



Bell 47J MANUAL



Preface

FOR SIMULATION USE ONLY - DESIGNED FOR SINGLE-PILOT OPERATIONS

This guide is designed to help provide a straightforward set of instructions to aid in operating the Bell 47J Ranger aircraft.

PHOTOSENSITIVE SEIZURE WARNING

A very small percentage of people may experience a seizure when exposed to certain visual images, including flashing lights or patterns that may appear in video games. Even people who have no history of seizures or epilepsy may have an undiagnosed condition that can cause these “photosensitive epileptic seizures” while playing video games.

Immediately stop playing and consult a doctor if you experience any symptoms.

These seizures may have a variety of symptoms, including light-headedness, altered vision, eye or face twitching, jerking, or shaking of arms or legs, disorientation, confusion, or momentary loss of awareness. Seizures may also cause loss of consciousness or convulsions that can lead to injury from falling down or striking nearby objects.

Parents should watch for or ask their children about the above symptoms. Children and teenagers are more likely than adults to experience these seizures.

You may reduce risk of photosensitive epileptic seizures by taking the following precautions:

- Play in a well-lit room.
- Do not play if you are drowsy or fatigued.

If you or any of your relatives have a history of seizures or epilepsy, consult a doctor before playing video games.

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About the Bell 47J

The 47J Ranger is a single-rotor, single-engine, piston-powered helicopter developed and manufactured by Bell Helicopter of the United States. The 47J is an iterative variant of the Bell 47, which took its first flight in 1945 and was introduced the following year. Bell developed the 47J, which they designated as an executive transport, from the 47H. The company introduced the 47J in 1956.

The 47J traces its lineage to the birth of the helicopter. American rotorcraft pioneer Arthur Young developed a series of prototype helicopter models throughout the 1930s and then joined Bell Aircraft Company in 1941. Young's early work culminated in the Bell 30, a demonstrator helicopter that took its maiden flight on June 26, 1943. The successful Bell 30 provided the basis for Bell's first commercial helicopter, the Bell 47.

The Bell 47 is a "tail rotor helicopter" that uses a 2-blade main rotor and a 2-blade anti-torque tail rotor. The prototype took its maiden flight on December 8, 1945, and Bell introduced the first production variant, the 2-seat 47A, in 1946. The 47A was the first helicopter to be certified for civilian use in the United States and quickly became widely adopted for a variety of applications. A long series of iterations followed, including the H-13 Sioux, used by the U.S. and British military.

The Bell 47 family of rotorcraft would go on to be one of the most successful aircraft lineages, of any type, in history. Bell and other companies under its license manufactured more than 5,000 47s. Many remain airworthy decades after the prototype first flew.

In the Fall of 1954, Bell introduced the Bell 47G, a powerful 4-seat general utility version of the 47. It was quickly followed by the Bell 47H, which they based on the 47G. The 47H was the first helicopter intended for executive use, and Bell sold only 33 models of it. Although the 47H proved a commercial disappointment, Bell remained steadfast in its resolve to introduce a helicopter aimed at the business and executive transport market.

In 1956, Bell released the 47J Ranger, a 4-seat version of the 47H. Larger than its predecessor, and fitted with a more powerful engine, it proved a great success. The Ranger was the first helicopter to transport a sitting American president and was featured in a number of popular movies, including the James Bond film Thunderball.

The Bell 47J features a single-pilot console that is centered at the forward portion of the cabin. The helicopter's bubble canopy provides maximum visual situational awareness for the pilot, with a 180-degree unobstructed field of view. The cabin is roomy and has seating for up to three passengers behind the pilot. The helicopter uses standard skids for its landing gear and can be fitted with floats for marine operations.

The 47J Ranger proved to be one of the most successful members of the Bell 47 family. The company manufactured 361 Rangers, comprising a series of civil and military subvariants. The helicopter saw worldwide use, both for commercial applications as well as for the governments of a dozen nations. In addition to executive transport, the Ranger was used for general utility transport of people and cargo, air ambulance, commuter flights, aerial surveying, and a variety of military applications, including liaison and reconnaissance.



The U.S. Air Force purchased two 47Js, designated UH-13J Sioux, in March of 1957 for use as the first presidential transport helicopters in American history. On July 12, 1957, American President Dwight D. Eisenhower became the first U.S. president to be transported by helicopter when an Air Force Sioux lifted off from the White House lawn.

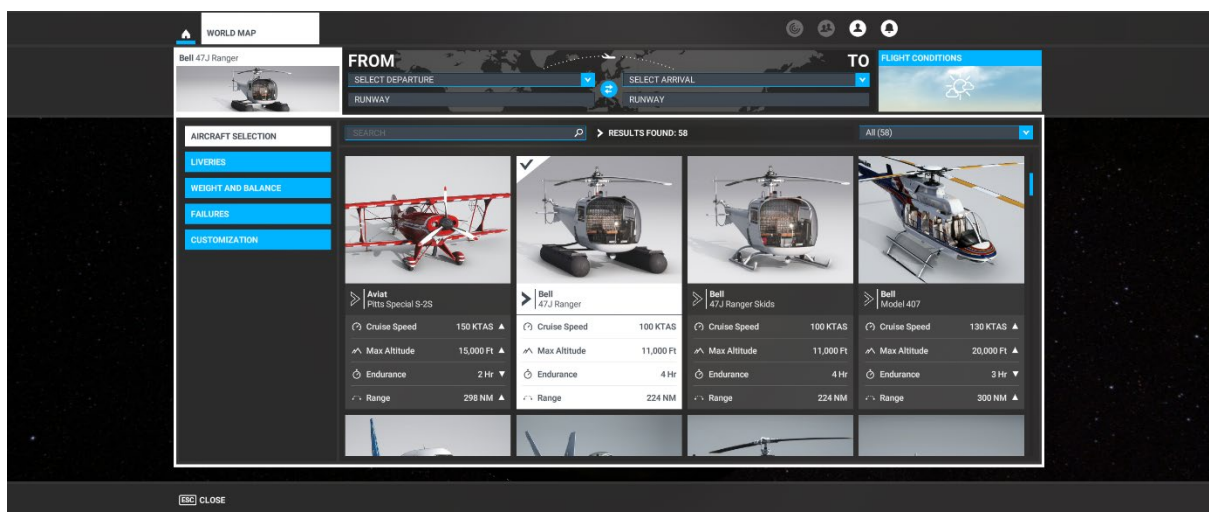
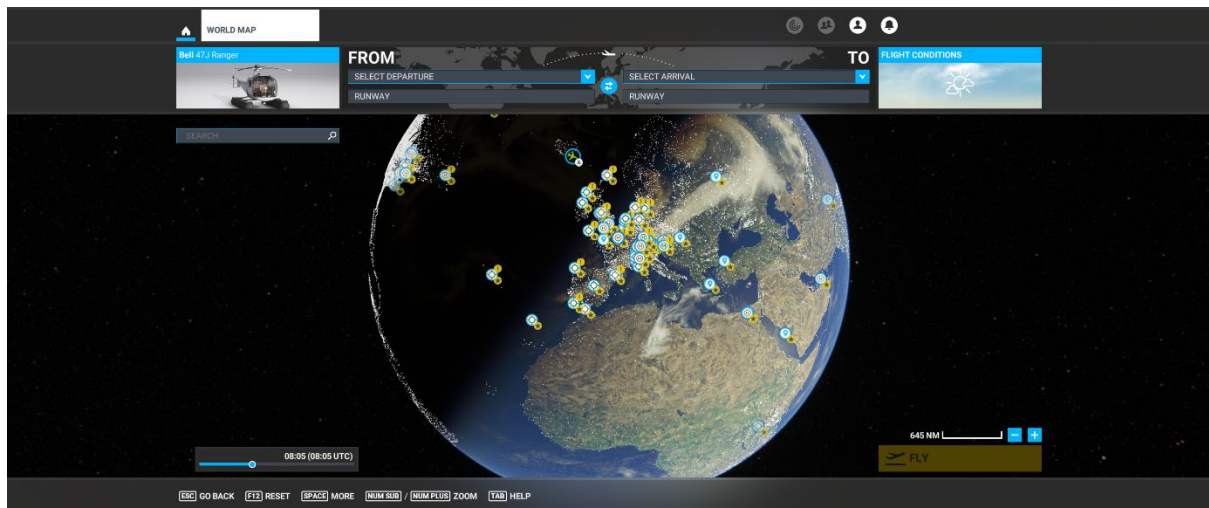
The Bell 47J measures 32 feet, 5 inches in length, stands 9 feet, 3 inches tall, and has a 2-blade main rotor system with a diameter of 37 feet, 2 inches. It is powered by a 6-cylinder Lycoming VO-540-B1B piston engine that delivers up to 260 horsepower to the rotor systems. It has a range of 260 miles, climbs at 870 feet per minute, and has a service ceiling of 11,000 feet above sea level. It cruises at 91 miles per hour and has a top speed of 105 mph.



Aircraft Selection and Liveries

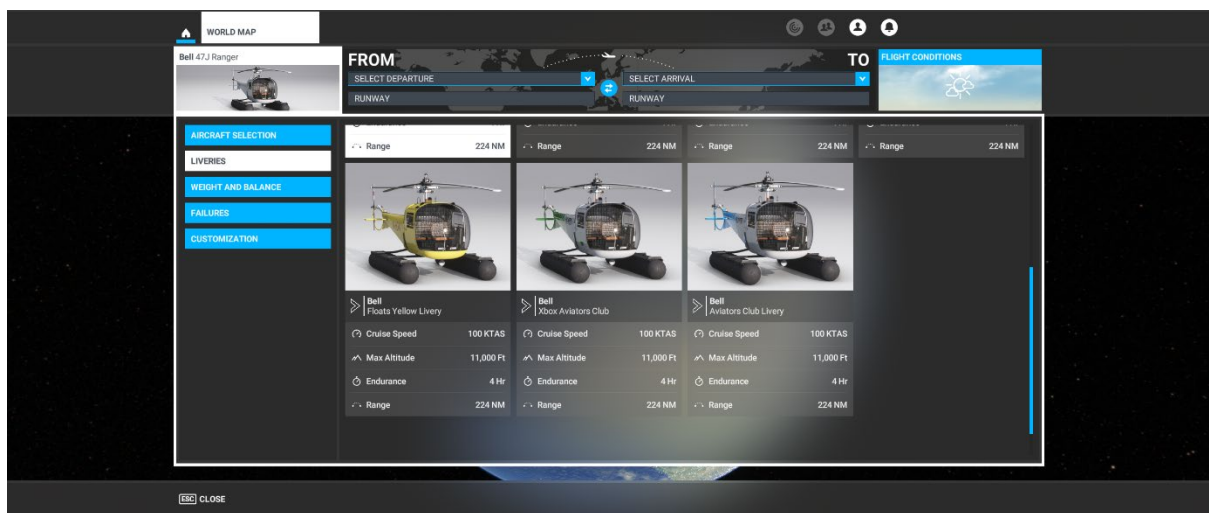
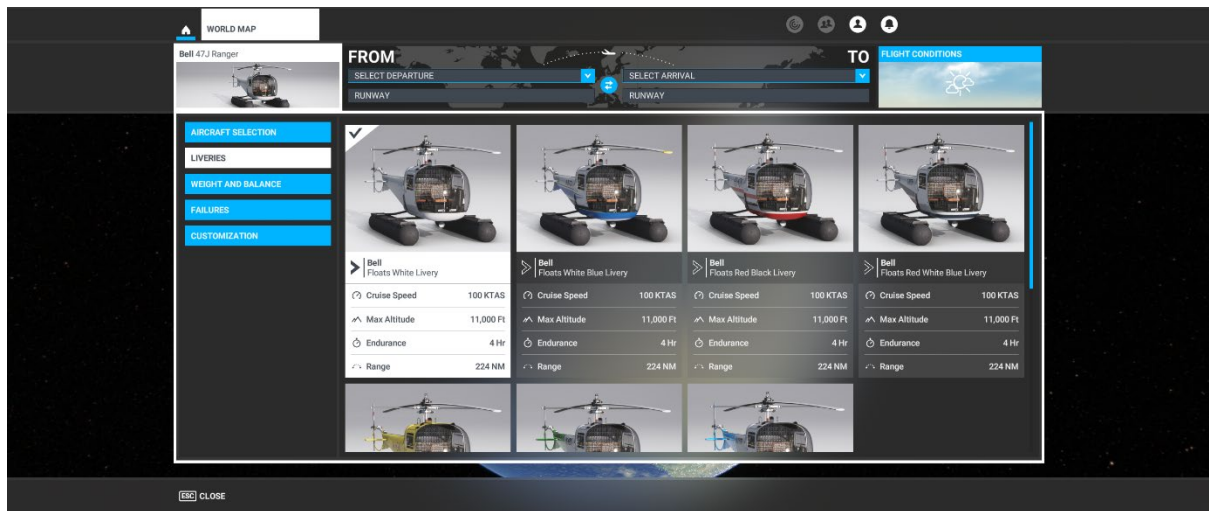
To fly the Bell 47J Ranger, you will need to select it from the Aircraft Selection menu. Click on WORLD MAP in the Main Menu and click the AIRCRAFT SELECTION icon on the top left.

Scroll until you see the Bell 47J Ranger or type "Bell" in the search bar, and it will appear.



Click on Liveries to select any of the various designs available for the Bell 47J. The same liveries are available on the Floats and Skids versions.





Cockpit Interaction

Some knobs within the cockpit have interaction where you can push, pull, or scroll them for their functionality.

This functionality will vary depending on your simulator's specific settings under GENERAL OPTIONS > ACCESSIBILITY.

If a control is set to "Lock," left click (and hold the left mouse button) the knob and push the mouse for "push" interaction and pull the mouse for "pull" interaction. Some functions also may have middle-mouse button "scroll" or "push" and right-mouse click "set" functions.

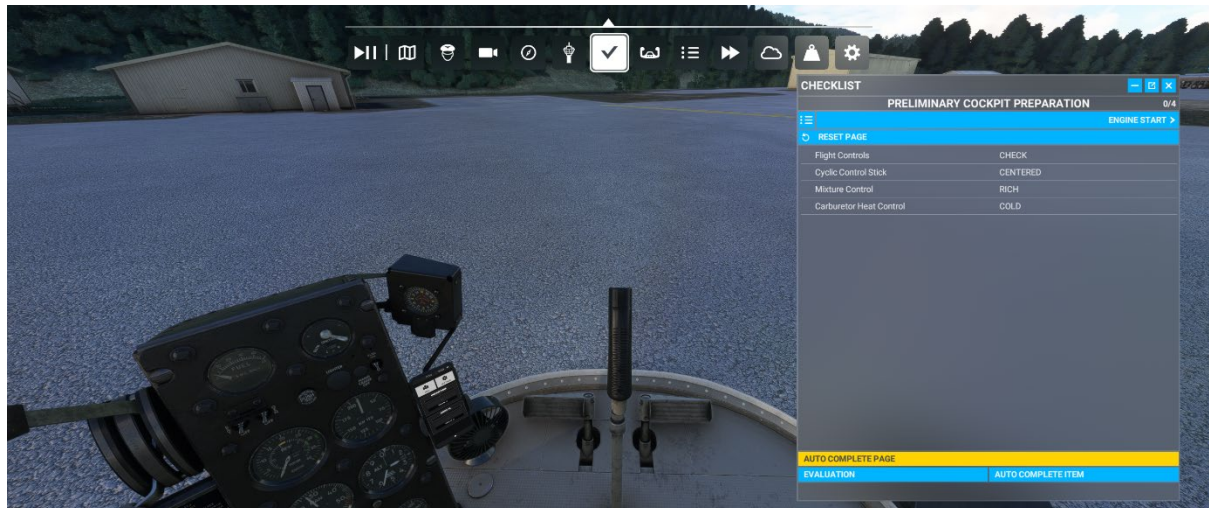
If it set to "Legacy," you will see an icon appear to the left, right, above, or below, which you use the middle-mouse wheel to scroll as if a circular arrow, and left click to "set" as if an up or down arrow icon.

On the Xbox, press **A** to interact with the knob and use **A** to "push," **X** to "pull," Right Stick to "scroll," and **B** to finish the control input.



Checklists

While this guide offers comprehensive operational instructions that are functionally complemented by the Quick Reference Card (QRC), iniBuilds has incorporated expedient procedural checklists within the simulator. These can be accessed via the top-of-screen drop-down menu by selecting the Checklist option.



Clicking the blue eye icon to the right of the checklist item will switch your view to the requisite panel where the button/switch/dial/gauge is located. You can use the AUTO COMPLETE option to expediently tick off the item from the checklist.

There is also a scrollable checklist within the aircraft itself on the left-hand side of the main instrument panel. This is also backlit for night-time operations once the battery switch is on.



You can use the interaction knobs to the left of the checklist panel to scroll up or down. The tooltip will also show you which procedure you are currently on.



Important Notes and Substitutions

The helicopter uses the new Computational Fluid Dynamics (CFD) flight model along with new fuel system and rotor blade physics. Care should be taken while flying the helicopter not to stress the airframe and rotor blades beyond their intended limitations as the helicopter, including all of its internal structural elements, reacts realistically in the system under these new simulation mechanisms.

By design, this helicopter is inherently stable in forward flight, however, it requires some practice to bring it into and maintain a stable hover.

You can enable two options within OPTIONS> ASSISTANCE OPTIONS "Helicopters: Assisted Tail Rotor" and "Helicopter: Assisted Cyclic" which are designed to help fly helicopters.



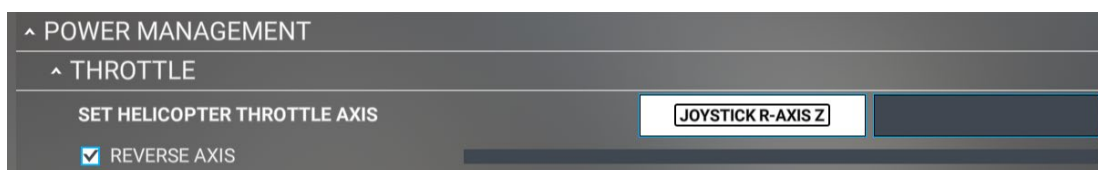
"Adjust whether you want assistance with tail rotor controls in helicopters. "

"Adjust whether you want assistance with cyclic controls in helicopters. "

Recommended Control Bindings

To control the throttle during start up and provide greater control during manoeuvres without Auto Governor enabled we recommend binding the following axis:

"SET HELICOPTER THROTTLE AXIS" or "PROPELLER AXIS"



Auto Governor

A helicopter governor is a crucial component of a helicopter's engine control system designed to regulate and maintain a consistent rotor speed, also known as rotor RPM (revolutions per minute). The governor helps ensure stable and efficient helicopter operations, especially during varying flight conditions.

The governor works by adjusting the pitch of the helicopter's main rotor blades to control the amount of lift generated. If the rotor speed increases beyond the desired RPM, the governor reduces the pitch of the blades to decrease lift, and conversely, if the rotor speed decreases, it increases the blade pitch to generate more lift.

The original Bell 47J, however, does not have a governor for playability, iniBuilds has added one. You can turn it on and off via the EFB and an additional switch in the cockpit.

Setting the EFB option to 'AUTO' will automatically engage the governor when the engine RPM is above 2400, regardless of the governor switch position on the main instrument panel. When the governor is engaged it will attempt to maintain an engine speed of 3100RPM.



Setting the EFB option to 'MANUAL' will enable the governor switch on the main instrument panel.





Setting the governor switch to 'ON' will **enable** the auto governor maintaining an engine RPM of 3100.



Setting the governor switch to 'OFF' will **disable** the auto governor, meaning the pilot will need to control the engine RPM manually in the green arc using the "SET HELICOPTER THROTTLE AXIS" or "PROPELLER AXIS" commands.



Bell 47J Ranger Specifications

Cruise Speed: 70 KTAS

Max Altitude: 11,000 FT

Max Weight: 2,850 Lbs

Range: 224 NM

Fuel Capacity: 49 Gal

Length: 31.5 Ft

Main Rotor span: 37 Ft 2 In



Electronic Flight Bag (EFB)

Within the cockpit is an EFB which allows for some key functions of the helicopter to be accessed.

There is a moving VFR Map, which will show your route if set within the World Map.

The Home page allows you to view the METAR of your departure and arrival airfield.

The Settings page allows you to switch the NAVCOM panels between Classic and Modern cockpit. There is an option to enable or disable automatic governor operation as previously discussed in this manual. For the float variant there is an option to add and remove the access ladder.

There is also an option to show / hide a rain cover on both variants.

We have also included an option to add a windshield datum mark to indicate the approximate attitude required in level flight to maintain 60 knots.



Home Page





Map page



Settings page Skids variant





Settings page Floats variant (for stairs)

See below for details about setting the various options.



The EFB can be hidden. Click the Rivet on the main instrument panel just to the left of the EFB to hide the EFB. Click the Rivet again to display it.



Classic Cockpit

We have included an option to hide the GPS and transponder units to provide a classic cockpit experience. This also enables an older style VHF radio panel on top of the main instrument panel.

Go to the Settings page and Toggle Classic Cockpit which will hide the modern units.



Classic Cockpit



Modern Cockpit



Radio and Transponder Functions

There are modern navigation, radio and transponder units installed into the aircraft on the main instrument panel, which have been adapted for use in Microsoft Flight Simulator using the default ATC system.

You can either use the in-sim ATC window to change radio frequencies and SQUAWK code for the transponder automatically, or manually tune them based on instructions given by in-sim ATC or an external provider such as VATSIM or IVAO.



Please see below on how each individual unit works in-sim.

Note: Modern Cockpit needs to be enabled to use the transponder system.



Classic Radio Unit

The aircraft has a conventional radio unit that is linked into the in-sim Air Traffic Control (ATC). Automatically using the in-sim ATC window whereby the radio will auto-tune to the frequency set by ATC, or manually tuned by the pilot which is still functional with ATC.



Radio Button Functions:

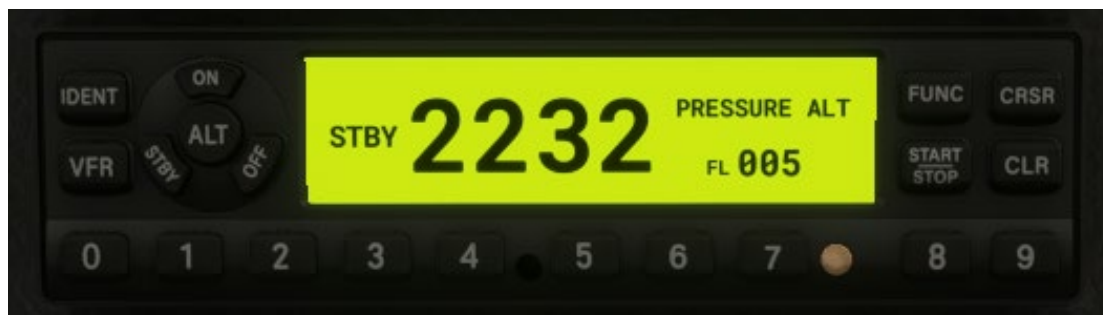
1. Power Switch
2. Frequency Display
3. VHF Source Selector Switch
4. MHZ Adjust
5. Volume Adjust
6. KHZ Adjust



Modern GTX Transponder Unit

The aircraft has a functional modern Transponder unit that is linked into the in-sim Air Traffic Control (ATC) that can be operated in two modes.

Automatically using the in-sim ATC window whereby the transponder will auto-tune to the frequency set by ATC, or manually tuned by the pilot which is still functional with ATC.



Transponder Button Functions:

IDENT: Activates IDENT for 18 seconds then shuts off

VFR : Swap between VFR code and current code

ON : Set XPDR to On Mode

STBY : Set XPDR to Standby Mode

ALT : Set XPDR to ALT Mode

OFF : Set XPDR to Off

FUNC: Changes the function section page on the right of the code characters with the following available pages:

- Current flight time
- Altitude Monitor
- Outside Air Temperature (OAT) reading and DALT level
- Flight ID
- Count up timer (start/stop/clear)
- 3 minute count down timer (start/stop/clear)

START/STOP: Starts/Stops Altitude Monitor, Count Up, Count Down and Flight timers

CRSR : Initiates starting time entry for Count Down timer and cancels code entry

CLR : Resets/Cancels data entry

0-9 buttons: Starts XPDR code entry

Both the radio and transponder are fully tied into the in-sim ATC functionality.

Either manual tuning on the units themselves or auto-tuning from the ATC panel or in-sim AI Radio Communications (ATC) works.



Modern GNS430 Audio/Nav Unit

The Bell 47J has a functional GNS audio/nav unit using the standard Working Title GNS430 system.



1. COM Power/Volume
2. COM Flip-flop
3. VLOC Volume
4. VLOC Flip-flop
5. Outer left knob
6. Inner left knob
7. CDI
8. OBS
9. MSG (message)
10. FPL (flight plan)

11. PROC (procedures)
12. Range
13. Direct To
14. Menu
15. CLR (Clear)
16. ENT (Enter)
17. Outer right knob
18. Inner right knob



Rain Cover

Using the EFB option for rain cover will show or hide the rain cover from the external and cockpit views.

The cover will auto-hide as soon as the rotor starts spinning.



Floats Stairs

Enabling the stairs on the EFB will show them on the right-hand side float.
The stairs will auto-hide as soon as the rotor starts spinning.



Windshield Datum Mark

Within the EFB Settings page there is an option to show or hide a Windshield Datum Mark. This will add a grease mark line on the front windshield to indicate the approximate attitude required in level flight to maintain 60 knots.





Cockpit Layout



1. Mixture
2. Engine Anti-Ice
3. Fuel Gauge
4. Magneto
5. Battery
6. Generator
7. Fuel Switch
8. RPM
9. Air Speed Indicator

10. Manifold Pressure
11. Altimeter
12. Temperatures
13. Oil Pressure
14. CHT
15. Oil Temperature Gauge Selector
16. Electrical Load
17. Compass





1. Floor Fan
2. Governor
3. Beacon Light
4. Nav Lights (Skids)



1. Engine Start
2. Landing Light
3. Throttle





- 1. Cockpit Light
- 2. Door Open/Close



- 1. Door Open/Close



Before Engine Start

Flight Controls Check
Cyclic Control Stick Centered
Mixture Control Rich
Carburetor Heat Control Cold

Engine Start

Master Battery On
Generator Switch On
Fuel Switch On
Throttle Slightly Above Idle
Mixture Rich
Starter DEPRESS
Ignition Switch Both

After Engine Start

Engine Idle
Oil Pressure Check 65 PSI
Throttle Increase
Engine RPM 2200 RPM
Oil Temperature Check 40 C Minimum
Throttle Increase
Engine RPM 3100 RPM

Magneto Test

Engine RPM Check
Ignition Switch Select L
Engine RPM Value Drop Check
Ignition Switch Both
Engine RPM Value Check Returns to Normal
Ignition Switch Select R
Engine RPM Value Drop Check

Hover

Clearance Obtain
Hover Taxi Slowly

Take Off

Collective Increase
Cyclic Forward
Rotation 30 KIAS Then Apply Backward Cyclic to Climb
Climb Speed 45-50 KIAS

Cruise

Engine Temperatures and Pressures Check
Carburetor Heat Control As Required
Fuel Quantity Check

Approach

Approach Speed 50 KIAS
Carburetor Heat Control As Required
Descent Rate 500 FT/MIN

Landing

Flare At 50 FT
Collective Increase

Taxi In

Clearance Obtain
Hover Taxi Slowly

Parking

EngineIdle
Cyclic Control Stick.....Centered
MixtureCut-Off
Ignition Switch Off
Main Rotor Pitch (Raise Collective)..... Increase
Generator Switch Off
Master Battery Off