need to activate the **Key Code** found in the box through Steam. This unique 15-digit code is usually a sticker that can be located inside the DVD case, and it will unlock all of the content that is included in the retail version you purchased. This code can be activated by either entering it into the form that appears during the installation process, or it can be entered into Steam directly after the installation process is complete through one of two options: (Figure 1.3.1 and Figure 1.3.2)

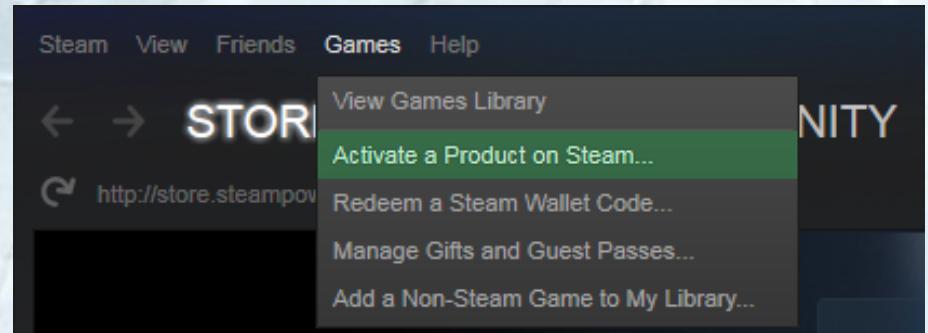


Figure 1.3.1

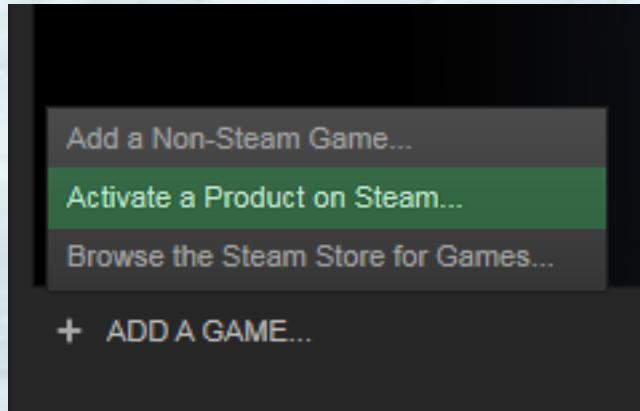


Figure 1.3.2

8. For the rest of the activation process, please follow the instructions in Section 1.2.

1.4 Installing and Activating the Third-Party Retail Version: once you have downloaded and installed the game, you will need to activate your 15-digit key through Steam. As with the retail Steam version, this key can be activated by either entering it into the form that appears during the installation process, or it can be entered into Steam directly after the installation process is complete through one of the two options that are described above in step 7 of Section 1.3

For the rest of the activation process, please follow the instructions in Section 1.2.

1.5 Transferring Your Non-Steam License Key to Steam: if you purchased your copy of IL-2: BOS before October 22nd, 2014, you can transfer your license key to your Steam account. You will not lose any in-game progress by transferring your key to Steam. However, please be aware transferring your key to Steam is a one-time process that cannot be undone. In addition, once you have transferred your key to Steam, you will only use the Steam interface to launch the game and to download any updates.

To transfer your license key to Steam, please follow the steps listed below:

1. Log in to your personal profile on the official IL-2: BOS website at <https://il2sturmovik.com/account>, and locate the **Get Steam-key for BoS** button: (Figure 1.5.1)

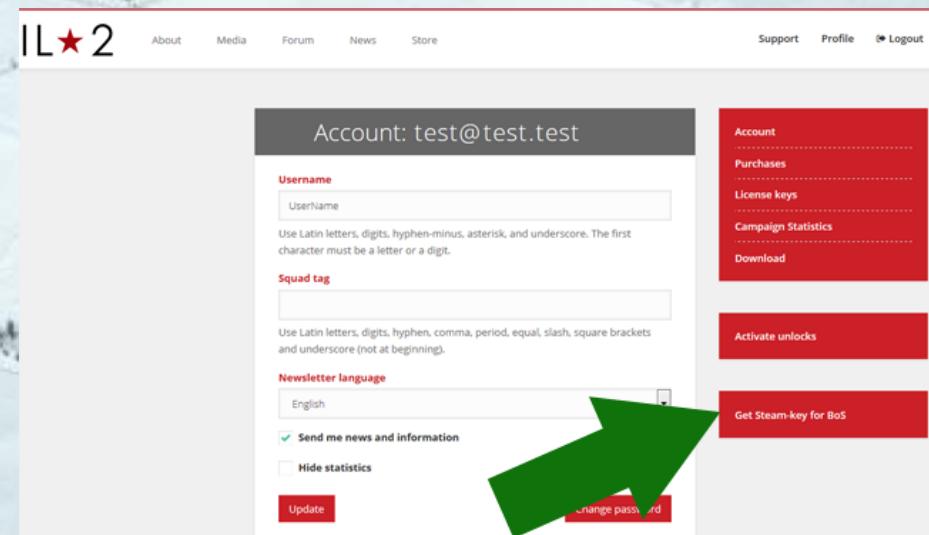


Figure 1.5.1

2. Read the terms of the transfer process, and then click on the **Get Steam-key** button if you agree to the terms: (Figure 1.5.2)

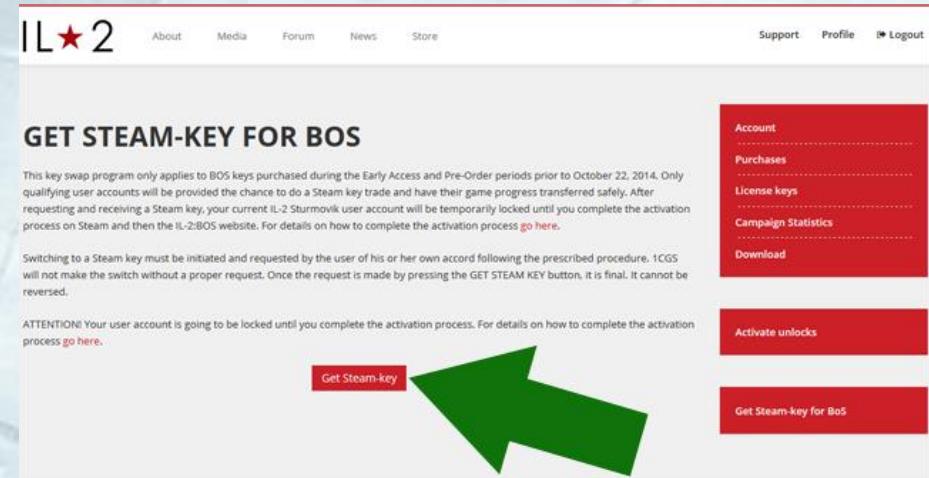


Figure 1.5.2

3. A new Steam license key will be generated for you once the transfer process is complete. Copy this new key to the clipboard. If you own the Standard edition of the game plus one or both premium keys, you may have two or three keys to copy (the first key is for the core game, while the other ones are for DLC): (Figure 1.5.3)

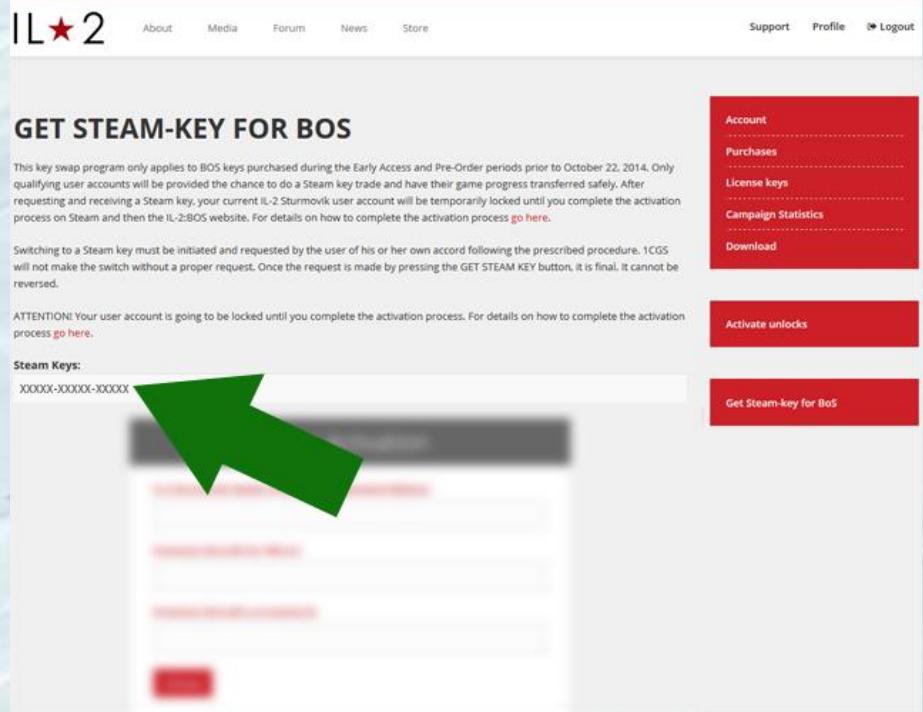


Figure 1.5.3

4. Launch the Steam application. Click on **+ ADD A GAME** In the bottom left-hand corner of the Steam app window, and then choose the **Activate a Product on Steam...** option: (Figure 1.5.4)

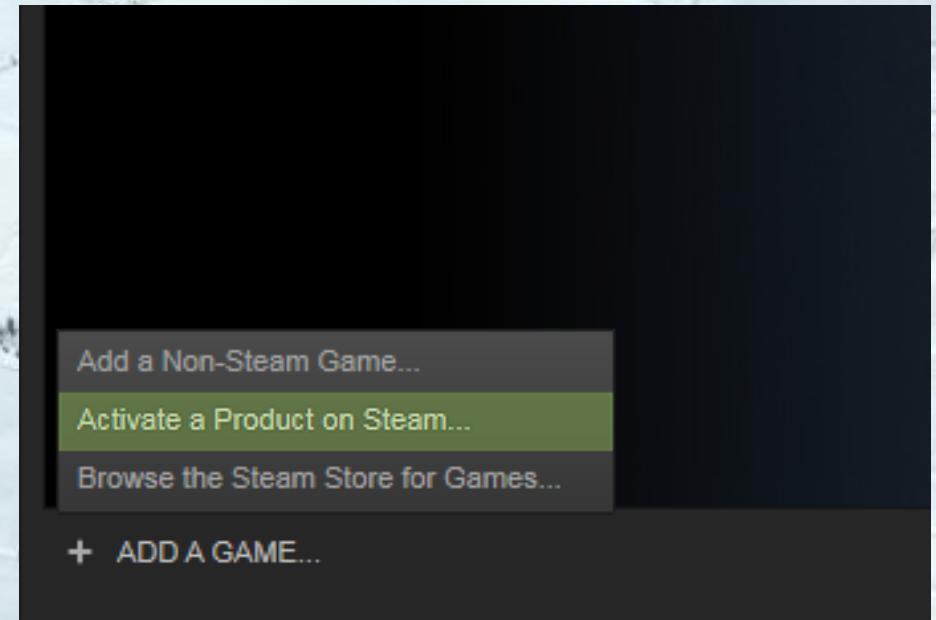


Figure 1.5.4

5. Paste the Steam license key into the blank **Product Code** field that pops up: (Figure 1.5.5)

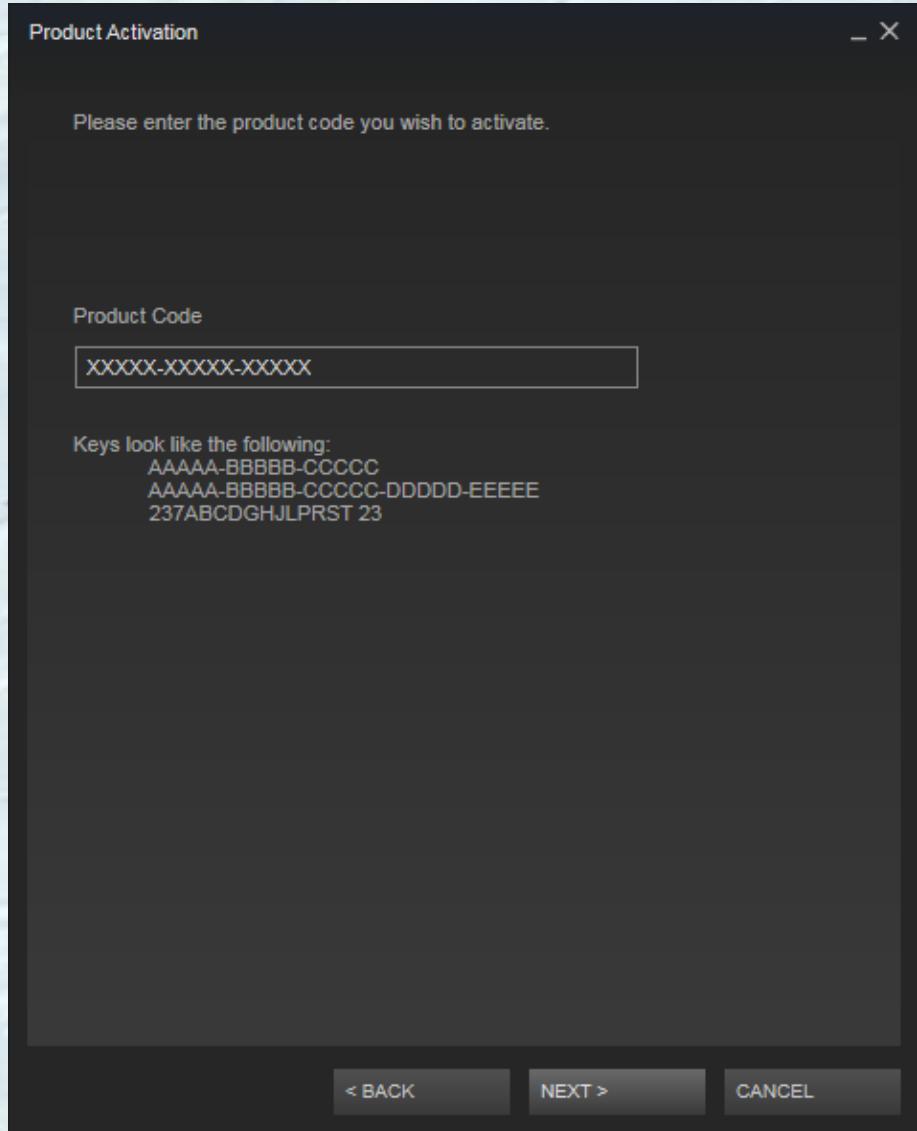


Figure 1.5.5

6. Congratulations! You now have the Steam version of IL-2: BOS: (Figure 1.5.6)

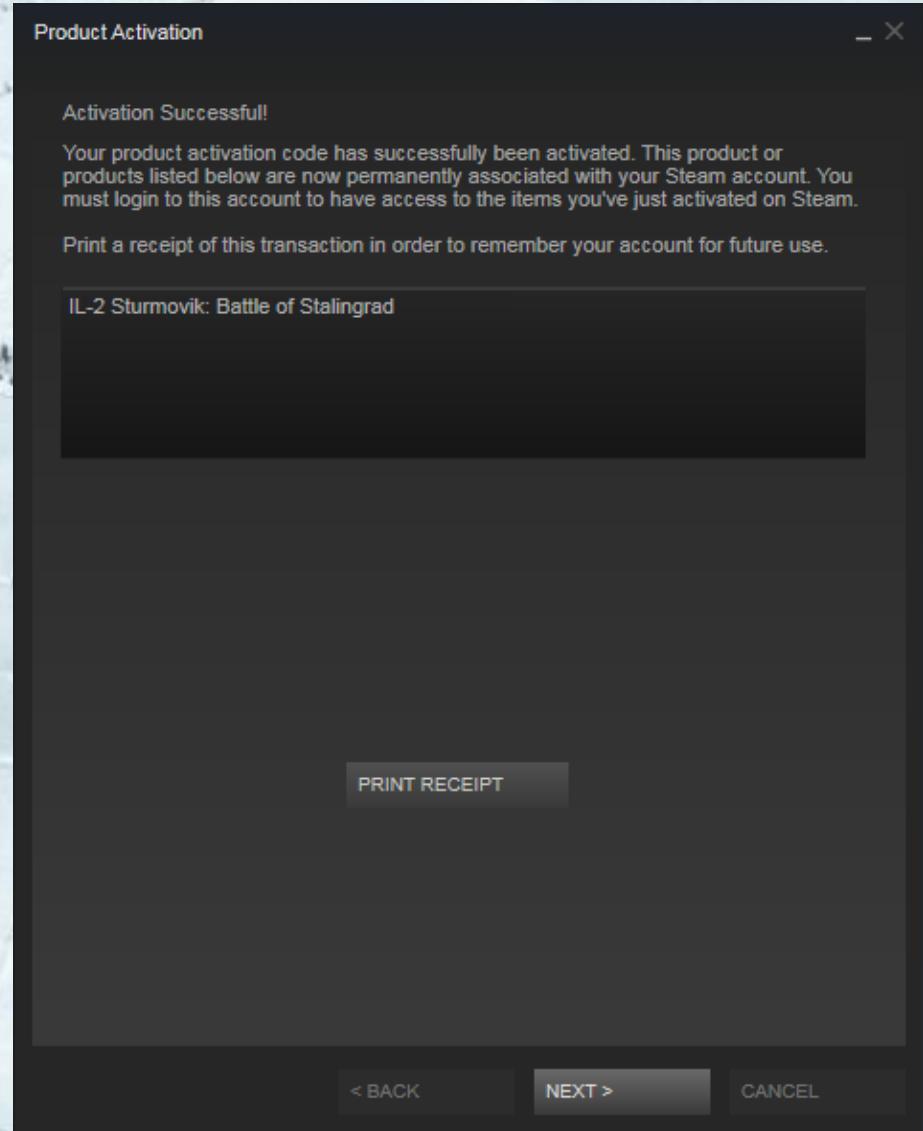


Figure 1.5.6

7. To complete the activation process, first navigate to the **LIBRARY** section of the Steam application. Select **IL-2 Sturmovik: Battle of Stalingrad**, and then click on the **CD Key** link at the top of the menu in the upper right-hand corner of the screen. Choose the option to copy the key to the clipboard: (Figure 1.5.7)

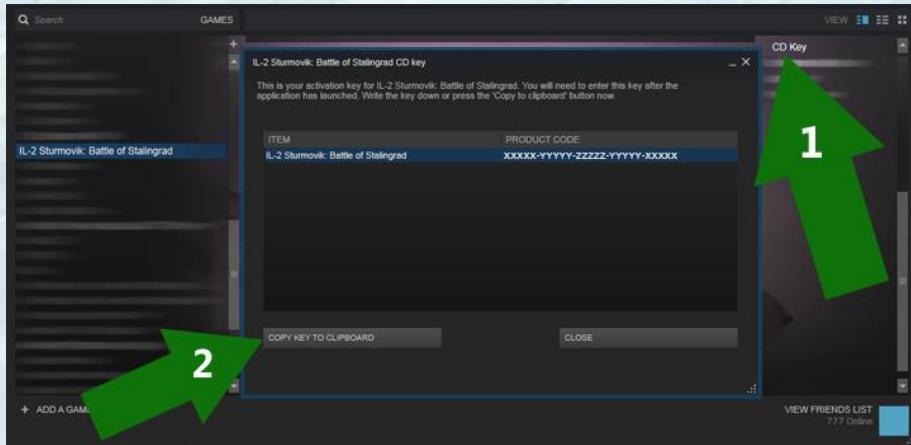


Figure 1.5.7

8. Return to your profile page at <https://il2sturmovik.com/account/>, and click on the **Get Steam-key for BoS** button. You will then see a **Keys Activation** window for the IL-2: BOS key you received on Steam: (Figure 1.5.8)

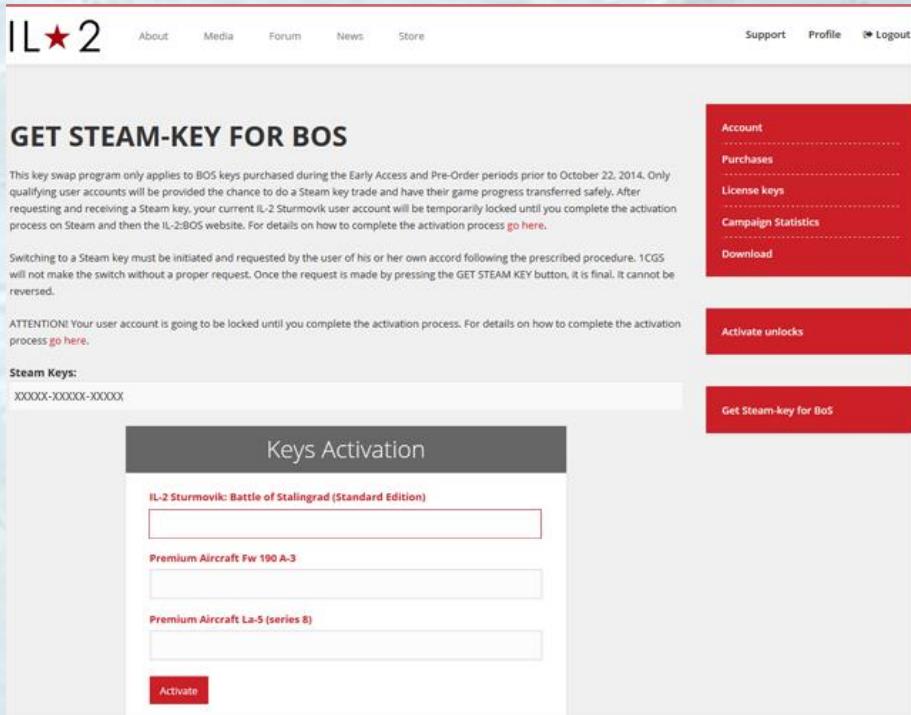


Figure 1.5.8

9. Paste your key into the blank **Keys Activation** field. Repeat this process for any additional DLC license keys: (Figure 1.5.9)

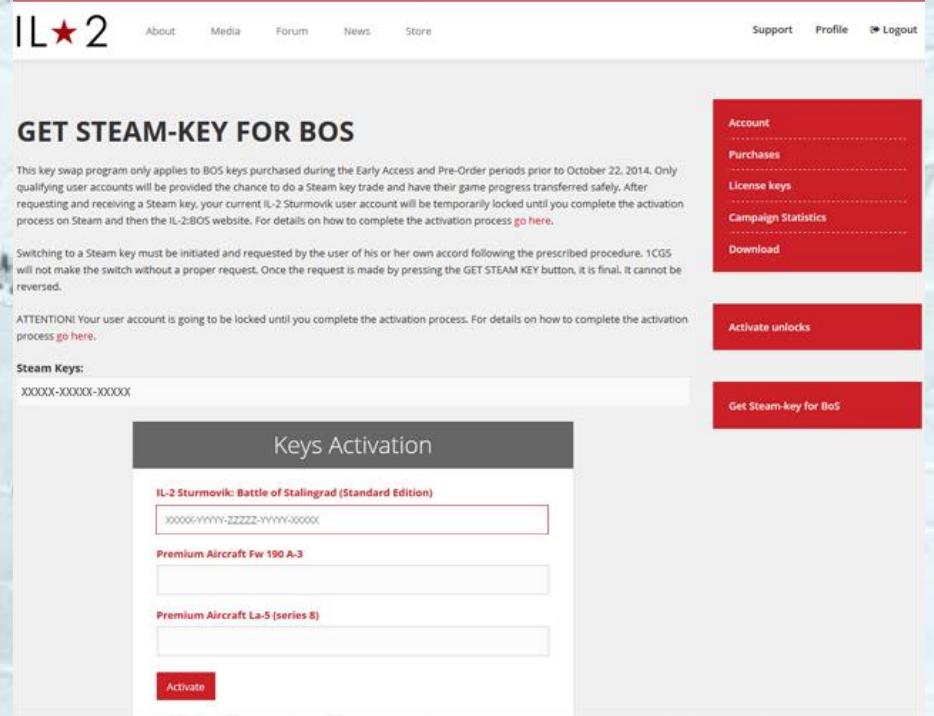


Figure 1.5.9

10. Congratulations! You have completed the activation process. Now you can play IL-2: BOS through Steam.

2.0 IL-2: BOS WEBSITE

There is much more to IL-2 Sturmovik: Battle of Stalingrad than just the simulation or game – it also has a companion website which is very important to the entire IL-2: BOS experience. The website is located at <http://il2sturmovik.com/> and allows you to carry out many important things such as:

- Purchase content such as airplanes
- Purchase gifts for friends
- Track your purchases
- Update your username and squad tag
- Update your newsletter and statistics display preferences
- Get the latest news about IL-2: BOS development
- Check out the IL-2: BOS campaign statistics
- Activate unlocks

- Participate in our Community Forum

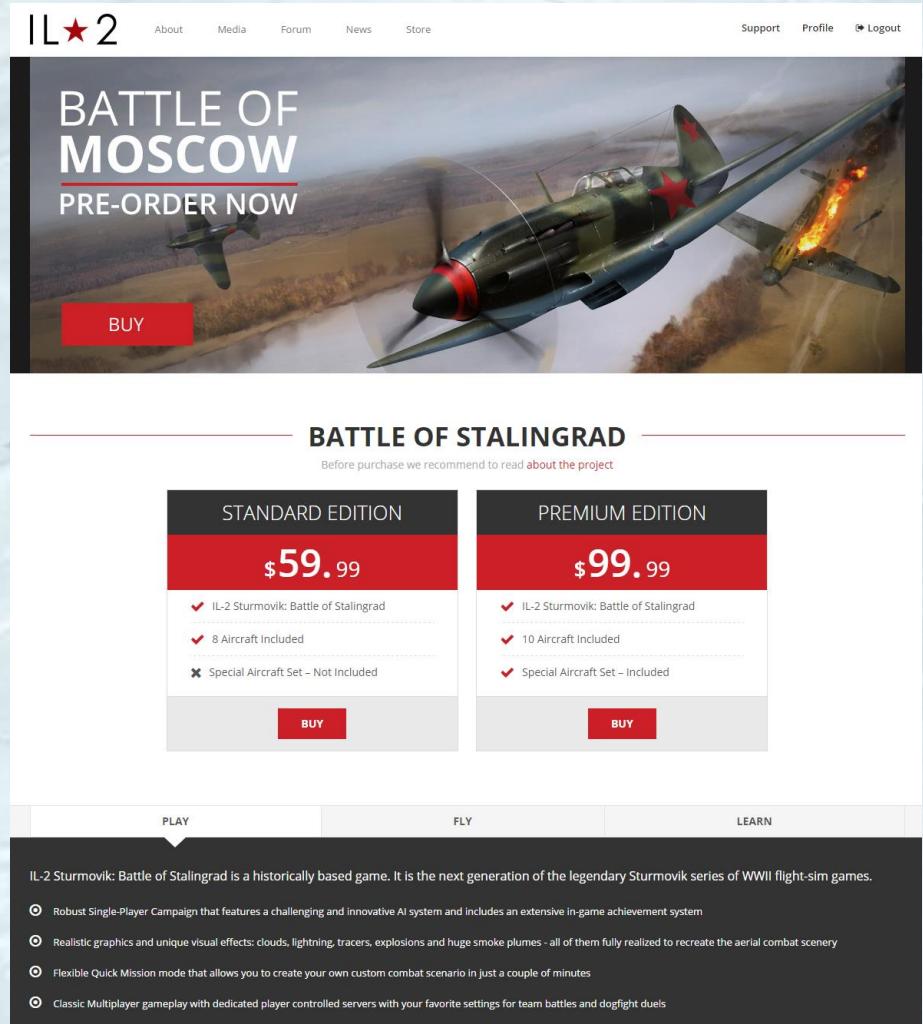


Figure 2.0.1

The website's homepage features several links to different portions of the website that will help you get the most out of IL-2: BOS. These links are titled as follows and are discussed in detail below: **About**, **Media**, **Forum**, **News**, **Store**, **Support**, **Profile**, and **Login/Logout**.

2.1 About: this section of the website discusses the research and design philosophy behind IL-2: BOS, key features of the game, the aircraft featured in IL-2: BOS, and the game's system requirements, among other things. This section of the website can be found at <http://il2sturmovik.com/about/>.

2.2 Media: this portion of the website allows users and other interested parties to read reviews about IL-2: BOS from media outlets and to download the game's official press kit. Also available here is a selection of screenshots and videos promoting the aircraft featured in the game. This section of the website can be directly accessed at <http://il2sturmovik.com/media/>.

2.3 Forum: we offer all IL-2: BOS users the opportunity to have their voice heard and participate in our community forum, and as such it is a great place to learn more about the game and chat with like-minded flight simulator enthusiasts from around the world. The forum can be directly accessed at <http://forum.il2sturmovik.com/>.

The IL-2: BOS team also utilizes the forum to make special announcements and discuss future development issues surrounding the game. Please read and understand the forum rules; if you choose to participate in the forum, please remember to be friendly and kind to your fellow flight-simmers. The IL-2: BOS community is a very friendly and helpful bunch.

2.4 News: we frequently post important news and development updates about IL-2: BOS on our website. The latest news will be posted at the top and is usually accompanied with screenshots. You can also view previous news and see how IL-2: BOS has developed over time. The news section can be found at <http://il2sturmovik.com/news/>.

2.5 Store: the IL-2: BOS web store is where you can purchase the various editions of IL-2: BOS, pre-order upcoming titles, and purchase premium aircraft. This digital content can either be added to your own personal copy of IL-2: BOS or sent as a gift to another user. The Store can be accessed directly at <http://il2sturmovik.com/store/>.

To purchase an item, simply click on the **BUY** button. You will then be given a choice to pay by either a credit/debit card or by PayPal. Fill in the necessary information on the checkout page to complete the purchase. Once the purchase is successful, you will be directed back to the IL-2: BOS website and you will see a message confirming your purchase.

Note: We do not retain your credit card or personal information. Every purchase is encrypted and the information is deleted after each purchase. We do not keep any personal records after your transaction. We use trusted Authorize.net for our credit card gateway and the PayPal payment processing system to ensure safe and secure transactions.

We have also built a system to send game and plane codes as gifts. Not only can you purchase a copy for yourself, but you can also purchase one or more copies of either edition or planes per user account (e-mail) and send it to a friend. You can activate one copy (digital key) on your account and send the others to friends, family or squadron mates. Detailed information on purchasing and sending gifts, is discussed in Step 6 of Section 1.1 and Section 2.7 below.

2.6 Support: if you encounter a problem with your copy of IL-2: BOS that cannot be resolved with help from fellow Community Forum users, please click on the **Support** link to submit a help request. On this page you will find a number of links to Frequently Asked Questions (FAQs) that may hold a solution for the issue you are experiencing. If none of these

FAQs are helpful, please click on the red **I have not found a solution in the FAQ** button. This will take you to a form where you can describe the issue you are having. Please be thorough in describing your problem and give as much info as possible so we can try to be effective in our assistance. We strive to answer all help requests within 1-2 business days. We apologize, but we do not offer phone-based support.

The Support page also features a number of links to the forum where you can post your suggestions to help improve the game and to file any bugs you have found while playing the game.

Note: the Support section of the forum is meant for resolving issues directly related to the game's functionality. Any and all forum-related issues need to be addressed directly to the forum's moderators and community managers.

2.7 Profile: this section of the website, which can be found at <https://il2sturmovik.com/account/>, allows you to manage all details related directly to your account. These options updating your username and squad tag information, managing your newsletter and statistics display preferences, tracking your purchases and license keys, and a number of other items all discussed below.

The first page you will see when clicking on the Profile link is the **Account** page. At the head of this page is your registered e-mail address. Immediately below this are the **Username** and **Squad** tag fields. Your username and squad tag can be updated at any time. This information is used to identify you both on the official community forum and within all game modes. If you choose to include a squad tag in your profile, it will be automatically appended to your username.

Below the **Squad tag** field is the **Newsletter language** section. As news about IL-2: BOS is communicated occasionally through e-mail, you can choose whether you want to receive news about the game with this method of communication. Clicking on the **Send me news and information** checkbox will keep your registered e-mail address on the mailing list, while clearing this checkbox will remove your registered e-mail address from any further news updates. You can also choose the language in which you want to receive these e-mails.

Below the newsletter section is the **Hide statistics** checkbox. By clicking on this checkbox, you will hide your campaign statistics from other visitors to the website. Campaign statistics are discussed in further detail below.

In this section of your Profile page, you can also update your password by clicking on the **Change password** button. Finally, if you have made any changes to your profile in this particular section of the page, be sure to click on the **Update** button to save your changes.

On the right-hand side of the Account page are a number of other links related to your account information. The **Purchases** link allows you to track the purchases you have made by viewing the licenses you currently own within IL-2: BOS. All items you purchase come with a unique identifying code that is stored in our database.

Below the Purchases link is the **License keys** link. This page shows all license keys you have either purchased or that have been given to you as a gift. This is also the page on which you activate your license keys. To activate a license key, copy the key, paste it into the **Key Activation** box, and then click the red **Activate** button. You will then need to login to the game in online mode to sync your account and thus enable the use of the license keys you have activated.

If you want to send an inactivated key code as a gift to another player, click the blue **Send gift** button next to the key code. A pop-up window will appear; enter the recipient's e-mail or nickname in the form, and then click **Send**.

Below the License keys link is the **Campaign Statistics** link. Your stats are collected as you play the official IL-2: BOS campaign, and those stats are then displayed on the IL-2: BOS website. Stats are updated regularly, and the system is always evolving. This particular link will show you your current campaign stats, but you can also view anyone else's campaign stats, provided they have chosen to display them to the public. To search for a player's campaign statistics, simply enter their name in the box at the upper right-hand corner of the screen, and then click on the **Search** button.

The Campaign Statistics page can also be reached directly at <http://il2sturmovik.com/stats/campaign/> or by clicking on the trophy icon found throughout the website at the upper left-hand corner of the screen.

Below the Campaign Statistics link is the **Download** link. This particular page contains the download link for the game's master installer, as well as links to helpful setup information topics, including system requirements, key activation, and in-game settings.

Below the Download link is the **Activate unlocks** link. If you do not wish to unlock the various features available for each IL-2: BOS aircraft by playing in campaign mode, you can automatically unlock them via the **Activate unlocks** link. To use this feature, you must either have purchased the Premium Edition of the game or have purchased all available premium aircraft.

Note: activating unlocks in this manner cannot be reversed. Additionally, aircraft paint schemes still must be unlocked by playing in campaign mode.

Below the Activate unlocks link is the **Get BOS on Steam** link. This link covers the process whereby you can swap your non-Steam IL-2: BOS key for a key which can be used on Steam. Please see Section 1.5 for more information about this feature.

2.8 Login/Logout: clicking on the **Login** link will take you to the username and password sign-in page, from where you can then log in with your registered e-mail address and password. Once you are logged in, you can then view all information stored on your Profile page.

If you have forgotten your password, you can choose to have it reset by choosing the **Forgot your password?** link. Alternately, you can contact customer support from this page if you need further assistance with your username and/or password.

Lastly, if you have not already done so, you can sign up for an IL-2: BOS account through the Login page.

3.0 IL-2: BOS LAUNCHER

IL-2 Sturmovik: Battle of Stalingrad comes with an external app called the **IL-2: BOS Launcher**. After the game is installed, a shortcut to the Launcher will be placed on your desktop; double-click on it to start the application. The Launcher allows the user to manage some of the necessary graphical and technical settings for IL-2: BOS. It also updates you on happenings in IL-2: BOS development and it is the portal in which you keep IL-2: BOS updated to the latest version. Links to different sections of the IL-2 Sturmovik: Battle of Stalingrad website can also be found at the top of the IL-2: BOS Launcher. For more information about the IL-2 Sturmovik: Battle of Stalingrad website, please see Section 2.0.

3.1 Main Screen: (Figure 3.1.1) When you start the launcher you will be greeted by the main window of the application. This display gives you information about IL-2: BOS development news and other special updates the team wishes to share, such as new features and airplanes. To read more information about these updates, click on the **read more...** button that can be found beneath each news item.

Note: the language in which the Launcher is displayed can be changed by selecting from the options available in the drop-down list at the upper right-hand corner of the screen. This option also affects the language in which the game is displayed.

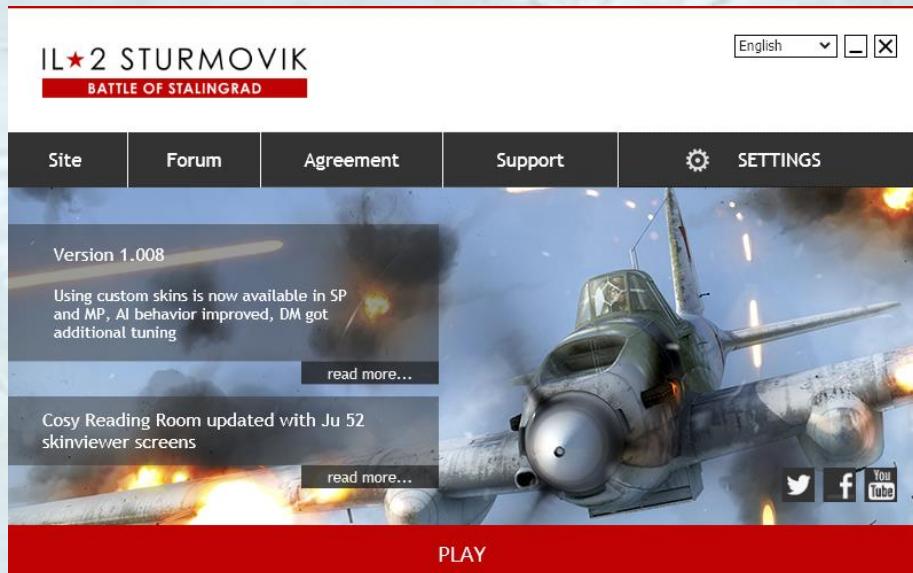


Figure 3.1.1

3.2 Site: clicking on the **Site** button will take you to the home page of the official IL-2: BOS website (<http://il2sturmovik.com/>). Please see Section 2.0 for more information.

3.3 Forum: clicking on the **Forum** button will take you to the IL-2: BOS Community Forum, located at <http://forum.il2sturmovik.com/>. Please see Section 2.0 for more information.

3.4 Agreement: the **Agreement** button takes you to a page at the official IL-2: BOS website, where you can view the details of the Terms of the Service agreement governing the relationship between the publisher of IL-2: BOS and the end user. The direct link to this page is <http://il2sturmovik.com/user-agreement/>, which can be viewed in English, German, or Polish.

3.5 Support: if you encounter a problem with your copy of IL-2: BOS that cannot be resolved with help from fellow Community Forum users, please click on the **Support** button on the Launcher screen to submit a help request. We will then attempt to help solve your problem. Please be thorough in describing your problem and give as much info as possible so we can try to be effective in our assistance. We strive to answer all help requests within 1-2 business days. We apologize, but we do not offer phone-based support.

The Support page can be reached directly at www.il2sturmovik.com/support.

3.6 Settings: (Figure 3.6.1) The **Settings** tab is where you can set a number of settings for IL-2: BOS. You can adjust the following settings:

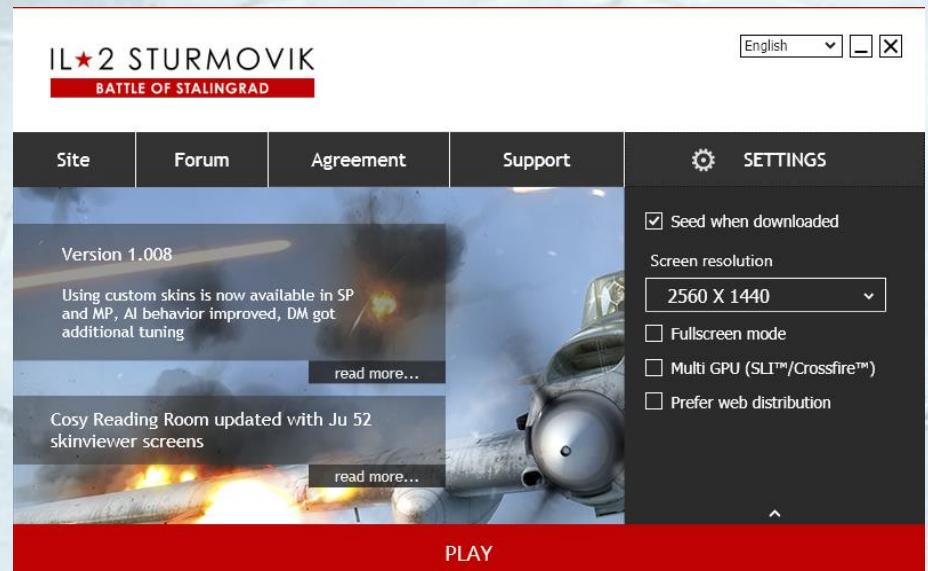


Figure 3.6.1

- Seed when downloaded: when this checkbox is enabled, your computer will act as a torrent server that will help other people download and update their copy of IL-2: BOS.

Depending on network activity, this option can consume a substantial portion of your network bandwidth, so you may wish to leave this box unchecked.

- **Screen resolution:** choose the resolution at which you want to play the game from the provided drop-down list. For best visual results, choose the resolution that matches your monitor's resolution. Choosing a lower resolution value can improve the performance of the game, at a cost to the quality of the graphics displayed.
- **Fullscreen mode:** enabling this checkbox will allow the game to take up the entire space of your monitor's display. This is especially important if you are playing the game at a resolution that is lower than your monitor's resolution. Disabling this setting can result in your computer's desktop being visible while the game is running.
- **Multi GPU (SLI™/Crossfire™):** enabling this checkbox loads special multi-GPU optimizations for IL-2: BOS that increase performance. This setting can be used with a single GPU, but it may cause stutters. We suggest only using this setting with multi-GPU setups.
- **Prefer web distribution:** enabling this checkbox tells IL-2: BOS to download updates only from an official game server and not from a peer-to-peer or torrent server.

4.0 PILOT PROFILES, STATS, AND AWARDS

4.1 PROFILE CREATION

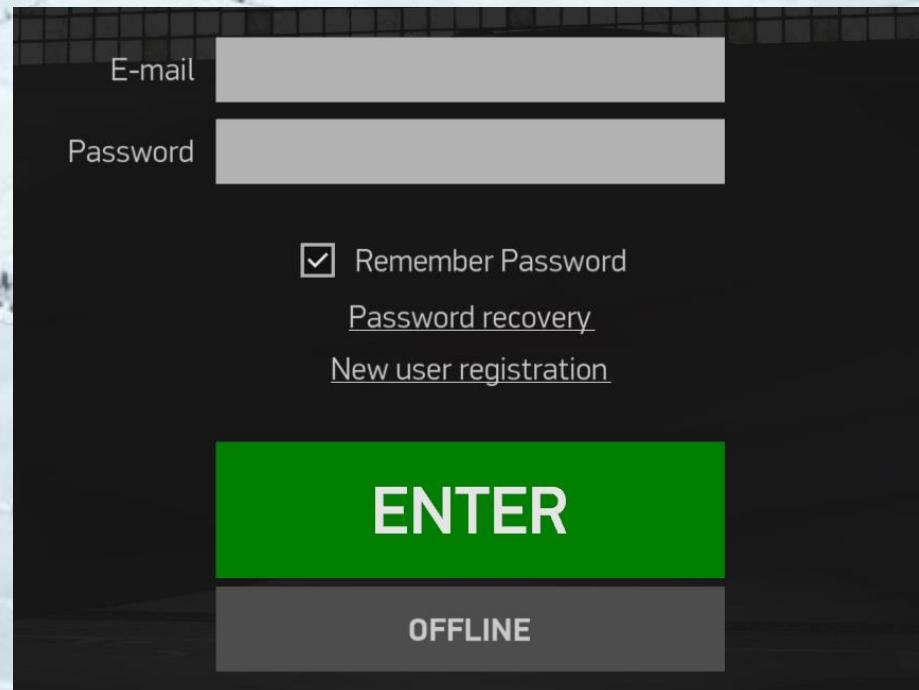


Figure 4.1.1

In order to access the game's content, you will need to create a pilot profile once you have successfully activated the game (Figure 4.1.1). Your profile keeps track of your in-game campaign statistics and shows the user name by which you will be seen by others in multiplayer and on the discussion forums at <http://forum.il2sturmovik.com/>. To create a pilot profile, please perform the following steps:

1. On the game's main login screen, click on the **New user registration** link. This action will open your web browser and take you automatically to your **Profile** page at <https://il2sturmovik.com/account/>. You will be prompted to enter your e-mail address and password if you are not currently logged in to your account.
2. In the **Username** field, enter the name by which you want to be known.
3. If you are part of an online squadron, you can enter your squad's name in the **Squad tag** field. This squad tag will then automatically be appended to your user name. Otherwise, you can choose to leave this field blank.
4. Finally, you can set your newsletter preferences and whether or not you want to display your campaign statistics. For more information about these particular settings, please see Sections 2.8 and 2.11, respectively.

5. Click on the **Update** button to save your settings once you have finished updating your profile information.

6. You can now close your web browser and return to the game's main login screen, from which you can now log into the game with your e-mail address and password.

4.2 ACCESSING THE GAME & PROFILE SYNCHRONIZATION

When you load IL-2 Sturmovik: Battle of Stalingrad, you will be given two choices at the User Authorization screen by which you may log in to the game: Online Mode (via the **ENTER** button) and Offline Mode.

- Online Mode allows you access all features offered by the game, including Single Missions, Quick Missions, Campaigns, and Multiplayer. An Internet connection is required to log in via online mode and at all times during the gaming session. Your game statistics are communicated to the IL-2 Sturmovik: Battle of Stalingrad master server, and awards are given based on your performance.
- Offline Mode allows you to log in to the game without the requirement of an Internet connection. This mode limits your access to Single Missions and Quick Missions. Campaign and Multiplayer modes cannot function in offline mode due to technical limitations.

Note: you should always start the game in Online Mode after installing the game for the first time, after re-installing the game, or after upgrading the hardware on your computer. The use of Online Mode is only possible after a one-time validation of your copy of the game. You do not need to reactivate your copy should you need to re-install it; you simply need to log in one time with your Player Account information in order to unlock the new installation. This allows unlimited installations and un-installations of IL-2 Sturmovik: Battle of Stalingrad on your machine.

4.3 PILOT CARD

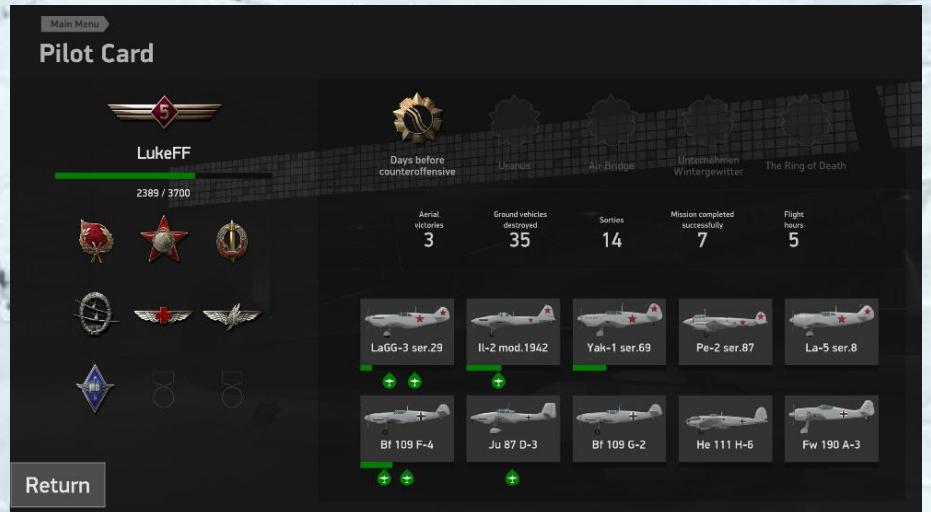


Figure 4.3.1

The **Pilot Card** screen (Figure 4.3.1) maintains the statistics you accumulate for your pilot profile while playing in Campaign mode. Statistics are updated periodically throughout the day by the IL-2 Sturmovik: Battle of Stalingrad master server. This screen can be accessed by clicking on the **Profile** link at the right-hand side of the main game screen and is divided into the following categories:

- **Current rank level:** your current rank level is depicted with a badge above your pilot's name. As your rank level increases, the overall difficulty of the game's campaign mode also increases. Below your pilot's name is a progress bar showing how many points you need to accumulate in order to reach the next rank level.
- **Awards:** as you complete missions in campaign mode, you will occasionally earn awards for your efforts. These awards are displayed below the current rank level progress bar. You can view more detailed information about these awards by hovering your mouse cursor over each award.
- **Campaign phases completed:** located at the upper right-hand side of the screen, this section of your pilot card shows which phases of the campaign you have completed. As with the awards, you can view more information about each completed phase by hovering your mouse cursor over each icon.
- **Air Victories:** this section notes how many aircraft you have shot down. Aircraft destroyed on the ground are not counted in this particular category.
- **Ground vehicles destroyed:** this section lists the total number of ground targets you have destroyed, including aircraft destroyed on the ground.

- **Sorties:** this number is the total number of missions you have flown, regardless of whether or not the mission result was a success.
- **Missions completed successfully:** this number lists the total number of missions you have flown in which you successfully completed the mission objective.
- **Flight hours:** this section notes how much time you have flown in career mode. This value is rounded to the nearest whole number.
- The bottom right-hand portion of the screen shows all of the planes you can currently fly in career mode. Below each plane's name is a progress bar which represents how many points you have accumulated flying each aircraft. These points are used to unlock aircraft modifications, paint schemes, and additional flyable aircraft. Your progress towards unlocking flyable aircraft is represented by the green-and-white aircraft icons below each individual aircraft progress bar.

To view detailed information about the unlockable items available for each aircraft, left-click on an aircraft's icon. This will open up a new screen (called the **Plane card**) that shows your progress towards unlocking items for the aircraft in question (Figure 4.3.2). Items you have unlocked will be highlighted in white, while locked items will be grayed out. Additional aircraft that can be unlocked will be displayed below the progress bar. In the image below, we can see two additional aircraft can be unlocked by flying successful missions in the LaGG-3, namely the Il-2 and the Yak-1.

Detailed information about each unlockable item can be viewed by hovering your mouse cursor over the item's icon. You can also jump to another aircraft's screen by clicking on any unlockable aircraft images at the bottom of the screen.



Figure 4.3.2

To return to the main game screen, either click on the **Return** button at the lower left-hand side of the screen or on the **Main Menu** tab at the upper left-hand corner of the screen.

5.0 OPTIONS, SETTINGS, AND AIRCRAFT CUSTOMIZATIONS

5.1 IN-GAME OPTIONS

The **Settings** option allows you to customize a number of features for the game, including controller settings, keyboard assignments, and the way certain features are displayed in the game. This screen is divided into seven sections: **Game**, **Flight Interface**, **Key Mapping**, **Input Devices**, **Graphics**, **Camera**, **Sound**, and **Multiplayer**. To access this screen, click on the **Settings** link on the main game screen.

*Note: you can return to the main game screen at any time from any of these seven sections by either clicking on the **Cancel** button at the lower left-hand corner of the screen or on the **Main Menu** tab at the upper left-hand corner of the screen. You can also return to the main settings screen at any time by clicking on the **Settings** tab.*

The **Game** section (Figure 5.1.1) is divided into three subsections: **Regional settings**, **Record**, and **User Profile**.

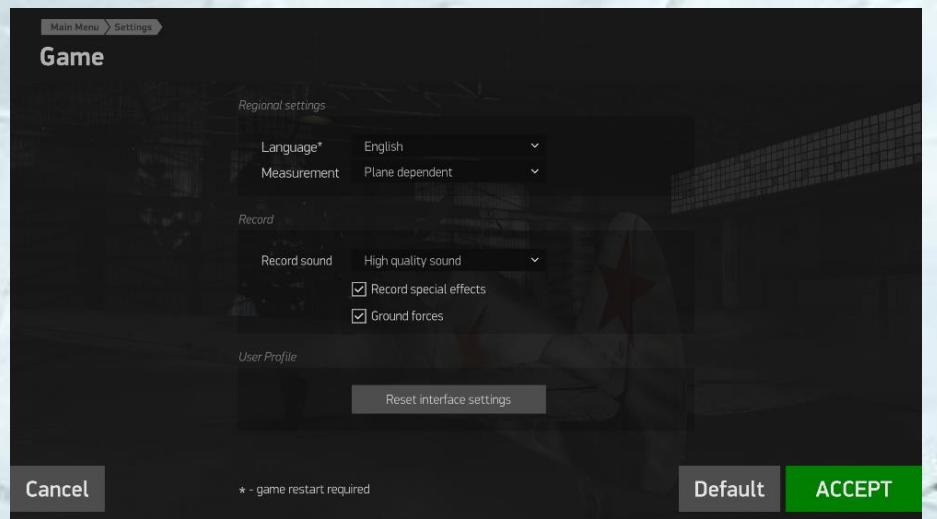


Figure 5.1.1

- The **Regional settings** subsection allows you to set the language in which IL-2 Sturmovik: Battle of Stalingrad is displayed. Choose the language you wish to use from the **Language** drop-down list. You can also set in this section the measurement system in which the flight instrument icons and bombsight controls are displayed. These options can be found in the **Measurement** drop-down list and are as follows:

- **Metric:** displays airspeed in kilometers per hour and altitude in meters.
- **Imperial:** displays airspeed in miles per hour and altitude in feet.
- **Plane dependent:** displays altitude and airspeed according to the instrumentation installed in each particular aircraft.

*Note: you cannot adjust these settings while you are flying a mission. Additionally, a restart of the game is required for any change in the **Language** section to take effect.*

- The **Record** subsection allows you to set various parameters for recording in-flight game play. The **Record sound** drop-down list gives you three options for the quality of the sound recording: **No Sound**, **Medium quality sound**, and **High quality sound**. To enable the recording of special effects (such as tracers, flames, and explosions), click on the **Record special effects** checkbox. To include the movement of ground vehicles in your recordings, click on the **Ground forces** checkbox.

Note: you cannot adjust these settings while you are flying a mission.

- The **User Profile** subsection allows you to undo any changes you have made to the **Game** screen. To do this, click on the **Reset interface settings** button. A dialog box will open, asking you to confirm your decision. A restart of the game will be required if any changes to the **Language** setting are made with this option.

Once you have completed your changes in the Game section, be sure to click on the **ACCEPT** button at the bottom of the screen to apply your changes. To reset all of the settings on this screen to their default values, first click on the **Default** button and then on the **ACCEPT** button. Otherwise, click on the **Cancel** button to undo all changes you have made. A restart of the game will be required if any changes to the **Language** setting are made.

The **Flight interface** section (Figure 5.1.2) allows you to change a number of settings that affect the way information is displayed during the course of a mission. Its options are as follows:

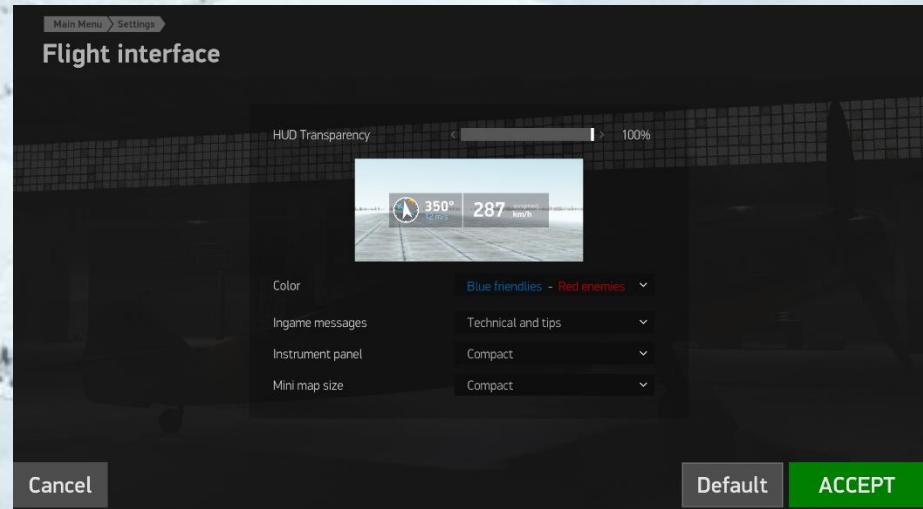


Figure 5.1.2

- **HUD Transparency:** this option controls the display of your compass heading, airspeed, altitude, and weapon status in the HUD (Heads-Up Display) at the bottom of the screen. Increasing this value will make the HUD more visible, while reducing this value will have the opposite effect. The screen below this slider previews the changes you can make here.
 - **Color:** this option controls the display of in-game icons and information on the flight map for all friendly and enemy forces. Two options are available from the dropdown box here: **Blue friendlies, red enemies** and **Red friendlies, blue enemies**.
 - **Ingame messages:** this option controls the display of technical information about your aircraft, such as throttle & radiator settings, engine overheat warnings, etc. The **Off** setting disables all in-game messages. The **Technical** setting will only display information related to your engine & weapon systems settings, such as throttle & radiator positions, trim settings, and weapon settings. The **Technical and tips** setting will, in addition to displaying the information described above, will display warnings critical to the operation of your plane, such as when your engine is overheating.
 - **Instrument panel:** this option controls the initial display of the HUD at the start of each mission. The **Hidden** setting hides the entire HUD. The **Compact** setting displays a limited amount of information, while the **Full** option displays the entire HUD.
- Note: the amount of information displayed on the HUD is dependent on your difficulty settings. Please see Section 5.2 for more information.*
- **Mini map size:** this option controls the initial size of the in-game map at the start of each mission. The **Hidden** setting hides the entire map. The **Compact** setting displays a small version of the map, while the **Full** setting displays a larger version of the map.

Once you have completed your changes in the Flight Interface section, be sure to click on the **ACCEPT** button at the bottom of the screen to apply your changes. To reset all of the settings on this screen to their default values, first click on the **Default** button and then on the **ACCEPT** button. Otherwise, click on the **Cancel** button to undo all changes you have made.

The **Key Mapping** section (Figure 5.1.3) allows you to customize your keyboard and flight controller axis inputs. The inputs you save on this tab can then be accessed and modified at any time in the game. These configuration files are stored in the **\IL-2 Sturmovik\data\input** folder. Your customized control inputs are saved in this folder with the **current** prefix, while the default control settings begin with the word **default**.

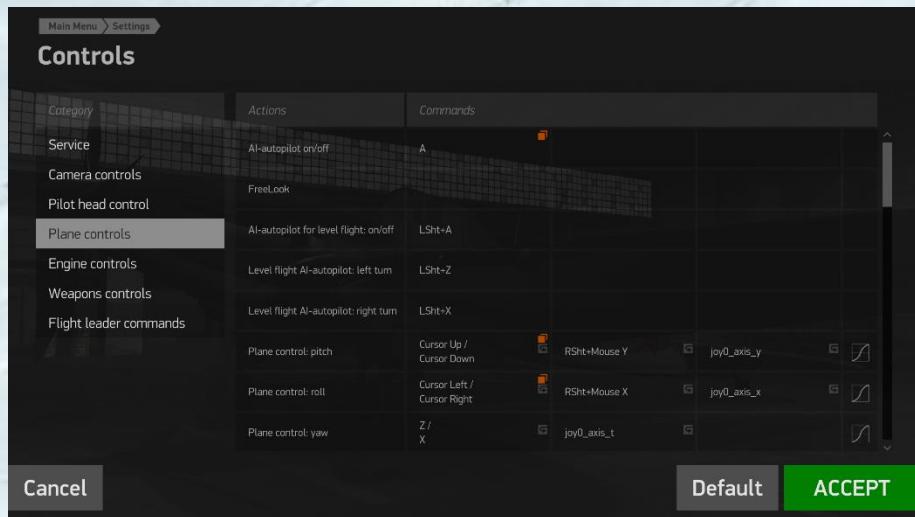


Figure 5.1.3

To change the keystroke or axis input for a particular command, please perform the following steps:

1. Choose the type of command you wish to alter from the **Category** column.
2. Since each command can have up to three inputs, choose the specific input you want to change by left-clicking on the command's appropriate column under the **Commands** heading. A dialog box will open up which says “**Press a key to assign it for a command.**” Press the button or move the controller axis (e.g., throttle lever, joystick handle, etc.) you wish to assign. The key-press or axis assignment you have entered will then be displayed on the screen.
3. Click on the **ACCEPT** button to assign the input to the game. Otherwise, click on the **Retry** button to apply another input, or select **Cancel** to exit the dialog box completely. If you have entered an axis input, you can invert its movement by clicking on the small white arrow icon next to the description of the control input you have modified.

Note: if you have assigned an input to a command that has already been assigned to

another command, an orange icon depicting two squares will be displayed next to the input you have entered. Hovering your mouse cursor over this icon will show which commands are also bound to the key input or axis being modified.

4. Once you have completed your changes, click on the **ACCEPT** button at the bottom of the screen to save your changes.

- If you want to revert to the game’s default input commands, click on the **Default** button at the bottom of the screen. If you wish to undo this action, simply click on the **Cancel** button. Otherwise, click on the **ACCEPT** button to save your changes.
- If at any time you want to undo any input changes you have made, simply click on the **Cancel** button at the bottom of the screen. This will revert your control setup to the last saved control setup.

You can also fine-tune your axis inputs while on the Controls screen by clicking on the graph icon at the far right-hand side of the **Commands** section. This will then open up the **Input responses** screen (Figure 5.1.4), where you can test the movement of your controller and make the following changes:



Figure 5.1.4

- **Sensitivity:** this setting affects how much effort it takes to move your controller throughout its full range of motion. Higher values will allow you to move your controller throughout its response range with little effort, but this can also make the controller difficult to control.
- **Dead zone: Center:** this setting allows you to set an area around your controller’s center point so it will not transmit input information to the game. This setting is helpful to eliminate “noise” from joysticks and rudder pedals that transmit a small bit of movement

even when the device is not being physically moved. As you adjust this value, a portion of the graph to the right of the slider will change color.

- **Dead zone: Edges:** this setting allows you to set an area around your controller's minimum and maximum points of movement so it will not transmit input information to the game. This setting is helpful to eliminate "noise" from throttles and other slider-based controllers that transmit a small bit of movement even when the device is at its minimum or maximum range of movement. As you adjust this value, a portion of the graph to the right of the slider will change color.
- For axis settings that do not have a defined center point (such as engine and mixture inputs), the **Dead zone: Edges** slider is replaced by the **Dead zone: Low** and **Dead zone: High** sliders. Functionally speaking, these two latter sliders function in the same way as the Dead zone: Edges slider.

Once you are satisfied with your input response changes, click on the **ACCEPT** button to apply them to the game. Otherwise, click on the **Cancel** button to undo any changes you have made and to return to the main Key Mapping screen.

Once you have completed your changes in the Key Mapping section, be sure to click on the **ACCEPT** button at the bottom of the screen to apply your changes. To reset all of the settings on this screen to their default values, first click on the **Default** button and then on the **ACCEPT** button. Otherwise, click on the **Cancel** button to undo all changes you have made.

The **Control devices** screen (Figure 5.1.5) allows you to make a number of changes to your joystick and mouse settings. Its options are as follows:

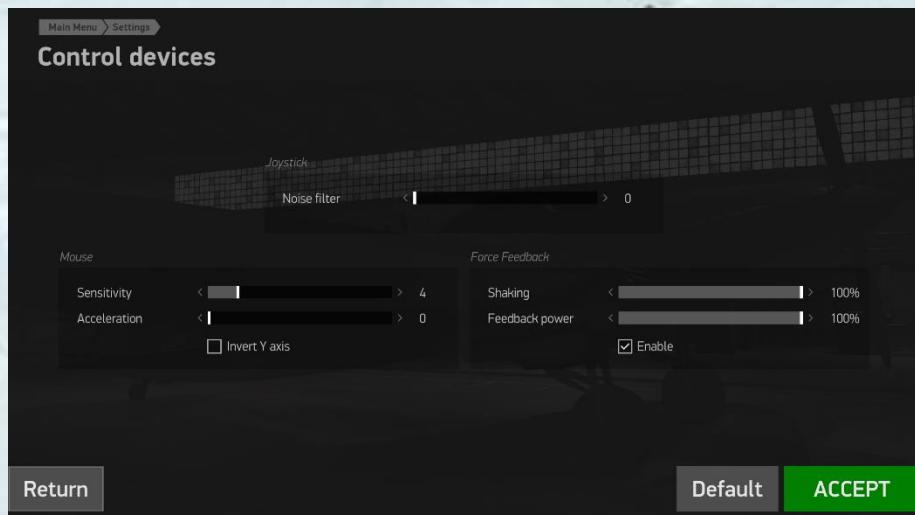


Figure 5.1.5

- **Joystick:** the **Noise filter** slider helps to eliminate any unwanted "noise" or spikes from your controllers which are mapped to an axis assignment (such as a joystick, rudder

pedals, throttle, etc.), which can cause erratic and unwanted movement. Higher values for this slider will have a stronger effect on eliminating these problems. It is recommended to keep this value at 0 if you are not experiencing this sort of problem with your controllers.

- The **Mouse** section allows you to adjust various settings for your mouse. The **Sensitivity** and **Acceleration** settings control the speed of your mouse for both in-cockpit and the various external camera views. Click and drag the sliders to the right to increase these values and to the left to decrease them. To invert your cockpit camera's Y axis (the camera's upward and downward movement) when using your mouse, click on the **Invert Y Axis** checkbox.

Note: this setting does not affect external camera views.

- **Force Feedback:** this section allows you to adjust your joystick's force feedback options (provided your joystick is a force feedback model). Click and drag the **Shaking** and **Feedback power** sliders to the right to increase these values and to the left to decrease them.

To enable force feedback for your controller, be sure the **Enable** checkbox is checked.

Note: enabling or clearing this checkbox will have no effect on non-force feedback controllers.

Once you have completed your changes in the Control Devices section, be sure to click on the **ACCEPT** button at the bottom of the screen to apply your changes. To reset all of the settings on this screen to their default values, first click on the **Default** button and then on the **ACCEPT** button. Otherwise, click on the **Cancel** button to undo all changes you have made.

The **Graphics** section (Figure 5.1.6) allows you to make various adjustments to IL-2 Sturmovik: Battle of Stalingrad's video settings. In order for some of these settings & changes to take effect, you will first need to exit and restart the game. In such cases, the game will let you know when a restart of the game is needed.



Figure 5.1.6

*Note: the only settings here that can be adjusted while flying a mission are the **FPS Limiter** and **Gamma** correction settings.*

- The left-hand column controls the overall appearance of the game. Higher values will improve the game's appearance but can also slow down your computer's frame rate.
- Screen resolution:** for best visual results, choose the resolution value from the drop-down list that matches your monitor's resolution. Lower values will improve the game's performance at a cost in visual quality.
- Full screen:** enabling this checkbox will allow the game to take up the entire space of your monitor's display. This is especially important if you are playing the game at a resolution that is lower than your monitor's resolution. Disabling this setting can result in your computer's desktop being visible while the game is running.
- Vsync:** this setting syncs your frame rate in the vertical to allow for a smooth picture without image tearing.
- Multi GPU support:** when enabled, this setting loads special multi-GPU optimizations for IL-2: BOS that increase performance. This setting can be used with a single GPU but may cause stutters. It is recommended to only use this setting with multi-GPU setups, such as SLI or Crossfire.
- FPS limiter:** this setting limits the game's maximum frame rate. Enabling this setting can help eliminate stutters and image tearing.
- Antialiasing:** this setting determines the level of AA that is applied to the game's image. Higher AA settings will produce fewer jagged edges and reducing the shimmering effect but can also slow down your computer's frame rate.

- Gamma correction:** this setting determines the brightness of the game's image. The default value is 1.

Once you have completed your changes in the Graphics section, be sure to click on the **ACCEPT** button at the bottom of the screen to apply your changes. To reset all of the settings on this screen to their default values, first click on the **Default** button and then on the **ACCEPT** button. Otherwise, click on the **Cancel** button to undo all changes you have made.

Most changes made on the Graphics screen will require you to restart the game. If a restart is required, the game will ask if you want to restart the game now. If you do not wish to restart the game at this time, either click on the **Accept** button to return to the main Settings screen or on the **Cancel** button to remain on the graphics settings screen.

The **Camera** section (Figure 5.1.7) is divided into two sections: **Cockpit view** and **External view**.

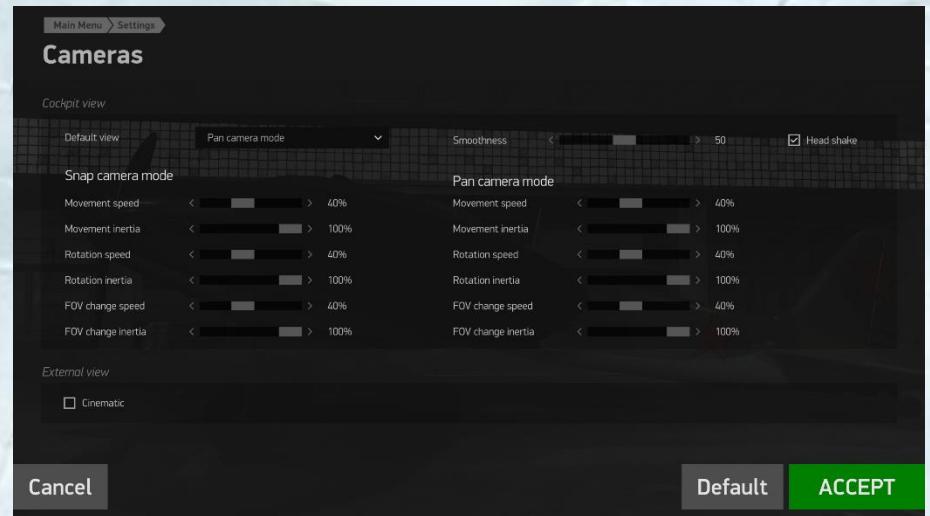


Figure 5.1.7

- The **Cockpit view** section allows you to adjust various in-cockpit camera settings, which are as follows:
 - Default view:** this setting determines which view mode will be default upon entering the cockpit during a flight. You can choose from **Centered quick view**, **Fixed quick view**, **Gradual quick view**, and **Pan camera mode**.
 - Smoothness:** this setting will smooth out the camera as it swings around in the cockpit, which can help with mouse-look or TrackIR usage. Higher smoothing settings will make the camera less responsive and more sluggish.

- **Head shake:** this setting determines if the cockpit camera will shake to mimic the effect as if your body was really shaking due to being inside a real cockpit. Situations where the aircraft can shudder and shake are stalls, turbulence, and landings.
- **Snap camera mode:** there are several settings that affect how the in-cockpit camera behaves, and you can change these settings to best match your personal preferences. There are two major types of cockpit view modes here - **Snap camera mode** and **Pan camera mode**. With Snap camera mode, the camera instantly snaps to the position you wish to see; with Pan camera mode the camera rotates to the position you wish to see. Each view mode has several settings that can be changed. They are **Movement speed**, **Movement inertia**, **Rotation speed**, **Rotation inertia**, **FOV change speed**, and **FOV change inertia**. These settings are meant to be used in conjunction with a hat switch or a keyboard. These settings do not interact with your mouse or if you are using an advanced viewing system, such as TrackIR.

- **External view:** this section allows you to choose the type of camera you wish to use when following an aircraft in external view mode. Enabling the **Cinematic** camera effect option simulates the effect of a non-stabilized camera. That is, the camera will move horizontally and vertically, thus simulating it being attached to an aircraft that is being buffeted around. Keep this checkbox cleared if you want your external camera view to remain stable. This option also adds a motion blur effect as you move your point of view around while inside the cockpit.

Once you have completed your changes in the Cameras section, be sure to click on the **ACCEPT** button at the bottom of the screen to apply your changes. To reset all of the settings on this screen to their default values, first click on the **Default** button and then on the **ACCEPT** button. Otherwise, click on the **Cancel** button to undo all changes you have made.

The **Sound** section (Figure 5.1.8) allows you to make various adjustments to IL-2 Sturmovik: Battle of Stalingrad's audio settings.

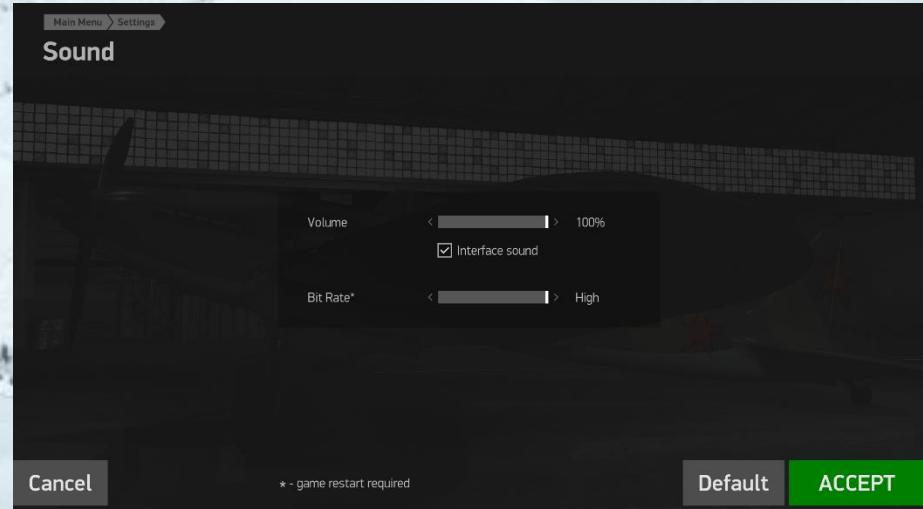


Figure 5.1.8

- **Volume:** this setting determines the overall sound level for the game.
- **Interface sound:** when this checkbox is cleared, interface sounds that are played in certain instances, such as moving your mouse cursor over a menu item, will be disabled.
- **Bit Rate:** this setting determines the level of detail at which sounds will be played. Most users can fly with the Medium or High settings without any problems. However, your computer will use more memory with the higher settings (due to the increased audio quality), so you may want to lower this setting if you encounter memory errors while playing the game. Adjusting this setting will require a restart of the game before your changes will take effect.

Once you have completed your changes in the Sound section, be sure to click on the **ACCEPT** button at the bottom of the screen to apply your changes. To reset all of the settings on this screen to their default values, first click on the **Default** button and then on the **ACCEPT** button. Otherwise, click on the **Cancel** button to undo all changes you have made.

The **Multiplayer** section (Figure 5.1.9) allows you to make various adjustments to IL-2 Sturmovik: Battle of Stalingrad's network settings for multiplayer game play.

Note: you cannot adjust these settings while you are flying a mission.

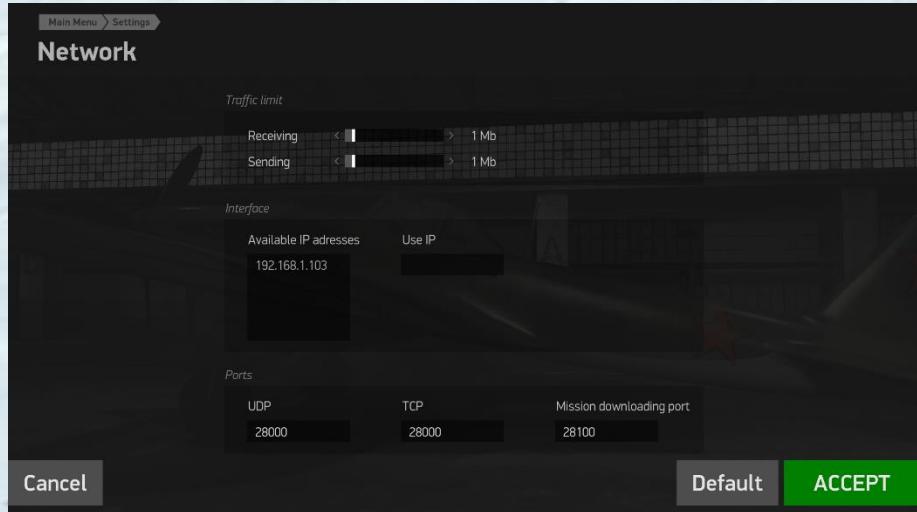


Figure 5.1.9

- Traffic limit:** the settings in this section allow you to set the maximum traffic limit for your connection in an IL-2: BOS multiplayer environment. Choose the setting that best matches your type of internet connection. You can choose from 256 Kb/s, 512 Kb/s, 1 Mb/s, 2 Mb/s, 4 Mb/s, and 10 Mb/s. Choose 1 Mb/s if you do not know the speed of your **Receiving** and **Sending** internet bandwidth. This should work for most users.
- Interface:** this section is where you can see your IP address or choose to manually enter it yourself. In most cases leaving the IP address alone is fine. To manually enter your IP address, click in the field below **Use IP** and type in your desired IP address. Manually entering your IP address is only recommended for experienced network users.
- Ports:** the game port settings are necessary for IL-2: BOS multiplayer to function properly. If these ports are not open, you may not be able to join or host a multiplayer match. By default, the game ports are as follows: **UDP** - 28000; **TCP** - 28000; **Mission downloading port** - 28100. You may need to manually open or forward these ports on your internet router. Please refer to your router manual or your ISP for instructions on how to do this. If you need to manually enter the game ports, just click in the appropriate field and enter the desired values.

Once you have completed your changes in the Multiplayer section, be sure to click on the **ACCEPT** button at the bottom of the screen to apply your changes. To reset all of the settings on this screen to their default values, first click on the **Default** button and then on the **ACCEPT** button. Otherwise, click on the **Cancel** button to undo all changes you have made.

5.2 DIFFICULTY SETTINGS

You can enable or disable a number of settings (Figure 5.2.1) in IL-2 Sturmovik: Battle of Stalingrad that affect the complexity and difficulty of the game before you begin a mission.

You can choose these options individually, or you can select one of the two presets in the far left column (**Normal** or **Expert**). If you choose to not use one of these two presets, your difficulty setting will be listed as **Custom**. In either case, your changes will be saved automatically.

Note: in Campaign mode, you can only choose from the Normal and Expert presets for your difficulty settings. Please see Section 13.3 for more information.

To access the difficulty settings display, click on the **Realism** button before loading a mission.

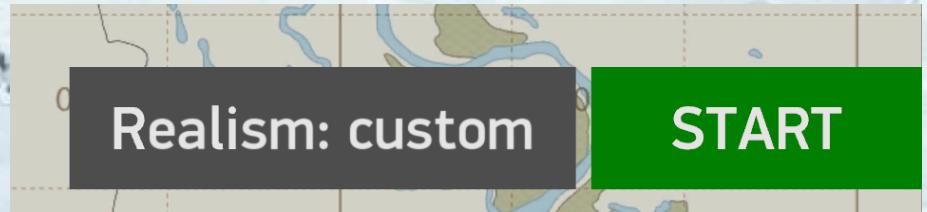


Figure 5.2.1

The Realism screen is divided into four sections: **Presets**, **Gameplay**, **Simplifications**, and **Piloting assistance** (Figure 5.2.2).

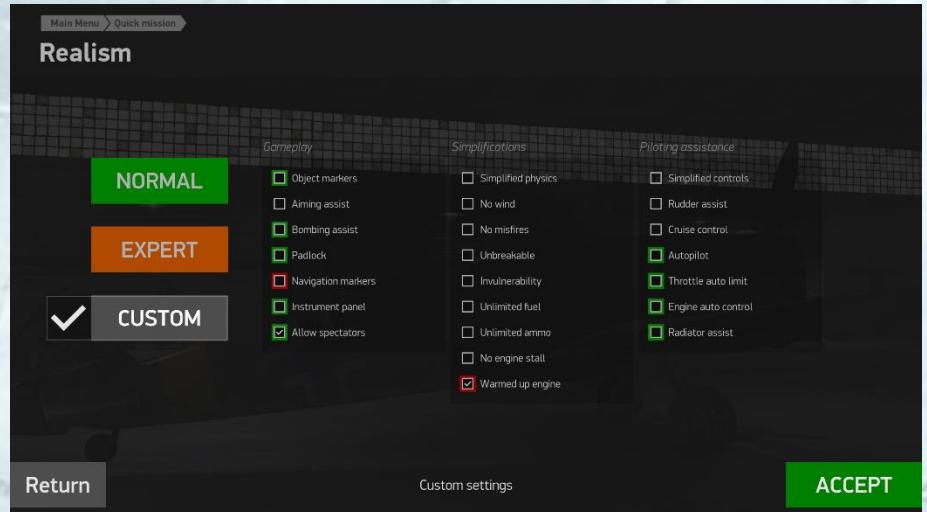


Figure 5.2.2

- The **Presets** section lets you choose from the two pre-defined difficulty settings as well as a third option to selectively enable and disable difficulty settings. In Custom difficulty mode, the red- and green-highlighted checkboxes show which difficulty options are enabled in the Expert and Normal difficulty modes, respectively.

- **Gameplay:**

- **Object markers:** displays markers over various objects (including aircraft and ground objects) for easier identification.
- **Aiming assist:** enables onscreen aids that help the player aim their machine guns and cannons properly.
- **Bombing assist:** enables onscreen aids that help the player aim their bombs and rockets properly.
- **Padlock:** enables the ability to visually “lock on” to an enemy aircraft and to follow its movements automatically.
- **Navigation markers:** enables colored markers and symbols that point the way to various waypoints and mission objectives.
- **Instrument panel:** displays a convenient instrument data panel in the lower left-hand corner of the screen, along with the in-game mini-map.
- **Allow Spectators:** enables the ability to use the various external camera views.

- **Simplifications:**

- **Simplified physics:** reduces the intensity and complexity of the physical forces acting on your aircraft is reduced, thus making flying easier.
- **No wind:** disables the effects of wind and turbulence.
- **No misfires:** eliminates the possibility of your machine guns or cannons misfiring.
- **Unbreakable:** eliminates the possibility of damage resulting from colliding with other objects or surfaces.
- **Invulnerability:** eliminates the possibility of damage resulting from enemy fire, including the pilot.
- **Unlimited fuel:** enables an unlimited supply of fuel.
- **Unlimited ammo:** enables an unlimited supply of ammunition.
- **No engine stall:** eliminates the disruption of fuel flow to the engine resulting from negative-g aerobatic maneuvers.
- **Warmed up engine:** automatically warms up your engine to the optimal temperature at the start of the mission.

- **Piloting assistance:**

- **Simplified controls:** enables an automatic pilot-assistance system, thus making flying much easier.
- **Rudder assist:** enables automatic support for the yaw axis. This option is recommended if your controller does not have a sufficient number of axes to support yaw movement.
- **Cruise control:** enables automatic control of the throttle in order to achieve the optimum flight speed. This option also takes into account the aircraft’s rate of climb or descent.
- **Autopilot:** enables artificial intelligence (AI) for the player’s pilot. This option allows the AI to fly the mission according to the defined objectives (including dogfighting with the enemy), without any input from the player.
- **Throttle auto limit:** enables automatic limiting of engine speed, which will prevent the engine from breaking down. This option takes into account the angle and speed of your dives in order to prevent damage to the engine. When this setting is enabled, you can toggle it on and off during a mission by pressing the **Left Shift + N** key combination (**Automatic RPM limiter**).
- **Engine auto control:** enables automatic control of your plane’s fuel mixture, propeller pitch (RPM), and supercharger settings in order to provide optimum power to your plane’s engine(s). When this setting is enabled, you can toggle on and off the various settings during a mission by pressing either the **Left Shift + M** key combination (**Automatic mixtures and superchargers control**) or the **Left Shift + R** key combination (**Automatic radiators control**).
- **Radiator assist:** enables automatic control of your radiator in order to prevent engine failures resulting from overcooling or overheating. This option applies only to engines equipped with radiators and cowl shutters. When this setting is enabled, you can toggle it on and off during a mission by pressing the **Left Shift + R** key combination (**Automatic radiators control**).

5.3 CUSTOMIZING YOUR AIRCRAFT

IL-2 Sturmovik: Battle of Stalingrad allows you to customize your aircraft before you begin playing a mission. These customizations include your aircraft’s paint scheme, weapon loadout, machine gun and cannon convergence, and fuel level. To customize your aircraft, click on the **Plane setup** link at the bottom of the Briefing screen. In the upper right-hand corner you will see a window divided into two tabs: **Setup** and **Paint scheme** (Figure 5.3.1).

Note: if you need to rotate the view of the 3D aircraft model while on the Plane setup screen, either scroll your mouse wheel up & down or click and drag your mouse cursor horizontally.



Figure 5.3.1

- The **Setup** tab allows you to adjust your fuel level, ammunition loadout, machine gun and cannon convergence, and to manage your unlockable aircraft features.
 - To adjust your fuel level, left-click and drag the **Fuel** slider left and right. As you adjust this value, the total amount of fuel your aircraft is carrying will be displayed directly above the slider.
 - To change your ammunition loadout, first click on the dropdown box in the **Ammunition scheme** section. This will open up the **Weapons Settings** screen (Figure 5.3.2), from which you can choose your ammunition loadout and enable unlockable aircraft features.

The ammunition loadouts from which you can choose will depend in part on which aircraft unlocks you have enabled. The list of unlocks for your aircraft are listed on the left-hand side of the screen under the **Select Modification** heading. Available unlockable aircraft features will have a checkbox next to their description, while those still locked are denoted by a padlock icon. As you enable and disable unlockable weapons, the weapon loadouts from which you can choose will change in the **Select Ammo Presets** column to the right. In certain cases, enabling a particular unlockable weapon will prevent other unlockable weapons from being simultaneously enabled (such as externally-loaded bombs).

*Note: unlockable aircraft items can only be unlocked either while playing the game in Campaign mode or by activating them via the **Activate Unlocks** feature at <https://il2sturmovik.com/account/>. Please see Section 3.2 for more information about this feature.*

Below the list of unlockable features is a green progress bar showing your overall progress towards unlocking all features for your aircraft (including official paint schemes). To the right of this progress bar is a text item notifying you how many

features you have unlocked for your plane and how many total unlockable items there are for your plane (these numbers exclude official paint schemes).

Below the green unlock progress bar is the **All Unlocks** button. Clicking on this button will take you to the planes **Plane card** screen (please see Section 4.2 for more information). Click on the **Return** button to return to the **Weapons Settings** screen.

Certain loadouts, such as those that include rockets and externally carried bombs, can be seen on the 3D aircraft model when chosen. For machine gun and cannon options, the blue-tipped rounds represent armor piercing ammunition, while the orange-tipped rounds represent high explosive ammunition.

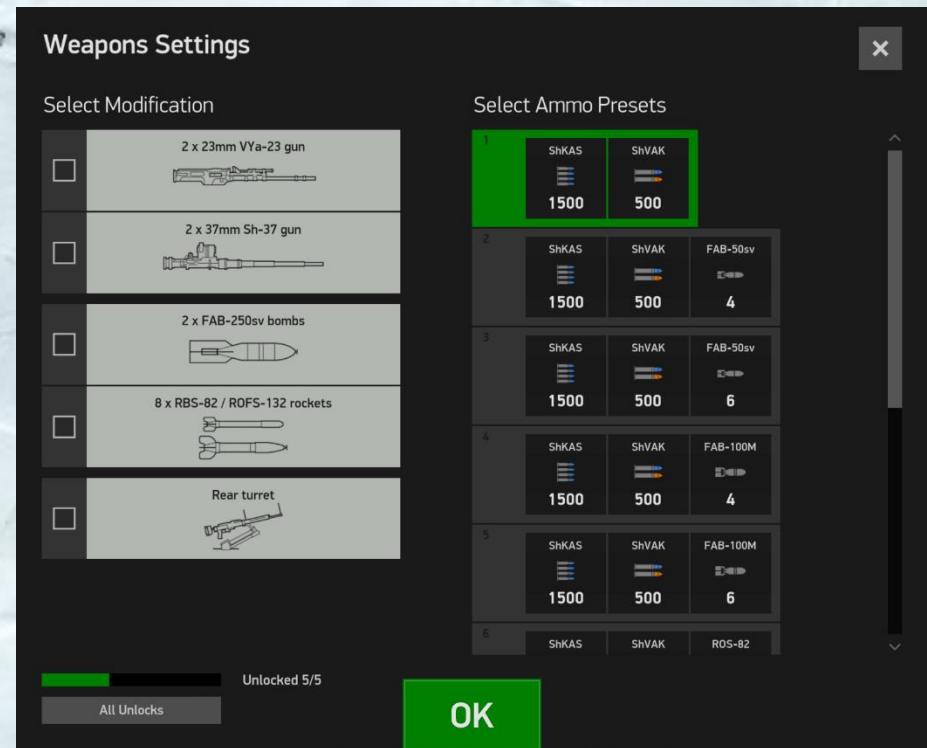


Figure 5.3.2

When you are finished adjusting your loadout, click on the **OK** button to return to the main aircraft configuration scheme. You can then either click on the **ACCEPT** button to apply your loadout changes or click on the **Restore Settings From Mission** button to undo all changes you have made.

- To adjust your machine gun and cannon convergence, left-click and drag the **Guns convergence range** slider left and right. This number represents the range in meters where the fire from your weapons will “converge” (or meet).

- Most rockets and bombs have adjustable fuse settings (Figure 5.3.3). For rockets, these options will be listed in the **Rockets range** dropdown box. In general, rockets can be set to either explode on contact or after traveling a set distance. This latter option is especially useful when attacking enemy aircraft. For bombs, the fuse options will be listed in the **Bombs timer** dropdown box. Bombs can be set to explode either on contact or after a certain number of seconds after the bomb has made contact with the ground. The **default** value is typically a short delay of about 1 second.

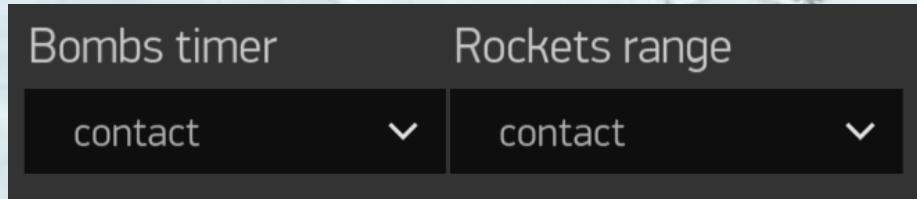


Figure 5.3.3

- As an alternate way to configure the unlockable features for your aircraft, click on the dropdown box in the **Unlocks** section. This will then open up the **Weapons Settings** screen (Figure 5.3.2), from which you can then adjust your loadout as described above.
- The **Paint scheme** tab (Figure 5.3.4) allows you to change your aircraft's paint scheme from its default colors to an official scheme you have unlocked in Campaign mode or to a third-party paint scheme.
- Paint schemes unlocked in Campaign mode can be accessed by choosing the **Official** setting from the dropdown box at the top of the screen. Schemes that have been unlocked will be highlighted in white, while those still locked will be grayed out and denoted by a padlock icon. All of these schemes can be previewed by hovering your mouse cursor over the aircraft scheme's description.
- Third-party paint schemes can be accessed by choosing the **Custom** setting from the dropdown box at the top of the screen. These paint schemes can be used in all forms of gameplay. Third-party paint schemes can be downloaded from <http://il2sturmovik.com/>. Once you have downloaded a custom paint schemes, follow any included instructions to properly install it. By default, IL-2: BOS stores third party paint schemes in the **\data\graphics\skins** folder on your computer.

When you are finished choosing your aircraft's paint scheme, click on the **ACCEPT** button to apply your changes and return to the mission briefing screen. You can also click on the **Restore Settings From Mission** button to undo any changes you have made.

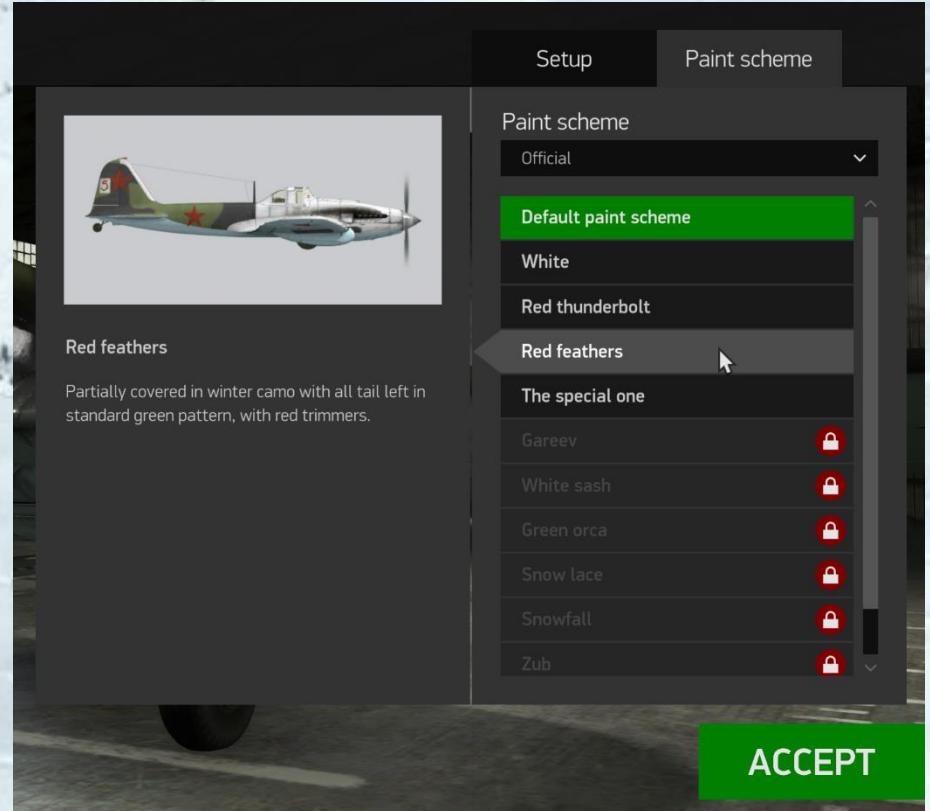


Figure 5.3.4

6.0 BASIC AIRCRAFT AND SYSTEMS MANAGEMENT

6.1 ENGINE AND COCKPIT CONTROLS

At more complex difficulty levels, you will need to manually manage your aircraft's engine in order to get the best performance out of it. Keep the following points in mind in order to keep your engine running properly. Other important aircraft subsystems are also covered in this section.

- **Engine startup/shutdown:** to start up or shut down your aircraft's engine, press the **E** key (**Engage engines start procedure / Stop engine**). This will start the engine startup / shutdown process, which includes items such as turning the electrical power on / off, priming the engine, etc.

Note: in all Soviet aircraft, be sure you have set your engine's fuel mixture to full, or the engine will fail to start. As long as your fuel mixture setting is correct, you need to press the E key only once to start your engine.

Note: all German aircraft have automatic mixture controls, and thus mixture cannot be adjusted on these planes. For these planes you thus do not need to adjust the fuel mixture prior to starting the engine.

- **Throttle control:** to control your engine's power with your keyboard, press the - key to increase power and the = key to decrease power. If you have an analog throttle on your controller, you can control the engine's power with the **Engines throttle control** axis assignment.
- **Engine boost:** with the La-5 series of aircraft, you can increase your engine's performance by engaging a special engine boost system, known as *forsazh* in Russian. To do so, press the **Left Shift + B** key combination (**Switch engines boost: on/off**). In order to provide maximum engine output without damaging your engine, *forsazh* should only be engaged below 3,000 meters and for a maximum continuous time of 5 minutes.
- **Prop pitch:** many aircraft in IL-2: BOS have constant-speed propeller systems that must be manually adjusted in order for your engine to run at peak efficiency. With this sort of system, the engine attempts to maintain the propeller RPM you have set. To control your aircraft's prop pitch with your keyboard, press the **Right Shift + -** key combination to increase pitch and the **Right Shift + =** key combination to decrease pitch. You can also control your aircraft's prop pitch with the **Propellers pitch control** axis assignment.

In the Bf-109 and Fw-190, the engine is fitted with a variable-pitch propeller. With this sort of system, the pilot controls the engine's RPM by the movement of the throttle, thus greatly easing the workload needed to fly the plane. However, you can override this system and manually control the aircraft's propeller pitch with your keyboard. To do this, first press the **Right Shift + P** key combination (**Switch propellers pitch control mode: manual / auto**) – you will see a switch in the cockpit move when you do this. You can then press the **Right Shift + =** key combination to increase prop pitch and the **Right Shift + -** key combination to decrease prop pitch.

Note: the Propellers pitch control axis assignment cannot be used with the Bf-109 and Fw-190 when the propeller pitch control is in manual mode.

If you do not wish to manually control your aircraft's propeller pitch, you can elect to have the computer automatically adjust it by enabling the **Engine auto control** setting from the list of difficulty options. You can then toggle automatic control of your propeller pitch with the **Left Shift + M** key combination (**Automatic mixtures and superchargers control**).

- **Radiator control:** on aircraft fitted with an inline engine, you will need to manually open and close the water and oil radiator shutters in order to maintain a safe operating temperature (which is about 80 degrees Celsius). Oil temperature also needs to be controlled in planes fitted with a radial engine. Letting your engine run too hot or too cold for extended periods can cause engine failure.

To control the water radiator shutters on your aircraft's engines with your keyboard, press the **Right Ctrl + -** key combination to open the shutters and the **Right Ctrl + =** key

combination to close the shutters. You can also control these radiator shutters with the **Water radiators shutters control axis** axis assignment.

To control the oil radiator shutters on your aircraft's engines with your keyboard, press the **Right Windows + -** key combination to open the shutters and the **Right Windows + =** key combination to close the shutters. You can also control these radiator shutters with the **Oil radiators shutters control axis** axis assignment.

There are a couple of exceptions to the above guidelines. First, with the Bf-109, the water and oil temperatures are automatically controlled by the engine. However, you can override the automatic control of the water temperature and manually adjust the radiators yourself. To do this, first press the **Right Shift + R** key combination (**Switch water radiators control mode: manual/auto**) – you will see a switch in the cockpit move when you do this. You can then press the **Right Control + Equals** key combination (**Bf-109 water radiator: open**) to open the radiators and **Right Control + -** key combination (**Bf-109 water radiator: close**) to close the radiators.

The second exception concerns the He-111. With this plane, the oil radiators are opened with the **Right Windows + =** key combination (**He-111 oil radiators: open one step**), and they are closed with the **Right Windows + -** key combination (**He-111 radiators: close one step**). In this manner, the radiators are opened and closed one notch at a time with every press of the relevant key combination.

The final exception concerns the Pe-2 and the Fw-190. Although the Pe-2 is fitted with a pair of inline engines, the oil radiators are fixed to a certain position and thus cannot be adjusted by the player. With the Fw-190, the oil temperature is automatically controlled by the engine.

If you do not wish to manually control your aircraft's radiator(s), you can elect to have the computer automatically adjust them by enabling the **Radiator assist** setting from the list of difficulty options. You can then toggle automatic control of your radiator(s) with the **Left Shift + R** key combination (**Automatic radiators control**).

- **Cowl shutters control:** aircraft fitted with a radial engine rely on ambient airflow (instead of a water radiator) in order to keep the cylinder heads of the engine from overheating. This ambient airflow is controlled by the engine's cowl shutters. In the Fw-190, these shutters are automatically controlled by the engine, but in Soviet aircraft you will need to manage these shutters yourself.

To control the air intake cowl shutters on your aircraft's engines with your keyboard, press the **Left Ctrl + -** key combination to open the shutters and the **Left Ctrl + =** key combination to close the shutters. To control the air outlet cowl shutters on your aircraft's engines with your keyboard, press the **Left Alt + -** key combination to open the shutters and the **Left Alt + =** key combination to close the shutters. You can also control these cowl shutters with the **Engines inlet cowl shutters control (La-5)** and **Engines outlet cowl shutters control (La-5)** axis assignments.

As with the water and oil radiators, you can elect to have the computer automatically adjust the cowl shutters by enabling the **Radiator assist** setting from the list of difficulty options. You can then toggle automatic control of your cowl shutters with the **Left Shift + R** key combination (**Automatic radiators control**).

- **Mixture control:** when flying Soviet aircraft, you must set the mixture to the proper setting in order for your engine to produce maximum power. At lower altitudes, the air is denser, so you will want to maintain a “rich” mixture. As you gain altitude, the air becomes thinner, so you will need to increase the amount of air in the mixture by “leaning” the mixture. If the needle on your tachometer is unstable (or “wobbling”), your mixture is too rich. If you notice your engine RPM starting to drop, your mixture is too lean. In addition, you will need to set your engine’s mixture to full rich in order to it to start.

To adjust the fuel mixture with your keyboard, press the **Right Alt + –** key combination to enrich the mixture and the **Right Alt + =** key combination to lean the mixture. You can also control the mixture setting with the **Engines mixture control** axis assignment.

Note: all German aircraft have an automatic mixture control system, so manual mixture control is not possible with these particular planes.

If you do not wish to manually control your aircraft’s mixture settings, you can elect to have the computer automatically adjust it by enabling the **Engine auto control** setting from the list of difficulty options. You can then toggle automatic control of your mixture settings with the **Left Shift + M** key combination (**Automatic mixtures and superchargers control**).

- **Supercharger:** a supercharger is an air compressor that increases the pressure of the air being supplied to the aircraft’s engine, thus allowing the engine to maintain its optimal power output. As such, you will need to manually adjust your supercharger as you gain or lose altitude. To adjust your plane’s supercharger, press the **Left Shift + S** key combination (**Switch engines superchargers: 1st gear speed/2nd gear speed**).

In Soviet aircraft fitted with an inline engine, you will need to move your supercharger into its 2nd gear as you climb past 2,000 meters. For the La-5 series of aircraft, the supercharger is shifted into 2nd gear as you pass 4,000 meters altitude.

With German aircraft, the Bf-109 and Fw-190 have automatically adjusted superchargers and thus cannot be manually adjusted by the player. The He-111 and Ju-87 have a manually adjustable supercharger system that has two different settings: Automatic and Low Altitude (*bodenlader* in German). By default, the supercharger in both of these planes is set to Automatic, and in most cases it can be left in that setting. The Low Altitude setting is useful for when you want to lose altitude quickly, such as dive-bombing in the Ju-87.

- **Stabilizer trim:** with the Bf-109 and Fw-190, the pitch of the horizontal stabilizer can be adjusted, which affects how much elevator input is needed to keep the aircraft in level flight. Stabilizer trim will either make your plane pitch downwards (“nose heavy”) or pitch upwards (“tail heavy”).

To adjust your aircraft’s stabilizer trim, press the **Right Shift + Up Arrow** key combination to make your aircraft more nose heavy, and press the **Right Shift + Down Arrow** key combination to make the aircraft more tail heavy. You can also control the amount of stabilizer trim in the Bf-109 with the **Adjustable stabilizer axis** axis assignment.

- **Pitch, roll, and yaw trim:** most aircraft in IL-2: BOS have trim tabs that affect the way the aircraft flies. These trim tabs are attached to the airplane’s various control surfaces. Pitch trim affects the control authority of the elevators; roll trim affects the ailerons; and yaw trim affects the rudder.

Note: while all of these trim systems are present in the game, few aircraft have all three trim systems fitted. Please see Appendix A for more information.

To adjust your aircraft’s pitch trim, press the **Right Control + Up Arrow** key combination (**Pitch trim down**) to make your more aircraft nose heavy, and press the **Right Control + Down Arrow** key combination (**Pitch trim up**) to make the aircraft more tail heavy.

To adjust your aircraft’s roll trim, press the **Right Control + Left Arrow** key combination (**Roll trim left**) to make your plane roll to the left, and press the **Right Control + Right Arrow** key combination (**Roll trim right**) to make the plane roll to the right.

To adjust your aircraft’s yaw trim, press the **Left Control + Z** key combination (**Yaw trim left**) to make your plane yaw to the left, and press the **Left Control + X** key combination (**Yaw trim right**) to make the plane yaw to the right.

To reset all of your trim inputs to their default positions, press the **Left Control + T** key combination (**Reset trimmers**).

- **Wheel brakes:** to slow your plane down while on the ground, press the **backslash** key (**Wheel brakes**). In Soviet aircraft, the amount of brake pressure applied to each wheel is dependent on your rudder position. For instance, if you have your rudder pushed to the left, more brake pressure will be applied to the left wheel than the right wheel, thus making it easier to steer to the left. In German aircraft, pressing the backslash key will apply equal brake pressure to both wheels, regardless of rudder position.

In all German aircraft, you can adjust the amount of brake pressure applied to each wheel, regardless of rudder position. To apply brake pressure to the left wheel, press the **comma** key; to apply pressure to the right wheel, press the **period** key. In this manner you can steer your aircraft more easily. You can also map these wheel brake inputs to the **Left wheel brakes (German)** and **Right wheel brakes (German)** axis assignments.

- **Tailwheel:** most planes in IL-2: BOS have a tailwheel that can be locked and unlocked. Unlocking the tailwheel can help with ground steering, while locking the tailwheel will help your aircraft track straight while taking off and landing. At mission start, your plane’s tailwheel is set to the locked position.

To toggle the locking & unlocking of your tailwheel, press the **Left Shift + G** key combination (**Tail wheel lock/unlock**). The exception to this procedure is the Fw-190. In

this plane, you lock the tailwheel by pulling back on your joystick; in all other positions, the tailwheel will be unlocked.

- **Canopy:** to open and close your aircraft's canopy, press the **Right Alt + C** key combination (**Canopy open/close**). While opening your canopy will improve your visibility, be aware it will slow down your plane (due to increased drag) and, in the case of the Bf-109, it will cause the canopy to be ripped off while in flight!
- **Altimeter:** you can adjust your altimeter in all aircraft between two different readings: standard atmospheric pressure and home airfield elevation. The former setting shows your altitude above sea level, while the latter will show your altitude above your home airfield. This latter setting is especially helpful when landing your aircraft. To adjust your altimeter's readout, press the **Left Alt + A** key combination (**Altimeter: reference pressure toggle**).
- **Lighting:** all aircraft in IL-2: BOS are fitted with cockpit lighting. In some planes, these lights are no more than simple cockpit lamps, while other aircraft also feature illuminated instruments. Pressing the **L** key (**Cockpit light on/off**) will cycle through all of the cockpit lighting options with which your aircraft is fitted.

Note: in low-light conditions, many instruments will automatically glow in the dark. This is a simulation of the radioactive paint that was applied to these instruments.

In addition to the standard cockpit lighting, all IL-2: BOS aircraft come with a set of navigation lights. Press the **Right Ctrl + L** key combination (**Navigation lights on/off**) to toggle this lighting on and off.

Finally, many aircraft are fitted with a landing light in their port wing. This light is helpful when landing and taxiing in low-light conditions. Press the **Right Shift + L** key combination (**Landing lights on/off**) to toggle this lighting on and off.

6.2 MULTI-CREW AIRCRAFT

IL-2 Sturmovik: Battle of Stalingrad features a number of multi-crew aircraft of different types, including attack planes, dive bombers, and medium bombers. Each of these aircraft has at least one gunner/observer position, and some have two engines. Because of this, keep in mind these features when flying a multi-crew airplane.

- **Engine and Cockpit Controls:**

- **Engine selection:** if flying a multi-engine aircraft, certain keyboard commands and axis assignments will control both engines simultaneously. If you wish to control only one engine at a time, press either the **1** key (**Switch engine 1 control on/off**) or the **2** key (**Switch engine 2 control on/off**) to control engine 1 and engine 2, respectively. To take control of both engines at the same time, press the **0** key (**Switch common control of engines on/off**).

- **Engine startup/shutdown:** to start up the engines in a multi-engine aircraft, you can choose to start both engines at the same time or start them individually. To start both engines automatically, press the **E** key (**Engage engines start procedure / Stop engine**). Likewise, the **Right Ctrl + 1** (**Engage engine 1 start procedure / Stop engine**) and **Right Ctrl + 2** (**Engage engine 2 start procedure / Stop engine**) key combinations will start engines 1 and 2, respectively. These commands can also be used to shut down the engines.

- **Throttle control:** to simultaneously control the power to both engines with your keyboard, press the **-** key to increase power and the **=** key to decrease power. If you have an analog throttle on your controller, you can control both engines with the **Engines throttle control** axis assignment, or you can assign each engine to its own axis with the **Engine 1 throttle control** and the **Engine 2 throttle control** axis assignments.

- **Prop pitch:** to simultaneously control the prop pitch of both engines with your keyboard, press the **Right Shift + -** key combination to increase pitch and the **Right Shift + =** key combination to decrease pitch. You can also control the prop pitch of both engines with the **Propellers pitch control** axis assignment, or you can assign each engine's prop pitch control to its own axis with the **Engine 1 propeller pitch control** and **Engine 2 propeller pitch control** axis assignments.

- **Radiator control:** to simultaneously control the water radiator shutters on both engines with your keyboard, press the **Right Ctrl + -** key combination to open the radiator shutters and the **Right Ctrl + =** key combination to close the radiator shutters. You can also control both sets of radiator shutters with the **Water radiators shutters control axis** axis assignment, or you can assign each set of radiator shutters to its own axis with the **Engine 1 water radiator shutters control** and the **Engine 2 water radiator shutters control** axis assignments.

To simultaneously control the oil radiator shutters on both engines with your keyboard, press the **Right Windows + -** key combination to open the shutters and the **Right Windows + =** key combination to close the shutters. You can also control these radiator shutters with the **Oil radiators shutters control axis** axis assignment, or you can assign each set of radiator shutters to its own axis with the **Engine 1 oil radiator shutters control** and the **Engine 2 oil radiator shutters control** axis assignments.

To control the oil radiators separately on the He-111, first select the engine you wish to control, and then press either the **Right Windows + =** key combination (**He-111 oil radiators: open one step**) or the **Right Windows + -** key combination (**He-111 radiators: close one step**). In this manner, the radiators are opened and closed one notch at a time with every press of the relevant key combination.

As described in sections 5.2 and 6.1, you can also enable automatic control of your radiators with the **Automatic radiator** setting in the list of difficulty options.

- **Mixture control:** to simultaneously adjust the fuel mixture on both engines with your keyboard, press the **Right Shift + -** key combination to enrich the mixture and the **Right Shift + =** key combination to lean the mixture. You can also control both engine mixture

settings with the **Engines mixture control** axis assignment, or you can assign each mixture lever to its own axis with the **Engine 1 mixture control** and the **Engine 2 mixture control** axis assignments.

As described in sections 5.2 and 6.1, you can also enable automatic control of your mixture with the **Automatic mixture** setting in the list of difficulty options.

- **Supercharger:** to separately control each supercharger, first select the engine you wish to control, and then use either the **Engage 1 supercharger switch: 1st gear speed/2nd gear speed** or the **Engage 2 supercharger switch: 1st gear speed/2nd gear speed** command. By default, these commands have no keyboard assignment, so you will need to manually assign a keyboard or other controller input to each one.
- **Propeller feathering:** if you need to shut down one of your engines due to engine failure, you can feather its propeller blades. Feathering involves turning the propeller blades parallel to the airflow, thus reducing drag. You use this feature by first selecting the engine you wish to control and then by pressing the **Left Ctrl + F** key combination (**Propellers feathering on/off**). Propeller feathering is currently available for the He-111.

- **Crew & Gunner Controls:**

- To cycle through the crew positions on a multi-crew plane, press the **Left Ctrl + C** key combination (**Switch to a next free plane combat post**). Note that unless you have enabled autopilot, you will still be in control of the aircraft when you move to a gunner position. To level out the aircraft in such a case, press the **Left Shift + A** key combination (**AI-autopilot for level flight: on/off**).
- To take control of a turret-mounted weapon, press the **T** key (**Turret: take/leave control**). This allows you to move the weapon laterally & vertically with your mouse and to fire the weapon with your left mouse button (**Fire turret guns**).
- To aim a turret-mounted weapon with the gun sights, press the **Left Shift + T** key combination (**Turret: nestle to the gunsight**).

*Note: this command does not enable you to take control of the weapon. You will still need to perform the **Turret: take/leave control** command to take control of the weapon.*

- To clear a misfire on a turret-mounted weapon, press either the **Left Alt + R** key combination or the middle button on your mouse (**Reload turret guns**).
- To move a machine gun from one mounting to another, press the **Left Shift + C** key combination (**Switch to a next firing point in the current turret**).

Note: this command is currently available for the gondola-mounted weapons in the He-111 and the side fuselage-mounted machine guns on the He-111 and the Pe-2.

6.3 BASIC WEAPONS MANAGEMENT

The main weapons you can employ in IL-2 Sturmovik: Battle of Stalingrad include machine guns, cannons, bombs, and rockets, as well as flare guns. Employment of these weapons and a number of weapons-related features is described below.

- **Machine guns / cannons:**

Note: many aircraft in IL-2 Sturmovik: Battle of Stalingrad feature machine guns and cannon that fire through the arc of the aircraft's propeller. In order for these types of weapons to fire, your aircraft's propeller must be spinning, as the propeller shaft is connected to the weapon synchronization gear fitted to your aircraft. This synchronization gear is what allows your weapons to fire without the rounds striking your aircraft's propeller blades.

- To fire all of your plane's guns, press and hold the **spacebar (Fire all guns)** on your keyboard.
- To fire only your machine guns, press and hold the **Right Alt + Space** key combination (**Fire only machine guns**).
- To fire only your cannons, press and hold the **Left Alt + Space** key combination (**Fire only cannons**).

- **Bombs:**

- To drop bombs, press the **B** key (**Drop bombs**). By default, this command will drop one bomb with every press of the key.
- To adjust the number of bombs that will be dropped with the Drop bombs command, press the **Left Windows + B** key combination (**Drop bombs mode toggle**). In most planes that have this feature, an indicator in the cockpit will show the current release setting. The best way to see how this feature works is to enable the on-screen technical messages (see Section 5.1 for more information).
- By default, your bombs are armed at the start of each mission. To disarm your bombs, press the **Left Windows + S** key combination (**Bombs safety switch**).

- **Rockets:**

- To launch rockets, press the **R** key (**Launch rockets**). By default, this command will launch one rocket with every press of the key.
- To adjust the number of rockets that will be fired with the Launch rockets command, press the **Left Windows + R** key combination (**Launch rockets mode toggle**). In all rocket-armed planes, an indicator in the cockpit will show the current release setting. The best way to see how this feature works is to enable the on-screen technical messages (See Section 5.1 for more information).

- **Flares:** in IL-2: BOS, flares (Figure 6.3.1) are primarily meant to be used for signaling. You can choose your flare color from the following choices: red (**Left Control +1**), green (**Left Control + 2**), or white (**Left Control + 3**).

If flying a Soviet aircraft, you will first need to open your canopy before you can launch a flare. Then, point the flare gun in the direction you wish to fire it (with either your mouse or head-tracking device) and click either your left mouse button or the **Left Control + Space** key combination (**Shoot personal weapon / flare pistol**).

Note: in all German aircraft (except for the He-111), flares are fired through a fixed pistol port when the canopy is closed.

Press the **Left Control + ~** key combination (**Remove personal weapon / flare pistol**) to “return” it to its holster when you are finished firing the flare gun.

Note: you cannot use the flare gun while occupying a gun turret position on a multi-crew plane.



Figure 6.3.1

- **Gunsights:** in German aircraft, you can toggle a special filter for your gunsight (Figure 6.3.2). This filter is handy when the sun is in your eyes. To toggle the use of this feature, press the **Left Alt + F** key combination.



Figure 6.3.2

- **Airbrakes:** airbrakes are used during dive-bombing attacks and keep your aircraft from building up too much speed. In IL-2: BOS, the Ju-87 and the Pe-2 are fitted with airbrakes. To toggle the use of your airbrakes, press the **Right Alt + B** key combination (**AirBrakes on/off**).
- **Attack siren:** a special feature of the Ju-87 is its landing gear-mounted “Jericho Trumpet” dive sirens. Powered by wind-driven generators, these sirens were historically intended to be a psychological weapon that would terrify enemy troops on the ground. In IL-2: BOS, these sirens have no practical effect on the enemy (other than slightly slowing your plane down due to increased drag). To toggle these sirens on and off, press the **Left Alt + S** key combination (**Attack Siren on/off**).

6.4 BOMBSIGHT USAGE

IL-2 Sturmovik: Battle of Stalingrad features a number of aircraft that are equipped with an optical bombsight, allowing you to bomb ground targets from high altitudes. Each bombsight is modeled according to its real-world counterpart. As such, the features and controls described below (Figures 6.4.1 and 6.4.2) will not necessarily be found on every aircraft equipped with a bombsight.

Note: placing your mouse cursor over a particular control will cause a tooltip to pop up, explaining in brief detail what type of function the control has.

- **Bombsight controls:**

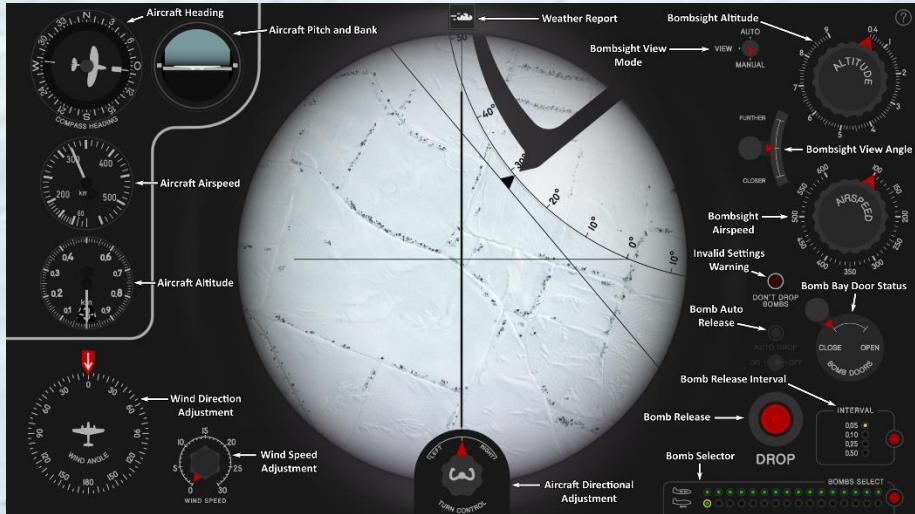


Figure 6.4.1

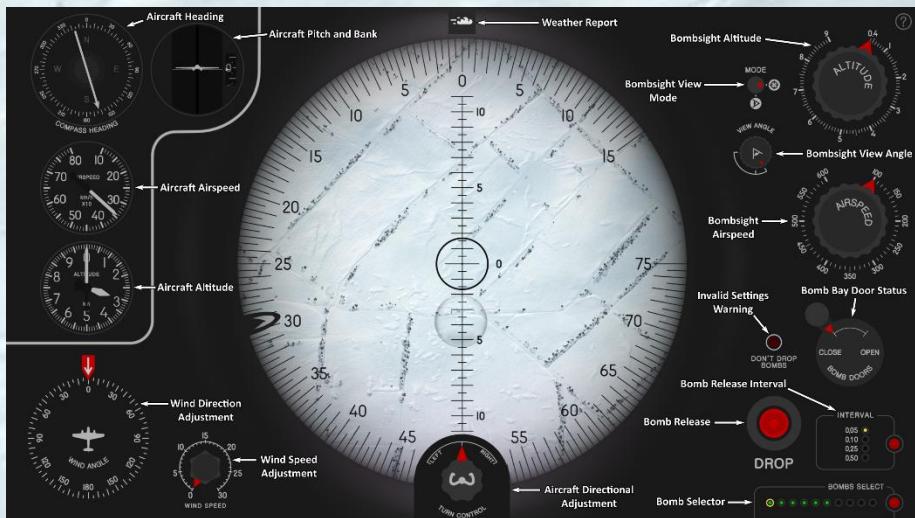


Figure 6.4.2

- **Aircraft Heading:** displays your aircraft's current course.
- **Aircraft Pitch and Bank:** shows whether your aircraft is flying straight and level.
- **Aircraft Airspeed:** displays your aircraft's indicated airspeed (IAS). This is displayed in either kilometers per hour or miles per hour. The measurement system displayed is dependent on your **Measurement** setting, which can be found on the **Settings > Game** page.

- **Aircraft Altitude:** displays your aircraft's altitude above sea level. This is displayed in either meters or feet. The measurement system displayed is dependent on your **Measurement** setting, which can be found on the **Settings > Game** page.

- **Wind Direction Adjustment:** sets the direction from which the wind is blowing. Wind direction is indicated in degrees.

- **Wind Speed Adjustment:** sets the speed at which the wind is blowing. Wind speed is indicated in meters per second, regardless of your Measurement setting.

- **Weather Report:** shows the speed and direction of the wind at various altitudes. This information can be toggled on and off by left-clicking on the icon.

- **Bombsight Altitude:** sets your aircraft's altitude above the target (**not** altitude above sea level), which is displayed in either meters or feet. As with the Aircraft Altitude and the Aircraft Airspeed displays, the measurement system displayed is dependent on your **Measurement** setting. The numbers represent thousands of meters or feet, while the tick marks represent hundreds of meters or feet.

- **Bombsight Airspeed:** this dial is used to set the aircraft's Indicated Air Speed, which is displayed in either kilometers per hour or miles per hour. Each of the tick marks represents tens of kilometers per hour or miles per hour. As with other instruments and dials on this page, the measurement system displayed is dependent on your **Measurement** setting.

- **Bombsight View Mode:** sets the viewing mode of the bombsight to one of up to three possible settings (dependent on bombsight), described as follows:

▪ **View Mode** allows you to move the bombsight up and down with the **Bombsight View Angle** feature. Your bombsight's view angle can be adjusted either by clicking and dragging on the knob or by scrolling your mouse wheel up and down.

▪ **Manual Mode** locks in your current bombsight viewing angle. This is the mode in which you want to be when you are ready to drop your bombs when flying the Pe-2. Although not the most practical method, you can also use this mode to manually drop bombs while flying the He-111.

▪ **Auto Mode** (available only with the He-111) calculates the point at which your bombs need to be dropped, based upon the data you have entered into the bombsight and the bombsight's viewing angle. When the **Bomb Auto Release** setting is also enabled while in this mode, your bombs will automatically be dropped when your aircraft reaches the calculated drop point.

Note: Bomb Auto Release has no effect in View Mode and Manual Mode.

- **Invalid Settings Warning:** this red light will light up when your bombsight cannot be operated properly. Factors that can cause this warning to light up include the following:

no bombs onboard the aircraft; aircraft is not flying a stable course; or when the altitude entered into the bombsight is outside the sight's operating parameters.

- **Bomb Bay Door Status:** shows whether your bomb bay doors are opened or closed. Left-clicking on the circle above the red arrow opens and closes the doors. You can also open and close your bomb bay doors with the **N** key (**Bomb bay doors toggle**).
- **Bomb Release Interval:** shows the amount of time that will elapse between each bomb being dropped, in seconds. Left-clicking on the red button will cycle through the various options. Choose a lower value if you want your bombs to detonate in a small area, and likewise choose a larger value if you want your bombs to be dropped over a larger area. In order for this feature to work, you must have multiple bombs selected to be released at one time. You can also adjust this feature with the **Left Control + B** key combination (**Drop bombs delay toggle**).
- **Bomb Selector:** shows the number of bombs onboard your aircraft (symbolized by green dots) and the number of bombs you have selected for release (symbolized by a circle around each green dot). You can change the number of bombs selected for release by left-clicking on the red button. You can also adjust your bomb release settings with the **Left Windows + B** key combination (**Drop bombs mode toggle**).
- **Bomb Release:** as the name implies, this button will release your aircraft's bombs in View Mode and Manual Mode. The number of bombs released with each press of the button is dependent on how many bombs you have selected with the Bomb Selector feature.
- **Aircraft Directional Adjustment:** this control allows you alter your aircraft's course by making shallow turns to the left and to the right. This control can also be entered with the **Left Shift + Z** (**Level flight AI-autopilot: left turn**) and the **Left Shift + X** (**Level flight AI-autopilot: right turn**) key combinations.

- **Executing a bombing run:**

While the bombsight controls in IL-2 Sturmovik: Battle of Stalingrad vary depending on the aircraft to which they are fitted, the following procedures will help you hit your target:

1. To access the bombsight, press the **V** key (**Bomb sight**). This will cause the Level Autopilot feature to be automatically engaged (as long as your aircraft is flying a reasonably stable course).
2. If applicable, adjust the wind direction and wind speed dials. To input wind direction, subtract the direction from which the wind is blowing from your aircraft's course. For example, if your aircraft's course is 350 degrees and the wind is blowing from 270 degrees, the wind is blowing 80 degrees from the left. Thus, you would rotate the dial 80 degrees to the left (counterclockwise).
3. Input your aircraft's Indicated Air Speed with the Bombsight Airspeed dial and your aircraft's altitude with Bombsight Altitude dial. Note that this altitude is your height

above the target and not your height above sea level (as indicated by your altimeter). For example, if your bombsight's altimeter reads 2,000 meters and your target is 100 meters above sea level, the altitude you would enter into the bombsight is 1,900 meters. If you are flying a bombing mission in campaign mode, your target's altitude will be noted in the mission briefing.

4. Ensure your bomb bay doors are open, and select the number of bombs you want to release. Once this is done, adjust the Bomb Release Interval setting as necessary.

Note: although the Ju-87 does not have a bomb bay, it has a floor-mounted window which can be opened with the Bomb bay doors toggle command.
5. Adjust your aircraft's course as necessary with the Aircraft Directional Adjustment feature (or with the **Level flight AI-autopilot: left turn** and **Level flight AI-autopilot: right turn** commands). If you use the Aircraft Directional Adjustment feature for this procedure, you do not need to hold down your mouse button once you have initiated a turn.
6. Switch your bombsight to View Mode, and then adjust the bombsight up and down as necessary with the Bombsight View Angle feature to line up the target with the crosshairs of your bombsight.
7. If flying the Pe-2, ensure the floating bubble is in the center of the bombsight. If necessary, adjust the bombsight's airspeed and altitude settings in order to bring this bubble to its correct position. It may also be necessary to throttle up or down your aircraft's engines.
8. Switch the bombsight back to Manual Mode (if flying the Pe-2) or to Auto Mode (if flying the He-111) once you are satisfied with the bombsight's settings and have lined up the target in the bombsight's crosshairs.
9. When the target passes under the crosshairs of the bombsight and with the bombsight in Manual Mode, release your bombs with the Bomb Release button. If the bombsight is in Auto Mode, your bombs will be automatically dropped at the calculated drop point. Once you have dropped all of your bombs, the Invalid Settings Warning light will light up.
10. To exit the bombsight view, press the **V** key again.

7.0 IN-FLIGHT OPTIONS

IL-2 Sturmovik: Battle of Stalingrad features a number of options you can quickly access while flying a mission. Each of these is described below and in the following section on communications.

7.1 IN-FLIGHT MAP

- To toggle the display of your in-flight mini-map (Figure 7.1.1), first ensure you have enabled the *Instrument panel* difficulty setting. Then, press the **M** key (**Change ingame map mode**). This map will be displayed in the lower right-hand corner of the screen. The default size of the map can be adjusted from the Settings section of the game. Please see Section 5.1 for more information about this feature.



Figure 7.1.1

Press the **M** key a second time to enlarge the map (Figure 7.2). Pressing the **M** key a third time will then hide the map.



Figure 7.1.2

7.2 BRIEFING

Press the **O** key (**Show/hide mission briefing**) to toggle the display of your mission briefing (Figure 7.3.1). The briefing screen displays important information about your mission, including the mission's objective, weather conditions, and a larger version of the in-flight map.



Figure 7.3.1

This briefing display contains the following features:

- MY PLANE:** clicking on this button will automatically zoom in and center the map on your aircraft's current position. This button is available only when the *Instrument markers* difficulty setting is enabled.
- MISSION ROUTE:** clicking on this button will center the map on your aircraft's mission route.
- To hide the mission briefing text, click on the arrow at the lower-left corner of the gray box. Clicking on this button again will re-display your mission briefing.
- To pan around the map, drag your mouse cursor while holding down your left mouse button.
- To zoom in and out on the map, scroll your mouse wheel up and down.
- To close this entire screen, either press the **O** button again or click on the **Return** button.

7.3 INSTRUMENT PANEL

- To toggle the display of the game's two-dimensional aircraft instrument panel, press the **I** key (**Show/hide instrument panel, navigation and map markers**). The number and type of gauges displayed is dependent on whether you have the *Instrument panel* difficulty setting enabled.
- With the *Instrument panel* setting disabled, the only information you will see is your airplane's current compass heading and a marker pointing the way to your flight path (denoted by a small orange flag) (Figure 7.3.1).



Figure 7.3.1

- With the *Instrument Panel* setting enabled, you will additionally see the current wind speed and direction (the latter denoted by a blue arrow), your current airspeed and altitude above ground level, and your remaining ammunition (including bombs and rockets) (Figure 7.3.2).



Figure 7.3.2

*Note: the measurement system in which the instrument panel is displayed is dependent upon your **Measurement** setting on the **Settings > Game** page.*

7.4. AIMING HELP

The Aiming Help option enables onscreen aids that help the player aim their weapons (including bombs and rockets) properly. To toggle this setting, first ensure you have enabled the *Aiming assist* difficulty setting. Then, press the **Right Ctrl + I** key combination (**Aiming help**). You will then see a yellow marker displayed on the screen (Figure 7.4.1). Press **Right Ctrl + I** key combination again to disable this marker.



Figure 7.4.1

7.5 SETTINGS

This option, which can also be accessed via the **Settings** link on the main game screen, allows you to access and adjust the game's settings. To enable this option, press the **Esc** key and then choose the *Settings* option from the menu that pops up. Please see Section 5.1 for detailed information about this page's settings.

7.6 HIDE HUD

This option clears the screen of all onscreen aids and text, including icons identifying enemy and friendly units, navigation markers, the onscreen instrument panel, radio messages, and other in-game messages. Press the **H** key to toggle this option (**Show/hide entire HUD**). The onscreen message notifying you about the HUD being hidden can be set so that it does not show again.

8.0 COMMUNICATIONS

8.1 IN-FLIGHT COMMUNICATION

IL-2 Sturmovik: Battle of Stalingrad has three sets of orders by which you can communicate with other aircraft and with gunners aboard your plane: pilot gestures, flight leader commands, and gunner commands. While pilot gestures are for communication between human players, flight leader commands are for ordering computer-controlled pilots when you are in charge of the formation. Gunner commands are for ordering any computer-controlled gunners on board your aircraft only. Each type of command is discussed below.

Pressing the ~ key (**Command menu**) will bring up the list of communication commands (Figure 8.1.1). Pressing the ~ key again or the **Esc** key will hide this display. Pressing the Esc key also allows you to return to the previous command menu list. Each key command described below can also be accessed via a keyboard shortcut, which is listed in bold and in parentheses.



Figure 8.1.1

- **Pilot gestures:** pressing the **F1** key will bring up the following commands:
 - **Pilot gesture: Look ahead!**: your pilot will gesture to other pilots to be on the lookout for enemy targets straight ahead (**Left Shift + 1**).
 - **Pilot gesture: Ok!**: notifies your flight you are “ready to go,” “ready to take off,” etc. (**Left Shift + 2**).
 - **Pilot gesture: Destroy!**: your pilot will gesture to other pilots to attack enemy targets (**Left Shift + 3**).
- **Flight leader commands:** pressing the **F2** key will bring up the following commands, which are divided into three categories: **Orders**, **Formation**, and **Patrol**:
 - **Orders category:** pressing the **F1** key will bring up the following commands:
 - **Hold this position and wait**: orders your flight to loiter in the area (**Left Ctrl + 0**).
 - **Attack nearest air target**: orders your flight to attack any nearby airborne targets (**Left Alt + 1**).
 - **Attack nearest ground target**: orders your flight to attack any nearby ground targets (**Left Alt + 2**).
 - **Cover me**: orders your flight to remain in formation and provide protection against enemy aircraft (**Left Alt + 5**).

- **Return to our mission**: orders your flight to cease their current actions if they are not in accordance with the mission’s objectives (for example, stopping an attack on an enemy target that is not part of the mission’s orders and returning to formation) (**Left Alt + 3**).
- **Do like me (copy my actions)**: orders your flight to mimic your actions. This can be as simple as remaining in formation with your aircraft or attacking an enemy target (**Left Alt + 4**).
- **Return to base**: orders your flight to return to your home airfield (**Left Alt + 0**).
- **Formation category:** pressing the **F2** key will bring up the following commands:
 - **Formation column**: orders your flight to form into a column behind your aircraft (**Left Ctrl + 6**).
 - **Formation left edge**: orders your flight to shift to the left of your aircraft in a “half-V” formation (**Left Ctrl + 7**).
 - **Formation right edge**: orders your flight to shift to the right of your aircraft in a “half-V” formation (**Left Ctrl + 8**).
 - **Formation V**: orders your flight to form into a “V” behind your aircraft. This is the default formation for the game (**Left Ctrl + 9**).
- **Patrol category:** pressing the **F3** key will bring up the following commands:
 - **Patrol the area**: orders your flight to loiter in the area (**Left Alt + 6**).
 - **Patrol for air enemies**: orders your flight to loiter in the area and to be on the lookout for enemy aircraft. Your flight will focus its attention on attacking any enemy aircraft it has spotted after issuing this command (**Left Alt + 7**).
 - **Patrol for ground enemies**: orders your flight to loiter in the area and to be on the lookout for enemy ground targets. Your flight will focus its attention on attacking any enemy ground targets it has spotted after issuing this command (**Left Alt + 8**).
- **Gunner commands:** pressing the **F3** key will bring up the following commands:
 - **Engage at**: pressing the **F1** key will bring up another command list, which controls when the gunners will open fire on enemy aircraft.
 - **Gunners: Close engage distance**: orders your gunners to commence firing at enemy aircraft at a closer range than the normal attack distance. Enemy aircraft outside the short attack distance range will not be engaged by your gunners (**Right Alt + 7**).

- **Gunners: Normal engage distance:** orders your gunners to commence firing at enemy aircraft at the normal attack range as programmed into the game. Enemy aircraft farther than this distance will not be engaged by your gunners (**Right Alt + 8**).
- **Gunners: Far engage distance:** orders your gunners to commence firing at enemy aircraft at the maximum distance possible (**Right Alt + 9**).
- **Gunners: Fire at will:** orders your gunners to fire at any enemy aircraft in the vicinity. This command is linked to the attack distance commands discussed above (**Right Alt + 1**).
- **Gunners: Return fire:** orders your gunners to only fire at enemy aircraft that are making an attack run on your aircraft. This command is linked to the attack distance commands discussed above (**Right Alt + 2**).
- **Gunners: Cease fire:** orders your gunners to cease firing all weapons (**Right Alt + 3**).
- **Gunners: Attack ground targets:** orders your gunners to cease firing all weapons (**Right Alt + 6**).

9.0 COCKPIT CAMERA ADJUSTMENT

IL-2 Sturmovik: Battle of Stalingrad offers a number of options for modifying the in-cockpit camera system for each individual aircraft. These options involve adjusting your zoom level, adjusting your default head position, and setting up customized snap views.

Note: you can adjust the in-cockpit camera settings for both the pilot's position and for any gun turrets fitted to your aircraft. Each gun turret has its own separate camera settings for each type of gun that can be fitted to the turret.

• Zoom level adjustment:

- To zoom in your cockpit view with your keyboard, press the **numpad + key** (**Pilot head: zoom in**). To zoom out your view, press the **numpad - key** (**Pilot head: zoom out**). You can also use your mouse's scroll wheel to zoom in and out (**Pilot head: zoom**). To return to the default, un-zoomed view, press the **numpad *** key (**Pilot head: reset zoom**).

• Adjusting the default head position:

1. Ensure any head tracking software (such as TrackIR) is disabled.
2. Make sure your cockpit view is centered by pressing the **numpad 5 key** (**Pilot head: snap position center**).
3. Adjust your camera view to the left and to the right with the **Delete** (**Move pilot head left**) and the **End** keys (**Move pilot head right**), respectively.

4. Adjust your camera view forward and backward with the **Insert** (**Move pilot head forward**) and the **Home** keys (**Move pilot head backward**), respectively.

5. Adjust your camera view up and down with the **Page Up** (**Move pilot head up**) and the **Page Down** keys (**Move pilot head down**), respectively.

6. Once you are satisfied with your changes, press the **F10 key** (**Save current corrections in head snap position**). If at any time before this step you want to revert to the default head position, press the numpad 5 key.

• Creating a snap view:

Creating a custom snap view is especially handy when you want to quickly shift your camera view to a specific position, such as a gun sight. To create a custom snap view, please note the following steps:

1. Ensure any head tracking software is disabled and your camera mode is set to Snap View by pressing the **F9 key** (**Change pilot head control method: centered snap – fixed snap – additive snap – pan view**). You can confirm your camera mode is in snap view mode by pressing and releasing any of the numpad keys from 0-9 (excluding the numpad 5 key) or the numpad decimal key.

2. Press and hold any of the numpad keys listed in step 1.

3. While still holding down the numpad key, adjust your camera view as described in steps 3-5 in the "adjusting the default head position" section.

4. Once you are satisfied with your changes, press the **F10 key**.

5. To switch to the custom snap view you have created, press the key you chose for the custom snap view in step 2. In addition, you can map this custom snap view to a button on a game controller. To do this, please refer to section 5.1. All of the snap view commands can be found in the **Pilot head control** section of the **Controls** settings screen.

Note: you can back up your custom snap views and edit them with a text editor by navigating to the \IL-2 Sturmovik Battle of Stalingrad\data\LuaScripts\snapviews folder.

10.0 FLIGHT RECORDER AND PLAYBACK SYSTEM

IL-2 Sturmovik: Battle of Stalingrad allows you to record your missions to a track file and then view the track in a specialized in-game display. To record and view a mission, please note the following steps:

• Recording a track file:

- Before you begin recording a mission, you can set a number of parameters in the **Record** section of the **Game** settings screen. Please refer to section 5.1 to view a description of these options.
- To begin recording a mission, press the **Left Ctrl + R** key combination (**Enables/disables flight recording**). You will notice a camera icon appear in the upper right-hand portion of the screen. Press this key combination again to finish recording. A new track file will be generated each time you begin recording in-game footage.

- **Viewing a track file:**

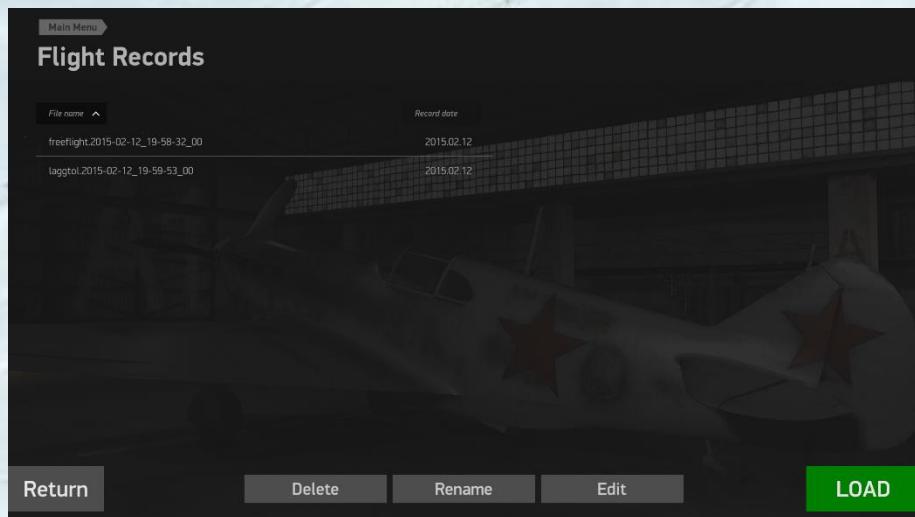


Figure 10.0.1

- To access your tracks, click on the **Flight Records** link on the main game screen. This will load the main flight records screen (Figure 10.0.1), from which you can load, edit, rename, and delete your track files.
- To view a track file without making any edits to it, click on the **LOAD** button.
- Once the track loads, you will need to un-pause the game in order to view your footage. If you wish to change the camera position while viewing the track, please note the camera options available in the "Editing a track file" section below.
- To begin playing the track, press the **Play** icon at the lower left-hand corner of the screen. You can also use this icon to pause the footage at any time. The track will play exactly as it was recorded and saved.
- If you wish to jump to a particular point of time in the track file, left-click and drag the marker that is located below the time display at the bottom of the screen.

- Press the **H** button if you wish to view your track without the playback interface at the bottom of the screen. Press this button again to restore the interface.
- To finish watching a track and to return to the main flight records screen, press the **Esc** key and choose the **FINISH SPECTATE** option.

- **Editing a track file:**



Figure 10.0.2

- Click on the **Edit** button from the main flight records screen.
- Once the track loads (Figure 10.0.2), you can edit the track's camera positions and the speed at which the track plays. These options are described below.
 - **F1 (Camera: player cockpit):** takes you to the in-cockpit view of your plane.
 - **F2 (External free camera at player plane):** takes you to an external view of your plane.
 - **F3 (Camera: flyby):** takes you to an external flyby view of your plane.
 - **F4 (Camera: combat camera):** takes you to a fixed external view above and behind your plane.
 - **F5 (External free camera at ground units):** takes you to an external view of the nearest ground object. Pressing this key repeatedly will cycle through all nearby ground objects. There are two related camera views for this option: the **Left Shift + F5** key combination (**External free camera at friendly ground units**) will lock on only to friendly ground objects, while the **Left Ctrl + F5** key combination (**External free**

camera at enemy ground units) will lock on only to enemy ground objects.

- **F6 (External free camera at bombs):** takes you to an external view of the nearest bomb that has been dropped. This camera view will follow the bomb all the way to the ground until it explodes. There are two related camera views for this option: the **Left Shift + F6** key combination (**External free camera at friendly bombs**) will lock on only to friendly bombs, while the **Left Ctrl + F6** key combination (**External free camera at enemy bombs**) will lock on only to enemy bombs.
- **F11: (Camera: free):** takes you to an external which does not follow any particular aircraft or ground object. From this point you can manipulate the camera view with your mouse or the following keys:
 - To move the camera forward and backward, press the **W** and **S** keys (**Move free camera forward/backward**), respectively.
 - To move the camera to the left and to the right, press the **A** and **D** keys (**Move free camera left/right**), respectively.
 - To move the camera up and down, press the **R** and **F** keys (**Move free camera up/down**), respectively.
- **Left Shift + F2 (External free camera at friendly aircraft):** takes you an external view of the nearest friendly aircraft. Pressing this key combination continually will cycle through all nearby friendly aircraft.
- **Left Ctrl + F2 (External free camera at enemy aircraft):** takes you to an external view of the nearest enemy aircraft. Pressing this key combination repeatedly will cycle through all nearby enemy aircraft.
- To accelerate the speed at which the mission plays, press the **right bracket** key (**Accelerate time in mission**). To decelerate the speed at which a mission plays, press the **left bracket** key (**Decelerate time in mission**).
- Once you have completed your edits, you will be prompted to by the game to save your changes. If you do not wish to save your changes, press the **EXIT** button. Your changes will be visible the next time you load the track with the **LOAD** button.

Note: you can share and back up your tracks by navigating to the \IL-2 Sturmovik: Battle of Stalingrad\data\Tracks folder. A complete track file is composed of two main parts: a file with the .trk file extension and a corresponding folder with the same name. You will need both parts in order to properly view, save, and share tracks.

11.0 QUICK MISSION GAMEPLAY

IL-2 Sturmovik: Battle of Stalingrad's quick mission builder allows you to create single-player missions on the fly with up to 16 aircraft and a variety of ground targets. You do not need to

be logged into the game via Online Mode in order to play a quick mission. To set up and play a quick mission, first click on the **QUICK MISSION** link on the main game screen, and then follow the instructions below.

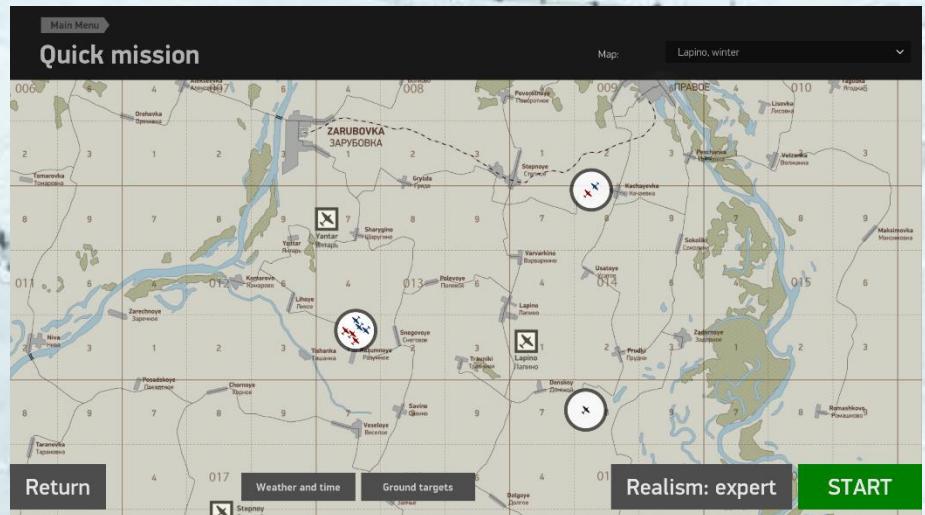


Figure 11.1.1

11.1 MAP SELECTION

The first thing you want to do when creating a quick mission is to choose the map (Figure 11.1.1) on which you want to play the mission. Choose your map from the drop-down menu at the upper right-hand corner of the screen. IL-2 Sturmovik: Battle of Stalingrad offers you a number of choices when selecting your map:

- **Lapino:** this is a scaled-down version of the Stalingrad map, which is centered on the airfield of Lapino and portrayed with winter terrain.
- **Stalingrad:** this is the full-size map that comes with the game, which depicts the Stalingrad battleground and surrounding terrain in the winter of 1942-43.
- **Novosokolniki:** this map centers on the city of Novosokolniki, which is geographically located west of Velikiye Luki. As with the other maps, this map is rendered with winter terrain.

11.2 MISSION TYPE SELECTION

You can fly three different types of quick missions: Free Flight, Skirmish, and Duel. To choose your mission type and to set up the mission's parameters, click one of the icons on the map. This icon marks where you will start the mission and denotes what type of mission you want to fly. Each of the three mission types is discussed below.

- **Free flight:** in this mode, your aircraft is the only one on the map. This sort of mission is handy when you want to practice with an aircraft and not have to worry about enemy planes. When setting up this type of mission, you have the following options:

- **Aircraft type:** the aircraft you will fly is listed in the dropdown box directly below the **Your plane** heading. To choose your aircraft, click anywhere in the dropdown box. A menu will pop up, allowing you to choose which aircraft you want to fly. You can also choose to allow the game to choose a random plane for you.
- **Aircraft settings:** click on the **Settings** link below your aircraft's name to adjust your weapon loadout, machine gun and cannon convergence, fuel level, and paint scheme. A menu will pop up, allowing you to make your changes. Once you are satisfied with your changes, click on the **ACCEPT** button to exit this display. You can also choose to cancel your changes by either clicking on the **X** button at the upper right-hand corner of the screen or by pressing the **Esc** key.

Note: you can also adjust your aircraft's parameters on the Plane setup screen once you have loaded the mission.

- **Starting altitude:** to choose your starting altitude, click on the **Start** dropdown box. You can choose to start on the ground or in the air at various altitudes. If you choose to start on the ground, you can choose to either start on the runway with your engine running or from the tarmac with the **Parked** option. With this latter option, you will start the mission with your engine off and canopy open.
- **Skirmish:** in this mode, you and up to 8 friendly aircraft can do battle with up to 8 enemy aircraft. In this type of mission, you have the following options:

- **Aircraft type and number:** the aircraft you and any friendly computer-controlled pilots will fly is listed on the left-hand side of the screen under the heading of **Allies**, while the enemy's aircraft settings are displayed on the right-hand side of the screen under the heading of **Enemies**. The formation of which you will be a part is marked as **My flight**.

To choose the type of aircraft for the mission, click on the dropdown box directly below each flight's name (My flight, Flight 1, or Flight 2). A menu will pop up, allowing you to choose a particular aircraft, or you can allow the game to choose a random plane.

Note: for Flight 2 aircraft on your side, you can choose any aircraft, regardless of whether you have purchased the aircraft in order to fly it. This also applies to all enemy flights.

To choose the number of aircraft for a particular flight, click in the dropdown box directly below the aircraft's name. You can choose anywhere from 0-4 aircraft or allow the game to choose a random number.

- **Aircraft skill level:** to adjust the skill level for a particular flight, click on the dropdown box to the right of the aircraft number dropdown box. You can choose a particular skill

level or allow the game to choose one at random.

- **Aircraft settings:** to adjust the weapon loadout and paint scheme for all aircraft of a particular flight, click on the **Settings** link below the aircraft's name to adjust the weapon loadout, machine gun and cannon convergence, fuel level, and paint scheme. A menu will pop up, allowing you to make your changes. Once you are satisfied with your changes, click on the **ACCEPT** button to exit this display. You can also choose to cancel your changes by either clicking on the **X** button at the upper right-hand corner of the screen or by pressing the **Esc** key.

Note: you can also adjust your own aircraft's parameters on the Plane setup screen once you have loaded the mission. Any changes you make on the Plane setup screen will not affect the other aircraft in your flight.

- **Starting altitude:** to choose the starting altitude for both enemy and friendly flights, click on the **Start** dropdown box. You can choose to start on the ground or in the air at various altitudes. If you choose to start on the ground, you will start on the runway with your engine running and ready to take off. The ground start option can be applied to both friendly and enemy flights.
- **Tactical situation:** you can choose from a number of tactical situations in which you will find yourself and the enemy at the start of the mission. To choose a particular setup, click on the **Approach** dropdown box. Each tactical scenario is described below.
 - **Face to face:** in this scenario, you and the enemy aircraft will begin the mission flying directly towards each other on parallel courses.
 - **Pursuit:** in this scenario, you will begin the mission pursuing the enemy aircraft from his tail position (also known as his "six o'clock").
 - **Escape:** in this scenario, you will begin the mission with the enemy aircraft pursuing you from your six o'clock position.
 - **Aside:** in this scenario, you and the enemy aircraft will begin the mission flying side-by-side on opposite & parallel courses.
 - **Scramble:** in this scenario, you will begin the mission on the ground at your airbase, while the enemy aircraft will already be airborne. This option is your only choice if you choose to start your flight and any friendly flights on the runway.
 - **Distance:** this setting determines how far apart the two sides are when the mission begins, in meters.
- **Duel:** in this mode, you will face off against successive waves of enemy aircraft. New enemy aircraft will be spawned once you have shot down all currently active enemy aircraft. In this type of mission, you have the following options:

- **Friendly aircraft type:** the aircraft you will fly is listed in the dropdown box directly below the **Your plane** heading on the left-hand side of the screen. To choose your aircraft, click anywhere in the dropdown box. A menu will pop up, allowing you to choose which aircraft you want to fly. You can also choose to allow the game to choose a random plane for you.

- **Friendly aircraft settings:** click on the **Settings** link below your aircraft's name to adjust your weapon loadout, machine gun and cannon convergence, fuel level, and paint scheme. A menu will pop up, allowing you to make your changes. Once you are satisfied with your changes, click on the **ACCEPT** button to exit this display. You can also choose to cancel your changes by either clicking on the **X** button at the upper right-hand corner of the screen or by pressing the **Esc** key.

Note: you can also adjust your aircraft's parameters on the Hangar screen once you have loaded the mission.

- **Enemy aircraft type:** the aircraft you will fly against is listed on the right-hand side of the screen and is displayed under the heading of **Enemy**. When choosing the enemy's aircraft, you can choose a specific aircraft type or allow the game to choose one at random. To choose the enemy's aircraft, click anywhere in the dropdown box. A menu will pop up, allowing you to make your selection. You can also choose to allow the game to choose a random plane for you.

Note: you can choose any enemy aircraft from this menu, regardless of whether you have purchased the aircraft in order to fly it.

- **Enemy aircraft skill level:** to adjust the enemy aircraft's skill level, click on the dropdown box directly below the aircraft's name. You can choose a particular skill level or allow the game to choose one at random.

- **Enemy aircraft settings:** click on the **Settings** link directly below the enemy aircraft's name to adjust its loadout, machine gun and cannon convergence, fuel level, and paint scheme. A menu will pop up, allowing you to make your changes. Once you are satisfied with your changes, click on the **ACCEPT** button to exit this display. You can also choose to cancel your changes by either clicking on the **X** button at the upper right-hand corner of the screen or by pressing the **Esc** key.

- **Number of enemy waves:** to choose how many waves of enemy aircraft you will face, click on the **Enemy waves** dropdown box. You can choose from 1, 3, 5, or 10 enemy waves. You can also choose to face an infinite number of enemy waves or to have the computer continue to generate new waves until you run out of ammunition. If you choose either of these two latter options, you will face only one enemy aircraft per wave generated.

- **Starting altitude:** to choose each sides' starting altitude, click on the **Start** dropdown box. You can choose to start as low as 200 meters or as high as 6,000 meters.

11.3 TIME AND WEATHER CONDITIONS

You can set the time of day and the weather conditions when setting up a quick mission. These parameters are accessed via the **Weather and time** button at the bottom of the screen. Each of these parameters is described below.

- **Time:** sets the time of the mission, in 30-minute increments.
- **Wind:** sets the speed of the wind. This value can be set from 0-12 meters per second.
- **Turbulence:** sets the speed and intensity of the wind's turbulence as it buffets your aircraft. This value can be set from 0-12 meters per second.
- **Weather:** sets the level of cloud cover and precipitation. There are five options for this setting: Clear, Cloudy, Average, Heavy, and Overcast. On the Overcast setting, you will see snowfall.

11.4 GROUND TARGETS

Ground targets can be added to any type of mission in Quick Mission mode and can be attacked by computer-controlled friendly aircraft. To enable the appearance of a particular type of ground target, first click on the **Ground targets** button at the bottom of the screen. You can then choose from five different types of ground targets: Anti-Air Artillery, Tanks, Artillery, Trains, and Vehicles.

Hint: to generate trains with anti-aircraft railcars, choose both the Trains and Anti-Air Artillery options. Likewise, to generate vehicle convoys with anti-aircraft vehicles, choose both the Vehicles and Anti-Air Artillery options.

11.5 DIFFICULTY SETTINGS

To set the difficulty settings for your mission, click on the **Realism** button at the lower right-hand corner of the screen. Please see Section 5.2 for detailed information on each difficulty setting.

11.6 MISSION GENERATION

Once you are satisfied with the setup of your mission, click on the **START** button to generate the mission. Once the mission is generated, you can adjust your aircraft's parameters from the Plane setup screen (see Section 5.3 for more info), view the mission briefing, and view your in-flight map. Click on the **START** button to begin the mission when you are ready. You can restart the mission at any time and keep your mission settings intact by pressing the **Esc** key and choosing the **RESTART MISSION** option. To finish your mission and return to the main Quick Mission setup screen, press the **Esc** key and choose the **FINISH MISSION** option.

12.0 SINGLE MISSION GAMEPLAY

In Single Mission mode, you can play a variety of pre-made single-player missions with aircraft you have purchased. All single missions in IL-2 Sturmovik: Battle of Stalingrad are stored in the `\IL-2 Sturmovik\Battle of Stalingrad\data\missions` folder. You can create subfolders for single missions in this directory, which will be recognized by the game on the main Single Mission screen. You do not need to be logged into the game via Online Mode in order to play a single mission. To play a single mission, click on the **MISSIONS** link on the main game screen and follow the steps below.

12.1 MISSION SELECTION

When you click on the **MISSIONS** link, you will be presented with the main single mission selection screen (Figure 12.1.1). On the left-hand side of the screen you will see the list of single missions you can fly.

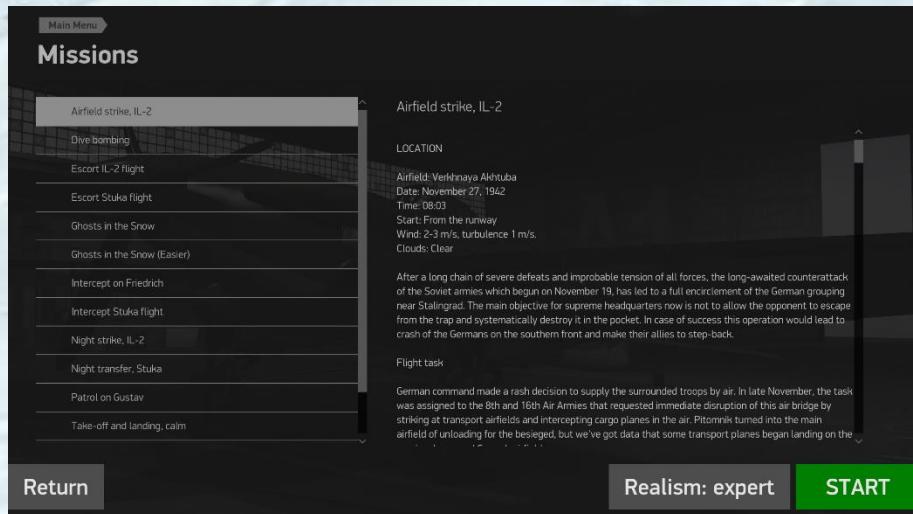


Figure 12.1.1

Left-clicking on the name of a mission in the left-hand column will load the mission's briefing in the right-hand column. You can also view this description on the briefing screen once the mission has been loaded.

Left-clicking on the name of any of the subfolders will expand that folder and list any missions inside that subfolder. Left-clicking on the folder's name again will close that particular subfolder.

To return to the main game screen, click either the **Return** or **Main Menu** buttons, or press the **Esc** key.

12.2 DIFFICULTY SETTINGS

To set the difficulty settings for your mission, click on the **Realism** button at the bottom of the screen. Please see Section 5.2 for detailed information on each difficulty setting.

12.3 STARTING THE MISSION

Once you are satisfied with the setup of your mission, click on the **START** button to generate the mission. Once the mission is generated, you can adjust your aircraft's parameters from the Plane setup screen (see Section 5.3 for more info), view the mission briefing, and view your in-flight map. Click on the **START** button to begin the mission when you are ready. You can restart the mission at any time and keep your mission settings intact by pressing the **Esc** key and choosing the **RESTART MISSION** option. To finish your mission and return to the main Single Mission selection screen, press the **Esc** key and choose the **FINISH MISSION** option.

13.0 CAMPAIGN MODE GAMEPLAY

Campaign mode allows you to play dynamically generated missions based upon a particular historical theme that progress through a number of historical phases. In this mode of gameplay, you score points by completing the primary objective of your mission. The campaign currently available also features unique awards not available in any other form of gameplay. You must be logged into the game via Online Mode in order to play a campaign mission. To play a campaign mission, click on the **CAMPAIGN** link on the main game screen and follow the steps below.

*Note: you can return to the main game screen at any time while in this game mode by clicking on the **Main Menu** tab at the upper left-hand corner of the screen. You can also return to the previous campaign setup screen by either clicking on the **Return** button at the lower-left corner of the screen or by clicking any of the tabs at the upper left-hand corner of the screen.*

13.1 CAMPAIGN SELECTION



Figure 13.1.1

When you click on the **CAMPAIGN** link, you will be presented with the main campaign selection screen (Figure 13.1.1). From this screen you can choose the campaign you wish to play. The green progress bar above each campaign's name shows how far along in the historical timeline you have progressed. Left-click on the campaign's image you wish to play in order to advance to the next step of the campaign selection process. Each of the currently available campaigns is described below.

- **Battle of Stalingrad:** as the name suggests, this campaign depicts the battle for the city of Stalingrad in the winter of 1942-43. The timeline of the campaign starts with the days immediately before the start of Soviet Operation Uranus in mid-November 1942 and ends with the final surrender of the German Sixth Army in early February 1943.

13.2 CAMPAIGN CHAPTER SELECTION

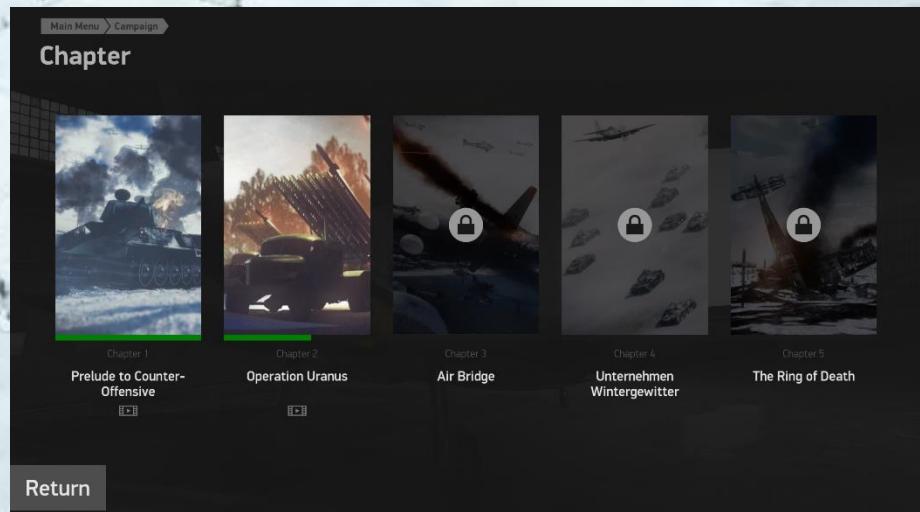


Figure 13.2.1

Once you have chosen your campaign, you will be taken to the campaign's mission chapter selection screen (Figure 13.2.1). On this screen you can see your current progress in each chapter of the campaign, denoted by the green progress bars. Chapters you have unlocked will be denoted by a full-color image, while locked chapters will be grayed out and shown with a padlock icon. You unlock the next chapter of the campaign by completing a certain number of missions in the current chapter of the campaign you are playing. In Figure 13.2.1, Chapter 3 (Air Bridge) will be unlocked once the player has completed a certain number of missions Chapter 2 (Operation Uranus). Left-click on the chapter's image you wish to play in order to advance to the next step of the campaign setup process.

For each chapter of the campaign, there is also an associated film clip. Clicking on the filmstrip icon below the chapter's name will automatically play the film. You can press the **Esc** key at any time to stop watching the film.

13.3 CAMPAIGN MISSION SELECTION

Once you have chosen your campaign chapter, you will be taken to the main campaign map screen (Figure 13.3.1). This map shows the historical location and disposition of the ground forces involved in the campaign, flight paths of major air operations, and the airfields from which the player can fly missions. Certain airfields will be locked when you start playing a new chapter; these can be unlocked by completing mission objectives and accumulating mission points.

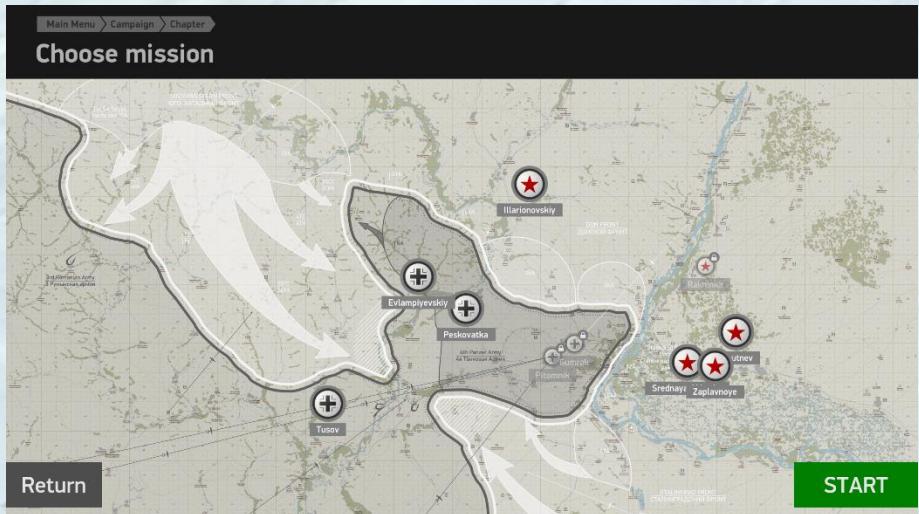


Figure 13.3.1

Left-click on an airfield's icon to choose which aircraft you will fly in your next mission (Figure 13.3.2). German airfields are denoted by an iron cross, while Soviet airfields are denoted by a red star. Any aircraft you have not yet purchased will be grayed out on the aircraft selection screen. Left-click on the aircraft you wish to fly; you can also press the **Esc** key or left-click on the **X** button to return to the main campaign map screen.

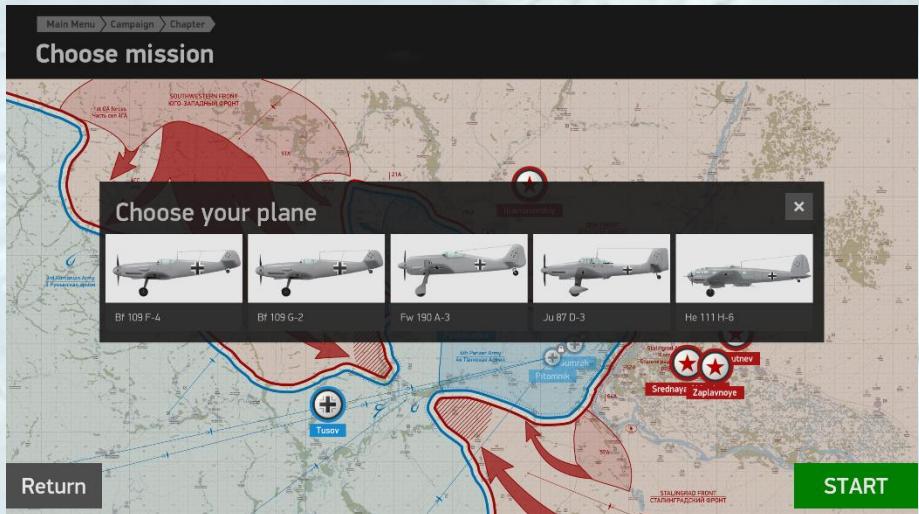


Figure 13.3.2

Once you have chosen your aircraft, you will be taken to the **mission template** display (Figure 13.3.3). Each of the options from which you can choose is described below.

- **Duration:** this option determines the mission's overall length. The **Short** setting starts your flight in the air and at the waypoint immediately prior to the mission's objective area. With the **Full** setting, the mission starts with your flight on the ground at your home airfield's runway, with engines running and ready to take off.

- **Difficulty:** this option determines the difficulty setting with which you will fly the mission. With the **Expert** setting, you will accumulate twice as many points as you will with the **Normal** difficulty setting. Please see Section 5.2 for more information on the game's difficulty settings.

- **Purpose:** this option determines the sort of mission you will fly. Irrelevant mission types for the aircraft you have chosen will be grayed out (e.g., He-111s cannot fly Intercept missions). Each mission type is described as follows:

- **Intercept:** prevent enemy bombers and attack planes from carrying out their mission.
- **Escort:** escort friendly bombers and attack planes and protect them from enemy fighter attacks.
- **Ground Attack:** attack a variety of ground targets, including vehicle columns, trains, artillery positions, and airfields.
- **Ground Support:** attack enemy tanks and artillery positions in support of friendly ground forces.
- **Bombing:** bomb ground targets from high altitude, including airfields, bridges, railway stations, and supply dumps.

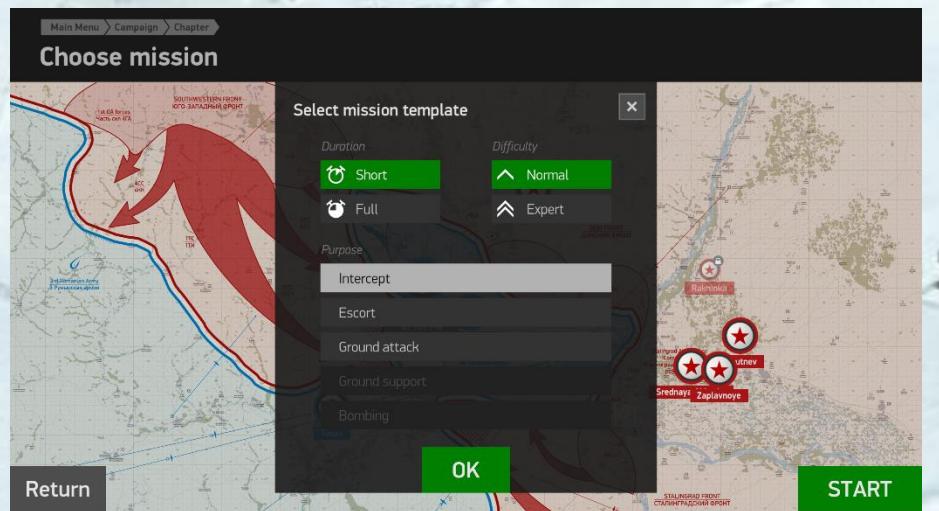


Figure 13.3.3

Click on the **OK** button once you are satisfied with your mission settings. The map will now be updated to show you the type of mission you will fly, along with the general area where your mission objective is located (Figure 13.3.4). If you are not satisfied with the type of mission that has been generated, you can go back and choose your airfield, aircraft, and mission template options again.

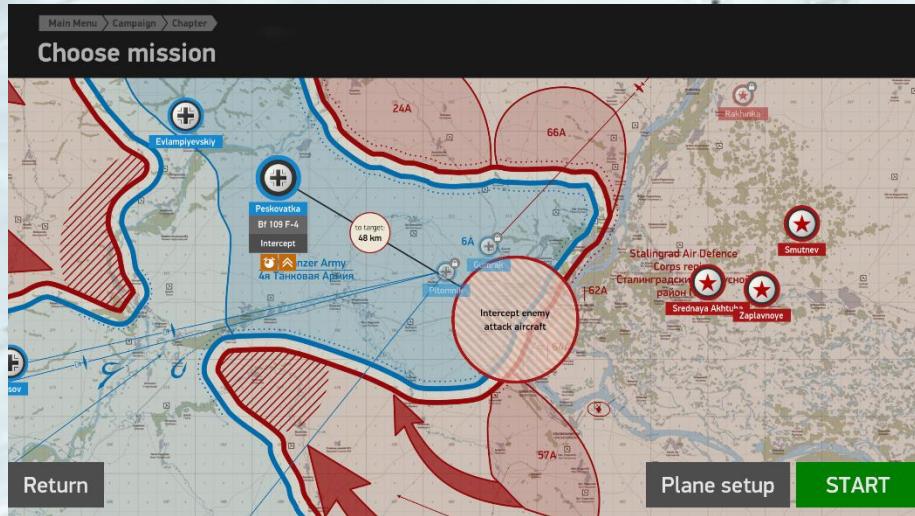


Figure 13.3.4

At this point, you can now adjust your aircraft's loadout by clicking on the **Plane setup** button at the bottom of the screen. This will be your only chance to adjust your plane's loadout before the mission is loaded. Please see Section 5.3 for more information about customizing your aircraft's loadout.

Note: the changes you make to your aircraft's loadout here will affect all aircraft in your flight. The only exception to this is the paint scheme you choose.

13.4 STARTING THE MISSION

When you are ready to load your mission, click on the **START** button at the bottom-right corner of the screen. Once the mission has been loaded, you can view the mission briefing and your in-flight map (Figure 13.4.1). As part of the flight path's display, the compass heading and time required to reach the next waypoint will be displayed on the map. At this point, you can also choose to return to the main campaign map screen by clicking on the **Abort Mission** button.

Click on the **START** button to begin the mission when you are ready. If you wish to then abort the mission before completing the primary objective, press the **Esc** button and choose the **CANCEL MISSION**; doing this will return you to the main campaign map screen.

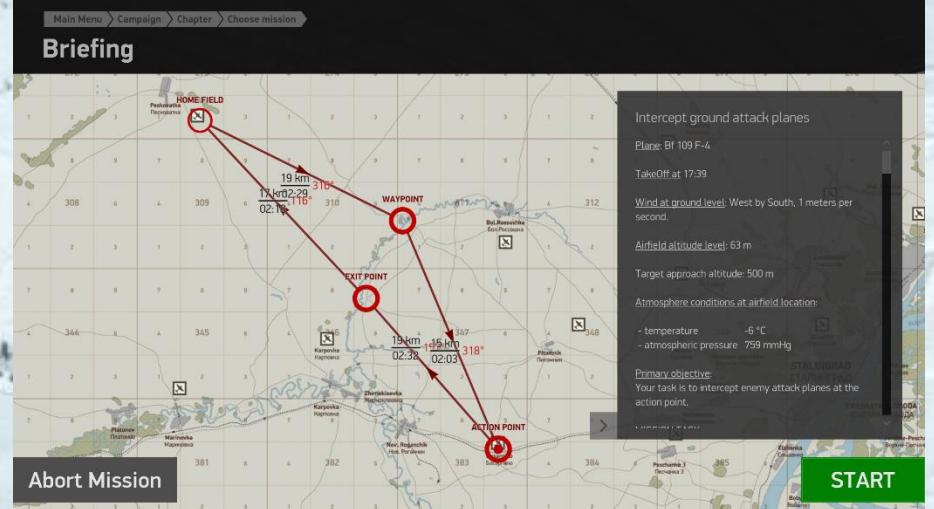


Figure 13.4.1

13.5 CAMPAIGN PROGRESSION

Once you have successfully completed your mission's primary objective, you will then need to fly your aircraft to the **EXIT POINT** in order to receive credit for completing the mission. At this point, you can choose to either exit the mission (by pressing the **Esc** key and choosing the **FINISH MISSION** option) or to continue flying on to your home airfield. You will earn additional points by making a successful landing at your home airfield. Conversely, bailing out of your aircraft or making a crash landing will reduce the number of points you can earn.

Once you have exited your mission, the game will first display any awards you may have earned and aircraft features you may have unlocked, as well as your progress towards the next pilot level. Your pilot level determines the overall difficulty of enemy opposition in the campaign. The game will then display your mission statistics, including total flight time, targets destroyed, and your pilot's end-of-mission status (i.e., landed, crash-landed, bailed out, etc.).

14.0 MULTIPLAYER

IL-2 Sturmovik: Battle of Stalingrad features a number of gameplay modes in which you can fly with and against other human pilots. You must be logged in to the game via Online Mode in order to play multiplayer missions. To access multiplayer mode, click on the **MULTIPLAYER** link at the bottom of the main game screen and follow the instructions below.

14.1 JOINING A MULTIPLAYER MISSION

- **Joining a server:**

When you click on the **MULTIPLAYER** link, you will be presented with the main multiplayer server list (Figure 14.1.1). On this page you can see detailed information for every active

server, including the server's name and connection status, difficulty settings, and the number of players currently on the server.

You can obtain more information about a particular server's difficulty settings and connection status by hovering your mouse cursor over the icon in question. In addition, you can sort the list of servers in ascending or descending order by their name, by the number of players currently on the server, or by their connection status.

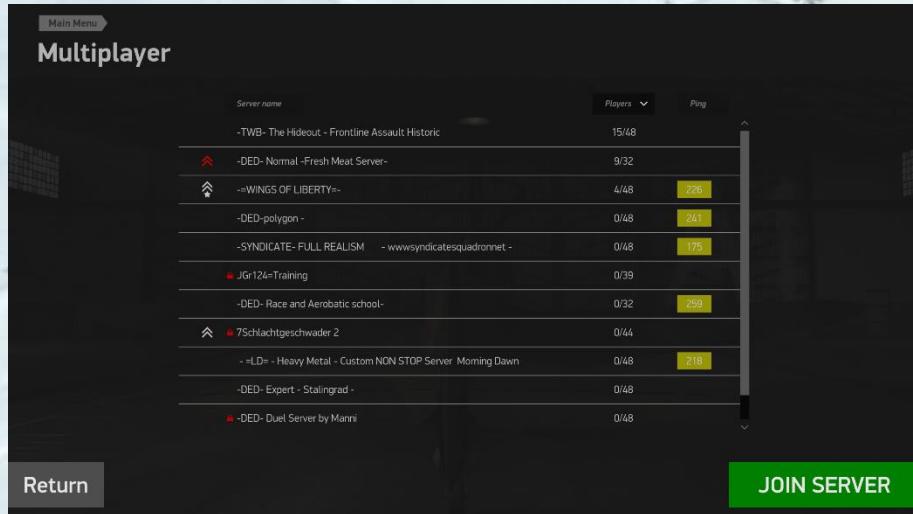


Figure 14.1.1

When you are ready, left-click on the server's name you wish to join, which will then be highlighted in gray, and then click on the **JOIN SERVER** button at the bottom of the screen. At this point, you may receive a notification about files being downloaded from the server to your computer. This is a normal process that is required for you to play on any multiplayer server. You can cancel this download process and return to the main multiplayer screen by either clicking on the **CANCEL** button or by pressing the **Esc** key. In addition, if the server requires a password, you will be required to enter it at this time in order to successfully join the server and load the currently-selected mission.

• Pre-mission options:

Once the mission has loaded, you will be presented with the **Briefing** screen (Figure 14.1.2). Besides choosing your aircraft, you can perform a variety of functions from this screen, each of which is described below.

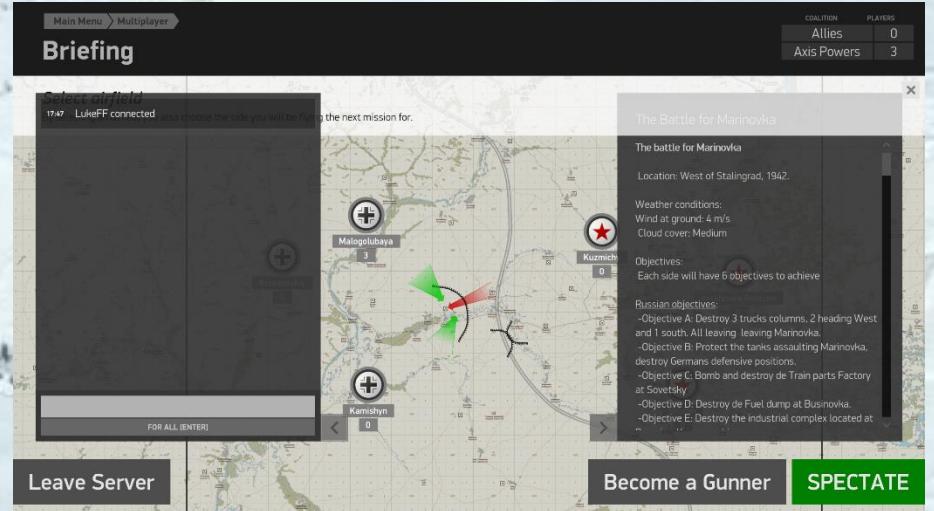


Figure 14.1.2

- **Text chat:** to send a text message to all other players on the server, left-click on the text box on the left-hand side of the screen and press the **Enter** key (**Send chat messages to all**). Once you have joined a particular team, you can also send messages to your team only by pressing the **Right Ctrl + Enter** key combination (**Send chat messages to friendly**). You can hide this screen by left-clicking on the arrow at the bottom right-hand corner of the display.
- **Spectating:** if you do not wish to fly a multiplayer mission but simply want to view the mission's action, click on the **SPECTATE** button.
- **Choosing your aircraft and beginning the mission:**
In multiplayer missions, you can either fly as the pilot of your own aircraft or as a gunner in a multi-crew aircraft.
 - **Flying as a pilot:** to pilot your own aircraft, first left-click on a valid airbase name on the map. Soviet airbase names are denoted by a red star, while German airbase names are denoted by an iron cross. On the **Choose your plane** screen, left-click on the type of aircraft you wish to fly. Once you have chosen your aircraft and made any adjustments to it on the Plane setup screen, click on the **START** button to enter the mission.
 - **Flying as a gunner:** to fly as a gunner, first click on the **Become a Gunner** button, which will open up a new screen (Figure 14.1.3), and follow these steps:
 - 1. Choosing a side:** all aircraft in IL-2: BOS are categorized into one of two categories in multiplayer mode: **Allies** and **Axis Powers**. Left-click on the side for which you want to fly under the **Choose a coalition** heading.

2. **Choosing a plane:** once you have chosen your side, a list of all currently active multi-crew airplanes will be shown below the **Choose a plane** heading. The center column shows who is piloting the plane, while the right-hand column shows the total number of gunner slots and of those which are open.

3. **Choosing a gunner position:** once you have chosen a plane, a silhouette of the aircraft will be displayed below the **Choose a gunner station** heading. Available gunner positions will be marked in green, while unavailable positions will be marked in red. Once you have chosen a position, click on the **START** button, which will take you directly into the mission. Once in the mission, you can change gunner positions (if available), by pressing the **Esc** key and choosing the **GUNNER POSITIONS** option, which will then open up a screen similar to Figure 14.1.3.

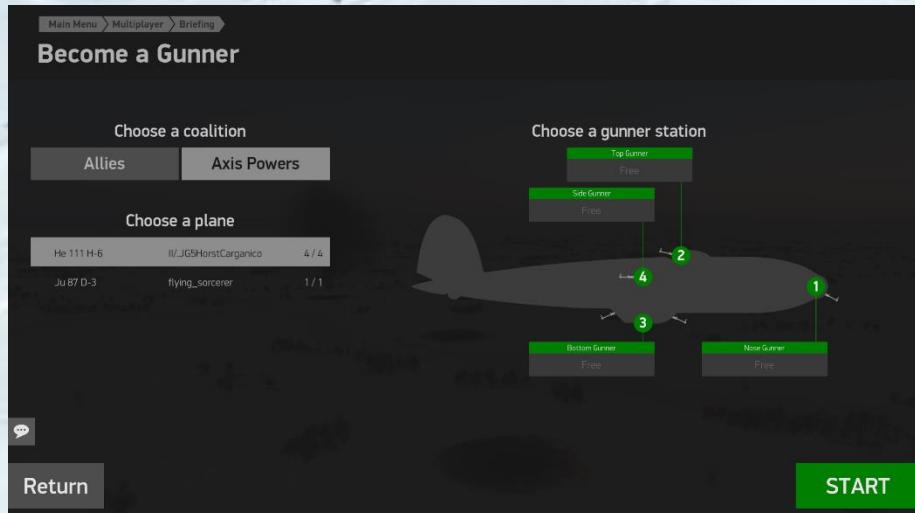


Figure 14.1.3

14.2 IN-FLIGHT OPTIONS

• Communication:

In addition to the in-flight options described in Section 8, you can also send text messages to other players while flying a multiplayer mission. To send a message, first press the **Enter** key to display the text entry field, and then left-click on the text box at the lower left-hand corner of the screen to enter your message. To send a message to all players on the server, press the **Enter** key (**Send chat messages to all**). To send a message to your team only, press the **Right Ctrl + Enter** key combination (**Send chat messages to friendly**).

To toggle the display of sent chat messages, first right-click anywhere on the screen and then press the **H** key (**Show/hide entire HUD**). The chat message window also displays system messages, including aerial victories and when a player has joined or left the server.

- **Locking gunner stations:** if you are flying a multi-crew aircraft and do not want other players occupying the gun turrets without your permission, you can lock out access to these positions by first pressing the **Esc** key and then choosing the **GUNNER STATIONS** option. You will then be presented with a screen which will allow you to either lock or unlock the gun turrets on your plane (Figure 14.2.1).

Note: this is an all-or-nothing feature. In other words, you cannot choose to lock one gun turret and leave all others unlocked, or vice versa.



Figure 14.2.1

- **Player information:**

Press the **Tab** key (**Lobby**) to view the current players on the server and their statistics (Figure 14.2.2).



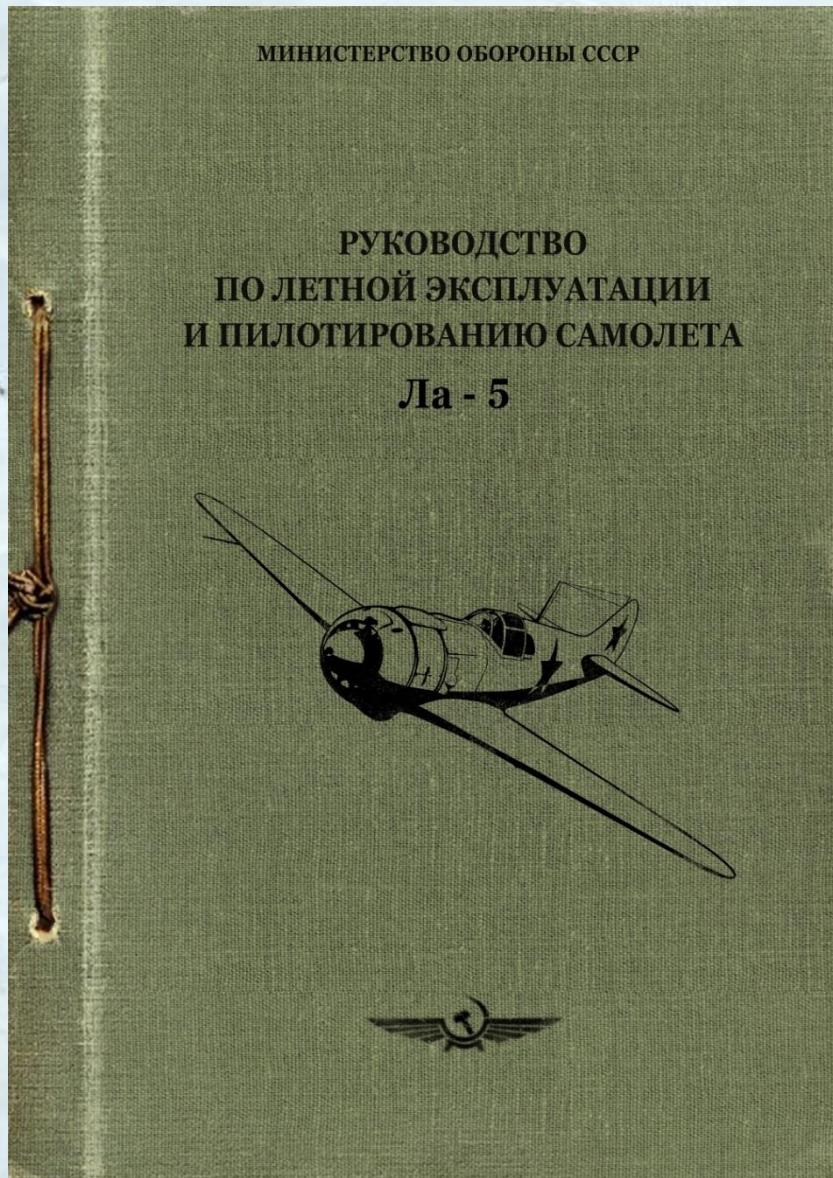
Figure 14.2.2

14.3 MISSION COMPLETION

To complete a multiplayer mission, press the **Esc** key and choose the **FINISH FLIGHT** option. Note that on some servers your plane must be on the ground before you can choose this option. Choosing the **FINISH FLIGHT** option ensures your statistics are counted correctly.

APPENDIX A – AIRCRAFT

A.1 SOVIET FIGHTERS



Lavochkin La-5 (Series 8)

One of the main Soviet fighters of the Second World War, the La-5 was a development of the LaGG-3 design. Design work to convert the LaGG-3 into a radial-engine fighter began later than other Soviet aircraft designers (in particular, Mikoyan-Gurevich and Yakovlev) for a variety of reasons. The M-82 radial engine was 250 kg heavier than the LaGG-3's Klimov engine, and its diameter was 460 mm greater than the maximum cross-section of the LaGG-3's fuselage. In addition, it would not be possible to retain the LaGG-3's machine gun and cannon armament with the M-82. These design difficulties, along with the desire to not disrupt LaGG-3 production, all delayed the introduction of the La-5.

Despite these obstacles (as well as political interference from Yakovlev), there was a desire on the part of Arkady Shvetsov to see his M-82 design not fall into disuse, as by late 1941 only a handful had been fitted to the Sukhoi Su-2. Thus, the LaGG-3 M-82 (as the La-5 prototype was known) was ready for flight tests in early February 1942. Despite problems with the cylinder heads overheating, this new plane was quickly found to be superior to the LaGG-3. Initial evaluations also showed – in comparison to the LaGG-3s then in production – the LaGG-3 M-82's speed at ground level was 10% higher.

The LaGG-3 M-82 design was a mix of technology inherited from the LaGG-3 and new design improvements. The fuselage and wing construction (built with delta timber), as well as the humpback canopy, were the same as that found on late-model LaGG-3s. To accommodate the M-82 engine, the engine mount was reworked and the internal armament changed to two synchronized 20 mm ShVAK cannons fitted above the engine.

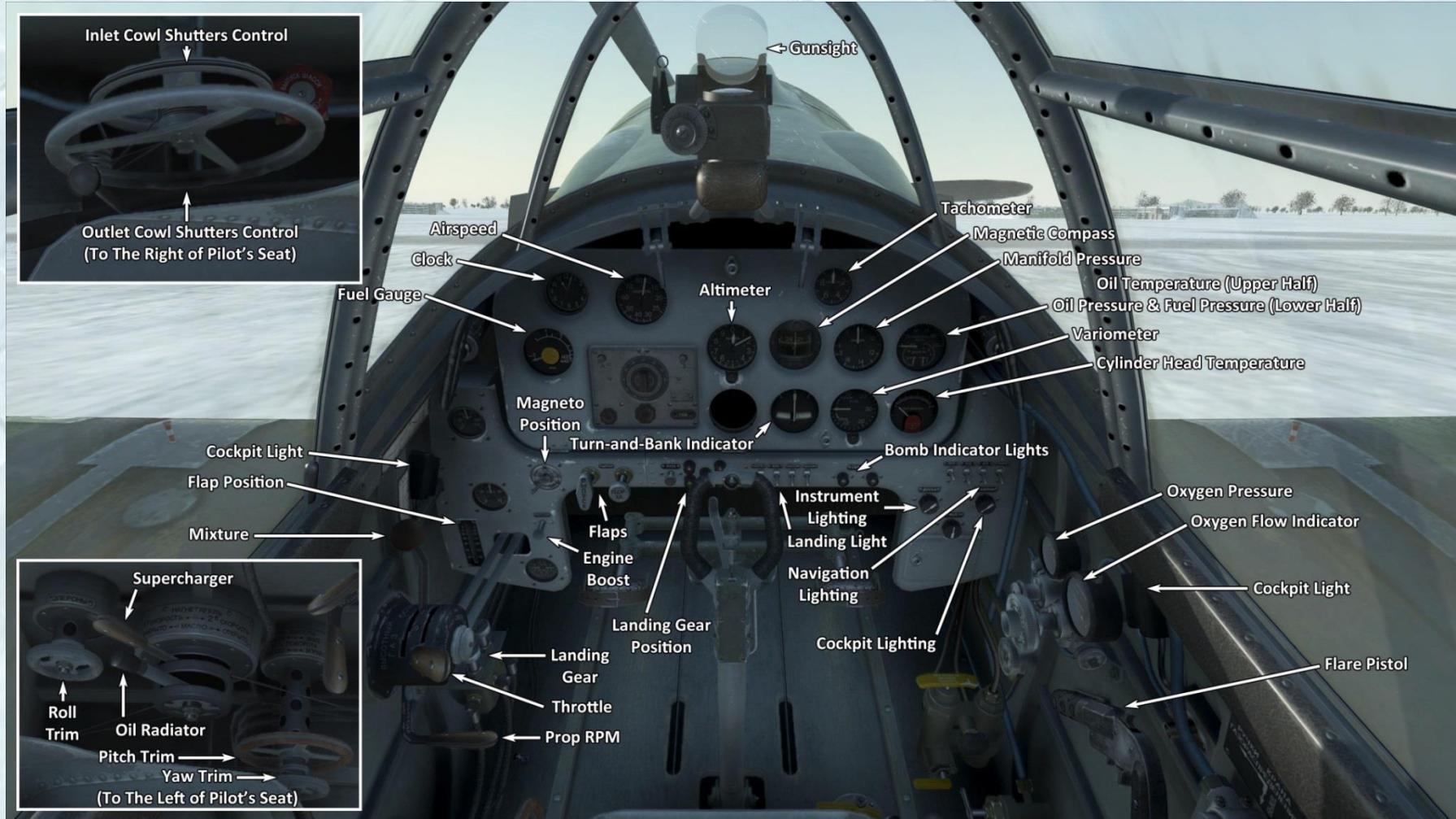
In spite of the LaGG-3 M-82's problems with controllability and being overweight, the flights made by the test pilots showed the aircraft to be a sound design. As a result, the type was put into production in June 1942 as the LaG-5 (this name was changed to La-5 in September 1942).

The La-5 received mixed reviews from frontline pilots. Pilots noted the aircraft required more demands upon flying technique than the LaGG-3 and Yak-1, owing to the plane's high weight and insufficient control balance. However, it was also noted that aircraft survivability was improved, as the double-row radial engine provided improved protection from frontal attacks.

The performance of the La-5 was put to the test in the skies above Stalingrad starting in late August 1942, with the 287th Fighter Air Division. Although many successful attacks were made during this time, the division's own losses were severe. For one, a number of aircraft were lost in accidents and to friendly anti-aircraft fire. In addition, pilots also concluded the La-5 was inferior to the Bf-109 F-4 and G-2 models in speed and climb maneuverability, which forced them to fly almost entirely on the defensive.

As a result of the La-5's design and manufacturing defects, an edict was issued by the Soviet State Defense Committee on 25 September 1942 which required the La-5 to be lightened and its overall performance characteristics improved. These improvements would first come in the form of the La-5F.

A.1 SOVIET FIGHTERS



La-5 (Series 8) Cockpit

Specifications

Crew: 1; **Engine:** 1 x Shvetsov M-82 radial, 1,700 hp; **Propeller System:** manually controlled constant-speed; **Armament:** 2 x 20 mm ShVAK cowling-mounted cannons; up to 200 kg in bombs; **Adjustable Trim:** pitch, roll, and yaw; **Tailwheel:** non-lockable

Engine Operating Parameters

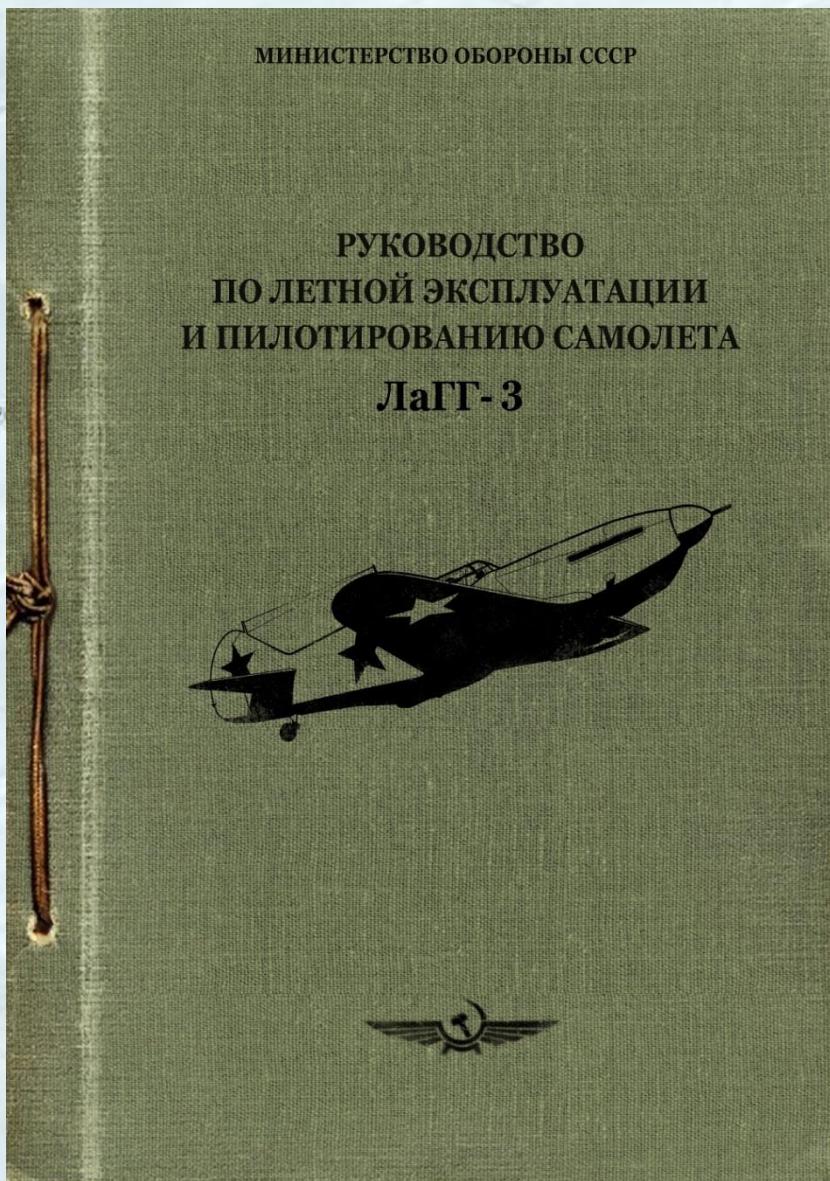
Max Continuous Power: 2,400 rpm at 950 mmHg

Oil Temperature: manually controlled; keep between 60 – 115 °C

Cylinder Head Temperature: manually controlled; keep between 100 – 250 °C

Supercharger: two-speed manual; switch gears at 3,000 m

Engine Boost: use only with supercharger in 1st gear below 3,000 m; 5-minute continuous usage limit



Lavochkin-Gorbunov-Gudkov LaGG-3 (Series 29)

The LaGG-3 was a further development of the I-301 prototype, the latter of which began flight testing in late March 1940 and completed its official state flight tests on the 12th of June. Owing to a lack of time, most of the 115 defects and deficiencies found while testing the I-301 could not be rectified before the aircraft entered series production. The last major modification to the I-301 prototype was the installation of an additional fuel tank in each of the aircraft's detachable outer wing panels; this addition was in response to a government edict issued in early October 1940 requiring all new fighters to have a range of 1,000 km.

Having satisfied the new requirement for range, the I-301 was renamed as the LaGG-3 and put immediately into serial production at Leningrad Plant No.23. Once the most serious production faults were eliminated, deliveries of production aircraft to frontline units commenced, with the 157th Fighter Air Regiment being the first unit to take delivery of the type. These initial-production aircraft were powered by the Klimov M-105P engine and armed with three 12.7 mm Berezin UB machine guns and two 7.62 mm ShKAS machine guns.

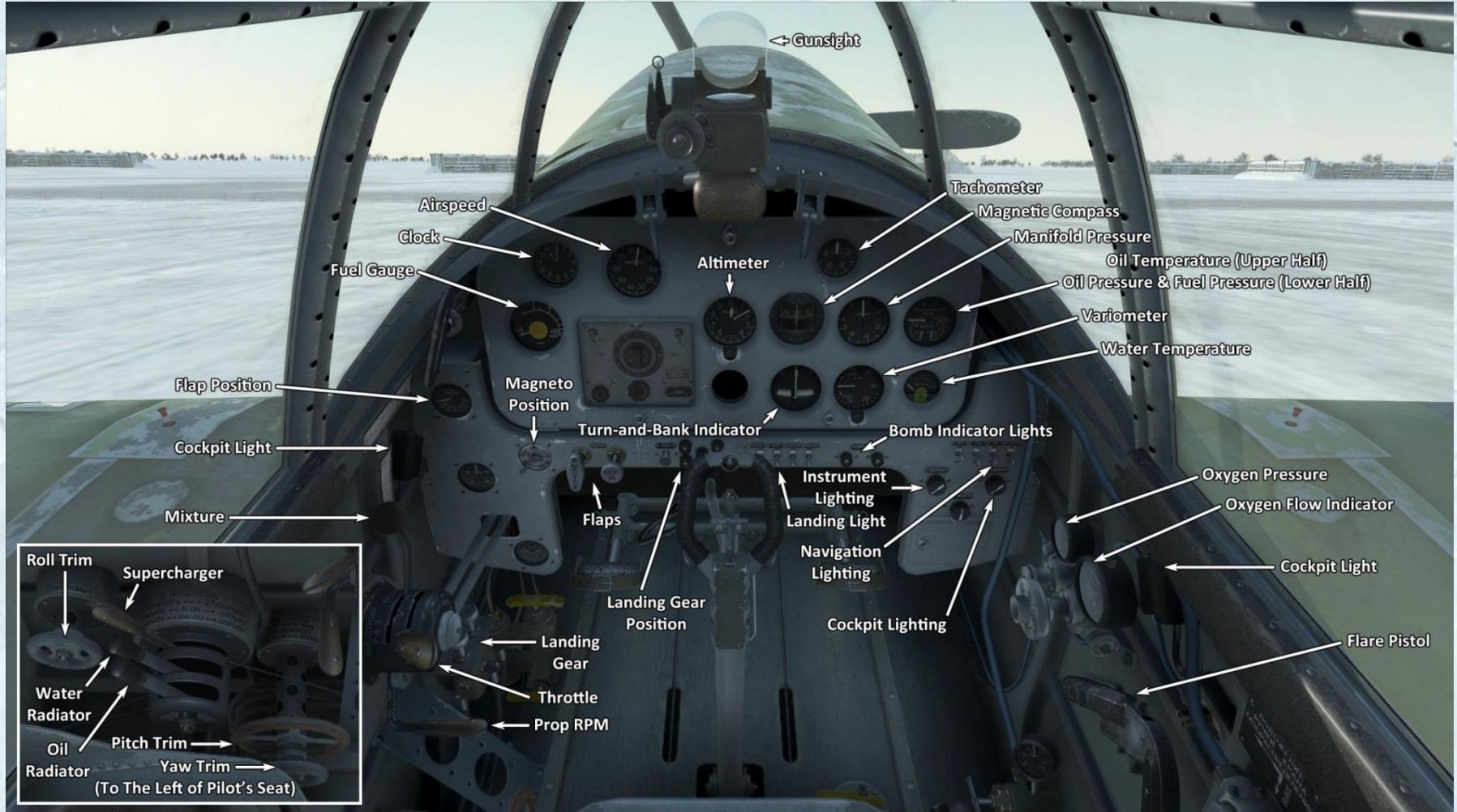
For a variety of reasons, the initial production batches of the LaGG-3 were beset by a wide variety of problems worsened by the need to evacuate Soviet aircraft factories to the east of the Urals after the German invasion of June 1941. One of the biggest challenges was in retraining factory workers to familiarize them with the new technology of phenol-impregnated wood. While some factories produced quite-well constructed planes, others were so poorly-built that their climb rate was reduced by at least 50% and their top speed reduced by about 50 km/h, when compared to the I-301 prototype. As a result, no LaGG-3s were in the inventory of the Air Command of the five western military districts of the USSR when the war with Germany began.

In response to these problems, major efforts were taken to improve the LaGG-3's performance. Among other things, these changes included a reduction in the aircraft's fuel capacity and stripping out nonessential equipment. Starting with the production of Series 4 in July 1941, the engine-mounted UB machine gun was replaced by a 20 mm ShVAK cannon, and the starboard UBS was removed. Beginning with Series 11, the aircraft's armament was further reduced to one 12.7 mm UBS machine gun and one 20 mm ShVAK cannon. With the introduction of Series 29 in 1942, the aircraft was now powered by the Klimov M-105PF engine.

In addition to its internal armament, the LaGG-3 could be fitted with six ROS-82 rockets and up to 100 kg in bombs. A small number of planes were built with a 23 mm VYa cannon, in place of the 20 mm ShVAK cannon. Further efforts to increase the LaGG-3's firepower saw the plane fitted with the 37 mm Sh-37 cannon. Some of these planes – referred to as the LaGG-3-37 – were sent to Stalingrad in September 1942, where the 291st Fighter Air Regiment claimed the destruction of 13 German bombers. Later LaGG-3-37s were fitted with the lighter and more reliable NS-37 cannon.

Ultimately, all of the weight-saving and engine performance improvements did not bring about the desired performance for the LaGG-3, so the type was transformed into the La-5 with the installation of the M-82 radial engine in 1942. Even so, production of the LaGG-3 continued well into 1944, when Tblisi Plant No.31 – the last plant producing the LaGG-3 – was switched over to building Yak-3s. During its three years of production from 1941 to 1944, some 6,528 LaGG-3s of all types were built.

A.1 SOVIET FIGHTERS



LaGG-3 (Series 29) Cockpit

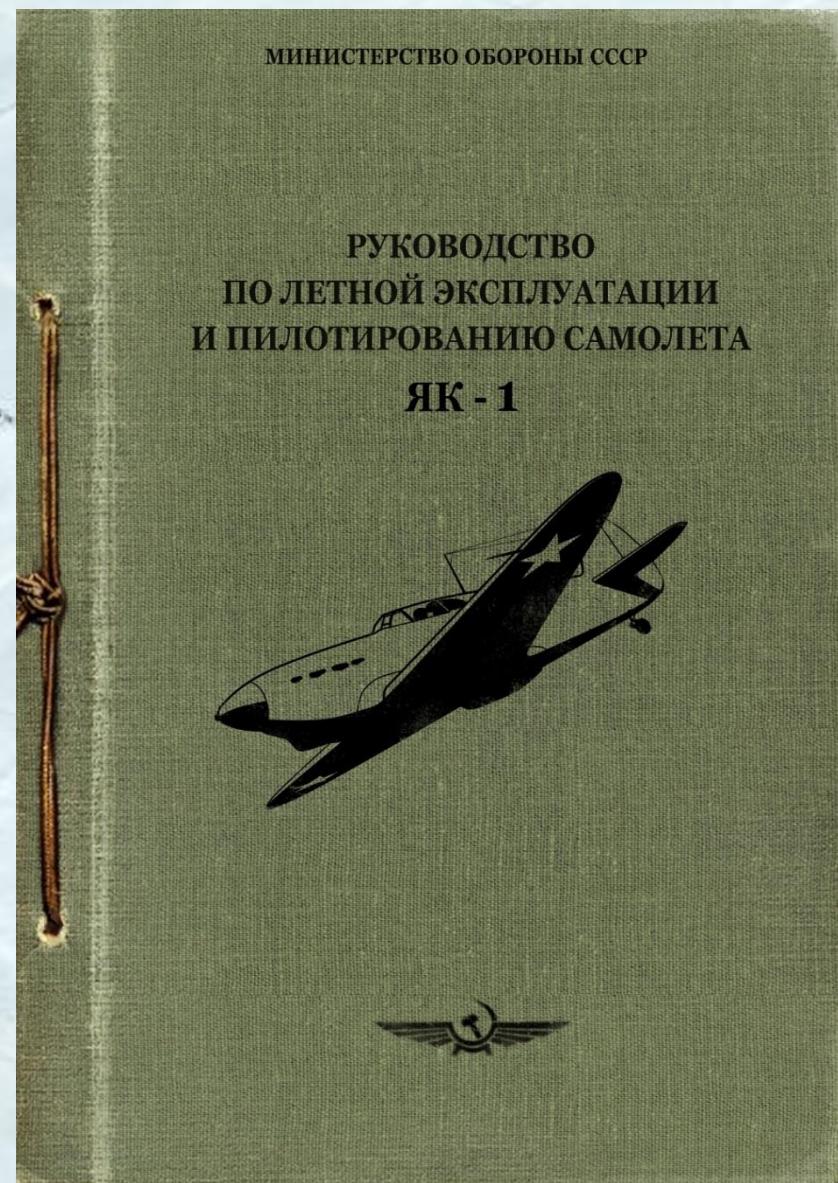
Specifications

Crew: 1; **Engine:** 1 x Klimov M-105PF inline, 1,210 hp; **Propeller System:** manually controlled constant-speed; **Armament:** 1 x 12.7 mm UBS cowling-mounted machine gun and 1 x 20 mm ShVAK nose-mounted cannon (ShVAK cannon can be replaced with 1 x 23 mm Vya-23 cannon or 1 x 37 mm Sh-37 cannon); up to 200 kg in bombs; 6 x ROS-82 rockets; **Adjustable Trim:** pitch, roll, and yaw; **Tailwheel:** non-lockable

Engine Operating Parameters

Max Continuous Power: 2,700 rpm at 1,050 mmHg
Water Temperature: manually controlled; keep between 60 – 110 °C

Oil Temperature: manually controlled; keep between 60 – 110 °C
Supercharger: two-speed manual; switch gears at 2,300 m



Yakovlev Yak-1 (Series 69)

The Yak-1 was the first of a whole family of piston-engine fighter aircraft developed by Alexander Yakovlev's design bureau, with some 37,000 aircraft of multiple types eventually being built. A single-seat monoplane of mixed construction, the Yak-1 prototype – then known as the I-26 – first flew on 13 January 1940. As the Klimov M-105 engine was still in the prototype stage at this time, the I-26 was powered by the M-106 engine. Armament consisted of an engine-mounted 20 mm ShVAK cannon and four 7.62 mm ShKAS machine guns.

The I-26's performance and handling were very good, but the plane suffered from chronic oil overheating problems that were never really solved, despite the engine being changed five times before the plane was lost in a crash on 27 April 1940. Improvements to the second prototype (I-26-2) resolved the oil overheating problems and a number of other design defects and saw two of the machine guns being removed. Even so, I-26-2 failed its state tests in June of 1940, although its main competitors – the MiG-3 and LaGG-3 prototypes – also received failing marks. Requests for improvement were incorporated into the third prototype (I-26-3); at the same time, a small production run was handed over to the 11th Fighter Air Regiment for operational trials (since the I-26 had already been ordered into production as the Yak-1, back in February 1940). State tests of the I-26-3 took place during October and November 1940, which were announced as being successfully passed in December.

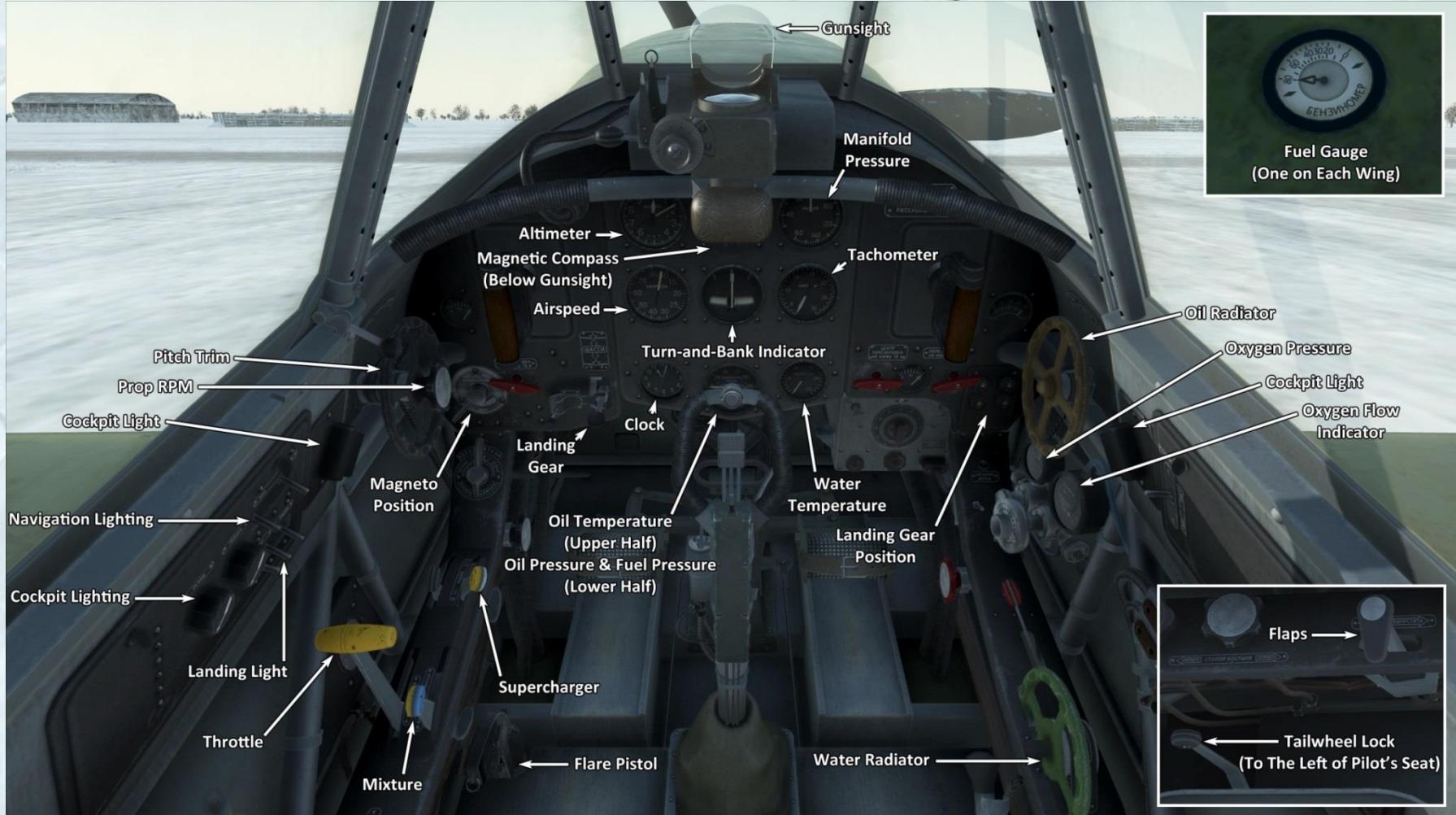
On the eve of the war with Germany, most of the Yak-1s were concentrated near Moscow, although over a hundred were also sent to the five western military districts before the beginning of hostilities. Although the plane was still beset by a number of design problems, its presence in frontline squadrons gradually grew during the summer of 1941. By early July, 133 Yak-1s were defending Moscow, and only 9 planes were reported as unserviceable; these numbers represented 1 out of every 6 fighters tasked with defending the capital.

The M-105P engine that powered the initial models of the Yak-1 was replaced with the M-105PA beginning in the summer of 1941. This engine made it possible to fly inverted for extended periods of time and to perform negative-g dives. Other improvements included the addition of a trim tab to the rudder and the installation of a radio receiver, although only about 1 in every 10 Yak-1s were ever fitted with radio equipment.

By early 1942, the Yak-1 had shown itself to be the best Soviet fighter in regards to overall performance, but it still was inferior when compared to the Bf-109 F-2 and F-4 models. While the performance of the Bf-109 F and the Yak-1 were very similar at 3,000 meters, the Daimler-Benz DB601N and DB601E engines provided entirely superior performance above 5,000 meters.

A number of changes were made to the Yak-1 throughout 1942 to bring the plane closer in performance to the Bf-109 F series. For one, it was decided in May to stop fitting the plane with underwing rockets and to instead fit the plane with a pair of bomb shackles. Even with these changes, the M-105PA was still not powerful enough to give the Yak-1 the desired performance, so it was decided to fit the plane with the more capable M-105PF. This engine change, along with a reduced internal armament of one 20 mm ShVAK cannon and two ShKAS machine guns, characterized Yak-1s by the time Series 69 was put into production and formed the basis for the much-improved Yak-1B variant. Eventually, by the time Yak-1 production was terminated in 1944 in favor of the Yak-3, 8,666 Yak-1s of all types had been built.

A.1 SOVIET FIGHTERS



Yak-1 (Series 69) Cockpit

Specifications

Crew: 1; **Engine:** 1 x Klimov M-105PF inline, 1,210 hp; **Propeller System:** manually controlled constant-speed; **Armament:** 2 x 7.62 mm ShKAS cowling-mounted-machine guns and 1 x 20 mm ShVAK nose-mounted cannon; up to 200 kg in bombs; up to 6 x ROS-82 rockets; **Adjustable Trim:** pitch; **Tailwheel:** lockable

Engine Operating Parameters

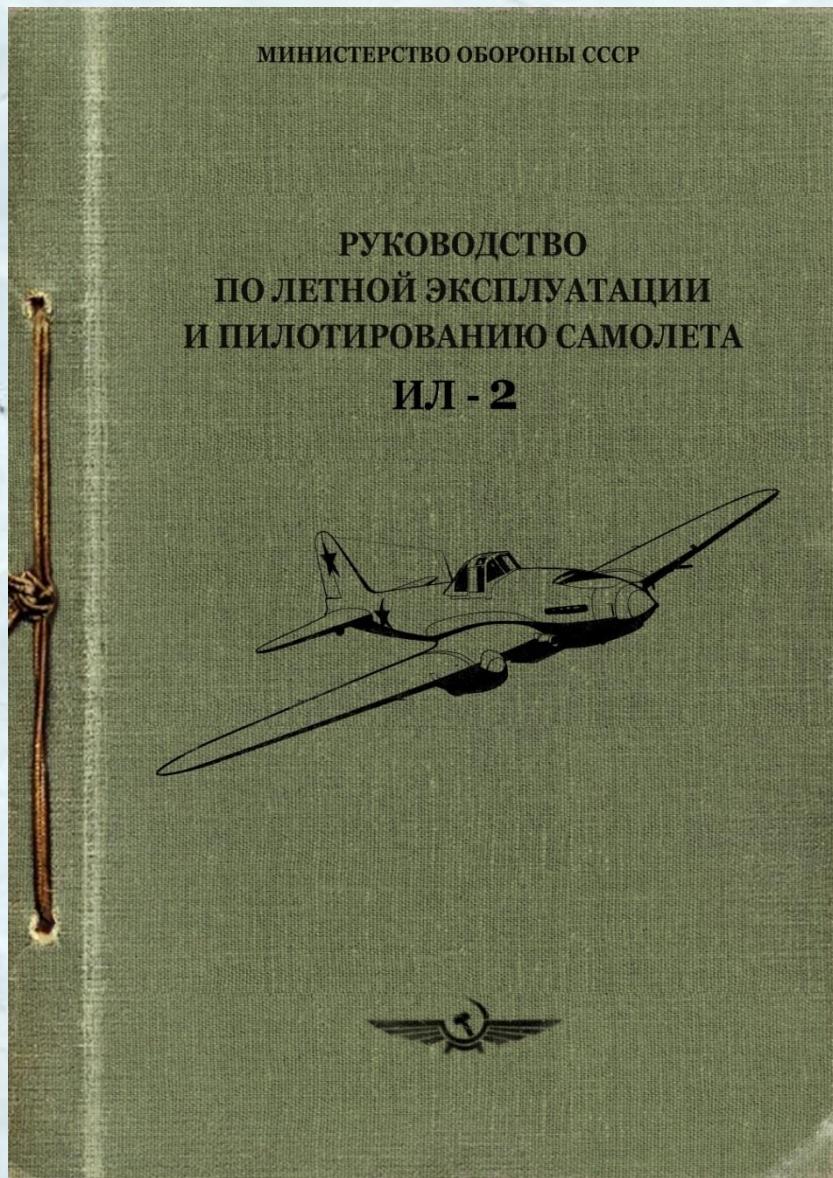
Max Continuous Power: 2,700 rpm at 1,050 mmHg

Water Temperature: manually controlled; keep between 60 – 110 °C

Oil Temperature: manually controlled; keep between 60 – 110 °C

Supercharger: two-speed manual; switch gears at 2,300 m

A.2 SOVIET GROUND ATTACK PLANES



Ilyushin IL-2 (Model 1942)

The IL-2 was an armored ground attack aircraft designed by Sergei Ilyushin in the late 1930s. The prototype, known as TSBK-55, was a two-seat aircraft whose most distinctive feature was a streamlined fuselage made of high-tensile armored steel. This armored body protected the engine, crew positions, and the fuel and oil systems. To simplify the aircraft's design, the water and oil radiators were fitted outside the armored body. The original armament consisted of five 7.62 mm ShKAS machine guns, four of these being fitted in the wings and the fifth for the rear gunner. The initial engine fitted to the design was the liquid-cooled Mikulin AM-35.

The first TSBK-55 prototype made its first flight in early October 1939, followed by the second prototype at the end of December. Following manufacturer's testing, the second prototype was sent for its state tests in April 1940, by which time it was now known as the BSh-2. The general impression of the plane was favorable, especially in comparison with the R-10 and BB-1. However, some faults were noted, the most notable of these being the plane's slow sea-level speed and inadequate forward view for the pilot. In response, Ilyushin installed the AM-38 engine in the first prototype TSBK-55 and also modified the plane's armor configuration. These changes gave the plane – now known as the TSBK-57 – a 61 km/h speed increase at sea level. These improvements showed the TSBK-57 to be the better overall aircraft when compared with the BSh-2, so it was decided to put the former into series production as the IL-2.

Series production of the IL-2 began in February 1941, and the first production plane was flown on the 10th of March. Two of the wing-mounted machine guns were replaced with 20 mm ShVAK cannons, although many planes were also built with 23 mm VYa-23 cannons. Up to 400 kg of bombs could be carried internally, along with wing-mounted rockets. In order to resolve problems with the plane's center of gravity, the rear gunner position was deleted.

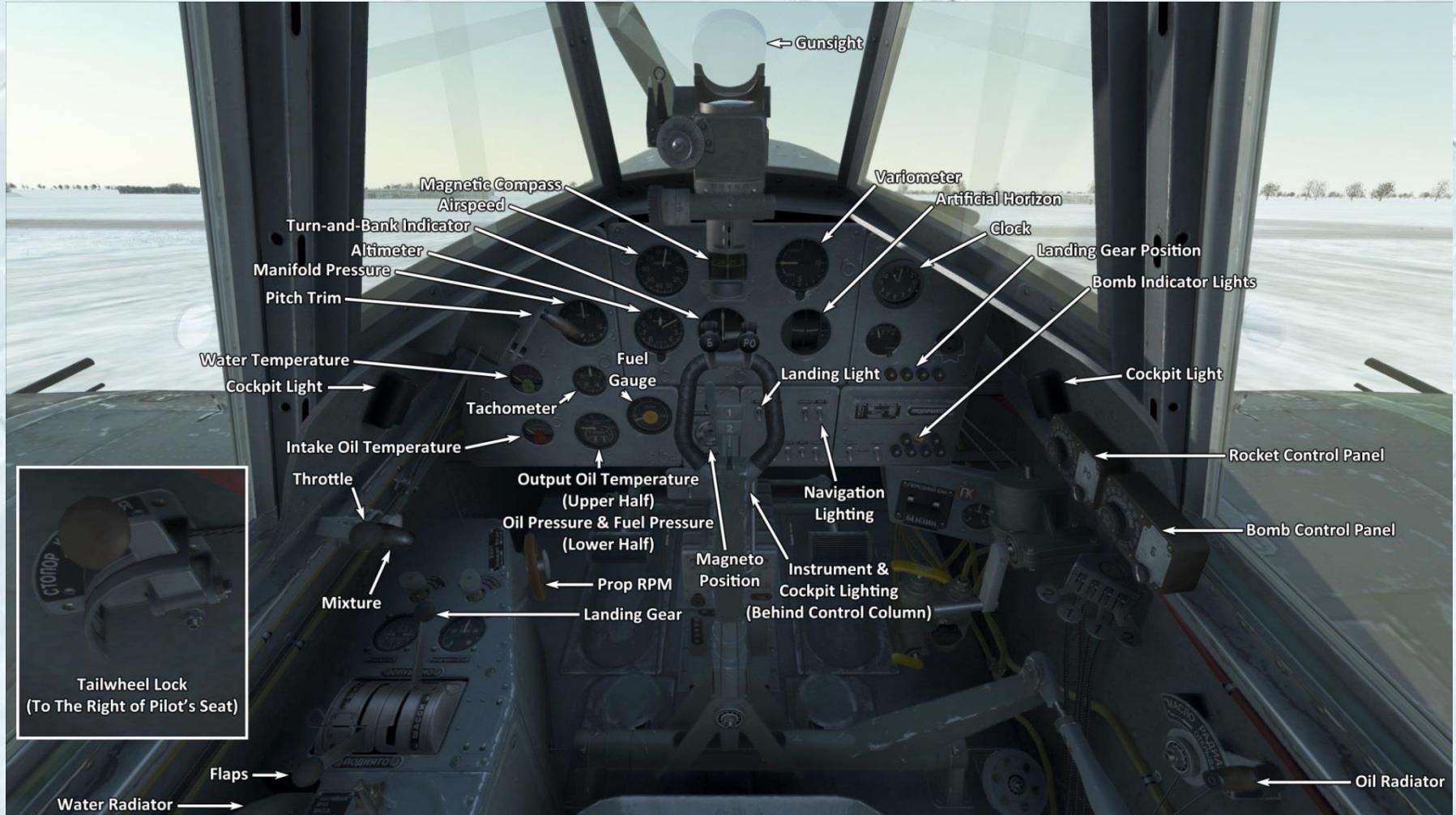
By the beginning of the war with Germany only 18 IL-2s had been delivered to the western military districts, so there had been little time for pilots to familiarize themselves with this new plane. Even so, once in combat the IL-2 was praised for its powerful armament, high survivability, and easy handling, the latter of which was especially important for inexperienced pilots.

Initial combat experience with the IL-2 showed it was highly vulnerable to enemy fighter attacks from the rear. The first attempts to resolve this problem involved fitting externally-mounted rear-facing machine guns, but this solution was not satisfactory. Eventually, by the spring of 1942 units were field-modifying their IL-2s to carry the same TSS-1 installation found on other Soviet planes, which featured a ShKAS machine gun and a narrow belt for the gunner's seat.

Many other changes were made to the IL-2 as the war moved into 1942. Starting in late 1941, the wings were built with a combination of wood and metal, and the ailerons were now covered in fabric. From the summer of 1942, all aircraft were built with wooden tail units and a filter for the carburetor air intake. The pilot's armor was improved by replacing the armored glass headrest with one made of metal, and an angled metal plate was fitted to the fuel tank behind the pilot's seat.

A small number of IL-2s were fitted with two 37 mm Sh-37 cannons and flown at Stalingrad in the winter of 1942-43. Reliability problems with the weapon and adverse effects on the plane's performance, however, prevented this configuration from entering mass production.

A.2 SOVIET GROUND ATTACK PLANES



II-2 (Model 1942) Cockpit

Specifications

Crew: 1 or 2, depending on plane configuration; **Engine:** 1 x Mikulin AM-38 inline, 1,600 hp; **Propeller System:** manually controlled constant-speed; **Armament:** 2 x 7.62 mm ShKAS wing-mounted machine guns and 2 x 20 mm ShVAK wing-mounted cannons (ShVAK cannons can be replaced with 2 x 23 mm VYa-23 cannons or 2 x 37 mm Sh-37 cannons) and 1 x 7.62 mm ShKAS rear turret-mounted machine gun (when configured as a two-seat plane); up to 500 kg in bombs; 8 x ROS-82, RBS-82 or ROFS-132 rockets; **Adjustable Trim:** pitch; **Tailwheel:** lockable

Engine Operating Parameters

Max Continuous Power: 2,050 rpm at 1,180 mmHg

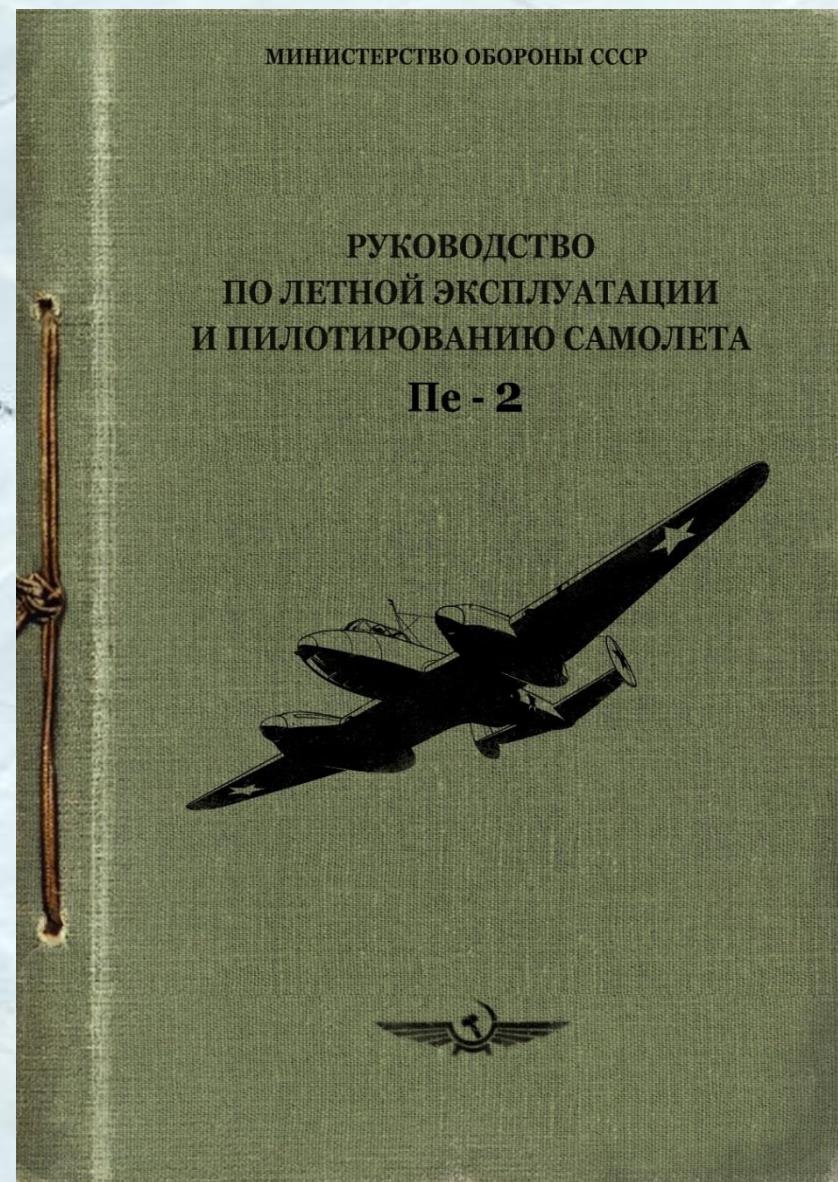
Boosted Power: 2,150 rpm at 1,285 mmHg; 10-minute continuous usage limit

Water Temperature: manually controlled; keep between 80 – 110 °C

Intake Oil Temperature: manually controlled; keep between 40 – 80 °C

Output Oil Temperature: manually controlled; keep between 70 – 115 °C

Supercharger: single-speed



Petlyakov Pe-2 (Series 87)

The Pe-2 was a twin-engine bomber design of the imprisoned Vladimir Petlyakov that had its origins in the '100,' a twin engine fighter designed as a high-altitude escort fighter for the ANT-42 heavy bomber. However, events in the spring of 1940 would fundamentally change the design of the '100.' First, it was realized it was impractical both to convert the SB bomber into a dive bomber and to continue work on the SPB dive bomber. Also, German aircraft purchased by the USSR began to be delivered, including the Junkers Ju 88. The Soviets were impressed both with the design features of the Ju 88 and its combat record in the just-concluded Battle of France.

With the above developments in mind, Petlyakov and his design team were ordered in early June 1940 to convert the '100' into a bomber with dive bombing capability. With only 45 days allotted for this task, the PB-100 (as it was now known) underwent a radical transformation, which involved a redesign of the fuselage and crew compartments, fitting the dive brake system, and changing the power plant. Remarkably, no test aircraft of the PB-100 was ever built – the design went straight into production after a single wooden mockup was constructed.

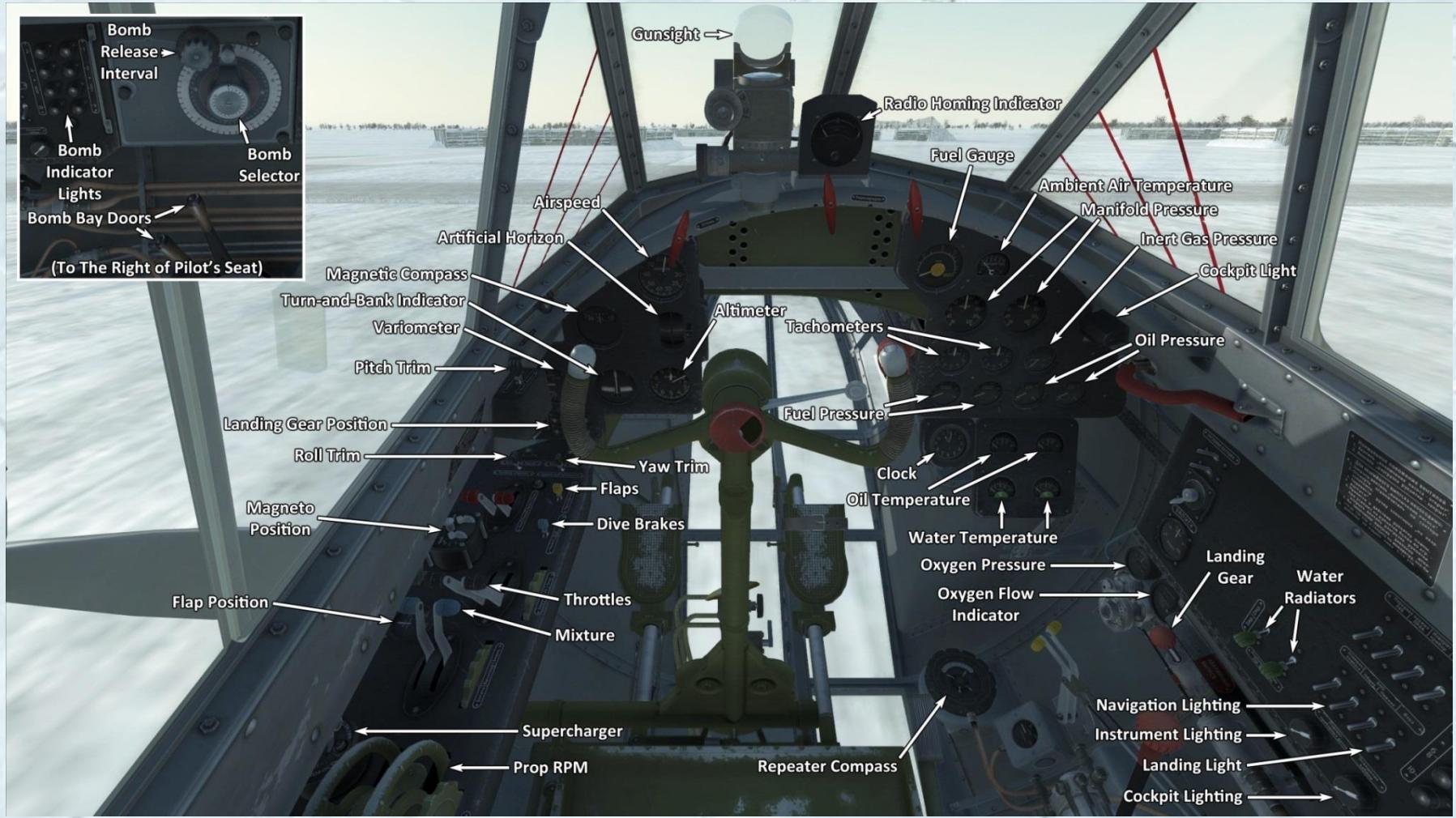
The PB-100 marked the first time a Soviet-designed aircraft made extensive use of electrically operated controls for the control surfaces, the M-105 engines, and a variety of other functions. Armament consisted of a pair of 7.62 mm ShKAS machine guns for the pilot, a single dorsal ShKAS for the navigator, and a single ventral ShKAS for the radio operator. The maximum bomb load was 1,000 kg. The name of the plane changed to Pe-2 in December 1940, and the first production plane was accepted by the military the following month. Despite some flaws in the plane's design (including the tendency to suddenly stall), the overall design was sound. Pe-2s of the first few production series could reach 540 km/h at altitude.

In April / May 1941, the Pe-2's ventral ShKAS was replaced with a 12.7 mm UBT machine gun. In addition, the pilot's starboard ShKAS was replaced with a 12.7 mm UB machine gun. By the time the war with Germany began in June, 180 Pe-2s were on hand in the five western military districts. These early Pe-2s acquitted themselves well and on several occasions were able to drive off the attacking Bf-109s without loss.

Starting in July 1941 with Series 22, the Pe-2 was fitted with M-105RA engines, which enabled improved performance at altitude. An additional ShKAS, which could be moved from one side of the fuselage to the other, was added in August. Production planes at this time started to be fitted with ten ROS-132 rocket launch rails, which proved to be a popular weapon configuration during the Battle of Moscow. Armor for the navigator and the radio operator was improved slightly, although they were still vulnerable to anything larger than a rifle-caliber cartridge. Protection for the fuel tanks was improved by injecting inert gas into the tanks as fuel was burned off.

The Pe-2's defensive armament was further improved beginning with Series 83 in early 1942, when the navigator's ShKAS began to be replaced with a 12.7 mm UBT fitted to the FT ('Front Task') gun mounting. Full-scale production of this configuration began with Series 87. The FT turret was replaced with the VUB-1 turret starting in the spring of 1942 with Series 110, which afforded the navigator better fields of fire. Another feature of Series 110 was the replacing of the RPK-2 radio direction finder with the RPK-10. Finally, throughout the summer of 1942, the M-105RA engines were modified to give a higher boost pressure. Known as the M-105RF, these engines increased the Pe-2's top speed by 16 to 21 km/h.

A.3 SOVIET BOMBERS



Pe-2 (Series 87) Cockpit

Specifications

Crew: 3; **Engine:** 2 x Klimov M-105RF inline, 1,210 hp; **Propeller System:** manually controlled constant-speed; **Armament:** 1 x 7.62 mm ShKAS and 1 x 12.7 mm UB nose-mounted machine guns; 1 x 12.7 mm UBT dorsal-mounted machine gun; 1 x 12.7 mm UBT ventral-mounted machine gun, and 1 x 7.62 mm ShKAS fuselage-mounted machine gun; up to 1,000 kg in bombs; 10 ROS-82 rockets; **Adjustable Trim:** pitch, roll, and yaw; **Tailwheel:** non-lockable

Engine Operating Parameters

Max Continuous Power: 2,700 rpm at 1,050 mmHg
Water Temperature: manually controlled; keep between 60 – 110 °C

Oil Temperature: fixed-position shutters; keep between 60 – 110 °C
Supercharger: two-speed manual; switch gears at 2,300 m



Focke-Wulf Fw-190 A-3

The development of the Fw-190 had its origins in a request issued by the German Air Ministry (*RLM*) in the fall of 1937 for a second fighter design to supplement the Bf-109, which was entering service at the time. Although there were those in both the *RLM* and the Luftwaffe Operations Staff who felt there was no need for a second fighter design, the *RLM* was concerned about future foreign designs outclassing the Bf-109; as such, it wanted to have new aircraft under development which could meet these potential challenges. In response to the *RLM*'s request, Kurt Tank initially presented a number of designs, most of which were liquid-cooled. However, the *RLM*'s interest was not roused until Tank presented the initial Fw-190 design in 1939, which was powered by the BMW 139 radial engine. The use of a radial engine meant the new design would not compete with the Bf-109 for the DB 601 engine, which was already in somewhat short supply.

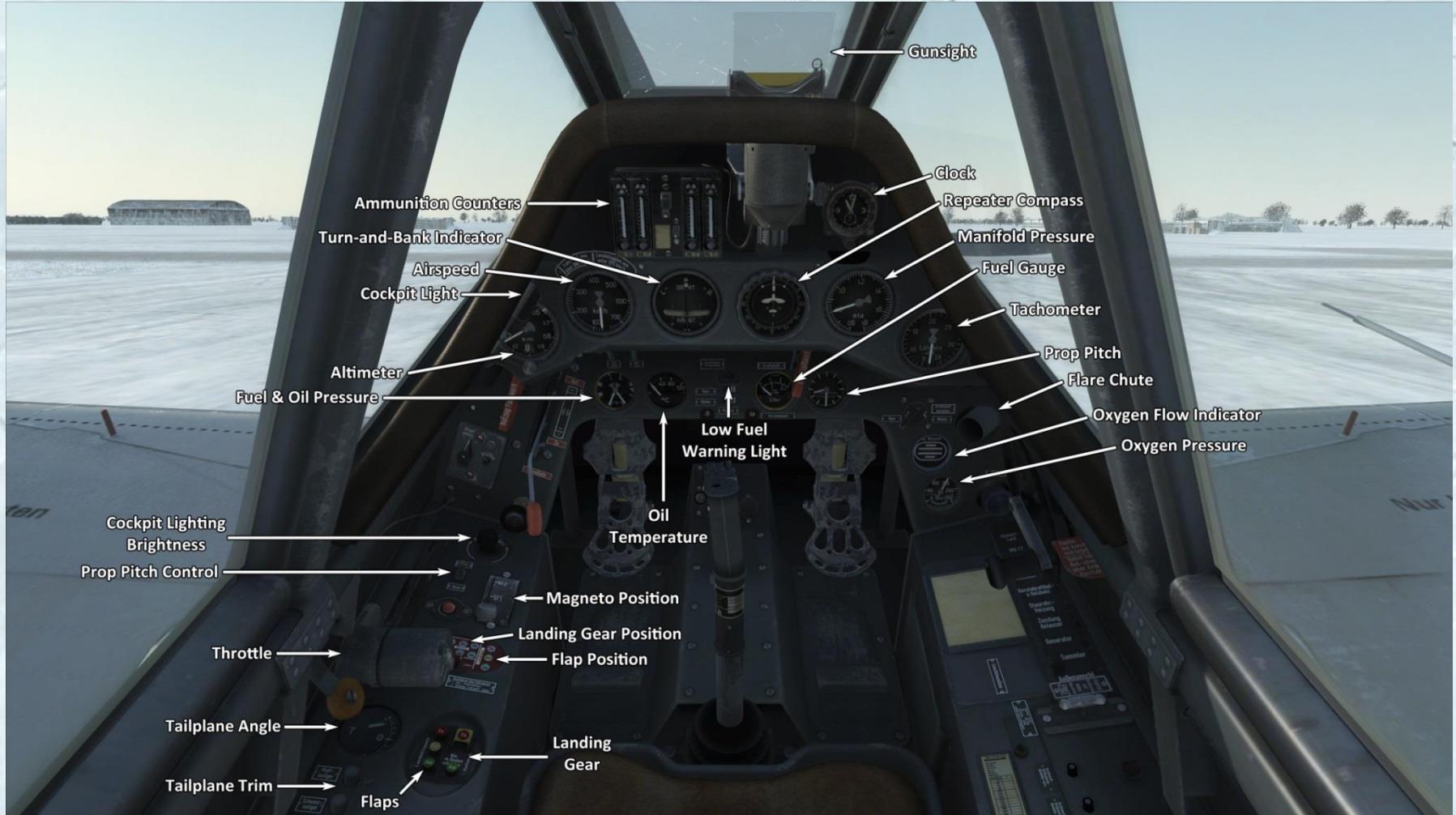
Besides its radial engine, the Fw-190 was designed with a number of other features which made it different than most other contemporary European fighter designs. For one, instead of cables and pulleys, pushrods and bearings were used to operate the plane's control surfaces. Another unique feature of the design was the extensive use of electrically-powered equipment. The Fw-190's armament was loaded and fired electrically, and starting with the third prototype, the landing gear was also operated electrically. Finally, starting with the V5 prototype (which introduced the BMW 801 engine), the *Kommandogerät* (command device) was fitted. This device, which was essentially an electro-mechanical computer, controlled the engine's mixture, propeller pitch, boost, and magneto timing, thus reducing the pilot's workload to simply moving the throttle control.

While the Fw-190 made its combat debut on the Western Front in the fall of 1941, it was not until one year later that it saw its first action in the East, in the form of the A-3 model. With this particular variant, the 1,677-horsepower BMW 801 D-2 engine was introduced. The fitting of this engine required the use of 100 octane C3 fuel, as opposed to the 87 octane B4 fuel used with the BMW 801 C engine. As with the A-2, the standard armament consisted of two 7.92 mm MG 17 machine guns fitted above the engine, two 20 mm MG 151/20E cannons fitted in the wing roots, and two 20 mm MG FF/M cannons fitted outboard of the MG 151/20s. The A-3 model was also the first variant that could be configured as a fighter-bomber. Known as the Fw-190 A-3/U3, this version could carry either up to 500 kg in bombs or a 300 liter drop tank beneath the fuselage. The U3 variant also dispensed with the MG FF/M cannons.

On the Eastern Front, I./JG 51 was the first unit to take the Fw-190 A-3 into action, when it was sent to help reinforce *Luftflotte 1* southeast of Leningrad in early September 1942. JG 51's III. Gruppe and its HQ elements would join I./JG 51 as the next Eastern Front units to be outfitted with the Fw-190 A-3 the following December.

In many ways, the Fw-190 was an ideal fighter for the Eastern Front. While it was out-climbed by the Bf-109 G, the Fw-190 was faster at altitudes below 3,500 meters, where most air combat on the Eastern Front took place. Pilots who flew both the Bf-109 and Fw-190, such as Heinz Lange, noted the Fw-190's superior ability to sustain battle damage and its superior armament, the latter of which made it an ideal IL-2 hunter. Additionally, the Fw-190's widely-spaced landing gear offered excellent stability on the often primitive landing strips of the Eastern Front. In all, 910 A-2 and A-3 models (records make no real distinction between the two) were built.

A.4 GERMAN FIGHTERS



Fw-190 A-3 Cockpit

Specifications

Crew: 1; **Engine:** 1 x BMW 801 D-2 radial, 1,730 hp; **Propeller System:** automatically controlled variable-pitch with manual override; **Armament:** 2 x 7.92 mm MG 17 cowling-mounted machine guns and 2 x 20 mm MG 151/20E wing-mounted cannons (armament can be supplemented with 2 x 20 mm MG FF/M wing-mounted cannons); up to 500 kg in bombs; **Adjustable Trim:** horizontal stabilizer; **Tailwheel:** lockable

Engine Operating Parameters

Max Continuous Power: 2,300 rpm at 1.2 ata

Combat Power: 2,400 rpm at 1.32 ata; 30-minute continuous usage limit

Emergency Power: 2,700 rpm at 1.42 ata; 3-minute continuous usage limit

Oil Temperature: automatically controlled; keep between 25 – 85 °C



Messerschmitt Bf-109 F-4

The Bf-109 F-series – development of which began in 1939 – marked the second major redesign of the Bf-109. Among the first changes Messerschmitt made was to fit the 1,332-horsepower Daimler-Benz DB 601 E to two Bf-109 E-1 airframes. Starting with the V23 prototype, the Bf-109 was fitted with new, semi-elliptical wings, which became the standard wing design for all future Bf-109 variants. The V24 prototype featured a newly-designed supercharger air intake and a deeper, more streamlined oil cooler beneath the cowling; these changes were also incorporated into Bf-109 series production.

A number of other aerodynamic improvements were made to the Bf-109 F. The propeller spinner, which was adapted from the Me 210, was larger and blended smoother into the new engine cowling. The new propeller had its pitch changed electrically and was regulated by a variable-pitch unit, although the pilot could still manually override the pitch settings. A redesign of the rudder improved its effectiveness and reduced the need to apply right rudder on takeoff to counteract the effect of the torque from the engine and propeller. The bracing struts were removed from the horizontal tailplanes, and a semi-retractable tailwheel was fitted. All of these improvements allowed the Bf-109 F to reach a maximum range of 1,700 km with an external drop tank, a nearly 400-kilometer improvement over a similarly-equipped Bf-109 E-7.

As the Bf-109 F was rushed into production, a number of critical problems were found only once the planes were sent into combat. One such flaw was with the wings, which could wrinkle or break away at high speeds. A second problem was with the tail structure, which also could break away due to oscillations in the tailplane spar overlapping with harmonic vibrations from the engine. The wing problem was solved by fitting thicker wing skins and reinforced wing spars, while the tail issue was fixed by reinforcing the entire structure.

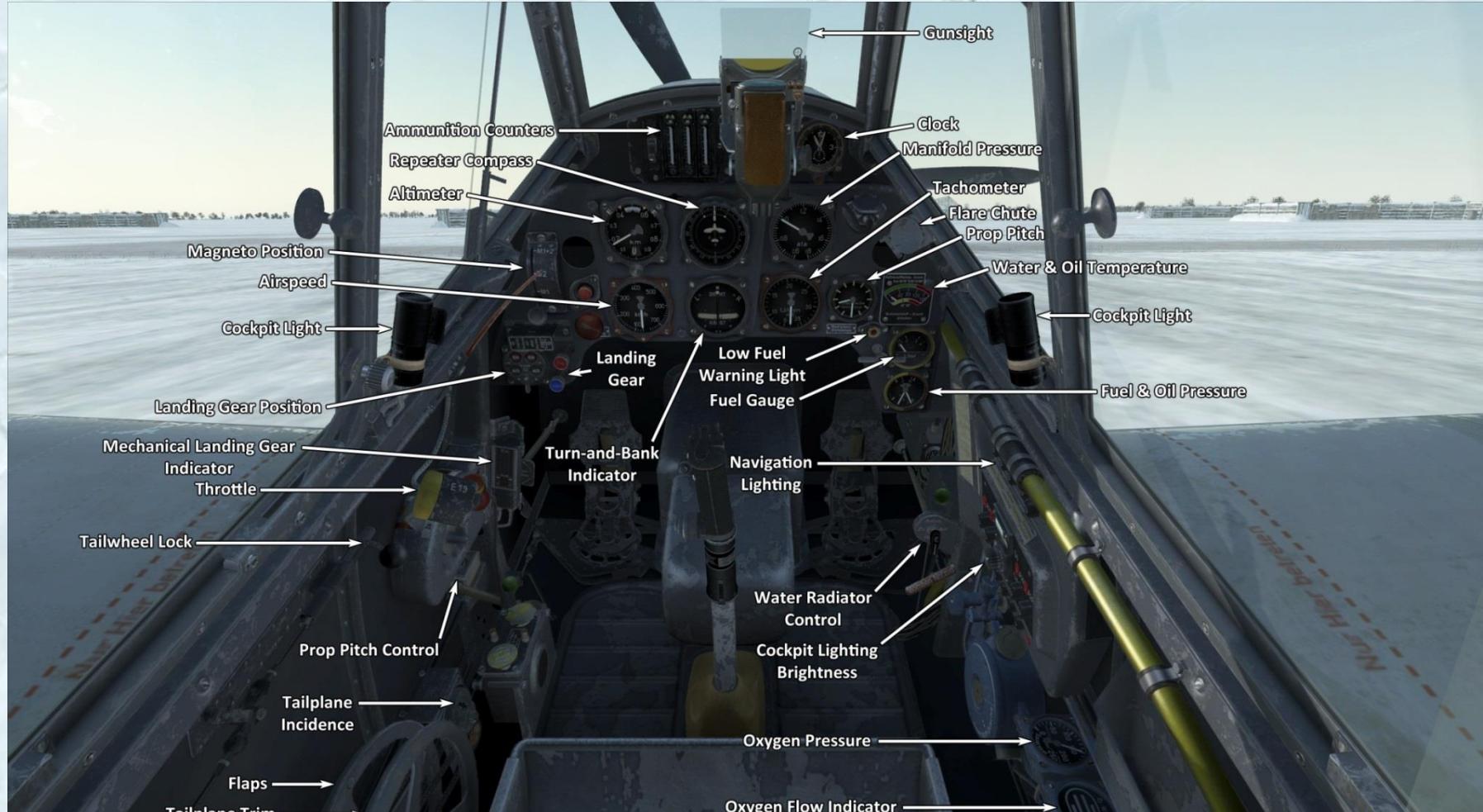
As the DB 601 E was not available in quantity when the Bf-109 F went into production, the F-0 through F-2 variants were fitted with the 1,159-horsepower DB 601 N. The F-4, in production from May 1941 to May 1942, featured as its standard armament a single 20 mm MG 151/20 cannon which fired through the propeller hub and a pair of 7.92 mm MG 17 machine guns which fired through the propeller arc. As opposed to the 15 mm MG 151/20 cannon of the F-2, the MG 151/20 could fire the Minengeschoß ("mine shell") high-explosive round.

Once the wing and tail unit problems were solved, German pilots generally agreed the F series was the best-handling of all Bf-109 variants. The F-4 was sent to the Eastern Front in mid-1941, where it gradually replaced the Bf-109 F-2. Along with the G series 109, the F-4 was viewed as being superior to any Soviet fighter design well into 1942.

For ground attack work, the Bf-109 F-4 could carry one 250 kg bomb or four 50 kg bombs beneath the fuselage. In order to better deal with the Il-2's heavy armor, a pair of 15 mm MG 151 or 20 mm MG 151/20 cannons were fitted to the wings of a small number of F-4s, starting in mid-1942; this variant was known as the Bf-109 F-4/R1. According to Soviet tests, the potential probability of a 20 mm gondola-armed Bf-109 shooting down an Il-2 was 75 percent.

Bf-109 F-4s served on the Eastern Front with the Luftwaffe well into 1942, until they were gradually replaced by G series 109s. Some of these F-4s were eventually handed off to Slovak and Hungarian units. In all, 1,841 F-4s of all types were built.

A.4 GERMAN FIGHTERS



Bf-109 F-4 Cockpit

Specifications

Crew: 1; **Engine:** 1 x Daimler-Benz DB 601 E inline, 1,350 hp; **Propeller System:** automatically controlled variable-pitch with manual override; **Armament:** 2 x 7.92 mm MG 17 cowling-mounted machine guns and 1 x 20 mm MG 151/20 nose-mounted cannon (armament can be supplemented with 2 x 15 mm MG 151 wing-mounted gunpods or 2 x 20 mm MG 151/20 wing-mounted gunpods); up to 250 kg in bombs; **Adjustable Trim:** horizontal stabilizer; **Tailwheel:** lockable

Engine Operating Parameters

Max Continuous Power: 2,300 rpm at 1.15 ata

Combat Power: 2,500 rpm at 1.3 ata; 30-minute continuous usage limit

Emergency Power: 2,700 rpm at 1.42 ata; 1-minute continuous usage limit

Water Temperature: automatically controlled with manual override; do not exceed 110 °C

Oil Temperature: automatically controlled; keep between 20 – 85 °C



Messerschmitt Bf-109 G-2

The G-series Bf-109 was a further development of the F-series design. Although the airframe of the early Bf-109 Gs was largely the same as the F-series airframe, there were a number of differences between the two series of aircraft. New features introduced to the Bf-109 G included reinforced wings, the use of heavier welded framing for the cockpit plexiglass, and additional armor for the fuel tank. The bulletproof windscreens, which was an external attachment on F-series aircraft, was now an internal part of the canopy. It was intended to fit a pair of small doors to the wheel wells which would cover the outer part of the main landing gear wheels when retracted, but this feature was dropped and only reintroduced with the Bf-109 K-4.

The engine fitted to early-production Bf-109 Gs was the newly-designed Daimler-Benz DB 605 A inline engine. Possessing greatly increased displacement and compression ratio values when compared to the DB 601 series of engines, the DB 605 A could generate 1,455 horsepower with 1.42 ata manifold pressure. However, as there were reliability problems with the DB 605 A during its first year of production, the power output of the engine was initially limited to 1,292 horsepower and 1.3 ata manifold pressure. This restriction was not lifted until early June 1943; even so, the G-2 could reach 660 km/h at 7,000 meters with this constraint. Even with all of the changes incorporated into the Bf-109 G series, the G-2 variant was only some 185 kilograms heavier than the Bf-109 F-4.

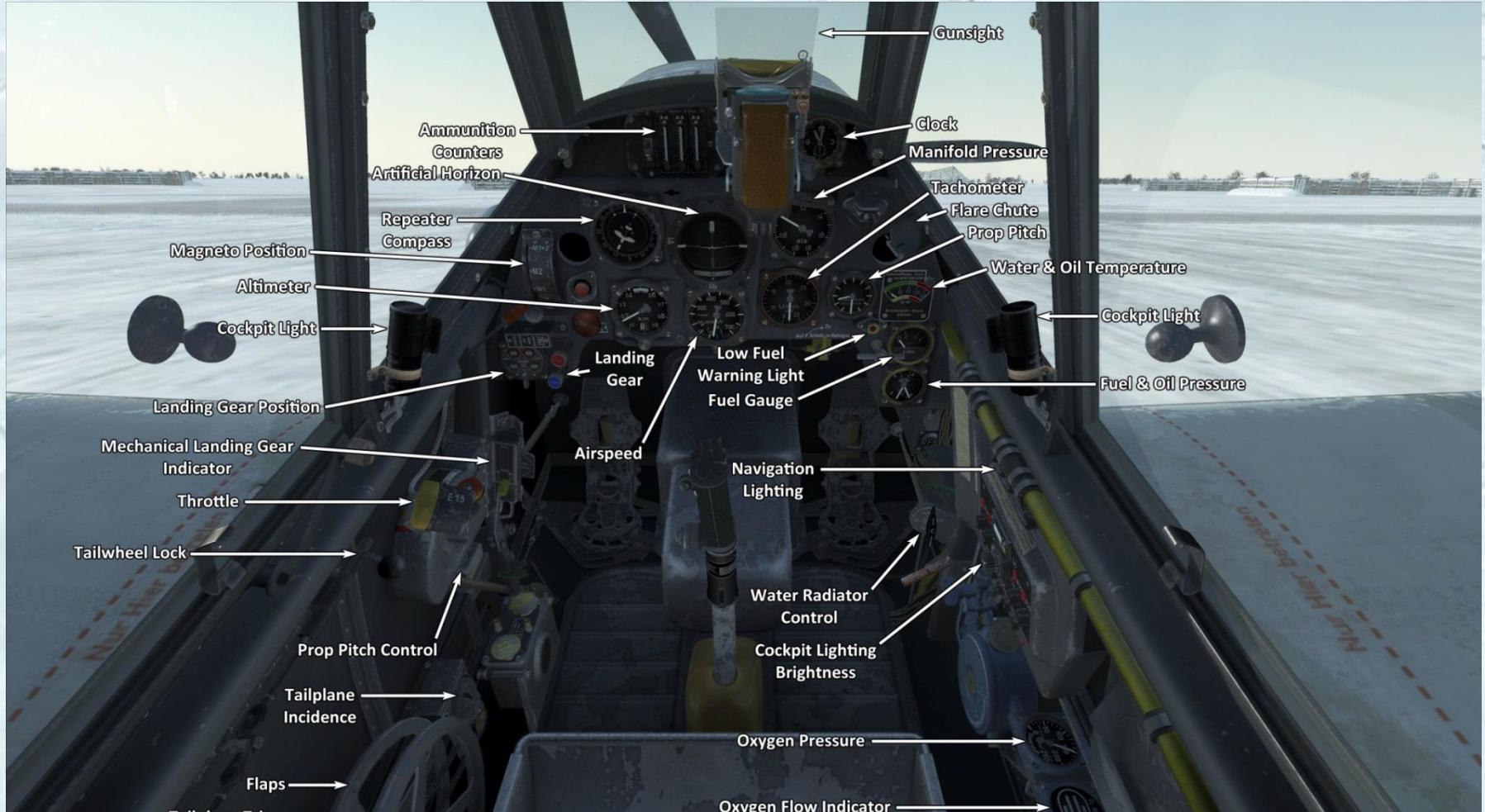
In comparison to the Bf-109 G-1, the G-2 model was built without cabin pressurization and the high-altitude GM-1 boost installation. The canopy glazing reverted to the single-layer design, and the angled head armor as seen on the F-4 was incorporated into the pilot's seat. Some Bf-109 G-2s were fitted with a transparent armored headrest which afforded the pilot a much-improved rearward field of view. As with the F series, the G-2 could carry a 300-liter drop tank beneath the fuselage, or for ground attack work it could carry one 250 kg bomb or four 50 kg bombs under the fuselage. Finally, as with the F-4, a pair of 20 mm MG 151/20 gondola cannons could be fitted underneath the wings. Known as the Bf-109 G-2/R6, an aircraft armed as such was estimated by the Soviets as having a 75-percent chance of shooting down an Il-2 in one attack from the rear.

Delivery of the Bf-109 G-2 to the Eastern Front began in July 1942, where it began to replace the F-2 and F-4. These first planes were sent to JG 52 and I./JG 53 in the southern combat zone and to JG 54 in the northern combat zone. By the end of 1942, most of JG 3 was also equipped with the Bf-109 G-2. Thus, by late 1942, the Bf-109 G-2 had become the German fighter force's standard fighter on the Eastern Front, with its performance making it superior to any other fighter aircraft in service at the time.

Once the Stalingrad airlift operation commenced, Bf-109 G-2s were tasked with escorting the Ju 52s assigned to resupply the surrounded the German 6th Army by air. For this task, Major Wolf-Dietrich Wilcke, commander of German fighter forces in the Stalingrad area, divided his Bf-109 units into 'deliverers' and 'receivers.' Stationed mostly outside the Stalingrad cauldron, the 'deliverers' escorted the transport planes as far as Stalingrad, where they were handed over to the 'receivers' of *Platzschutstaffel* Pitomnik. These operations continued until the 17th of January 1943, when Pitomnik airfield was captured by the Soviets.

1,586 Bf-109 G-2s were built between May 1942 and February 1943. In addition to the Germans, the type was also flown during the war by Bulgaria, Finland, Hungary, and Romania.

A.4 GERMAN FIGHTERS



Bf-109 G-2 Cockpit

Specifications

Crew: 1; **Engine:** 1 x Daimler-Benz DB 605 A inline, 1,310 hp at 1.3 ata (1,475 hp at 1.42 ata); **Propeller System:** automatically controlled variable-pitch with manual override; **Armament:** 2 x 7.92 mm MG 17 cowling-mounted machine guns and 1 x 20 mm MG 151/20 nose-mounted cannon (armament can be supplemented with 2 x 20 mm MG 151/20 wing-mounted gunpods); up to 250 kg in bombs; **Adjustable Trim:** horizontal stabilizer; **Tailwheel:** lockable

Engine Operating Parameters

Max Continuous Power: 2,300 rpm at 1.15 ata

Combat Power: 2,600 rpm at 1.3 ata; 30-minute continuous usage limit

Water Temperature: automatically controlled with manual override; do not exceed 110 °C

Oil Temperature: automatically controlled; keep between 30 – 85 °C

A.4 GERMAN GROUND ATTACK PLANES



Junkers Ju-87 D-3

The D-series Ju-87 Stuka (short for *Sturzkampfflugzeug*, or “dive bomber”) was the successor to the B-series Ju-87. The Ju-87 B had proven to be highly vulnerable to enemy fighters during the Battle of Britain, and the appearance of newer and faster Soviet fighters in the summer of 1941 made it even clearer that a replacement for the Ju-87 B was needed. The original plan was to terminate Ju-87 production by the end of 1941, and in fact, production was very low in the latter months of the year. However, as there were no adequate replacement aircraft available and due to the critical situation on the Eastern Front, the German Air Ministry was compelled to reinstate Ju-87 production – in the form of the Ju-87 D – in January 1942.

Many aerodynamic changes were introduced to the Ju-87 D to improve the type’s performance. The water radiators were positioned under the inboard sections of the wings, and the oil cooler was moved to the position formerly occupied by the water radiator. Changes were also made to the cockpit to improve aerodynamics and to provide more visibility and space for the crew. Power for the Ju-87 D came in the form of the inline Jumo 211 J, which could provide 1,400 horsepower. Even so, the Ju-87’s main weakness – its slow speed – remained a problem.

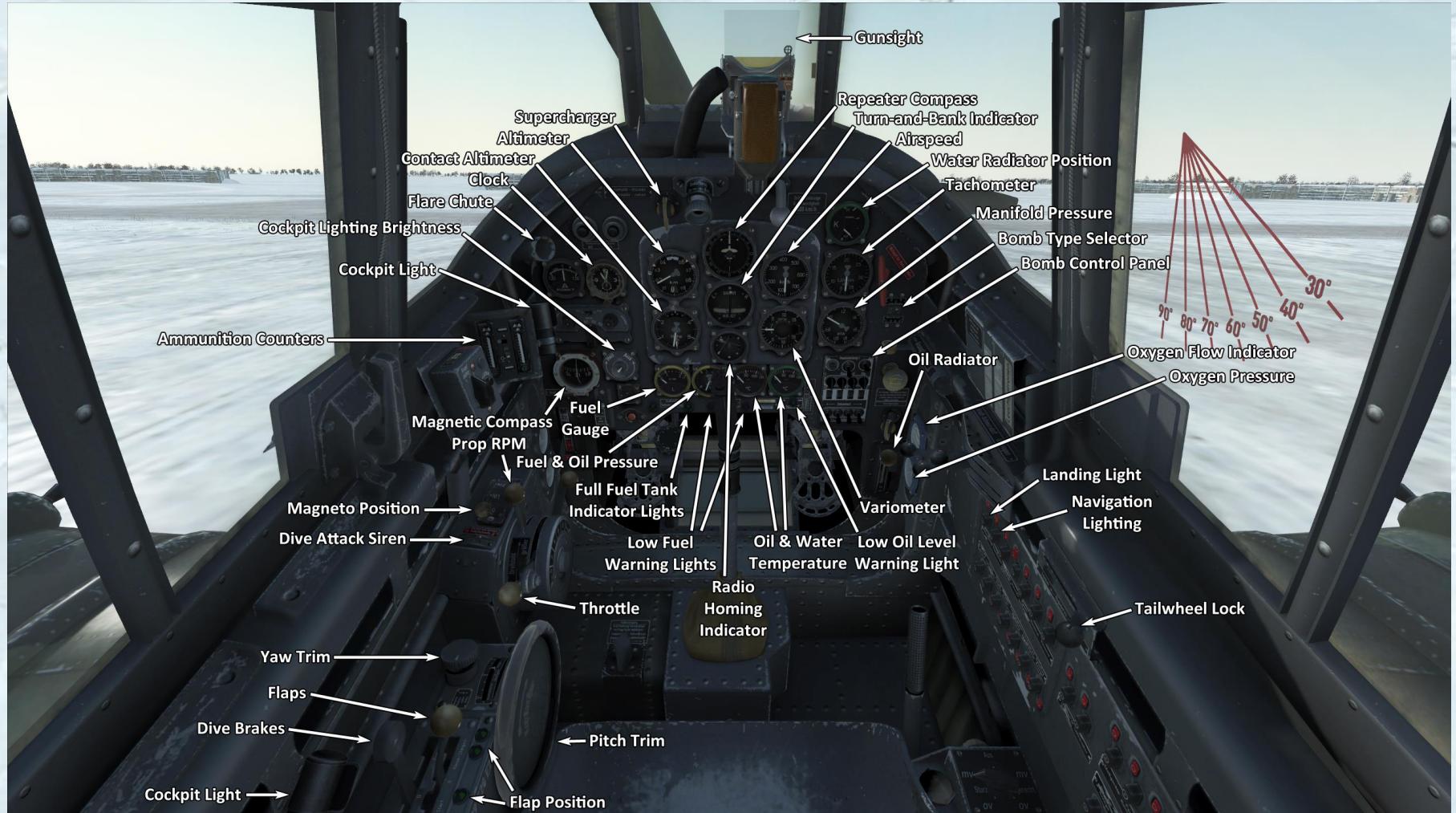
To help improve the Ju-87 D’s survivability, the rear gun turret was now fitted with a twin-barrel 7.92 mm MG 81Z machine gun, and the plane’s armor was increased. The forward-firing armament of two 7.92 mm MG 17s remained unchanged. While B-series Ju-87s could carry a maximum of 500 kg of bombs, the Ju-87 D could carry up to up 1,800 kg of bombs (in an overload condition with a reduced fuel load; the typical bomb load for a Ju-87 D was anywhere from 500-1,200 kg). Finally, internal fuel capacity was increased to 800 liters, which gave the Ju-87 D a flight time of 2 hours and 15 minutes.

For the Ju-87 D-3, the plane’s armor was increased even more for the type’s ground attack role. Some D-3s were fitted with a pair of “Jericho trumpet” propeller-driven dive sirens, which were an attempt to degrade enemy morale while the plane was in its dive towards the target. However, these devices were gradually removed from frontline planes starting sometime in 1942, as the increased drag caused a loss of about 20-25 km/h in airspeed, and by this stage in the war the shock effect they had on the enemy was largely diminished.

In addition to carrying bombs, the Ju-87 D could be fitted with a variety of armament for low-level ground attack missions. In one such configuration, a 7.92 mm WB 81B “watering can” gunpod could be fitted under each wing; each of these gunpods carried three MG 81Z machine guns. Beginning in late 1942, conversion of the Ju-87 D into a specialized anti-tank variant began. Armed with two 37 mm BK 3.7 gunpods, the first flight of a Ju-87 D-1 armed as such took place at the end of January 1943. This armament configuration – which also saw the dive brakes removed – led to the Ju-87 G series. A number of Ju-87 D-1 and D-3 aircraft converted to carry the BK 3.7 cannon were committed to the Battle of Kursk in July 1943, in addition to a small number of G-series planes.

Delivery of the Ju-87 D to frontline units began in early 1942. Although the type was not much faster than its predecessors, the pilots who flew it received it with much enthusiasm and praised its easy handling characteristics. By the time production of the Ju-87 D-3 ceased in 1944, a total of 1,559 had been built. In addition to the Germans, the Ju-87 D-3 was also operated during the war by Italy, Hungary, and Romania.

A.4 GERMAN GROUND ATTACK PLANES



Ju-87 D-3 Cockpit

Specifications

Crew: 2; **Engine:** 1 x Junkers Jumo 211 211 J inline, 1,420 hp; **Propeller System:** manually controlled constant-speed; **Armament:** 2 x 7.92 mm MG 17 wing-mounted machine guns (MG 17s can be supplemented with 2 x 7.92 mm WB 81B wing-mounted gunpods or replaced with 2 x 37 mm BK 3.7 wing-mounted cannons) and 1 x 7.92 mm MG 81Z rear turret-mounted machine gun; up to 1,800 kg in bombs; **Adjustable Trim:** pitch and yaw; **Tailwheel:** lockable

Engine Operating Parameters

Max Continuous Power: 2,250 rpm at 1.15 ata

Climb Power: 2,400 rpm at 1.25 ata; 30-minute continuous usage limit

Takeoff Power: 2,600 rpm at 1.42 ata; 30-second continuous usage limit

Water Temperature: manually controlled; keep between 40 – 110 °C

Oil Temperature: manually controlled; keep between 60 – 105 °C

Supercharger: two-speed automatic; can be manually set to 1st gear below 2,900 m



Heinkel He-111 H-6

Of all types of He-111s produced before and during World War II, the He-111 H variant was built in more numbers and saw more combat than any other version built. The He-111 H was a derivative of the Daimler-Benz DB 601 A – powered He-111 P variant, the latter of which had entered large-scale production in 1938. However, as there was uncertainty regarding the delivery of DB 601 engines, it was decided to switch to the Junkers Jumo 211 engine before the outbreak of the war. This change in power plant marked the beginning of H-series development. Beginning with the H-4 model and ending with the H-14, all changes introduced to the He-111 H variant were essentially modifications of the H-3 version.

Construction of the He-111 H-6, which was a further development of the H-4 version, began in 1941, with the He-111 V25 serving as the prototype model. The engines were upgraded to the 1,300-horsepower Jumo 211 F-1; this engine model was replaced in later H-6 production by the 1,340-horsepower Jumo 211 F-2. Both of these engine types featured Junkers VS 11 constant-speed propellers, automatic turbocharger activation, and automatic mixture control.

The defensive armament for the He-111 H-6 consisted of one or two 7.92 mm MG 15 machine guns in the nose, a single MG 15 in the dorsal position, two MG 15s in the gondola, and two MG 15s to the left and right of the radio equipment in the fuselage. Occasionally, a 20 mm MG FF/M cannon was fitted in the nose position for strafing missions; this same cannon was also sometimes fitted in the forward-firing gun position of the gondola. A remotely-fired 7.92 mm MG 17 was also sometimes installed in the tail. Armor protection for the crew was also improved.

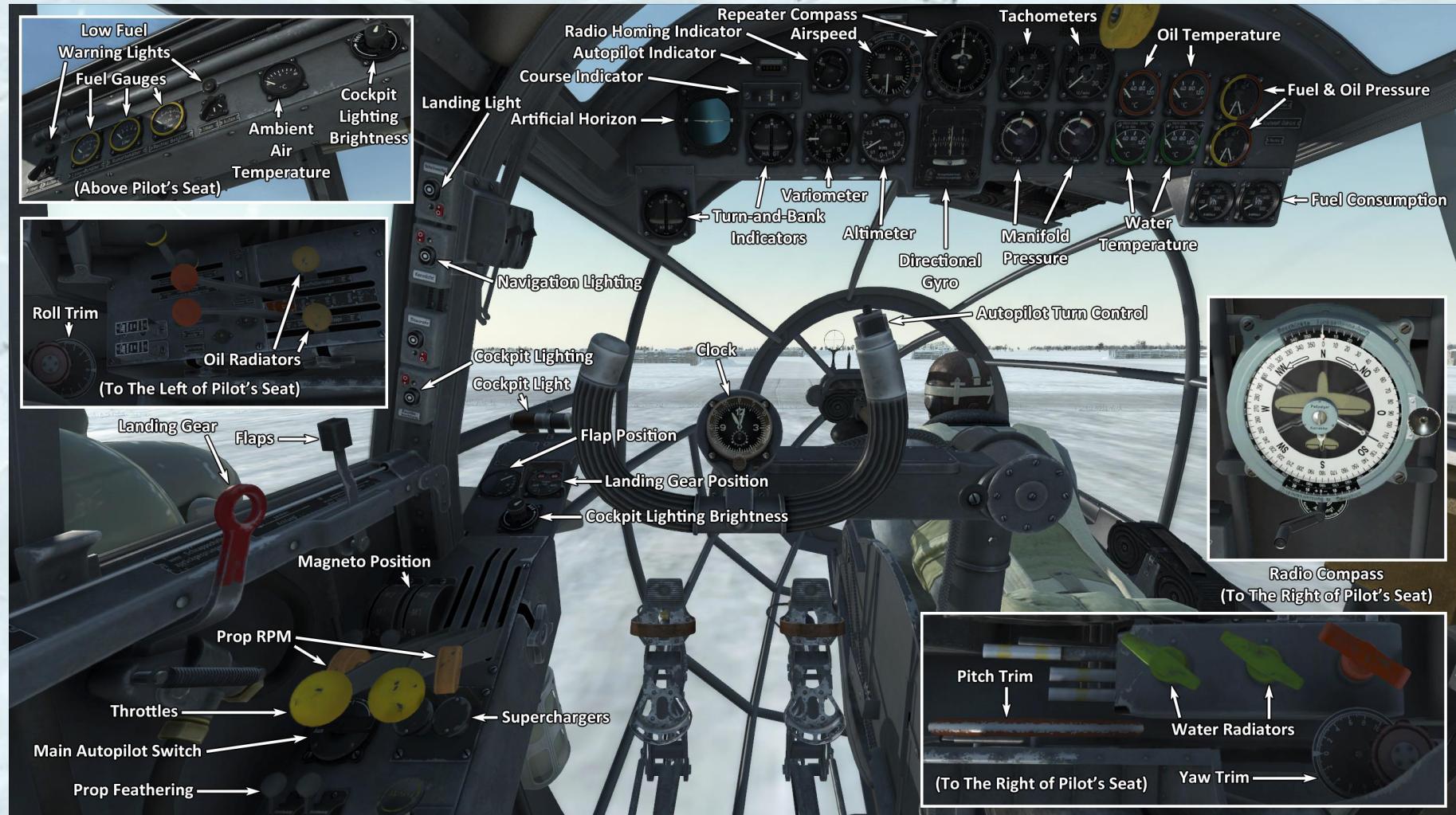
As with the H-4, the He-111 H-6 could carry up to 2,000 kg of bombs in standard configuration. To carry the heaviest bomb loads (including those putting the plane in an overload configuration), the first 500 planes were fitted with one ETC 2000 bomb rack and one PVC 1006 bomb rack; the PVC 1006 bomb rack was replaced with an ETC 2000 bomb rack starting with the 501st plane built. As an alternative, four SC 250 or 16 SC 50 bombs could be carried in the bomb bay and a single large-caliber bomb carried below the fuselage on an ETC 2000 bomb rack. The H-6 could also be armed with two LT-5b aerial torpedoes or with LMA & LMB aerial mines.

The He-111 H-6 entered service in late 1941. Along with the later H-16, the H-6 was the largest-distributed aircraft amongst the Luftwaffe's horizontal bomber units, seeing service with nearly every German bomber wing. The majority of bomber units that flew the H-6 were situated on the Eastern Front, including KG 1, KG 4, KG 26, KG 53, KG 55, and KG 100 (the former *Kampfgruppe* 100). KG 26 operated the H-6 as a torpedo bomber over the North Sea, the Baltic Sea, the Mediterranean, and the Black Sea before it converted to the Ju 88 torpedo bomber.

Although it was regarded as being a bit slow, the He-111 H-6 proved to be a popular plane amongst its flight crews for its excellent handling characteristics and ability to withstand damage. In addition to its roles as a bomber, torpedo bomber, and minelayer, the H-6 was used to fly in supplies to surrounded German troops in places such as Kholm, Demyansk, and Stalingrad and to help evacuate military personnel from these same locations. In a number of cases, the H-6 was also used to attack railway targets.

With 1,800 built between 1941 and 1942, the H-6 was the most-produced version of the He-111 H series. In addition to the Luftwaffe, the H-6 saw wartime service with Hungary and Romania.

A.4 GERMAN BOMBERS



He-111 H-6 Cockpit

Specifications

Crew: 5; **Engine:** 2 x Junkers Jumo 211 F-2 inline, 1,340 hp; **Propeller System:** manually controlled constant-speed; **Armament:** 1 x 7.92 mm MG 15 nose-mounted machine gun, 1 x 7.92 mm MG 15 dorsal-mounted machine gun; 2 x 7.92 mm MG 15 gondola-mounted machine guns, and 2 x 7.92 mm MG 15 fuselage-mounted machine guns (nose-mounted MG 15 and rear-facing gondola-mounted MG 15 can each be replaced with 1 x 20 mm MG FF/M cannon); up to 3,500 kg in bombs; **Adjustable Trim:** pitch, roll, and yaw; **Tailwheel:** non-lockable

Engine Operating Parameters

Max Continuous Power: 2,250 rpm at 1.15 ata

Climb Power: 2,400 rpm at 1.25 ata; 30-minute continuous usage limit

Takeoff Power: 2,600 rpm at 1.42 ata; 30-second continuous usage limit

Water Temperature: manually controlled; keep between 40 – 110 °C

Oil Temperature: manually controlled; keep between 60 – 105 °C

Supercharger: two-speed automatic; can be manually set to 1st gear below 2,900 m

Credits

Author and Design

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This User Manual is dedicated to all in the IL-2 community. Thank you for your support. We hope you find this manual useful. Future revisions and additions will follow.



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