Grumman Albatross (HU-16E & G-111)

Pilot's Guide

for Microsoft Flight Simulator 2024 & 2020

Version 2.3.6 (FS 2024)
&
Version 1.3.5 (FS 2020)

DO NOT USE IN REAL AIRCRAFT

Preface

Welcome to the Grumman Albatross for Microsoft Flight Simulator 2024 & 2020. This manual is intended to aid in understanding and navigating the peculiarities of the Albatross' systems and handling, and to help get the most satisfaction and enjoyment out of each flight in this versatile and rugged aircraft.

Introduction to the HU-16E

The HU-16E Albatross is a twin-engine amphibious seaplane developed and manufactured by American aerospace firm Grumman. The “E” variant is an evolutionary iteration of the original HU-16 design, the prototype of which took its maiden flight on October 24, 1947. The HU-16E was used by the United States Coast Guard from 1951 to 1983 for several maritime mission sets.

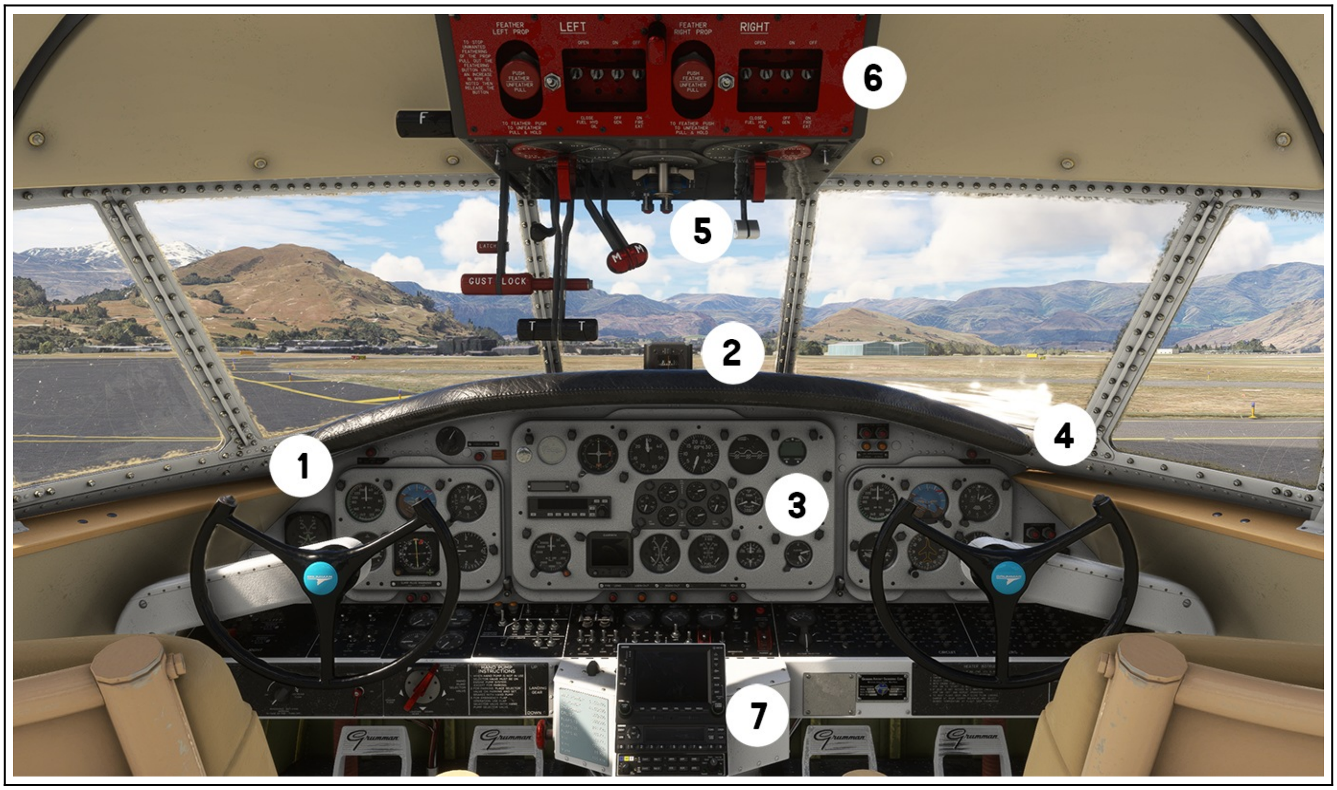
Grumman used their Mallard airframe for the base of their G-64 project, a military multi-role amphibious seaplane. The prototype, called the XJR2F-1 Pelican, took its maiden flight on October 24, 1947. This airframe would undergo several evolutionary developments and would ultimately be called the HU-16 Albatross.

The HU-16E variant, which was used by the United States Coast Guard, has a larger wing than initial versions, giving it better performance. It proved an exceptional aircraft during its operational tenure for the service as it could operate from both land and water, boasted a spacious interior, was rugged and reliable, and had great endurance. The aircraft, called the “Goat” by its pilots and crew, performed a wide array of missions for the Coast Guard, including maritime search and rescue, patrol, transport of personnel and cargo, medical evacuation, and general maritime operational support. It participated in several specialized and high-profile operations, including patrols during the Cuban Missile Crisis.

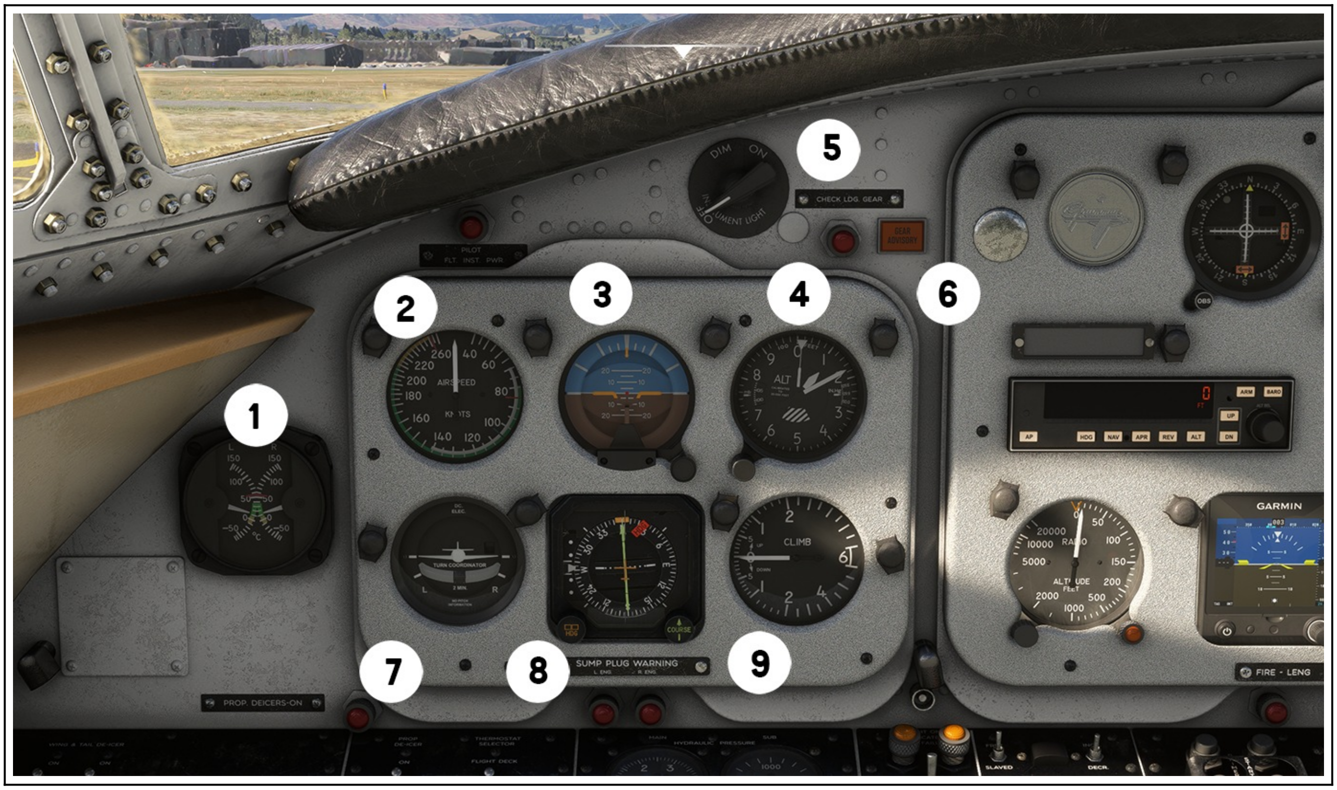
HU-16E General Specifications

Wingspan	96 feet, 8 inches
Length	61 feet, 3 inches
Height	25 feet, 10 inches
Powerplant	2 x Wright R-1820-76B Cyclone 9-cylinder, radial piston engines, 1425 HP each
Maximum Range	2300 NM
Cruise Speed	145 KTAS

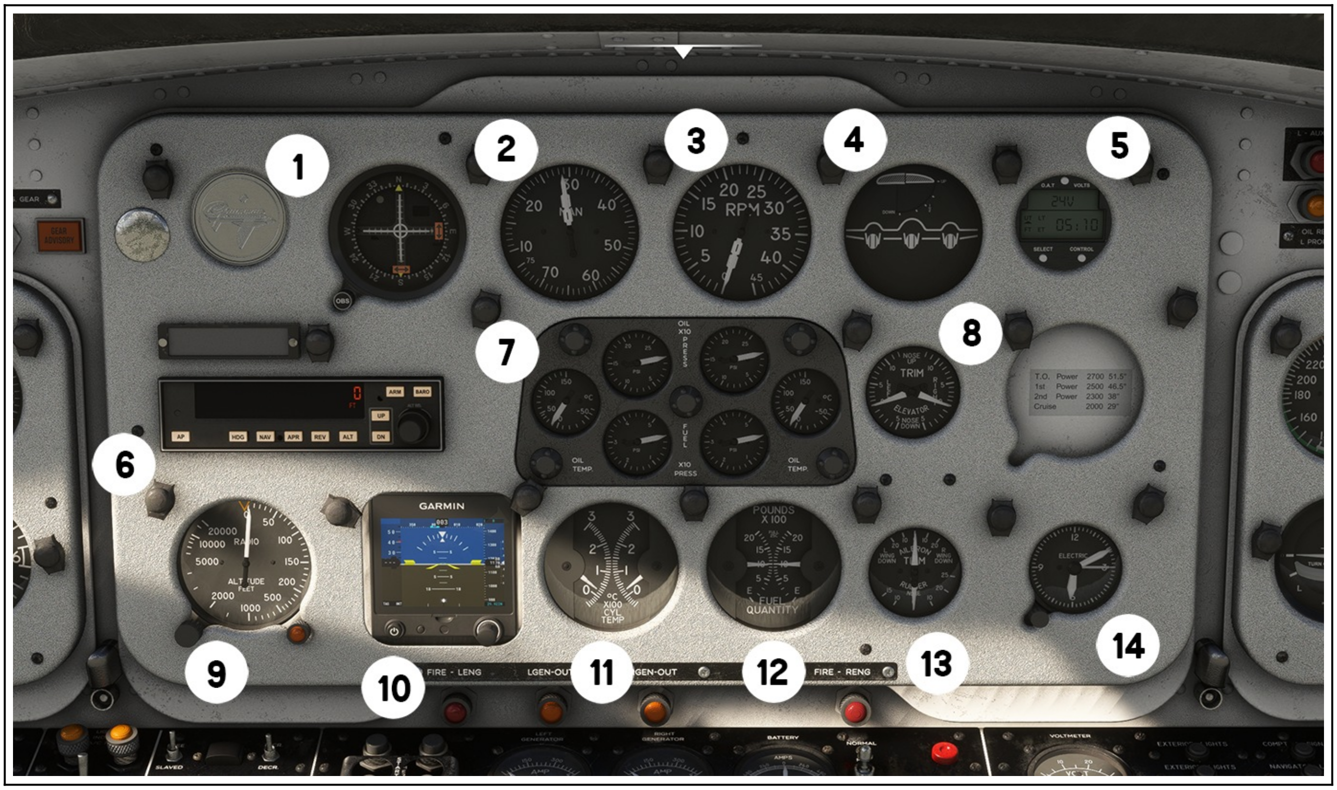
GENERAL COCKPIT ORIENTATION (HU-16E)



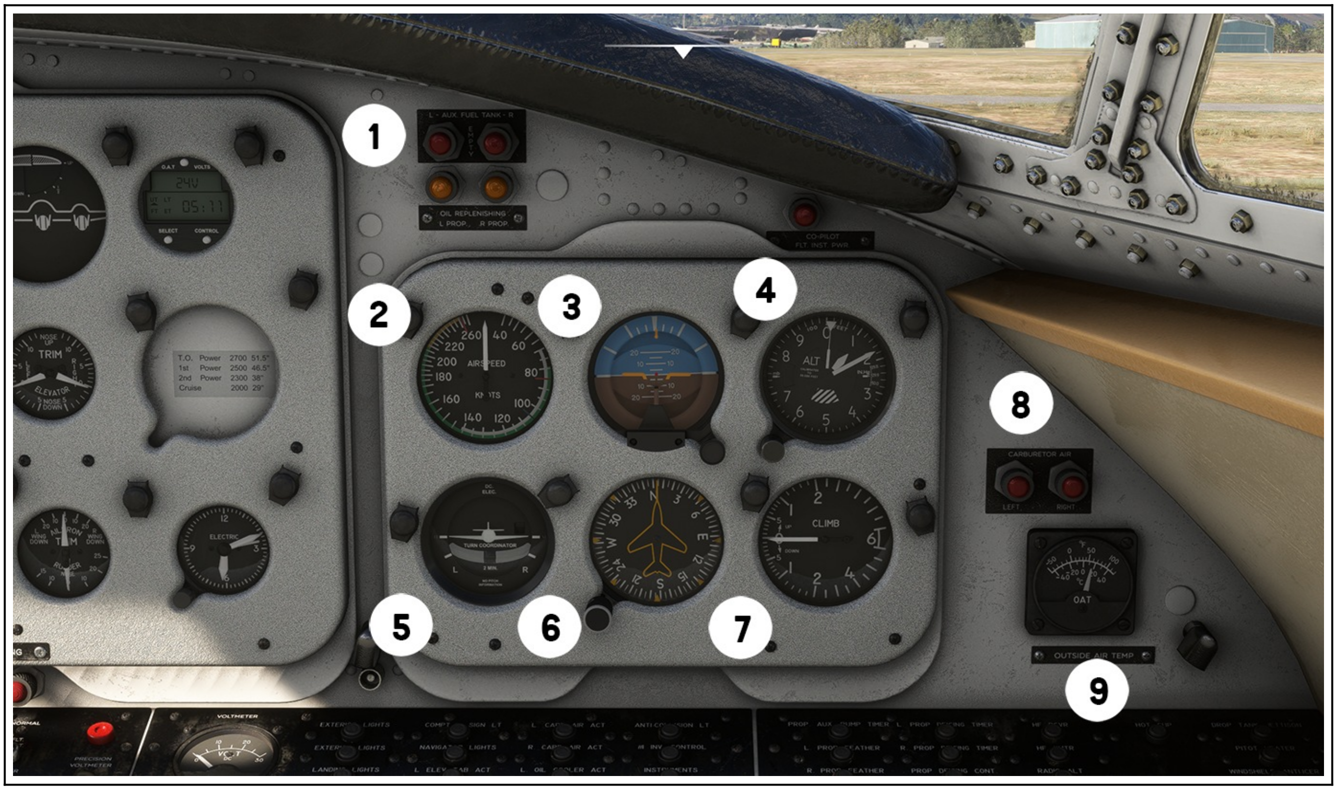
1. Flight Instruments (Pilot's Side)
2. Compass
3. Engine Instruments & Systems Indicators
4. Flight Instruments (Co-pilot's Side)
5. Engine Controls
6. Emergency Controls
7. Radio Stack (Garmin GNS 530, Transponder, Audio Panel)



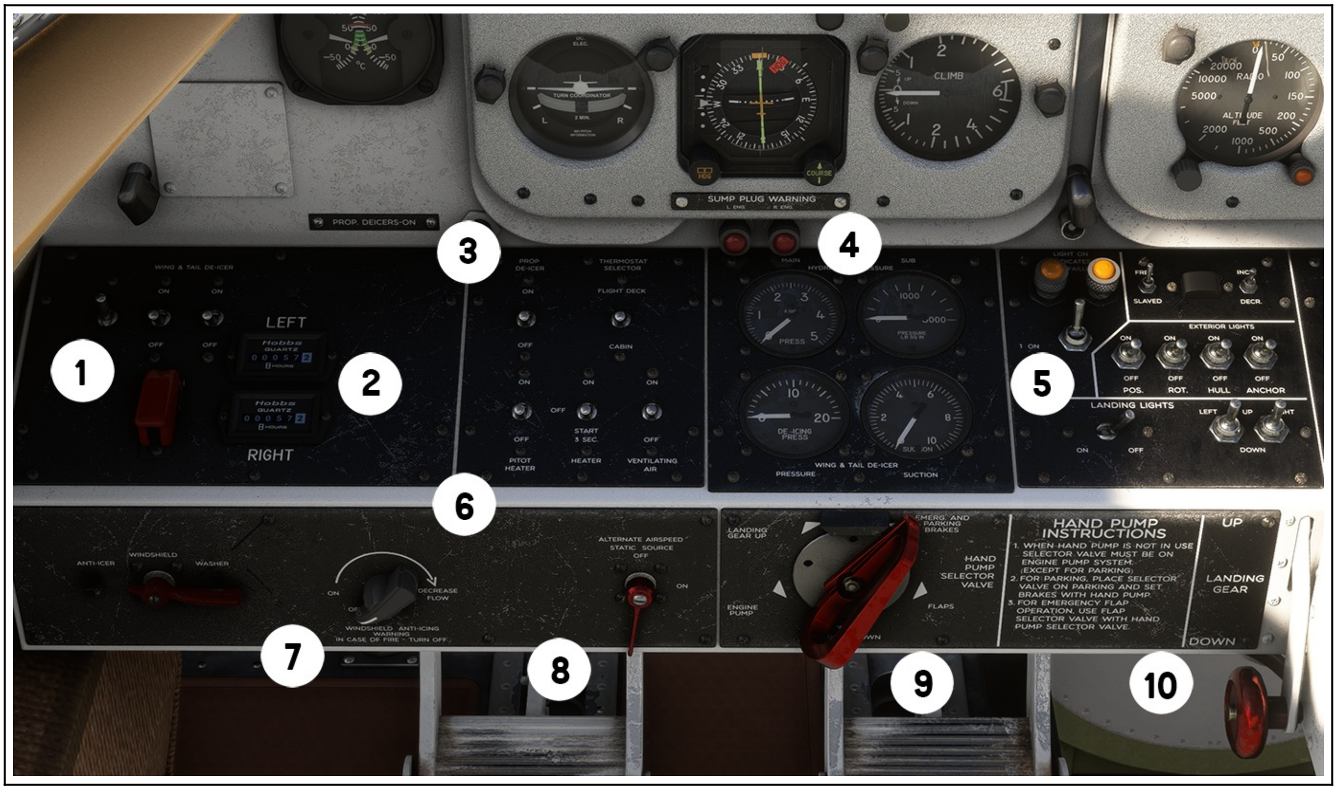
1. Left & Right Engine Carburettor Air Temperature Indicators (deg. Celsius)
2. Airspeed Indicator (in Knots)
3. Attitude Indicator
4. Altimeter (in Feet)
5. Instrument Lights Brightness Control
6. Landing Gear Warning Lights
7. Turn Coordinator
8. Horizontal Situation Indicator (HSI)
9. Vertical Speed Indicator (Feet per Minute x 1000)



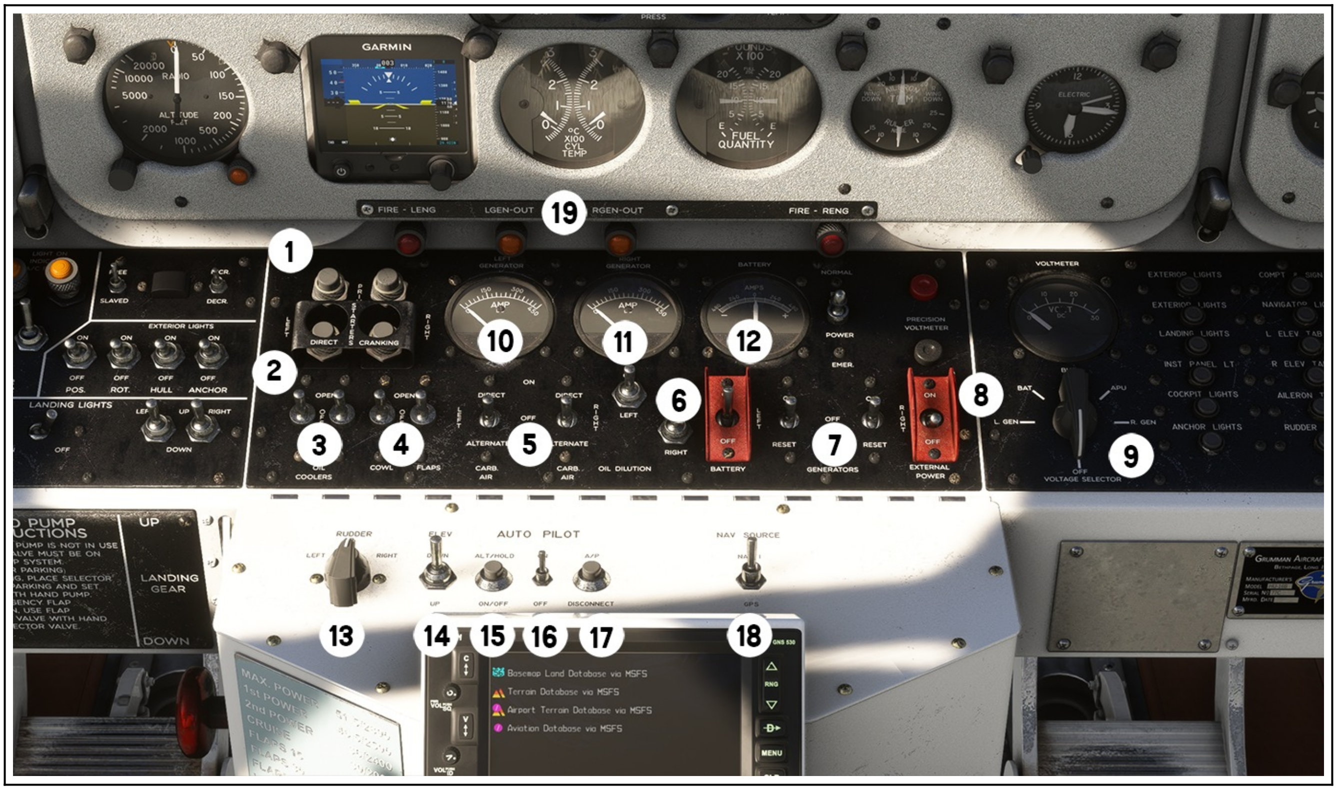
1. OBS (Omni Bearing Selector, Nav 1 Radio)
2. #1 & #2 (Left & Right) Engine Manifold Pressure Indicators (in inches of Mercury)
3. #1 & #2 (Left & Right) Engine Tachometers (in revolutions per minute)
4. Landing Gear and Flaps Position Indicators
5. Chronometer / Timer
6. Autopilot
7. Left and Right Engine Fuel Pressure (Psi), Oil Pressure (Psi), and Oil Temperature (degrees Celsius) Indicators
8. Elevator Trim Position Indicators
9. Radio Altimeter (in Feet)
10. Backup Attitude Indicator and MFD
11. Left & Right Engine Cylinder Head Temperature Indicators (degrees Celsius)
12. Fuel Quantity Gauges (Left and Right Main Tanks only, in pounds)
13. Aileron and Rudder Trim Indicators
14. Clock



1. Auxiliary Fuel Tank Pump Dry Indicator Lights
2. Airspeed Indicator (in Knots)
3. Attitude Indicator
4. Altimeter (in Feet)
5. Turn Coordinator
6. Gyro Heading Indicator (in degrees)
7. Vertical Speed Indicator (Feet per Minute x 1000)
8. Left and Right Engine Carburettor Alternate Air (Max Carb. Heat) Indicator Lights
9. Outside Air Temperature (in degrees Celsius)



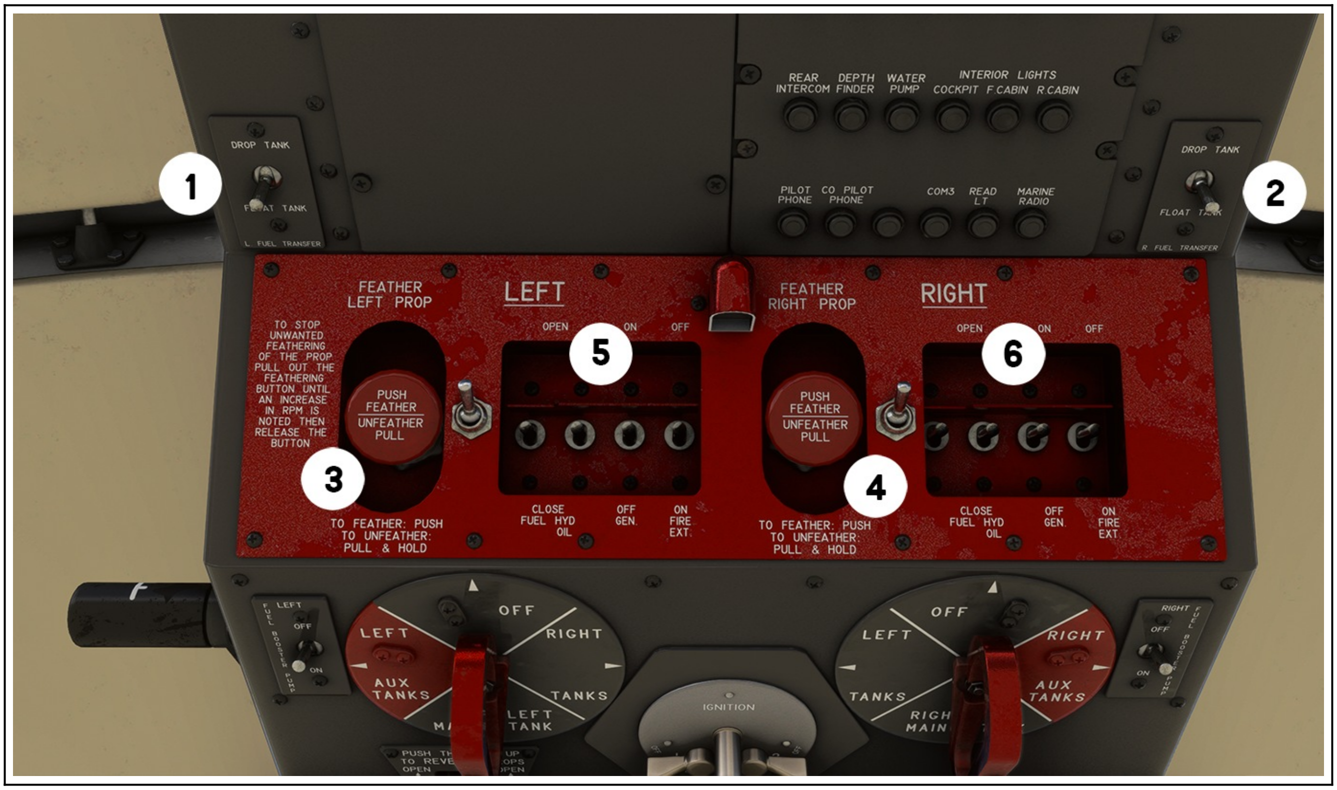
1. Wing & Tail (Structural) De-ice Boot Switches
2. Hobbs Engine Time Indicators (in hours)
3. Propeller De-ice Switch
4. Hydraulic System & Structural De-ice Pressure Gauges (in Psi)
5. Exterior Lighting Switches
6. Pitot Heater Switch
7. Windshield De-ice Switch
8. Alternate Static Air Source Control
9. Backup Hydraulic Line Selector
10. Landing Gear Selector



1. Engine Primer Buttons
2. Engine Starter Buttons
3. Engine Oil Cooler Flap Switches
4. Engine Cowl Flap Switches
5. Alternate Carburettor Air (Carb Heat) Switches
6. Master Battery Switch
7. Generator Switches
8. External Power Connection Switch
9. Voltmeter Bus Selector Knob
10. Left Engine Generator Current Load (in Amperes)
11. Right Engine Generator Current Load (in Amperes)
12. Battery Bus Current Load (in Amperes)
13. Rudder Trim Knob
14. Elevator Trim Switch
15. Autopilot Altitude Hold Toggle Button
16. Autopilot On/Off Switch
17. Autopilot Disconnect Toggle Button
18. Localizer Nav Source Switch (GPS / Nav 1 Radio)

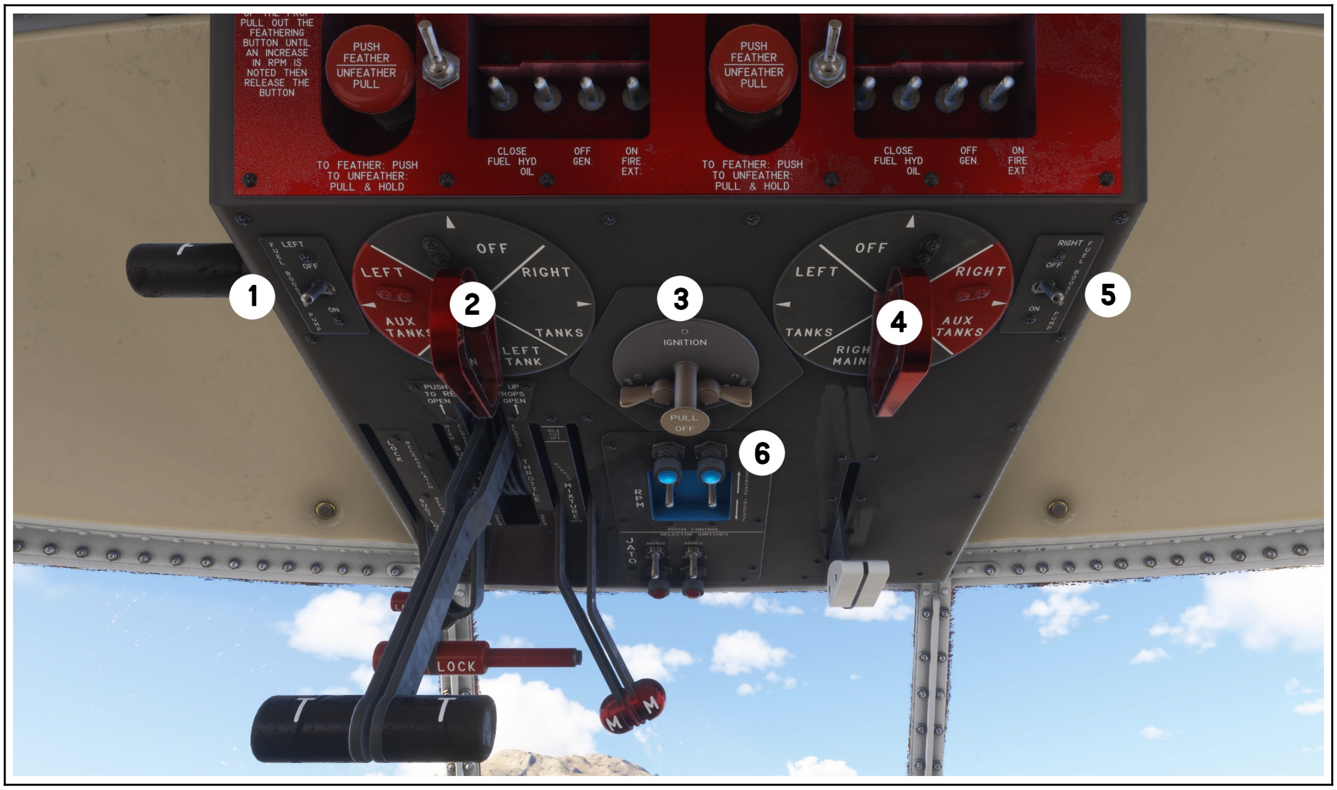
HU-16 Legacy Avionics Panel Option:

The HU-16 is fitted with two choices for avionics and navigation instruments: the default GNS 530 GPS version, and an older dual VOR plus ADF radio stack version. These two panel versions can be switched between via the “Modern Avionics” checkbox on the clipboard, located to the left of the pilot’s seat. This setting is persistent between sessions. For further information please see the “Accessories Clipboard” section near the end of this manual.



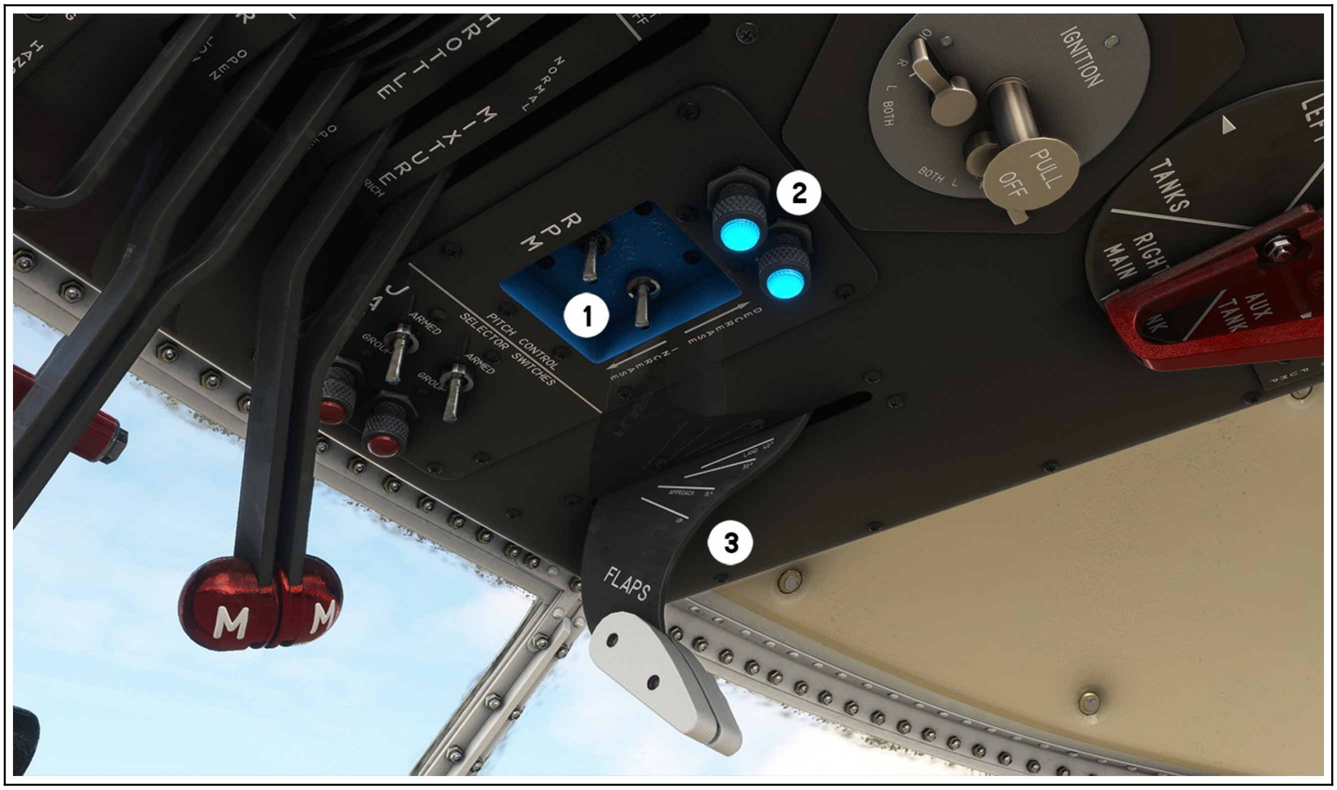
1. Left Side Tanks Fuel Transfer Pump
2. Right Side Tanks Fuel Transfer Pump
3. Left Engine Propeller Feather Switch
4. Right Engine Propeller Feather Switch

5 & 6.
"Crash Bars" and Emergency Cutoff Switches for Left and Right Engines: (Fuel, Hydraulics, Generator, Fire Extinguisher)

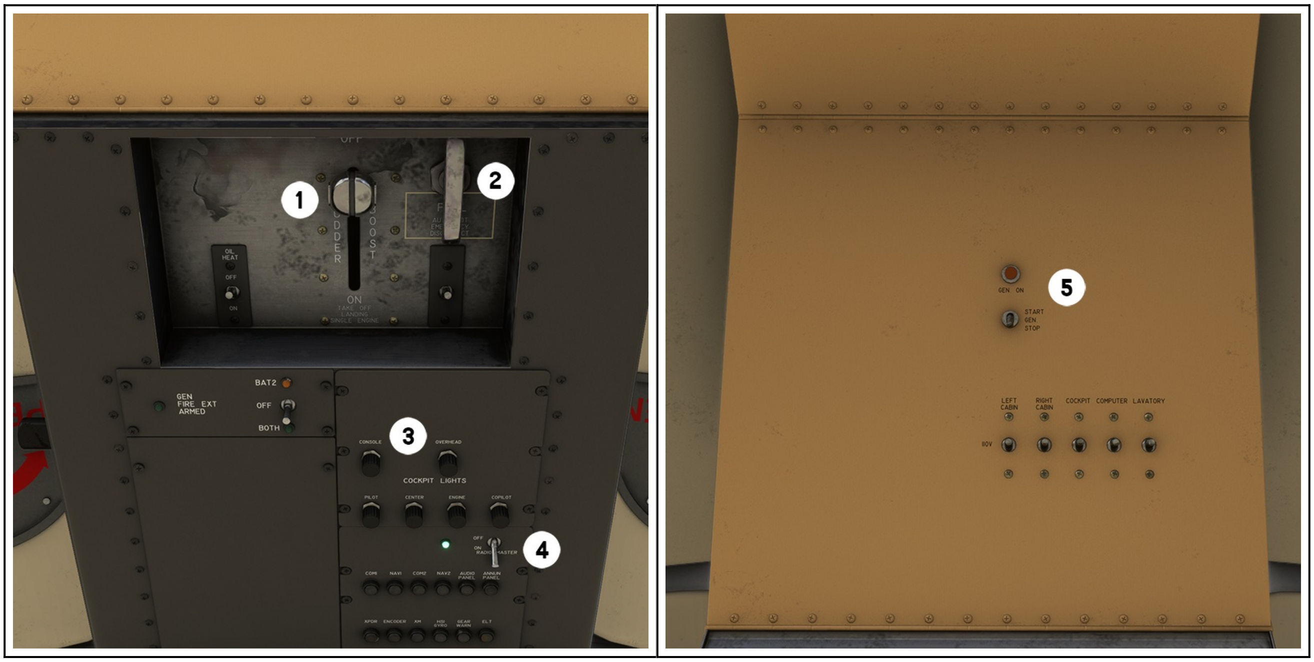


1. Left Engine Auxiliary Fuel Pump Switch
2. Left Engine Fuel Tank Selector
3. Left and Right Engine Magneto Switches
4. Right Engine Fuel Tank Selector
5. Right Engine Auxiliary Fuel Pump Switch
6. Master Ignition Switch

1. Supercharger Gear Control Lever
2. Gust Lock Lever Release Latch (Pull to allow Gust Lock movement)
3. Gust Lock Lever (Forward position = Unlocked, Aft position (shown) = Locked)
4. Throttle Levers
5. Mixture Levers



1. Propeller RPM Control Switches
2. Propeller RPM Limit Indicator Lights
3. Flaps Control Lever



1. Rudder Boost Control Knob
2. Autopilot Disconnect Switch
3. Interior Lighting Knobs
4. Avionics Master Switch
5. Auxiliary Power Unit (APU) Switch

1. Manual Hydraulic Pump Handle

Introduction to the G-111

The G-111 is a twin-engine amphibious seaplane developed and manufactured by American aerospace firm Grumman. It is a civilian variant of the Grumman HU-16 Albatross aircraft used by the U.S. Coast Guard and U.S. Navy. To produce the G-111, Grumman reconditioned previous HU-16 airframes for civilian passenger transport. Called the G-111 Albatross, Grumman also marketed the amphibious seaplane as the G-111 Caribbean. The G-111 is piloted by two and was initially configured to carry up to 28 passengers. Grumman initially planned to build 57 G-111s but ultimately only 13 were produced.

The G-111 Albatross, re-manufactured by Grumman from the late 1970s to the early 1980s, maintains all the ruggedness and reliability of the original HU-16 airframes, with added comfort for passenger service. The ability to operate out of land facilities and on water, including rough seas, makes the G-111 Albatross one of the most versatile aircraft ever created. Despite somewhat successful but brief careers as small regional airliners, most of the G-111s were eventually sold off to private owners, who then heavily updated their furnishings and avionics, effectively turning them into flying yachts. This rendition closely matches one such real world modernized G-111 example and includes advanced flat-panel avionics in the cockpit.

G-111 General Specifications

Wingspan	96 feet, 8 inches
Length	61 feet, 3 inches
Height	25 feet, 10 inches
Powerplant	2 x Wright 982CH9HE3 9-cylinder radial piston engines, 1475 HP each
Maximum Range	1480 NM
Cruise Speed	145 KTAS

GENERAL COCKPIT ORIENTATION (G-111)

NOTE: As most primary controls and functions are similar between the HU-16E and G-111 Albatrosses, this section focuses only on those items unique to the G-111's layout.

The G-111 comes with two avionics options: the Garmin G1000 suite, or Garmin G3X Touch suite. These are selectable through the "Variants" list in MSFS 2024, and the "Liveries" section in MSFS 2020.

Garmin G-1000 version

1. Garmin G1000 Pilot's Display
2. Garmin G1000 Co-Pilot's Display
3. Garmin G1000 Navigation Display (With Autopilot controls)

1. Elevator Trim Failure Light & Pitot Heater Active Light
2. Gear Configuration and Position Indicator Lights
3. Garmin Audio Panel

1. Propeller Continuous “Safe” Operation RPM Lights
2. Fuel Totalizer
3. Vertical Card Compass
4. #1 & #2 (Left & Right) Engine Torque Pressure Indicators (in Psi x100)
5. Propeller Reverse Beta Active Lights

1. Left & Right Engine Status Warning Lights (Oil Pressure, Fuel Pressure, Generator etc.)
2. Fuel Transfer Pump “Tank Dry” Lights & Alternate Air (Max. Carb Heat) Lights

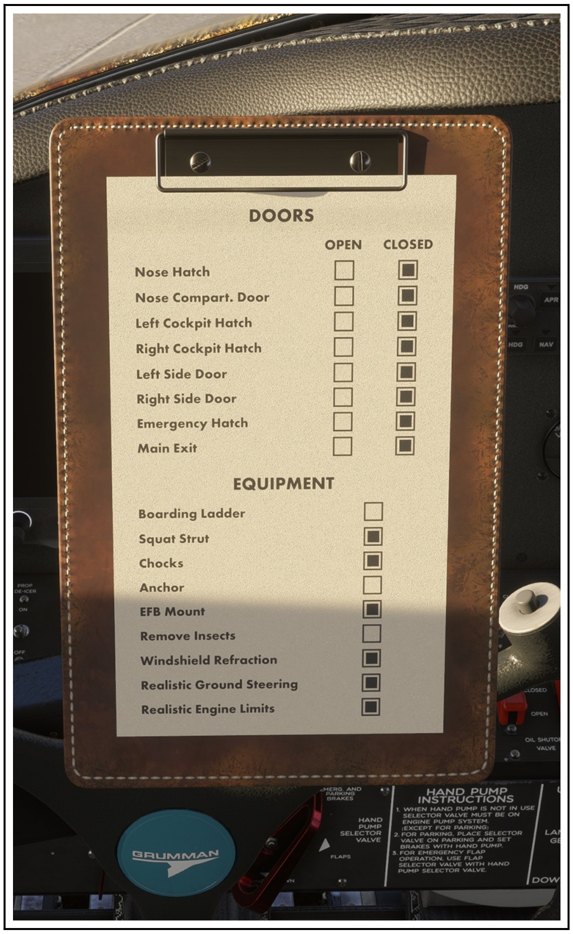
1. Exterior Lighting Control Switches
2. Elevator Trim Switch and Position Indicator
3. Aileron and Rudder Trim Switches and Position Indicators

Garmin G3X Touch version

1. Garmin G3X Pilot’s Display
2. Garmin G3X Co-Pilot’s Display
3. Garmin G3X MFD
4. Garmin GMC 307 Autopilot Control Head

SYSTEMS OPERATION:

Accessories Clipboard



An accessories clipboard is located to the left of the pilot's seat in each aircraft. This board is provided as a convenient access point for several important functions, such as: opening and closing the aircraft's doors, enabling realistic engine limits, choosing the nose wheel steering mode, deploying or stowing the wheel chocks, sea anchor, boarding ladder, and squat strut, disabling the sim's blue control highlights, activating the pushback function, and hiding the EFB and its mount, if so desired.

NOTE: The options available on the clipboard will vary between MSFS 2024 and 2020 depending on each sim's features, and between the HU-16E and G-111 Albatrosses, depending on their installed equipment.

Click the top edge of the board to move it into position in front of the yoke, and click again in the same place to stow it.

The "Realistic Engine Limits" option, if selected, will enable engine damage, and even failure, if the engines are mistreated. See the "Engine and Propeller Management" section later in this manual for further details. This option is disabled by default.

The "Realistic Steering" option, when activated, disconnects direct nosewheel steering from the rudder control, and changes the nosewheel into a free castering type. In this mode you must use careful differential braking and thrust modulation to manoeuvre the aircraft on the ground. This is how the real Albatross works, however it can be somewhat challenging to operate differential brakes smoothly in the sim unless you have physical rudder pedals equipped with individual toe brake axes. This option is disabled by default.

The “Remove Insects” checkbox can be used to remove accumulated insects from the aircraft’s windshield and airframe. If this box is left checked then it will prevent any further insects appearing on the aircraft. The Albatross’ windshields also feature realistic distortion and refraction common in aviation acrylics, however this can be disabled via the clipboard as well if so desired.

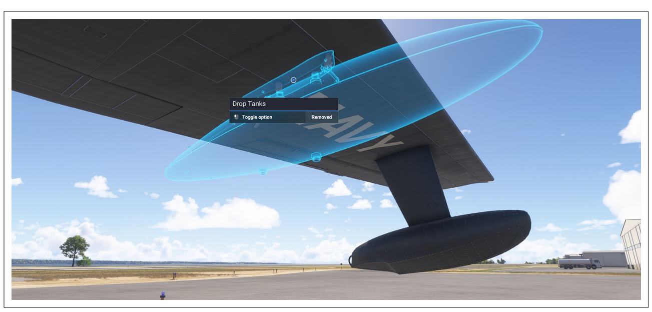
Note: The “External Fuel Tanks”, “Realistic Engine Limits”, “Realistic Ground Steering”, “Windshield Refraction”, “Remove Insects”, “EFB Mount”, “Disable Blue Highlights”, and the HU-16’s “Modern Avionics” options are all saved and remain persistent between sessions. All other selections are reset with each new flight.

External Fuel Tank Installation & Removal

As of the MSFS 2024 Albatross v2.3.3 update (and 2020 v1.3.5 update), the external fuel tanks, aka “Drop Tanks”, are now user installable and removeable, rather than permanently attached to specific variants.

The external tanks can be toggled on or off via the accessories clipboard in the cockpit, or installed and removed manually in preflight / walkaround mode (2024 only) by clicking on their respective wing pylon connection points.

Note that the fuel tanks are installed or removed as *a pair* for balance reasons, so activating either pylon will install or remove both tanks at once.



IMPORTANT EXTERNAL TANK OPERATING NOTES:

- The external tanks can *only* be removed or installed while the aircraft is stationary on the ground (or on water) with both engines shut down.

- The tanks and their pylons do significantly increase the aircraft's parasite drag when installed, so if they are not required for your currently intended flight it may be advantageous to remove them.

- Removing the external tanks will also drain all of their fuel. After (re)installation they will be empty and will need to be filled via the EFB (2024) or Weight and Balance menu (2020).

- There is currently no provision for dropping the tanks in flight. This may or may not come with a future update.

The external tanks will be installed by default during your first flight in the Albatross, but after that your tank installation choice will be persistent between sessions, per Albatross type. Installing the tanks on the G-111, for instance, will install them for *all* G-111 variants and liveries, however the HU-16 versions will remain unaffected, and vice versa.

Operating with the "Realistic Engine Limits" Option

When choosing to operate the Albatross with "Realistic Engine Limits" turned on, via the options clipboard, there are some extra engine health parameters and practices that you will need to be aware of and correctly manage for a successful flight. NOTE: You can enable this option at any time, however it can only be *disabled* when the aircraft is on the ground with both engines shut down.

Supercharger and engine RPM limits:

The engines on the Albatross can only be run above 46.5" manifold pressure and/or 2500 RPM for a *maximum of five minutes*. Beyond that time limit the components of the supercharger can become overheated and potentially blow their gaskets or fail entirely. If you have enabled "Realistic Engine Limits" you must pay *careful* attention to the duration of your high power settings and ensure that you are never above METO (Maxmimum Except TakeOff) power continuously for more than a few minutes. "METO" is 46" MAP and 2500 RPM. This "five minute rule" should be taken as a hard limit, and if possible you should endeavour to remain well under it. However, if you are forced to run the engines at full power for more than three minutes, you should reduce power and rpm as soon as possible and let them cool for *at least* 15 minutes before any further full power operation.

If you suffer engine damage or experience loss of power, you should immediately reduce that engine's output to less than 30" of manifold pressure and bring the RPM down to 2300 or less. If the engine continues to lose power or fails, immediately cut off its mixture lever, turn off its magnetos and leave the throttle open for a few seconds to extinguish any potential internal fire. Push in the appropriate feathering button on the overhead panel, wait for the engine to stop turning, and then cut off its throttle.

Oil temperature limits:

With realistic engine limits activated you will also need to pay close attention to the oil temperature of each engine during all phases of flight. Exceeding an oil temperature of 100 degrees C will begin to vapourize the oil, initially resulting in excessive smoke from the exhausts, and eventually progressive and severe loss of pressure as the oil continues to absorb heat. This resulting loss of pressure will very rapidly lead to oil starvation and total engine failure. Avoiding overtemp conditions will require you to manage the oil cooler doors, via their switches on the center instrument sub panel, and, depending on the conditions, possibly reduce your power settings and increase airspeed.

During normal operation of the airplane you should endeavour to maintain an oil temperature of between 70 and 75 degrees Celsius at all times if possible.

During engine startup the oil will typically be too cold for normal operation, and the oil cooler doors should be set to fully closed until the oil reaches at least 50 degrees C. During taxi you can set the oil cooler doors to approximately half open to maintain an even temperature.

For takeoffs, if the available runway distance is low, you should close both the oil cooler doors and cowl flaps entirely to minimize drag. If runway length is not an issue then the doors can be left open for extra cooling.

During a long climb is where you will need to monitor the oil temperatures most closely. At full power and maximum RPM, the engines' heat output may be slightly too high for the oil coolers to handle, even with fully open doors. In this case you must reduce power and RPM to "METO" settings as soon as possible after takeoff, however, under very hot conditions even this may be insufficient to cool the oil. If so it is recommended to reduce your climb rate and RPM, and increase speed. The additional airflow and lower power demand should be enough to get temperatures back into the normal range. If neccessary, and if the terrain allows it, you can also use a stepped climb profile after takeoff to help get temperatures under control.

During cruise you can normally close the oil cooler doors down to around 20% open, or less if ambient air temperature is very low. They can remain similarly closed down during descent, all the way to final approach.

During short final, if the oil temperature isn't too low, the doors should be partially opened again in preparation for a possible go-around.

Spark plug fouling:

In addition to the potential for catastrophic engine damage, you may also experience mild to severe spark plug fouling if the mixture levers are not set correctly in each phase of flight.

If the mixtures are continuously left in the "rich" setting, especially while at idle or low throttle settings, then carbon and other partial combustion byproducts will begin accumulating on the spark plugs almost immediately. The richer your mixture and the lower your power setting the faster this occurs. It can still occur at higher power settings, such as in cruise, but usually at a slower rate.

If you encounter plug fouling it will present initially as a slight reduction in power. If not cleared it will continue to worsen into audible engine ‘hunting’ and loss of RPM, eventually leading to intermittent combustion, and possibly even full engine stoppage if running at idle. At this point the engine may also become very difficult to restart, and require immediate and aggressive clearing if it does start again.

Avoidance of plug fouling however is quite easy, it simply requires using the correct mixture settings for each power setting and phase of flight.

After engine start you should set the mixtures to a position slightly lean of the middle “normal” range, as soon as possible, and then during all taxi operations endeavour to keep them at the minimum setting that will still allow combustion, aka aggressive leaning.

For engine run-up you can move the mixtures forward to “normal”. Full rich is required for full power run-up only. Just prior to takeoff move the levers to rull rich, and leave them there until you reduce the throttles to below 40” MAP, or lower.

For cruise climb (below 40” MAP) you should use the “normal” mixture setting unless engine temperatures are too high for the cowl flaps to dissipate alone.

For maximum range cruise performance and descents you should set the mixtures to slightly lean of “normal”.

When on short final for landing set them to full “rich”, and then lean them aggressively again once you are fully clear of the runway and are cleaning up the aircraft for taxi.

If you do encounter plug fouling, immediately set your mixture to “Normal” and then as lean of that setting as you can manage, *and increase RPM* as much as you can. The leaner your mixture and/or higher your RPM the faster the plug fouling should clear up.

Using the “Pushback” Function

At the bottom of the clipboard is an option to engage the plane’s bespoke pushback function. Due to a specific amphibian multiplayer bug and its workaround, the sim’s native pushback tugs cannot connect to the Albatross. This function is provided as an alternative, and has the extra advantage of working on water as well as on land. To activate the pushback function you can use the clipboard option, or press the “Toggle Pushback” key or control binding (Alt-P by default). Note that the aircraft must be nearly stationary for the pushback to engage, and on land you can steer during pushback with the rudder. Any large increase in forward thrust or motion will cancel the pushback function.

NOTE: This pushback function will not respond to radio calls for a pushback tug.

Fuel Management Notes

Understanding the operation of the Albatross' fuel system will become very important for long flights. While this system is not particularly complex, its functions may not be immediately obvious.

Both variants of the Albatross have left and right main wing fuel tanks (340 gallons each), auxiliary tanks inside the wing floats (212 gallons each), and optional under-wing external (drop) tanks adjacent to the engine nacelles (295 gallons each).

The fuel quantity gauge on the main instrument panel displays the fuel remaining in the left and right main wing tanks *only*. There is no provision for displaying the fuel level inside the float tanks or in external tanks.

The fuel tank selector handles on the overhead panel will allow you to set each engine to run from the main tank on its own side of the aircraft (left or right), the auxiliary (float) tank on that same side, or from the main tank on the *opposite* side of the aircraft (aka cross-feed). There is no mechanism for the engines to draw fuel directly from external tanks. For this you will need to use the transfer pumps.

The aircraft is equipped with two fuel transfer pumps, each with dual intake lines, allowing fuel to be moved from either the float tanks or drop tanks into the main tanks on the same side of the aircraft. Fuel can be pumped from only one tank at a time (float or drop) and only *towards* the corresponding main tank. There is no option for reverse flow pumping nor is there any mechanism for cross-feed pumping.

The transfer pump switches can be found on the cockpit overhead panel, directly aft of the propeller feathering and engine emergency switches (red panel section). Each switch handles its corresponding side of the aircraft (left or right) and has three positions:

Float Tank → Main Tank / **OFF** / Drop Tank → Main Tank

When using the transfer pumps you should make sure to run both left and right side pumps at the same time and in the same flow direction to maintain good lateral balance of the aircraft. Failure to do so may present trimming problems later in the flight.

Typically both fuel selectors should be set to their respective "Main Tank" position for start-up and all other phases of flight. Once the aircraft reaches a safe altitude after takeoff both transfer pumps should be set to "float → main" mode to begin pumping fuel from the float tanks to the main tanks.

Once the float tanks have been nearly depleted a pair of "Aux Fuel" warning lights on the co-pilot's side of the main panel will illuminate (if the transfer pumps are active).

The pumps can then be switched off, or, if external tanks are present they can then be switched to the "Drop Tank → Main Tank" transfer mode. When the drop tanks have been nearly depleted the same "Aux Fuel" lights will illuminate again to indicate a low pump pressure condition. At this point the pumps should be switched off and the remaining main tank fuel consumed.

Note: It is normal practice to transfer and consume as much of the float tank fuel as possible (and then drop tank fuel, if present) during flight before consuming the main tank fuel. This helps to reduce outboard weight and bending stress on the wings from turbulence and landing forces.

Engine & Propeller Management Notes

Throttles:

The throttle levers on the Albatross hang from the overhead panel between the pilot and copilot seats. The throttles can be operated independently or together, and can be pushed upwards from the idle gate position into reverse mode when required, which forces the propeller blades into reverse beta.

Further aft motion of each throttle past this detent increases the amount of reverse thrust provided. Reverse thrust should ***only*** be used during a landing roll or when manoeuvring on the water at low speeds. Use of reverse thrust on the ground to taxi the aircraft backward is never recommended as this can easily result in tipping the aircraft over onto its tail, with resultant damage.

Differential engine thrust is the primary means of directional control on water at low speeds, as the aircraft is not fitted with water rudders, and moderate and careful usage of this can be extremely useful for manoeuvring the aircraft in tight spaces.

Propeller Controls:

The constant speed propeller controls on the Albatross are somewhat unusual. Rather than relying on levers to control the governors, as in most aircraft, the propeller speed limits are selected through two momentary switches (left prop & right prop) located on the overhead panel, in a recessed blue box, next to the mixture levers.

These are three-way switches. Holding a switch forward will continuously increase the RPM limit, while holding it aft will decrease it. The upper and lower limits are 2750 rpm and 1400 rpm respectively. If the propeller governor is set to either the upper *or* lower rpm limit, the light adjacent to that switch will glow blue. You can click in the space between the switches to highlight and activate both at once.

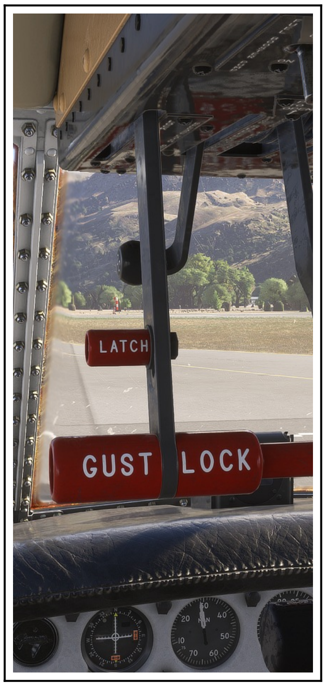
NOTE: These switches set the RPM *limit* of the governors only, not propeller blade pitch directly. Engine torque output and airspeed will determine if those limits can actually be reached.

Supercharger Control:

Both engines are fitted with two-geared superchargers to improve power output, especially at higher altitudes. The gear setting for both engines is controlled via a single small lever (labelled “SC”) on the overhead console, adjacent to the throttles. The low gear (default setting) is intended to be used during all engine operation below 10,000 feet MSL altitude. The high gear is meant for altitudes above 10,000 feet.

The low gear can typically maintain sufficient manifold pressure for cruise flight up to approximately 15,000 feet MSL at relatively low gross weight, however beyond this altitude (or at higher gross weights) the high gear will be required to maintain performance. Moving the lever to the aft position will engage the high gear. Prior to changing supercharger gears the throttles should be slowly reduced until engine manifold pressures fall below a maximum of 35 inches, to avoid over-boosting and potentially damaging the engines. After selecting supercharger high gears, once manifold pressure has re-stabilized, the throttles can then be slowly advanced again as needed.

Gust Lock:



The Albatross is fitted with an integral gust lock system to prevent the control surfaces from being deflected by wind or other forces when the aircraft is to be left unattended. When engaged the gust lock immobilizes the control wheels and columns, and rudder pedals, preventing the ailerons, elevators, and rudder from moving almost entirely. It also blocks forward throttle movement so that taxi and takeoff with the gust lock engaged is rendered impossible.

When the gust lock is in the forward and up position, towards the windscreen, it is disengaged. In its full aft position it is engaged.

The gust lock is itself also guarded by a latch to prevent accidental engagement during flight or disengagement while on the ground.

To engage or disengage the lock first click on the smaller “Latch” handle to permit free lever movement, and then click the “Gust Lock” handle to switch its position. The latch must be released before each gust lock position change.

Squat Strut (Anti-tip brace):

The Albatross comes with an optional “Squat Strut”, which when attached will prevent the aircraft from tipping backwards onto its tail, should the weight and balance limits be exceeded during cargo and passenger loading.

The strut is automatically attached during cold & dark start starts on land, and while in the aircraft configuration menu screens.

The strut can be toggled on or off while in avatar walkaround mode by clicking on the scrape plate under the rear fuselage, or via the options clipboard in the cockpit. Note that the strut will automatically stow if the aircraft begins to move while it is still deployed.

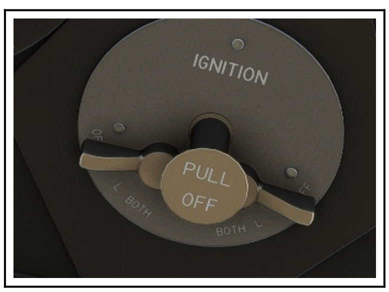
Mixture Controls:

Fuel /Air mixture is controlled via two red handled levers hanging from the overhead panel, adjacent to the throttles. During startup (at low altitude airports), takeoff, and initial climb-out, the levers should be advanced to the full forward position (full rich). When starting the engines at a higher altitude aiport (4000+ foot elevation) you may need to reduce the mixture levers to the midde “normal” setting, or lower, to achieve engine start and maintain combustion at idle.

During taxiing, cruise climbs, and in cruise flight, the levers should be moved to the “normal” position to save fuel. In cruise flight the engines may be run “lean of peak” by reducing fuel mixture slightly aft from the “normal” position. This will improve fuel economy, endurance, and possibly range at the cost of some speed.

Important Note: Due to the fact that the engines are supercharged, and constant manifold pressure can be maintained through throttle position alone, the mixture levers do not need to be (and should not be) reduced with increasing altitude as they are on normally aspirated engines. Instead, the throttles should be slowly opened as altitude increases in order to maintain a constant engine manifold pressure. The “full rich” and “normal” settings will give appropriate and precise fuel metering to the engines based on engine manifold pressure alone.

Ignition & Starters:



Each engine is furnished with dual magnetos for safety and redundancy. The controls for these are on the cockpit’s overhead console next to the mixture levers. For all phases of flight except start-up and shut-down each engine’s magnetos should be set to the “both” position. There is also a “Master Ignition” pole that can be pulled downwards to cut ignition to both engines at once if required.

The engines use electrical starter motors, actuated by a pair of guarded momentary buttons on the main sub-panel. Directly forward of those are similar switches for the electrically driven primer jets. Unless the engines have recently been run and the cylinders are still warm, it is advised to prime each engine for ~4 seconds prior to attempting a start. If the engines will not start within 15 seconds, check fuel level, mixture, and ignition for proper settings, re-prime, and try again. Some “sputtering” and smoke during engine start is completely normal.

Propeller Feathering & Engine Emergency Controls:

A number of controls to aid in the event of an engine failure or loss of power are located on a red sub-section of the cockpit's overhead panel.

If an engine is failing the affected engine's propeller can be forced into feathered mode to stop the engine from spinning and greatly reduce drag. Depending on the level of the terrain around the aircraft this may be mandatory to prevent a forced approach and landing.

To feather the propeller of a failing or failed engine, first pull that engine's mixture lever to the "cutoff" position. Once this is complete, push in the affected engine's "Prop Feather" button. This will force the propeller blades to approximately 90 degrees of beta pitch and bring the engine to a halt within a few seconds. Once the engine has stopped turning you can reduce the stopped engine's throttle to idle and set its magnetos to the "off" position.

In the case of an engine fire, double engine failure, or any situation requiring an immediate descent and forced landing, there are four emergency switches to the right of each Prop Feather button. These are the "Close Fuel Valve", "Close Hydraulic Valve", "Generator Off", and "Fire Extinguisher" switches. These can be activated individually as required or switched all at once by pulling down the "Crash Bar" above those switches for the affected engine(s).

Engine Cowl Flaps & Oil Cooler Flaps:

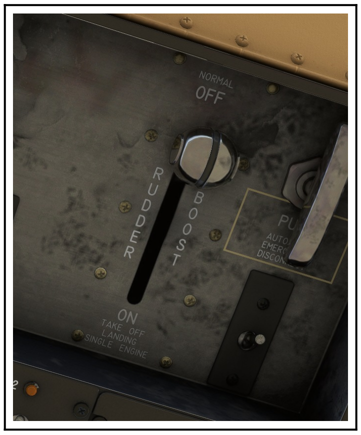
The Albatross has electrically actuated mechanical doors on each engine nacelle to provide extra cooling air as needed for the engines and oil cooling radiators. Switches to control their deployment are located below the central main panel. Unless operating the aircraft in extremely cold conditions, both the cowl flaps and oil cooler flaps should be set to the closed position prior to engine start, and then adjusted as neccessary once the engines have warmed up to normal operating temperatures. During long climbs the doors may need to be set to fully open, and power reduced and airspeed increased if the cooling effect is insufficient.

During descent the doors should be further closed to 10-20% to prevent shock cooling, and then set back to at least half open just prior to final approach. They should remain open during roll-out and taxi, and then only closed after engine shutdown. Note: You can click in the space between the cowl flap switches to highlight and activate both switches at once.

Hydraulic System Management Notes

Due to the new and more realistic modular hydraulic system capabilities in MSFS 2024, the Albatross' hydraulic systems behaviour differs between the two sims. Those items common to both the 2020 and 2024 implementation are covered here first, with 2024's differences outlined at the end of this section.

Rudder Boost Circuit:



A hydraulic boost circuit is present in the aircraft to increase rudder effectiveness and help reduce pilot fatigue in difficult crosswind situations. It should be engaged only when normal rudder authority proves insufficient for the current flight situation (water operations in general, crosswind takeoffs etc.), and disabled when not required to avoid potentially over-controlling the aircraft. The boost lever is located on the aft most section of the cockpit overhead panel.

Backup Hydraulic System:

In case of engine and/or normal hydraulic pump failure, the aircraft is fitted with a backup hydraulic line system and manual pump. As the system is only capable of pressurizing one hydraulic line at a time, a selector handle is provided to allow the pilot to choose which line to pressurize. This handle is located on the sub-panel directly in front of the pilot's seat. The manual pressurization pump handle is located directly below the right side of the pilot's seat.

The hydraulic selector has five modes: Parking Brake, Flaps, Gear Down, Gear Up, and Engine Pump.

In most phases of flight, once the parking brake is no longer required, the selector should be moved to the “Engine Pump” position so that the backup system’s pressure can be maintained by the main hydraulic system.

The backup hydraulic system is used for engaging the parking brake regardless of main system functionality. To do this, move the selector to “Parking Brake” and activate the manual handle once. To release the brake activate the handle once again.

To lower or raise the landing gear, or deploy the flaps, rotate the selector to the appropriate position and activate the hand pump repeatedly. Because hydraulic pressure is lost while moving these large structures continuous pumping will be required to maintain pressure.

Hydraulic System Operation in MSFS 2024:

With 2024’s new hydraulics, the main and subsystem pressures are now much more realistic in their behaviour. The main hydraulic system in the Albatross, which powers the landing gear and flap actuators, does not have any accumulators, and therefore relies entirely on engine driven pumps to maintain system pressure, nominally ~3000 PSI.

In order to deploy or retract the gear and flaps an engine speed of at least 1000 RPM (~600 prop RPM on the gauge) should be maintained, allowing the engine driven pumps to maintain adequate pressure. Each engine driven pump, on its own, is sufficient to pressurize the entire system if required (in case of an engine failure). If the pressure is allowed to fall below 1800 PSI gear and flap deployment and retraction may be significantly slowed, or even halted mid-travel, until pressure is restored.

The hydraulic subsystem, which operates at 1500 PSI, governs the the wheel brakes and parking brake and does have an accumulator.

IMPORTANT: Unless the aircraft actively needs the parking brake to be engaged, the hydraulic selector handle should always be left in the “Engine Pump” setting and the aircraft immobilized with chocks. This ensures that the subsystem accumulator will receive constant charging from the main hydraulic system whenever the engines are running. Failure to set the handle correctly could result in loss of braking effectiveness or complete brake failure.

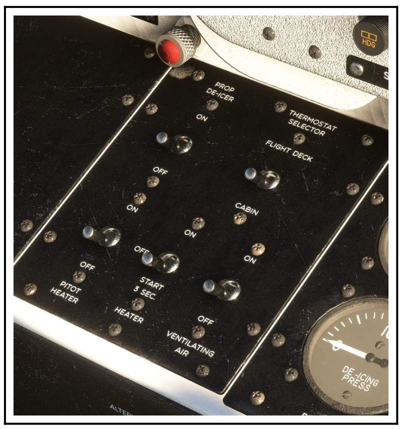
When moving the hydraulic selector handle from “Emerg/Parking Brake” mode to any other setting, the pressure in the parking brake line will be lost, so care should be taken to depress the wheel brakes immediately after switching modes.

Flaps Operation:

Each wing is fitted with hydraulically powered trailing edge split flaps, with an approximate 10 second deployment time. The hydraulic pressure is tuned to always remain under the maximum stress limit for the flaps. Any flap setting can be selected at any speed, and if the hydraulic power cannot overcome the ram force on the flaps they will simply not deploy until airspeed has been reduced. Note that this works in reverse as well. Flying beyond the design speed limit of the deployed flaps at any given setting will force them to retract.

The first flap setting (15 degrees) can be selected at up to 170 knots indicated airspeed if required. The second and full flap settings should only be used below 130 knots indicated. The flaps selector handle is located on the overhead console, to the right of the mixture levers and propeller speed switches.

De-icing Systems:



The HU-16 and G-111 are both fitted with pitot heaters, propeller de-icing and heated alternate air ducts for the carburettors. Additionally the HU-16 has structural de-icing in the form of pneumatic boots on the leading edges of the wings and horizontal and vertical tails.

Control switches for the pitot heat, prop de-ice, and structural de-ice can be found on the far left side of the lower main instrument panel, directly in front of the pilot's seat. The engine carburettor heat switches (labelled Direct / Alternate Carb Air) are located on the lower centre of the instrument panel next to the main battery switch.

Electrical System Management Notes

The 28 volt electrical system in both variants consists of a primary 36 ampere-hour battery and two engine driven 430 ampere generators. The HU-16 is also fitted with an auxiliary power unit (APU), located in the tail section, to provide electrical power to all systems and maintain battery charge, should the aircraft need to be moored for long periods away from a base. It does not, however, provide sufficiently high current for engine starts.

Warning lamps are located on the main panel in both aircraft to indicate any cut-out or failure of a generator circuit. A voltmeter with bus selector is fitted to the main sub-panel, forward of the centre console, to help diagnose any electrical issues.

Ammeters are provided for each generator circuit and the battery to show current DC load. If the generators are working the battery ammeter will show a positive reading (charging).

Important Note: The engine driven generators can not provide stable power if engine rpm is less than 600. If idling below this rpm the generators are automatically disconnected from the bus and the battery will slowly drain. After engine start make sure to maintain at least 700 rpm as much as possible.

COCKPIT LIGHTING CONTROLS:

Although the HU-16 and G-111 have very different looking interior night illumination, they are fitted with broadly similar lighting controls.

Most cockpit lighting is controlled by dimmer knobs on the main overhead panel. Note that with the exception of the overhead "dome" lights, there are no circuit on/off switches for any of these panel and map lights.

The main overhead cockpit dome light brightness is controlled both via its overhead panel dimmer and a switch located on the cockpit door frame directly aft of the pilot's seat.

The lights in the forward nose compartment and aft passenger areas do not have dimmers and are controlled by several discrete switches located throughout the cabins.

The HU-16 has a unique instrument light dimmer knob. This is located on the main panel directly in front of the pilot.

NOTE: Due to the fact that almost all cockpit lighting is potentiometer driven, and that these do not play "nicely" with the sim's "toggle all lights" event ('L' key), the use of this key should be avoided.

WATER OPERATIONS:

As with all amphibians & flying boats, special care and attention must be paid during all water operations. Always ensure that the rudder boost hydraulic circuit is active during water ops.

During engine start on water it is advised to move the throttles into the neutral or very slightly reversed position. This will force the beta angle of the propeller blades to be nearly flat (~0 degrees) and therefore produce minimal thrust. Due to the wide lateral spacing of the engines any asymmetric thrust at all will impart a significant yaw moment on the water, and this effect must be planned for during startup. Once both engines have been started however it is fairly straightforward to maintain any desired heading with differential thrust and rudder, although this may require practice.

Takeoffs should be made directly into the prevailing wind whenever wind speeds are low. Any crosswind component during a water takeoff will increase the difficulty of the operation. In extremely heavy seas it is advisable to try to ride the crest of a wave during the entire takeoff run. Given that this requires operating in a crosswind and fighting the natural weathervaning of the aircraft it may be necessary to takeoff with full rudder deflection and one engine at full power, with the other at substantially lower throttle setting.

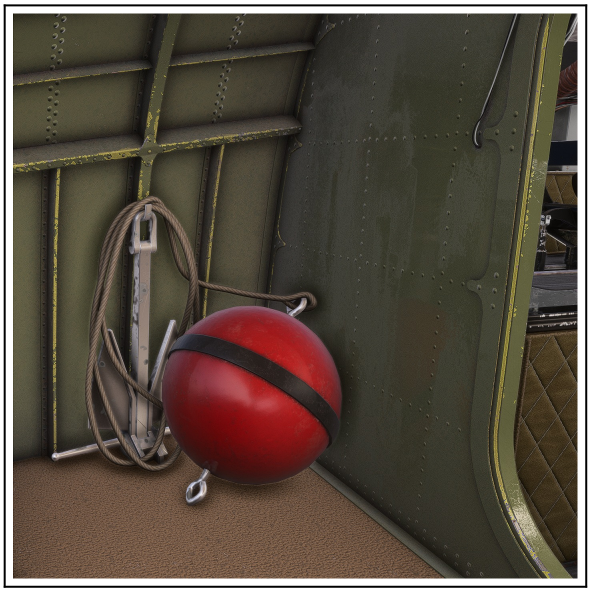
When accelerating for takeoff at higher gross weights (35,000lb +) it is advised to input some positive elevator trim, and to use a low to moderate throttle setting until the aircraft rises onto the “step”, i.e: the hull begins hydroplaning, at approximately 20 to 40 knots. The reason for this is that due to the high mounted position of the engines, any abrupt increase in power at low speed with a high weight can cause a strong forward pitching moment, potentially submerging the entire bow. Takeoffs on water should always be made with flaps at the first setting (15 degrees).

As with takeoffs, all landings should be made into the prevailing wind whenever possible, unless the swells are extreme. Any flap setting can be used during landing, depending on the available water area, however when landing at higher gross weights the use of full flaps is recommended.

Be aware that the wing pylons can "dig in" if subjected to extreme force when impacting a wave and destroy your aircraft. During touchdown care must be taken to keep the wings as level as possible. At lower speed the pylons may be eased into the water to aid in turning if needed.

ANCHORING:

The HU-16 and G-111 are fitted with a lightweight aluminium "Danforth" style sea anchor, tether line, and marker buoy. These are stored in the nose compartment below and forward of the cockpit, as shown below.

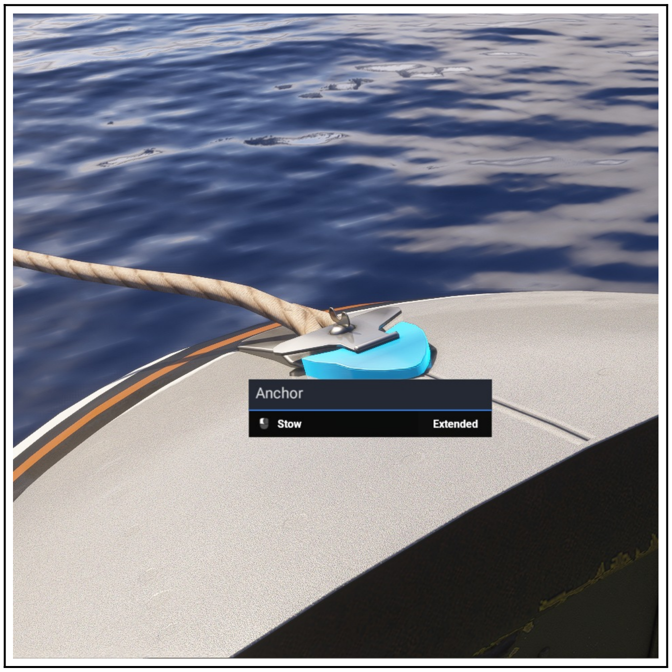


Prior to deploying *or* retracting the anchor certain conditions must be met:

- The aircraft must be on water
- Ground speed must be less than 10 knots
- The nose hatch must be open
- Both engines must be shut down, or operating at idle throttle

NOTE: If any of these restrictions are broken then the anchor will not deploy, and if it has already been deployed it will immediately retract and stow again.

The anchor can be manually deployed or retracted by clicking on its hook on the compartment wall.



The anchor may also be retracted (only) by clicking the rope latch on the hull just forward of the nose hatch.

The anchor can also be deployed and retracted via the accessories clipboard in the cockpit, however the same operating restrictions apply.

CARGO LOADS:

In the MSFS 2024 version the HU-16 and G-111 both come with the option of displaying various cargo loads via the EFB. The aircraft has two cargo “stations”, one in the main fuselage and another smaller one in the nose compartment. The nose compartment has a maximum load of 500 lbs and the main fuselage 1000 lbs. You can add weight to each area incrementally and they will fill with the appropriate amount of cargo. Note that these cargo stations can noticeably affect the longitudinal balance of the aircraft, so take care during loading them and check the centre of gravity position before departing.

The HU-16 Passenger variant has general cargo and baggage...

The HU-16 Search and Rescue variant will load up with rescue equipment and medical supplies...

And the G-111 will contain luxury furniture and adventure travel related items.

OPERATING LIMITATIONS:

Mass

Empty Weight (HU-16E)	22,800 lbs
Empty Weight (G-111)	23,500 lbs
Maximum Takeoff Weight (Land)	37,000 lbs
Maximum Landing Weight (Land)	34,000 lbs

Engine Performance

Maximum Power (Takeoff only, 1 minute max.)	54.5” MAP, 2700 rpm
METO (Maximum Except Take Off)	46.5” MAP, 2500 rpm
Cruise Climb	36” MAP, 2300 rpm
Cruise	30” MAP, 1800 rpm

Speeds

Stall (Clean) (V_{S1})	78 KTS IAS
Stall (Full Flaps) (V_{S0})	69 KTS IAS
Minimum Control Single Engine (V_{MC})	105 KTS IAS
Best Angle of Climb (V_X)	90 KTS IAS
Best Rate of Climb (V_Y)	115 KTS IAS
Best Cruise (V_{CE}) 30” MAP, 1800 rpm, @16,000 ft	130 KTS IAS
Never Exceed (V_{NE})	252 KTS IAS
Full Flap Extension Limit (V_{FE})	140 KTS IAS
Landing Gear Operating (V_{LO})	150 KTS IAS
Landing Gear Extended (V_{LE})	150 KTS IAS
Design Manoeuvring (Turbulent Air) (V_A)	120 KTS IAS

Load Limits

Positive G Max @29,500 lb	+3 G
Positive G Max @37,000 lb	+2.4 G
Negative G Max	-2.77 G

CHECKLISTS:

Pre-Flight, Exterior

Wheel Chocks	REMOVE
Left Tire Condition	INSPECT
Left Wheel Brake Condition	INSPECT
Left Landing Gear Strut Condition	INSPECT
Left Wing Flap Condition	INSPECT
Left Aileron Condition	INSPECT
Nose Tires Condition	INSPECT
Nose Landing Gear Strut Condition	INSPECT
Right Tire Condition	INSPECT
Right Wheel Brake Condition	INSPECT
Right Landing Gear Strut Condition	INSPECT
Pitot Tube Cover	REMOVE
Elevator Condition	INSPECT
Rudder Condition	INSPECT

Pre-Flight, Interior

Battery Switch	ON
Fuel Quantity Gauges	CHECK
Generator Switches	CHECK OFF
Oil Cooler Flaps	FULL OPEN
Engine Cowl Flaps	FULL OPEN
Cockpit Lighting	AS REQUIRED
Avionics Master Switch	ON
Left & Right Fuel Pump Switches	CHECK OFF
Fuel Mixture Levers	CUTOFF
Gust Lock	DISENGAGE
Throttles	IDLE
Magnetos	OFF
Fuel Selectors	LEFT MAIN & RIGHT MAIN

Supercharger Gear	LOW
Propeller RPM Switches	MAX RPM
Flaps	UP
Hydraulic Hand Pump Selector Valve	PARKING BRAKE MODE
Parking Brake	SET
Wheel Chocks & Ladder	STOW
Beacon Light Switch	ON

Left Engine Start

Engine Master	ON
Magnetos	BOTH
Mixture Lever	FULL RICH
Left Fuel Pump Switch	ON
Primer Button	PRESS & HOLD (4+ SECONDS)
Starter Button	PRESS & HOLD (15 SECONDS)
Oil Pressure	CHECK
Left Generator Switch	ON

Right Engine Start

Magnetos	BOTH
Mixture Lever	FULL RICH
Right Fuel Pump Switch	ON
Primer Button	PRESS & HOLD (4 + SECONDS)
Starter Button	PRESS & HOLD (15 SECONDS MAX)
Oil Pressure	CHECK
Right Generator Switch	ON

Before Taxi

Cabin Doors	CLOSED & LOCKED
Left & Right Fuel Pump Switches	OFF
Rudder Boost Pump	ON
Elevator Trim	SET NEUTRAL
Navigation Lights Switch	ON
Transponder	STANDBY
Comm & Nav Radios	SET
Altimeter Pressure Setting	SET
Parking Brake	RELEASE

Runway Threshold

Left & Right Fuel Pump Switches	ON
Pitot Heat	ON
Propeller De-ice Switch	ON
Flight Controls Movement	FREE AND CLEAR
Landing Light Switch	ON
Strobe Light Switch	AS REQUIRED
Flaps	SET TAKEOFF (15 DEG)
Engine Indicators	CHECK
Transponder	SET ALT MODE

Normal Takeoff

Throttles	MAX (54.5” MAP)
Rotate	80 KTS IAS
Positive Vertical Speed	TAP BRAKES, LANDING GEAR UP
@300 FT AGL & 115 KNOTS IAS	REDUCE POWER TO METO (45” MAP)
Propeller RPM	SET TO 2500 RPM
Flaps	UP
Airspeed	MAINTAIN 115 KTS IAS

Cruise Climb

Throttles	MAINTAIN 36” MAP
Propeller RPM	SET TO 2400 RPM
Engine Indicators	CHECK
Rudder Boost Pump	OFF
L & R Fuel Boost Pump Switches	OFF
L & R Fuel Transfer Pump Switches	ON : FLOAT TANK → MAIN TANK
Airspeed	MAINTAIN 120 KTS IAS

Cruise

Supercharger Gear (Above 10,000 ft AGL)	SET HIGH
Throttles	MAINTAIN 30” MAP
Propeller RPM	SET TO 1800 RPM
Elevator Trim	SET
Engine Cowl Flaps	HALF
Oil Cooler Flaps	HALF
Engine Indicators	CHECK
Landing Light Switch	OFF

Descent

Supercharger Gear	SET LOW
Throttles	MAINTAIN 20” MAP
Propeller RPM	SET TO 2300 RPM
L & R Fuel Boost Pump Switches	ON
Engine Cowl Flaps	CLOSED
Oil Cooler Flaps	CLOSED
Engine Indicators	CHECK
Landing Light Switch	ON
Rudder Boost Pump	ON
Airspeed	MAINTAIN 115-130 KTS IAS
Elevator Trim	SET

Final Approach

Engine Cowl Flaps	FULL OPEN
Oil Cooler Flaps	FULL OPEN
Propeller RPM	MAX RPM
Throttles	AS REQUIRED
Flaps	AS REQUIRED
Landing Gear	DOWN
Engine Indicators	CHECK
Rudder Boost Pump	ON
Airspeed	MAINTAIN 85-90 KTS IAS
Elevator Trim	SET

After Landing

Throttles	IDLE
Braking	MINIMUM REQUIRED
Landing Light Switch	OFF
Strobe Lights Switch	OFF
Flaps	UP
Transponder	SET STANDBY

Parking / Shutdown

L & R Fuel Boost Pump Switches	OFF
L & R Fuel Transfer Pump Switches	OFF
Avionics Master Switch	OFF
Rudder Boost Pump	OFF
Throttles	IDLE
Mixture Levers	CUTOFF
Magnetos	OFF
Battery Switch	OFF
Gust Lock	ENGAGE

USEFUL LOCAL VARIABLES:

For those who like to bind various controls to their hardware, below are some potentially useful XML Lvars. Use or change them at your own risk! All of these are normal Lvars, ie “L:” not the newer expansion type “L:1:” etc.

XMLVAR_THROTTLE_GUST_LOCK_ENGAGED - 0/1 off/on
XMLVAR_RUDDER_BOOST - Rudder hydraulic boost 0/1 off/on
XMLVAR_SUPERCHARGER_HANDLE - 0/1 supercharger low/high gear
XMLVAR_LADDER_VIS - 0/1 ladder visibility off/on
XMLVAR_LANDING_LIGHTS_ACTUATOR_GOAL_POS_1 - 0-100 left landing light target position when on (0 is fully retracted, 100=fully extended)
XMLVAR_LANDING_LIGHTS_ACTUATOR_GOAL_POS_2 - (as above, for right landing light)
XMLVAR_NOSE_DOOR - 0/1 nose compartment door closed/open
XMLVAR_CABIN_TABLE_1 - 0/1 HU16 left cabin table closed/open
XMLVAR_CABIN_TABLE_2 - 0/1 HU16 right cabin table closed/open
XMLVAR_YOKEHIDDEN1 0/1 pilot’s yoke visible/hidden
XMLVAR_YOKEHIDDEN2 0/1 copilot’s yoke visible/hidden
XMLVAR_HU16_KNOB_DME - 0-2 controls dme knob (off/Nav1/Nav2)