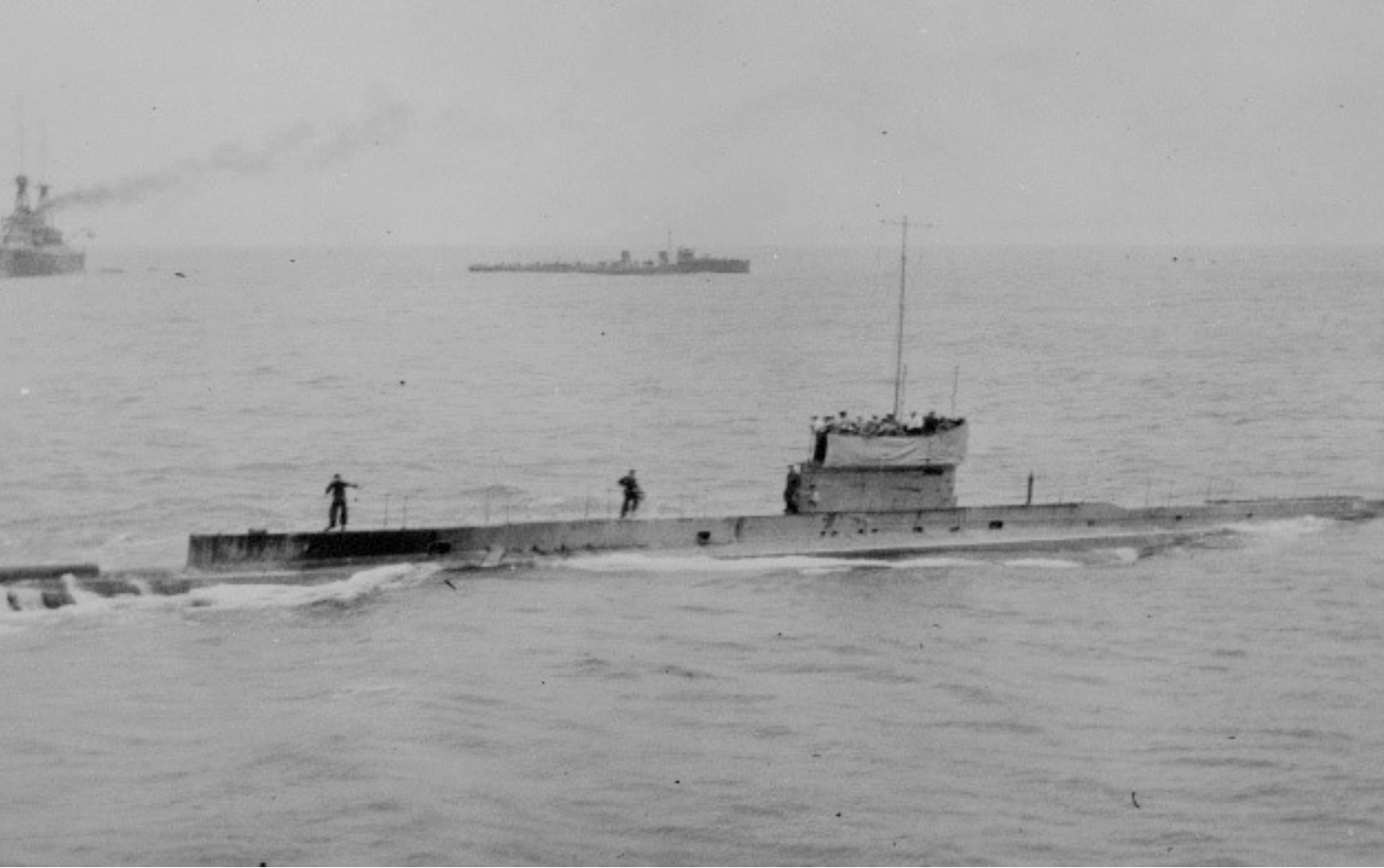


EVOLUTION OF THE SUBMARINE



Photos courtesy of the Royal Australian Navy



EARLY DAYS

While it is widely considered that William Borne designed the first submarine in 1578, it was Leonardo de Vinci (1452-1519) who initially developed the idea of a military vessel that could submerge under water to attack enemy ships.

It wasn't until 1776 that the first submarine to make an attack on an enemy ship was built. Named the Turtle, it was designed by David Bushnell and was built with the intention to break the British naval blockade in New York Harbor during the American Revolution. Operated by Sergeant Ezra Lee, the Turtle made an unsuccessful attack on a British ship on 7 September 1776. Lee was forced to surface but managed to escape.

Several more submarines were attempted over the years; however, modern day submarine warfare wasn't born until the beginning of the 20th Century. At the start of World War I, submarines were still in their infancy. Considered 'unethical' and not fitting into the conventional rules of war, few foresaw the watershed in naval warfare that submarines were about to bring about.

ROLE IN THE GREAT WARS

Once their true capabilities were realised, submarines had a substantial impact on World War I; sinking ships, laying mines, blockading ports and providing escorts to trans-Atlantic convoys. During World War II, submarine technology advanced significantly. The Germans, who were operating their U-Boats in the Atlantic Ocean, adopted the principle of a 'snorkel' (allowing the boat to recharge its batteries while staying submerged). Japan was the first nation to utilise the 'midget subs', most famously when they launched their coordinated attack on Pearl Harbor (in the Pacific Ocean) in 1941, where the United States had been operating their submarines.



ADVANCING TECHNOLOGY

From 1945 to 1991, the Cold War dictated much of the advancement in military capabilities. Many features of the German U-Boats were incorporated into future designs. However, it was only when the US launched the first nuclear powered boat in 1955 that the submarine was transformed from a surface ship that could submerge briefly, to a fully underwater vessel which could stay underwater for extended periods of time.

During the Cold War, the United States strategy relied heavily on its ability to control the seas. Apart from performing traditional roles, submarines were also capable of launching missiles should the need arise. The United States was more dominant in this underwater strategy, which proved vital in deterring the nuclear war that had been a constant threat for more than forty years.

With the end of the Cold War, far fewer submarines were commissioned. In 2000, forty-seven nations were operating more than 700 submarines; over 300 of them were nuclear-powered. Submarine technology, however, has continued to advance.

During the first Gulf War submarines were used to launch limited Tomahawk missile attacks, but during the second Gulf War the United States deployed far more submarines which were heavily involved in strike missions.

The United States continued to build more advance submarines, including ones that could operate weapons in any sea conditions; from under arctic ice to operating in shallow water.

In 2004, the United States commissioned the first Virginia Class attack submarine, designed specifically for littoral and euslrine waters. This submarine does not have a periscope, but instead uses a high resolution digital camera. It is also capable of going to great depths, getting in close to the shore in shallow water and launching unmanned undersea vehicles. All of these advancements have been designed with the added intention of fighting terrorism.

SUBMARINES IN AUSTRALIA

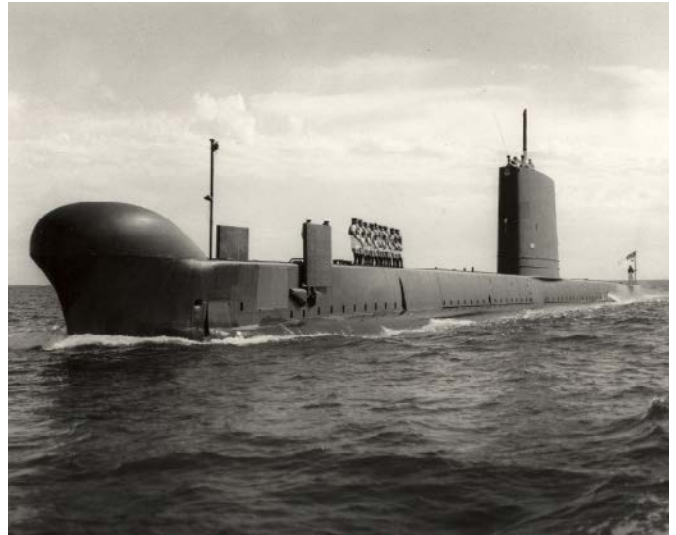
The first Australian submarines, the AE1 and the AE2, were commissioned into the Royal Australian Navy in 1914. They were deployed during World War I, but both were lost during combat. The fate of the AE1 has never been determined. The AE2 was the first submarine to break through the Turkish defences before sustaining irreparable damage and sinking on 30 April 1915.

In 1919, six "J" Class submarines were commissioned into the Royal Australian Navy. The second-hand boats, received from the Royal Navy, were in such bad condition that they were immediately placed into refit once they reached Sydney. Even after extensive work, the boats spent very little time in the water and, except for J7, all were decommissioned in 1924.

Under the Royal Australian Navy's post World War I development program, two submarines – Otway and Oxley – were ordered from the Royal Navy. They arrived in Sydney in 1929, but due to maintenance problems and the depressed economy they were returned to Britain in 1931.

During World War II, the Royal Australian Navy obtained an ex-Dutch submarine K9, which was used for training purposes for surface ships in submarine detection.

It wasn't until four initial Oberon Class submarines were commissioned that Australia began to build a strong submarine fleet. While the Oberons were not involved in any conflict in service, their presence was invaluable to the Royal Australian Navy. They were built at Scotts Shipbuilding at Greenock in Scotland and the first of the boats, HMAS *Oxley* was commissioned in March 1967. This was followed by HMAS *Otway*, in March 1968, HMAS *Ovens*, in April 1969 and HMAS *Onslow*, December 1969. HMAS *Oxley*'s arrival in Sydney coincided with the commissioning of the submarine base HMAS *Platypus*, at Neutral Bay, Sydney. In 1977 and 1978 two more submarines were commissioned, HMAS *Orion* and HMAS *Otama*.





UNIQUE CAPABILITY

Submarines are the least visible of all military operations. While this makes them highly secretive in nature, it also makes them highly valuable. They provide several different functions, many of which affect other military operations.

Designed to be virtually undetectable and able to stay out at sea for months, submarines are able to patrol the world's oceans – even in hostile territory. This allows them to gather intelligence, undertake surveillance and carry out reconnaissance missions. They are able to monitor the air, land and sea (both above the surface and below).

During times of war, submarines are crucial in controlling the seas. They detect and destroy hostile submarines and surface ships, blockade foreign ports and restrict ocean transport. They provide intelligence and underwater protection for aircraft carriers and are able to detect and lay mines more efficiently than any other navy vessel. Submarines provide a means to land Special Forces in hostile regions and, if fitted with suitable weapons, are able to strike land targets. In addition, submarines act as a force multiplier. This means that in order to find just one submarine, foreign nations must deploy several military vessels and aircraft.

While most commonly known for the role they play in navies, submarines are also used for a variety of reasons in the private sector. The most common are scientific submarines, which explore the world's oceans to further research and to locate sunken ships. They can also be used for tourism and unmanned submarines (which are very small and operated remotely from the surface) are used to perform work which is too deep or too dangerous for divers.



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