

how do I become a submariner?

Being a submariner is one of the most challenging positions in the Navy. Submariners in Australia have to attend the Royal Australian Navy Submarine Training Systems Centre, based just south of Perth at HMAS Stirling. New recruits are rigorously tested for endurance, capability and the ability to cope with the living conditions within the submarine.

The Navy believes that submariners are a different breed of sailor, having being pushed to their limits to prove they are capable of working within one of the most demanding arms of the Defence Force. Before you are able to apply to be a submariner, you must first spend at least a year in the Navy training in your chosen field.



ASC

ASC

Mersey Road, Outer Harbor
South Australia 5018
Telephone: +61 8 8348 7000
www.asc.com.au

on board a submarine

how do submarines work?

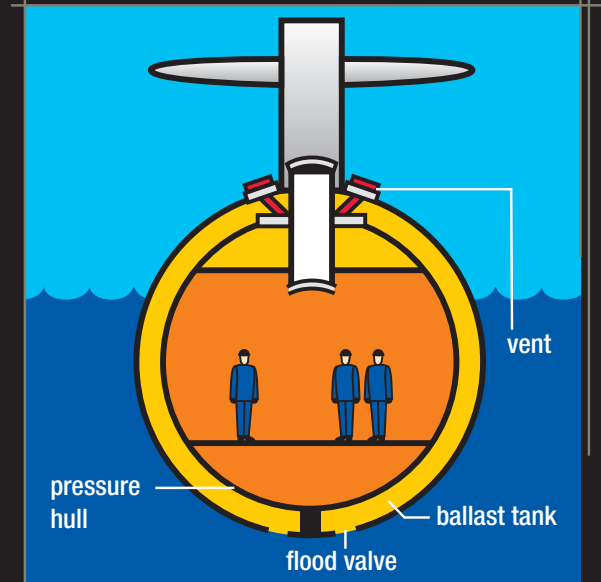
Ships are able to float on the surface of the ocean because the weight of the water they displace (push out of the way) is equal to the weight of the ship. This means that if a ship weighs 3000 tonnes, then it will push 3000 tonnes of water out of the way. This creates a force (buoyant force) that acts against gravity and keeps the ship afloat.

Submarines are able to control how they float with special tanks called ballast tanks. It's like when you have a ball in the swimming pool and you try to keep it underwater, it always wants to rise to the surface. But if you put a hole in it so it can fill with water, the ball will sink. It's the same with ballast tanks.

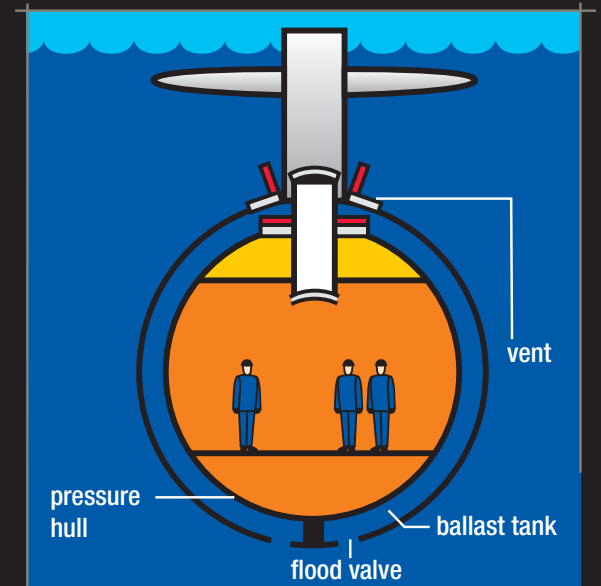
To dive, the ballast tanks are opened and flooded with seawater. This reduces the submarine's buoyancy and it sinks. The captain uses pumps to make the submarine neutrally buoyant and once the submarine is at the right depth, the captain uses control surfaces (which are a bit like plane wings) to control the direction the submarine is travelling in.

To surface, compressed air is pumped into the ballast tanks, which forces the water out, allowing the submarine to once again become more buoyant. In an emergency, the ballast tanks can be filled very quickly with air to bring the submarine to the surface far more rapidly than normal.

Submarines either have nuclear power or batteries as their main power source.



This simplified diagram shows a submarine's ballast tanks filled with air, allowing it to float on the surface. Not all submarines have ballast tanks around the hull. The Collins Class, for example, has ballast tanks located inside the hull.



In this diagram, the ballast tanks are filled with water, allowing the submarine to submerge.

ASC

how do submarines work? continued

Non-nuclear submarines are propelled by electric power, which is stored in huge batteries. Like any battery, once it runs out of power it needs to be recharged. Non-nuclear submarines use diesel engines to recharge the batteries.

On diesel submarines, like the Collins Class, batteries are recharged by running the diesel engine. The engine requires oxygen and fuel to run, so the captain comes up almost to the surface and raises a snorkel mast. This allows the submarine to take in air, while staying under the surface, just as you can when you snorkel in a pool or at the beach. Nuclear submarines are able to stay submerged for much longer than diesel submarines, because nuclear reactors do not need oxygen or fuel to create power.

When travelling under water, submarines use a sonar (sound navigation and ranging) device to listen to what is going on in the water. Sonar devices listen to sound waves which travel through the water and bounce off objects. In a submarine, an active sonar sends out a 'ping' sound, which bounces off the object and allows the onboard computers to determine how far away the object is.



torpedos



The six torpedo tubes can easily be seen on the front of HMAS Rankin.

The Collins Class can discharge Mk48 torpedos. These are 6 metres in length and weigh about 2 tonnes. In a submarine, the torpedo is first loaded in a torpedo tube, then prepared for launch and fed target data from the combat system. Once the torpedo is discharged from the submarine, an engine on board the torpedo activates and provides its own propulsion. The combat system onboard the submarine guides the torpedo via an electrical guidance wire. When the torpedo reaches the desired point beneath the target vessel an explosive charge within the torpedo is detonated.



escape & rescue

In the case of an emergency, there are two ways that the crew can escape. The Collins Class submarines are fitted with a single man escape tower located just behind the fin. If the submarine is not too deep, the crew are able to enter the tower, one at a time, wearing special escape suits. Once inside, the suit is plugged into an air supply and the tower fills with water. When the pressure inside the suit is equal to the water pressure, the top hatch opens and the crew member floats to the top.

The other form of rescue (in Australia) is using the submarine rescue vehicle REMORA. This vehicle is manually operated from the surface and attaches to the escape tower, allowing up to nine crew members to be rescued at a time.



This diagram shows REMORA attached to the escape tower.

life on board a submarine

The crew of a Collins Class submarine work on six hour shifts. This means that they work for six hours, have six hours off and then go back to work. When they are off duty, crew members are able to sleep or just relax. The crew sleeps in three tiered bunks, two bunks per cabin (six beds). The senior crew (officers, senior sailors) have separate areas to the junior sailors. Officers and senior sailors' accommodation, wardroom and mess are located on the upper platform. The junior sailors' accommodation, mess area (with built in entertainment system), showers and cabins are located in the accommodation area on the lower platform.



The crew eat everyday food and the galley (kitchen) provides food to all messes (food halls). The crew's mess is located adjacent to the galley on the lower platform.