

Advanced Hybrid Aircraft Ltd. – Albatross & Patroller 3

Peter Lobner, updated 13 September 2023

1. Introduction



As Advanced Airship Corporation (AAC) was failing financially in the UK, chief designer Bruce Blake went on to form Advanced Hybrid Aircraft (AHA) in 1992 in Surrey, BC, Canada. The AHA management and technical team has decades of airship design experience at AAC and its predecessor organizations in the UK, including Wren Skyships and Airship Industries.

AHA is now focusing on the design and development of the Patroller 3, or P3, semi-buoyant hybrid aircraft, which is a long endurance (3 day/night) aircraft designed for manned missions such as patrol and surveillance of borders and coastlines. AHA notes that the P3 "...is a manned airborne solution which offers a low cost alternative to the proliferation of UAVs; manned surveillance entails situational awareness, which cannot be gotten with UAVs."



Rendering of Patroller 3. Source: AHA

Advanced Hybrid Aircraft is working with Luffships Ltd. (LSL) and Luffships Canada (LSC), as noted on the Luffships website (<https://luffships.com/projects/other-types/patroller-3/>), to "establish useful buoyant aircraft at affordable prices that work reliably with little fuss serving people's daily needs."

2. The sub-scale Albatross

The P3 is based on the design of a remote controlled, sub-scale semi-buoyant hybrid aircraft known as Albatross, which was built and test flown in Australia.

AHA describes the Albatross as follows:

“The Albatross RPMB was constructed in Melbourne during 1985, and flown many times during 1986-87. It is a 40% scale demonstrator for (what is now known as) the AHA Light Utility hybrid buoyant aircraft (same configuration as the P3). All the systems onboard were automated, other than the R/C flight controls using a ground based transmitter. The twin propellers were driven by two Fuji EY15D, single cylinder, 4-stroke petrol engines. An electric hand-starter was used, being inserted into the propeller hubs.”



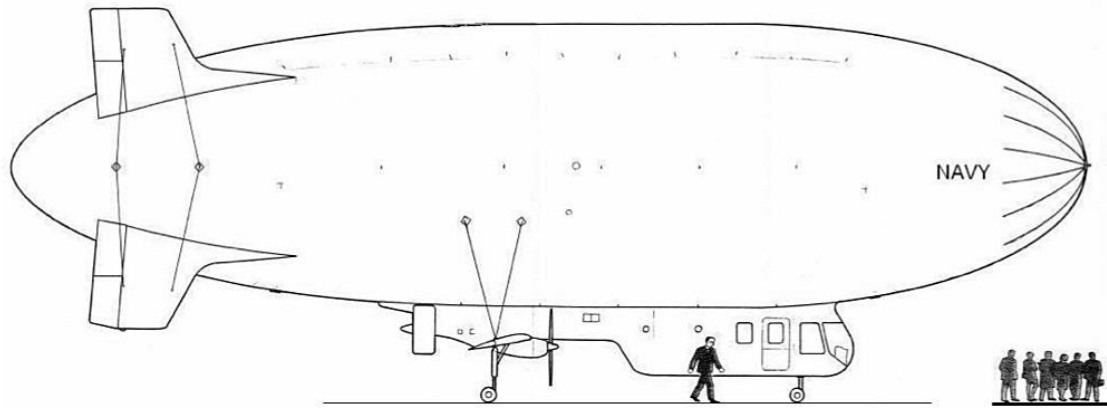
Albatross sub-scale model in flight. Source: AHA

The Albatross test program verified the data on which P3 calculations for airspeed and endurance were based.

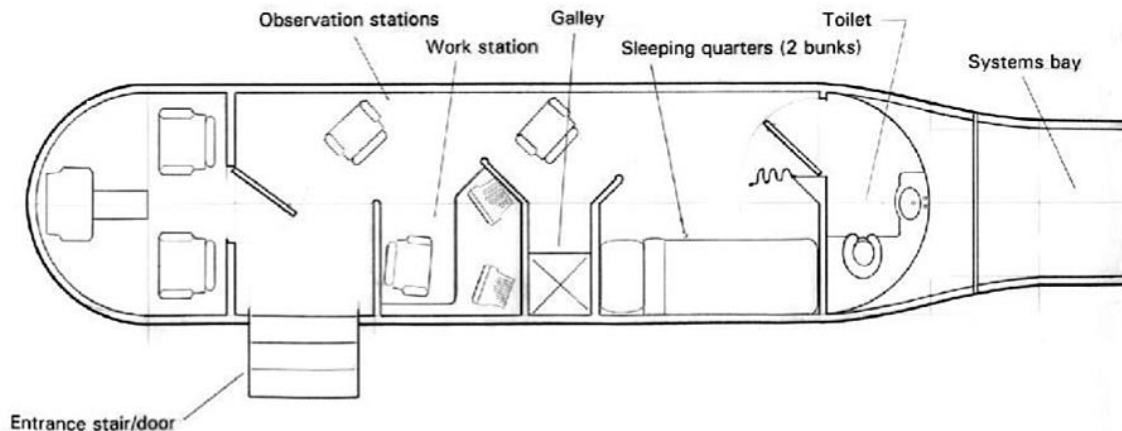
3. The Patroller 3

The P3 is a modern, semi-buoyant, hybrid aircraft that derives 75% of its lift from the aerostatic buoyancy of helium lift gas in the envelope

and 25% from the aerodynamic lift of the wings and envelope in forward flight. Since the P3 is heavier-than-air, it makes short takeoffs and landings (STOL) and can takeoff, land, taxi and park on the ground without the assistance of a ground crew.



Patroller 3 starboard side profile view. Source: AHA



Example Patroller 3 gondola layout. Source: AHA

The P3 has a nominal crew of five and a nominal endurance of three days. A comfortable and roomy cabin is provided for the crew, including work stations, bunks (2) and a toilet at the rear.

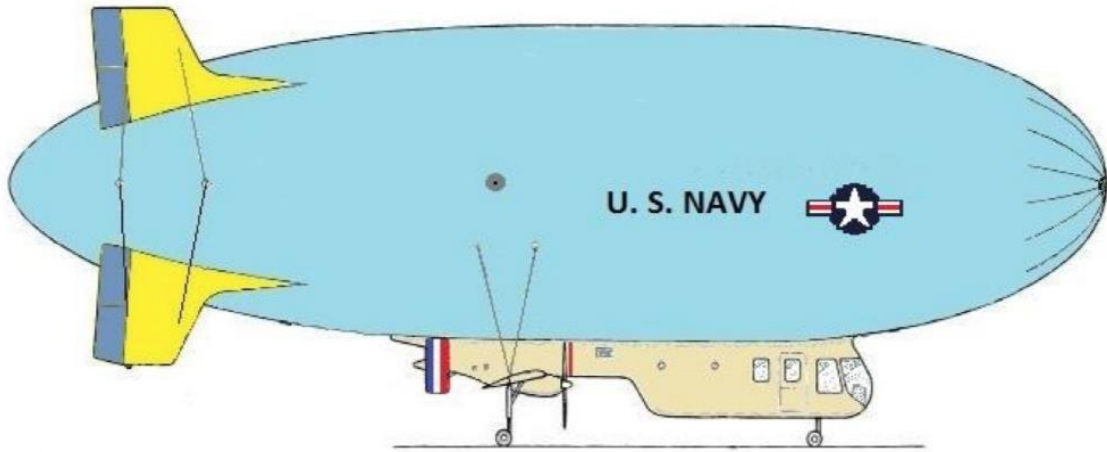
AHA describes the P3's mission capabilities as follows: "The main role for which this aircraft is intended is border and coastal patrol and surveillance. This role may be extended to the patrol of the 200 mile offshore limit in relevant locations..... Whilst the P3 offers the capability for patrol and surveillance, it also allows for close-in interdiction where needed, due to its ability to loiter at low and higher

altitudes, and its ability to Dash at >70 knots in pursuit of a ground or sea-borne suspect vehicle or boat. Intercept-and-Identify roles are expected to be made much more effective than with other means.” P3 operating costs are expected to be a fraction of those for helicopters and fixed-wing maritime patrol aircraft on similar mission profiles.

General characteristics of the Patroller 3 *

Parameter	Patroller 3
Length	125 ft (38.1 m)
Diameter	33.6 ft (10.2 m)
Height	45.6 ft (13.9 m) overall
Lift gas	Helium
Envelope volume	85,000 ft ³ (2,407 m ³)
Gross static lift	5,100 lb (2,313 kg)
Takeoff weight	5,610 lb (2,545), minimum
Heaviness	10% to 30%
Accommodations	1 x pilot, 3 to 5 crew / passengers
Propulsion system	<ul style="list-style-type: none"> • 2 x DAIR 100 aero Diesel “main engines” @ 130 shp (97 kW) each, mounted on stub wings behind the gondola, driving 2-bladed, large diameter, variable pitch propellers. • 1 x Freedom 1590 twin-rotor Wankel “Dash engine” @ 200 shp (149 kW), mounted on the centerline behind the gondola, driving a moderate diameter ducted fan. • Total installed power (3 engines): 460 shp (343 kW)
Speed, maximum	<ul style="list-style-type: none"> • 75 knots maximum (Dash speed) with three engines • 52 knots cruise with two main engines • 41 knots cruise with one main engine
Endurance	Depends on airspeed & number of engines used. <ul style="list-style-type: none"> • 43-100 hours on one engine @ 30-40 knots • 22-75 hours on two engines @ 30-50 knots • 7-30 hours on three engines @ 40-70 knots
Range	Depends on airspeed & number of engines used. <ul style="list-style-type: none"> • 1,700 - 3,000 nautical miles (3,148 - 5,556 km) on one engine @ 30-40 knots • 1,100-2,250 nautical miles (2,137 – 4,167 km) on two engines @ 30-50 knots • 480-1,200 nautical miles (889 – 2,222 km) on three engines @ 40-70 knots

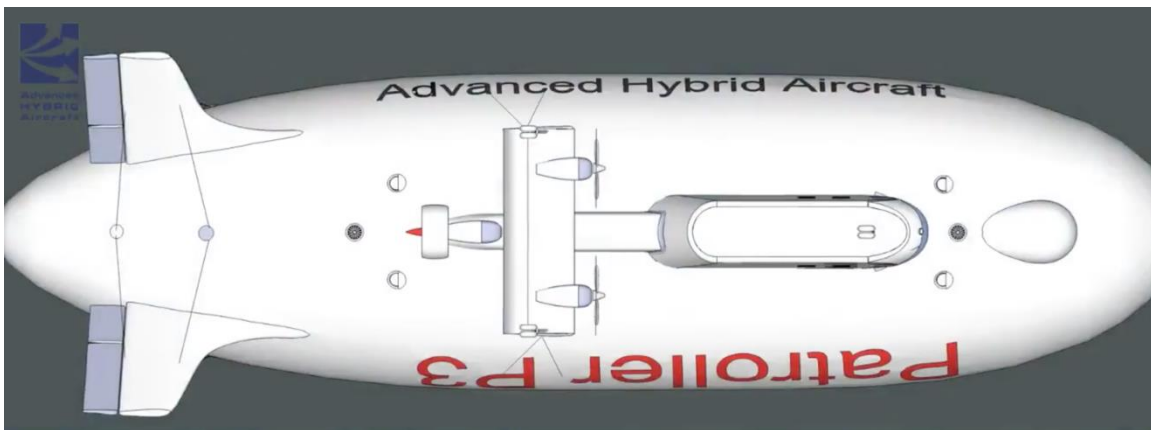
* The Light Utility XR variant data above are equally applicable to the P3, since the two configurations are nearly identical.



Patroller 3 in US Navy colors. Source: AHA



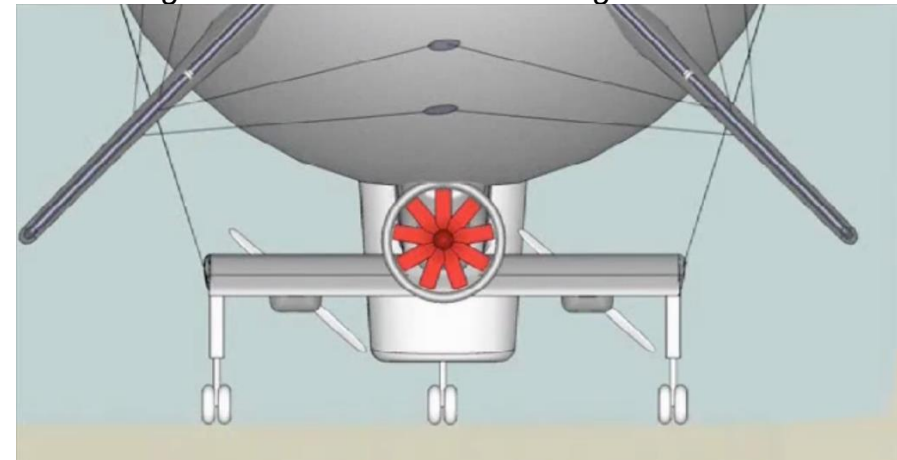
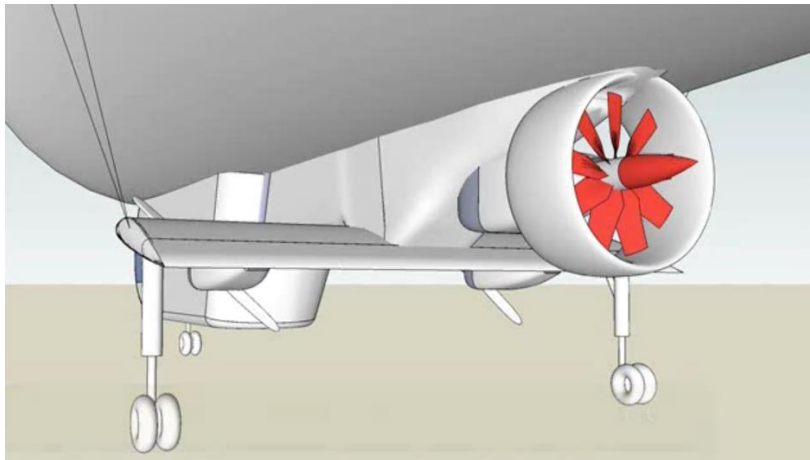
Patroller 3 bow quarter view in flight.



Patroller 3, view from underneath highlighting the placement of the gondola, engines and X-tail. Note the sensor location under the chin of the envelope. Source, two graphics above: Screenshots from AHA video.



Note the X-tail with active control surfaces. All three engines are mounted behind the gondola.



Note the position of the Dash engine (highlighted in red) on the aircraft's centerline, behind the gondola. The two cruise engines are mounted on the stub wings, ahead of the Dash engine.

*General arrangement of the Patroller 3.
Source, all graphics: Screenshots from AHA video.*

4. For additional information

- “Patroller 3,” Luffships, <https://luffships.com/projects/other-types/patroller-3/>

Video

- “Advanced Hybrid Aircraft Patroller 3 Airship - ISR, SAR, Patrol & Surveillance,” (3:52 min), posted by Ben Lovegrove, 3 November 2017:
<https://www.youtube.com/watch?v=MJwkyQQk0YU&t=1s>

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