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The Beriev Be-200 Altair amphibious aircraft

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The Beriev Be-200 Altair (Russian: Бериев Бе-200) is a multipurpose amphibious aircraft designed by the Beriev Aircraft Company and manufactured by Irkut. It has a capacity of 12 tonnes (12,000 litres, 3,170 US gallons) of water, or up to 72 passengers.

The name *Altair* was chosen after a competition amongst Beriev and Irkut staff in 2002/2003. This name was chosen as it is not only the name of the alpha star in the Eagle constellation, but also because "Al" is the first part of the name of the A-40 *Albatross* amphibious aircraft, whose layout was the development basis for the creation of the Be-200, "ta" stands for Taganrog, and "ir" stands for Irkutsk.

The Be-200 can be configured for fire fighting, search and rescue, maritime patrol and environmental monitoring, cargo and passenger transportation operations. It can take off and land on unprepared airstrips and water.

Development

The Be-200 was designed by the Beriev Aviation Company, with the Russian Irkutsk Aircraft Production Association (now part of the Irkut Corporation). Beriev are responsible for development, design and documentation; systems-, static-, flight- and fatigue-testing of prototypes; certification and support of the production models.

"The aircraft was developed under Irkut's first full civil programme." The aircraft was designed by Beriev Aircraft and is assembled at the Irkutsk Aviation Plant of Irkut.

Designed as a multirole amphibious platform, the Be-200 can be configured for a range of missions. The aircraft is a high-wing T-tail monoplane, presented in figure 1. The hull is of a single step design with high length-to-beam ratio. This design provides stability in water.

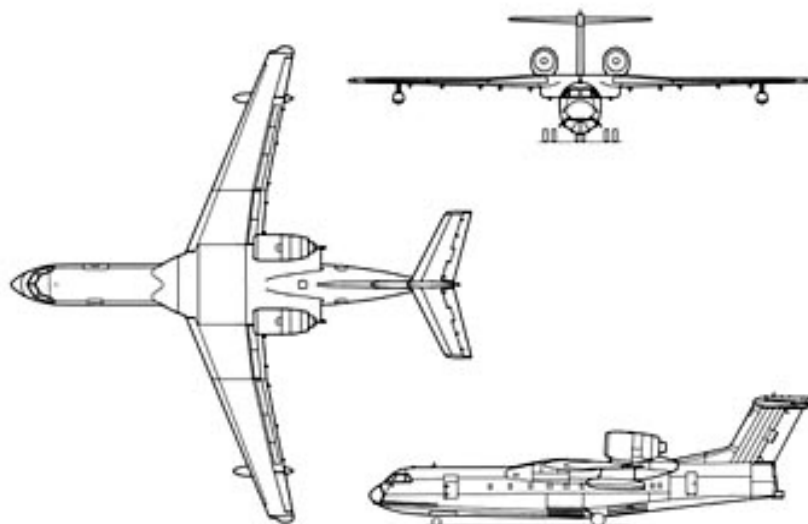


Fig. 1. T-tail monoplane

The first Be-200 test aircraft completed its maiden flight in September 1998. Be-200ES, the first production aircraft, touched the skies in June 2003. The Russian Ministry of Emergency Situations (Emercom) was the first customer to receive an aircraft in July 2003 under seven Be-200 fire-fighting and rescue aircraft order.

Design

The Be-200 airframe is made of aluminium alloys and coated with corrosion-free materials. There was also a selective use of such materials as titanium, composites and other corrosion-free materials. The Be-200 features significant maritime characteristics to perform littoral and water operations. The aircraft delivers flight characteristics similar to conventional aircraft.

Be-200 mission variants

The multirole Be-200 can be configured as an amphibious water drop fire-fighting aircraft, a freighter, or as a passenger aircraft. The Be-200 can also be equipped for special missions — air ambulance and search and rescue.

The passenger variant, presented in figure 2 and designated as Be-210, is the pressurised and air conditioned cabin allowing transportation of up to 72 passengers. It has the maximum range of 1,850 km.

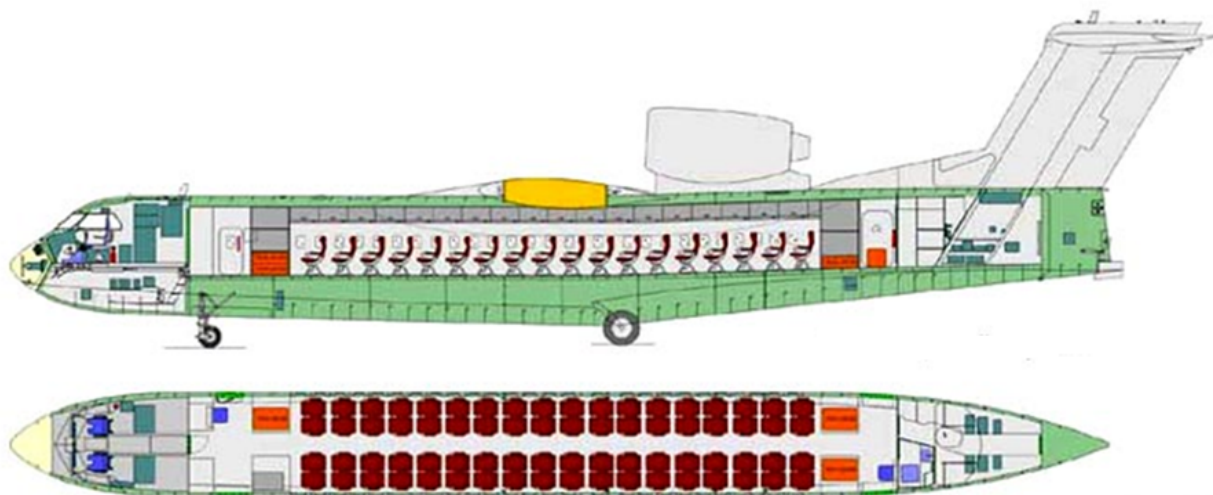


Fig. 2. Passenger variant Be-210

When configured as an air ambulance (figure 3), the aircraft can accommodate ten medical staff as well as 30 injured persons on stretchers. The aircraft features emergency diagnostics and intensive care facilities.

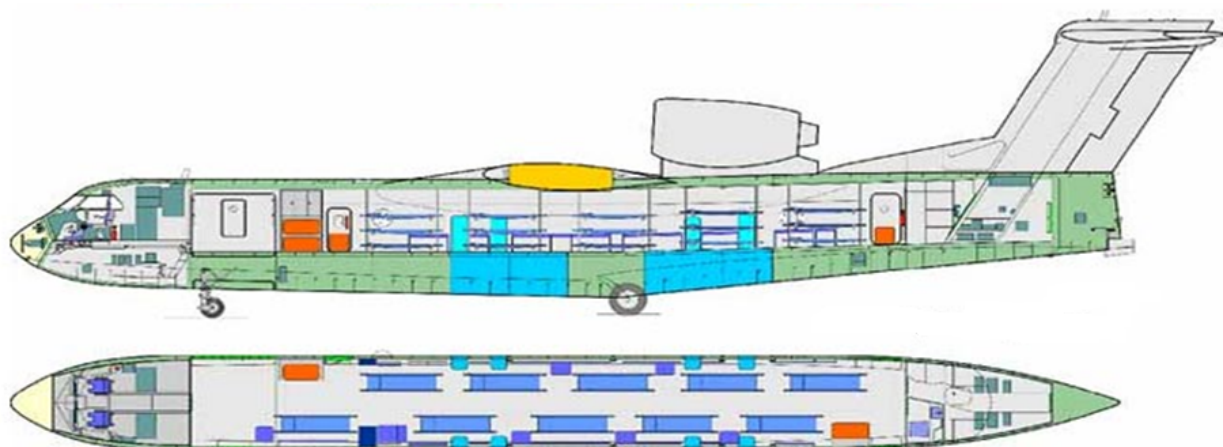


Fig. 3. Air ambulance version

The search and rescue (SAR) variant, presented in figure 4, can perform operations within an area of 200 miles (or 320 km) for 6.5 hours. The aircraft can be equipped with searchlights and sensors, an inflatable boat, thermal and optical surveillance systems, and medical equipment. The SAR variant can accommodate up to 45 passengers. The aircraft is also capable of being configured for anti-submarine warfare duties.

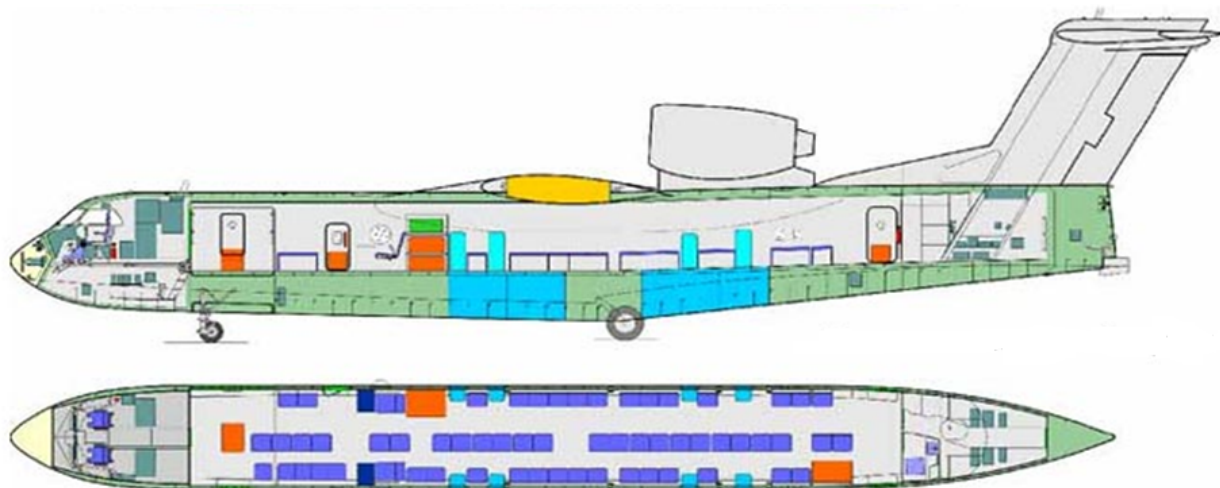


Fig.4. Search and rescue (SAR) variant

The fire-fighting variant (figure 5) has a crew of two members, and is fitted with fire extinguishing fluid and water tanks. The Be-200 fire-fighter suppresses fires by dropping water and/or chemical retardants. The aircraft can drop 270 t of water on the fire area without refuelling.

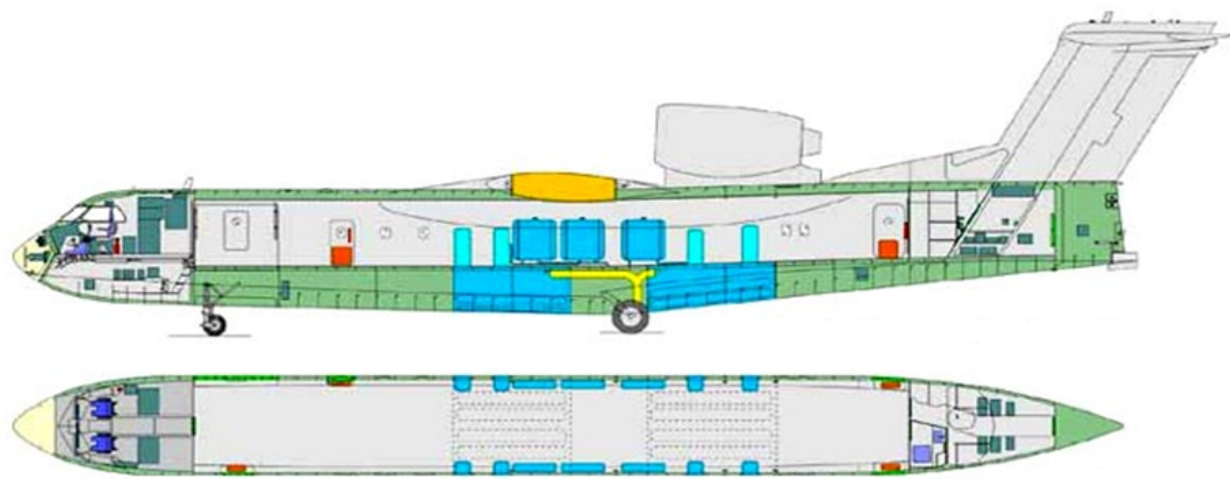


Fig.5. Fire-fighting variant

Eight ferric aluminium alloy water tanks are located under the cabin floor in the centre fuselage section. Four retractable water scoops, two forward and two aft of the fuselage step can

be used to scoop a total of 12 tonnes of water in 14 seconds. Alternatively, the tanks can be filled from a hydrant or a water cistern on the ground. The water tanks can be removed quickly for carrying cargo.

Water can be dropped in a single salvo, or in up to eight consecutive drops. The aircraft also carries six auxiliary tanks for fire-retarding chemical agents, with a total capacity of 1.2 m³. The aircraft can empty its water tanks over the site of a fire in 0.8 to 1.0 seconds when flying above the minimum drop speed of 220 km/h (135 mph)

Beriev developed unique fire-fighting equipment for the Be-200, allowing it to scoop water while skimming the water surface at 90-95% of takeoff speed. The Be-200's engines are located high and to the rear in order to keep them clear of spray.

The transport variant, presented in figure 6, is fitted with floor-mounted cargo-handling equipment to transport loose cargoes, as well as cargoes loaded in standard containers and pallets. The aircraft has a capacity to carry 6.5t payload.

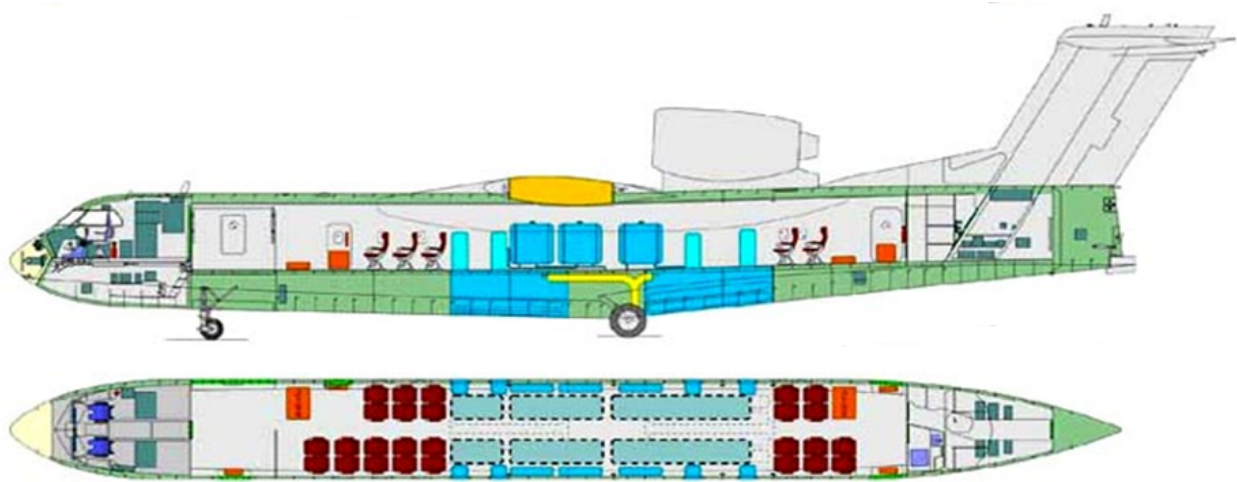


Fig. 6. Transport variant

The flight control system, integrated with the aerodynamic design, provides high manoeuvrability at low speeds as well as better handling capabilities and safety, and reduces the pilot's workload.

The aircraft is powered by two D-346TP high-bypass ratio engines. The D-346TP is a specific "maritime" corrosion-resistant version of the D-436 three shaft turbofan engine. These are mounted above the wing root pods on the landing gear fairings to prevent water spraying into the engines during take-off and landing.

The D436TP turboprop engines deliver a higher performance at hot-and-high conditions compared with turboprop engines installed on similar types of fire-fighting aircraft. The engines have been developed with advanced materials and innovative solutions.

The Digital Flight Control (Fly-by-wire) cockpit is fitted with modern navigation systems such as satellite navigation (GPS), FMS, autopilot and weather radar. The ARIA 200-M all-weather integrated avionics system developed by Honeywell with the Moscow Research Institute of Aircraft Equipment, uses six 152 x 203 mm (6 x 8 in) LCDs to display information to the two-man crew.

This aircraft fitted with flight/navigation and communication equipment allows the navigation and flight control at all flight phases in adverse weather conditions at any season, day and night.

Aircraft landing gear

The aircraft is equipped with hydraulically operated rearward retractable landing gear units. Each unit has two wheels in addition to a water rudder, which provides steering in the water. The underwing stabiliser floats fitted on wings provide stability in water.

Be-200 aircraft performance

The Be-200 can operate from either a 1,800 m long runway or an area of open water not less than 2,300 m long and 2.5 m deep, with waves of up to 1.3 m high.

The Be-200 can fly at a maximum speed of 680km/h. It has a range of 3,300 km and service ceiling of 8,000 m. The aircraft can climb at a rate of 3,350 ft (or 1021 m) per minute. The Be-200's maximum take-off weight on the runway and water is 41 t and 37.9 t respectively.

The Be-200 amphibious aircraft has good prospects and the range of its applications will steadily expand opening up new capabilities. It is a unique amphibious aircraft with no equivalent in the world.

Variants

- **Be-200** — Basic multirole model
- **Be-200ChS** (as it is more often known, a transcription of the Russian **Бе-200ЧС**) or **Be-200ES** (Emergency Services) — Multirole model fitted to the requirements of the Russian Ministry of Emergency Situations
- **Be-200E** — English cockpit version of the Be-200ES
- **Be-200RR** — Projected Rolls-Royce engined variant.
- **Be-210** — Projected Passenger only model
- **Be-220** — Projected maritime patrol variant.

Be-200 general characteristics

- **Crew:** 2
- **Length:** 32.0 m (105 ft 0 in)
- **Wingspan:** 32.8 m (107 ft 7 in)
- **Height:** 8.9 m (29 ft 2 in)
- **Wing area:** 117.4 m² (1,264 ft²)
- **Empty weight:** 27,600 kg (60,850 lb)
- **Max Take Off Weight (Land):** 41,000 kg (90,390 lb)
- **Max Take Off Weight (Water):** 37,900 kg (83,550 lb)
- **Max Capacity (Water or Retardant):** 12,000 kg (26,450 lb)
- **Max Capacity (Cargo):** 7,500 kg (16,530 lb)
- **Max Capacity (Passengers):** 44 (Be-200ES) 72 (Be-210)
- **Powerplant:** 2 × Progress D-436TP turboprops, 7,500 kgf (16,534 lbf) each

Performance

- **Maximum speed:** 700 km/h (435 mph)
- **Cruise speed:** 560 km/h (348 mph)
- **Economy speed:** 550 km/h (342 mph)
- **Landing speed:** 200 km/h (124 mph)
- **Takeoff speed:** 220 km/h (137 mph)
- **Minimum speed (Flaps 38°):** 157 km/h (98 mph)
- **Range:** 2,100 km (1,305 mi)
- **Ferry range (One Hour Reserve):** 3,300 km (2,051 mi)
- **Service ceiling:** 8,000 m (26,246 ft)
- **Rate of climb:** 13 m/s (2,600 ft/min) (At Sea Level and MTOW — Flaps 20°)
- **Rate of climb:** 17 m/s (3,350 ft/min) (At Sea Level and MTOW — Flaps 0°)

Avionics

- ARIA 200-M - integrated avionics system.

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