



A6M5 ZERO

USER GUIDE

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TABLE OF CONTENTS

INTRODUCTION

AIRCRAFT FEATURES A1-2

SYSTEM REQUIREMENTS A2-1

INSTALLATION

POST INSTALLATION TASKS A2-5

UPDATING YOUR AIRCRAFT A2-5

MICROSOFT UPDATES A2-6

UNINSTALLING A2-6

OVERVIEW

INTRODUCTION TO THE A6M ZERO A3-1

SIDEBAR: WHAT'S IN A NAME? A3-3

DEVELOPMENT OF THE ZERO

SIDEBAR: RELIABILITY VS. WEIGHT SAVING A3-6

SIDEBAR: A DEBATE OVER... EVERYTHING! A3-7

OPERATION

AIRCRAFT SYSTEMS AND OPERATION B1-1

CONTROL SURFACES B1-1

LANDING GEAR B1-1

BRAKES B1-1

HYDRAULIC SYSTEM B1-1

ELECTRICAL SYSTEM B1-1

FUEL SYSTEM B1-1

ENGINE CONTROLS B1-2

KEYBINDINGS B1-2

MAIN INSTRUMENT PANEL B1-3

LEFT SIDEPANEL B1-4

RIGHT SIDEPANEL B1-5

GUNSIGHT B1-6

NOTEPAD CONFIGURATOR B1-7

MSFS2024 OPTIONS B1-8

NORMAL PROCEDURES

OPERATING PROCEDURES B2-1

ON ENTERING PILOT'S COMPARTMENT B2-1

STARTING THE ENGINE B2-2

ENGINE WARM-UP B2-2

ENGINE TESTING B2-3

TAXIING B2-3

TAKE-OFF B2-3

ENGINE FAILURE ON TAKE-OFF B2-4

GENERAL FLYING CHARACTERISTICS B2-5

STALLS B2-5

PERMISSIBLE ACROBATICS B2-5

DIVING B2-6

NIGHT FLYING B2-6

APPROACH AND LANDING B2-6

STOPPING THE ENGINE B2-6

WEAPONS

OPERATING GUNS: B3-1

FAQ & TROUBLESHOOTING

CREDITS

INTRODUCTION

PRESENTING THE BLACKBIRD SIMULATIONS A6M5 ZERO

Our recreation is based on the A6M5 Model 52 Zero. We've spent countless hours of research to try and mimic the most authentic known characteristics of the aircraft, as well as to capture the feel of the aircraft as described by historical records.

We've aimed not to provide an 'arcade' version of the aircraft with fantastical performance, but one that's rooted in factual numbers and references. Our aircraft will go 'fast', but it will take skill to eke out every bit of performance. It handles light and turns sharply, but the pilot must be aware of the limitations of the aircraft and the negative effect that excessive airspeed has on handling. The Zero can go really fast, or it can handle extremely well, but it can't do both at the same time!

Control and operation of the Zero's engine and systems are designed to be fulfilling and as authentic as possible, given that the various systems must be often interpreted from vague and incomplete historical sources.

We cannot escape the fact that our aircraft exist in a simulator grounded in the modern day. The features of Microsoft Flight Simulator 2024 have been leveraged to create an immersive experience, but this means that our flights are taking place in a modern environment. Your avatar is the pilot sitting in the aircraft, and any ground crew that exist is that which the simulator provides.

At the same time, we still wanted to present an aircraft that could feasibly exist in the era in which it was produced. This means that rather than to hard-mount modern radios in the cockpit, we've opted to include a fictional handheld transceiver for communicating with ATC.

In addition, to help preserve the historical nature of the aircraft, we've included operational* armaments - you can charge and fire the weapons, with the weight of the ammunition being accounted for with every round fired.

(* The weapon firing function is not allowed in compliance with rules set out for the Microsoft Marketplace. This capability is only available in the version of the product sold through our website.)

A1-1

INTRO

INSTALLATION

OVERVIEW

OPERATION

NORMAL
PROCEDURES

WEAPONS

FAQ



INTRODUCTION

AIRCRAFT FEATURES

- Accurate flight and engine systems, with true-to-life fuel and electrical modeling
- Performance tuned to match historical references and published documents
- Custom wear and failure simulation that responds to engine mismanagement
- Custom start simulation to replicate the hand-cranked inertia starter
- Authentic replication of controls and instrumentation unique to the aircraft
- Extremely high detail 3D model with crisp, high-resolution textures
- Ten high resolution liveries with an authentic representation of wear and use
- Dynamic sound simulation that brings immersion and life to every aspect of the aircraft
- Dynamic custom visual effects for engine smoke and exhaust
- Custom drag calculations for external components that affect overall airspeed
- Custom canopy effects that respond to aircraft motion
- Custom belly-landing effects including propeller damage and custom physics
- Fuselage dirt that accumulates during ground operation
- Custom gunsight based on video references of the real instrument
- Dynamic and immersive internal and external vibration effects
- Realistic lighting effects, including select radium painted markings on the instruments
- Functional chocks that can be removed at the appropriate stage (inside the cockpit)
- External interactive behaviors including functional steps that let you climb onto the wing
- Tight integration with Microsoft Flight Simulator 2024 standards and features
- Configuration, loadout, and startup controlled via an analog menu with persistent elements
- Configurable and persistent behaviors that can scale realism to personal preferences
- Ability to toggle or reset engine failures to provide a smooth experience for all users
- Weapon simulation* with authentic interactions, weight, muzzle flash and tracer effect

(* Weapons are not able to be fired when the aircraft is purchased from the Marketplace; they are for display purposes only. Weapons do not have any effect on the simulator environment.)



A1-2

INTRO

INSTALLATION

OVERVIEW

OPERATION

NORMAL
PROCEDURES

WEAPONS

FAQ

SYSTEM REQUIREMENTS

The following requirements apply as a minimum to successfully install, configure, and operate the Blackbird A6M5 Zero.

(Please note that your choice of scenery, location, simulator settings and 3rd-party utilities may place additional demands on your simulation platform and may affect your simulator experience.)

SUPPORTED PLATFORMS:

- Microsoft Flight Simulator 2024

(NOTE: Our product is tested with, and designed to operate in, the most recent updates to the simulator; this includes all hotfixes available at date of release.)

SUPPORTED OPERATING SYSTEMS:

- Windows 10
- Windows 11

PROCESSOR (CPU):

- 3.0 GHz quad core processor required
(higher core counts and clock speeds strongly recommended.)

VIDEO CARD (GPU):

- DirectX 11/12 compliant video card with an absolute minimum of 8 GB video ram.
(16 GB VR)

SYSTEM MEMORY (RAM):

- 16 GB RAM minimum
(32 GB or greater recommended for Virtual Reality (VR).)

STORAGE:

- 6 GB or greater free disk space.

GAMING CONTROLLER:

- Joystick, yoke, or other gaming controller (a means of controlling the aircraft rudder, either with twist joystick function or dedicated pedals, is additionally recommended.)

NOTE: All Blackbird products require a minimum of one functioning gaming device such as a joystick for proper operation and control.

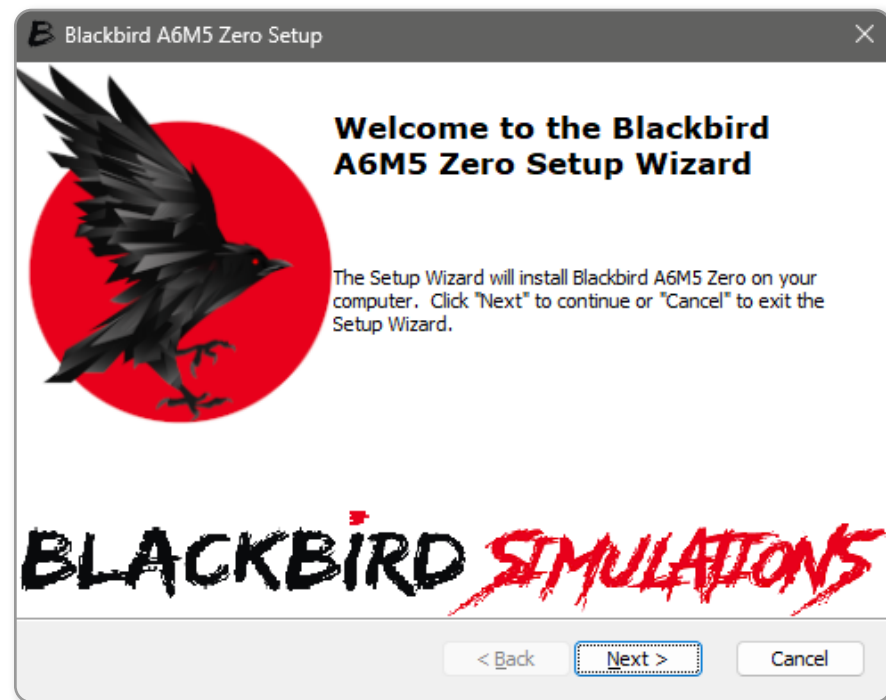
Version numbers shown in any following images may differ from the downloaded product.

INSTALLATION

IMPORTANT INFORMATION

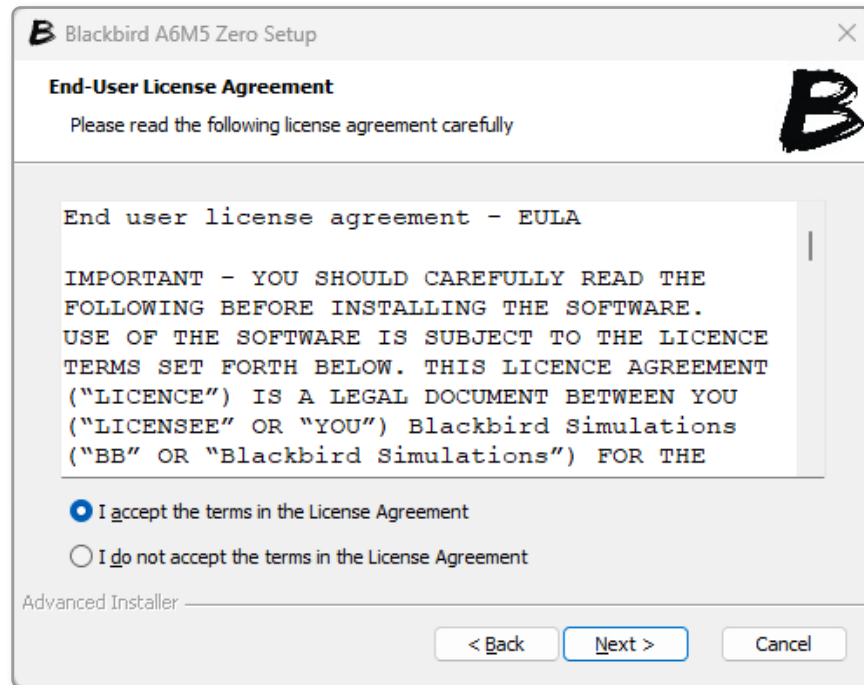
As with other flight simulator add-ons, preinstallation precautions should involve closing any open applications, as well as temporarily disabling any active antivirus software. Failure to temporarily disable antivirus software when installing may result in a nonfunctioning product and/or simulator!

After purchase, you will have been given a link or an option to download a compressed (.zip) file. This compressed file contains an executable (.exe) file, which is the installer for the Blackbird A6M5 Zero. Using the Windows File Explorer (or file compression utility of your choice) unzip this file to a location of your choosing. Once unzipped, you may begin installation by right-clicking on the executable (.exe) file, then selecting "Run as administrator". The installer will run, showing an initial welcome screen. Left click on the "Next" button to continue.



This screen will allow you to view the End User License Agreement (EULA). Please take the time to review the included details. Clicking "I Agree" at this screen will confirm your acceptance of the license agreement and will allow you to proceed to the next step of the installation.

You will then come to the Customer Information window. Fill in the fields and enter the 12-digit activation key that was included in the purchase confirmation documentation. Click Next.



Blackbird A6M5 Zero Setup

End-User License Agreement

Please read the following license agreement carefully

End user license agreement - EULA

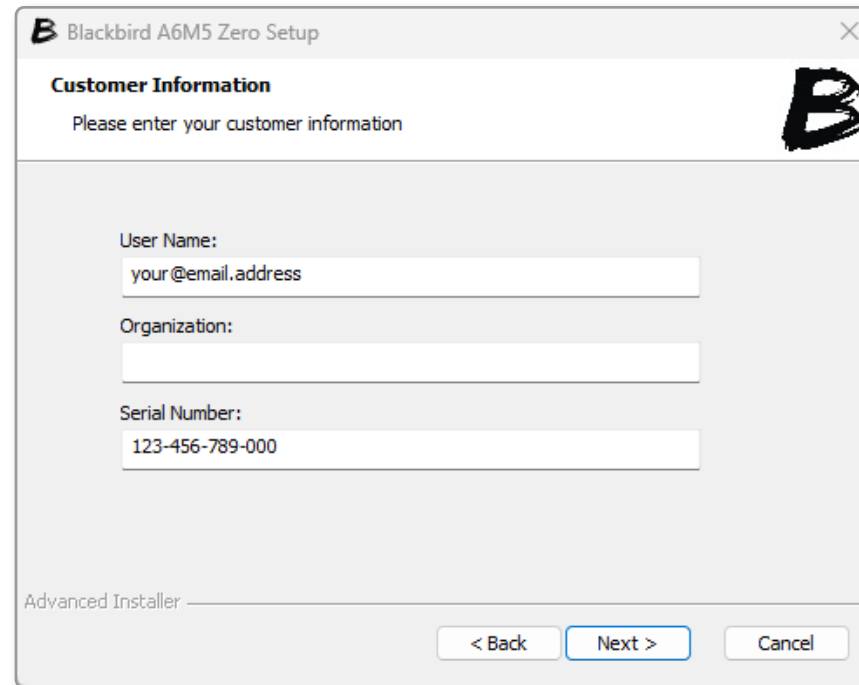
IMPORTANT - YOU SHOULD CAREFULLY READ THE FOLLOWING BEFORE INSTALLING THE SOFTWARE. USE OF THE SOFTWARE IS SUBJECT TO THE LICENCE TERMS SET FORTH BELOW. THIS LICENCE AGREEMENT ("LICENCE") IS A LEGAL DOCUMENT BETWEEN YOU ("LICENSEE" OR "YOU") Blackbird Simulations ("BB" OR "Blackbird Simulations") FOR THE

☒ I accept the terms in the License Agreement

☐ I do not accept the terms in the License Agreement

Advanced Installer

< Back Next > Cancel



Blackbird A6M5 Zero Setup

Customer Information

Please enter your customer information

User Name:
your@email.address

Organization:

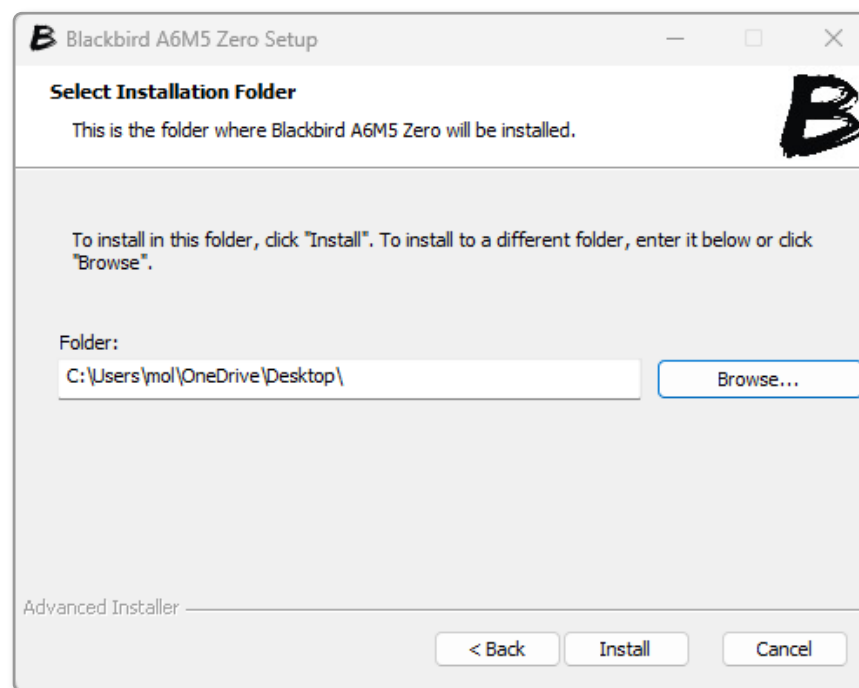
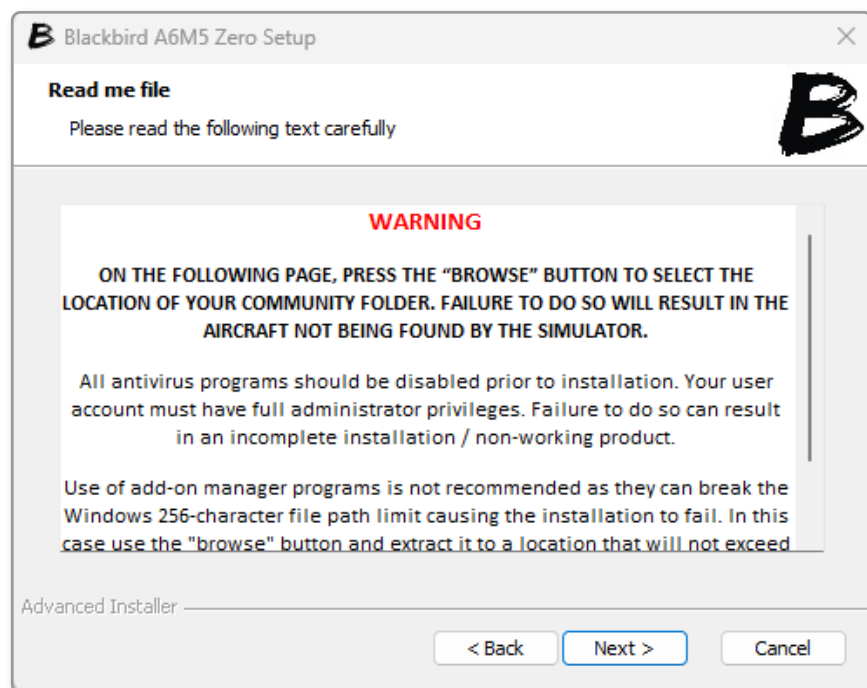
Serial Number:
123-456-789-000

Advanced Installer

< Back Next > Cancel

For an error-free installation, please take a moment to read through the important information shown on this 'Read me' screen. Click Next.

In the current iteration of MSFS2024, our installer is not always able to find the Community folder automatically. If your Community folder cannot be automatically located (typically due to re-installing MSFS to another location/ drive), or if you have a custom installation path, "browse" to the correct location. Please verify the correct path to your "community" folder before clicking the "Install" button.



If all else fails, install to your desktop and then copy the Zero folder to your Community folder.

A quick way to find your Community folder from within MSFS2024 is to click on the Marketplace tab, and then go to My Library where at the top-right you will see a search box and just next to it, the Settings cogwheel. Click on the cogwheel to reveal the location of your Community folder.

INSTALLATION

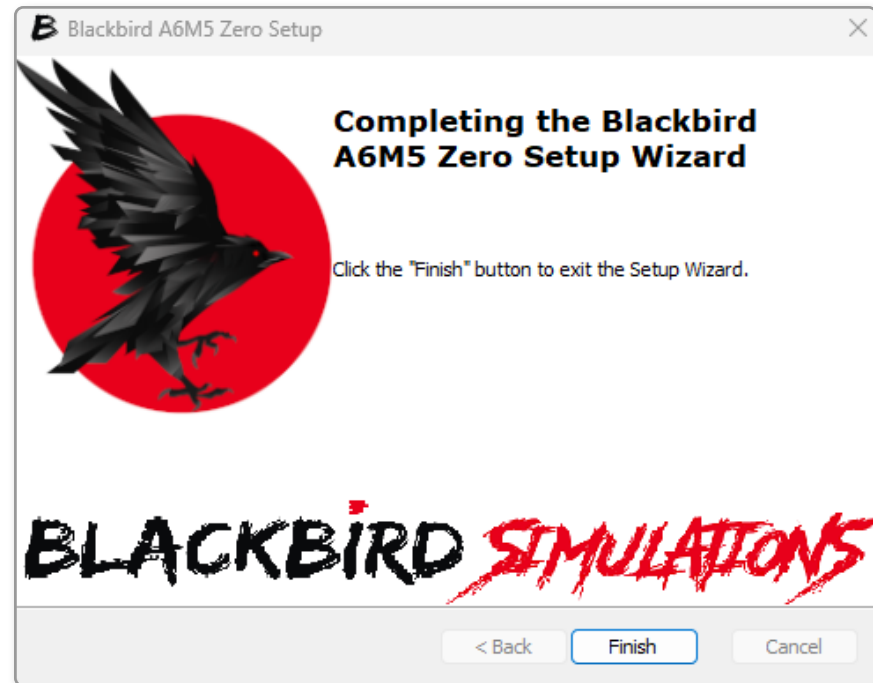
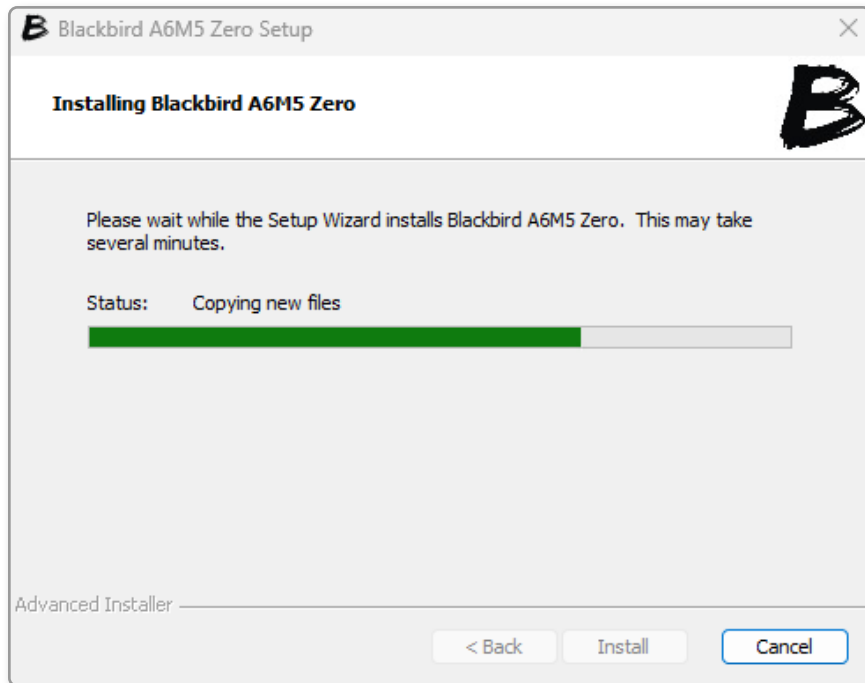
A2-4

INTRO
INSTALLATION
OVERVIEW

OPERATION
NORMAL
PROCEDURES
WEAPONS

FAQ

The installer will extract the files to your chosen location, after it completes, click finish.



POST INSTALLATION TASKS

Be sure to turn your antivirus program back to its previous state. Also, ensure that your MSFS directory is off-limits to any automatic antivirus scanning. Failure to do this may result in a nonfunctioning simulator!

It may be worthwhile to backup or save a copy of your downloaded installer. It's worth noting that as new updates are released, we do not continue to offer older versions for download.

UPDATING YOUR AIRCRAFT

NOTE: The download link in your original purchase email will always download the latest released version. We recommend filing this email for future downloads/updates.

To update the Blackbird Zero:

- Back up any custom liveries and files
- Uninstall using Windows programs and features.
- Install the updated version.
- Replace custom files.

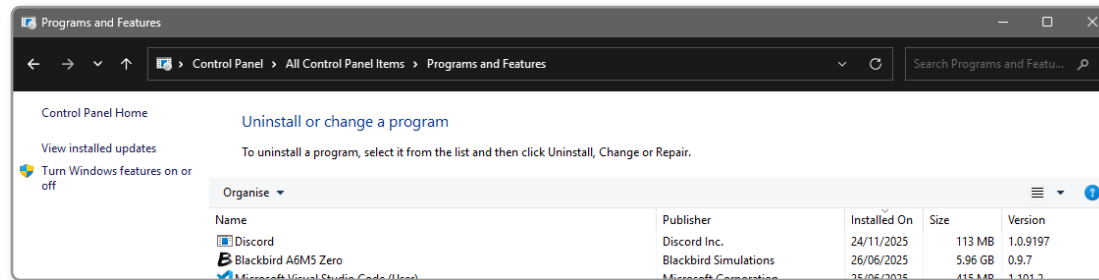


UNINSTALLING

It is not recommended to manually delete folders or files from your MSFS "community" folder.

The Blackbird A6M5 Zero may be uninstalled using Windows Control Panel "Programs and Features".

NOTE: Prior to uninstalling the aircraft, please be sure to back up any customized files, flight plans, or custom liveries you have installed. Once the uninstall is complete, it is safe to delete the milviz-D30-short folder from your MSFS "community" folder.



MICROSOFT UPDATES

From time to time, Microsoft will update the MSFS platform, which has the potential to break our custom code and cause issues with our A6M5 Zero simulation. Blackbird Simulations will always make its best endeavors to ensure a revised build is available as soon as possible following the release of sim updates; however, it's not always possible to do this in a timely manner.

We thank you for your patience in these circumstances.



INTRODUCTION TO THE A6M ZERO

The A6M Zero was one of the most renowned fighter aircraft of the Second World War, symbolizing both the early air dominance of Imperial Japan and the dramatic shift in air superiority as the war progressed. Introduced in 1940, the Zero embodied the Japanese military doctrine of speed, agility, and range—qualities that initially gave it a tremendous advantage over Allied aircraft in the Pacific Theater. Lightweight and highly maneuverable, the Zero could outperform many of its adversaries in dogfights during the early years of the war, gaining a near-mythical reputation among pilots on both sides of the conflict.

Named “Rei-sen” (short for *Rei-shiki Sentōki*, or Type 0 Fighter), the A6M received its “Zero” moniker from the Japanese Imperial year 2600 (1940) in which it was introduced. Designed by Jiro Horikoshi, the aircraft marked a revolutionary step in fighter design and capabilities. With a design philosophy that emphasized offensive capabilities and long-range operations, it was well suited to Japan’s strategic needs for a carrier-based aircraft capable of reaching distant targets across the vast Pacific Ocean.

The Zero’s performance was stunning upon its debut. With a very high top speed, an extremely long operating range, and an astounding turn radius, it was superior to nearly all of its early adversaries. It featured a low-wing monoplane design, retractable landing gear, and a closed cockpit—innovations that reflected the cutting-edge aviation engineering of its time. Its design was focused on minimizing weight, achieved through extensive use of lightweight materials and innovative construction techniques, as well as the elimination of armor protection and self-sealing fuel tanks—compromises that would later prove to be critical vulnerabilities.

The Zero first gained international attention during the Second Sino-Japanese War, but it was the surprise attack on Pearl Harbor on December 7, 1941, that cemented its fearsome reputation. During this operation and the subsequent battles of the early Pacific War— including the invasions of the Philippines, Malaya, and the Dutch East Indies— Zero pilots consistently outclassed Allied aircraft like the P-40 Warhawk, Buffalo, and F4F Wildcat in air-to-air combat. The Zero became a symbol of Japan’s early wartime success and a psychological weapon as much as a physical one, with stories of its agility and lethality spreading rapidly among Allied pilots.

Part of the aircraft's success lay in its impressive range, which enabled it to escort bombers across unprecedented distances. This capability was critical in Japan's island-hopping campaign, as it allowed the Zero to operate from aircraft carriers and remote bases while still striking targets far afield. Its armament consisted typically of two 7.7 mm machine guns and two 20 mm Type 99 cannons, giving it formidable firepower. The combination of speed, firepower, and maneuverability allowed experienced Japanese pilots to dominate the skies during the war's early years.

However, the Zero's supremacy would not last. As the Allies studied captured models and developed tactics to exploit its weaknesses—such as using “boom and zoom” attacks to avoid turning dogfights—its dominance began to erode. The lack of armor and self-sealing fuel tanks meant the Zero could be easily set ablaze if hit, and while highly agile at lower speeds, its performance at high speeds and in dives was limited. As newer Allied fighters entered the battlefield, including the F6F Hellcat, F4U Corsair, and P-38 Lightning, the Zero began to face adversaries with superior speed, firepower, and survivability.

Japan attempted to counter this shift by upgrading the Zero throughout the war. The A6M2 was the first major production model and the type involved in the attack on Pearl Harbor. It was succeeded by variants like the A6M3, which had a more powerful engine and clipped wings for improved roll rate, and the A6M5, which featured a redesigned exhaust system and improved armoring. Despite these efforts, the basic airframe could not accommodate the kinds of upgrades necessary to keep pace with Allied advancements in aviation technology and pilot training. By the latter half of the war, many Japanese pilots were inexperienced and undertrained, further diminishing the effectiveness of even the improved Zero models.

Even in decline, the Zero remained a fixture in Japan's air defense, and its legacy was further cemented in its use during the desperate final months of the war. Many were used in kamikaze attacks, reflecting both the strategic desperation of Japan and the symbolic significance of the Zero.

After the war, the legacy of the Zero remained complex. While admired for its design and effectiveness in purpose, it also remains as a wartime symbol of cost, sacrifice and honor.



SIDEBAR: WHAT'S IN A NAME?

A common practice leading up to and during the Second World War, was the use of the Japanese Imperial calendar by both the Imperial Japanese Army and the Imperial Japanese Navy to provide identification based on the year of adoption of a particular design. This applied to most types of vehicles, as well as weapons, instrumentation, as well as all manners of armament.

Other than the 'Zero', other well-known examples of this identification methodology can be found in the naming of the 'Type 92' 70mm light howitzer, adopted in 2592 (1932), or the 'System 97' cipher machine which entered service in 2597 (1937).

This often makes for confusing nomenclature when researching the details of Japanese military equipment. For example, the Zero used for it's 20mm cannons the 'Type 99' machine gun, but of two different 'marks' during the production span of the aircraft: the 'Type 99 Mark 1' and the 'Type 99 Mark 2', which shared the same operating principle but were of significantly different size and fired different ammunition. There was also a 'Type 99' light machine gun, as well as a 'Type 99' tank gun, neither of which bear any relation other than the type designation.

Likewise, the nose guns in the majority of Zero aircraft were the 'Type 97' aircraft machine gun, which was a 7.7mm design that shared no commonality with the 'Type 97' heavy tank machine gun (also a 7.7mm design), or the 'Type 97' automatic cannon (a 20mm design) that was used as an anti-tank rifle!

DEVELOPMENT OF THE ZERO

As far back as 1937, based on experiences with the A5M fighter in combat, the specifications for what would be the A6M were issued. The first two A6M1 prototypes were completed in early 1939. By mid-1940, the first production A6M2 aircraft, with the Sakae 12 engine developing 940 horsepower, were proving successful in combat.

The initial A6M2 went through a design change early in production, with the wings changed to incorporate manually folding wingtips to better fit on aircraft carriers. This early version of the Zero was extremely successful, with the aircraft being dominant in the early stages of the war.

The Sakae 21 engine, with better high-altitude performance and increased power, was introduced in early 1941 and quickly adopted. Being heavier and larger, the new engine necessitated a change in position to correct the center of gravity. This in turn reduced the size of the fuselage fuel tank and required changes to the cowl and oil cooler and carburetor air intakes. This new model, the A6M3, also featured redesigned wings with squared-off wingtips in place of the folding design. Overall, the new variant was minimally faster but gave up some of the range of the A6M2 in addition to being less maneuverable.

A redesign of the A6M3 meant to rectify some of the deficiencies of the variant, with a redesigned wing that could carry under-wing drop tanks and incorporated folding wingtips, was accepted by the Navy but never entered production.

Although not confirmed by the manufacturer, it's possible that the designation A6M4 was given to prototype aircraft mounted with an experimental turbo-supercharged Sakae engine. As the development of the turbo-supercharged engine ran into numerous issues, these experiments ended up being cancelled, and very little information remains.

In mid-1943, the A6M5 Model 52 was developed from the A6M3 - the wings were again shortened to increase speed, the folding wingtip mechanism was removed, and the ailerons and flaps were redesigned. In addition, a new separated exhaust system was developed with the exhaust stubs aimed to the aft of the aircraft and distributed around the fuselage. This redesign used the engine exhaust to provide an additional amount of thrust, however the actual amount added is debatable.



A Japanese A6M Zero fighter aircraft is shown in flight, banking to the left. The aircraft is white with red circles on the wings and tail. The tail number 'EI-142' is visible. The background features a dense forest of evergreen trees under a sunset sky with orange and yellow clouds.

Subsequent refinements of the A6M5 focused on changes to the both the nose guns and the wing cannons, as well as minor improvements to pilot protection. Other changes saw outboard wing racks for rockets or small bombs, and redesigns to the center drop tank.

In the late stages of the war, production capacity of the two factories building the Zero had declined dramatically. The introduction of the Sakae 31 engine, featuring water-methanol injection, resulted in a possibly very small number of aircraft designated A6M6c being built, but little is known.

The last production variant was the A6M7. Developed from the A6M5 with changes to increase effectiveness as a dive-bomber, it featured a reinforced vertical stabilizer and swapped the centerline fuel tank for a rack that could carry a single 250 kg bomb. It's possible that some A6M7 aircraft were built with the Sakae 31 engine, but no conclusive evidence exists, as even the total amount of A6M7 aircraft produced is not confirmed.

The final development of the A6M Zero was the A6M8. It featured the Kinsei 62 engine that developed 1560 horsepower. This required significant changes to the cowlings of the aircraft. Twin 13.2mm guns were installed in the nose, with 20mm cannons in the wings. The design also called for drop tanks to be mounted on the wings, to allow for mounting a single 250kg bomb under the fuselage. Although 6300 aircraft were slated for production, only two prototypes had been built by the end of the war.

SIDEBAR: RELIABILITY VS. WEIGHT SAVING

One thing that can be noticed in our presentation of the Zero is the lack of period-specific radio equipment. There are several reasons for this, combining historical accuracy with practicality in a modern simulator.

Before the war, Japan was purchasing aircraft radios manufactured in the United States. In the lead-up to hostilities, these supply lines came to a halt, and Japan started domestic production of the same radios. Unfortunately, as the war went on, these domestically produced radios suffered from a lack of raw materials and were notorious for unreliability. They were extremely prone not only to interference from the aircraft, but also subject to being easily damaged from vibration during flight and impact upon landing.

In an aircraft where survival was measured in every bit of weight saved, it grew extremely common for ground crews to strip the radios from the aircraft. The leader of a squadron would, in some cases, have the only functioning radio - and late war, possibly the only training in how to use it - all other pilots would be required to maintain visual contact.

Apart from having this sort of historically correct context, our other reasons for not including the radios in the Zero are more practical. First is that the radios that would have been featured in the Zero were not compatible with our modern communication systems as we know them and featured a combination of voice communication and pilot-keyed morse code.

Last is the matter of correct representation. Of the various radio components that would have been used in the Zero, there is only one known example of the transmitter unit, and no known surviving examples of the receiver - all we have is some basic drawings and, due to their extremely hard to reach location, small portions of visibility in a few low-resolution monochrome photos.



SIDEBAR: A DEBATE OVER... EVERYTHING!

One of the more interesting aspects of researching the Zero is lack of agreement between references on nearly every aspect of the aircraft. From the most basic performance figures to details on the operation of and procedures in the Zero, there are many notable examples where multiple sources disagree, whether in-print or online.

While there are a few flying examples of the Zero, most are extensively changed from the original aircraft for purposes both practical and obvious. Even the non-flightworthy aircraft that sit in museums cannot be trusted; they are often subject to large degrees of remanufacture or restoration.

Some of the most-complete information we have for the A6M5 Model 52 comes from documents that the Technical Air Intelligence Centre (TAIC) compiled post-war through testing aircraft captured during operations in the Philippines. Unfortunately, this testing was not very exhaustive, partly because the test flights were limited due to maintenance and reliability issues.

We can also reference testing that was done on other models of the Zero. One well-known example was the 'Akutan Zero', which was an A6M2 Model 21 which crash-landed on Akutan Island in June of 1942 and recovered by US forces. However, how well the Akutan Zero represented its average in-service counterpart is contested. The aircraft had to be repaired to be made flight-worthy (the landing gear was completely sheared off) and a read-through of the subsequent test reports reveals interesting notes such as the aircraft only developing 2000 rpm, suggesting issues with the prop governor.

We can also turn to pilot reports from both sides. There are cases on both sides where aircraft have been pursued and were either able to successfully outrun their pursuers or else forced into a battle when having to make course changes that allow aircraft to close the distance between. Based on the aircraft involved, one can then speculate - 'if aircraft 'A' has a certain known top speed, that must mean that aircraft 'B' was capable of matching or exceeding'. While possible to some degree, such speculation does not allow for variables such as aircraft condition or pilot training, and rarely are details such as engine settings, the availability or use of emergency boost, or even the altitude of the encounter, mentioned.

In any case, it all makes for fascinating study, especially when trying to determine the operation of key controls of the aircraft, or even basic performance numbers. One of the more hotly debated aspects is the top speed of the aircraft. Despite some references stating that the top speed of the aircraft was in excess of 350 mph (265 kts), other references state it as being much slower. Many of these figures are stated without an accurate source and without any accompanying information such as rpm or manifold settings, or even the altitude at which a number was obtained.

The TAIC manual for Model 52 that we've used as a primary reference does contain a partial chart arrived at through limited testing showing true air speeds at certain altitudes and engine settings. Although much lower than other sources, displaying a top speed of only 305 mph (265 kts) true air speed at 15,000 feet, the completeness of the information presented throughout the manual forces us to consider the document as an important source of information.



AIRCRAFT SYSTEMS AND OPERATION

We've tried to take as little liberty as possible with the aircraft controls, but in some cases, we've had to infer operation based on the limited mention of those systems in the resources available.

The Zero is not an extremely difficult aircraft to operate, but it does reward a knowledge of its various controls and systems. It's worth remembering that the even though the aircraft was still a contemporary of many of the late war Allied aircraft, it's basic design stems from pre-war principles and the technology available to engineers at that time. As well, the weight limitations on the aircraft as well as a general disregard for pilot safety means that it simply does not have some of the features found on Allied contemporaries.

CONTROL SURFACES

Control surfaces are of a conventional design. The elevators are the only control surface that was capable of being trimmed during flight. Operation of elevator trimming is by a vernier drum located to the left of the pilot. (For the sake of user convenience, the ability to trim the ailerons and rudder remain in the simulator and can be operated via standard key assignment.)

The wing flaps are hydraulically operated. Operation of the flaps is indicated by a graduated slide mounted on the right-hand wall of the cockpit. The flaps selection lever is a three-position lever located to the rear right hand side of the pilot. The lever can be selected up or down and may be moved to the middle stop position at any time to command partial flaps.

LANDING GEAR

The hydraulically operated landing gear consists of two main oleo struts and a steerable* tailwheel. The tailwheel can be locked for take-off and landing, with the control for doing so located to the left of the pilot.

(* References vary on the availability of tailwheel steering. It's been theorized that carrier-based aircraft retained the steerable tailwheel to assist in operating in a tight deck environment.)

Indicator lights representing the state of the landing gear are located at the top of the electrical switch panel, to the forward left of the pilot, somewhat obscured by the control quadrant. Lights indicate red when the gear is fully retracted, and green when the gear is fully extended. It is required to turn on the gear indicator lights with the dedicated switch located on the electrical switch panel.

In addition, manual indicator pins are located on the top of each wing; these pins raise when the gear is up and lower from sight when the gear is down.

The landing gear may be operated in the case of an emergency with the emergency pump handle. To lower the landing gear, the twin gear uplock release handles must be

pulled, and the gear handle must be inserted into the pump from its stowed position. (For simplicity, the emergency system may be reset using the status page on the notepad.)

BRAKES

Braking on the aircraft is conventional and is operated by rocking the rudder pedals forward. A parking brake is not installed. (The simulator parking brake is used for other purposes in the aircraft, so it is advisable NOT to bind the parking brake to any controller.)

It's perhaps noteworthy that the TAIC manual references the brakes as "very bad, and pilots are warned to use the brakes sparingly and with caution."

HYDRAULIC SYSTEM

The hydraulic system on this aircraft is used for the operation of the landing gear and the flaps. There is no accumulator in the hydraulic system, so pressure depends entirely on the engine-operated pump.

ELECTRICAL SYSTEM

Electricity is supplied by an engine driven generator and a 12 volt 20 amp battery. The battery and generator switches are located on the electrical switch panel, to the left of the pilot.

FUEL SYSTEM

Normal tank usage should be in the following order:

1. Belly tank (if installed)
2. Both wing tanks
3. Fuselage tank

The fuselage tank should be selected last, due to the limited quantity of fuel it holds, while the belly tank should only be selected once at altitude.

It is not dangerous to run dry on one tank because the fuel pump picks up suction quickly when switched to another tank.

Fuel tank gauges are located on the shelf to the left of the pilot. Readouts can only be attained when the button, located behind each gauge, is lifted then dropped. The rear gauge serves for both wing tanks and indicates quantity of the tank selected by the selector located to the rear of the gauges. The front gauge indicates only the fuselage tank; the belly tank quantity is not displayed.

INTRO

INSTALLATION

OVERVIEW

OPERATION

NORMAL
PROCEDURES

WEAPONS

FAQ

ENGINE CONTROLS

- A. The throttle is conventional and controls the amount of fuel feed to the engine.
- B. Mixture is maintained by operating two mixture controls as follows:
 - 1. Automatic mixture control operates differently from the conventional mixture control in that the forward positions will give a leaner mixture. For take-off, the mixture should be set at automatic rich (full back). At altitude, the mixture may be moved progressively forward to achieve automatic leaning.
 - 2. Manual mixture control is spring loaded to remain in a forward position. At high altitudes, the automatic mixture control can prove ineffective, and the manual mixture control may be used to achieve sufficient leaning. The automatic mixture control is moved to the fully forward position and the manual mixture lever may be used to effect proper leaning.

NOTE: The automatic and manual controls are interconnected; as the automatic control is moved, there is also a corresponding movement of the manual control.

IMPORTANT: The automatic mixture control is incompatible with the automatic mixture assistance option within Microsoft Flight Simulator. If using the assistance feature is important, the automatic mixture control MUST be fully forward to enable use of the manual mixture lever.

- C. On the supercharger control, forward position is high blower; rear position is low blower. Generally, high blower is used at about 10,000 feet. (Due to limitations in how Microsoft Flight Simulator emulates multi-speed superchargers, this lever shifts automatically at 10,000 feet.)
- D. The propeller has automatic controls which select high rpm when placed in the forward position.

- E. The magneto has four positions:
 - 1. full left - "On";
 - 2. one notch to the right - "Left Mag";
 - 3. two notches to the right - "Right Mag";
 - 4. full right, both mags.
- F. There is no electrically energized starter in this airplane. The starter is energized by means of a hand crank.
- G. The electrical ignition booster is controlled by means of a spring-loaded toggle switch. The booster is switched on by holding the switch in up position.
- H. The emergency power boost can be operated by pulling the emergency boost control handle. Note that use of this control is not recommended except in severe circumstances and is limited to less than 60 seconds duration, during which the pilot should monitor engine temperatures carefully.
- I. Cowl flaps are operated by rotating the cowl flap control handle.
- J. The oil cooler shutter is operated by rotating the oil cooler control handle.
- K. The carburetor air is warmed by means of an oil jacket supplied with engine oil. Warm air can be supplied to the carburetor by using the carburetor air control, located on the far-right side of the cockpit, to the right of the front panel, along the fuselage wall.

KEYBINDINGS

- Toggle Water Rudder - Fire guns (can be fired using LMB on trigger handle as well)
- Toggle Variometer Switch - Switches guns from 7.7mm to 20mm (can be toggled via RMB interaction on throttle handle)
- Increase Mixture (Small) - Increments automatic mixture control one notch
- Decrease Mixture (Slow) - Decrements automatic mixture control one notch

INTRO

INSTALLATION

OVERVIEW

OPERATION

NORMAL
PROCEDURES

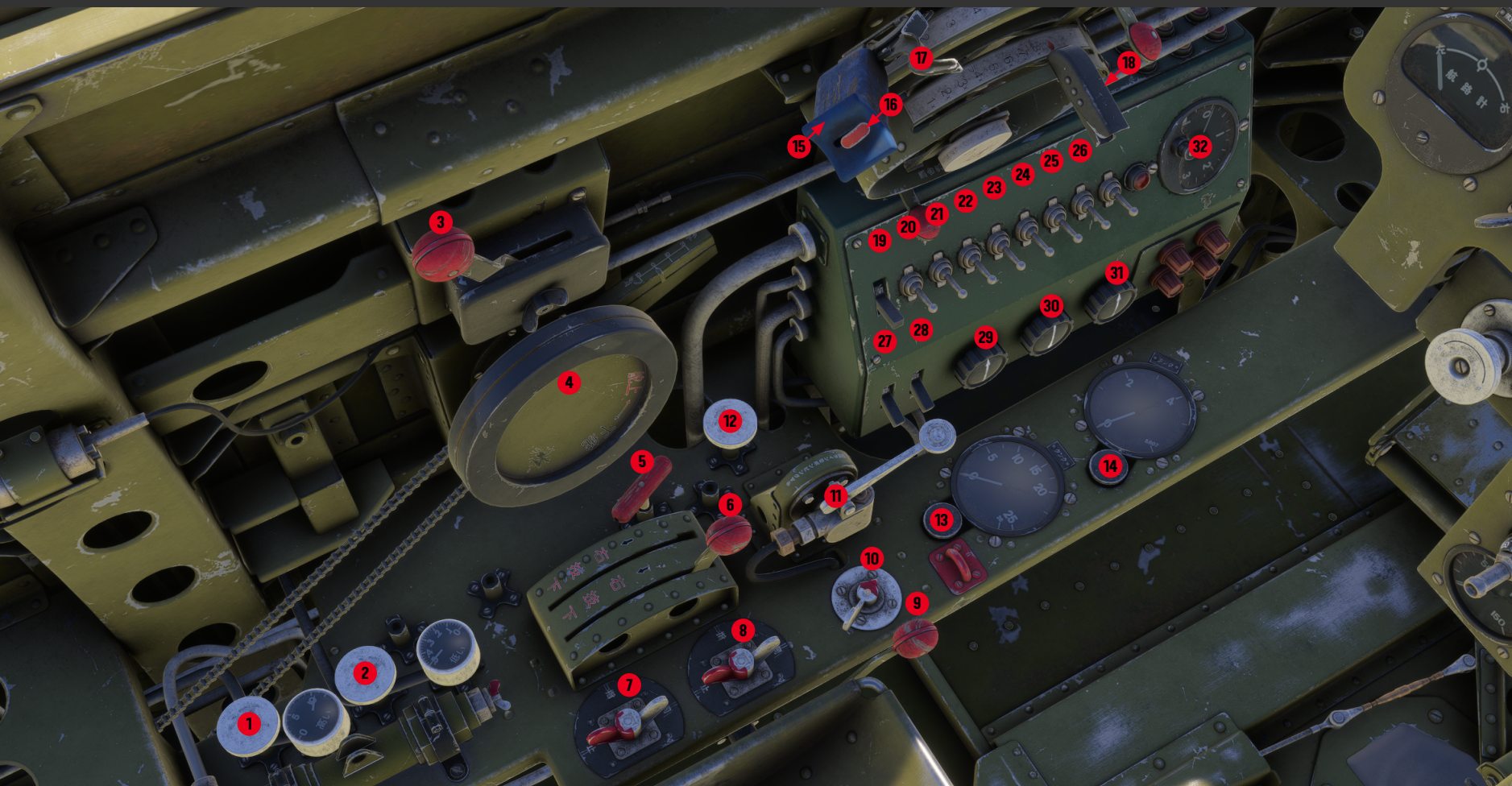
WEAPONS

FAQ



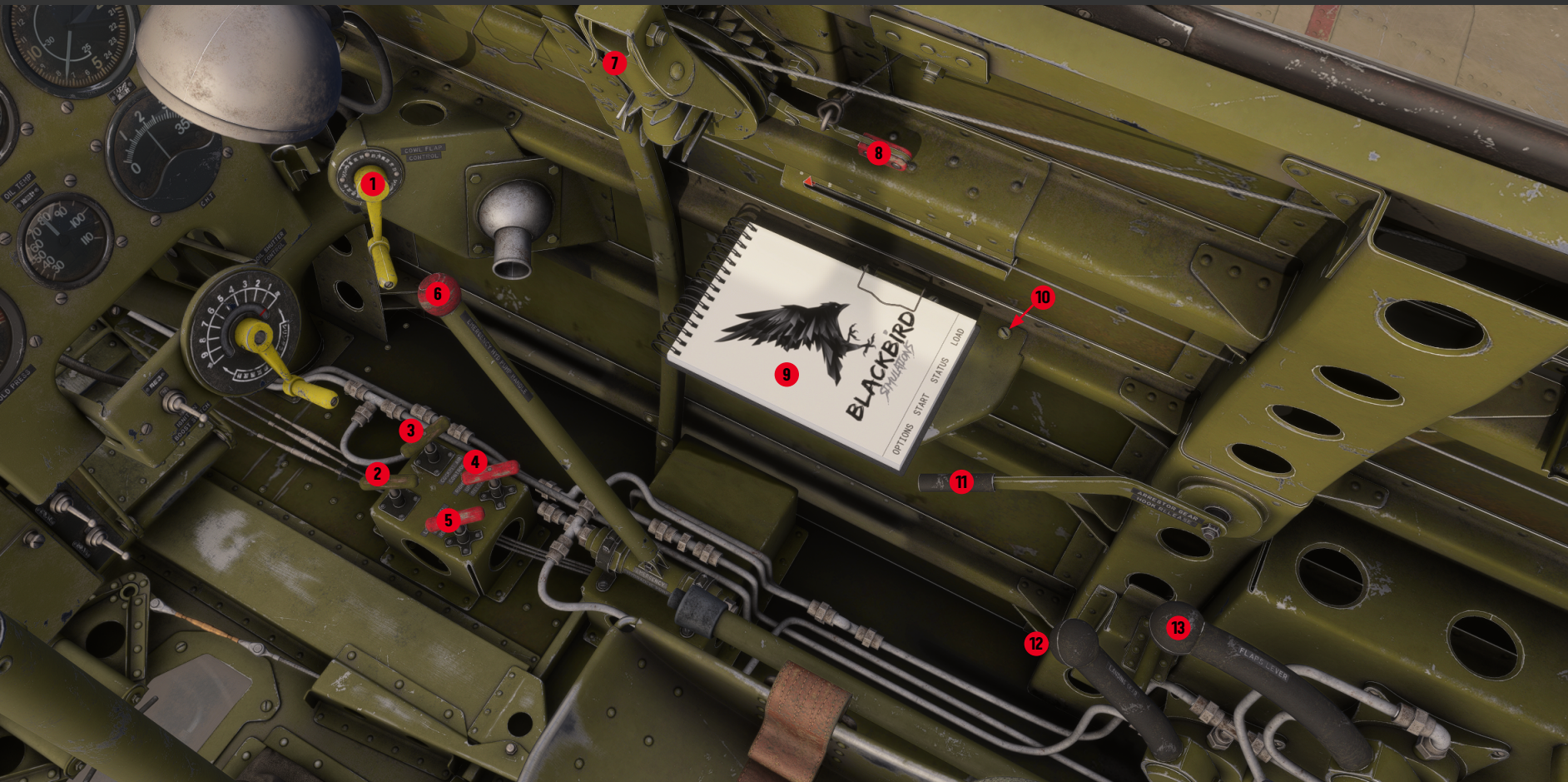
Main Instrument Panel

- | | |
|------------------------------|---|
| 1. MANUAL MIXTURE CONTROL | 16. RATE OF CLIMB (meters x 100) |
| 2. AUTOMATIC MIXTURE CONTROL | 17. FUEL/OIL PRESSURE (kg/cm ²) |
| 3. EMERGENCY POWER BOOST | 18. TACHOMETER |
| 4. RADIO COMPASS | 19. MANIFOLD PRESSURE (cmHg) |
| 5. E.G.T. (°C) | 20. OIL TEMPERATURE |
| 6. MAGNETO | 21. C.H.T. (°C) |
| 7. ENGINE PRIMER | 22. FLIGHT ASSIST (altitude hold & wing leveller) |
| 8. AIRSPEED (knots) | 23. HEADING ASSIST (heading hold mode set by compass card adjustment knob [11]) |
| 9. ALTIMETER (meters x 1000) | 24. IGNITION BOOST |
| 10. COMPASS | 25. OIL COOLER SHUTTER |
| 11. COMPASS CARD ADJUSTMENT | 26. COWL FLAPS |
| 12. ARTIFICIAL HORIZON | 27. EMERGENCY GEAR HANDLE (shown stowed) |
| 13. BANK/TURN INDICATOR | 28. CARB HOT AIR CONTROL (in front of lamp) |
| 14. CHARGING HANDLES | 29. INERTIA STARTER CRANKING CLICKSPOT |
| 15. GUNSIGHT BRIGHTNESS | 30. ENGAGE INERTIA STARTER CLICKSPOT |



Left Sidepanel

- | | |
|--|-------------------------------|
| 1. MASTER AIR VALVE | 17. GUNS TRIGGER |
| 2. FIRING AIR VALVE | 18. PROP GOVERNOR |
| 3. GUNS SAFETY | 19. BATTERY |
| 4. TAIL TAB CONTROL | 20. GENERATOR |
| 5. BELLY TANK RELEASE | 21. FORMATION LIGHTS |
| 6. TAIL WHEEL LOCK | 22. NAV LIGHTS |
| 7. WING TANK SELECTOR (off / right / left) | 23. COCKPIT LIGHTS |
| 8. FUSELAGE TANK SELECTOR (off / fuselage / belly) | 24. GEAR INDICATOR LIGHTS |
| 9. MANUAL FUEL PUMP | 25. PITOT HEAT |
| 10. WING TANK GAUGE SELECTOR | 26. GUNSIGHT |
| 11. CHARGING HANDLE | 27. FOOT, GLOVE & HEAD HEATER |
| 12. CHARGING AIR VALVE | 28. SUIT HEATER |
| 13. WING TANK QUANTITY ENERGIZER | 29. COCKPIT LIGHT INTENSITY |
| 14. FUSELAGE TANK QUANTITY ENERGIZER | 30. COMPASS LIGHT INTENSITY |
| 15. THROTTLE | 31. FORMATION LIGHT INTENSITY |
| 16. GUNS SELECTOR (Right-click to toggle) | 32. AMMETER |



Right Sidepanel

1. COWL FLAPS
2. WING TANK AIR DOORS
3. COCKPIT COLD AIR SHUTTER
4. RIGHT GEAR UPLOCK RELEASE
5. LEFT GEAR UPLOCK RELEASE
6. EMERGENCY GEAR HANDLE (SHOWN POSITIONED)
7. TAILHOOK CRANK
8. TAILHOOK ARM RELEASE
9. NOTEPAD CONFIGURATION TOOL
10. NOTEPAD VISIBILITY TOGGLE
11. ARRESTOR HOOK RELEASE
12. LANDING GEAR
13. FLAPS LEVER



Pilot close (gunsight)

1. Gunsight
2. Manual gunsight (flip to deploy)
3. Gunsight filter
4. Gunsight brightness
5. 7.7mm Charging handles
6. Normal / Alternate filament switch

NOTEPAD CONFIGURATOR

☐ DISPLAY ENGLISH LABELS
☐ HIDE HANDHELD RADIO
☐ HIDE EXHAUST HEAT BLUR
☐ HIDE EXHAUST SMOKE
☐ TURN OFF COCKPIT SHAKE
☐ TURN OFF EXTERIOR SHAKE
☒ ENFORCE SERVICING REALISM
☒ ENFORCE ENGINE REALISM
☐ MANUAL MIXTURE DEFAULT

EXTERNAL HAND CRANK

0%

TOGGLE CRANK

ENGAGE CLUTCH

☒ FAST CRANK ☒ AUTO CLUTCH
☒ AUTO IGNITION BOOST

PRIMING: ☒ AUTO PRIME

AUTOSTART

WHEEL CHOCKS:

IN PLACE

TOGGLE

BELLY TANK:

ATTACHED

REPLACE

EMERGENCY PUMP:

SAFE, HANDLE STOWED

RESET

AIRCRAFT EXTERIOR:

PRETTY CLEAN

WASH

ENGINE HEALTH:

GOOD CONDITION

RESET

FUEL:

FUSELAGE:100%

REFUEL

LEFT WING:100%

REFUEL

RIGHT WING:100%

REFUEL

BELLY TANK:100%

REFUEL

AMMUNITION:

TYPE 97 7.7MM MACHINE GUNS:

LEFT GUN: 500 ROUNDS

RIGHT GUN: 500 ROUNDS

TYPE 99-2 MOD 1 20MM CANNONS:

LEFT GUN: 100 ROUNDS

RIGHT GUN: 100 ROUNDS

UNLOAD

RELOAD

OPTIONS

START

STATUS

LOAD

OPTIONS

START

STATUS

LOAD

OPTIONS

START

STATUS

LOAD

OPTIONS

START

STATUS

LOAD

The notepad can be toggled between the main instrument panel and the right side panel. Operation is generally self-explanatory; exceptions are listed below

OPTIONS

MANUAL MIXTURE DEFAULT allows the automatic mixture lever to be placed fully forward by default on the next flight. The automatic mixture lever **MUST** be placed full forward to allow use of the Assistance / Automatic Mixture feature, this option simply allows that to be done by default on flight load. [See p.B1-2]

ENFORCE ENGINE REALISM provides obfuscation of fuel and ammunition quantities on the **LOAD** tab while also removing the temptation for instant refueling or ammo reloading. The values and ability to reload are still available while on the ground.

START

AUTOSTART does the same job as CTRL+E

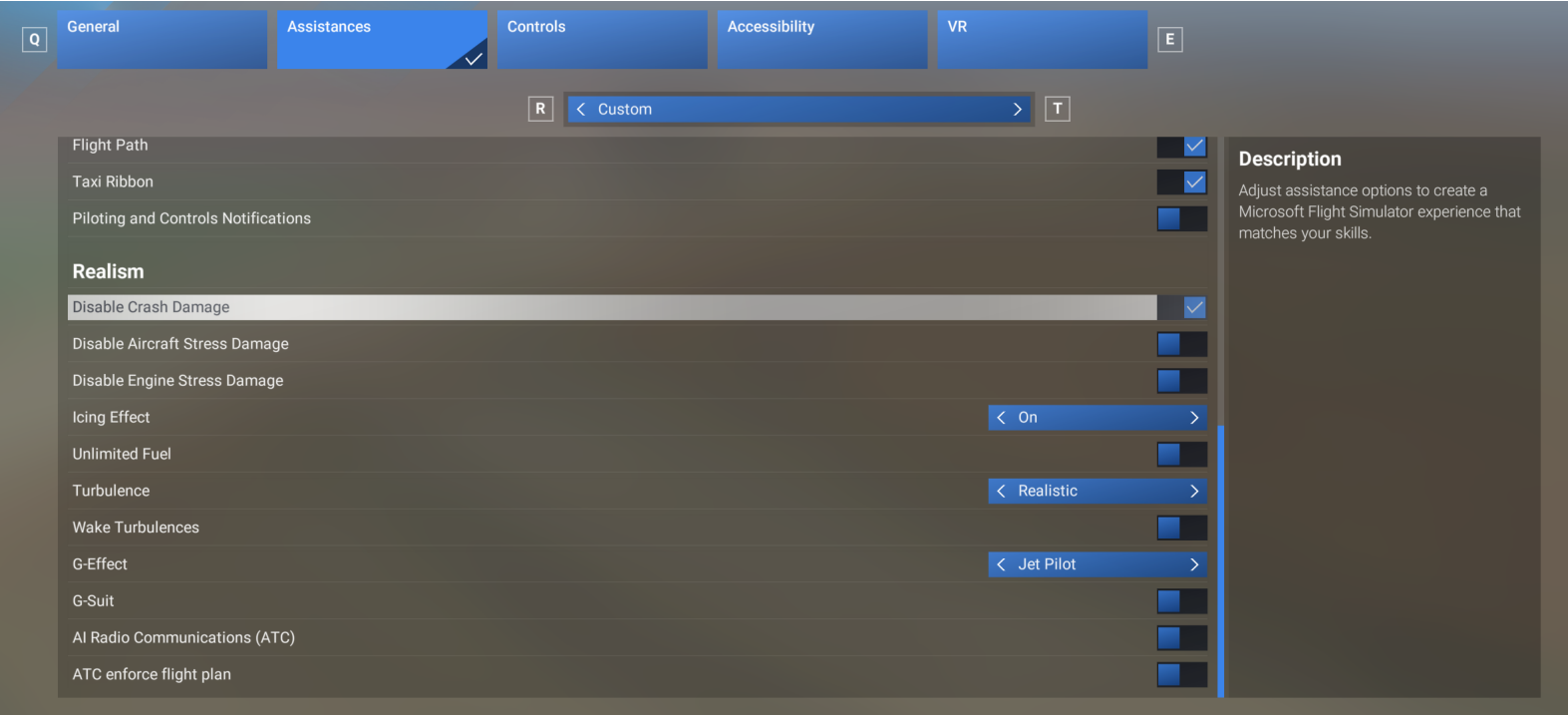
STATUS

WHEEL CHOCKS This option allows for commanding the ground crew to remove the chocks once you are ready for taxi. if you remove them while in avatar mode, they sit off to the side, waiting to be put back in place

EMERGENCY PUMP RESET is the only way to stow the pump once deployed in the cockpit

MSFS2024 OPTIONS

It's not an absolute, but we could suggest that for the full experience, turn the Assistancess / Disable Crash Damage ON. Leaving that setting off means you don't get the wonderful experience of trying to 'safely' belly land the Zero once you've blown the engine, trying not to flip upside down in the process!



NORMAL PROCEDURES

B2-1

OPERATING PROCEDURES

NOTE: Before entering aircraft, ensure main wheels are chocked. No parking brakes are provided.

ON ENTERING PILOT'S COMPARTMENT

- A. Enter the cockpit from the left. Steps and a catwalk on the wing are provided for entry to the cockpit.
- B. Check before all flights:
 - 1. Check flight controls for free operation.
 - 2. Battery switch and landing gear indicator switches "On", other electrical switches "On" as required.
 - 3. Flap up control neutral. Mechanical indicator only, on right side of cockpit.
 - 4. Landing gear down. Electrical indicators on electrical switch box.
 - 5. Check contents of fuel tanks.
 - 6. Fuel selector valves:
Wing tanks - left or right, as desired.
Fuselage tank - off".

NOTE: If belly tank is provided, use it first.

Warning: Wing tanks must be used before the fuselage tank.

- 7. Oil shutter closed.
- 8. Set altimeter to field elevation.
- 9. Trim tab "neutral". 1 degree of nose up trim can help with nose heavy tendency before landing gear is raised.



INTRO
INSTALLATION
OVERVIEW

OPERATION
NORMAL
PROCEDURES
WEAPONS

FAQ

NORMAL PROCEDURES

B2-2

STARTING THE ENGINE

Note: the aircraft has no parking brake, so chocks are required for startup and engine run-up

- A. Ignition switch "off"
- B. Carburetor air "cold"
- C. Oil shutter "closed"
- D. Cowl flaps "open"
- E. Propeller "high rpm"
- F. Automatic mixture control "auto rich"

Note: If automixture assistance is being used, select "manual" on the automatic mixture control

- G. Maintain fuel pressure with wobble pump
- H. Prime engine as needed

NOTE: 4 to 5 strokes of the primer pump are generally sufficient. Engine may also be primed by pumping the throttle 2 strokes.

- I. Ground crew should energize starter by external crank
[Without ground crew the inertia starter can be energized either by using 'Toggle Crank' on the START page of the notepad, or by using the hidden clickspot on the right hand canopy frame.]

After starter is energized:

- J. Turn Ignition switch "on"
- K. Maintain fuel pressure with wobble pump
- L. Ground crew engages starter
[Without ground crew, the starter can be engaged by using 'Engage Clutch' on the START page of the notepad, or by using the hidden clickspot on the right hand canopy frame.]
- M. Hold booster switch "on" until engine fires evenly.
- N. Generator switch "on"

ENGINE WARM-UP

- A. Continue warm-up until the following instrument readings are indicated:
- B. Fuel pressure 0.3 kg/cm²
- C. Oil pressure 5 kg/cm²
- D. Oil temperature 45°C
- E. Cylinder head temperature 150°C



INTRO
INSTALLATION
OVERVIEW

OPERATION
NORMAL
PROCEDURES
WEAPONS

FAQ

NORMAL PROCEDURES

B2-3

ENGINE TESTING

- A. Check magnetos at 1800 rpm with propeller control at "high rpm." A maximum loss of 70 rpm is permissible.
- B. Increase rpm to 2000 and move the propeller control to "low rpm." The rpm should drop to 1300. Return propeller control to "high rpm."
- C. Advance throttle to fully open position. Twenty-six hundred (2600) rpm and +15 manifold pressure should be attained.
- D. Retard throttle to 900 rpm, check landing flaps, check hydraulic pressure gauge.

TAXIING

- A. Unlock tail wheel.
- B. Signal for removal of chocks.
- C. Note that the brakes are poor and should be used sparingly. The steerable tailwheel mechanism is linked to the rudder on this aircraft and does provide directional control in addition to the rudder.

TAKE-OFF

- A. Align aircraft with runway and lock tail wheel.
- B. Mixture control "automatic rich."
- C. Propeller control "high rpm."
- D. Fuel valve:
 - o Wing tanks - left or right, as desired.
 - o Fuselage tank - "off."

NOTE: If belly tank is carried, do not use it until planned altitude is reached.

- E. Open oil cooler as necessary for proper temperature of 50°C.
- F. Flaps. Normally flaps are not needed for take-off.
- G. Carburetor air "cold/off."
- H. Cowl flaps "open."
- I. Canopy full forward and locked.
- J. Directional control on take-off is satisfactory with sufficient rudder effectiveness at low speeds to offset torque effect.

**NOTE: Rudder authority changes during the takeoff roll.
Be carefull not to over-compensate!**

- The take-off run is very short.
- Landing gear is slow to retract and care must be taken to build up speed before the gear is fully retracted.



INTRO
INSTALLATION
OVERVIEW

OPERATION
NORMAL
PROCEDURES
WEAPONS

FAQ

NORMAL PROCEDURES

ENGINE FAILURE ON TAKE-OFF.

If engine fails immediately after take-off, act quickly as follows:

1. Push nose down to maintain speed.
2. Retract wheels at once.
Power off stall, with wheels and flaps up, occurs at 85 mph (74 kts).
3. Pull canopy full open and lock; canopy is not droppable.
4. Lower flaps if possible.
5. Cut magneto switch to reduce fire hazard.

NOTE: There is a great danger of fire or a crash landing because none of the fuel tanks are leak-proof or crash-proof.

6. Land straight ahead, if possible. Avoid maneuvers at low altitude.



B2-4

INTRO
INSTALLATION
OVERVIEW

OPERATION
NORMAL
PROCEDURES
WEAPONS

FAQ

NORMAL PROCEDURES

B2-5

GENERAL FLYING CHARACTERISTICS

- A. Engine.
 - 1. The engine should not be operated at 1600 rpm for any great length of time.
 - 2. Maximum rpm 2700. 2750 is attainable but should only be used for take-off or for short periods of time.
 - 3. Manifold pressure should not exceed +10 cmHg, except for takeoff or in emergency.
- 4. Airplane.
 - 5. The airplane is stable at all wing loadings. Relatively large movements of center of gravity can be tolerated without seriously disturbing the stability of the airplane.
 - 6. Initial climb is steep, with poor visibility straight ahead but adequate visibility in other directions.
 - 7. Rate of climb at low altitudes is approximately 3500 ft/min at 135 mph (117kts).
 - 8. Rudder and elevator forces are normal at all speeds, but increasing aileron stiffness is apparent above 250 mph (217 kts).
 - 9. Lateral trim can be assisted by proper use of the fuel from the wing tanks.
 - 10. As the landing gear is lowered, the airplane becomes nose heavy. Ample trim is available to compensate for this change in trim.

STALLS

- A. The airplane approaches the stall gently and the controls are effective right up to the point of stall.
- B. The following is a chart showing stalling speeds:

1. Wheels and flaps up. Power off.	85 mph	(74 kts)
2. Wheels and flaps up. Power on.	80 mph	(70 kts)
3. Wheels down, flaps down. Power off.	78 mph	(68 kts)
4. Wheels down, flaps down. Power on.	65 mph	(56 kts)

PERMISSIBLE ACROBATICS

- A. Outside loops are not permitted.
- B. Snap rolls are not permitted over 170 mph (148kts).
- C. Slow rolls are not permitted over 250 mph (217 kts).
- D. All pull outs should be gentle.



INTRO

INSTALLATION

OVERVIEW

OPERATION

NORMAL
PROCEDURES

WEAPONS

FAQ

NORMAL PROCEDURES

B2-6

DIVING

- A. Maximum indicated airspeed should not exceed 345 mph (300 kts).
- B. Pull outs should be gentle.

NIGHT FLYING

- A. This aircraft is equipped with conventional cockpit, navigation, and recognition lights.
- B. There are no landing lights provided.

APPROACH AND LANDING

- A. When the airplane nears the field:
 - 1. Put propeller to high rpm.
 - 2. Mixture to "automatic rich."
 - 3. Carburetor heat to "cold/off."
 - 4. Cowl flaps "closed."
 - 5. Oil cooler open as needed to maintain a temperature of 60°C to 80°C.
 - 6. Wheels "down" and locked.
 - 7. Tail wheel locked.
 - 8. Flaps down full.
- B. Landing:
 - 1. Land with the tail up to maintain good rudder control on the ground.
 - 2. After landing and coming to a stop, unlock the tail wheel; open cowl flaps; raise wing flaps; return flaps lever to neutral.
- C. In case of an unsuccessful attempt to land, open the throttle and raise the landing gear immediately. When sufficient speed and altitude have been gained, raise the flaps.

STOPPING THE ENGINE

- A. When the aircraft has stopped rolling, proceed with the following:
 - 1. Signal for the wheels to be chocked.
 - 2. Advance throttle to 1800 rpm, place propeller in low rpm and allow rpm to become constant.
 - 3. Retard throttle to 1000 rpm and move manual mixture control to "idle cut off."
 - 4. When engine stops, turn magneto switch to "off" position.
 - 5. Fuel valves, battery switch, generator switch, electrical switches "off."



INTRO

INSTALLATION

OVERVIEW

OPERATION

NORMAL
PROCEDURES

WEAPONS

FAQ

WEAPONS

OPERATING GUNS:

- Guns safety handle located on LH wall of cockpit, must be moved to 'fire'
- 7.7mm guns must be charged before operation via handles on guns
- 20mm guns must be charged before operation via push lever on LH shelf
- All air valves must be open for operation (they default to that position)
- Guns may be fired with keybind or via interaction with trigger handle (attached in front of throttle)
- Only one set (7.7mm or 20mm) may be fired at a time. Selector switch is on top of throttle and may be accessed via rmb interaction on throttle (or lmb hold, rmb click)
- Guns may be reloaded via notepad 'load' page.

Note: In order to comply with the rules set out by Microsoft, the guns are not able to be fired in aircraft purchased through the Microsoft Marketplace



B3-1

INTRO
INSTALLATION
OVERVIEW

OPERATION
NORMAL
PROCEDURES
WEAPONS

FAQ

INSTALLATION

Q. How can I fix a 'specified filepath is too long' installer error?

A. This can be caused by "MSFS addon linker" type programs.

To remedy, you can either:

- Disable the "add-on linker" program.
- Modify your OS.
Use the internet to find a solution that works with your system. There are a number of methods available and not all of them are guaranteed to resolve the issue. e.g. Maximum Path Limitation.
- install to a known location (like your desktop) and then manually move the installed folder to your Community folder.

Q. How do I fire the guns?

A. The weapon firing function is not allowed in compliance with rules set out for the Microsoft Marketplace. This capability is only available in the version of the product sold through our website.



INTRO

INSTALLATION

OVERVIEW

OPERATION

NORMAL
PROCEDURES

WEAPONS

FAQ
FAQ

CREDITS

TESTERS

Aidan
einherz
28morela
N7 Damen
davesterp51
Sonicviz
jjbz
MikeGambino
The Flying Freja
Tim-HH
azflyboy
Broseff
b.huston

BLACKBIRD ZERO TEAM

Colin Pearson
Jim Stewart
Claude Chiasson
Steve McNitt
Oisín Little
Merlin Little
D'Andre Newman
Kat Namsavanh
Lea Namsavanh



A6M5 ZERO

Screencaps courtesy of The Flying Freja (A3, A4, A5, B3, B5, B6, C1, D1) & Tim-HH (A6)

A6M5 User Guide BB v1

