The Amphibious HU-16BT SUPER ALBATROSS with Four Turboprop Engines

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SUPER ALBATROSS DESIGN

Engineering studies by Grumman have proved the operational and economic advantages of modifying the Albatross with turboprop engines. The studies were based on the installation of United Aircraft of Canada Model PT6A-34 turboprop engines rated at 783 equivalent shaft horsepower each. An alternate installation using Garrett TPE 331 engines could be provided if preferred, which would provide similar aircraft performance.

The three view drawing shows the clean, streamline installation of the turboprop engines on the Super Albatross. The propeller now has a greater tip-to-water clearance and is placed 20 inches further forward. These changes reduce spray problems in water operations. The fuel system has also been redesigned to provide an independent fuel supply to each engine.

PERFORMANCE

With the turboprop modification the Super Albatross will provide:

- **Improved takeoff**
- **Improved operation and safety, particularly with one engine failed**
- **Greater service ceiling and increased rate of climb**
- **Increased cruising speed at all altitudes**
- **Quieter engine operation and less crew fatigue**
- **Improved water handling.**

OPERATIONS

The turbine powered Super Albatross will provide:

- **Standardization to less expensive and less volatile jet fuel**
- **Increased safety through the proven greater reliability of turboprop engines and their record of higher time between unscheduled removals**
- **Reduced overall engine maintenance costs**
- **Increased operational availability and mission readiness**
- **The ability to cruise on two engines to extend aircraft range.**

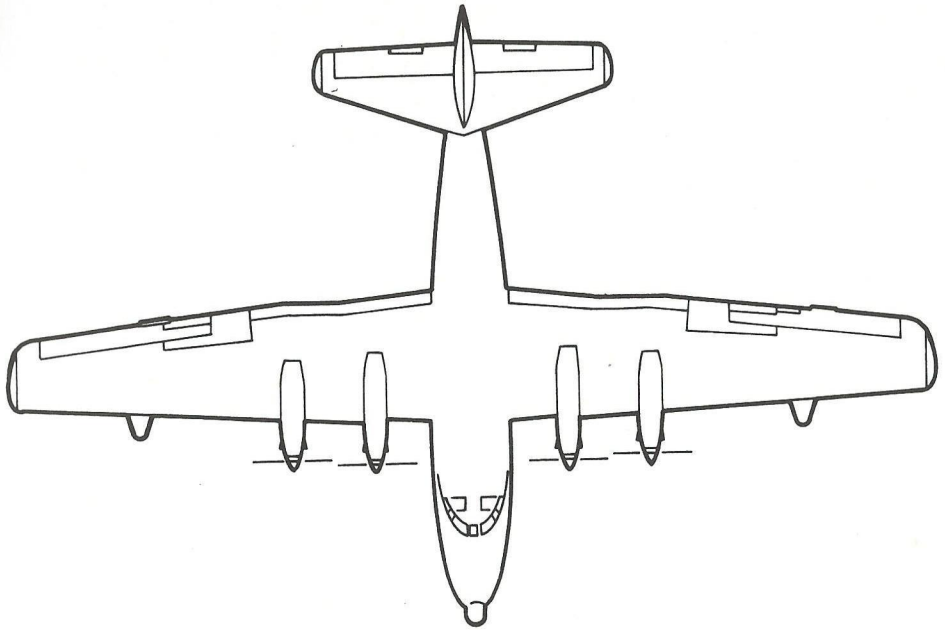
ALBATROSS SERVICE RECORD

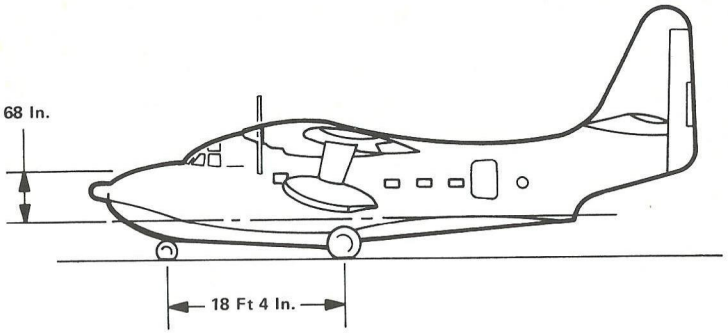
The reciprocating engine Albatross, which has been in service with the United States Air Force, Navy and Coast Guard, is also in the military inventories of 15 other nations. Its history of many years of highly successful operational service has effectively demonstrated the ruggedness, dependability and versatility of the basic Albatross design.

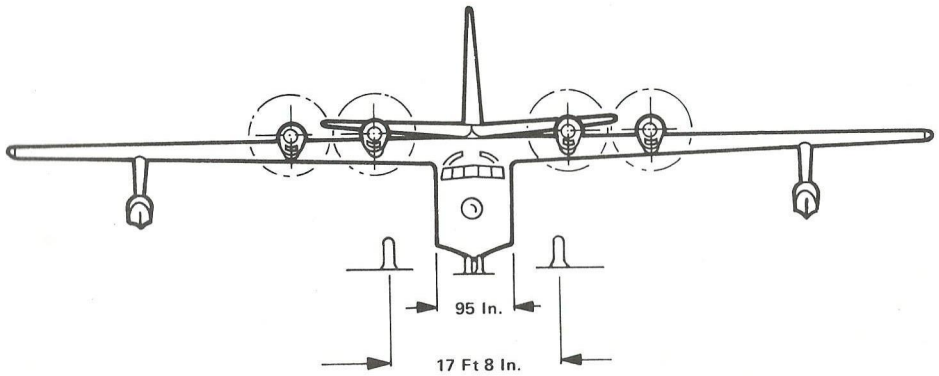
Structural reinforcement of the wing during turboprop modification provides many more years of active service life.

The Super Albatross will provide:

- **Improved comfort**
- **Improved safety**
- **Greater usefulness.**







DIMENSIONS

Span, wing	(96 ft 8 in.)	29.5 m
Length	(61 ft 3 in.)	18.7 m
Height	(25 ft 10 in.)	7.9 m
Draft	(3 ft 4 in.)	1.0 m
Wing chord	(14 ft 8 in.)	4.5 m
Wing aspect ratio	9.0	
Span, tailplane	(31 ft 0 in.)	9.44 m

Areas

Wing	(1035 sq ft)	96.2 m^2
Flaps	(135.4 sq ft)	12.6 m^2
Ailerons	(90.4 sq ft)	8.4 m^2
Fin	(95.0 sq ft)	8.8 m^2
Rudder	(45.5 sq ft)	4.2 m^2
Stabilizer	(139.8 sq ft)	12.9 m^2
Elevator	(87.8 sq ft)	8.2 m^2

WEIGHTS

Weight empty, equipped	(21,400 lb)	9705 kg
Max. T.O. weight (land)	(36,500 lb)	16550 kg

TURBOPROP INSTALLATION

The installation of four turboprop engines requires some wing and cockpit modification. No internal wing strengthening is required for the inboard engines due to their lighter weight and lower power. Some internal wing strengthening is required for the outboard engines. Engine mounting and nacelle structure are standard for all four engines; quick engine change proven powerplant packages, now in production, are used. Cockpit engine controls and instruments are centralized and easy to operate and to read by either pilot or copilot.

DECREASED WEIGHT

The saving in aircraft empty weight due to the four turboprop installation as compared to the reciprocating engine installation is approximately 2600 lb.

DECREASED MAINTENANCE AND OPERATING COSTS

Extensive service experience with turboprop engines has justified a time between overhaul of 3000 hours which is more than twice that for reciprocating engines.

Current turboprop experience indicates that scheduled inspection and maintenance will require only five minutes per engine per flight hour for the Super Albatross. This is much less than the time reported by users for maintenance of the R-1820-76 engines.

The propeller diameter for the turboprop engines is 99 inches, compared with 132 inches for the present propellers. This increases tip-to-water clearance by more than 5 inches, which results in picking up less spray to erode the propellers or impinge on the aircraft structure.

Both turboprop engines considered are proven production engines with well over 5 million flying hours in service. They are used worldwide and are marinized and fully qualified for operation in a salt water environment.

AIRCRAFT VIBRATION AND NOISE

Turboprop engines are noted for their smoothness and quietness compared with reciprocating engines.

Reductions of 12 to 15 decibels in sound pressure levels have been recorded in the cabins of aircraft converted from R-985 reciprocating engines to turboprop engines of equal power. On the 4-engine Super Albatross this noise reduction is even greater, since the inboard engines' propeller tip clearance to the hull is approximately 8 inches greater than with reciprocating engines.

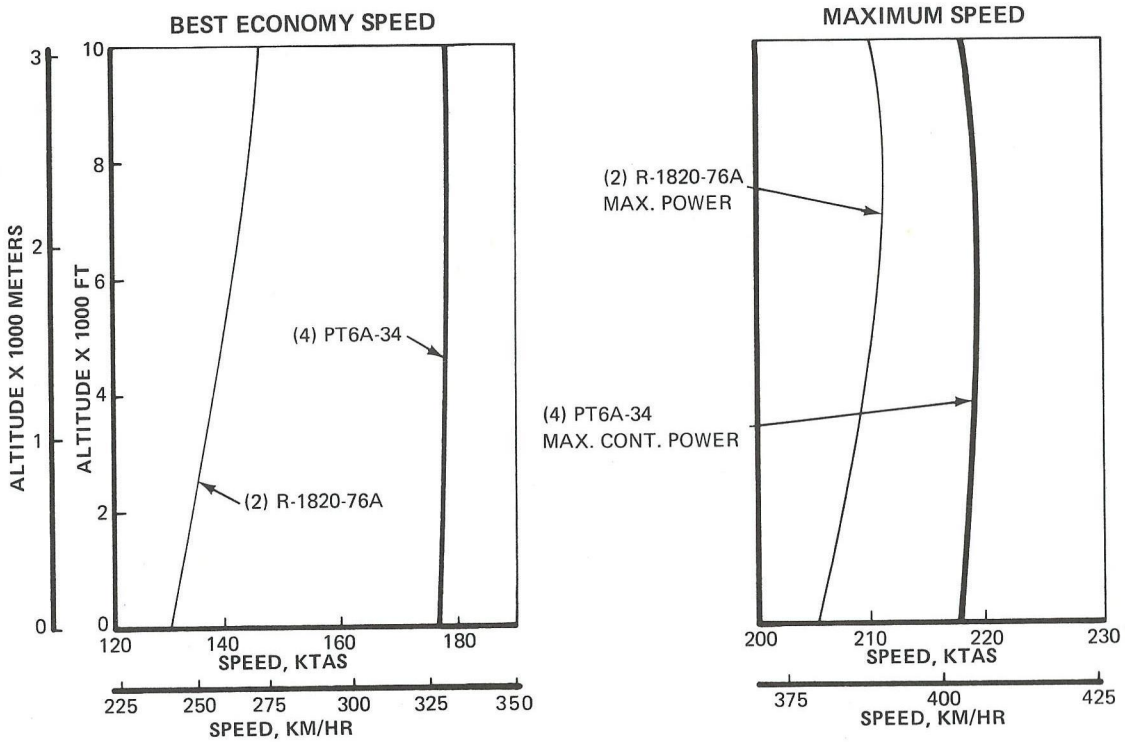
PERFORMANCE COMPARISON

(Standard Day—Zero Wind)

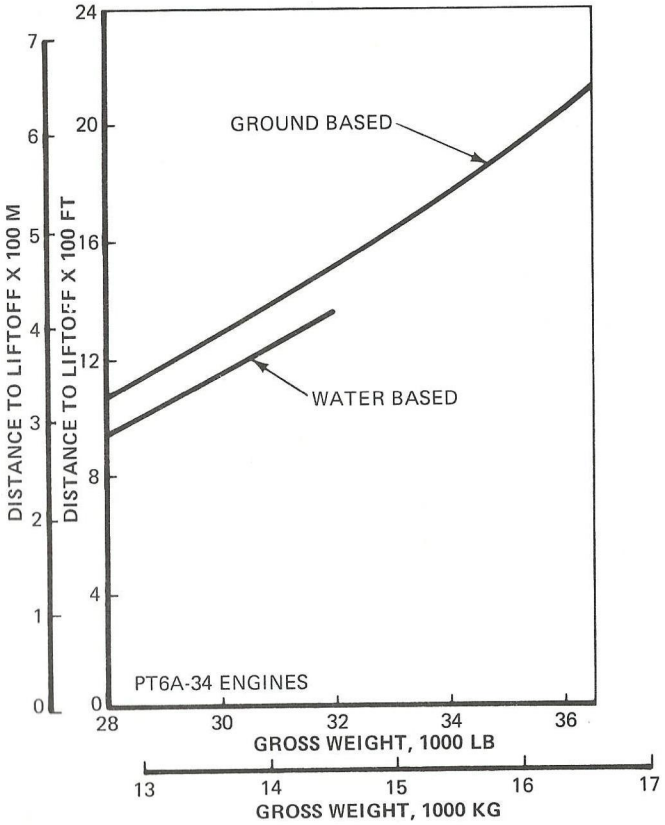
	R-1820-76	PT6A-34
Maximum Speed--Sea Level 13,605 kg (30,000 lb)	380 km/h (205 KTAS)	402 km/h (217 KTAS)
Rate-of-Climb--Sea Level 16,327 kg (36,000 lb) Max. Continuous Power	271 m/m (900 fpm)	445 m/m (1480 fpm)
One Engine Failure Rate of Climb at Sea Level 16,327 kg (36,000 lb) Max. Power	30 m/m (100 fpm)	268 m/m (890 fpm)
Service Ceiling--13,605 kg (30,000 lb) Max. Continuous Power	6706 m (22,000 ft)	7300 m (24,250 ft)
One Engine Failure Service Ceiling 13,605 kg (30,000 lb) Max. Continuous Power	3050 m (10,000 ft)	6706 m (22,000 ft)
Max. Range Cruise Speed @3050 m (10,000 ft)		
4 Engines Operating	———	330 km/h (178 KTAS)
2 Engines Operating	270 km/h (146 KTAS)	274 km/h (148 KTAS)
Ferry Range with 300 gallon drop tanks--45 minute reserve, 4 Engines Operating	———	3050 km (1650 n mi)
Ferry Range with 300 gallon drop tanks-- 45 minute reserve, 2 Engines Operating	5000 km (2700 n mi)	4070 km (2200 n mi)

SPEED VS ALTITUDE

GW = 13605 kg (30,000 lb) (2)-300 gallon drop tanks

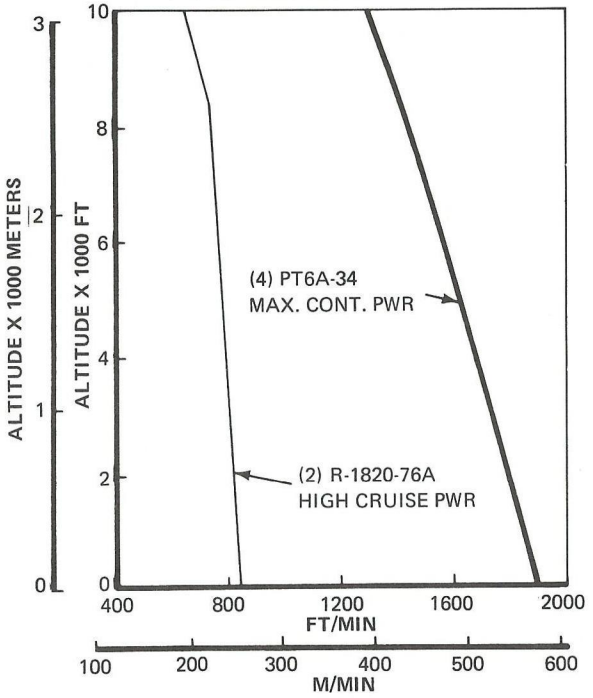


TAKEOFF DISTANCE
STD DAY ~ SEA LEVEL

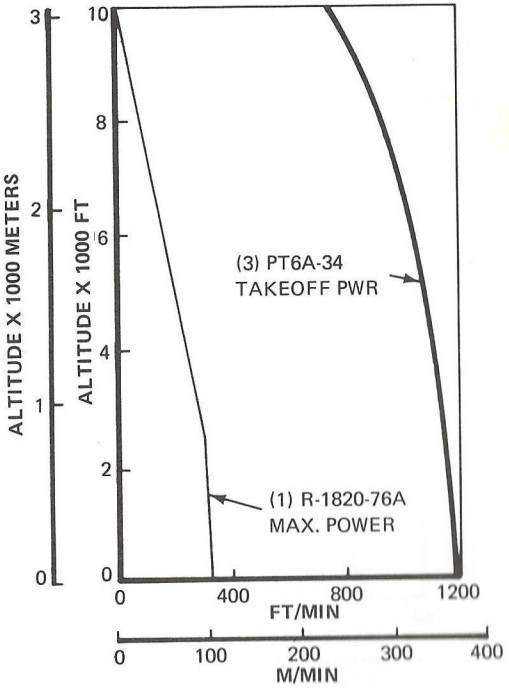


RATE OF CLIMB
GW = 13605 kg (30,000 lb)

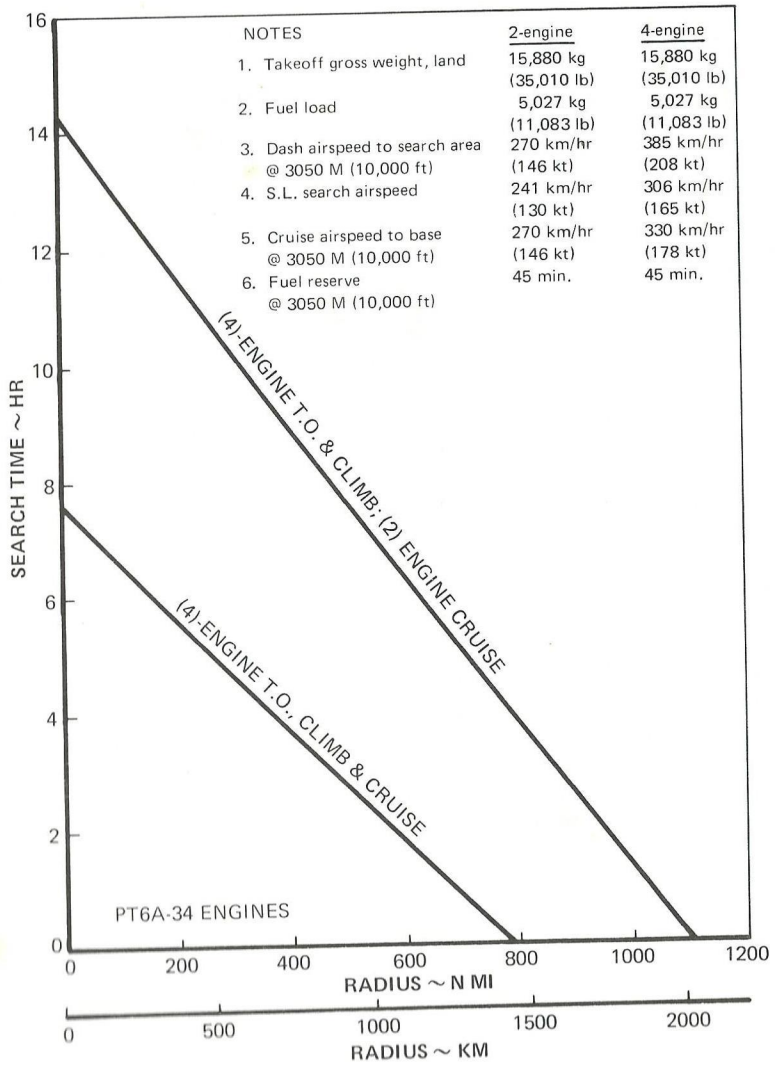
ALL ENGINES OPERATING



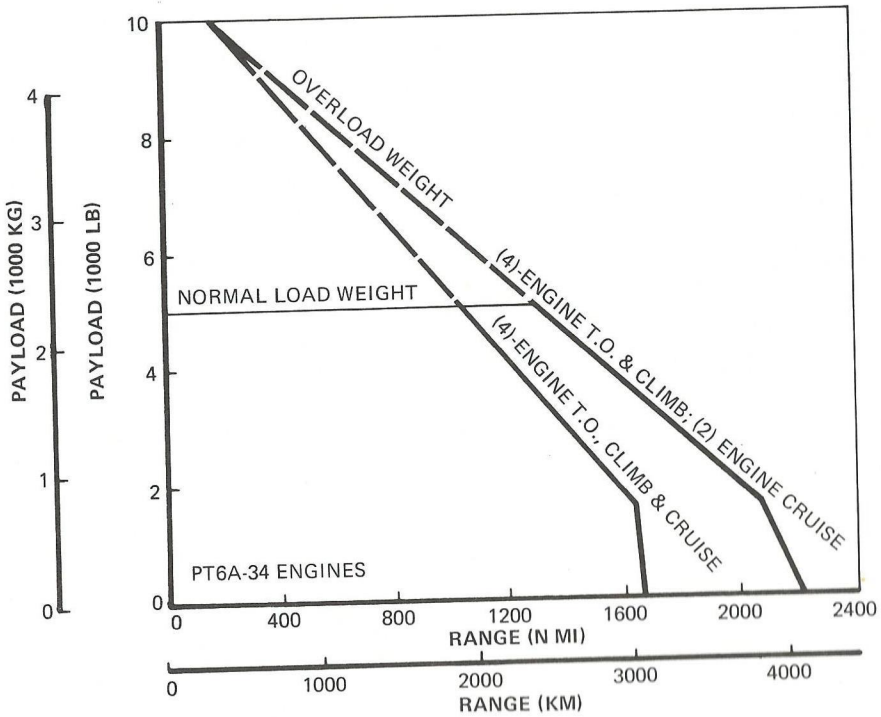
ONE ENGINE OUT



SEARCH TIME VS RADIUS



PAYLOAD VS RANGE



1. MAX. TAKEOFF WEIGHT, LAND 16550 kg (36,500 lb)
2. CLIMB TO AND CRUISE AT 3050 m (10,000 ft)
3. RESERVES: 45 MIN. AT 3050 m (10,000 ft)
4. EMPTY WEIGHT: 9705 kg (21,400 lb)

FOR FURTHER INFORMATION CONTACT
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