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Maritime Engineering Journal

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Canada's Naval Technical Forum

Feature Article

HMCS *Fredericton*: Meeting the Challenges of Operational Deployment during COVID-19

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Navy Frigate Maintenance and Upgrade Program Underway at Québec Shipyard

Photo by Lt(N) Denise Dickson, MSEO HMCS *St. John's*

HMCS *St. John's* Marine Technician MS Devon Lohnes takes appropriate COVID-19 precautions while his ship undergoes a maintenance and upgrade refit at the Davie Shipyard in Lévis, Québec in November.

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Maritime Engineering Journal

95
(Established 1982)
Winter 2020

***Maritime Engineering Journal* on Canada.ca:**
https://www.canada.ca/en/department-national-defence/corporate/reports-publications/maritime-engineering-journal.html

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Master Sailor Andrew Hindy (left) and Sailor 1st Class Ethan Hann discuss the operation of a local operating panel aboard HMCS *Fredericton* during Operation Reassurance on May 30, 2020.
(Photo by Cpl Simon Arcand, Formation Imaging Services)

The *Maritime Engineering Journal* (ISSN 0713-0058) is an unofficial publication of the Canadian Armed Forces published by the Director General Maritime Equipment Program Management. Views expressed are those of the writers and do not necessarily reflect official opinion or policy. For reprint information, contact: MEJ.Submissions@gmail.com, or Maritime Engineering Journal, DGMEPM, 101 Colonel By Drive, Ottawa, Ontario, Canada, K1A 0K2.

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COMMODORE'S CORNER

The naval materiel enterprise remains on an even keel during an unpredictable year

By Commodore Lou Carosielli, CD

It is probably safe to say that 2020 will go down in the record books as one of the more "interesting" years in recent history. With the COVID-19 resurgence in full swing, and communities struggling to flatten the curve, Canadians across this country have been digging deep to manage in the face of an unseen adversary. Despite the hardships, this "can do" attitude is something we can all take pride in as we step up in our various ways to care for ourselves, our families and our fellow Canadians.

A great example of this is being demonstrated every day by the people of the Royal Canadian Navy's naval materiel enterprise who continue to support the RCN's operational commitments in a world hampered by travel restrictions, supply chain issues, and workplace modifications. As newly promoted **LCdr Natalie Mailhot-Montgrain** describes so well in this issue's cover story, "Meeting the Challenges of Operational Deployment During COVID-19," a new process of innovative ship-shore collaboration had to be developed on the fly to meet the challenges of sustaining HMCS *Fredericton* during the ship's six-month deployment to Operation Reassurance from January to July. Lessons learned from their experience have played out in any number of ways this past year as:

- HMCS *Toronto* deployed on Operation Reassurance in northern Europe in August;
- HMCS *Winnipeg* deployed on Operation Projection and Operation Neon in the Asia-Pacific region from September to December;
- HMCS *Summerside* deployed on Operation Caribe in the Caribbean Sea from October to December;
- HMCS *Halifax*, HMCS *Ville de Québec* and MV *Asterix* joined Exercise Joint Warrior off the northwest coast of Scotland from October 4 to 15;
- HMCS *Victoria* proceeded to sea on submarine trials in September; and
- HMCS *Harry DeWolf* attained Operational Status Transfer to the RCN on October 13, and completed Basic Single Ship Readiness Training on October 23.

The driving force behind these naval materiel enterprise successes has been the professionalism, technical expertise and dedication of our military/civilian workforce and industry partners. Their tenacity to stay the course gives us the edge in achieving excellence in operations, even as we continue to prepare the RCN for the future by exploring innovations in areas such as artificial intelligence and remotely piloted systems.

But even as our teams look for innovative ways to carry on delivering critical technical and engineering support to the in-service fleet and major capital projects, there is a focus on safety. We only need look to this year's National Silver Cross Mother — **Mrs. Debbie Sullivan**, whose son **Lt(N) Chris Saunders**, the Naval Technical Officer who died during the fire aboard HMCS *Chicoutimi* in 2004 — to be reminded of the hazardous environment in which we work, with or without a global health pandemic adding to the complexity.

And so, as we move into winter and the holiday season with necessary COVID-19 restrictions in place, it is important that we keep an eye on each other's well-being. We may feel as if we have already used up much of our resilience, but no one should feel isolated in despair. We work as a team, and we take care of ourselves as a team. If you feel that you, or someone you know, might need assistance, please don't hesitate to put your hand up. There are many formal and informal support mechanisms available through your chain of command/supervisors, colleagues and friends that are ready to support you.

Thank you for your hard work, and take care.

HMCS *Harry DeWolf* (AOPV-430)
Photo by Cpl David Veldman, CAF Combat Camera

FORUM

Naval Weapons Engineering Technician CPO1 Gilles Grégoire Appointed Canadian Armed Forces Chief Warrant Officer

By Tom Douglas, MEJ Associate Editor

A long-serving member of the Royal Canadian Navy's technical community has been selected for the most senior non-commissioned member (NCM) appointment in the Canadian Armed Forces — that of CAF Chief Warrant Officer (CWO). In September, W Eng Tech **CPO1 Gilles Grégoire, MMM, CD** became the 14th person to be named to the position since it was created in 1978 to assist the Chief of the Defence Staff on all issues relating to NCMs.

The Campbellton, NB native comes well-qualified for the job, with extensive experience at sea and ashore during his 34 years of naval service as a Naval Weapons Technician. At sea, he first served aboard steam-powered destroyer escorts, before joining the fleet of gas-turbine patrol frigates. His operational deployments include Op Forward Action (off Haiti), Op Sharpguard (Adriatic Sea), Op Apollo (Persian Gulf), Op Unison (Gulf of Mexico for Hurricane Katrina relief), and Op Reassurance (Mediterranean Sea and Black Sea).

CPO1 Grégoire also saw extensive service at the CF Naval Engineering School as the *Halifax*-class equipment instructor and senior instructor, and as Naval Weapons Training Chief. He also served as Special Projects Technician at the Canadian Forces Maritime Warfare Centre in Halifax, and in 2009 was appointed a member of the Order of Military Merit. In 2013, Chief Grégoire graduated with a Certificate of Military Studies from the NCM Executive Professional Development Program at the Royal Military College of Canada. He has also completed the NATO CSEL Leadership Course.

In June 2013, CPO1 Grégoire was appointed coxswain of HMCS *St. John's*, and was part of the first-ever full crew swap in RCN history to help sustain HMCS *Toronto* during Operation Artemis in the Arabian Sea. In 2014, he was appointed coxswain of *Toronto* on Operation Reassurance, and afterward served ashore as CWO for Chief of Force Development in Ottawa, a unit responsible for developing future capabilities required to produce strategically relevant, operationally responsive, and tactically decisive military forces.

Photo by Cpl Mélani Girard

In 2016, when he was appointed Formation Chief for Maritime Forces Pacific/Joint Task Force (Pacific), Chief Grégoire told CFB Esquimalt's base newspaper *The Lookout* that he was "ecstatic" to have achieved such a milestone in his career.

"I am a man whose big goal in life when I joined the Navy was to become a petty officer in a warship," he told staff writer Peter Mallett. "I feel extremely fortunate to have this opportunity."

Two years later, CPO1 Grégoire was selected as the Canadian Joint Operations Command Chief Warrant Officer, continuing his aspirations to support operations in Canada, North America, and around the world.

This past August, the newly-appointed CAF CWO told the *Journal* about the best piece of advice given to him as Ordinary Seaman Grégoire on the first day of his Naval Weapons trade training. It came from a senior lieutenant who told the young sailor: "Whatever you do, just be the best at it. Whether you are at cleaning stations, fixing the gun, or standing watch at the brow, be the best, and take ownership of the job that has been given to you."

His latest appointment as CAF CWO — that he describes as "an honour" — is a fitting acknowledgment of the dedication and loyalty he has demonstrated throughout his distinguished naval service to Canada. He credits his success to great mentors, regular physical fitness, and to the indispensable support of his wife Denise.

Bravo Zulu, Chief Grégoire!

FORUM

NTO Survey Action Plan – You Spoke and We Listened

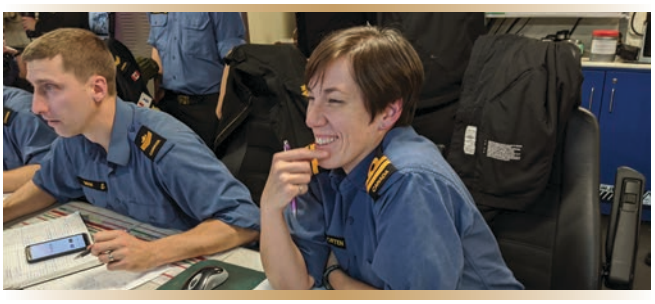
By Cdr Jay Thor Turner

In recent years, the Naval Technical Officer (NTO) community has responded to a number of occupational surveys — i.e. the NTO Unit Morale Survey (2017), the LCdr Dugas Survey (2019), and the Canadian Armed Forces Retention Survey (2019) — all aimed at highlighting areas of concern.

Following the first of these, members of the community began work to determine what the key issues were, and how the occupation could address them. From the surveys, initiatives, workshops, pilot programs and town hall meetings that followed, an NTO Survey Action Plan was developed that reflects the senior Naval Engineering leadership's commitment to strengthening job satisfaction and retention within the NTO community.

The mission of the action plan is to foster high job satisfaction and enhanced quality of life within the Naval Technical Officer community. The focus areas in the plan are: **Mentorship and Communication, Recognition, Workload and Work-Life Balance, and Career Path.** While these main focus area titles are pretty much self-explanatory, behind each of them are several more tightly itemized "Lines of Effort," with each of these further broken down into one or more detailed "Specific Activity" action points with an identified "Champion."

The intent was to create a high-level action plan that highlights those elements that the NTO community might directly influence to create meaningful change. This does not mean that any of the other identified concerns will be ignored or forgotten, just that they will need to be addressed by other means. The Naval Engineering Council will continue to track all issues raised through the NTO survey and review process, and will support their resolution whenever and however possible.

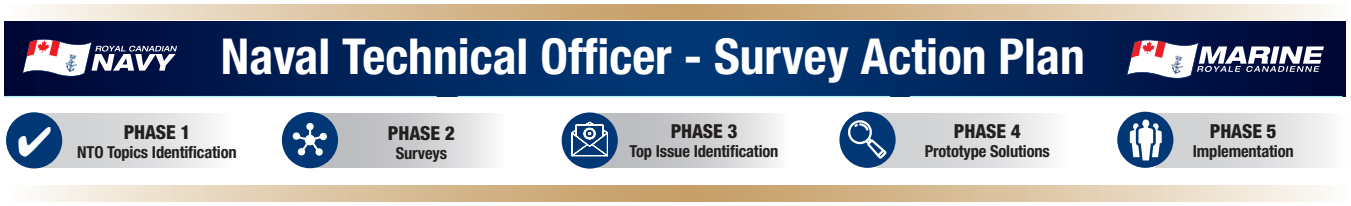


The NTO Survey Action Plan reflects the senior leadership's commitment to strengthening job satisfaction and retention within the Naval Technical Officer community.

For more information, please visit the Naval Technical Branch SharePoint site on the DWAN at: https://collaboration-materiel.forces.mil.ca/sites/MEPM/DMMS/DCOS/NT_Branch/SitePages/Home.aspx, or contact Cdr Turner at jaythor.turner@forces.gc.ca.

NTOs can also check in with their local Naval Technical Assistant Branch Advisors — Cdr Iain Meredith (Maritime Forces Pacific), Cdr Jay Thor Turner (National Capital Region and Out-of-Canada), and Cdr Danny Croucher (Maritime Forces Atlantic).

Cdr Turner is the Deputy Chief of Staff – Maritime Equipment Program Management in Ottawa.



FORUM

Profile: Captain (Navy) Seana Routledge

By Brian McCullough

The RCN's first female Naval Technical Officer to be promoted Captain (Navy) says she might easily have become a doctor, had it not been for an opportune encounter with a Royal Military College of Canada (RMC) "Information Day" team visiting her high school in Moncton, NB. Even then, had "Cool Air Force Pilot" been one of the available options, she might have ended up flying jets rather than blazing a path for young women wanting to pursue technical careers in the Navy.

During the course of her 24 years of wearing a uniform in the service of Canada, Capt(N) Seana Routledge has stayed true to herself — honouring the guidance of her father Donald, who passed away in 2015, and her mother Charlene — as she worked her way to an "RCN First" by becoming the first woman in the technical branch to wear the four gold stripes of a Navy captain on her shoulders.

She said that she never really considered herself to be a role model, but as she told RCN Public Affairs Senior Editor Darlene Blakeley following her promotion in June, the realization came to her that she had become one whether she intended to or not (see "Captain (Navy) Seana Routledge on Women in STEM in the RCN," page 7).

In fact, her views on gender equality are quite simple: "Women shouldn't be afraid to do anything against the gender grain, and nor should men. To ensure this is the case, our organizational policies need to ensure there are no barriers to equality."

Working mostly from the Ottawa home she shares with her spouse and their active two-year-old toddler, Capt(N) Routledge maintains a busy work schedule as the deputy project manager responsible for establishing the supportability and in-service support programs for Canada's next generation of warships. It is a massive transition effort that she is well-prepared to manage, and a world away from the quiet life she knew growing up in small-town New Brunswick.

Both of her parents had studied to be chemists in Halifax, NS, but by the time Seana was born in Richibucto, NB, a coastal fishing community of 1,500 people tucked away on New Brunswick's eastern shore, her father was overseeing a parish as an ordained Anglican priest, and her mother was fully engaged in ministry support work. Over the next 15 years, the family (she has two older sisters) would serve several small parishes around the province before transferring to Moncton for Seana's Grade 11 year.

CPO1 Gerald Doutré

RAdm Chris Earl presented Capt(N) Seana Routledge with her captain's bars at her promotion ceremony in June, marking a new chapter for women in the naval technical occupations.

"For me, the moves were always an adventure, but the move from Perth-Andover to Moncton was hard at first. I was going into a high school with a larger population than the towns I spent my childhood in, and I felt intimidated coming in as a girl with strong academics. Fortunately, I found a good group of girlfriends who had the same drive for math and science, so I was quickly accepted. There was no competition."

After high school, the RMC recruiters convinced her that science and engineering would be the most productive path for her when she enrolled in the Regular Officer Training Program (ROTP) in 1996. But what she didn't figure on was the difficulty she would face adjusting to the regimentation of the military.

"I didn't really know what I was getting into at all," she said. "I remember calling home to my parents in tears a couple of times, saying: 'I can't do this!' But all I needed was the gentle reminder from my dad that this was my choice, and if I put my mind to it I could do it. And he was right. I never looked back."

(Continues next page...)

She would go on to graduate from RMC with a BEng in Computer Hardware in 2000, and then complete her naval engineering training in Halifax before joining HMCS *Ville de Québec* (FFH-332) for her Combat Systems Engineering Officer (CSEO) qualification (2002), followed by Head of Department qualification in HMCS *St. John's* (FFH-340) in 2005. She would return to *Ville de Québec* in 2007 as the ship's CSE department head.

Capt(N) Routledge says there has been no "zig-zag" in her career, but her resumé tells a story of some interesting and varied staff jobs with the Navy on the East Coast over the past decade with the Formation Technical Authority, Engineering Operations, the Canadian Forces Maritime Warfare Centre (Modelling and Simulation), and Maritime Forces Atlantic Headquarters (Information Warfare). While on the coast, she also served as the Business Planning Officer and Operations Manager for Fleet Maintenance Facility Cape Scott, and as Commanding Officer of CFB Halifax Base Information Services.

Capt(N) Routledge has solid credentials as well within DGMEPM in Ottawa having been a staff officer in Fleet Management, and the section head for Above Water Weapons and Simulators. She left that position to take up her current appointment earlier this year.

Determined to round out her skillset of technical, administrative, and leadership experience, she has completed the Joint Command and Staff College course through distance learning, and holds a Master of Business Administration degree from Saint Mary's University in Halifax, for which she earned the Gold Medal for the top academic average in her graduating class.

"Education was an important theme in our house when we were growing up," she said. "Our parents wanted us to become successful, independent contributors to society, and while they were always supportive, they also expected us to work hard."

Capt(N) Routledge adds that while she is still grappling with the newness of her promotion, she is thankful for how a few special mentors in the Navy taught her the importance of good communication, passion for the job, and authenticity in leadership. She says the most significant takeaway from her career so far has been the importance of teamwork, and the need for diversity within the team.

"Through experience you learn how to get the best out of yourself, and the best out of your team. I want what's best for the organization, and that includes making the people on my team feel valued in the work they do. Everyone has a role to play — and it's that richness of diverse thought on the team that makes an organization effective."

Brian McCullough is the Production Editor of the Maritime Engineering Journal.

FORUM

Captain (Navy) Seana Routledge on Women in STEM in the RCN

By Darlene Blakeley

[Edited and abridged from an RCN Public Affairs "Sailor Profile" from July 22, 2020 with the kind permission of the author.]

Photo by Mona Ghiz, MARLANT Imaging Services

The first woman to achieve the rank of Captain (Navy) as a Naval Technical Officer in the Royal Canadian Navy (RCN) sees a bright future for those pursuing science, technology, engineering and mathematics (STEM) careers in the service.

"Technology will continually evolve, providing never-ending opportunities for those in STEM for years to come, particularly in the area of shipbuilding and in-service support," said Capt(N) Seana Routledge, Deputy Project Manager – Transition in the Canadian Surface Combatant Project Management Office. "We need innovators as we move toward the future, and those in STEM can play a pivotal role in advancing innovation in the RCN."

Capt(N) Routledge believes that strong solutions can be developed when there is a diverse group of people around the table collaboratively working on problems.

"We struggle both within government and within the private sector to recruit women into STEM roles," she said. "Without diversity in our leadership and throughout our organization, we can lose the opportunity for innovative ideas that come from having different opinions, perspectives and experiences."

She says that since the RCN wants to see more women in STEM leadership roles, it needs to continue to focus on improving how it gets women to join, encouraging them throughout their careers, and providing them with equal opportunities to advance and develop in order to keep them. This requires the RCN to look at providing flexibility in its careers paths so women can pursue their professional and personal goals.

"If we can achieve this, then the RCN will be stronger, richer and more effective in accomplishing its mandate," she said.

(Continues next page...)

Capt(N) Routledge says she achieved her current rank because of the changes that have already been made in the RCN over the last 25 years to remove many of the barriers for women.

"Understanding that nothing is perfect, we need to continually look at our policies, processes and postings, and continue to amend them to ensure equality," she says. "Gender-Based Analysis Plus (a government process by which a policy, program, initiative or service can be examined for its impacts on various groups of women and men) that is now integral to our policies is a great advancement in ensuring equality in all we do."

A diverse range of postings over the years has given her a solid breadth of experience, and an opportunity to demonstrate her leadership potential to progress through the ranks. She is keenly aware that she is a role model for women pursuing STEM careers in the RCN, even if it's not what she expected.

"I didn't think I'd be the first woman in my trade to attain this rank, and I'm not someone who enjoys the spotlight," she said. "In addition, for much of my career I never really considered myself a role model for other women."

That changed a few years ago, however, when a young naval lieutenant stopped her in the front entrance of her office building and congratulated her on her then-promotion to commander.

"She said something to me that always stuck with me; that she was pleased to see more women promoted to that rank as it was nice to have another woman to look up to and identify with. I realized that whether I wanted to be a role model or not, I actually already was one."

Capt(N) Routledge is quick to pass credit for her success to other female Naval Technical Officers, who she says paved the way before her with other firsts within the RCN that enabled her to attain her goals.

She adds that Cmdre Josée Kurtz, who was her executive officer when she was a head of department in HMCS *Ville de Québec*, and was the first woman ever to command a Standing NATO Maritime Group, inspired her to pursue her unique goals.

"Her professionalism and work ethic were always an inspiration to me."

In her current position, Capt(N) Routledge is responsible for leading the development of an in-service support and sustainment solution for the navy's new surface combatant, so that when the fleet is built and ready for service, all of the support mechanisms such as infrastructure, training, spare parts, maintenance equipment and documentation are in place.

"My goal is to develop the most effective solution possible within the available resources, and to ensure that the RCN and Director General Maritime Equipment Program Management are well positioned to be able to maintain these ships for many years to come," she said.

The future is sure to be exciting for those interested in STEM careers in the RCN, but Capt(N) Routledge says that with any large organization there will be challenges. However, she strongly believes that these challenges are worth pursuing, and encourages other women in STEM career paths to consider joining the RCN.

"I have had so many rewarding experiences throughout my career that balance out any of the challenging times, and they keep me motivated to continue to progress."

Darlene Blakeley is the Senior Editor for RCN Public Affairs in Ottawa.

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.

FEATURE ARTICLE

HMCS *Fredericton*: Meeting the Challenges of Operational Deployment During COVID-19

By LCdr Natalie Mailhot-Montgrain
Photos by Cpl Simon Arcand, Canadian Armed Forces Combat Camera

When HMCS *Fredericton* (FFH-337) deployed overseas on January 20, 2020 the COVID-19 coronavirus was already making headlines around the world. Since little was known of the restrictive impact this global outbreak would have on our deployment as the mission progressed, *Fredericton* carried on with a full schedule of operations, assuming its role as Canada's forward deployer on Operation Reassurance in Central and Eastern Europe with NATO Standing Maritime Groups 1 and 2.

On March 11, the World Health Organization declared COVID-19 a global pandemic, and travel restrictions soon became a reality for us. Not only were crew members confined to ship once we arrived in a port — apart from using a cordoned off section of the jetty for sports and exercise when allowed (most ports did not allow it) — any planned travel leave during our rest and maintenance period (RAMP) was no longer an option.

What's more, our normal procedures for conducting routine and emergency ship support activities while deployed had to be completely restructured. With the ship closed to outside personnel we could not receive in-person technical assistance visits or undertake any contracted work locally, and major unknowns began to arise concerning the delivery of critical spares and maintenance equipment from Canada. It quickly became clear that if *Fredericton* were to fulfill Canada's commitment, we would have to become as self-sufficient as possible in maintaining our technical readiness.

Fortunately, even though we were half a world away from home port, we were not alone. Thanks to some excellent long-distance support from our coastal Fleet Engineering organizations, training facilities, life-cycle materiel managers (LCMMs), and field service representatives (FSRs) through the in-service support contract

The memory of fallen MSE Phase VI trainee SLt Abbigail Cowbrough lives on through these touching memorial plaques that were made for the technical spaces she worked in during her time aboard HMCS *Fredericton*. Engineering department personnel S1 Jesse Thompson, S1 Eric Bergeron, S1 Cory Stone, S1 Kyle Stone and PO2 Matt Carroll (top) pooled their technical and artistic talents to create the plaques. S1 Cory Stone received a Task Force Commendation for the commemorative pieces he designed and fabricated to preserve the memory of all six people lost when Stalker 22 went down in the Ionian Sea on April 29, 2020. A Canadian Forces Unit Commendation was presented to the crew of HMCS *Fredericton* for "exceptional resiliency in the face of unprecedented challenges."

(ISSC), *Fredericton*'s crew was able to keep on top of things. Shore facilities back home were facing their own hardships in supporting a deployed ship while working under severe COVID-19 restrictions, but they successfully coordinated a much-needed sustainment flight in time to meet the ship's arrival at the naval base in Souda Bay, Crete for a shortened RAMP in April.

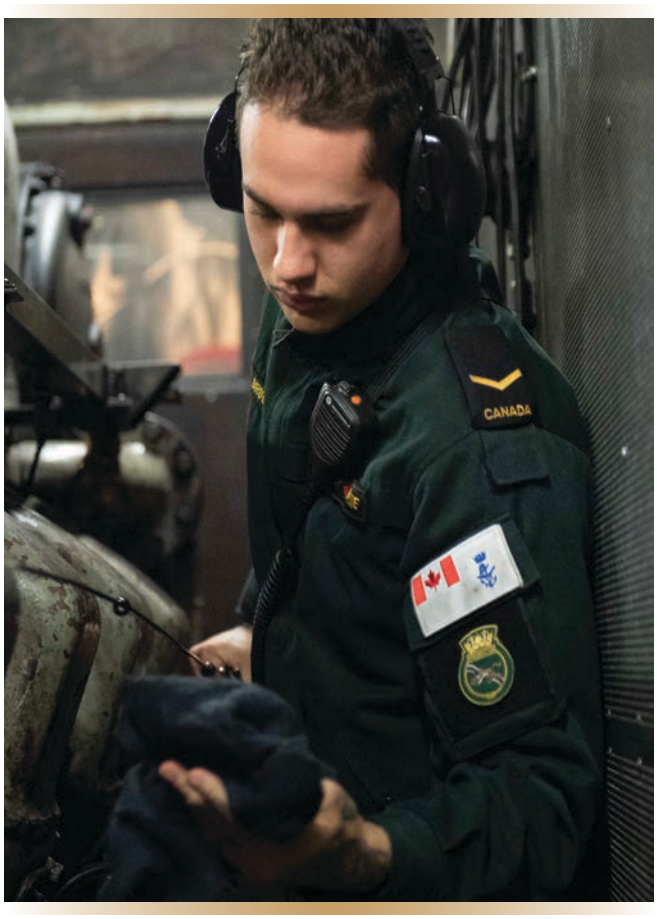
Coordinating authorized repair plans with technical stakeholders and continuous liaison with subject matter experts who offered remote troubleshooting empowered the ship's staff to take advantage of opportunities to perform extensive corrective and preventive maintenance normally undertaken by shore authorities. Creative temporary repairs became the new normal as we sourced whatever we could from on-board stores, or through local purchase orders that met our design specifications. Our logistics department truly lived up to their motto of *Servitium nulli secundus* — Service Second to None, and it was wonderful seeing the senior technicians working close alongside the junior personnel so that the repairs became fun instructional moments as they took things apart and put them back together again.

The expression on Marine Systems Engineering Officer Natalie Mailhot-Montgrain's face during the last leg of *Fredericton*'s passage home from Op Reassurance last July tells the story of a six-month overseas deployment characterized both by impressive technical achievements from her engineering team, and the tragic loss of six of their colleagues in April.

The deployment actually helped establish stronger working relationships between ship's staff, FSRs and LCMMs with respect to the equipment we were operating and maintaining under the ISSC. With habitability on board ship so crucial to the crew's well-being, one of the things we kept a close eye on was the freshwater supply generated by our Mk IV shipboard reverse osmosis desalination units (SRODs) manufactured by BluMetric Environmental Inc. Our technicians continually liaised with the company FSR on best operational practices and repair plans to achieve high production of potable water while operating in areas with various salinity levels. In turn, ship's staff helped the FSR and LCMM grasp the intricacies of the deployed plant operation by sharing data and detailed explanations that could prove helpful toward the continual improvement of fleet-wide SROD system operation, knowledge and subsequent training. *Fredericton*'s own SME, Sailor 1st Class (S1) Ian Forrester, received a Task Force Commendation for his efforts in maintaining high freshwater production levels throughout the deployment.

There was similar collaboration surrounding other equipment. As *Fredericton* was one of the first ships under the ISSC to have deployed with Toromont Caterpillar C32 diesel generators (DGs), the FSR, LCMM and shipboard technicians worked in partnership to define numerous grey areas for preventive and corrective maintenance that would be within the capability of ship's staff to complete. During the initial DG installation and trials, S1 Daniel Hoffer had worked in tandem with Toromont technicians to create and

Repairs, maintenance and training never let up as *Fredericton*'s technical personnel liaised remotely with shore authorities during COVID-19 restrictions while deployed. Here, S2 Tyree Downey and S1 Ethan Hann monitor the condition of a turbine.



S2 Craig Bruce verifies the oil level of a diesel engine aboard HMCS *Fredericton* during Operation Reassurance, July 6, 2020.

implement a reporting method whereby all stakeholders could be kept abreast of current DG health and maintenance, and any new developments. This was instrumental in helping achieve full diesel-generator operations throughout the deployment.

On yet another front, technician Master Sailor (MS) Steve Brown engaged in a high volume of correspondence with shore-based SMEs to troubleshoot a number of interdependency/interface issues between the ship's integrated platform management system and the propulsion diesel engine. The information and data he was able to acquire led to a better understanding of the propulsion plant, and to some very effective remote troubleshooting.

And so it went. As issues arose, thorough repair plans would be formulated with full FSR/LCMM review and endorsement. This process not only led to successful maintenance and repair work, but to a higher capability and capacity standard for our Mar Techs. By necessity, we were reaching new levels of training and work proficiency.

And it didn't stop there. PO2 Kevin Twohig and MS Kevin Saunders, both former Naval Fleet School instructors, successfully developed and executed the fleet's first Engineering Watchkeeper residential course at sea. To capitalize on the unique opportunity of conducting this program aboard a deployed ship, each instructional period was immediately followed by a walk-through of the engineering spaces to observe system operation of the running machinery *in situ*. On many occasions, the participants were able to contribute their own knowledge in terms of system maintenance and defect rectification.

With similar initiative, the ship's training petty officer, PO2 Jamie Whittle, collaborated with the structure and electrical supervisor to update the engineering roundsperson walk-through, and with other senior engineering watchkeepers to actively promote cross-training at all levels during watches. Throughout the department, Mar Techs with different backgrounds were learning from one another, and developing into more well-rounded technicians in the process.

Our deployment on Op Reassurance was not without its setbacks, and none was more devastating than losing one of our own engineering officers, SLt Abbigail Cowbrough, and five other friends, colleagues and crewmates in the tragic April 29 crash of *Fredericton*'s CH-148 Cyclone helicopter — call sign Stalker 22. It was a difficult time for everyone on board, and we found solace by supporting one another, fabricating commemorative items to remember our colleagues, and carrying on with our work and training.

Despite the hardships, the pride of the mighty *Freddie* continued to resonate strongly with the knowledge that we would be bringing the ship home in a better engineering state than when we sailed for Op Reassurance more than six months earlier. It was a huge boost in helping the engineering department persevere through an extremely challenging deployment.

LCdr Natalie Mailhot-Montgrain was the Marine Systems Engineering Officer aboard HMCS Fredericton during Op Reassurance ROTO 12, and is now the Marine Systems Engineering Division Commander at Naval Fleet School Atlantic in Halifax.

FEATURE ARTICLE

HMCS *Calgary*'s 2020 Unscheduled Docking: "All for a Quarter Turn More"

By Lt(N) Haley van Poorten, P.Eng.
Assisted by Chris Young

Photo by Cpl Jay Naples, MARPAC Imaging Services

HMCS *Calgary* sails during Task Group Exercise 20-1 off the coast of Vancouver Island on April 5, 2020. Thanks to an outstanding Formation-wide effort, the ship was able to meet its operational commitments following an unscheduled docking to resolve a propeller oil leak.

HMCS *Calgary* (FFH-335) returned to operations from the 2019-2020 holiday leave period and immediately commenced preparations for a busy spring. We were scheduled to ammunition ship at the Canadian Forces Ammunition Depot (CFAD) Rocky Point southwest of Esquimalt, BC on January 9 and 10, take on 255 m^3 of DFO on January 13, then conduct Intermediate Air-Ship Readiness Training (IASRT) workups from January 20 to 31. This was all in preparation for our upcoming deployment on Operation Protection/ Operation Neon in the Asia-Pacific region in March.

While *Calgary* was alongside CFAD on the afternoon of January 9, I was piped to the quarterdeck to examine a slick of oil seen trailing away from the ship on the surface of the water. In my capacity as *Calgary*'s Marine Systems Engineering Officer (MSEO), both the oil leak and any possible environmental contamination issues had to be investigated and contained promptly. On closer inspection, we could see tiny oil bubbles occasionally coming to the surface on the port side, approximately in line with the propellers at frame 58. A hydraulic oil leak in the controllable reversible-pitch propeller (CRPP) was immediately suspected, and the Queen's Harbour Master was immediately contacted so that a boom could be put in place to reduce the spread.

First thing the next morning, with high winds and choppy seas making conditions difficult, divers went into the water to try to locate the source of the oil leak, but were thrown about by the underwater currents and were unable to see anything. The weather was also too windy to allow our port-side missiles to be embarked, so the ship was cold-moved by tug back to Esquimalt that Friday evening.

On the following Monday, we topped off our fuel tanks in preparation for sailing one week later. From January 14 to 16, Fleet Maintenance Facility Cape Breton's (FMFCB) main propulsion technical officers came to the ship to assist our dive team and the MSE department in ascertaining the source of the oil leak. The CRPP system was pressurized to 60 bar for sustained periods, but it still took several attempts before the source was finally identified by the divers and captured on video on January 16. CRPP oil was coming out of the vestigial Prairie Air propeller noise-reduction system air holes from the topmost blade of the port propeller. The shafts were rotated to determine if it was only the one blade that was affected, but all blades had the same issue when in the top position.

Our sailing for IASRT workups was set for the 20th, but a risk assessment quickly concluded that operating in the waters surrounding Vancouver Island near the US border, and within a significant marine mammal habitat, with a known deleterious substance leaking from the propeller would be intolerable. It was determined that the ship would need to undergo an unscheduled docking to try to rectify the oil leak. Our risk assessment was submitted to Fleet Technical Authority (Pacific) on January 18.

Meanwhile, HMCS *Regina* (FFH-334) was scheduled to go into the FMFCB graving dock during the next available docking window (based on tides) at the end of the following week for pre-docking work period surveys. The Formation quickly looked at all possible docking options for us — Victoria Shipyard Limited (VSL), nearby docks in the US, or having a floating dock brought to Esquimalt — but the decision was made in the late afternoon of January 20 to have our ship take HMCS *Regina*'s planned docking window at the FMFCB graving dock, and we were scheduled to cross the sill at 0830 on January 25. *Calgary* had just completed a change of command that morning, making it a bizarre first day for our new CO.

By moving forward with this tight timeline, *Calgary* remained on schedule for our departure on Operation Projection in March, but there was a lot of work that needed to be done in the next four days. We had to lighten the ship from "operational heavy" to docking load condition by end of day on January 24 — or risk missing our tidal window, which would impact the deployment. While decisions were being made about whether to put *Calgary* into dock with an almost full ammunition load, we went alongside *Regina* to transfer fuel and bilge effluent. Both vessels' MSE teams went into an around-the-clock defueling rotation to offload the liquids as quickly and safely as possible. This involved a great deal of coordination and teamwork between the two ships to set up reliable communications between our two machinery control rooms, check that the defueling hoses were within certification date, rig temporary lighting to safely conduct fueling operations at night, and establish a workable watch rotation.

Sea Training Pacific's MSEO and Chief Engineer (CENG) also helped by stepping in so that *Calgary*'s CENG and I could attend meetings and otherwise support the preparations for our upcoming docking. The FMF project leader and Formation Engineering Readiness were working quickly to create a work package to merge this unscheduled docking with a previously scheduled four-week short work period that would have started in late

Images courtesy the author except where noted.

A slow oil leak emanating from the vestigial Prairie Air holes in *Calgary*'s port propeller blades threatened the ship's deployment schedule last spring.

Oil can be seen draining out of the uppermost propeller blade's Prairie Air inlet tube.

February. Since planning for the SWP was already well underway, it was a matter of cutting that work package down by identifying what was absolutely essential to make the ship deployment-ready as quickly as possible. Docking-dependent jobs such as inspecting the hull and changing out underwater fittings that needed replacement pushed aside other less critical work, but any job making the cut had to be materially supported within the reduced timeline. Given that the work period was starting several weeks earlier than originally planned, parts availability became a significant issue.

(Continues next page...)

On the evening of January 22, with the decision made to de-ammunition the ship prior to docking, *Calgary* returned to CFAD under her own power. However, because of the CRPP oil leak, the best way to minimize the oil loss was to have the pitch locked to full ahead on the port side so that the system would not be pressurized. To give the bridge the most operational capability possible, the best option was to lock the port shaft and drive the starboard gas turbine in unitized mode. Earlier that day, with *Calgary*'s entire MSE department already fully tasked with completing the liquid transfer to HMCS *Regina*, Mar Techs came over from HMCS *Vancouver* and HMCS *Ottawa* to help us lock our port shaft and CRPP, while we flashed up the propulsion plant.

The "ahead' chamber drain plug, showing signs of oil weeping, had backed itself off by a quarter turn.

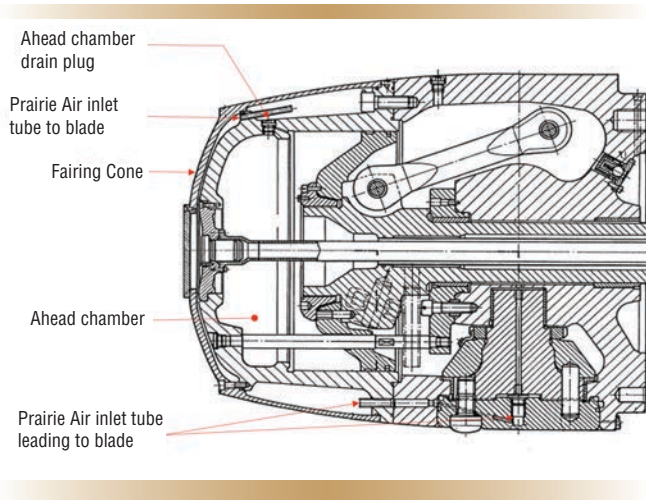
Our hot move to CFAD was not without its risks, as we were carrying an unbalanced missile load, a counterbalancing freshwater ballast load, a light six-percent fuel load, and were trimmed by the bow in preparation for docking. My first pre-sailing briefing to our new CO must have sounded pretty strange: "Captain, sir, *Calgary* is at immediate notice for power. Currently driving starboard GT unitized, full power is not available, no other drive modes are available. MCR will retain thrust station in control." A tug from QHM stood by us for the short run down the coast.

It was hard for me not to be hyper-conscious of the movement of the ship throughout the hot moves, and as the ship's weight changed while we were off-loading ammunition. I breathed a heavy sigh of relief when we finally got back to Esquimalt late the next evening and tied up outboard of HMCS *Regina* at Jetty C1, lined up for the docking evolution that was due to begin two days later.

January 24 was spent completing all the system preparations and isolations prior to the docking. HMCS *Regina*'s MSE department provided us with a valve/isolation checklist, which was immensely helpful in ensuring all systems were ready for the docking evolution. The final briefings were given to ship staff so that all personnel understood the sequence of events and their roles for the next morning.

Thanks to the efforts of everyone, from the FMF Naval Architecture, Marine Systems Engineering, Production, and Operations staffs, to the Mar Techs from other units, and the cooperation of all departments within HMCS *Calgary*, the docking evolution went very smoothly. The ship landed on the blocks successfully on January 25 in a comfortable upright position. Having a fully-crewed ship in the FMFCB graving dock posed certain complications, as the firemain water pressure, LP air, HP air, chilled water, and main fridges all needed to be maintained through shore connections. Leaks in the ship-shore LP air supply kept the system in alarm throughout the work period. At risk was our remote valve actuation, including automatic closure of ventilation valves to prevent the spread of smoke in the event of a fire.

FMF main propulsion technical officers began investigating the oil leak from the port propeller as soon the graving dock was pumped dry. A replacement hub and matching blade set shipped to Esquimalt for us arrived



Propeller hub schematic.

shortly after we docked, but we hoped that a full hub replacement would not be required. If so, there might not have been sufficient time for the FMF team to complete that work and meet our planned undocking window of March 2/3. We thought that the oil might be escaping through a blade seal, but there were a number of possible failure points for oil to have made it to the Prairie Air holes in the blades:

- a blade oil seal or air plug seal;
- the ahead servo piston chamber drain-plug gasket or piston guide-rod plug gasket;
- a propeller cap sealing ring or mounting fastener; or
- an O-ring for the air valve cover or air valve plug. (The air valve itself is no longer fitted, so the plug is there in its place).

When the fairing cone was removed from the propeller hub, it was found to be full of emulsified oil instead of sea water. The Prairie Air system has been de-activated and removed from all of our frigates, but when it was functional it would have filled the fairing cone with pressurized air that would be directed to the five propeller blades via tubes that are still in place. Any emulsified oil that found its way into the fairing cone would certainly travel into the blades and leak out through the Prairie Air holes at the blade tips. With the fairing cone removed, and everything cleaned, the CRPP system was left running overnight to see if the source of the leak would become evident. Sure enough, oil was found to be weeping from the ahead chamber drain plug. It looked as if the drain plug had backed off a quarter-turn, enough for the lock-wire groove to align with the guide-holes in the recess and allow the oil to escape.

After it was confirmed that all of the oil had been drained from the blades, the system was left running for several days at normal operating pressures to see if any other oil leaks could be found, but the drain plug remained the only issue. FMF emptied the hub and removed the drain plug to confirm the condition of the plug and seals, and that the correct gaskets were installed and in good condition. They then retightened the plug, lock-wired it with a new guide hole, and left the system running at operating pressure for 24 hours. Several pitch movements were conducted, but no further leaks were observed. I conducted regular rounds of the dock bottom in the evenings, as did FMF during the working day, to monitor for any new oil leaks, but none appeared throughout the remainder of the work period. HMCS *Calgary* was successfully undocked on March 2.

Since then, the ship has completed a partial power trial, CRPP and steering trials, and participated in directed ship readiness training and a 50-day task group exercise during Operation Laser. The CRPP system has been put through the full range of operational requirements, with no further oil leaks. It is still hard to believe that something so small as a quarter-turn on a drain plug could have caused such a huge operational disruption to so many units.

The success of HMCS *Calgary*'s unscheduled docking and work period was thanks to an outstanding Formation-wide effort. Maritime Forces Pacific (MARPAC) Headquarters, FMF Cape Breton, Fleet Engineering Readiness, Formation Technical Authority, Sea Training Pacific, Naval Fleet School Pacific, and the MSE departments of the other ships in harbour all contributed in a very big way. The exercise demonstrated the ethics, values and expertise that Canadians expect of us in the Canadian Armed Forces and Department of National Defence, and it was an inspiring time for the entire MARPAC technical community as civilians and RCN personnel answered the call to get HMCS *Calgary* deployment-ready in what seemed like record time.

Lt(N) Haley van Poorten, is the Marine Systems Engineering Officer aboard HMCS Calgary. Chris Young is a Main Propulsion Technical Officer with Fleet Maintenance Facility Cape Breton in Esquimalt, BC.

FEATURE ARTICLE

Engineering the Installation of a Remotely Piloted Aircraft Systems Capability Aboard Royal Canadian Navy Ships

By Matthew Bullock

While remotely piloted systems have been used in the Royal Canadian Navy (RCN) for sacrificial targeting purposes for at least four decades, the remotely piloted aircraft systems (RPASs) capability used for intelligence, surveillance and reconnaissance (ISR), and for intelligence, surveillance, target acquisition and reconnaissance (ISTAR) has been evolving in the RCN for the past 16 years.

In 2004, Defence Research and Development Canada acquired a Silver Fox RPAS from BAE Systems, and used it to perform various tests, trials, and research and development activities. Then in 2009, the Canadian Forces Maritime Warfare Centre conducted a maritime evaluation, consisting of a demonstration of operations of the Boeing Insitu ScanEagle from the *Kingston*-class Maritime Coastal Defence Vessel (MCDV) HMCS *Glace Bay*. The demonstration included tracking pre-positioned vessels, locating divers in the water, and handing over control of the aircraft from ship to shore.

As a result of the limited airborne ISR sensor suites currently on board HMC ships, a statement of operational capability deficiency was raised regarding the risks associated with the inability of deployed ships to maintain contact with vessels of interest beyond visual and electro-optical/infrared sensor range. To attempt to address this deficiency in over-the-horizon maritime ISR capability, *Halifax*-class ships were provided a mission fit for Operation Mobile in the Mediterranean Sea, and for Operation Artemis in the Arabian Sea. Using an existing Land Forces ISTAR RPAS service contract, the ScanEagle was used to provide near-persistent ISR and to extend the ships' sensor range, thus substantially increasing the situational awareness of tactical commanders at sea. Through cueing, detection, surveillance and reporting from the ScanEagle (Figure 1), HMC ships were able to interrupt illicit activities by intercepting multiple hashish and heroin shipments while reducing the risk to naval boarding party personnel.

Numerous engineering lessons have been gathered by the RCN during the projects, demonstrations and

(Images courtesy the author.)

Figure 1. A ScanEagle RPAS being catapaulted from the flight deck of a *Halifax*-class ship, and how the launch and recovery equipment was stored.

activities just mentioned. These lessons, along with experience recently gained within Director General Maritime Equipment Program Management (DGMEPM) in managing RPAS projects, have helped shape some of the projects, that exist today to provide an RPAS capability to the Canadian Armed Forces.

The Maritime Mini Unmanned Aircraft System (MMUAS) Project initiated in 2017 sought to address the RPAS capability deficiency in *Kingston*-class vessels. A minor capital project was created, and two hand-launched Puma systems (Figure 2) were procured through a competitive process. As the *Kingston*-class vessels have no operational capability to de-conflict airspace, the Puma must be flown within visual line of sight. However, the Puma is still used in operations to provide overwatch during boarding party operations, to assist in tactic

development, to aid in RPAS flight procedures, and to generally help sailors learn more about operating and maintaining an RPAS.

The Puma airframes, spare items, and control system equipment are stored in three maritime weather-resistant protective hard-shell cases that can be stowed away until use. Figure 3 shows the mission planning laptop, the maintenance laptop (which controls antenna communications), and the hand-held controller when in use on the bridge.

The largest engineering challenge that arose from implementing the MMUAS project was the installation required to operate a DND-owned RPAS for ISTAR on an RCN vessel. The "antenna farm" equipment installation on the superstructure saw various iterations of development, design and integration (Figure 4) to operate better with the ship motion of an MCDV, and to improve the communications link while the aircraft is flying 20 nautical miles away from the ship.

CAF Unmanned Aircraft System Provision of Service Project

As a temporary stop-gap measure to provide ISTAR data for *Halifax*-class ships, the CAF Unmanned Aircraft System Provision of Service (UPS) project was initiated in 2017. The RCN, along with Canadian Special Operations Forces Command (CANSOFCOM) sponsored a project to receive ISTAR data while using an RPAS. The contract, awarded in December 2018, provides services related to RPASs, such as flight operations, maintenance and training. Unlike other procurement contracts that could also be in the form of a temporary lease, all equipment in this service contract is owned and maintained by the contractor (QinetiQ Target Systems (QTS) Canada) who will be using the V-200 (Figure 5). HMCS *Toronto* has been chosen to receive the CAF UPS fit. Ship modifications have been completed, and sea testing is planned to be performed upon the ship's return in the spring of 2021, including the determination of shipboard helicopter operating limits.

One of the largest operational trade-offs was finding a location to store and maintain the RPAS aboard the frigate. It had to be close to the flight deck, as the airframe cannot be disassembled into easily manageable pieces, and there had to be sufficient space to hold all the equipment needed to support traversing the aircraft into the hangar. The starboard torpedo magazine was chosen as the most viable option. When the Request for Proposals was issued,

Figure 2. A Puma RPAS being hand-launched from a *Kingston*-class MCDV.

Figure 3. The Puma system's hand-held controller with mission planning and maintenance laptops on the bridge of an MCDV.

Figure 4. The MCDV superstructure antenna arrangement for the Puma RPAS went through several iterations of development, design and integration to achieve a best fit.

Figure 5. The V-200 RPAS performing acceptance testing in Foremost, Alberta in early 2020.

Figure 6. The V-200 aboard a frigate. The custom-built track system was designed by QinetiQ Target Systems to traverse the aircraft from the torpedo magazine into the hangar.

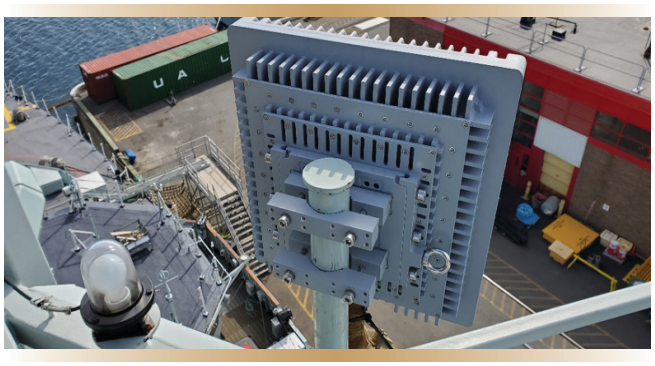


Figure 7. Four primary directional control antennas provide command and control over the V-200 RPAS, as well as receive downloaded payload video.

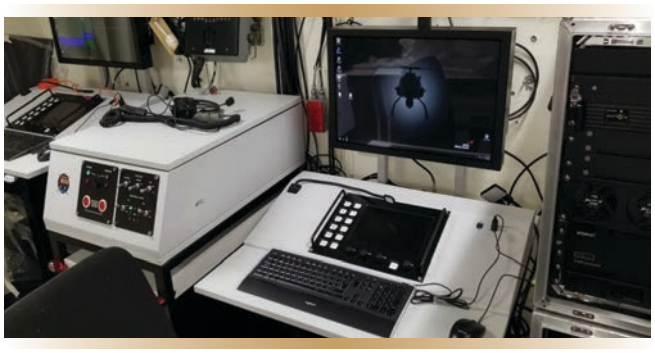


Figure 8. The temporary V-200 control station installed in the CSE technician office aboard a frigate.

bidders had to confirm that their proposed system could fit within that space, and be able to fit through the doors and passageways to get to the hangar. The starboard torpedo magazine was completely emptied to accommodate both the V-200 RPAS and a custom-built track system designed by QTS to traverse the aircraft from the torpedo magazine into the hangar (Figure 6).

As can be expected with any warship that has operated for over 30 years, the electromagnetic environment and available space aloft limited where the V-200's 10 antennas could be situated. The final placement consisted of:

- Four primary directional control antennas located on the mast (Figure 7). These antennas provide command and control over the RPAS as well as receive payload video, and each antenna is optimized to provide 90 degrees of coverage out to a distance of approximately 50 nautical miles;
- Two secondary control antennas, with one located on the hangar top and one on the bridge top, provide a secondary control link when operating close to the ship;
- Two omnidirectional antennas, each co-located with one secondary control antenna, provide short-distance, 360-degree communication to support launch and recovery; and
- Two GPS satellite antennas to provide location and direction of the flight deck. These antennas support automatic launch and recovery of the RPAS.

One of the other integration impacts that required an operational trade-off was the location of the control station. When the CAF UPS project was initiated, it was envisioned that the control station would be situated in the operations room, but this was discounted due to limited space, security concerns, and the complexity of modifications that would be required. A tiger team of personnel from ship's staff, Fleet Engineering Readiness, Director of Naval Requirements, and Fleet Maintenance Facility Cape Scott came to the conclusion that the Combat Systems Engineering technician office could be modified to install the control station for this temporary fit (Figure 8).

RCN ISTAR UAS Project

The RCN ISTAR UAS Project is the RCN's initiative to meet Strong, Secure, Engaged (SSE), Canada's defence policy, which articulates the need for the CAF to acquire a fleet of remotely piloted systems. The aim of this capital project is to deliver RPASs to the RCN. The project is currently in definition phase with a planned contract award date in late 2023.

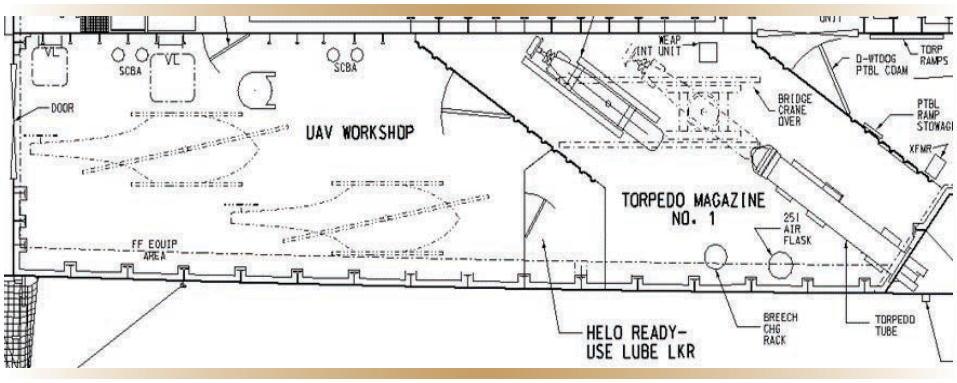


Figure 9. One possible solution for modifying the torpedo magazine to accommodate an RPAS.

The Government of Canada team that includes DND, Public Services and Procurement Canada (PSPC), and Innovation, Science and Economic Development Canada (ISEDC) is working in collaboration with industry through a Request for Information (RFI) process to build the strategic context for the future sustainment of the RPAS equipment. The service life of this capability is estimated to be 12 to 15 years.

Building on the lessons learned and operational feedback from previous RCN experience with RPASs, some of the high-level requirements for the RPAS sought under this project include:

- Ability to take off and land vertically from the flight deck of a *Halifax*-class frigate. This requirement eliminates the need for large launch-and-recovery equipment such as was used with the ScanEagle, and which cannot be easily fit and handled on board the ship when the ship has a helicopter air detachment embarked.
- Ability to fly for at least six hours. This requirement provides sufficient time for the aircraft to transit out to an area of interest, or to perform longer search patterns for vessels of interest.
- Able to operate at least 50 nm from the controlling ship, while carrying EO/IR and maritime radar. This requirement, in conjunction with the expected performance of the sensors, will extend the controlling ship's ability to detect, locate, and identify surface contacts.

The project faces numerous engineering challenges. Real estate aboard ship is at a premium, and it is extremely difficult to relocate existing equipment elsewhere in the ship, adding the fact that new antennas must be included in the ship's electromagnetic spectrum. The project also needs to ensure that the operational requirement that "… must not alter or degrade the functions and capabilities of existing *Halifax*-class warfighting capabilities," is respected. The project has performed various engineering option analysis studies, and trade-off analyses are ongoing. However, permanently fitting any new capability into a warship that was not designed to carry it, without affecting or degrading other capabilities, is nearly impossible.

Some of the temporary engineering solutions that were performed in other projects, such as removing the starboard torpedo tubes, were not seen as favourable solutions. A balance between permanently modifying the ship structure and temporarily employing the RPAS capability on certain ships must be found. One of the option analyses provided a possible solution, depicted in Figure 9, that would enlarge the door to the flight deck in order to fit the aircraft. Most notably, approximately half of the sonobuoy storage, and over one third of the total ship torpedo storage is removed.

Whatever the final engineering solution for this project turns out to be, this exciting capability will be integrated to the RCN Major Surface Combatant to provide what the Commander RCN has stated is "a real game changer."

Matthew Bullock is the Maritime Remotely Piloted Aircraft and Surface Systems Program Manager with the Major Surface Combatant directorate in the National Capital Region.

Acknowledgement

The MRPAS team works together to attempt to deliver this capability for the RCN (and our friends in CANSOFCOM). Contributions to this article came from two experts in the remotely piloted systems field, notably Thanushian Pathmaligam (ex-Project Manager for the RCN ISTAR UAS project), and Jason Fox (Project Manager for the CAF UPS project).

FEATURE ARTICLE

ESSM Missile Transfer while Deployed in the Time of COVID-19

By Captain Chelsea Dubeau
(With Lt(N) Julien St-Aubin and CPO2 Nels Jensen)

The morning of August 31, 2020 was a hot one in the Pearl Harbor, Hawaii sunshine as the Combat Systems Engineering Officer (CSEO) aboard HMCS *Winnipeg* (FFH-338) stood on the flight deck, ready to give his team a safety briefing. A successful Rim of the Pacific (RIMPAC) exercise had just ended, during which *Winnipeg*'s CSE department figured significantly in the many weapon exercises — including missile and torpedo firings. The evolution they were about to conduct away from their home port of Esquimalt, BC was fraught with risk, and had been months in the making.

Lt(N) Julien St-Aubin and his ship's staff were about to transfer two empty Evolved Sea Sparrow Missile (ESSM) canisters and one spare telemetric ESSM from *Winnipeg* to their sister ship HMCS *Regina* (FFH-334), then embark three warshot ESSMs from *Regina*. The ammunition transfer was part of HMCS *Winnipeg*'s transition preparations for their upcoming deployment to the Asia-Pacific region in support of Operation Projection and Operation Neon through to December.

Ammunition safety protocols — including the regulation of procurement, storage, transportation, inspection, maintenance, authorized modification, issue, use, and disposal of all ammunition and explosives within the Department of National Defence and the Canadian Armed Forces — are managed through the Director of Ammunition and Explosives Regulation (DAER). Normally, *Winnipeg*'s CSE team would play a supporting role to the experts identified by DAER who would be on-site in Pearl Harbor and leading the transfer, comprised primarily of staff from Canadian Forces Ammunition Depot (CFAD) Rocky Point.

But the circumstances on this occasion were anything but normal. It being the summer of 2020, with COVID-19 pandemic mitigations the order of the day, the usual routine of flying CFAD staff out to Hawaii to oversee the missile reconfiguration of the two frigates was not an option. Long before the frigate had even sailed from Esquimalt to participate in RIMPAC, staff checks were conducted to determine whether *Winnipeg*'s crew could

Photos by Sailor 1st Class Valerie LeClair, deployed Imagery Technician HMCS *Winnipeg*.

Prior to sailing on deployment (above), HMCS *Winnipeg*'s CSE team was walked through the correct and safe ESSM missile-handling procedures they would need when conducting operations on their own later in Pearl Harbor (next page).

lead the required missile transfer between the two ships while deployed. This prompted Lt(N) St-Aubin to liaise with both the CSEO of HMCS *Regina* and CFAD staff, and it appeared that the evolution would be a go.

CFAD staff provided additional training and mentorship to Lt(N) St-Aubin and his fire-control technicians to help them better understand the composition of the ESSM canisters, including areas of concern such as hard points for transport, and inspection of the various connections, as well as some key considerations for properly installing the missiles aboard ship that are crucial for system operability.

The experts also walked *Winnipeg*'s CSE team members through several missile embarkations until they could set up, crane aboard, and install several ESSM canisters by themselves safely and correctly.

And now here they were in Pearl Harbor, ready to begin the transfer. With the safety briefing complete, Lt(N) St-Aubin's team set to work to crane the three canisters off *Winnipeg*. It was hot, meticulous, and intensely focused work, and once the canisters were secured for transport, the team moved over to *Regina*'s jetty to exchange them for the warshot ESSMs. Helping to oversee the operation was CPO2 Nels Jensen, a member of Sea Training Pacific who had been on board *Winnipeg* with a team of sea trainers for the ship's Intermediate Multi-ship Readiness Training (IMSRT) program. Now, CPO2 Jensen and his team would be representing the Formation Ammunition Inspector to make sure the ship conducted the missile transfer in accordance with safety regulations and policy. The ESSMs were duly craned off *Regina* and hoisted aboard *Winnipeg*, completing the transfer successfully and without incident.

Even though this might only have been a temporary capability, the training opportunity was invaluable should the need ever arise again. Being able to adapt in managing a high-risk evolution such as handling ESSMs without the on-site support of DAER and CFAD personnel demonstrated how a ship's technicians can quickly learn a skill and make things happen. While there were certain challenges and unforeseen obstacles that had to be overcome, the successful planning and execution of the ESSM transfer was a testament to the team's hard work and ability to find workable solutions.

Captain Chelsea Dubeau was deployed as the Public Affairs Officer embarked aboard HMCS Winnipeg.

NEWS BRIEFS

Warship Refit Work at Québec Shipyard

HMCS *St. John*'s (FFH-340) entered the Davie Shipyard at Lévis, Québec in August for what is expected to be a year-long refit period to maintain and upgrade the ship's hull and mechanical systems, and other critical equipment. The work is part of a larger $1.5 billion maintenance and upgrade program — to be shared evenly across three Canadian shipyards — to maintain Canada's fleet of 12 frigates until they can be replaced by a new generation of Canadian Surface Combatants (CSCs) in the 2040s.

St. John's is the first of three frigates that will be refitted at the Davie yard over the next five years, and marks a welcome return of warship activity to the Québec shipyard. Three of the *Halifax*-class frigates — HMC ships *Ville de Québec*, *Regina*, and *Calgary* — were constructed at Davie in the 1990s.

In July 2019, Public Service and Procurement Canada announced that the federal government was investing more than $7.5 billion in the Royal Canadian Navy's (RCN) *Halifax*-class vessels. The $1.5 billion portion of the initiative guarantees $500 million each for Davie, Seaspan Victoria Shipyards Limited, and Irving Shipbuilding Inc. of Halifax, NS to carry out maintenance and upgrades on the first group of RCN frigates. This work is in addition to the Halifax-Class Modernization/Frigate Extension project (see MEJ issue no. 82) that saw the replacement and updating of combat systems and operational equipment that was undertaken by Irving and Seaspan between 2010 and 2018.

These initial five-year contracts include a minimum of three frigates for each shipyard, and are expected to rise in value as additional work packages are added. The agreements will provide an estimated 400 jobs at each shipyard, plus hundreds of related opportunities for marine sector suppliers and subcontractors across the country.

Minister of National Defence Harjit S. Sajjan, who took part in the July 2019 announcement of the $1.5 billion portion of the *Halifax*-class upgrades, said the undertaking was essential for supporting the modernization of the RCN.

Photos by Lt(N) Denise Dickson, MSEO HMCS *St. John*'s

"With our government's continued investment, our Navy will continue to contribute to maritime security and stability around the world," he said. "This is a testament to how our defence policy, *Strong, Secure, Engaged*, continues Canada's re-engagement in the world. I am proud of our sailors and the great work they do."

The current refits are designed to ensure that the RCN maintains a combat-capable surface fleet until the Canadian Surface Combatants being built by Irving Shipbuilding are delivered to replace the *Halifax*-class frigates and the already retired *Iroquois*-class destroyers. The state-of-the-art CSCs will provide the RCN with modern and capable warships that are able to monitor and defend Canada's waters, contribute to international operations, and deploy as credible naval forces worldwide on short notice.

File photo (2017) by LS Dan Bard, Formation Imaging Services Halifax

NEWS BRIEFS

NETE Tasking: Internet Support to Sailors (IS2S)

The Internet Support to Sailors (IS2S) initiative aims to enhance the quality of life aboard HMC ships through the provision of Wi-Fi networks to allow crews to access the Internet using their own personal devices. The initial capability provides connectivity via cellular network when within range of land, and via cellular network or land-based connection when alongside. The IS2S network has no connection to any operational or administrative shipboard networks.

The Naval Engineering Test Establishment (NETE) conducted a developmental evaluation (DEVAL) of IS2S on board HMCS *Ottawa* (FFH-341) in FY2017/2018, then performed an options analysis for the permanent fit and tested the solution in NETE's Montreal lab. NETE has been supporting the implementation of the permanent IS2S engineering change (EC) for *Halifax*- and *Kingston*-class ships, including set-to-work and validation of IS2S on the initial ships on each coast, and configuration at NETE of subsequent sets of IS2S equipment that are then sent to the Formations for deployment. A new NETE Task will investigate options to add connectivity at sea via satellite.

The work described here was performed as a series of taskings from the Major Surface Combatant 2 section of the Directorate of Maritime Equipment Program Management, and was funded by the Director of Naval Requirements.

— Brian Foster, Manager for Information and Communication Systems, Naval Engineering Test Establishment / Weir Marine Engineering, LaSalle, QC.

Call for Papers: Canadian Nautical Research Society Conference (June 10-11, 2021)

The Canadian Nautical Research Society (CNRS) will be holding its next annual conference online from June 10 to 11, 2021. The conference theme is: **Canada's Pacific Gateway — past, present and future**. Proposals are invited for papers or presentations relating to the general theme of "Canada's wider Pacific Ocean dimensions," or other maritime contemporary and historical topics. The deadline for submissions is **March 15, 2021**.

This will be a virtual conference to commemorate the 150th anniversary of British Columbia joining Canada. Presentations will be for a maximum of 20 minutes, followed by time for discussion. Proposals should be sent by email to **Michael Hadley**: pilgrim33@telus.net or **David Collins**: birchinall@gmail.com. Please include your name, affiliation (if any) and title, and a brief description of 250 words or less. Abstracts for accepted papers will be published in the CNRS newsletter *Argonauta* prior to the conference. The Annual General Meeting of the Society will be held virtually on Saturday, June 12.

https://cnrs-scrn.org/admin/conferences_e.html

PRESERVING CANADA'S NAVAL TECHNICAL HERITAGE

NEWS (WINTER 2020)

Canadian Naval Technical History Association

CNTHA News
Est. 1997

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CNTHA News is the unofficial newsletter of the Canadian Naval Technical History Association. Please address all correspondence to the publisher, attention Michael Whitby, Chief of the Naval Team, Directorate of History and Heritage, NDHQ 101 Colonel By Dr Ottawa, ON K1A 0K2 Tel. (613) 998-7045 Fax (613) 990-8579

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CNTHA Online — Insight through Hindsight

By Capt(N) Don Wilson (Ret'd), Webmaster Emeritus

CNTHA is pleased to report that **Jeff Wilson**, our stalwart volunteer website architect whose technical expertise and boundless energy have been so very much appreciated, is working on a long-term update to apply ever more advanced software and internet design features to enhance the functionality, usability, and security features of this key element of the CNTHA's "face to the world."

A major aspect of the proposed new website is the migration to a completely Cloud-based virtual platform to improve the robustness of the architecture and bolster security. As new features are added, people looking to research aspects of Canada's naval technical history can expect to find state-of-the-art search capabilities such as advanced data mining and object relationship mapping.

The Executive offers its gratitude to Jeff, as even now visitors to the CNTHA website will find improved access to what we have to offer, including links to the Oral History Project interviews we conduct in support of DND's Directorate of History and Heritage. The interview excerpt that follows gives a sense of the "Insight through Hindsight" that continues to be so generously offered by retired members of the naval technical support community who were once involved in Canada's naval ship and equipment development programs.

For naval technical professionals in active career mode today, there is much to be learned from their insights. We encourage all of you, young and old alike, to take an active role in contributing to the discussion through the CNTHA's oral and written history program, and through your letters to the publication you are reading now. We look forward to hearing from you at info@cntha.ca.

HMCS *Algonquin* (DDH-283)
DND photo

Oral History Project:

[An edited excerpt from a 2009 CNTHA interview with **RAdm (Ret'd) Eldon J. (Ed) Healey**, RCN Marine Systems Engineer, 1953-1985, Assistant Deputy Minister (Materiel), 1985-1990. He was overseer for the DDH-280 prime mover testing at NAVSec Philadelphia that provided confidence in the "revolution" from steam to gas turbine propulsion and electrical generation.]

On the subject of Technological Revolution vs. Evolution…

I just wanted to say a few words about technological evolution over my period in naval procurement. I think it goes without saying that procurement of new ships was a pretty intermittent type affair for Canada, so unlike other navies — the USN in particular — that could slowly *evolutionize* because they were building many more ships, we tended to *revolutionize*.

Let's just take one example: We went from steam destroyers on the *Saint Laurent* class, to follow-on classes which were an *evolution* of that first design and not much radically changed in terms of the basic ship and the basic systems, even when we added flight decks and hangars later. But the DDH-280 Project was a *revolution*. Even in design, we had a ship that depended totally on gas turbines for its propulsion, and almost totally for its electrical generation. We had nine gas turbines in that ship, and not many navies at that stage — if any —had that much reliance on gas-turbine technology.

Most other navies had at least propulsion diesels, and fairly significant power-generation diesels as well. We made that revolutionary step to have minimal manning for our propulsion systems, even though we didn't have the electronic controls and digital capability we have today. We used a combination of pneumatics and electronics to control the propulsion system, and somehow made it work.

Full interview available at: http://cntha.ca/tech-hist/oral-written-hist/histories/edhealey.html