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STEALTH OBSERVERS

*Refitting
the Victoria class
submarines*



For 30 years, the Canadian navy operated three Oberon class submarines acquired between 1965 and 1968 and retired from 1998 to 2000. The search for suitable replacements, however, took place at the end of the Cold War, a period mostly governed by Jean Chretien's Liberals that General Rick Hillier has called a "decade of darkness." The government's lack of enthusiasm for this purchase was palpable.

Canadian Defence White Papers, beginning with Perrin Beatty's *Challenge and Commitment* (1987), broached the subject of acquiring up to 12 nuclear propelled submarines, but that raised the collective ire of peace advocacy groups around the country. Defence Minister Bill McKnight announced its cancellation after Brian Mulroney's Conservative government was re-elected in 1988.

Faced with the imminent obsolescence of the three Oberon submarines, the 1994 Defence White Paper spoke of the need for a replacement submarine and indicated Canadian interest in acquiring the four Upholder class from the Royal Navy. Built by Vickers Shipbuilding and Engineering, HMS *Upholder*, the first of

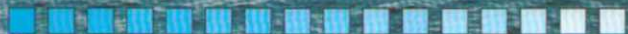
her class, was ordered in 1983 and completed in June 1990. The three additional boats, *Unseen*, *Ursula* and *Unicorn*, were ordered in 1986 and delivered from 1991 to 1993.

Designed as *hunter-killers* to operate in international waters between Greenland, Iceland and the United Kingdom (the G-I-UK Gap), to track and, if necessary, engage Soviet naval ships and submarines, the British Ministry of Defence originally planned to build a fleet of 12, soon trimmed to 10, then nine and ultimately to just four.

As a result of the British decision to use an all-nuclear submarine force, these boats were tied up in 1994 to await a purchaser. On 6 April 1998, the Canadian government announced the Submarine Capability Life Extension Project, in which the four Upholders would replace the three Oberon boats to patrol the three Canadian coastlines, to meet NATO commitments, conduct fisheries protection and carry out anti-drug operations.

Leaving the boats tied up and unused for five years took a toll on the vessels, much the same as a car that is left unattended in

The Royal Canadian Navy's (RCN) Victoria class submarines stand as the most unappreciated, maligned and misunderstood ships of the fleet: unappreciated by a public that does not recognize the importance of Canada's maritime domain; maligned by many news media and commentators who do not take the time to educate themselves about their necessity in the Canadian fleet mix; and misunderstood by both.



a garage for several years. This resulted in a "cold handover" to the RCN of "mothballed" submarines, rather than a "hot handover" of working boats, necessitating a work program for the four vessels.

In 1999, the British Ministry of Defence placed a contract with Marconi Marine, then the owners of Vickers Shipbuilding and Engineering, for the reactivation of the four boats. HMS *Unseen* was the first into the Devonshire Dock Hall for a six-month work period to replace some hydraulic system components and install new batteries. The other submarines followed six months apart.

What Canada received were four conventionally powered boats with vastly more evolved and effective hydrodynamic features and advanced marine engineering systems, improved habitability and endurance than their predecessors. As part of the transaction, Canada also received a training package, four state-of-the-art shore-based simulators, initial spare parts and a comprehensive technical information package.

The Upholder class also offered other notable improvements over the Oberons: periscopes with integrated range finders that show the exact distances to other vessels; Thales Underwater systems Type 2040 hull mounted sonar, a passive search and intercept sonar operating at medium frequency, installed in the bow; and Submarine Escape and Rescue (Sm E&R) upgrades, including stowage space for escape materials and emergency underwater telephones.

When operating on battery power, the Upholders are almost undetectable by passive sonar and are small, therefore difficult to detect by magnetic anomaly or another non-acoustic method. The 22,000 specially designed anechoic, or elastomeric, rubber tiles coating the hulls reduce noise coming from the interior and absorb sonar transmissions ("pings") from other vessels.

The Canadian "refit"

When taken into service, there was an additional refit to "Canadianize" the boats, the equipment and their capabilities. This included:

- long-range sonar featuring the Thales Underwater Systems Type 2007 flank array sonar and Thales Underwater Systems Type 2046 towed array sonar, both operating in passive mode and low frequency for long-range detection and location (the Canadian Towed Array (CANTASS) has been integrated into the towed sonar suite);
- a navigation suite that includes a global positioning system, a Kelvin Hughes Type 1007 and a Foruno portable navigation radar;
- the Northrup Grumman Sperry Marine Mark 49 inertial navigation system, based on ring laser gyro technology;
- ultra high frequency (UHF) tactical satellite and Demand Assigned Multiple Access (DAMA) satellite communications; and
- adjusted torpedo tubes to accommodate Canada's Mark 48 heavy torpedo.

Onboard weapons systems include:

- the Mark 48 heavy torpedo, upgraded from Mod 4 to Mod 7;
- Lockheed Martin Librascope Torpedo Fire Control System, upgraded and installed by Lockheed Martin Canada, Lockheed Martin Undersea Systems and Northstar Technical of St. John's, to the operational specifications of the RCN (some components from the Oberon boats fire control system were installed in the Victoria class); and
- six 533 mm (21-inch) bow torpedo tubes equipped with two air turbine pump discharge systems.

The U.K. intended that the Oberon boats would be the last conventional submarines in the Royal Navy. Nuclear propelled boats are bigger, faster and have greater endurance. However, smaller and quieter conventional diesel electric boats are more suited to work in coastal shallow waters and their nearly silent operation makes them excellent for "cloak and dagger" surveillance and reconnaissance operations. Their design included advanced noise-attenuation features to minimize noise levels below the already very quiet Oberon class.

Since their acceptance into the Canadian fleet, the Victoria class boats have been in refit for five years to install equipment and sen-

sors, and retool to make them interoperable with the Canadian fleet and allied navies, and to meet the national missions assigned to them. The extended work periods to “Canadianize” them has led many to question why Canada made the purchase.

“When we accepted these boats, people assumed we would be ready to go as soon as we received them, but there were a lot of improvements we needed to do, including communications and the weapon system,” said Capt (N) Luc Cassivi, director of the Canadian submarine force.

HMCS *Victoria*’s successful torpedo trials at the navy’s Maritime Experimental and Test Ranges in British Columbia’s Nanoose Bay in March 2012 and the undocking of HMCS *Windsor* in Halifax on 10 April began the long awaited process of integrating the updated submarines into the Canadian fleet mix. However, commentators and media continue to see the series of refits and retrofits as “repairs.”

Cassivi notes that the long domestic “refit” was, in part, because the RCN was making the transition to a submarine force that is essentially and exclusively Canadian. The navy took on the responsibility as design authority for this class of submarines. “We had to grow our own indigenous knowledge of the class, much as if you buy a very complex car and you decide to repair it at home. You have the manuals but you have to learn about the vehicle the first time you undertake a repair job, and that takes time.

“Any class of submarine would have a significant strategic impact,” he added. “It is important that we have a balanced navy to defend our territory and bring strategic effect to any situation we need. To do that, we need to be able to control the sea or an area of the sea. Submarines are vital tools to accomplish that.”

Maritime challenges

Canada calls on its submarines to perform a number of major tasks, but principally, it is to observe without being seen or heard – to monitor activities of other vessels, to provide intelligence, surveillance and reconnaissance, and to take decisive action when necessary to exercise the full spectrum of anti-surface and anti-submarine warfare as a last resort.

Canada faces a range of maritime challenges, from human smuggling, trafficking and illegal migration to drug smuggling (Canada has deployed ships and a submarine to Operation *Caribbe*, a multinational naval effort to curb the drug trade), resource security triggered by Arctic energy and mineral exploration, maritime security to the sea routes that covey 80 percent of world trade, over-fishing and marine habitat abuse by foreign vessels in our territorial waters, and sovereignty in the Arctic.

Their stealth allows submarines, in particular diesel electric submarines, to patrol and observe without betraying their presence. “The observer, particularly a stealthy observer, can choose when, if at all, to reveal its presence in order to influence activities,” Cassivi explained. “The mere presence of a submarine in an area of concern changes the dynamic of how other maritime forces will behave, and even reconsider whether they will be in the area to begin with.”

Submarines also contribute to Canadian sovereignty. Canada can issue a Notice of Intent for a submarine deployment into a specific area. This would discourage mariners with less than in-

nocent intentions and open doors with allied nations who wish to use Canadian waters. It also brings nations to enter into water-space management agreements with Canada, if they wish to bring a submarine into Canadian waters.

“We have established agreements with our allies regarding the management and control of waterspace in the same way we manage the control of airspace for aircraft,” Cassivi noted. “We share information among like-minded nations and allies so we can de-conflict activities and ensure that incidents do not happen. This is a significant side benefit to operating a submarine fleet, that we have access to that level of information and development of a greater level of understanding. This also opens the door to a level of intelligence sharing we otherwise would not have.”

Benefit to industry

The cost to acquire four new diesel electric submarines and their necessary infrastructure is estimated at between \$5 and \$7 billion.

“These four submarines cost Canada shy of \$1 billion,” Cassivi said. “For about the cost of one of the boats, we received four boats, training for Canadian submariners, four state-of-the-art simulators and all the technical information material.”

When Canada operated the Oberon class, the British had the design authority, and they were operating and exporting them. There were well-established supply lines for spares and the manufacturer retained a large group of engineers who were very efficient at dealing with that platform as it aged. This allowed Canada to get significant life out of the Oberons.

The British intended to do the same with the Upholder class, but becoming a nuclear-only submarine force stopped the assembly at four platforms. When Canada agreed to the purchase, we received the entire fleet of Upholders, and there was no expectation that Britain would retain the role of design authority for this class. Nor was there any expectation that the British supply chain for these boats would remain in operation.

As Canada is the only nation operating the Upholders, new supply lines have to be established to provide high quality materials for the harsh undersea environment. This has led to the development of an in-service support contract and effective relations with industry through the Canadian Submarine Management Group, based in Esquimalt.

Because Canada is the sole user for the Upholder class, Canadian industry is developing a level of knowledge and capability in support to the submarine industry where none existed previously.

Conclusion

Since acquiring these four submarines, they have collectively served three years at sea and participated in two serials of Operation *Nanook* (2007 and 2009) and in Operation *Caribbe*.

Despite the failure of most Canadians to recognize Canada as a maritime nation, having the world’s longest coastline along the Atlantic, Arctic and Pacific oceans requires that we develop continuous situational awareness and the capability to respond to any threat or incident that occurs in our maritime domain. So maritime specialists are asking, not “why do we need submarines?” but “are four enough?” ■