



HALIFAX-CLASS FRIGATES

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The Royal Canadian Navy's (RCN) *Halifax*-class frigates are the backbone of the fleet's combat capability. Based in Halifax and Esquimalt, the RCN's 12 frigates regularly deploy around the world, either independently or with NATO or other allied countries. They are versatile ships, and their missions can vary considerably from fisheries patrol and surveillance to combat operations.

The ships were designed in the 1980s for anti-submarine and anti-surface warfare as a replacement for the aging *St. Laurent*, *Restigouche*, *Mackenzie* and *Annapolis*-class vessels. They were constructed by Saint John Shipbuilding in Saint John, New Brunswick, and Sorel, Quebec, between 1992 and 1997 in two batches, ordered in 1983 and 1987. The frigates are large (for Canada) at 134 metres in length. Despite their size, the ships are maneuverable and flexible. They have a top speed of over 30 knots and can come to a full stop from that speed within one ship length.

As noted, the frigates were originally planned for anti-submarine warfare (ASW), a role Canada played very well during the Cold War. Their ASW capabilities and their effective operating range is augmented by the addition of a maritime helicopter on the flight deck at the back of the ship. Until recently, the ships carried the CH-124 Sea King helicopter, but the Sea Kings have been retired after more than 50 years of service, and the ships are now equipped with the CH-148 Cyclone.

Halifax-class ships:

- HMCS *Halifax* (330)
- HMCS *Vancouver* (331)
- HMCS *Ville de Québec* (332)
- HMCS *Toronto* (333)
- HMCS *Regina* (334)
- HMCS *Calgary* (335)
- HMCS *Montreal* (336)
- HMCS *Fredericton* (337)
- HMCS *Winnipeg* (338)
- HMCS *Charlottetown* (339)
- HMCS *St John's* (340)
- HMCS *Ottawa* (341)

Having the capability to operate helicopters is a major asset for the frigates. They extend the range and roles of the ships. But utilizing helicopters from ships adds a complexity to frigate operations. It may seem like an easy thing to land a helicopter on a ship, but it isn't. The original idea to use helicopters on ships was a good one, but it took many years to figure out the safest way to land the helicopters. If you've been to sea you know that

ships move, and therefore landing a helicopter safely on a ship that is moving up and down and side to side is challenging. To operate these helicopters in open ocean conditions, a Canadian-designed recovery assist, secure and traverse system (RAST) – known as the 'bear trap' system – is built into the deck which facilitates the launch and recovery of helicopters even in rough seas.

The ships faced the awkward problem of being designed for the Cold War but entering service after the Cold War had ended. With the demise of the Soviet Union in 1991, the RCN faced the old challenges, as well as a set of new challenges. For years after the Cold War ended, it seemed that traditional state-based conflicts were a thing of the past. However, following the Russian invasion of Ukraine in February 2022 and aggressive Chinese actions in the Pacific, state-based conflict on land and at sea is again on the agenda. In addition to the old challenges,

Canadian warships now increasingly must deal with threats that are not state-based or combat-related – what are referred to as unconventional threats – in coastal or littoral areas. Naval ships must deal with threats such as explosive-laden speed-boats and short-range, land-based anti-shiping missiles. As well, naval ships rely more and more heavily on technology, and that raises the possibility of cyber-attacks on communication, navigation and/or weapon systems – a threat that must be taken seriously and counter-measures taken. (See Briefing Note #34 for more on cyber-security.) Innovations in procedures and tactics have enabled the frigates to operate more effectively in the new threat environment. In preparation with Canada’s allies, the frigates are now practicing defensive operations with specially designed drone targets and Canadian-designed uncrewed speed-boats.

The *Halifax*-class frigates protect themselves in a layered defence, which incorporates Sea Sparrow missiles, 57 mm gun, Phalanx system and RAMSES electronic countermeasures system. (See Briefing Note #12 for more about RCN capabilities.) The frigates’ surface-to-surface missile is the Harpoon block 1C. Two quadruple-launch tubes carry eight missiles which can deliver a 227-kilogram warhead up to 130 kilometres. These weapons can be used by the ship to attack enemy vessels or targets ashore.

For air defence, the ships employ the Sea Sparrow missile. The Sea Sparrows are designed to intercept incoming missiles, drones or aircraft up to 50 kilometres out from the ship and can deliver a 39-kilogram (86 pounds) warhead at speed Mach 1.6. These weapons can be used against enemy aircraft or incoming missiles.

If this defence fails, electronic jamming (RAMSES) is used to try and interrupt the weapon’s flightpath. As well, the ships have other defensive capabilities. The main gun on the bow deck is primarily an air defence weapon. It is a 57 mm 70 mk2 Bofors capable of firing at a rate of 220 rounds a minute reaching as far away as 17 kilometres. This gun fires explosive rounds to fill the air with shrapnel to shred incoming missiles. Close-in weapon systems are the ship’s last resort. This additional protection is provided by a Phalanx close-in-weapon system capable of firing 3,000-4,500 radar-directed rounds a minute at the threat. The Bofors is therefore the first line of defence, with the Phalanx Gatling gun used as a last resort.

Defence from sub-surface threats employs different systems. The ships’ light torpedoes allow them to engage a hostile submarine. Two twin 324 mm torpedo tubes are installed near the helicopter hangar. The torpedoes are the Mark 46 lightweight anti-submarine torpedo, smaller than the heavyweight versions carried by submarines. While the ship can use these to attack enemy submarines, they are primarily defensive weapons since getting close enough to fire them would place the frigate in range of the enemy submarine. Surface ships therefore prefer to attack enemy submarines with their embarked helicopter. The frigate’s helicopter extends that range and provides the frigate with its best anti-submarine warfare weapon.

To meet rapidly evolving threats in the maritime world, a modernization of the frigates – the Halifax-class Modernization/Frigate Life Extension (FELEX) program – was begun in 2010 and completed in 2016. This refit is characteristic of naval ships, and most ships undergo modernization at the mid-point of their expected service. The modernization added state-of-the-art equipment, including new command and communications systems, an upgraded surface-to-surface Harpoon missile system, a new radar suite, and new Sea Sparrow missiles. This \$4.3 billion refit brought the ships up to date, improved combat capability and interoperability, and ensured that the frigates remain effective throughout their service life that will extend into the mid-2030s.

In June 2010 the Canadian government launched the National Shipbuilding Procurement Strategy (now called the National Shipbuilding Strategy) which, among other things, aims to replace the *Halifax*-class frigates, and the capabilities of the retired *Iroquois*-class destroyers, with up to 15 new warships referred to as the Canadian Surface Combatant (CSC). This replacement class is currently in the design stage and construction is anticipated to begin in the late 2020s. (See Briefing Note #6 for information about the NSS, and Briefing Note #9 for information about the CSC.)