



AMPHIBIOUS AIRCRAFT - SIGNIFICANT OPERATIONAL ROLES

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China has just flown the world's largest amphibious aircraft, the AG 600, codenamed "Kunlong", in a new configuration at Zhuhai in South China's Guangdong province.¹ The aircraft is manufactured by the Aviation Industry Corporation of China (AVIC).² The 20-minute test flight was meant to check basic flight functions. The new variant has been designed to undertake fire-fighting missions. The 60-ton aircraft can carry nearly 12-tons of water. In view of China's desire to get Taiwan into its fold, there is global speculation that China may launch an invasion to annex the island nation. In such an eventuality, amphibious aircraft would also be relevant.

China's Large Transport Aircraft Programs

China's first indigenous large military transport aircraft, Y-20, entered service in 2016.³ This aircraft, with a 200-ton maximum take-off weight, gave China significant air power projection capability. The aircraft can carry a 66-ton load or two Type 15 tanks. Powered by four turbofan engines, it has a 4,500-kilometres range with a full load. The C919,⁴ built by the Commercial Aircraft Corporation of China (Comac), is a narrow body, single-aisle, airliner that will compete with the Boeing 737 and Airbus A320. The aircraft first flew in 2017 and is now all set for customer deliveries later in 2022. Significant parts and systems of the aircraft, including engines, are from Western sources.

AVIC AG 600 Aircraft

The 53.5-ton maximum all-up-weight AG 600 aircraft is powered by four Chinese WJ-6 turboprops. Like most amphibious aircraft, the AG600 is a hybrid aircraft with the capability to operate from both land and water. The aircraft took merely five years from the drawing board to rollout. The first flight was in December 2017, and the first ocean flight was in July 2020. After more detailed testing and certification, the aircraft is likely to enter service in 2023. The fire-fighting variant will take an additional two years

for induction. Nearly 17 aircraft have been ordered by Chinese government departments. China will target Pacific Island countries, New Zealand, and some ASEAN countries to market the aircraft. The aircraft will be used for transportation, aerial fire-fighting, air-sea search and rescue (SAR), and a variety of other maritime roles.

The aircraft requires 1,500 m long, 200 m wide and 2.5 m deep stretches of water for take-off and landing. It can operate at up to Sea State 3, implying 2 m waves. It will be able to collect 12 tons of water in 20 seconds run. The aircraft is larger in size than the other two large amphibious aircraft, Japan's ShinMaywa US-2 and Russia's Beriev A-40 (BE-200). For the search and rescue role, it will pick up 50 people from the sea. China has built or reclaimed many islands in the South China Sea (SCS). This aircraft will be very useful for operating and securing these far-flung island territories. From a southern Chinese airbase, it could reach any island territory in about four hours, flying at a cruise speed of 500 km per hour. It could also be used for supporting ship replenishments.

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Other Large Amphibious Aircraft

The Shin Maywa US-2 is a Japanese short-take-off and landing amphibious aircraft, developed from their own Shin Meiwa US-1A seaplane of 1970 vintage. It was meant for the Japan Maritime Self-Defence Force (JMSDF) for use in the air-sea SAR role. Subsequently, this 15-ton water carrying capacity aircraft was also used for aerial firefighting. The aircraft was offered to the Indian Navy and Indian Coast Guard, as well as some ASEAN countries. Indonesia and Thailand were the main contenders. The aircraft crew, in addition to the pilots, includes a SAR coordinator, on-board maintenance crew, divers, paramedics, and a sensor operator. It can also carry 20 passengers or 12 stretchers. Its take-off and landing distance are less than 330 m at full load.

The Beriev A-42 is a Russian amphibious aircraft capable of anti-submarine warfare in addition to SAR and fire-fighting. Though the project started in 1986, it got grounded after the dissolution of the Soviet Union. Between 1989 and 1998, the original Beriev A-40 variants set many world records. Though revived in 2002, the final order by the Russian Navy for three aircraft was placed only in September 2019. It would use two Russian Progress D-27 prop-fan engines or two Rybinsk RD-36-35 turbojet engines to get an increased range of 9300 km. The date for service entry is still open-ended. The take-off run on water could be nearly 2 km. The aircraft could carry anti-submarine and anti-shipping missiles or armaments. Nearly 19 Russian Beriev Be-200 utility turbo-jet powered amphibious aircraft have been built. They are being used for fire-fighting, SAR,

maritime patrol, cargo, and passenger transportation. Azerbaijan was the first foreign customer to purchase one Be-200ES in 2008. Algeria, Chile, China, and the United States have placed orders for the Be-200ES pending certification of a newer variant. These may be reviewed in light of the Ukraine conflict.

Amphibious Aircraft Design Issues

The ability to operate from both land and water has its advantages and complexities. Dual design means a combination of a wheeled undercarriage and a boat-shaped bottom. This adds weight to the aircraft. There are some smaller amphibious planes with floats having a much smaller wheel-set under the floats themselves, as is the case in the DHC Otter floatplane. Larger amphibious aircraft also require wing-tip float tanks for support when stationary. These add weight and aerodynamic drag. These could be detachable and removed when extended land-based operations are involved. Amphibious aircraft shapes and systems make them heavier, more complex to operate and slower in flight due to increased drag. Yet they are versatile and, in many ways, have an advantage over helicopters for sea operations, being faster, with a longer range, and can carry much more load. They could be great for operating on remote islands or over large water bodies.

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The USAF Amphibious Aircraft Project

The USA made its initial amphibious aircraft in the mid-1920s, primarily as airliners. World War II saw the US Armed Forces and their allies using these for military operations. Seaplanes and amphibians were used for Anti-Submarine Operations in World War II. The advent of ship-based helicopters did dent their further development and operational use. In September 2021, the US Air Force (USAF) Special Operations Command (AFSOC)⁵ asked Lockheed Martin for an operational capability demonstration of an amphibious variant of the MC-130J Commando II special mission aircraft within 17 months. Earlier, the company had revealed the floatplane version of the Hercules at a virtual Special Operations Forces Industry Conference (SOFIC) in May 2021. It is a project being handled jointly through the Air Force Research Labs. Aircraft are meant to operate from littoral areas in support of special operations forces. This variant is likely to be fitted with large underslung floats mounted on the fuselage.⁶ The aircraft would be meant for penetrating into denied areas, inserting or extracting troops, or resupplying special operations forces, such as refuelling helicopters and tilt-rotor aircraft. Lockheed had proposed a waterborne C-130 a few decades earlier, but it did not fit into the operational concepts of the US armed forces then. The amphibious MC-130J could offer a variety of capabilities for special operations, especially for expeditionary and distributed operations.⁷ This could become all the more important to take on China in

the South China Sea and also during a possible invasion of Taiwan. China's development of amphibious aircraft may also have similar operational imperatives. In the long-term, US Navy, Marine Corps, and the US Coast Guard may all invest in the amphibious Hercules.

Operational Roles and Employability - India

Sea SAR remains an important role for amphibious aircraft. They could be useful in the Bay of Bengal and in particular for operations in Andaman & Nicobar (A&N) Islands. They have a significant role for many ASEAN nations. Surveillance of shipping is another operational role. Interdiction roles could include anti-contraband, counter-terrorism, anti-infiltration, and anti-piracy operations. Their multi-role capabilities, higher speed, and larger radii-of-action compared to helicopters make them more versatile. They have a great role in sea logistics support and communications. Small far-flung islands with no or just one small runway, as is the case in Lakshadweep, could become an attraction. Also, if the runway in the Nicobar Islands were to be damaged or inoperative, amphibians would still operate. For countries with large island territories, an amphibious aircraft could be useful during the conflict, when existing airfields may be put out of action by the adversary. With climate change, the world is seeing increased incidents of forest fires. These aircraft have a great role in fire-fighting. With the greater involvement of India in the Indo-Pacific and the Indian Ocean, such an aircraft could have an operational role. However, considering the other operational systems competing for limited funds, the priority of an amphibious aircraft may currently be lower.

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Notes:

¹ Ashish Dangwal, “New Milestone For China – World’s ‘Largest’ Amphibious Aircraft AG600 Conducts Its First Flight With New Configuration”, *The Eurasian Times*, June 2, 2022, <https://eurasianimes.com/worlds-largest-amphibious-aircraft-ag600-conducts-its-first-flight/>. Accessed on June 03, 2022.

² AG600, AVIC Official Website, <https://www.avic.com/c/2021-06-24/513755.shtml>. Accessed on June 03, 2022.

³ Steven Jiang, “China’s military gets boost with huge new transport plane”, CNN, July 07, 2016, <https://edition.cnn.com/travel/article/china-jumbo-freighter/index.html>. Accessed on June 03, 2022.

⁴ Taylor Rains, “Meet the Comac C919, the first mainline airliner made by a Chinese company that could begin deliveries this year”, *Business Insider*, February 13, 2022. <https://www.businessinsider.in/thelife/news/meet-the-comac-c919-the-first-mainline-airliner-made-by-a-chinese-company-that-could-begin-deliveries-this-year/slideshow/89548256.cms>. Accessed on June 03 2022.

⁵ Gareth Jennings, “AFSOC plans operational capability demo of amphibious MC-130J ‘in only 17 months’”, *Janes*, September 17, 2021, <https://www.janes.com/defence-news/news-detail/afsoc-plans-operational-capability-demo-of-amphibious-mc-130j-in-only-17-months>. Accessed on June 03, 2022.

⁶ Thomas Newdick and Joseph Trevithick, “Amphibious MC-130J Transport Is On Special Operations Command’s Wishlist”, *The Drive*, May 19, 2021, <https://www.thedrive.com/the-war-zone/40694/amphibious-mc-130j-transport-is-on-special-operations-commands-wishlist>. Accessed on June 03, 2022.

⁷ Ibid.



Centre for Air Power Studies

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