

Maritime Engineering Journal

Canada's Naval Technical Forum



Summer 2020



Special Feature

Battle of the Atlantic – 75th Anniversary

Canada

Battle of the Atlantic – 75th Anniversary

HMCS *Esquimalt* – the last RCN warship lost to enemy action during the Battle of the Atlantic.



The end of the war didn't come soon enough for this little minesweeper, torpedoed and sunk by U-190 in the Halifax Approaches on April 16, 1945. Naval veteran Lou Howard, aboard sister ship HMCS *Sarnia*, was awarded Mention in Dispatches for his actions during rescue operations on that fateful day.

Story begins on page 11



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The River-class frigate HMCS *Sea Cliff* (K344) was better designed for
Atlantic convoy work than the much smaller corvettes.

(Royal Canadian Navy photo)

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COMMODORE'S CORNER



The Environment in Which We Serve

By Captain (Navy) Sébastien Richard, CD

As we were putting the final sections together for this summer edition of the *Journal*, news reached us of the tragic loss of six members of the Canadian Armed Forces (CAF) in the April 29 crash of an RCAF CH-148 Cyclone helicopter (call sign Stalker 22) off the coast of Greece. Deployed with HMCS *Fredericton* (FFH-337), they were serving on the front lines of Canada's contribution to Operation Reassurance – NATO's commitment to the security and stability of Central and Eastern Europe.

While we share in the grief of the family and friends who have been deeply affected by this devastating loss of life, we note that the Naval Technical community lost one of its own – 23-year-old Marine Systems Engineer, **SLt Abbigail Cowbrough**. Our tribute to her memory, kindly prepared for us by Cdr Tom Sheehan, follows this column.

As we mark the 75th anniversary of VE Day and the end of the Battle of the Atlantic, we are reminded by the deaths of these six CAF members that the environment in which we serve can be dangerous and unforgiving. Whether that environment is the cabin of a helicopter on a mission over the Ionian Sea, the deck of a small convoy escort fighting heavy seas and an unseen enemy in the Atlantic, or a world plagued by a virus pandemic that is creating havoc with our physical and mental well-being, we do what we have always done – adapt to conditions, and carry on.

Seventy-five years ago, the surrender of Nazi Germany brought an end to six grim years of warfare in the European theatre, including that part of it that historian David Syrett called the “largest, longest and most complex” naval battle in history – the Battle of the Atlantic. In this edition of the *Journal*, we commemorate the important role that the Royal Canadian Navy (RCN) and Canadian Merchant Marine played in ensuring an uninterrupted resupply of goods and munitions from North America to the United Kingdom and Russia. The early years were tough, but with persistence came reward as advancements in technology and shipbuilding gave the Allies the advantage they needed to gain ultimate victory in Europe.



Today, we find ourselves in a similarly demanding environment as we protect ourselves and our families against the virulent threat of COVID-19. Although we have been ordered to “preserve the Force,” we still need to maintain a viable defence supply chain in support of high-priority activities such as *Fredericton*’s deployment overseas, and the construction of the RCN’s future fleet units. Unfortunately, physical distancing has caused a dramatic reduction in the amount of on-site work that can be conducted, and created a growing backlog of maintenance that could see our ships experience critical equipment failures that could keep them alongside for lengthy repairs.

When plans are eventually laid out for a gradual return to work, it will take time for us to get everything back up and running to maximum capacity. Whatever that scenario looks like, it must include time and opportunity for our ships and shore facilities to address the maintenance workload, acknowledging that this will have to be weighed

against the Command's need to send ships to sea. One thing is clear, though. Maintaining the operational availability of all ship classes is key to ensuring that the force effectiveness of the RCN remains relevant. The success of this depends on each one of us doing our part to protect the integrity of the defence supply chain, and making sure that proper maintenance is being carried out.

Everyone has been doing a remarkable job under some pretty extreme conditions, so let's all hang in there and do what we safely can for now. When the situation permits, we will use our best talents and effort to bring things back on

line as quickly and responsibly as possible. It took total commitment toward a common goal to win the Battle of the Atlantic, and the best way to salute that achievement is by showing the same dedication ourselves as we work together to meet the challenges facing us during these uncertain times.

I wish us all brighter days ahead.



SLt Abbigail Cowbrough – Tribute to a Fallen Comrade

By Cdr Tom Sheehan

Losing six sailors and aircrew in the crash of a CH-148 Cyclone helicopter off the coast of Greece on April 29 was a tragedy that is difficult to comprehend or even process. Our thoughts and prayers go out to their family and friends, and to everyone else who has been affected by this terrible loss to the Canadian Armed Forces during such a difficult time in the world's history.

As a Naval Technical community, we especially mourn the loss of SLt Abbigail Cowbrough, a 23-year-old Phase VI Marine Systems Engineer serving aboard HMCS *Fredericton*. I have been asked to say a few words about Abbigail, and hope that by sharing and celebrating a few of the things I experienced in seeing this talented and dynamic young officer in action, we pay proper tribute to a fallen sailor and friend. During her short time in uniform, Abbigail Cowbrough made a profoundly positive impact on the people around her, and on the Naval Technical branch as a whole.

In the summer of 2018, the branch was trying to mitigate concerns that the workload on seagoing heads of departments (HODs) and technicians was contributing to burnout, stress injuries, and early attrition. With all the buzz around innovation, an opportunity was offered to us by the Royal Canadian Air Force Aerospace Warfare Centre to take a tiger team of experts to a week-long Communitech Innovation Base Camp in Kitchener, Ontario to learn some new thinking and problem-solving strategies. My inclination was to assemble a team composed entirely of senior officers and non-commissioned members, thinking they had the experience to understand the problem and develop

sustainable solutions. The facilitators, however, insisted that a complex institutional problem like the one we were grappling with called for the type of creative and agile thinking that is more likely to come from younger people. And they were right.

Enter recent Royal Military College graduate, A/ SLt Abbigail Cowbrough. That such a junior officer could become such an important part of the team in solving a problem she had yet to face herself spoke volumes about her quickness of mind, her personality, and her commitment to teamwork in achieving a common goal. When I first met her at Communitech, I was struck by her confidence, her poise, and that huge smile of hers. What soon became clear to me was that the facilitators had been right. The issue we were being asked to look at was daunting to say the least, but here was this fearless go-getter ready to take it on. She fit right in with the other bright young minds on the team, and I knew we were on a winning path.

Over the course of the week, Abbigail showed a rare combination of energy and empathy as she soaked up every bit of knowledge from the staff, worked with her teammates, and conducted interviews. She knew how to keep things on track. To say that she was really "amped up" and happy with the way we were pushing toward our goal would be an understatement. She did whatever was needed to help, and never for one moment assumed that her own lack of experience or sea time would limit her contribution in any way. She was pumped.

(Continues next page...)



Courtesy Royal Military College of Canada

Having gotten to know Abbigail well enough through our work at Communitech, I enquired whether she might be able to join us at Fleet Technical Authority (FTA) for the rest of the summer while she was waiting for her occupational training to start in the fall. She would be exposed to some new aspects of the Navy's technical responsibilities, and we felt certain that we could benefit from her excellent organizational skills and can-do attitude. One of the first things she did for us, in fact, was write up our Communitech experience for the Fall 2018 issue of the *Maritime Engineering Journal*. Explaining to the naval technical community at large what it was we had set out to achieve, what we had learned from the workshop, and what the path forward looked like was an important next step in solidifying the gains we felt we had made. Once again showing remarkable maturity for someone at such an early stage of her career, she put together a comprehensive article that was widely praised across the Naval Technical community.

Abbigail's next challenge was to tackle the ambiguity surrounding technical officer employment by spearheading a project to enhance the awareness of junior officer

positions available across Canada. Reaching out to over 200 junior officers, she created PowerPoint presentations containing data for each position. She then changed the military acronyms used for the position titles into plain language, produced a standardized description paragraph, and created a graph showing the engineering, divisional, or project management work breakdown structure. Her goal was to enhance awareness of the Navy's technical officer positions to ensure that all NTOs had current and accurate information to assist them in choosing future posting preferences. Even though she had yet to complete her own occupational training, she understood the need, connected with the community, and made things better for everyone in the branch.

Both as a person and as a technical officer, Abbigail represented who we ought to be, and what we can achieve. She showed that experience can sometimes leave a blind spot, and, on occasion, lead to arrogance. She taught us that it is the upcoming generations that are best suited to creating a better future. If it's true that the current generals won the last war, then it makes sense that people like Abbigail are needed to win the next one. She won a lot of significant battles for our community in a very short time and, through reverse mentorship, taught a lot of us senior people how to make positive changes regardless of any challenges or constraints.

As we move on with our careers and other interests, it makes us proud to honour the memory of Abbigail by acknowledging her selfless and joyous loyal service to the Royal Canadian Navy, to the Naval Technical community, and to her shipmates aboard *Fredericton*. She was clearly where she wanted to be, and doing what she loved in the service of Canada. We wish her spirit fair winds and following seas.



This specially prepared text was provided to the Journal through the courtesy and kind permission of author Cdr Tom Sheehan, and Fleet Maintenance Facility newsletter editor Ashley Evans.

In memoriam

Capt Kevin Hagen, Capt Brenden Ian MacDonald, Capt Maxime Miron-Morin,
SLt Matthew Pyke, SLt Abbigail Cowbrough, MCpl Matthew Cousins

FORUM

CPO1 Donald Henry “Buster” Brown, MMM, CD (1941-2020)

By CPO1 Gerald Doutre, DGMEPM Division Coxswain

The submariner and Naval Technical communities lost a great sailor with the passing on April 11 of former **Royal Canadian Navy (RCN) Command Chief Petty Officer, stoker and submariner, CPO1 (Ret'd) Donald Henry “Buster” Brown** at the age of 78.

When CPO1 Brown retired in 1995 from the Admiral's staff as the Command Chief Petty Officer for Maritime Command, it was the culmination of an illustrious naval career that had its start when he joined the Royal Canadian Sea Cadets in 1954 in his adopted home of Winnipeg. It was my great privilege, through my father, to have known Buster Brown well, and I am honoured to share the following edited career notes from his family.

Buster was born in London, England on June 30, 1941 and immigrated to Canada with his mother in 1946. He enlisted in the RCN in 1958 as an engineering mechanic, and during his first four years as a sailor served at sea aboard the minesweeper HMCS *Fortune*, completed a four-month tour in the Far East aboard HMCS *Crescent*, and was later drafted to the destroyer HMCS *Micmac* based in Halifax.

By 1962, he had completed further trades training, and had volunteered to go on exchange and undergo training with the Royal Navy's submarine service in the United Kingdom. He would serve aboard Her Majesty's submarines *Grampus*, *Andrew*, *Anchorite*, *Alliance* and *Aeneas*.

Buster returned to Halifax in 1968, and served aboard the submarine HMCS *Onondaga*, and later that year commissioned HMCS *Okanagan* at Chatham, England. He was aboard in 1973 when the Royal Fleet Auxiliary tanker *Grey Rover* collided with the submerged Canadian submarine during workups in the Clyde estuary in Scotland, and later wrote an account of the incident: http://jproc.ca/rrp/rrp2/oberon_okanagan_prang.html. He remained in *Okanagan* through 1981, rising to the position of Chief Engineer. He was later appointed Submarine Squadron Chief Engine Room Artificer.



Due to personnel shortages, Buster went back to the surface fleet as Chief ERA aboard the destroyer HMCS *Skeena*. By 1984, he was serving as Chief ERA on the staff of Commander Sea Training Atlantic, charged with the task of training and working up ships' crews in achieving operational status at sea. In 1988, Buster was named Coxswain of the tanker HMCS *Protecteur*, and a year later returned to the submarine service as Chief ERA of the inaugural Submarine Sea Training Group.

In 2001, Buster was lured into the Hollywood movie business, working as Submarine Technical Advisor on the feature-film production of “K-19: The Widowmaker,” filmed primarily in Halifax, and starring Harrison Ford and Liam Neeson. Buster was also chairman of the Submariners Association of Canada (East), a board member of the Royal Canadian Naval Association, and a long-time member of the Atlantic Chiefs & Petty Officers Association in Halifax.

Rest in peace, Chief. We have the watch.



FORUM

*Letter to the Editor***A family connection to the SS *Nerissa* story**

Your review of LCdr (Ret'd) Bill Dziadyk's book "S.S. *Nerissa*, the Final Crossing" stirred many emotions in me. My uncle, Captain (Army) William (Bill) Hazen Embree, was one of the 83 crew and 124 passengers lost during that sinking on the night of April 30, 1941 off the north coast of Ireland. The information in the book complements my own research into my family's genealogy, and will become part of my family records which include letters from survivors who were with my Uncle Bill on that transit, the Silver Cross medals presented to his mother and young wife, and newspapers from the time announcing the tragedy.

Uncle Bill was a medical doctor and surgeon who had graduated from Dalhousie University Medical School, was newly married, and was in private practice in New Glasgow, NS when he volunteered for the Royal Canadian Army Medical Corps. He served at Camp Aldershot, NS before boarding SS *Nerissa* at Pier 21 in Halifax to join the war effort in England and Europe.

The SS *Nerissa*, torpedoed and sunk by U-552, was the only troopship carrying Canadian troops to be lost during the Second World War, and Uncle Bill was just short of 32 years of age when he was lost with so many others. In a handwritten letter of farewell that I hold, addressed to my grandfather's sister in Edmonton, and dated March 25, 1941, Uncle Bill seems to have had a premonition of his death:

"I hope Aunt Em you will not think me an awful sentimental fool for writing this. When you get this I will be on my way to England, and I couldn't go, in case I don't come back, without writing you and letting you know how much I have always appreciated all you've done for me and the family...Now I must close, but please remember I have tried to do what is right. Love, Bill."

As part of my research into the SS *Nerissa*, I traced the career of Kapitänleutnant Erich Topp, who commanded the 769-tonne Type VIIC U-552 from 1940-1942. On August 3, 1942, while patrolling North American waters as part of German Operation Drumbeat, his U-boat was attacked by HMCS *Sackville*, forcing him to return to base. He was later involved with bringing the first Type XXI U-boats into service. Topp joined the Federal German Navy in 1958, and retired in 1969 as a rear admiral. He died in 2005.

My family certainly had mixed emotions as I moved my own naval career through the Canadian submarine service.

Canada paid a terrible toll in the war effort, losing so much skill, potential, life and young vitality. Honouring their sacrifice is the least we can do. One of the decorations I displayed in my headquarters office during my time as Director of Marine and Electrical Engineering (DMEE) in the mid-1990s, and which now hangs in my den at home, is a framed memorial to my Uncle Bill. His name is also commemorated with the other Canadian military lost in the SS *Nerissa* in the Book of Remembrance at the base of the Peace Tower on Parliament Hill, and on Panel 14 of the Sailors Memorial at Point Pleasant Park in Halifax.

It is unfortunate that, being a merchant ship with British registry in Hamilton, Bermuda, *Nerissa*'s name is never read out at Battle of the Atlantic ceremonies along with the names of other Canadian ships that were lost during the war, but a campaign is now underway to correct this oversight.

Thank you for keeping me on the mailing list for the *Maritime Engineering Journal*, which has developed well over all these years. I certainly appreciated learning about LCdr Dziadyk's book, and am now sharing what information I have with him.

With sincere regards,
Captain (N) (Ret'd) Sherm Embree
Sable River, Nova Scotia



Captain William Hazen Embree, physician and surgeon, Royal Canadian Army Medical Corps.



Capt(N) Embree served in the Royal Canadian Navy from 1965 to 1998 as a Marine Systems Engineer, and was the editor of the Maritime Engineering Journal from 1994 until his retirement.

SPECIAL FEATURE

Battle of the Atlantic – 75th Anniversary

A Young Engineer's Service in the Battle of the Atlantic

By Captain Rolfe Monteith, CD, RCN (Ret'd)

At age 96, I am in that perilous phase of life in which I am attempting to recall the past with any kind of clarity, so forgive an old seadog if I steer a bit of a zigzag course in describing certain aspects of the 1939-1945 war at sea that affected me deeply. While my shipboard service as a young Royal Canadian Navy (RCN) engineering officer under training was not confined to the North Atlantic theatre, it was part of that epic struggle known as the Battle of the Atlantic.

During the final months of 1943, I served as a Midshipman (E) trainee aboard the newly commissioned Royal Navy V-class destroyer HMS *Hardy* (R08) – one of a long list of Royal Navy ships to bear that famous name. The previous *Hardy*, an H-class destroyer commissioned in December 1936, was lost during the First Battle of Narvik in April 1940. There was no way I could have known that history would tragically repeat itself with my own ship in 1944, shortly after I had returned ashore to continue my naval engineering training.

Limited though it was, my seagoing experience during wartime operations in the Bay of Biscay, Gibraltar, Scapa Flow, and on the Arctic convoys to Russia, influenced me throughout my full 29-year career with the Royal Canadian Navy, and helped establish personal friendships and international connections that I enjoy to this day. My few months spent running the gauntlet of enemy submarine and air attacks might be part of a distant past, but allow me to offer some personal perspective on a battle that was won at enormous cost to so many people such a very long time ago.

The Battle of the Atlantic was by far the longest campaign of the Second World War. As had been the case just over a quarter century earlier, maintaining control of



Midshipman Rolfe Monteith aboard HMS *Hardy* at Gibraltar in 1943.

the North Atlantic was crucial to the survival of Britain and to the eventual Allied victory. Keeping the sea lanes between North America and the United Kingdom open allowed convoys of merchant ships to transport the troops, food, fuel, armaments and other critical supplies that were desperately needed to sustain Britain in her hour of need, and support the Allied operations in Europe and North Africa. That we were able to safely escort many of these ships on to Russia's northern ports of Murmansk and Archangel meant that allied Soviet forces could defend their homeland, and keep the enemy engaged along a second major front.

The battle began on the evening of September 3, 1939 when the British passenger liner SS *Athenia*, bound for Canada with 1,418 crew and passengers, including children, was torpedoed by U-30 off the coast of Ireland



The destroyer HMS *Hardy* (R08) at speed in 1943.

with the loss of 117 lives, including 54 Canadians. Canada would declare war on Germany one week later, and over the next six years would support the war at sea in every way imaginable.

Eager to join the fray myself, I attempted to join the Royal Canadian Navy in mid-1940 as a boy seaman at the age of 16. The chief petty officer in charge of the recruiting unit wisely persuaded me to return to my education, and to apply again the following year as a naval cadet under the Commonwealth Special Entry system. Obeying orders even then, I did just that, and was accepted under Special Entry No 55, along with 30 other Canadians. As a point of interest, Prince Philip joined the Royal Navy as a cadet under SE No 53 in 1939.

Being accepted as a naval cadet, I was required to select which branch of the RCN I wished to join. Coming from the farming town of Clinton, Ontario, I knew nothing of the Navy, and blindly selected engineering. Once I was enrolled, however, it was explained to me that I would have to take a three-year degree course at the Royal Naval Engineering College in Plymouth, England. This did not sit well with my enthusiasm to get into the thick of things as soon as possible, and so I contemplated a different plan as my cadet class prepared to head overseas.

The RCN cadets of SE 55 crossed the Atlantic aboard the armed merchant cruiser RMS *Laconia*, a converted Cunard passenger liner, in convoy (HX 147) with 64 merchant ships and an escort screen that included several Canadian corvettes, and the Town-class destroyer HMCS *Columbia*. We reached Liverpool in late August 1941 without loss.

It was a critical time in the war. As soon as I reached Royal Naval College Dartmouth, I applied to transfer to the executive branch – the operational side of the Navy. My divisional officer, Lt Cdr Brook, a Royal Navy (RN) gunnery officer and a veteran of the First World War, pleaded with me to withdraw my request, explaining that, “One day the war will be over, and with an engineering degree you will have a productive second career.” It was a very emotional moment for me, as I was very young and dead keen to become deeply involved in the war. Lt Cdr Brook won the day, however, and I am indebted to him for directing me toward a most rewarding career in the RCN as an engineer, and a productive civilian career afterward with British industry.

Basic training at Royal Naval College Dartmouth included cadets from Britain, New Zealand, South Africa and India. As Europe had fallen the previous year, SE 55



Naval Cadet Rolfe Monteith on guard duty at Royal Naval College Dartmouth, UK in 1941.

was also blessed with having cadets from Norway, Denmark, Belgium and France. Cadet Monteith might not have realized it at the time, but the friendships and worldwide contacts made at Dartmouth would become even more relevant after the war.

As my classes and shore training progressed over the next two years, I looked forward to when we would go aboard ship for the sea phase of our naval education. It must be appreciated that, when we finally joined HMS *Hardy* in late 1943, our time aboard ship was intended to broaden our horizons as junior officers by having us spend time in each department of the ship. It might be heresy for an engineer to admit it, but what I found most interesting was standing watches on the bridge.

In September 1943, *Hardy* joined the Home Fleet at Scapa Flow for workups. In mid-October, we sailed in company with HMCS *Haida* and HMCS *Iroquois*, and the RN destroyers *Janus* and *Vigilant*, as escort for the battleship HMS *Anson* that was carrying a relief garrison to the remote Norwegian island of Spitsbergen in the Barents Sea. In late November, we safely

escorted the Russian convoy JW 54B to Murmansk and Archangel. These Arctic trips were dangerous affairs, as we were under almost constant surveillance by German reconnaissance aircraft and frequently at action stations.

As a very young midshipman, I was on a steep learning curve aboard ship. Being in the engineering branch, I naturally came to the attention of the squadron engineer – one Cdr Ernie Mill – who insisted that I be able to operate and restart any and all machinery in the ship, even if a compartment were blacked out. It was an invaluable lesson in damage control in case of enemy action, especially on the convoys from Scapa Flow to Russia where we could expect attacks by German U-boats and Luftwaffe aircraft at any time.

With my action station being on the quarterdeck, I got to know the crew responsible for manning the anti-submarine depth charges at the stern. One of these sailors was the ship's postman who had been in the RN for some 20 years and was still an able seaman. He was a fabulous chap.

One night while watchkeeping in the engine room, the petty officer on watch mentioned that he had been sunk off the coast of West Africa in a previous ship about a year earlier. It turned out he was speaking of the *Laconia* – the very same ship I had made my Atlantic crossing on in 1941. My world suddenly felt very small, and while it touched me in a personal way, there was even greater significance in how this incident altered the conduct of German U-boat operations for the remainder of the war.

As an armed transport, the *Laconia* was a legitimate target of war when she was torpedoed and sunk by U-156 on September 12, 1942. She was making a fast, unescorted passage from South Africa to Britain when she was hit. Unfortunately, she had 2,732 crew and passengers on board, including women and children, and a large number of Italian prisoners of war. Following his successful attack, the German U-boat commander acted in a most gallant fashion by surfacing to assist survivors, but was horrified to find so many non-military personnel in the water, along with 1,500 Italian allies.

There are many sad aspects to this event, but none so awful as what happened afterward. As U-156 and other U-boats crammed their decks with survivors, they signaled on open channels that they were conducting a humanitarian rescue operation under a Red Cross banner. A patrolling U.S. Army Air Forces B-24 Liberator spotted them and reported the nature of the operation, but was ordered to attack the enemy vessels. When it was all over, some 1,619 people (1,420 of them Italian prisoners) had perished in the sinking and its tragic aftermath, and a new order – the Laconia Order – was issued by the German naval command, forbidding U-boats from assisting survivors of vessels they engaged. The war at sea had turned a page.

The Battle of the Atlantic had many moments of drama. The dangers to Allied shipping were substantially increased with the German invention of the schnorkel, which enabled the U-boats to run semi-submerged on their diesel engines, making them difficult to spot. Their tactic of preying on convoys in highly organized wolf packs led to so many Allied ship losses in 1942 that a special ASW base, HMS *Western Isles*, was established on the west coast of Scotland to give naval escort groups a crash course in improving their competence in submarine hunting. It was for good reason that Britain's wartime prime minister, Winston Churchill, wrote in 1948, "The only thing that ever really frightened me during the war was the U-boat peril."

By mid-1943, the tide of battle in the Atlantic had finally begun to turn in our favour. With the escort groups operating more efficiently, and with our ability to once again read the enemy's coded naval traffic (something denied the Allies when the Germans added a fourth rotor to their Enigma encryption device in early 1942), the path was being cleared for the June 6, 1944 D-Day landings, and the Allied invasion of occupied Western Europe.

(Continues next page...)

The converted armed transport, RMS *Laconia* as she appeared before the Battle of the Atlantic.





Photo by Brian McCullough

Rolfe Monteith during a 2018 working session with the Canadian Naval Technical History Association in Ottawa.

It is important to remember that in 1939 Canada was primarily an agrarian economy with limited industry and minimal armed forces. The Royal Canadian Navy, not yet 30 years old, went to war with six modern destroyers and a handful of new minesweepers, and fewer than 3,500 men – two-thirds of them reservists. These numbers would swell to 471 vessels of all description, and a personnel roll of close to 100,000 including 6,500 women.

As the war progressed, the RCN also grew in stature as a skilled anti-submarine force, despite experiencing a challenging operational learning curve with ships manned largely by Hostilities Only crews. And we made our mark. Beginning in 1941, Canadian Rear Admiral Leonard W. Murray was placed in command of the Newfoundland Escort Force (reorganized in 1942 as the Mid-Ocean Escort Force), and in May 1943 was appointed Commander-in-Chief Canadian Northwest Atlantic – the only Canadian to command an Allied theatre of operations in either of the two world wars. I feel this was the RCN's finest hour.

My memories of my time aboard HMS *Hardy* are fraught with the awareness that, 30 days after I disembarked at the end of December 1943, the ship was hit by a GNAT acoustic torpedo as she was reinforcing the escort for an inbound convoy being attacked by U-boats. HMS *Venus* took off survivors before sinking the hulk on January 30, 1944, but 35 of my former shipmates had lost their lives.

After the war, I would undergo conversion training as an air engineer, and on separate occasions during my naval career would hold appointments in headquarters as Director of Air Engineering, and Director of Marine Engineering. Some 25 years after my retirement in 1970, I got involved with the creation of two important projects to document the technical history of the Canadian Navy. In 1995, the aviation side of the story was written and published as, *"Certified Serviceable" – Swordfish to Sea King: The Technical Story of Canadian Naval Aviation by Those Who Made It So*. The other side of the story as it relates to surface ships, submarines and the role of Canada's naval defence industrial base has become an active, ongoing project of the Canadian Naval Technical History Association, whose newsletter appears in this journal.

My time at sea during the Battle of the Atlantic may have been extremely short, but I was proud to have played my small part in what was a tremendous and arduous undertaking in the name of a just cause. The Allies had suffered terrible losses of ships and men, as had the enemy. Canada alone paid dearly through the loss of 59 Canadian-registered merchant vessels, 1,500 merchant seamen, 27 warships and 2,024 sailors in uniform. It was not what any of us would have wished for, but we did our bit, and victory was ours.

Canada's role in the Battle of the Atlantic was nothing less than heroic. As historian Niall Ferguson wrote so eloquently in his 2002 book, *Empire*: "Without Canadian pilots the Battle of Britain might well have been lost. Without Canadian sailors, the Battle of the Atlantic surely would have been."

And to that I say, amen.



Among the many additional highlights of his long and distinguished career in the RCN, Captain (Ret'd) Monteith served as Air Engineer Officer aboard the aircraft carrier HMCS Magnificent (CVL-21), as Project Manager for the Canadian Hydrofoil Project, and as Director of Fleet Maintenance. After leaving the Navy in 1970, he emigrated to the UK where he worked with the firm Babcock & Wilcox until 1983, and thereafter as a private consultant, travelling the world on behalf of British industry. He is a former chairman of the British Naval Equipment Association, and an active member of the Russian Arctic Convoy Association.

SPECIAL FEATURE

Battle of the Atlantic – 75th Anniversary Mentioned in Dispatches

For naval veteran Lou Howard, the day the RCN lost its last warship to enemy action in the Battle of the Atlantic was one he would never forget.

By Brian McCullough.
Vintage photos supplied by Lou Howard.

The tiny bronze oak leaf insignia that 96-year-old Second World War naval veteran Lou Howard wore on the ribbon of his 1939-45 War Medal could easily be overlooked. It is barely 30 millimetres long by nine millimetres wide, and yet it signals to the fleet, and to anyone else who cares to ask, that this white-haired gentleman with the perfect manners was awarded Mention in Dispatches (MID) during his war service to Canada.

It is a select honour indeed. Of the nearly 100,000 men and women who served in the Royal Canadian Navy during the war, only 1037 MIDs were awarded for “valiant conduct, devotion to duty or other distinguished service.”

For Lou Howard, a Selkirk, Manitoba native and retired civil engineer, the incident that changed his life forever would come out of a cold blue sea on a calm, sunny day within sight of the Halifax area coastline. The date was Monday, April 16, 1945 – the day the *Bangor*-class minesweeper HMCS *Esquimalt* (J272) became the last Canadian warship to be lost to enemy action during the six-year Battle of the Atlantic.

At the time, Howard was the navigation and asdic (anti-submarine sonar) officer aboard *Esquimalt*’s sister ship, HMCS *Sarnia* (J309). As a Hostilities Only recruit, he had no intention of making a career of the Navy, but said he was eager to do his bit.

In the fall of 1942, Howard was studying first-year engineering at the University of Manitoba when he joined the University Naval Training Divisions (UNTD) program as a seaman-officer candidate at HMCS *Chippawa* in Winnipeg. In December 1943 he enlisted for active service as an ordinary seaman in the Royal Canadian Naval Volunteer Reserve (RCNVR). Fully expecting to become a stoker, he underwent basic training at HMCS *Cornwallis* in Nova Scotia, which included familiarization aboard the school’s training ship, HMCS *Hamilton*, an old four-stacker destroyer acquired on lend-lease from the Americans.



Photo by Brian McCullough

Lou Howard joined the Royal Canadian Navy as a volunteer seaman in December 1943, and by the end of 1944 was sporting the single wavy stripe of a sub-lieutenant in the RCNVR. He said the discipline remained an integral part of his lifestyle for more than 75 years.

And then things changed. In the spring of 1944, Howard successfully challenged an officer selection board, and that summer went on his divisional officer’s course at HMCS *Discovery* in Vancouver. In September, he went back east for signals, navigation and asdic training at HMCS *Kings*, the wartime naval officer training school established at University of King’s College (Dalhousie University) in Halifax. Howard graduated at the beginning of November with a single wavy stripe on his sleeve, and celebrated by marrying his childhood sweetheart, Marjorie Benson, on Christmas Eve. They were both just 20 years old. The couple would have three children together, and remain married for 62 years until Marjorie’s death in 2007.

When Howard reported for duty as a sub-lieutenant on board HMCS *Sarnia* on January 2, 1945 – his 21st birthday – he had no idea what life aboard a small ship in the winter North Atlantic would be like. The cold and wet, the poor food and lack of sleep, the boredom and the stress of maintaining vigilance against the underwater threat of U-boats would soon imprint themselves as his new normal. With a crew of 78, the ship was also seriously overcrowded.

Both *Sarnia* and *Esquimalt* were relatively new ships, having been commissioned into service as minesweepers at Montreal-area shipyards in 1942. By 1944, however, the 600-ton vessels – less than two-thirds the displacement of a corvette – had been outfitted with asdic and radar, and were operating as anti-submarine ocean escorts for small groups of merchant ships marshalling in Halifax from ports along the Atlantic seaboard. The assembled ships would then sail in large convoy toward St. John's, and then on to the UK.

“It was a frenzy trying to get those convoys organized,” Howard said. “The spies knew when we were sailing, and we’d be running around trying to get these ships in order, and to get them to stop making smoke. Things settled down by the time we got 25 miles out from the Halifax gates, but we spent a lot of time at actions stations. We were constantly lacking sleep.”

Howard said the work became almost routine, handing off fully laden convoys to UK-based escorts that came out to meet them mid-Atlantic, then turning around to escort a convoy of “empties” back to Canada. The round trip would take about 14 days, which pushed the vessels to the limits of their endurance.

“Our small ships weren’t designed for convoy work,” Howard said. “After four or five days at sea, our fridges were empty.”

The sea and weather could also be formidable adversaries to these shallow-draft escorts. In February 1945, *Sarnia* was escorting a convoy from Boston to Halifax in the teeth



SLt Lou Howard aboard HMCS *Sarnia* in 1945. Three other crew members, including the captain, were awarded Mention in Dispatches for their actions on the day HMCS *Esquimalt* was torpedoed and lost.

of a strong north-easterly gale when the ship began to ice up heavily. As the ice rapidly accumulated on the upper decks and superstructure, the ship’s roll became dangerously sluggish – heeling 30-plus degrees to starboard, before slowly righting and going over 30-plus degrees to port. There was real danger the small minesweeper would capsize, and Howard recalled the fright among the crew as they hove-to and began clearing away the ice as quickly as they could.

And there was Lady Luck to contend with as well. Shortly after returning from that stormy trip back from Boston, Huff Duff – the ship’s cat – went missing. Named after the familiar term for the ship’s high-frequency direction-finding (HF/DF) gear, the cat was something of a talisman on board. The crew wasn’t happy having to sail on their next trip without him, but were relieved when Huff Duff somehow found them when they got back a week later, despite being berthed as the third outboard ship at a

HMCS *Sarnia*





The small *Bangor*-class minesweepers were never designed for the mid-Atlantic convoy escort duties they were called on to perform toward the end of the war. When refrigerated provisions ran out after five days at sea, the cook would bring out waxed turnips and parsnips to see the crew of 78 through to the end of their two-week round trip.

different jetty than usual. In proper naval fashion, Huff Duff was summarily hauled before the captain's table as a defaulter, and given 30 days stoppage of leave. Howard said the entire crew was much more at ease when they sailed on their next convoy escort assignment with their feline mascot at his usual post.

Tragically, luck would run out for their sister ship, HMCS *Esquimalt*. By the end of March 1945, the two ships were off convoy duty and reassigned to anti-submarine patrols in the Halifax Approaches. There was nothing unusual when they were called out on April 15 to search for a U-boat that was suspected to be prowling in the area, but *Sarnia* knew something was wrong when *Esquimalt* missed their scheduled rendezvous at 0800 the next morning. *Sarnia*'s captain, Lt. Bob Douty, reported this to the authorities ashore, but received no response. He was intending to leave his sector to search for the other minesweeper when his ship picked up a strong asdic contact, forcing him to prosecute an attack with depth charges. It turned up nothing. Finally, at 1125, the shore authorities seemed to wake up to the fact that *Esquimalt* was overdue, and initiated a coordinated search. The delays would prove costly.

In fact, *Esquimalt* had been attacked at 0632 that morning with an acoustic torpedo fired from the German submarine U-190. The ship immediately lost all electrical power, and sank within minutes without being able to transmit a distress signal. The drenched survivors took to the Carley floats, where they would suffer for the next six

hours before some were rescued by a boat's crew from the nearby Halifax East Light Vessel. *Sarnia* arrived on scene at 1230, and dangerously stopped engines for close to half an hour to pick up 27 survivors and 13 dead before getting underway and racing back to Halifax Dockyard at full speed. In all, 44 men lost their lives that day.

The citation for Howard's Mention in Dispatches reads in part: "This Officer... went over the ship's side to help bring men aboard, and... was personally responsible for saving a life after applying artificial respiration for over an hour. Sub lieutenant Howard's conduct during this time... aided greatly in helping the wounded and the dying."

Howard had spent 30 minutes waist-deep in the near-freezing sea at the bottom of a scramble net, transferring survivors and bodies from the rescue boat to waiting hands on deck. The former Winnipeg Beach lifeguard would supervise further resuscitation efforts, but sadly the sailor he had revived died before the ship got back to Halifax. It was the first time he had seen dead and injured. Even some of the men they brought on board alive, died after reaching the deck. It was as if they knew they were safe and could give up the struggle, he said.

No one spoke of post-traumatic stress disorder in those days, but the effect of the day's events on Howard became visible when his hair began to turn white almost immediately. What terrified him most, he said, was the "heart-stopping" 20 minutes or so when his ship was stopped dead in the water as they picked up *Esquimalt*'s crew.

"We were down on that scramble net, and we knew a submarine was out there," he said. "I was scared stiff that whole time."

In the strange ways of the aftermath of war, Howard would meet U-190's chief engineer, Werner Hirschmann, at an *Esquimalt* and *Sarnia* reunion on the 50th anniversary of the sinking in 1995. The two would go on to become friends, and remained so until Hirschmann's death last November at the age of 96. Hirschmann had spent a short time as a prisoner of war in Gravenhurst, Ontario before being repatriated to Germany. He later emigrated to Canada.

In the fall of 2017, Howard was warmly received at the legendary Crow's Nest Officers' Club in St. John's, Newfoundland, where he donated a souvenir *Sarnia* pennant. He also took the opportunity to examine, of all things, U-190's periscope that had been salvaged in 1947 and donated to the mess in 1963. Following U-190's surrender in

1945, the German vessel was commissioned into the RCN as an anti-submarine training vessel, and was eventually sunk as a target in a massive show of naval firepower at the exact spot where *Esquimalt* had met her fate 30 months earlier.

Howard spent the final days of the war at sea. As Halifax erupted into chaos during the May 7-8, 1945 VE-Day riots, his small ship was left lolling on its own within spitting distance of the shore. Another week would pass before they would be allowed to come back in.

"I was on the bridge of HMCS *Sarnia*, seeing the glow in the sky from the fires that were happening in Halifax, and the guy in the radio shack put on Doris Day singing *Sentimental Journey*," Howard said. "The war was over, and we'd come out of it, but they'd forgotten about us out there."

Deeply affected by the extreme conditions he had endured, and by the horror of the futility of war he had experienced on that sunny day in the Halifax Approaches when HMCS *Esquimalt* was lost, Howard swore he would never go to sea again. It was a promise he kept until he finally acceded to his second wife Hyacinthe Wade's wishes the year after they were married, and booked a Cape Horn cruise for the two of them in 2012.

Howard said that, despite everything, he remained proud of his wartime naval service to Canada.

"I was determined to be a good naval officer, and the structure and routine of the Navy fit right in with who I was," he said. "At 21 years of age I was in the thick of the battle, I had to respond, and I did my duty."



Survivors of the minesweeper HMCS *Esquimalt* waited six hours to be rescued after their ship was torpedoed by U-190 in the Halifax Approaches on April 16, 1945. Forty-four of their shipmates died in this final loss of a Canadian warship to enemy action during the six-year Battle of the Atlantic.



Photo by Brian McCullough

This HMCS *Esquimalt* memorial cairn has a place of honour on the lawn of the town hall of Esquimalt, BC, not far from the naval dockyard. An annual remembrance ceremony is normally held here on April 16, the anniversary of the ship's loss.

A sad postscript: *It was my very great pleasure to enjoy a number of lively conversations with Lou Howard in the preparation of this article, a shorter version of which appeared in the Ottawa Citizen in 2017. It saddens me now to report that Lou died on May 4, one day after Canada commemorated the 75th anniversary of the end of the Battle of the Atlantic. He was a remarkable Canadian, one of many who answered the call in our country's hour of need.* – Brian McCullough

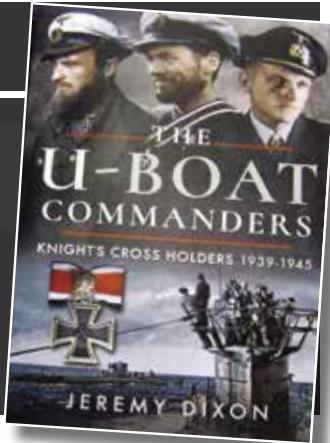
Read more about Lou Howard's wartime experience at: <http://www.thememoryproject.com/stories/406:louis-henry-howard/>

Another first-hand account of the *Esquimalt* incident, from *Sarnia* engine room artificer petty officer veteran Liam Dwyer, is at: <http://www.thememoryproject.com/stories/1314:liam-dwyer/>

An excellent detailed account of this tragic incident and its aftermath, written by historian Robert C. Fisher, appears on the website of the CFB Esquimalt Naval & Military Museum: <https://navalandmilitarymuseum.org/archives/articles/ship-histories/hmcs-esquimalt/>



— SPECIAL FEATURE BOOK REVIEW —

*Battle of the Atlantic – 75th Anniversary***The U-Boat Commanders:
Knight's Cross Holders 1939-1945**Reviewed by Tom Douglas – Associate Editor *Maritime Engineering Journal*<https://www.pen-and-sword.co.uk/The-U-Boat-Commanders-Hardback/p/16216>https://www.amazon.ca/s?k=the+uboat+commanders&i=stripbooks&ref=nb_sb_noss

Author Jeremy Dixon's exhaustive research has produced an impressive biographical anthology of the more than 120 U-boat commanders who were awarded the coveted Knight's Cross during the Second World War.

Dixon writes that approximately 7,320 Knight's Crosses were awarded during the conflict, with 318 going to the Kriegsmarine, including 144 from the U-boat service. There are photos in the book of the various recipients, some shown receiving their awards from Adolf Hitler. Also illustrated are a number of the 1,720 ships destroyed or badly damaged by U-boats. The book provides a wealth of information about the Knight's Cross recipients, their victims, and the feared effectiveness of the U-boat menace.

Albrecht "Cherry" Brandi and Wolfgang Lüth were the only U-boat commanders to receive three variations of the medal — the Knight's Cross, the Knight's Cross with Oak Leaves, and the Knight's Cross with Swords and Diamonds.

Brandi's operational skills got him out of some tight spots. On one occasion, while surfaced near the Moroccan coast, his U-617 shot down a Sunderland flying boat, but not before it dropped three bombs that crippled his vessel. Brandi ordered the crew to scuttle their submarine, before

taking to the boats and rowing to Spain. He was interned at Cadiz, but escaped and used false papers to make it back to Germany. Brandi was appointed Chief of the Small Naval Combat Unit in Holland in January 1945, and after the war became an architect and served as governor of Westphalia. He died in 1966.

Lüth's operational talents also brought him recognition and promotions. In one instance when his U-181 was attacked by aircraft in the South Atlantic, the U-boat commander's evasive action launched an unsuccessful ten-hour cat-and-mouse chase by Allied forces. The submarine withstood 30 depth-charge attacks, and Lüth went on to achieve the distinction of being the U-boat commander with the second-highest amount of enemy tonnage sunk.

Ironically, Lüth died during the war, but not at sea. On May 14, 1945 while commandant of the German Naval School, he was shot dead by a nervous guard while walking back to his barracks during a violent storm. He never heard the sentry's challenge. He was given a Nazi state funeral — the last of the Third Reich.

**Submissions to the Journal**

The *Journal* welcomes unclassified submissions in English or French. To avoid duplication of effort and ensure suitability of subject matter, contributors are asked to first contact the production editor at MEJ.Submissions@gmail.com. Contact information may be found on page 1. Letters are always welcome, but only signed correspondence will be considered for publication.

SPECIAL FEATURE

Battle of the Atlantic – 75th Anniversary
Saluting Those Who Served

By LCdr Brian McCullough, CD, RCNR (Ret'd)

RCNVR Stoker Ted Ballantyne

Albert Edward “Ted” Ballantyne (1921-1994) served as a stoker in the Royal Canadian Naval Volunteer Reserve from August 1941 until his demobilization as an acting/leading stoker first class on November 22, 1945. He saw sea service aboard the naval tug HMCS *Bersimis* (W05), the corvette HMCS *Cobalt* (K124), and the minesweeper HMCS *Georgian* (J144). The son of a pioneering Northern Ontario family, Ted later rose to the position of Superintendent of Railways with the Spruce Falls Power and Paper Company in Kapuskasing, Ontario. We acknowledge the courtesy of his family in allowing us to honour his memory on behalf of all stokers and engineers who served with the RCN during the Battle of the Atlantic.

The assistance of Julie Latimer, Curator of the Ron Morel Memorial Museum, Kapuskasing, is gratefully acknowledged.

**RCAF Armourer/Observer**
Lawrence McCullough

The Royal Canadian Air Force played a key role in providing critical air support throughout the Battle of the Atlantic. Saint John, New Brunswick native Lawrence “Mort” McCullough (1925-) “came from away” to serve as an armourer and air observer for No. 10 (Bomber Reconnaissance) Squadron B-24 Liberators flying Eastern Air Command antisubmarine patrols out of Gander and Torbay, Newfoundland. He would end the war as a leading aircraftsman, before moving on to post-war bomb disposal work at Dartmouth, Nova Scotia. He completed a full, 30-year career in the air force before retiring as a sergeant in 1973. This is my father, and it gives my family great pleasure to honour him for his service on behalf of all RCAF ground and flight crews who supported the war at sea.



SPECIAL FEATURE

*Battle of the Atlantic – 75th Anniversary***National Treasures – HMCS *Haida* & HMCS *Sackville*
Canada's Last Battle of the Atlantic Warships**

When the Battle of the Atlantic ended on May 8, 1945 following six long years of warfare, the Royal Canadian Navy was operating a force of more than 400 warships of all types. By the time the Second World War came to an end three months later, plans were already in motion for a rapid downsizing of the fleet. Canadians are fortunate in that two of the RCN's stalwart and storied ships from the Atlantic battle have been preserved for future generations, but they need our financial support.

The Tribal-class destroyer **HMCS *Haida* (G63)**, commissioned in 1943, is the last of her type anywhere in the world. In her heyday, the ship collected hard-won battle honours that earned her the respect of the Navy as "Canada's Fightingest Ship." Since 2002, *Haida* has been preserved as a floating National Historic Site under the care and supervision of Parks Canada in Hamilton, Ontario, and in 2018 was designated as the ceremonial flagship of the Royal Canadian Navy. An interesting account of restoration efforts to preserve the ship's steel structures can be found in the CNTHA News section of our Spring 2019 issue (MEJ 89). The ship's online coordinates are: www.pc.gc.ca/en/lhn-nhs/on/haida.

The Flower-class corvette **HMCS *Sackville* (K181)**, commissioned on the last day of 1941, is the last of Canada's 123 corvettes that served during the Battle of the Atlantic. In the 1950s, the decommissioned ship was converted into a civilian oceanographic research vessel, and served with the Department of Marine and Fisheries until 1982. The following year, *Sackville* was acquired for historical preservation by "an enterprising group of individuals from the Naval Officers Association of Canada" who established what is today the Canadian Naval Memorial Trust. In 1985, the Government of Canada designated the former convoy escort as Canada's Naval Memorial. The little ship is a popular tourist attraction on the Halifax, Nova Scotia waterfront. Find her online at: [https://hmcssackville.ca](http://hmcssackville.ca)



Canada's last remaining fighting ships from the Battle of the Atlantic need our ongoing financial support. They also served.



Photo by Alan Lenarduzzi



Photo by Roger Litwiller

SPECIAL FEATURE

Battle of the Atlantic – 75th Anniversary

Visible Tribute – The RCN's Commemorative Heritage Paint Ship Program¹

By Roger Litwiler

In 2019, the Royal Canadian Navy repainted the frigate HMCS *Regina* and the maritime coastal defence vessel HMCS *Moncton* in modern variations of distinctive Admiralty Disruptive D-Day Pattern camouflage used during the Second World War. Both ships are the second to bear their respective names, with both predecessors having fought in the Battle of Atlantic. The commemorative paint schemes are meant to honour Canadian sailors who served at sea during the six-year battle, and those who serve in the fleet today.

The historically accurate markings involve a sweeping pattern of light and dark grey, white, blue, green, and black waves. A Western Approaches variation used the same colours in straight geometric designs, and is worn today by Canada's last corvette, HMCS *Sackville*, in Halifax (see page 17). The disruptive patterns were adopted by the RCN, and most ships received several variations of this camouflage during the war.

The heritage paint schemes were originally researched by DND's Directorate of History and Heritage for the RCN centennial in 2010. Adapting the patterns to fit modern hull shapes involved the efforts of project, naval architecture and production staff from Fleet Maintenance Facility Cape Breton (FMFCB) in Esquimalt for HMCS *Regina*, and project and naval architecture personnel from DMEPM(NC) and DNPS in Ottawa for HMCS *Moncton*.

The actual painting was done cost-effectively during already scheduled maintenance periods. The work for *Regina* was conducted by FMFCB, while that for *Moncton* was conducted by Shelburne Ship Repair (Irving Shipbuilding) on the East Coast, under in-service support contract oversight by SNC-Lavalin Defence Programs Inc. The ships will wear their commemorative colours throughout 2020.



Roger Litwiler is a naval historian, author and lecturer specializing in Canada's proud naval heritage. He is a retired Canadian Armed Forces Reserve naval officer.



Photo by Mona Ghiz, MARLANT Public Affairs



Photo by Cpl Jay Naples, MARPAC Imaging Services

HMCS *Moncton* (top) and HMCS *Regina* are looking smart in their distinctive Admiralty Disruptive Pattern camouflage. Both ships will wear the commemorative heritage markings throughout 2020 to honour Canadian sailors past, present and future.



Courtesy FMF Cape Breton

The final approved design for HMCS *Regina*, although the ship kept her current pennant number.

1. Adapted from: <http://www.rogerlitwiler.com/2019/10/08/canadas-navy-honours-the-sacrifice-of-our-sailors-past>

FEATURE ARTICLE

The Canadian Surface Combatant – Starting a New Conversation on Canada's Major Warship Replacement Project

By Cdr Andrew Sargeant

Ship procurement has come a long way since the days of the Battle of the Atlantic. Between 1939 and 1945, when the Royal Canadian Navy arguably came of age, shipyards throughout England, the Maritimes and Quebec threw themselves into building small corvettes that had the range and armament to protect Allied convoys facing a deadly U-boat threat. The corvette's simple "whaler" design meant they could be manufactured quickly and cheaply in smaller shipyards, and by war's end, hundreds of these ships had been produced, of which 123 served in the RCN, and 10 were lost.

In this, the 75th anniversary of the end of the Battle of the Atlantic, it seems fitting that the principal effort to recapitalize the RCN's fleet is truly taking shape. The Canadian Surface Combatant (CSC) Project, currently in project definition, is a highly complex procurement that will deliver one of the most capable warships of any navy. The platform, based on the BAE Systems Type 26 design, will house a bespoke Canadian combat system, allowing the ship to meet a broad range of threats, and carry out the mandate of the RCN. Not only is the CSC Project the flagship effort of the RCN's fleet recapitalization, but with an estimated cost of \$56-60 billion for 15 modern

warships, it is noteworthy for being the largest, most complex procurement ever undertaken by the Government of Canada.

This is obviously a huge undertaking for the RCN's technical support community, and hugely exciting for the sailors who will eventually take these ships to sea, and for the teams who will be supporting them from ashore. The scope and complexity associated with delivering the CSC is orders of magnitude greater than anything we've experienced before in Canada, including the recent HCM/FELEX frigate update project. Executing a combat system mid-life upgrade in the 25-year-old frigate platforms was no small feat, and will allow the *Halifax* class to carry the load until CSC arrives, but the scope of CSC and the impact it will have on the RCN enterprise will change the very way we do business. It is safe to say that the changes will be felt across the RCN, Assistant Deputy Minister (Materiel), the broader Canadian Armed Forces, and the Department of National Defence.

(Continues next page...)



Image courtesy Lockheed Martin Canada

With this in mind, we at the CSC Project would like to start a new conversation about what this all means for the Naval Technical support community, including the many stakeholders who are contributing to the effort as part of the wider naval materiel enterprise. A series of articles has been proposed to the *Maritime Engineering Journal* on a range of CSC topics, of which this article is the introduction. We hope the series will be of interest to our professional community, promote awareness, generate dialogue, and even attract ideas that might aid in finding smart solutions to challenging problems. It is not an understatement to say that CSC will transform the way we deliver and manage materiel and technology in the years ahead, and that the engagement of the broader Naval Technical community will be key to meeting the future demand.

Subsequent “CSC Update” articles will provide the latest information on the project, along with discussion on specific themes that we hope allow the community to explore subjects that are particularly novel and challenging. Some articles will be more technical in nature, but they will be accessible and relevant to a broad audience. The following topics are the likely ones we will be covering, although not necessarily in this order:

CSC Design: CSC is based on the BAE Systems Type 26 design, adapted to Canada’s needs. While this offers a relatively mature platform design, by contrast, the combat system will be designed from the ground up. Even when we are ready to cut steel, the design work will continue, particularly on the combat system. How the ship is designed and built, and what impact the Type 26’s zonal design approach will have on project milestones and build schedules will be the basis for an interesting discussion.

CSC Combat System: The CSC combat system is being designed around the Aegis Fire Control Loop and SPY-7 AESA 3D radar, and will include collaborative engagement capability and solid-state illuminators, all controlled by an upgraded Canadian CMS 330 combat management system. The ship will carry a 127-mm gun, and a 32-cell vertical launch system capable of handling Standard and Tomahawk missiles. When it is complete, the overall configuration will produce one of the most capable combat systems in the world. We will examine the technical and programmatic challenges of integrating a wide range of complex systems obtained from Canadian and international defence suppliers, including significant procurements through US Government Foreign Military Sales.

Land-Based Test Capability: Combat systems of this complexity require exhaustive testing to ensure they are fit for purpose and safe to operate. The old days of testing a combat system on board ship, as was done to a great degree during the introduction of the *Halifax* class and during the HCM/FELEX modernization, is no longer viable. The magnitude of the testing program is such that dedicated land-based test facilities are essential to designing, integrating, and certifying the combat system, not just for ship acquisition, but through life. Land-based testing is a strategic capability that will necessarily modernize how we do business for Canada’s Navy.

Design for Supportability: We will look at many aspects of this, such as: How do we know that the CSC will be affordable when in-service? Which decisions made during project definition will have far-reaching impacts downstream on the supportability of the class? What are the challenges associated with buying a platform designed to certain proprietary rules and industry standards, building an all-new combat system to potentially different rules and standards, and developing a support solution that can be handed over to the RCN and DGMEPM?

Integrated Data Environment: A Navy-wide IDE is a strategic imperative for the RCN, without which future ships would be unsupportable. We will look at how the CSC IDE fits into this model, and how concepts such as the “digital ship” and a “common source database” relate to the IDE. Will sailors maintaining equipment have computer tablets connected to a cloud solution? The IDE is a very challenging space that we have to get right.

CSC Training: What will the CSC crewing model look like? How many people and of which trades? Will the RCN be creating new trades or retiring existing ones? Once all that is decided, how will we train our crews? How do we balance advances in technology with time-tested best practices? How do our allies who are building similar ships do their training? Will we be sending RCN sailors to sea on USN Aegis ships? All great questions, and ones that the project team is hard at work on answering right now.

Infrastructure Projects: Aside from land-based test facilities, what other infrastructure projects are being driven by CSC? What is a secure training facility? Will there be one on each coast? Will the new ammunition intended for CSC require significant upgrades to the ammunition depots at CFAD Bedford and CFAD Rocky Point? Do the jetties and ranges need upgrading as well? A ship is nothing without the infrastructure to sustain it.

Advances in Supply Chain Management and Technology: Significant progress has been made in this area even since the HCM/FELEX days. What is supply chain assurance, and how will it impact CSC in terms of acquisition and in-service support? What are the cybersecurity concerns? Will the warehouses of the future look like Amazon? Will automatic identification technology be implemented, and if so, how? We will tell you how the RCN's best forward-thinkers are on top of these questions as well.

CSC In-Service Support: How do we link the supportability solution, delivered by the contractor, to the ISS solution that will be competed for separately? We will update everyone on where we are in the Sustainment Business Case Analysis process, and lay out the challenges and lessons learned in terms of transitioning to in-service.

International Collaboration: The Royal Navy is building the Type 26, the Royal Australian Navy is building the *Hunter* class based on the Type 26 design and incorporating the Aegis Fire Control Loop – so, how are these ships similar, and how are they different? What are the opportunities for collaboration with our allies as we all recapitalize our fleets with a similar platform and on similar

schedules? We expect to offer a wide-ranging assessment of the challenges and advantages facing us as we make CSC truly one of Canada's own.

There is no question that the Canadian Surface Combatant will change the way we do business, both in terms of operations and sustainment. Over the next several decades, the effort to deliver CSC will likely touch most everyone in the naval technical community. And while the atmosphere is vastly different from the dark days when Canada urgently needed our shipyards to crank out small escort vessels to join the Battle of the Atlantic, the opportunity to engage in productive discussion, and to share creative ideas surrounding complex (and sometimes urgent) problems, lies before us once again. We hope these articles will help to keep the conversation going.



Cdr Sergeant is the acting Deputy Project Manager (Transition), and Senior Supportability Engineering Manager for the Canadian Surface Combatant Project.



The *Maritime Engineering Journal* on Canada.ca — keeping us all in touch during these challenging times

While Canada and the entire world battle to defeat the common enemy COVID-19, the *Maritime Engineering Journal* is still accessible, even to those self-isolating at home.

As we announced in our previous issue (MEJ 92), our management team and the people at RCN Public Affairs have worked closely together to present the *Journal* as a fully accessible PDF on an external facing page at: <https://www.canada.ca/en/department-national-defence/corporate/reports-publications/maritime-engineering-journal.html>

Having the *Journal* available as a fully accessible PDF on the **Canada.ca** website marks a great step forward in ensuring we reach as many people as possible in a format

they prefer. While we do not currently have plans to re-code our entire 38-year back catalogue that is available online through the kind cooperation of the all-volunteer Canadian Naval Technical History Association (<http://www.cntha.ca/publications/m-e-j/>), every effort will be made to keep the *Journal* in step with the formatting requirements of our readers.

Comments, enquiries and offers to write for the *Maritime Engineering Journal* can be sent to MEJ.Submissions@gmail.com



NEWS BRIEFS



MiRRAS Test Bed — New Technology at Fleet Maintenance Facility Cape Breton

Fleet Maintenance Facility Cape Breton (FMFCB) in Esquimalt, BC recently acquired the Mixed Reality Remote Assistant Support (MiRRAS) test bed, which is used to leverage the Microsoft HoloLens headset technology to provide Marine Technicians (Mar Tech) and Weapons Engineering Technicians (WEng Tech) with holographic annotation while performing routine maintenance and repairs on board Royal Canadian Navy (RCN) vessels.

Project Description

The MiRRAS project will be used to develop software applications for the Microsoft HoloLens headset that uses holographic annotation to display reference material, and give step-by-step instructions to a technician performing maintenance routines on shipboard equipment.

The project will develop test units that the RCN will use to investigate the potential implementation of mixed reality headsets in fleet maintenance facilities, and on board Her Majesty's Canadian ships to support equipment repairs and routine maintenance. The MiRRAS test bed will leverage cloud-based computing for data processing and storage, but at no point will the technology be connected to any shipboard networks.

Background

Marine and Weapons Engineering technicians are expected to conduct preventive and corrective maintenance in various sea states, often in limited light conditions and small spaces. Occasionally they are required to work outside in a variety of weather conditions. Their ability to keep systems operational depends on their training and education, the collaborative experience of their fellow shipmates, and the procedures and recommendations found in maintenance manuals located on board.

Today's marine propulsion, communication, radar and weapon systems are complex and require a high level of technical knowledge to maintain and repair. The

complexity of these systems also necessitates the use of technical manuals that are difficult to use in shipboard or maintenance facility environments. In addition to the challenges of working in a ship, technicians have to look at and interpret two-dimensional drawings or written descriptions, construct an image in their mind and perform the required work based on that mental model.

Mixed reality technology is being used and tested in industry. Studies at Boeing factories have shown "a 90-percent improvement in first-time quality when compared to using two-dimensional information, along with a 30-percent reduction in time spent doing a job."

Capable Deficiency

A mixed reality headset will allow Navy technicians to have access to a head-up display, instead of having to rely on a physical maintenance manual. This may potentially lead to more efficient and safer equipment repairs and maintenance. Technicians will not have to lay down tools to refer to a manual, and will have step-by-step instructions displayed in their field of vision over the equipment.

Potential future capabilities will allow subject matter experts to provide remote holographic training and support to less qualified technicians and/or students. The MiRRAS headset will support two-way video and audio holographic views, holographic annotation, and the use of 3D training and support simulation content.



An edited reprint from The Cape Crusader newsletter (Vol. 2, Issue 3, March 2020), courtesy of editor Ashley Evans and Team FMFCB.

NEWS BRIEFS



Novel Modeling and Simulation Capability at the Naval Engineering Test Establishment

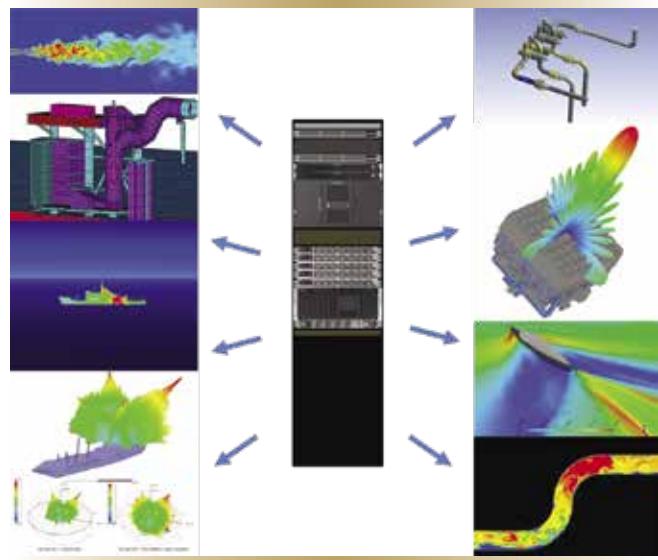
By Eric Fortier, NETE Combat & Control System Section

The Naval Engineering Test Establishment (NETE) is ramping up a new Modeling and Simulation Capability (MaSC) with an approach that is poised to cater to a wide variety of engineering needs. In the past, sizeable simulation suites have typically consisted of bespoke systems that were configured and optimized for a singular purpose. Such systems usually required planning to develop, significant investment, and often could take years to deploy. NETE is alleviating these hurdles for the engineering community by providing a somewhat more generic approach to the problem.

The underlying hardware of the MaSC is composed of high-density graphical processing unit (GPU) servers, configured according to common practices found in most high-performance computing architectures. However, these computing resources are then accessed and managed using virtual desktop infrastructure software that effectively acts as an abstraction layer for the user. Users can then reap the benefits of a customized set of computing resources, delivered through a familiar desktop experience.

By leveraging the flexibility of a software-defined environment, deployed desktops are configured in as many ways as there are applications. As such, one user could leverage parallel computations on a desktop with 50 computer processor cores and 20K GPU cores, while a second user runs software in a distributed fashion across 100+ virtual machines. The possibility of running virtual machines under various Linux and Microsoft operating systems means users have the flexibility to choose the environment that is most suitable to them.

Designed to handle sensitive information, the MaSC can only be accessed from 12 terminals at the NETE facility in Montreal. Upon receiving valid user credentials, these terminals provide a high-end desktop experience through an encrypted video stream from the cluster. Security is enhanced, as there is no physical media located at any of the terminals.



The MaSC is currently configured to supply 280 CPU and 100K GPU cores from a single equipment rack, with room to spare should there be a need to add servers. Several software licenses are also already in play to perform a variety of engineering analysis tasks such as finite element analysis, computational fluid dynamics, and ship thermal and electromagnetic signatures.

In cases where modeling and simulation have been overlooked as a potential prospect for providing timely and feasible engineering solutions, it is expected that, with assets and services at the ready, the cost-effectiveness of this approach can become increasingly more apparent in the future.





NEWS

Canadian Naval Technical History Association

CNTHA News

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Battle of the Atlantic – 75th Anniversary

In his 2009 paper, "Shipyards of the Canadian Naval Shipbuilding Program, 1939-2017," CNTHA founding member Douglas Hearnshaw offered a historical overview of the shipyards involved with building ships in support of the 1939-1945 Battle of the Atlantic. The following is an edited excerpt regarding one such yard in Port Arthur – now part of Thunder Bay, Ontario.

Port Arthur Shipbuilding Company

In 1910, local capitalist James Whalen was determined to build a shipyard in Thunder Bay to augment his salvage, towing and lumber business. He approached the American Shipbuilding Company of Cleveland, Ohio to direct an engineer to Port Arthur to design and complete a shipyard, including a drydock. This individual did a first-class job: layout of the shipyard was so efficient that very little has had to be changed in the intervening years. This was the establishment of what was first known as the Western Dry Dock and Shipbuilding Company, and under Whalen's management the firm built a few tugs and barges, before getting an order to build the largest and most palatial passenger ship on the Great Lakes, the 6,095-ton *SS Noronic*, launched in 1913.

During the First World War, Western Dry Dock (renamed the Port Arthur Shipbuilding Company in 1916) built several seagoing freighters, and a series of armed naval trawlers for both the Canadian Government Merchant Marine (CGMM) and the British Admiralty. Toward the end of the war, the shipyard was engaged in building more seagoing merchant ships for the CGMM as part of the government's effort to

mitigate the effects of the post-war recession. By the late 1920s, with business drying up, the shipyard turned to ship repair work and other engineering projects to remain viable throughout the Depression years and beyond.

In 1940, the Canadian government and British Admiralty were once again looking for naval vessels to be built in Canada, and Port Arthur Shipbuilding received contracts for the first of many corvettes and minesweeper escorts. The shipyard's modern and very active machine and boiler shops were able to manufacture the engines and boilers for these ships – machinery that was rated by both governments as the best of its kind made in Canada. From 1940 to 1945, Port Arthur Shipbuilding completed nine Flower-class corvettes, six Bangor-class minesweepers, and 20 Algerine-class minesweepers – 12 for Canada, and eight for the Royal Navy. All told, the Lakehead shipyard proved a very able producer for the war effort, and is in operation today under the ownership of Heddle Shipyards.



¹Doug Hearnshaw's full paper can be found at: <http://www.cntha.ca/articles/shipyards-narrative.html>

HMCS *Port Arthur* (K233), built at Port Arthur Shipbuilding, on commissioning day in Montreal, May 26, 1942.

DND/RCN photo courtesy Bruce Hulbert, For Posterity's Sake.

