



# Grumman HU-16A “Albatross”

## Flight Operations Manual

The Grumman HU-16A “Albatross” first flew in the XJR2-F Prototype form on Oct 1, 1947. It is an all metal, high wing, twin engine air sea rescue amphibian. It is powered by 2 nine-cylinder Wright R1820-76A “Cyclone” engines turning 3 blade, full feathering, constant speed, reversible pitch Hamilton Standard Propellers of 11 feet in diameter.

Dimensions	Fuel Capacities	Weight and Limits
Wingspan: 80”	Left Main: 2261.2 lbs, 342.6 gals	Empty: 19,820 lbs
Wing Area: 883 sq ft	Right Main: 2261.2 lbs, 342.6 gals	Max TO Water: 29,500 lbs
Length: 62’ 1”	Left Float: 680 lbs, 103 gals	Max TO Land: 33,000 lbs
Height: 27’ 1”	Right Float: 680 lbs, 103 gals	Max Landing: 31,000 lbs
Tread: 17’ 8”	Left Drop: 1020 lbs 154.5 gals	Cruise Optimal: 155 kts
Prop Diameter: 11’ 1”	Right Drop: 1020 lbs 154.5 gals	Cruise: Economy: 145 kts
Prop Gnd Clearance: 8’	Total: 7922.4 lbs 1097.3 gals	Ceiling: 21,500 ft
Prop Wtr Clearance: 4’		Range: ~2,500 nm

# Operations

**WARNING WARNING:** This aircraft is equipped with a 360° Castoring Nosewheel. Ground control operations do NOT employ the rudder except at sufficient air speeds for the rudder to gain effectiveness. Taxiing on land is accomplished through the use of differential braking and differential engine thrust. Familiarize yourself with the single wheel braking methods available in FlightGear, notably, the [,] and [.] keys for left and right brakes respectively and check your joystick and other input devices for single wheel braking options.

Taxiing on water is accomplished using differential engine thrust only. An engine control dialog has been provided to assist those who do not have a dual throttle quadrant. Press [F9] to open the Engine Control Dialog.

**WARNING WARNING:** Use of Reverse Thrust while on land with the aircraft parked or at low taxi speeds is PROHIBITED. Possibility of rapid attitude change (pitch back) and severe fuselage damage exists...

**WARNING WARNING:** This aircraft is equipped with constant speed propellers. Familiarize yourself with the proper procedures for operating an aircraft so equipped. Failure to make use of the engine and propeller controls correctly will drastically reduce aircraft performance and fuel economy.

## Where is the Blue Lever?

Unlike most aircraft equipped with constant speed propellers, the Albatross does not make use of the standard “Blue Lever” for propeller pitch adjustments. Instead, the propeller pitch is controlled by 2 toggle switches located on the overhead panel.

In “Pilot View” these switches are hidden behind the throttle levers when the throttles are at idle. Use [Shift]-[V] to switch to “Overhead View” to access them. (Propeller adjustments can also be made using the F9 – Engine Control dialog).

The clickable control pane on the panel (use Ctrl-C to display) operates both switches simultaneously. Individual propeller adjustments can be made by clicking the individual toggle switches themselves. These switches are accompanied by 2 rpm range warning lights that indicate if the propeller rpm is either too high or too low. FG users that own a quadrant with a propeller control lever can use that in place of the overhead switches.



## FEATURES

### Instrument Panel Options

This aircraft is equipped with 2 complete 3D instrument panels. The first and default is the original panel equipped in the military aircraft. The second is a civilian retrofit with modern instruments/radios, etc. You can switch between these 2 panels at any time by using the “HU-16A-Albatross / Military/Civilian Cockpit” menu commands or by simply tapping the [I] key.



Military Cockpit



Civilian Cockpit

### Amphibious Operation

The aircraft will determine where it is being loaded and will configure itself appropriately. Loading at a Seaplane Base (in the water) will result in the following configuration: Landing Gear Up / Parking Brake Off - Loading at a land based Airport will result in the following configuration: Landing Gear Down / Parking Brake Set.

Seaplane bases can be located by searching for [S] in the launcher.

### Differences from the Original Aircraft

The Original HU-16A-Albatross required a crew of 4 which included a Radio Operator who sat behind the copilot and a rather large rack of bulky radio equipment. Constantly switching to “Radioman View” to operate the radio equipment does not lend itself to an enjoyable simulator experience, therefore the center console or ‘pedestal’ has been modified from its original state to include radio equipment generally not found in the original aircraft.



## KEY REFERENCE

Knowing these shortcut keys will aid in learning the HU-16A-Albatoss and add to your flying enjoyment.

[g]	Raise/Lower Landing Gear	[y]	Show/Hide Yokes toggle
[d]	Door Control Dialog	[u]	Raise Pilots Seat
[F8]	Fuel Control Dialog	[Shift]-[u]	Lower Pilots Seat
[F9]	Engine Control Dialog	[Ctrl]+[u]	Reset Pilots Seat to default height
[F11]	Autopilot Dialog	[Shift]+[F11]	Auto-throttle mini Dialog
[F12]	Radios Dialog	[i]	Toggle Military / Civilian Inst Panel
[Del]	Toggle Thrust Reverse	[Alt]-[m]	Toggle Map Display
[?]	Aircraft Help Dialog	[Alt]-[r]	Toggle Auto-Coordination

## CHECKLISTS

Use the Checklists menu command to access these in the aircraft where the controls and instruments are marked to assist in locating them.

### STARTUP PROCEDURE

Doors closed and locked. Use the [d] key to open the door control dialog if needed.

Throttles - Idle (Full Back)

Parking Brake - Set

Propeller RPM Control Switches - Full Forward

Mixture Levers - Full Rich (Forward)

Battery Switch (Or Ground Power) - On

Avionics Power Switch - On

Panel Lights - As Required

Seat Belt / No Smoke Signs - On

Ignition Selectors (L and R) - Both

Fuel Selector Valves - Both to Main

Prime Engine for 5 seconds, then engage Starter and hold until engine catches, release.

Repeat for both Engines

Generator Switches - On

Inverter Switches - On

## TAXI / TAKE OFF

Anti-Collision Lights, Strobe Lights and Navigation Lights – On  
Altimeter – Set to local Barometric Pressure  
Radios and Avionics – Set for Departure  
Transponder – “ON” Mode  
Elevator Trim – set for takeoff  
Gust Lock – Off  
Flight Controls – Check Free and Correct Operation  
Parking Brake – Off  
Taxi to assigned Runway – max taxi speed 20 kts, (check Brakes/Gyro/Turn Coord)  
Flaps – 15 degrees  
Transponder - “ALT” Mode (Mode C)  
Landing Lights – On  
Take Off – Smooth Increase to Full Throttle  
V-Speeds - Announced by Co-Pilot

## CLIMB / CRUISE

Landing Gear – Up after steady climb established (If departing from land)  
Flaps – Up when airspeed is sufficient  
Landing Lights – Pilots Discretion  
Aux Fuel Transfer – ON (select appropriate Aux fuel source)  
Aux Fuel Transfer Warning Lights – Monitor, change Aux source when needed  
Mixture – Adjust as necessary as altitude increases  
No Smoke / Seat Belt Signs – As needed  
Cruise Alt – Adjust Throttle and RPM for maximum fuel efficiency at desired speed.

## APPROACH/LANDING

Altimeter – Set for Destination  
No Smoke / Seatbelt Signs - On  
Aux Fuel Transfer – Off  
Landing Lights - On  
Landing Gear – Down for Airport Landing, Up for Water Landing  
Mixture – Adjust as needed as altitude decreases - Full Rich below 5000 msl  
Propeller RPM Control Switches – Full Forward  
Flaps – 15 deg below 105kts , 30 below 90, 40 below 80  
(After nose wheel touchdown reverse thrust may be used to slow from an overly fast landing,  
Use only at high speed)  
Flaps – Up (After exiting Runway (or after slowing to taxi speed on water)  
Landing Lights - Off

## SHUTDOWN PROCEDURE

Parking Brake - Set

Flaps - Verify Up

Propeller RPM Control Switches - Full Forward

Throttles - Idle (Full Back)

Transponder - "Stdbby" Mode

Mixture Levers - Full Rich (Forward)

Fuel Selector Valves - Both to Off

(Engines will continue to run for a short time while they scavenge fuel from feed and collector lines. Wait until they stop)

Ignition Selectors (L and R) - Off (When engines have stopped)

Inverter, Generator and Inst Power Warning lights - Check All On

Inverter Switches - Off

Generator Switches - Off

Seat Belt / No Smoke Signs - Off

Anti-Collision Lights, Strobe Lights and Navigation Lights - Off

Avionics Power Switch - Off

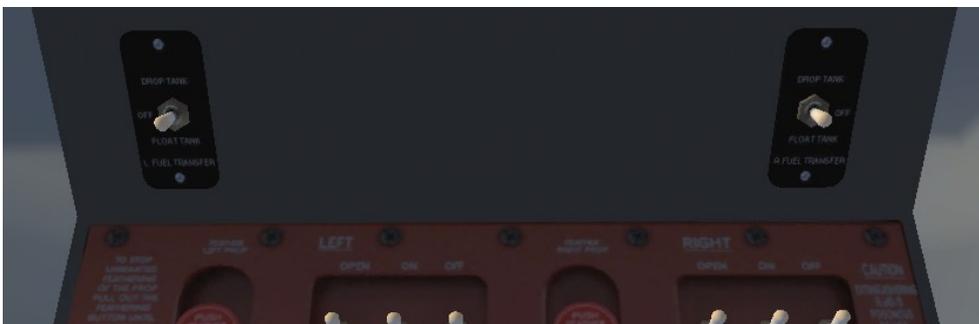
Battery Switch - Off

Flight Controls - Centered

Gust Lock - Engaged

## FUEL SYSTEM

Normal flight is conducted with the Fuel Selector Valves in the MAIN position. The Aux Fuel Transfer Pumps are used to move fuel from the selected Aux Fuel Source (either Float Tanks or Drop Tanks) into the Main Tanks. The Aux Fuel Transfer Pump switches are three-position indicated by OFF, FLOAT, and DROP. An automatic system stops the Aux Fuel Transfer Pump when the destination tank becomes full to prevent overfilling. There are two warning lights on the Instrument Panel on the Co-Pilots side that indicate if the corresponding Aux Fuel Transfer Pump fuel flow rate drops too low. This indicates the selected aux source is empty. Either change the Aux Fuel Transfer Pump fuel source or turn the the Aux Fuel Transfer Pump OFF when this warning light illuminates.



The AUX Fuel Selector Valve position (Colored RED) is for emergency use only and draws fuel from the Float Tanks only directly to the engines bypassing the Main Tanks.

The Opposite Tanks position can be used in flight to balance the aircraft in the case of the 2 main tanks becoming severely unbalanced.

This aircraft is NOT equipped with any low fuel warning indicators, however, the F8 - Fuel Control Dialog is. When fuel volume in any of the 6 tanks becomes extremely low you will see the volume indicator change to RED. If Drop tanks are not attached, the volume indicators for those tanks do not appear on the dialog.

**WARNING WARNING:** Landing with more than 100lbs (15.2 gals) of fuel in either float tank is PROHIBITED. Plan your fuel needs accordingly. There is NO fuel dump mechanism for the float tanks. The only way to remove fuel from the float tanks is via the Aux Fuel Transfer Pumps or by running the engines directly from the Float Tanks by placing the Fuel Selector Valve in the AUX position.

### DROP TANK OPERATION

Use the “HU-16A-Abatross / Drop Tank Control” Menu item to attach drop tanks. To Fill your Drop Tanks use the F8 - Fuel Control Dialog.

All other Drop Tank Operations can be conducted either from the “HU-16A-Abatross / Drop Tank Control” Menu item dialog or from the instrument panel.

To Jettison a drop tank, both the Master ARM and the Selected Tank Arm must be on.



Drop Tank Control Panel

## AUTOPILOT OPERATION

The original HU-16A-Albatross did include an autopilot, but one of extremely limited ability. Basically nothing more than a Wing Leveler with a large knob for making long slow turns, the A/P was designed to reduce pilot workload while conducting large sweeping search patterns over large areas of open ocean. This autopilot has not been reproduced in this aircraft as the Civilian Retrofit A/P installed (and available while viewing the Military Cockpit layout via the F11 A/P Dialog) can be made to re-create the behavior of the original autopilot system simply by using it in CWS Mode only and never enabling any other a/p mode. (See Full CWS Mode: below)

### Civilian Retrofit Autopilot

Although the instrumentation and control units installed in this Albatross look suspiciously like a Bendix/King kfc200 flight control system, this is NOT a kfc200. This aircraft is equipped with the latest in FlightGear autopilot technology, the EP-C2H6O.



**WARNING WARNING:** The A/P operates only above 300 ft agl. Automatic disengagement occurs descending through 300 ft agl.

**WARNING WARNING:** Flight control deflection A/P disengagement:

Deflecting any flight control more than 6 degrees will cause all A/P modes to disengage and the A/P will revert to Full CWS Mode.

Full CWS mode:

AP annunciator 'on' and no other modes active. This is the default A/P mode when A/P is activated and no vertical or lateral modes are active. Set aircraft pitch/bank with flight controls. Release flight controls and A/P will maintain last observed pitch and bank. If bank angle is less than +6/-6 degrees when flight controls are released the A/P will fly wings level and last observed pitch.

HDG Mode:

Follow HSI Heading Bug

NAV Mode:

Follow NAV1 Radial or ILS

ALT Mode:

Achieve and maintain altitude displayed in the altitude selector

FD Mode:

Follow Route Manager laterally (vertically if altitudes are specified in the Route Manager) If Route Manager does not specify altitudes then achieve and maintain altitude in the altitude selector.

APPR Mode:

Full CWS Mode will remain active until NAV1 is in range, then lateral control is automatically switched to NAV mode. CWS Pitch mode will remain active until GlideSlope is captured, then GS Mode is automatically activated.

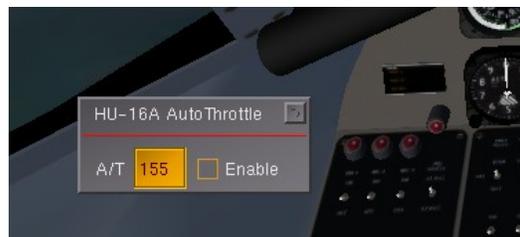
Pitch Up/Down:

In ALT Mode: Increase/decrease selected altitude in 100 ft steps.

In all other modes including APPR Mode before GS capture: Increase/decrease last observed pitch by 0.5 degrees. In APPR Mode after GS Capture: No effect

Auto-Throttle

The A/T controls throttle position ONLY. It does not interfere with the pilots propeller pitch/rpm or mixture choices. It is recommended that you use the Auto-Throttle as little as possible in this aircraft. Best speed / fuel economy can only be achieved by manual pilot tuning of the manifold Pressure, Mixture and Propeller Pitch.



## **WARNING WARNING:** Center of Thrust vs Center of Gravity

The center of thrust in an HU-16A is approximately 8 feet (2.43m) ABOVE the center of gravity and approximately 5 feet (1.5m) ABOVE the pilots head. Power changes affect aircraft pitch in a manner you may not be accustomed to:

Adding power will tend to pitch the aircraft DOWN.

Reducing power will tend to pitch the aircraft UP.

## WATER OPERATIONS:

Taxiing on water is easily accomplished using asymmetric engine thrust. Press the [F9] function key for the engine control dialog which includes independent left and right throttle controls.

**KEEP THE NOSE UP!** At all speeds above taxi speeds it is crucial that you keep the nose elevated as much as possible. Land with as high an angle of attack as possible without stalling the aircraft. Maintain full back pressure on the yoke to raise nose out of the water on takeoff.

I hope you enjoy flying the Grumman HU-16A Albatross,

ePilot