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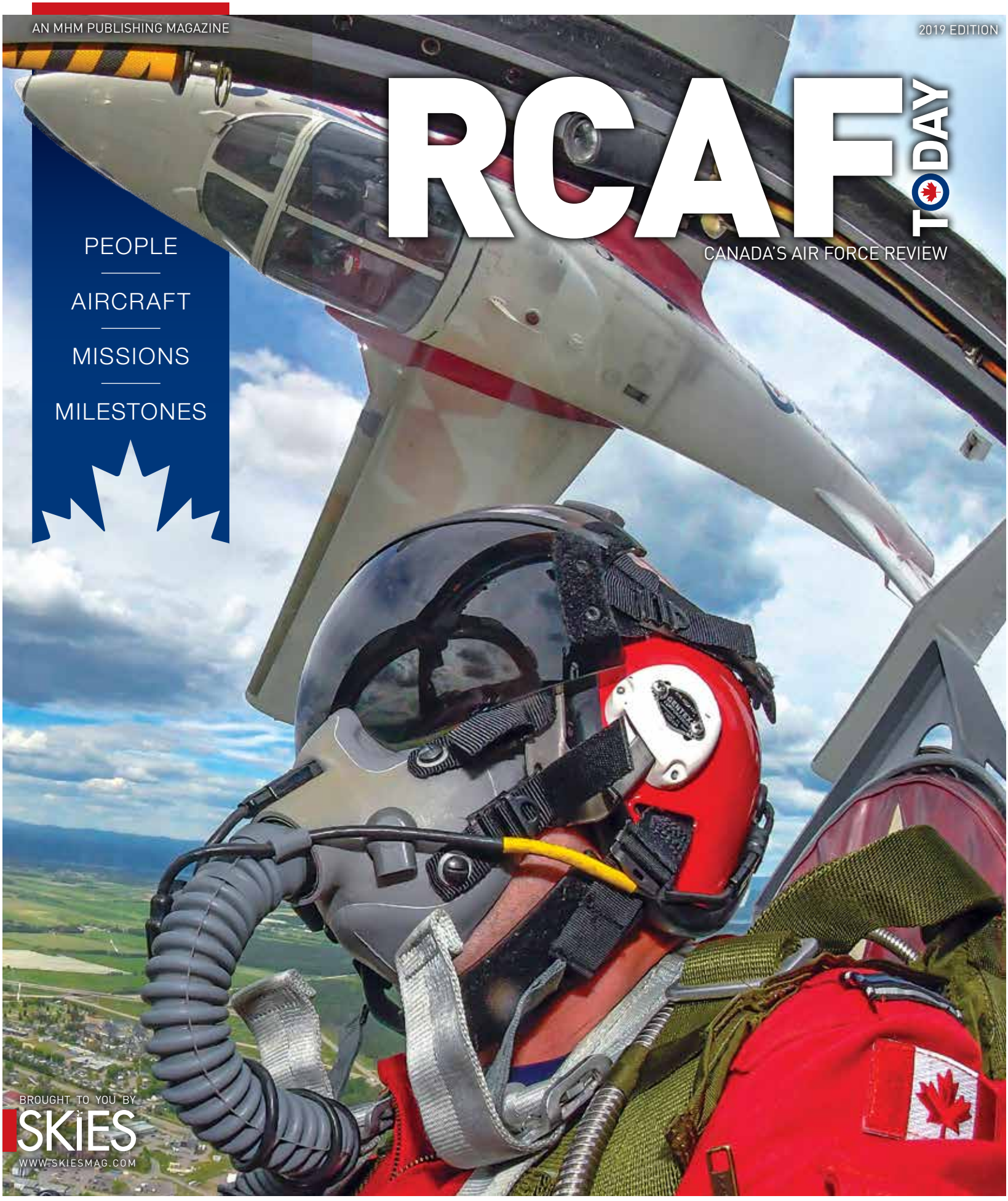

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Canadian Forces Snowbird Lead Solo pilot, Capt Taylor Evans, flies the mirror role with Opposing Solo pilot, Capt Logan Reid.

Mike Reyno Photo

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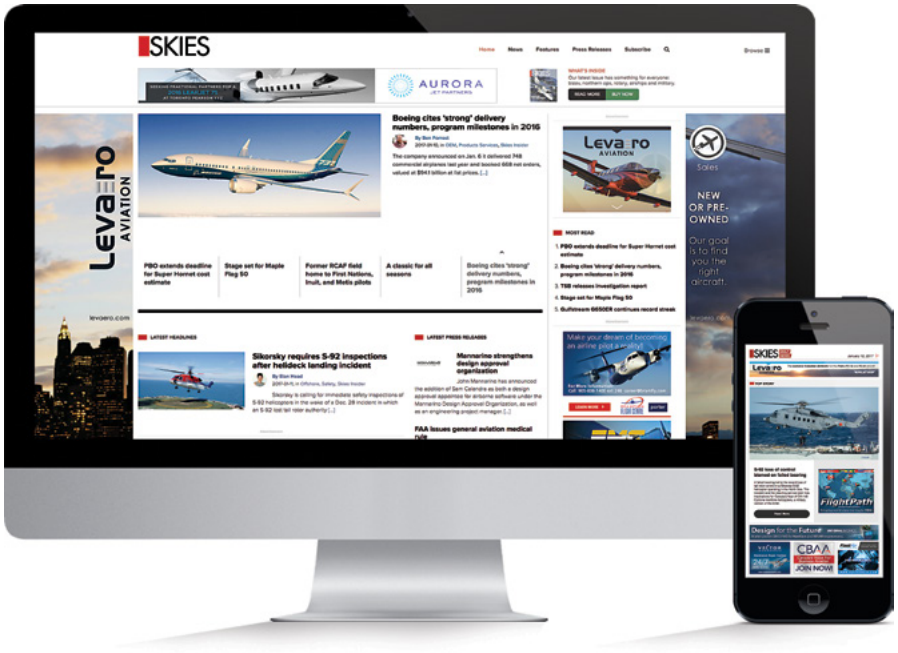

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From the Editor

BY CHRIS THATCHER

Stepping inside the Combined Aerospace Operations Centre (CAOC) is like stepping into an old bank vault. The key-coded door is steel and heavy, and swings open slowly and with some effort.

Even with most desktop screens dark for security reasons and four large screens on the main wall showing limited information, the CAOC personnel can paint a picture of a centre with a vast reach, monitoring Royal Canadian Air Force (RCAF) aircraft across the country and around the world as they conduct or support operations and exercises.

While the tempo on the spring morning of our visit was moderate by their standards—a CC-177 in need of repair in Mexico, a CH-148 Cyclone mobile repair team in transit to Oman, various aircraft in operations in Iraq and Mali, and CH-146 Griffon helicopters lending support to flood surveillance in Eastern Canada—it wasn't hard to imagine what the vaulted room would look like in a crisis, with experts at all work stations and the screens alive and streaming data.

More impressive, though, was the fact that all of this around-the-clock global monitoring and aircraft traffic management was being conducted with less than 100 people; most, like their commander at 1 Canadian Air Division, wear more than one hat. The diversity of demands might mean a shift is never boring, but senior officers acknowledged in multiple interviews that teams are small and, at times, stretched thin. Not said, but implied, was the need for reinforcements.

The pressure to attract more people and retain experienced personnel is an ongoing challenge for the RCAF and the Canadian Armed Forces as a whole. Most acute for the Air Force are pilots. Too many are opting to leave for the commercial sector and perhaps a more balanced family life.

In this issue, LGen Al Meinzinger, RCAF commander, acknowledges and tackles the problem head-on, describing a myriad of initiatives underway or in development to retain the Air Force's experienced pilots, technicians, aviation specialists and support personnel. And Col (Ret'd) Andy Cook, a former CC-130 Hercules and CC-150 Polaris pilot, offers a few simple changes to pilot career management practices that might improve retention.

Money is rarely the reason pilots seek change, but fewer hours in a cockpit can be. And for those yearning for ample opportunities to fly, learning a new aircraft can help. For maritime helicopter pilots, the CH-148 Cyclone has proven to be an incentive, as Maj Erik Weigelin explains. The commander of the helicopter air detachment on HMCS *Ville de Quebec* describes the Cyclone's first operational deployment.

Fixed-wing search and rescue pilots, too, are gearing up for a new aircraft; we meet with the leadership of 435 Transport and Rescue Squadron as they celebrate 75 years and prepare for their role in the transition to the CC-295.

Fighter pilots, however, have been waiting almost a decade since the government announced a plan in 2010 to acquire the F-35 Joint Strike Fighter to learn which next-generation fighter they will be flying. Col (Ret'd) Al Stephenson, a former CF-188 Hornet pilot, attempts to solve the Rubik's Cube that is fighter procurement, in particular the politicization of the process.

It might be the RCAF's largest program that does not specifically involve the acquisition of an aircraft, but the investments in retention and new fleets will not amount to much if the Air Force does not get its Future Aircrew Training program right. We take a deep dive into the requirements and some of the key considerations on the table.

No issue would be complete without some flying. We join the CH-146 and CH-147F aircrews on Operation Presence in Mali, speak with the exchange officer in Scotland flying the Eurofighter Typhoon, and soar over Labrador with 444 Combat Support Squadron. And we mark some important anniversaries with the RCAF's flight engineers, 430 Tactical Helicopter Squadron, and 134 Wing, which played a vital role on D-Day.

HIGHLIGHTS FROM THE LAST YEAR

BY ROYAL CANADIAN AIR FORCE PUBLIC AFFAIRS

The 12 months since LGen Al Meinzinger took command of the Royal Canadian Air Force in May 2018 have been busy and productive ones for the men and women who provide the Canadian Armed Forces with relevant, responsive and effective air and space power to meet the defence challenges of today and into the future.

"Since I took command of the RCAF, I have continued to emphasize the pillars or anchor points that underpin our collective efforts. I call these our four P's: our people, our defence policy, our programs, and our posture," he said recently.

Over the past year, the RCAF has achieved a number of milestones, reflecting the Commander's four priorities, and celebrated its proud history that inspires, gives purpose and guides the Air Force to the future.

- In June and July 2018, approximately 120 personnel undertook "public duties" in the United Kingdom—guarding the Sovereign and royal residences such as Buckingham Palace, St. James Palace, the Tower of London and Windsor Castle. It was the first time in the RCAF's 94-year history it had been invited to be the Queen's Guard.
- On July 5, the first personnel departed for Gao, Mali, for Operation Presence, part of a multinational United Nations mission. The Air Task Force, which includes approximately 250 personnel as well as Griffon and Chinook helicopters, conducts medical evacuations, transports troops, equipment, supplies and food, and assists with the rapid deployment of UN forces. The mission is supported by Hercules aircraft operating out of Dakar, Senegal. The mission, which will end on July 31, 2019 and scale back over the next month, marked Canada's return to peacekeeping and the inaugural overseas deployment of the Chinook.
- On July 18, the new Cyclone helicopter began its first operational deployment, with the embarkation of a HELAIRDET onboard HMCS Ville de Québec for Operation Reassurance. Currently, Cyclones are deployed onboard HMCS Toronto and HMCS Regina.
- On Aug. 12, the "Raise the Arrow" project team brought its first artifact—a delta test vehicle—to the surface of Lake Ontario. The team is searching for the 1/8th scale free flight models of the famed CF-105 Avro Arrow that were launched over the lake during testing of the aircraft's design in the 1950s.
- On Nov. 20, the Auditor General released a report on Canada's fighter force, highlighting key points regarding the recruitment and retention of technicians and pilots as well as the need for an in-depth analysis of upgrades required for the CF-188 Hornet fleet to remain operationally relevant until 2032. "I welcome the Auditor General's report and take its findings seriously," said LGen Meinzinger in a statement that outlined steps that will be taken to improve the health of the fighter force.

Members of Operation Presence-Mali pose for a group photo with the CH-147F Chinook helicopter at the small arms range near Gao, Mali, on Jan. 2, 2019. **Cpl Ken Beliwicz Photo**

- At the end of 2018, the RCAF and the Royal Canadian Navy bid farewell to the stalwart Sea King maritime helicopter. The conclusion of the Sea King's 55 years of service was marked with a farewell parade and flypast at Patricia Bay, B.C., on Dec. 1.
- In December, the RCAF announced that Exercise Maple Flag, Canada's premiere fighter exercise held at Cold Lake, Alta., would not take place in 2019 so that work could begin to ensure that the exercise meets the evolving training needs of Canada and her Allies.
- In January 2019, Air Task Force-Romania, deployed on Operation Reassurance, Canada's contribution to NATO's assurance and deterrence measures in Central and Eastern Europe, returned home from its four-month mission. The ATF, consisting of 135 personnel and five CF-188 Hornets, was the third deployment of an ATF to Operation Reassurance.

❶ Four Army reservists from the Montreal area, serving with the Air Task Force-Iraq on Operation Impact, pose in front of a CH-146 Griffon helicopter after receiving the recently-approved tactical aviation door gunner badge on Jan. 14, 2019. From left are MCpl Marc Renaud, Cpl Patrice Corbeil, Cpl Pierre-Michel Demarais and Sgt Eric Washburn. **MCpl Ron Syllion Photo** // ❷ Petty Officer 1st Class Dwayne Worrell, a diver, jumps from the CH-148 Cyclone into the Mediterranean Sea for training during Operation Reassurance on April 21, 2019. **MCpl Manuela Berger Photo** // ❸ The RCAF Band leads a portion of the RCAF Public Duties contingent down The Mall from Buckingham Palace to St. James's Palace in London, where the contingent would mount guard for 24 hours. **MCpl William Boucher Photo** // ❹ The artifact brought to the surface on Aug. 12, 2018, by the "Raise the Arrow" project has been identified as a delta test vehicle. This photo, taken on Aug. 24, shows the DTV after the preliminary removal of mussel shells. **Joanna Calder Photo** // ❺ A Royal Canadian Air Force CC-150T Polaris aircraft prepares for takeoff before an air-to-air refuelling mission in early 2016 during Operation Impact. **DND Photo** // ❻ Members of the Royal Australian Air Force and the RCAF work outside the Aerospace Engineering Test Establishment after the arrival of the first F-18s from Australia at 4 Wing Cold Lake, Alta., on Feb. 16, 2019. **Able Seaman Darren McDonald Photo**

- In January, Canadian Army door gunners who support tactical aviation operations and possess specific qualifications became entitled to their own specialist flight crew badge.
- On Jan. 25, four members were awarded the United States Air Force Space Operations Badge at the Combined Space Operations Center at Vandenburg Air Force Base, Calif. It was the first time the USAF had presented space wings to coalition partners.
- On Jan. 28, the CC-150 Polaris strategic air-to-air refueller returned home to Trenton, Ont., marking the conclusion of the Polaris' contribution to Operation Impact in Iraq and Syria, which began in October 2014. Polaris aircraft flew 1,166 sorties, representing more than 7,050 hours, and delivered more than 65 million pounds (29.5 million kilograms) of fuel to coalition partners.
- On Feb. 16, the first two interim fighter aircraft arrived at Cold Lake. Canada is procuring 18 F-18 aircraft and parts from Australia to supplement the current CF-188 Hornet fleet until a permanent fleet of advanced fighters is fully operational.
- On Mar. 8, the first of the CC-295 fixed-wing search and rescue aircraft rolled off the assembly line in Spain. The 16 new aircraft will replace the CC-115 Buffalo and CC-130 H-model Hercules in the FWSAR role.
- In May, programs were launched to ensure the continuing health of the RCAF and its ability to achieve mission success. These initiatives are vital in the face of an unprecedented level of global competition for the skills of pilots, aviation technicians and support personnel. Across the RCAF, initiatives are underway to restore and retain levels of personnel experience and thereby ensure the Air Force can meet its current mandate and properly transfer skills and knowledge to the next generations of aviators.
- Throughout the year, the RCAF celebrated a number of historical milestones, including the 60th anniversary of NORAD in May 2018; the 75th anniversary of the Dambusters Raid in May 2018 (with additional commemorations throughout the year); the 100th birthday of the RCAF's oldest squadron—401 Tactical Fighter Squadron—in November 2018; the RCAF's 95th birthday on Apr. 1, 2019; the 70th anniversary of NATO on Apr. 4, and the 75th anniversary of D-Day, the invasion of Normandy, on June 6.

The RCAF is also gearing up for its 100th birthday on Apr. 1, 2024, which will include celebrations throughout the year and mark the start of the RCAF's next century of service to Canada and Canadians.

Fighter Candidates

POSITION FOR A REQUEST FOR PROPOSALS

BY KEN POLE

After years of political and bureaucratic turbulence, the plan to replace the Royal Canadian Air Force (RCAF) fleet of Boeing CF-188 Hornets is about to go on afterburners with the release of a "final and official" request for proposals (RFP) to four potential bidders. That's how Public Services and Procurement Minister Carla Qualtrough put it during a May 30 speech at CANSEC, the Canadian Association of Defence and Security Industries annual conference and trade show in Ottawa.

She said she expected the RFP "in less than two months' time," implying before the end of July. When *RCAF Today* pressed in mid-June for a more accurate timeframe, her department referred to her speech.

The new target is "later than we envisioned, but not by much," acknowledged Qualtrough, explaining that the procurement had been "as complex as any the federal government has ever conducted."

The first of the legacy Hornets, originally designed and built by McDonnell Douglas, was delivered to the RCAF in 1982. The original procurement of 138 has dwindled and shifting geopolitical realities have persuaded planners that 88 replacements will be enough to fulfill training and operational commitments at home and abroad.

Canada flagged its replacement intentions in 1997 by signing on to the Joint Strike Fighter (JSF) project, a United States-led effort also involving Australia, Britain, Denmark, Italy, the Netherlands, Norway and Turkey. By getting in on the hangar floor, as it were, Canada hoped its financial support would lead to procurement priority when the multirole stealth JSF became available.

Lockheed Martin eventually was chosen to build three variants of its "fifth-generation" F-35 Lightning II, but lifecycle costs, estimated by independent auditors at $42 to $45 billion over a four-decade operational life, became contentious.

That prompted the Conservative government to "reset" in December 2012 for "a complete assessment of all available aircraft." In the meantime, other partners in the JSF initiative have begun taking delivery of F-35s as have other countries, including Israel, Japan and South Korea under separate arrangements through the U.S. Foreign Military Sales program.

The F-35 seemed back on track until the 2015 general election campaign when the Liberals said they would not buy them, subsequently opting for a competition to potentially identify a lower-cost alternative and setting the stage for the latest phase.

In the interim, the government has acquired 18 Australian F/A-18A Hornets to ensure the Air Force

A request for proposals to replace the CF-188 Hornet is expected before the end of July. **Galen Burrows Photo**

Col William Radiff, 3 Wing commander, prepares for take off in a CF-188 Hornet aircraft at Mihail Kogalniceanu Air Base in Romania. **Cpl Dominic Duchesne-Beaulieu Photo**

can concurrently meet both NORAD and NATO commitments—the first two aircraft recently began test and evaluation of their Canadian systems at 4 Wing Cold Lake, Alta.—and will upgrade avionics and mission support systems across the fleet of 76 CF-188s to meet interoperability and regulatory requirements. It is also considering an upgrade of the combat capability of the Hornets.

Meanwhile, as the F-35 continued to loom large, Boeing insisted that its next-generation F/A-18 Super Hornet is equally capable. The other contenders when the "reset" button was pushed were the multinational Eurofighter Typhoon, Sweden's Saab Gripen and the French Dassault Rafale. Dassault eventually withdrew from the competition.

At CANSEC 2019, as in previous years, Lockheed Martin and Airbus (senior partner in the Eurofighter program), had significant presences, but neither had much to say about the procurement. Airbus' basic position was that they were awaiting the RFP and while Lockheed had much the same stance, it did provide a subsequent statement.

"The F-35 is the most survivable aircraft and a generational leap ahead of any other fighter in production today," it reiterated. "We've reduced production cost below $80 million and the world's most advanced fighter is now more affordable to procure than less capable, legacy aircraft. And with more than 400 aircraft and 200,000 flight hours across the fleet, the F-35 is delivering today and growing rapidly."

Citing "deep roots" in Canada's aerospace sector, Lockheed Martin said 110 companies "played a large part in all phases of the development and production of the F-35," and more than $1.8 billion in contracts to date had resulted in hundreds of jobs and technology transfers.

"As the F-35 transitions into full-rate production and with its current projection of more than 3,500 jets over several decades, the program has potential to bring additional manufacturing and production opportunities to Canada," the company said.

Jim Barnes, Arlington, Va.-based manager of global sales and marketing for Boeing Defense, Space & Security, used his briefing to make an economic case for the Super Hornet, saying that operating costs are "a huge active ingredient" to consider.

"The Super Hornet is less than $20,000 per hour" compared with a competitor's $35,000. "Take that $15,000 an hour delta, multiply by 150 hours per year for a fleet of 88 planes for 30 years, you're approaching $6 billion in cost savings. That can't be ignored … when the government of Canada evaluates the true cost."

Patrick Palmer, Saab Canada's executive vice-president and Ottawa-based head of sales and marketing, took a more operational approach to his briefing. The original Gripen (Swedish for Griffin) was developed when the neighbouring Soviet Union was still a Cold War threat. It was designed to operate from highways and roads and "to be completely upgradeable," as opposed to a more traditional mid-life refit.

The Gripen has since gone through several evolutions to be NATO interoperable, net-centric, air-to-air refuelled with bigger internal tanks, and capable of carrying "just about any weapon out there." Moreover, he pointed out, it had been designed from the outset for Arctic operations, requiring minimal ground crew support and able to operate from austere airstrips.

At this stage, how the process will shake out, including a proposed non-binding approach to industrial benefits in Canada, remains to be seen. Still, Qualtrough predicted, "we're getting the fighter jet for the RCAF's needs, at the right price, and with the right economic benefits for Canada."

ASPIRATIONS FOR A FUTURE FIGHTER LEAD-IN TRAINING PROGRAM

As part of a future fighter lead-in training program, the Air Force will seek a replacement for the CT-155 Hawk to prepare pilots for the next-generation fighter that will replace the CF-188 Hornet. **Mike Reyno Photo**

Once the Royal Canadian Air Force secures a future fighter aircraft, hot on its contrail will be a decision on the future Fighter Lead-In Training (FLIT) system to prepare the next generation of fast jet pilots.

The future FLIT project office is slated to begin analysis of options in September for an "integrated system of training aircraft, ground training systems, training airspace and air ranges," and anticipates implementing a new program in 2024-2025, around the same time the Air Force could receive the first of its new fighter jets. Initial operational capability is projected for 2027.

Fighter lead-in training is an essential stepping stone between advanced pilot training at 2 Canadian Forces Flying Training School (2 CFFTS) at 15 Wing Moose Jaw, Sask., and the operational training unit (OTU) at 410 Tactical Fighter Operational Training Squadron at 4 Wing Cold Lake, Alta.

The current program, which produces between 20 and 24 pilots per year, is delivered on the CT-155 Hawk under Phase IV of NATO Flying Training in Canada (NFTC) at 419 Tactical Fighter Training Squadron in Cold Lake, an Air Force-industry partnership managed by CAE Military Aviation Training. The contract is set to expire in December 2023, though there is a one-year option to extend it.

"In Moose Jaw, you learn to fly the Hawk; in Cold Lake, you learn to fight the Hawk," explained Scott Greenough, director of NFTC operations and a former CF-188 Hornet pilot and commandant of CFFTS. "Now we are introducing concepts [pilots] are going to learn on the F-18: Advanced fighter

manoeuvres, conventional weapons delivery, low-level tactical missions."

The Air Force knows it needs a more flexible and agile system that can keep pace with the rapid technological changes in fighter capabilities and threat systems as it graduates young pilots from Wing standard to almost combat-ready, senior officers. At an industry briefing in April, the RCAF acknowledged it is identifying what that will look like.

At this early stage of the project, Air Force requirements are "considered aspirational," Stephan Kummel, director general Fighter Capability, told *RCAF Today* in a statement. But the goal is a pilot candidate with "theoretical education, comprehensive weapon system training and experiential training."

That includes a "training system-of-systems" to prepare students for flying frontline aircraft with "kinematic performance and the weapons and sensor (offensive and defensive) systems," he said.

The RCAF is also aiming to capitalize on advances in training technologies around live, virtual and constructive applications, as well as enhanced training methodologies, "to help defray or overcome the burgeoning operational costs of live flight training," he added. "As we advance the future FLIT project, the RCAF is paying close attention to the success of our allies in the training environment."

As part of changes across both the Future Aircrew Training (FAcT) and future FLIT programs, the Air Force is pushing down more training requirements from the OTUs to develop more advanced skills on less expensive platforms.

"We download a lot [onto the Hawk that] we would generally have to introduce in the Hornet," noted Col Denis O'Reilly, commanding officer of 15 Wing, "so that [pilots] have a better chance of success when they hit that higher, faster, more aggressive aircraft with more weapon systems to manage."

The Hawk has limited sensor capability, so one of the objectives of future FLIT will be an advanced aircraft that better emulates the future fighter. Whether the RCAF acquires that training jet or asks the eventual contractor to provide it, is still up for discussion. Kummel said "all options for the eventual provision of future FLIT are on the table."

The Air Force is also assessing the right balance of uniform and contracted instructor pilots for future FLIT. The FAcT program is willing to expand the number of contracted instructors to allow more RCAF pilots to remain in the OTUs and tactical squadrons.

"In general, fighter lead-in instruction requires a specialized skillset when compared to basic flight training instruction," observed Kummel. "Not only do FLIT instructors require recent and relevant operational fighter experience, they also require instructional qualifications within a specialized training environment that includes highly-performant aircraft (aerodynamic and kinematic), as well as weapon system and sensor operations."

To ensure a continuous 'training pipeline' that streams Winged fighter pilots with the requisite knowledge, skills and experience, both the FAcT and FLIT project offices are collaborating to ensure a decision in one doesn't create a ripple effect in the other.

"We are redefining that graduation standard for Advanced Flight Training-Jet (AFTJ), the final phase of what we would deliver under FAcT," explained Col Pete Saunders, director of Air Simulation and Training. "Future FLIT will take that graduation standard and bring it up to the entry standard for whatever the future fighter OTU is.

"We talk a lot to ensure [they] have a clear understanding of what we will and will not deliver. That's why we looked at AFTJ, because we realized we had a couple of areas that weren't going to mesh."

Canada's distinguished history of military pilot training dates back to the British Commonwealth Air Training Plan in 1939. NFTC, with its multinational flavour, has become an extension of that success. Future FLIT is seen as an opportunity to leverage and build on that wealth of expertise.

"The RCAF considers future FLIT a critical enabler to the operational advantage required by our future fighter force," said Kummel. "Our fighter pilots are extensions of the weapon system."

RCAF TECHNICIANS MAKE A WINNING IMPRESSION

BY MAJ HOLLY-ANNE BROWN

Royal Canadian Air Force air maintenance technicians know all about pressure. They know that Canadian Armed Forces' readiness and the ability to delivery air power whenever and wherever required depends heavily on their ability to maintain RCAF aircraft to deploy on operations at a moment's notice.

In April, the RCAF notched up that pressure by sending five teams—more than 30 personnel—to Atlanta, Ga., for four days to compete in the annual Aerospace Maintenance Competition, sponsored by the Aerospace Maintenance Council (AMC).

Sgt Dawn Dearing of the Aerospace Engineering Test Establishment (AETE) at 4 Wing Cold Lake, Alta, knows a thing or two about competing alongside the aviation industry's best and brightest. She participated as a member of the Elevate Aviation Team at last year's AMC event in Orlando, Fla. (Elevate Aviation is a Canadian non-profit company that "provides a platform for women to thrive and succeed through aviation.")

Her exposure to the competition generated the idea of entering RCAF teams this year.

The 2019 AMC contest comprised 30 air maintenance tasks; each one was designed, developed, supervised and judged by a variety of airlines, aviation organizations and industries. The maintainers' skills were challenged in the disciplines of inspection, troubleshooting, repairs and testing. Tasks included wheel and brake removal and inspection, dent damage evaluation on an airframe panel, aileron cable rigging, troubleshooting aircraft power distribution systems, and more.

The team from 435 Transport and Rescue Squadron accepts second place overall in the military category at the Aerospace Maintenance Competition in Atlanta, Ga. **Maj Holly-Anne Brown Photo**

Eighty-four teams, representing militaries, civilian airlines, aviation companies, as well as high schools and colleges with aviation programs, were pitted against each other, racing against the clock to follow a prescribed scenario with a detailed set of instructions.

Not only was the competition a new experience for the RCAF technicians, and based on practices followed by civilian aviation industries and organizations, all tasks had to be completed in 15 minutes or less. Technicians are used to working under pressure, but Dearing was quick to clarify that the pressure they experience at their squadrons doesn't really translate into a timed competition type of situation.

"For me, this [competition] is about the elevation of what we do," she explained. "When we're back home, we are not under that time pressure. We know we have to meet our operational commitments, and we need to put the rubber on the ramp when we need it there. But, at the same time, if we have to step back and say, 'I can't do that in the next five minutes,' they understand that. But here, you have 15 minutes, and then you put your tools down and you walk away."

The contest was fierce, with remarkable talents exhibited by young students and aviation veterans alike.

"This competition is amazing; there's no other way of looking at it," said CWO Steve Godin, the air maintenance branch chief warrant officer.

THE TEAMS

Five RCAF teams competed in Atlanta.

- 4 Wing Team, led by Sgt Dawn Dearing. This team comprised technicians from units belonging to 4 Wing Cold Lake.
- 401 "Rams" from 401 Tactical Fighter Squadron, led by WO Darryl Poole. 401 Squadron is also located at 4 Wing.
- 19 Wing Search and Rescue Maintenance Team, led by Sgt Brad Saunders. This team comprises technicians from several squadrons at 19 Wing Comox, B.C.
- 435 Transport and Rescue Squadron, led by Sgt Serena Cross. 435 Squadron is also based at 19 Wing.
- The RCAF Spitfires, an all-female team led by MWO Theresa Nevills. This team brought together women from several RCAF units across the country: Aviation systems technician Cpl Trisha Chipman (Greenwood, N.S.); aircraft structures technician MCpl Tiffany Goodwin (Borden, Ont.); avionics systems technicians Cpl Samantha Yeadon (Gagetown, N.B.); Cpl Diana Meuret (Trenton, Ont.); aviation systems technicians Cpl Dela Cruz (Comox); MCpl Leslie Blair (Shearwater, N.S.); and team coach Sgt Jayne Graham (Cold Lake).
- In addition, RCAF technicians made up four of the five members of Elevate Aviation's all-women team.

"They've touched just about every aspect of work on an aircraft."

Despite the challenges, the RCAF maintainers more than held their own throughout the competition. The team from 435 Transport and Rescue Squadron, located in Winnipeg, Man., took second place overall in the military category and Sgt Amélie Côté from the 4 Wing team won the award for best time on task number three: aircraft technologies group sheet metal accuracy. This task required competitors to test their "sheet metal/structures skill and accuracy for locating a part, laying out/marking holes and shims, drilling and dragging holes, as required, in aluminum parts."

"Their knowledge of aircraft is just phenomenal," said Godin. "They've showed us they are leaders. We are very proud of them."

The competition also gave RCAF technicians an amazing opportunity to try new disciplines, to learn from a wide array of experiences, and to gain fresh perspectives.

"It's been really nice to see the emerging technologies that are developing in the aerospace industry," said Cpl Nick Burley, a member of the 435 Squadron team. "When you've been working on an airframe for a while, you kind of get set in your ways, and this is a nice way to break out, see new technologies … and how we can maybe do our job more effectively and more efficiently."

"The best value of this competition, for me, was when the technicians were outside of their comfort zones," said Col Andrew Wedgwood, the air maintenance branch advisor. "They were doing tasks [that were] perhaps outside of their trades, but what's important is how they reacted outside of that comfort zone, because it's going to happen during their careers."

Next year's event will be held in Dallas, Texas, and, with this year's success under their belts, many of the RCAF competitors are already raring to go. The best reward is the realization that "this competition gives us the confidence to do more than we think we can," said Cpl Samantha Yeadon of the RCAF Spitfires team.

Maj Holly-Anne Brown Photo

Cpl Christopher Ninclaus (centre) accepts the ATIS technician of the year award from LCol Eric Cyr (left) and CWO Albert Levesque (right). **MCpl Christopher Noakes Photo**

ATIS TECHNICIAN OF THE YEAR

BY MCPL CHRISTOPHER NOAKES

Every year, aerospace communications and information systems (ATIS) technicians select one member who has performed beyond the demands of normal duty, or who has made exceptional contributions to the goals and objectives of the ATIS trade. That individual is honoured with the "Technician of the Year" award.

Last year, that distinction was awarded to Cpl Christopher Ninclaus of 22 Wing North Bay, Ont.

Ninclaus works within the Mission Support Squadron's Wing Telecommunications and Information Services (WTIS) organization, which is part of 22 Wing's Mission Support Squadron. He is an integral part of the team that maintains the operational systems required to sustain the NORAD mission.

He is directly responsible for the technical maintenance, upgrading, testing, and cyber-related security of the Battle Control System (BCS) and the Internal Communications System, among others. He works closely with 22 Wing's Air Defense Operations community, and has a reputation for being exceptionally proficient.

Ninclaus was specifically recognized for directing a systemic reconfiguration of the BCS, while also working with outside agencies to test more than 200 system requirements, leading to a 90 per cent success rate and operational system acceptance.

Also excelling in the realm of cyber security, Ninclaus attended a Network Defense Analyst course where he graduated as its top student. Working within the cyber realm, he has provided instrumental assistance with the vulnerability testing of 22 Wing's operational networks.

Outside of his official duties, Ninclaus is also known for his volunteer activities as part of the larger 22 Wing community. He is the vice-president and local steward for 22 Wing's Auto Hobby Club and helped organize the popular Summer Car Show to raise money for the Soldier On program.

CORMORANT NEGOTIATIONS ENTER FINAL PHASE

The RCAF plans to increase the fleet of 14 CH-149 search and rescue helicopters during an upgrade project, but by how many is still being negotiated. **Mike Reyno Photo**

The federal government and Leonardo Canada remain in discussions on the midlife upgrade of the CH-149 Cormorant (CMLU) that would extend the life of the search and rescue (SAR) helicopter fleet until at least 2040.

"We are working closely with the government to define the requirements," Francesco Norante, president of Leonardo Canada, told a press conference at CANSEC in late May.

The CMLU project took a major step in February, according to the Department of National Defence (DND), entering what the military calls the definition phase of the procurement process following years in options analysis.

The project office, together with Leonardo and in-service support contractor, IMP Aerospace, will now determine the scope of the planned upgrade, the final configuration, number of aircraft and training devices, and an economic benefits package that fits with the government's Industrial and Technological Benefits policy and its emphasis on strengthening key industrial capabilities.

A contract award to begin implementing the eventual statement of work is anticipated in fall 2020.

The discussions began in earnest last spring after Public Services and Procurement Canada (PSPC) posted a letter of notification (LoN) in April outlining a sole-source negotiation with Leonardo, formerly AgustaWestland, to replace, modify or upgrade current and projected obsolete systems on the Royal Canadian Air Force (RCAF) variant of the AW101.

"Since entering service starting in 2001, the CH-149 Cormorant helicopter has proven to be an excellent asset for the RCAF, providing the necessary capability to successfully deliver SAR services in the challenging Canadian environment," said a DND spokesperson.

Though the RCAF surveyed other manufacturers to gauge whether an alternative helicopter might be better than the 18-year-old Cormorants, which have experienced problems with obsolete components in recent years, PSPC said a market survey and an analysis of options had determined the Cormorant was "the only solution to meet the rotary wing search and rescue capability requirements."

Leonardo has proposed an upgrade program based on the Norwegian AW101-612 All-Weather Search and Rescue Helicopter (NAWSARH) model, which entered service in December 2017.

The AW101-612 standard includes a Leonardo Osprey multi-panel 360-degree AESA surveillance radar system, four-axis digital Automatic Flight Control System (AFCS), two rescue hoists, searchlight, a cellphone detection system, an electro-optical/infrared device, and a fully integrated avionics and mission system. It also features a new 3,000 horsepower CT7-8E engine.

"Canada is still working on some of the performance requirements, [but] the concept is very much using the off-the-shelf solution," said Dominic Howe of Leonardo Helicopters, though he noted there would be some specific Air Force modifications.

Among the Canadian items on the RCAF's upgrade list are enhanced aircraft flight management, communications, navigation and safety systems to address current and forecasted regulatory requirements, and better SAR sensor capability and communication systems to improve interoperability with other SAR assets.

The LoN stated the government would also proceed with a plan to "augment" the current fleet of 14 Cormorants by as many as seven and return the Cormorant capability to a fourth main operating base in Trenton, Ont. The RCAF currently operates the Cormorants from three bases in Gander, N.L., Greenwood, N.S., and Comox, B.C., and augments them with five yellow-painted CH-146 Griffon helicopters from Trenton.

DND acquired nine VH-71 aircraft, variants of the AW101 that do not have valid airworthiness certificates, from the U.S. government in 2011 when the presidential fleet replacement program was cancelled. Leonardo had been proposing for several years to convert seven to the same standard as the Norwegian model.

In early June, however, DND did not mention the VH-71 program in a request for information and said the plan was to expand "the fleet size from 14 to at least 16 aircraft."

Howe said the VH-71 aircraft are stored at IMP Aerospace facilities in Halifax as non-flyable spares, but whether they are converted would depend on the eventual request for proposal from the government. "We are using spares from those airframes as part of the augmentation aspect of the CMLU," he said. "Those aircraft have very limited hours. Since they came into Canada, they have been maintained, looked after."

The first upgraded aircraft is expected back in the Air Force by 2022.

PROTOTYPING THE **UPGRADED GRIFFON**

The Air Force and Bell Helicopter are developing three prototypes for an upgraded CH-146. **Mike Reyno Photo**

The Air Force and Bell Helicopter Textron Canada will build up to three different prototypes of the CH-146 Griffon over the next three years to determine design solutions for a limited life extension of the multirole helicopter.

The innovative approach to testing and gathering feedback for a "proof of concept" was confirmed by senior officers during presentations to an industry briefing in April.

To meet new regulatory requirements, improve connectivity and address several obsolescence concerns with avionics and other onboard systems, the Air Force plans to extend the estimated life expectancy of all 85 helicopters until at least 2030.

The prototyping process will determine exactly what gets replaced and the configuration of new systems, but the project calls for upgraded cockpit displays and engines—something pilots have been suggesting for several years—integrated sensor systems, new communications radios and cryptographic equipment, cockpit voice and flight recorders, navigation systems, automatic flight control systems, and control display units.

In late January, the government awarded the design work to Bell after receiving expenditure approval for the project on Jan 11. The 20-year-old CH-146 is a variant of the Bell 412. This definition phase is valued at $90 million, but the entire Griffon Limited Life Extension (GLLE) project could be worth up to $800 million. The project will also upgrade the flight simulation and training devices, which will be procured under a separate contract.

Once the final design has been tested and approved, the project is expected to begin implementation in 2022.

Tactical helicopter squadrons have been operating at an exceptionally high tempo for the past three years. With Air Task Forces near the northern Iraqi city of Erbil and the northern Mali town of Goa on Operations Impact and Presence, 1 Wing Kingston was forced earlier this year to draw on 438 Tactical Helicopter Squadron of St. Hubert, Que., a unit comprised of about 50 per cent Reservists, to provide four Griffons for utility lift and transport for NATO Mission-Iraq, a 12-month training and capacity building mission headed by Canadian MGen Dany Fortin at Camp Taji airfield, approximately 30 kilometres north of Baghdad.

"The pace of operations and the concurrency of operations have created a situation where we have had to go to 438 Squadron," said Col Travis Morehen, commanding officer of 1 Wing and the current commander of Task Force Mali. "I wouldn't want to put them in the rotation normally, but we are kind of in extraordinary circumstances right now."

Extending the life of the Griffon, however, is just a prelude to an eventual replacement program. The Air Force has yet to list a new tactical aviation project in its Defence Capabilities Blueprint, but it is already thinking about what comes next. And that thinking isn't limited to a one-for-one replacement with a single aircraft.

The director general of Air Force Development told *RCAF Today* in 2018 that discussions have included the idea of a "tactical system" with the agility, integrated weapons and sensors, satellite connectivity and endurance to fulfil a range of roles. "Is it going to be only one aircraft or is it becoming a system? I'm going to be fascinated by the answer," said BGen Michel Lalumiere.

BLOCK IV AURORA UPGRADE IN FINAL VALIDATION

The Royal Canadian Air Force (RCAF) began ground testing in late May of a prototype for the Block IV modifications on the CP-140 Aurora. The tests were to be followed by a first flight to confirm the viability of new systems prior to the start of operational test and evaluation later this year.

The Air Force is adding beyond line-of-sight (BLOS) wideband satellite communications, Link 16 data exchange network access, and infrared counter measures for self defence to the maritime patrol aircraft, which in recent operations over Iraq and Libya has become a world-leading intelligence, surveillance and reconnaissance (ISR) platform.

The Block IV upgrades are the final step in a four-phase program that began in the late 1990s to extended the life of the four-engine turboprop variant of the Lockheed Martin P-3 Orion until 2030.

Under the Aurora Incremental Modernization Program (AIMP), Block I in the early 2000s replaced high frequency radios and standardized several obsolete systems across the entire fleet of 14 aircraft. Block II upgraded navigation, flight instruments, communications management and radar systems, rewiring much of the aircraft for Block III, which delivered new mission system architecture, including an array of sensors and data management systems, as well as tactical displays.

Thirteen of the 14 CP-140s have completed the Block III modifications at IMP Aerospace facilities in Nova Scotia. The last is expected to be delivered to the Air Force by the end of the year

At the same time, all 14 aircraft have been part of the Aurora Structural Life Extension Project (ASLEP) to replaced the outer wings, the lower section of the centre wing, the horizontal stabilizers and other components subject to fatigue. The changes are expected to add about 15,000 flight hours to the airframes. The last aircraft will be completed this year, senior officers told an industry briefing in April, and full operational capability should be achieved in January 2020.

"The structural life-extension and system modernization projects currently underway will ensure that the Aurora remains a world leader in its underwater warfare, maritime patrol, and overland surveillance roles," said a spokesperson for National Defence.

The inclusion of BLOS satellite communications in the Block IV work package will make permanent a capability that was installed on several Auroras in December 2014 for deployment as part of Joint Task Force-Iraq. In collaboration with IMP and other industrial partners, the Air Force rapidly introduced an interim BLOS

The Block IV upgrade on the CP-140 Aurora will enhance its anti-submarine warfare, maritime patrol and overland surveillance and reconnaissance roles. **MCpl PJ Letourneau Photo**

SATCOM system to support secure high-speed data streaming. The expanded sensor capability included ground mapping radar and electro-optical systems with heat-sensitive infrared cameras, as well as electronic emissions collection and onboard analytical capacity.

With the new systems, "what we've got with an upgraded Aurora, [is] on par or better with any other aircraft out there," Col Mike Adamson, commander of 14 Wing Greenwood, N.S., told *RCAF Today* when the two CP-140s deployed to Joint Task Force-Iraq completed their mission and returned to Canada in early 2018.

Adamson and other CP-140 crews admitted the Aurora community is still learning how to exploit the full capability of the new sensors and mission systems. The Block IV additions should be completed by 2022, but the Air Force will likely declare initial operational capability by June 2020.

The life extension program is intended to keep the CP-140 flying in its critical anti-submarine warfare, maritime patrol, and overland ISR roles until the RCAF acquires the Canadian multi-mission aircraft (CMMA), a project slated to begin option analysis in 2021 or 2022 that could result in a mix of manned and unmanned capabilities, a senior Air Force officer told industry in April.

With a beyond-line-of-sight satellite communications system and Link 16 data exchange, the Block IV CP-140 Aurora will be managing more on-board data. **Combat Camera Photo**


The RCAF's first CC-295 fixed-wing search and rescue aircraft rolls off the line in Spain. **Airbus Photo**

NEW SAR MISSION MANAGEMENT SYSTEM TAKES TO THE CLOUD

By the time the first CC-295 fixed-wing search and rescue (SAR) aircraft enters service, the Royal Canadian Air Force will also be operating a new cloud-based search and rescue mission management system (SMMS).

The new system, a large part of which is currently being implemented by MDA, a Maxar Technologies company and formerly MacDonald, Dettwiler and Associates, will modernize the command and control capabilities of the three Joint Rescue Coordination Centres (JRCC) in Halifax, N.S., Trenton, Ont., and Victoria, B.C., as well as the Canadian Coast Guard Maritime Rescue Sub-Centres in Quebec City, Que., and St. John's, N.L., and a deployable SAR headquarters.

SMMS, which is expected to be operational in 2020, will include upgrades to software and hardware of a number of systems to better integrate and display airport data, digital maps, geographic information, and other sensor feeds for controllers in the multi-department centres.

Though speed and compatibility of the new mission management system will be the most noticeable change for controllers, the biggest step for the Air Force is the cloud-based architecture.

"For a system this critical, one that has a 24/7, 365-days command-and-control function, I would be tempted to say it is probably the first," said BGen Michel Lalumiere, until recently the director general of Air Force Development and now chief of Fighter Capability.

"SMMS will be leveraging a cloud architecture, which we have not done to many systems in defence," he explained. "This is a key opportunity for us to do that, because SMMS needs it. There are so many stakeholders—1 Canadian Air Division, Canadian Joint Operations Command and others—that need to have real-time command-and-control information, the same information the JRCC is managing and releasing. That info becomes easily accessible to those who have access to the cloud."

Greater flexibility and enhanced information sharing with interagency partners goes to the heart of the Air Force's mantra of AIR Power—agility, integration, reach, power. But the new system will overlap for a period with the current one as controllers are brought up to the new speed.

"Like everything SAR, we are going to be implementing it without stopping the current systems," said Lalumiere. "That has definitely been informing since day one how we put the project together. We have an operational implementation working group developing all the key parts … to make sure we are able to carry on SAR operations as we are doing the test and evaluation, the pilot trial, and the training of that system."

Both the CC-295 and the CH-149 Cormorant have their own structured data that will have to be integrated, likely at the JRCC, for a complete SAR picture. The Air Force works with different industry standards for data on multiple aircraft, but sensor data will probably have to be integrated "in multiple steps," he said. "We don't need it to be seamless, but we do need it to be effective, so we'll push integration to the level in the system that will permit us to do that."

Among the many feeds for SMMS will be new SAR repeaters for the Medium Earth Orbit Search and Rescue (MEOSAR) system. MDA was awarded a $39 million contract in May to deliver 10 and could be asked to provide 12 more.

Deployed on the United States Air Force's next-generation GPS III constellation, the repeaters will detect signals from distress beacons across the country and along coastlines and relay them to ground stations.

"MEOSAR is going to do what [low earth orbit] SAR has been doing for 35 years, but on steroids," said Lalumiere, former director general of Defence Space Programs. "When the system hits full operational capability, the number of sensors we will have detecting alert beacons, for a country the size of Canada, will truly be a game changer."

The improved mission management system comes as the Air Force prepares for the arrival of the first Airbus CC-295 in Canada in spring 2020. On March 8, the first of 16 new aircraft rolled off the assembly line in Spain. A second is ready to begin ground testing and three more were on the assembly line as of mid-June.

Simon Jacques, president, of Airbus Defence and Space Canada, said ground testing was almost complete on the first aircraft and a maiden flight was scheduled for late June. "It is imminent."

The RCAF is scheduled to accept the first aircraft in Spain by the end of the year and, following airborne testing and evaluation, fly it to 442 Transport and Rescue Squadron at 19 Wing Comox, B.C. to begin the transition from the CC-115 Buffalo. 442 Squadron will be supported by 435 Transport and Rescue Squadron as its crews and technicians go through a conversion program at the new SAR training centre, which will open in fall 2020.

Initial cadre training of both aircrews and technicians—the RCAF's first group of trainers—will begin this fall at Airbus' facilities in Spain, said Jacques. Airbus has also begun "knowledge transfer" to PAL Aerospace technicians who will be responsible for in-service support of the CC-295 under a joint venture between the two companies called AirPro.

"Once 442 has a critical mass of crews, which we are calling four crews and five aircraft, we will declare IOC (initial operating capability) for fixed-wing SAR," said Lalumiere. "These crews will become operational in very short order because we are converting as SAR is still being delivered."

With advanced sensor capability on the CC-295, Airbus has suggested it should mean less time searching and more time for the rescue. Lalumiere said the sensors and beyond-line-of-sight communications will give crews greater reach to detect lost hikers, distressed boaters and aircraft crash sites, and better work with other agencies and higher headquarters.

Though the CC-295 is an off-the-shelf aircraft, the Air Force has requested several design changes, including the new mission system capability, integrated with an advanced radar and electro-optical infrared camera; additional communication systems such as a wireless intercom and a public safety radio; a larger spotter window; an overhead escape hatch; a gravel deflector to protect the radar dome; and modifications to the cargo compartment to fit SAR gear.

TWO AIRCRAFT QUALIFIED SO FAR FOR **REMOTELY PILOTED SYSTEM PROJECT**

Processing, exploitation and dissemination, otherwise known as PED, might be the Holy Grail for militaries operating a wide array of intelligence, surveillance and reconnaissance (ISR) sensors. If the data from sensor systems can't be collected, analyzed and moved to ensure timely and accurate decision-making, it's just accumulated data.

Finalizing a PED capability concept will be one of the critical steps for the Royal Canadian Air Force (RCAF) before it selects a remotely piloted aircraft system (RPAS). And that won't be a simple process. The solution will have to be applicable to other aircraft and align with the Canadian Armed Forces PED concept. It will also have to be interoperable with NORAD, NATO and Five Eyes (Canada, United States, United Kingdom, Australia and New Zealand) partners.

The PED challenge was highlighted to industry during a briefing in April on the RCAF's project to acquire a fleet of armed medium altitude, long endurance (MALE) remotely piloted aircraft and related equipment for ISR and precision strike.

According to senior officers who could not be identified under the Chatham House rule, a proof of concept phase is underway and will be part of an operational capability demonstrator as the Air Force defines its solution. The RCAF recently completed options analysis and officers said they now have "mature requirements" with which to work.

Previously known as the Joint Unmanned Surveillance Target Acquisition System (JUSTAS) project, RPAS has since 2005 been exploring options for MALE unmanned systems. The Forces have been trialling platforms since the mid-1990s and the Air Force operated an Israel Aerospace Industries (IAI) Heron, called the CU-170, under a lease arrangement as part of Project Noctua, in Afghanistan between mid-2008 and mid-2011. The four Heron systems provided around 550 hours of surveillance per month.

While the requirements call for strike capability, the Air Force has not yet clarified whether it will seek one platform or two, an option that was under consideration at one point as a way to separate domestic from international operations. Rather than specifying a fleet size, the Air Force might invite bidders to propose how many aircraft would be required to meet a set of mission requirements.

"This capability will be integrated into a network of systems to enable near real-time flow of information essential to Canadian Armed Forces operations, and to support domestic law enforcement and civilian authorities," said a spokesperson for National Defence. "Additionally, it will significantly expand Canada's ability to contribute to Joint intelligence, surveillance and reconnaissance operations with its allies."

Beyond PED, the RPAS project, valued at up to almost $5 billion, cuts across almost 40 of what the military calls defence capability investment areas, everything from autonomy to aircraft subsystems, weapons systems, battlespace situational awareness tools, data and bandwidth management, encryption, portable communications systems, electronic countermeasures, advanced and integrated sensing systems, fire control and friend/foe identification systems, surveillance and reconnaissance integration tools, tracking systems, and virtual training systems.

How many aircraft can meet Canada's requirements remains to be seen. Following the release of an invitation to qualify (ITQ) on May 2, 2019, Public Services and Procurement Canada (PSPC) announced that two suppliers met criteria that included endurance and precision guided munition capability.

L3 Technologies MAS, in partnership with IAI, is offering the Artemis, an advanced variant of the CU-170 Heron. The United States government and General Atomics Aeronautical Systems are proposing SkyGuardian, a MQ-9 Reaper. General Atomics Aeronautical Systems has formed Team SkyGuardian Canada with L3 Wescam, MDA, and CAE, its worldwide training partner for the MQ-9.

While only pre-qualified suppliers will be invited to participate and bid in subsequent phases of the procurement process, PSPC said "Canada may, at its sole discretion, re-open the ITQ."

Team SkyGuardian Canada, led by General Atomics Aeronautical Systems, is proposing a variant of the MQ-9 Reaper. **GA-AS Photo**

L3 Technologies MAS and Israel Aerospace Industries are offering the Artemis, an advanced variant of the CU-170 Heron. **Team Artemis Photo**

BUILDING THE GROUND INFRASTRUCTURE FOR STREAMING AIRCRAFT DATA

With every new or upgraded aircraft, the Royal Canadian Air Force has expanded its intelligence, surveillance and reconnaissance (ISR) capability, adding new sensors and mission systems to collect and stream data.

The rapid introduction in 2014 of an interim beyond-line-of-sight satellite communications system on the CP-140 Aurora—it will become permanent with a planned Block IV upgrade—to stream video on Operation Impact over Iraq and Syria is just one example of systems that are changing how the Air Force communicates.

Getting that information to the ground and into the hands of decision-makers, however, has often required an *ad hoc* solution cobbled together by communications and electronic engineering specialists for each operational theatre.

In April, the Air Force received approval and funding to move into the definition phase of a project called Tactical Integrated Command, Control, Communications–Air, or TIC3-Air, that will provide permanent ground entry points for data across Canada and on international missions.

The project, part of a larger effort to design the Air Force's future C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance) architecture, will deliver 16 static tactical data link (TDL) ground entry stations (GES) to connect Link 16-enabled aircraft with ground-based command and control networks, a process that has been likened to a router that connects a home network to the Internet. Four more GES will be configured for video streamlining.

Critically for operations, the project will also provide five deployable TDL and streaming video GES systems to link aircraft with mobile or fixed headquarters.

In addition, TIC3-Air will deliver about 1,000 modernized VHF/UHF ground-air-ground radios to Canadian Air Defence radio system sites and air traffic management sites across the country.

It will also include a Link 16 tactical relay kit for the CC-150 Polaris tankers—but employable on a future air-to-air refuelling platform or any other aircraft—extending the range of a network by allowing the aircraft to serve as a relay to the fighter jets that are refuelling or flying near them.

"TIC3-Air is really looking at replacing the existing capability with the updated radios, but it will also expand our footprint slightly to take into account a little more of what we can do that is not being covered by other existing projects," explained Col Nick Torrington-Smith, director of Air Domain Development.

Though tactical data links and the ability to network all sensor data will be fundamental to any future aircraft, he said TIC3-Air was concentrating primarily on ground-based infrastructure such as modernizing legacy radios and GES to ensure deployable ground units like mobile control and reporting units and airspace coordination centres have the requisite connectivity.

"The ability to expand our footprint and go to more and more platforms will be inherent," he said. "The project isn't going to provide those radios on the new fighters, the upgraded Auroras, or the upgraded [CC-130J] Hercules, because each one of those platforms will have its own life-extension project. But the radios that will be provided with those projects will be compatible with what we are doing."

Tactical data exchange wavelengths like Link 11, which is currently on the CP-140, Link-16, and Link 22, the next evolution, have become the standards for U.S. and NATO coalition operations to ensure secure communication and shared situational awareness. They are also part of a discussion within the Canadian Armed Forces about future networking capabilities.

"All of these tactical data link conversations are happen in a Joint environment," said Torrington-Smith. "Upgrading our radios and the tactical data link to Link 16 on a number of platforms is going to give us that interoperability with our Army and Navy counterparts and will allow us the flexibility to also stay interoperable with our NORAD and NATO allies."

The definition phase is scheduled for three years, with a request for proposals expected by spring 2022, but the Air Force would like to move more quickly on the project if it can, he said.

One of the questions to resolve with industry is the preferred procurement strategy. TIC3-Air has a number of components and the Department of National Defence prefers to deal directly with a single prime contractor. "The next step will be to engage the defence industry," he said.

The project is valued at as much as $210 million and has typically attracted the most questions during RCAF briefings to industry on C4ISR-related programs, Torrington-Smith noted. "There was quite a bit of interest from industry in this project."

Four CF-188 Hornet fighters from 433 Tactical Fighter Squadron perform air-to-air refuelling with a CC-150 Polaris. TIC3-Air will deliver a networking relay capability to the Polaris. **Cpl Gary Calvé Photo**

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"The appearance of U.S. Department of Defense (DoD) visual information does not imply or constitute DoD endorsement."

Facing an acute shortage of pilots, and attrition in other occupations, the RCAF is introducing a number of initiatives to retain experience. **Mike Reyno Photo**

THE RACE to RETAIN & increase experience

BY LGEN AL MEINZINGER

The Royal Canadian Air Force employs a highly technical, highly trained workforce and, of the three Canadian Armed Forces services, RCAF members are the most widely dispersed across our vast nation, often in more remote locations.

Developing these trained and intellectually accomplished, specialized aviators is a significant investment for Canada and our most powerful advantage—now and into the future.

However, as I and others have discussed in the pages of *Skies* magazine, air forces and the civilian airline industry around the world are facing shortages of skilled personnel arising from an unprecedented growth in the global aviation industry.

The RCAF is not immune to the high demand for pilots, technicians, highly trained aviation specialists and support personnel, and we are facing a shortage of experienced personnel in many fields. We risk losing the priceless depth of experience that our more senior personnel possess and, thus, the ability to mentor, train and transfer knowledge to our newer aviators.

Last autumn, the Auditor General released a report focusing on the recruitment and retention of fighter force technicians and pilots. At that time, I outlined steps being taken to address the concerns raised in the report. However, it is clear that these modern realities extend far beyond our fighter community.

Our declining experience levels may impact our ability to train, absorb, and employ personnel in certain areas. Without action, this scenario could further affect the RCAF's operational output.

This situation is exacerbated by the very real fact that we 'train our own'; we do not hire fully qualified personnel 'off the street' and immediately put them to work. Even our members who graduate from civilian aviation training institutes have only begun their life-long learning experience. It takes special training, skills, and qualifications to perform these tasks in a military environment in potentially hazardous areas.

The closest we can come to off-the-street recruiting is if we enrol fully qualified former RCAF members or members of allied Air Forces—and even then, it is quite likely that some level of recertification or refresher training would be required.

Moreover, the loss of experience levels creates a cascading effect that cannot be solved simply by increasing our intake and our training capacity. It takes time to build skills and knowledge. Our experienced members do the work to bring new personnel to operationally effective levels. Therefore, we must nurture an environment whereby the RCAF's quality of life and the quality of service make it more attractive for our members to stay than to leave.

We are taking concrete actions to tackle the challenges of restoring and retaining our experienced personnel numbers across the board, working closely with departmental partners such as the vice chief of the defence staff, chief military personnel, the associate deputy minister (Materiel), and associate deputy minister (Human Resources-Civilian).

The situation in the pilot occupation is our most acute. There are no signs of immediate relief in the international pilot shortage, and while we have experienced a pilot shortage over the past few years—although we have no lack of interested applicants and recruits—we have seen an increasing shortage of experienced pilots. Unexpected voluntary attrition of RCAF personnel to the civilian aviation industry has exacerbated the challenges.

Therefore, as directed by the chief of the defence staff under what has been dubbed Operation Experience, we will implement initiatives to stabilize and rapidly increase levels of pilot experience across all our fleets. We have already initiated some of our targeted short-term objectives and, in the longer term, we will put in place holistic initiatives across all training functions and all operational aircraft fleets to ensure we continue to deliver effective air and space power.

These actions are nested within a broader RCAF campaign plan—Operation Talent—which focuses on the quality of life and quality of service of all our Regular and Reserve Force personnel and their families. Operation Talent

The RCAF is increasing the length of first aircrew tours in tactical squadrons to a minimum of four years, beginning with pilots. **MCpl Mathieu Gaudreault Photo**

Planning is underway for a new air operations officer occupation focused on enabling and supporting operations. **Derek Heyes Photo**

The Air Force will accept more contracted instructors for basic aircrew and Operational Training Unit production. **Combat Camera Photo**

addresses, in particular, the intake, training, absorption and employment of our aviators.

Although these two directives have been published separately, they address two aspects of a single challenge and the RCAF will implement measures in a seamless, mutually complementary and holistic manner.

The challenge is complex, however, and will require equally complex solutions. Our solutions will address the entire RCAF, not just one occupation, but I recognize that we first need to stabilize our most critical areas.

As mentioned, we are already working on several initiatives to alleviate our situation; we will implement some of them quickly, but others, I want to be clear, may take up to five to seven years to fully implement.

For instance, we're already seeing progress on the establishment of a new air operations support technician occupation (Reserve Force) that will augment force protection capabilities and provide support to aircraft maintenance and search and rescue activities. This will allow our highly qualified aviation and search and rescue technicians to focus on their primary functions. We will begin accepting applications to this occupation this summer.

Planning is also under way to establish an air operations officer occupation that will provide the RCAF an exciting new employment field focused on enabling and supporting operations. The stand-up of this new occupation will also result in more aircrew being employed within our squadrons.

Some actions have already been initiated, including:

- Adjusting the policy on the obligatory service tied to certain commitments such as pilot training and international exchanges;
- Increasing the length of first aircrew tours in tactical squadrons to a minimum of four years, beginning with pilots; and
- Contracting additional instructors for basic aircrew and Operational Training Unit production, while also exploring the creation of public service instructor positions.

In the coming year we will implement further initiatives, including:

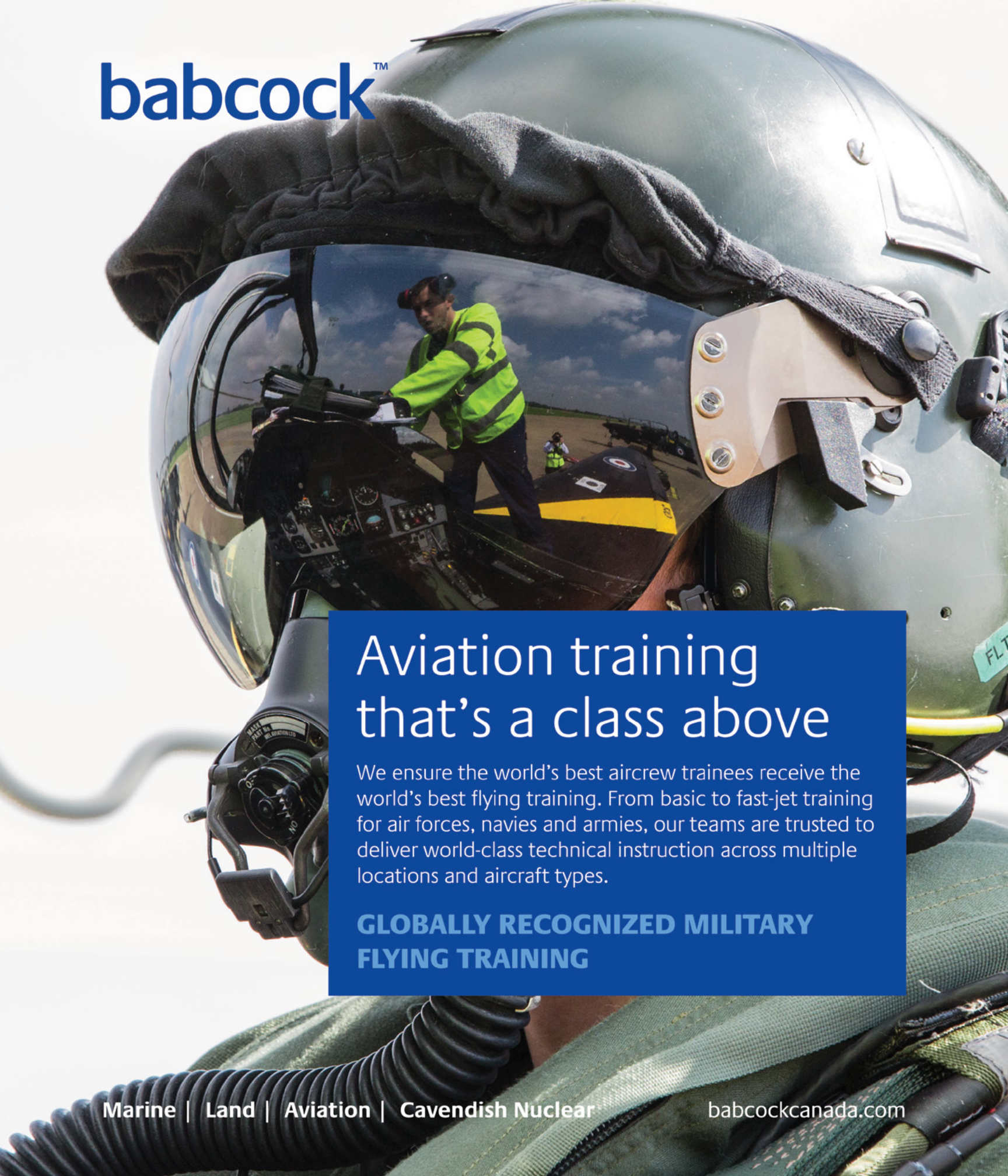
- Enabling greater employment flexibility for Reservists, including how we compensate Reservists employed on domestic operations;
- Explore training options with allies by seeking methods to better recognize existing qualifications and experience of applicants and re-enrolling/enrolling military skilled applicants who bring experience; and
- Exploring more modern compensation and benefit models based on skillsets, rather than the current model, which is based on rank progression, across RCAF occupations.

And there will be much more.

We are dedicated to fulfilling our mission of providing the Canadian Armed Forces (CAF) with relevant, responsive air and space power to meet the defence challenges of today and into the future. In several areas, we will seek collaborative partnerships with industry and our allies to assist us in achieving our goals.

I am encouraging all members of the Royal Canadian Air Force team, from the most senior to the most junior, to become informed and do their part to strengthen and advance our marvelous air force. "Sic Itur Ad Astra"—Such is the pathway to the stars.

LGen Al Meinzinger *is commander of the Royal Canadian Air Force. A former CH-135 Twin-Huey and CH-146 Griffon pilot, he commanded Canada's Joint Task Force Afghanistan Air Wing and has served as deputy commander of the RCAF and director of staff for the CAF Strategic Joint Staff.*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INSIDE
THE NERVE CENTRE

CREATED A DECADE AGO TO PROVIDE GREATER COMMAND AND CONTROL FOR AIR FORCE ASSETS, THE COMBINED AEROSPACE OPERATIONS CENTRE IS A HUB OF ACTIVITY THAT NEVER SLEEPS.

BY CHRIS THATCHER

Shortly after midnight on Thursday, May 30, the phones in the Royal Canadian Air Force Combined Aerospace Operations Centre (CAOC) in 1 Canadian Air Division (1 CAD)/ Canadian NORAD Region Headquarters at 17 Wing Winnipeg, Man., started ringing.

A massive forest fire over 3,300 hectares in size was bearing down on the Pikangikum First Nation, a community of 3,800 people in northwestern Ontario only accessible by air or water, and the provincial government was starting to fear for their safety.

The request for military assistance wasn't yet official, but the staff in the CAOC that night immediately began searching for resources. At 424 Transport and Rescue Squadron at 8 Wing Trenton, Ont., technicians began stripping a CC-130H Hercules of its air droppable search and rescue (SAR) kit and configuring the aircraft to transport passengers.

By dawn, the Hercules was lifting off with a flight plan for Pikangikum, but little else. It was still unclear if the gravel airfield could support the weight of a CC-130 or if it had the necessary wingtip clearance from obstacles for a bird that size.

The aircrew was instructed to gather information about the fire and the runway, provide a situational awareness report, and then land in nearby Red Lake for gas. By midday, a hasty operational airworthiness assessment had been completed by 1 CAD staff, and the crew had approval to attempt a landing, albeit after a couple of low passes. They were also cleared to keep the engines running while they loaded passengers.

At the same time, staff in the CAOC began locating and coordinating additional aircraft, re-tasking them from other duties to join the airlift. By Thursday afternoon, a CC-130 J-model from 436 Transport Squadron in Trenton was flying sorties between the Pikangikum airfield and Thunder Bay, Ont.

At 435 Transport and Rescue Squadron in Winnipeg, crews had also begun reconfiguring a SAR H-model Hercules for passenger transport, and by early Saturday morning it was airborne for Pikangikum, taking over for the Trenton-based H-model and joining four Trenton-based J-models in the airlift.

That same day, two RCAF captains were on the remote airfield with backpack radios, managing the busy airspace overhead, while one of the J-model Hercs was postured to operate with night vision goggles if evacuations were required through the darkness. In addition, two CH-147F Chinooks from 450 Tactical Helicopter Squadron in Petawawa, Ont., were dispatched to Red Lake on Thursday as "an ace in the hole" if reduced visibility or weather prevented fixed-wing operations.

Over a 96-hour period, five Hercules would participate in the airlift, transporting almost 1,800 residents to safety.

Remarkably, conducting the orchestra of Hercules was just the first challenge that weekend. By Friday morning, the CAOC was being advised that the Alberta government was about to ask Ottawa for military assistance as a forest fire threatened its northern communities.

CH-147 Chinooks and CH-146 Griffons standby at Williams Lake airport for a possible evacuation of the Williams Lake region during Operation LENTUS in British Columbia in 2017. **Cpl Gabrielle DesRochers Photo**

The CC-130T H-model Hercules provides both air-to-air refuelling for NORAD fighter jets and search and rescue capability to the Arctic. **Galen Burrows Photo**

Two CC-130 Hercules evacuated Northern communities affected by flooding to Timmins, Kapuskasing and Ottawa respectively during Operation LENTUS in 2014. **Cpl Levarre McDonald Photo**

A Griffon's-eye-view of flood waters in New Brunswick during Op Lentus. **Cpl Matthieu Racette Photo**

Maj Vern Greenway (left), one of the senior operations duty officer in the Combined Aerospace Operations Centre, works alongside duty defensive officers SL John Attwells and Capt David Weichel in the Air Operations Center. **DND Photo**

Two Royal Canadian Air Force CF-188 Hornet fighters from 433 Tactical Fighter Squadron fly over Iceland during an Operation Reassurance surveillance mission in 2017. **Caporal Gary Calvé Photo**

No sooner had the staff begun a divide-and-conquer strategy to obtain the necessary approvals to respond to Ontario while simultaneously deliberately planning for Alberta, a third call from the Canadian Air Defence Sector at 22 Wing North Bay, Ont., put everybody on edge: The Canadian NORAD region (CANR) surveillance operations centre and Nav Canada were tracking an unidentified and noncommunicative aircraft in Quebec showing abnormal altitudes.

Though it did not appear to pose an immediate danger to population centres, CAOC staff began a process to evaluate the possible threat. It eventually turned out to be a small aircraft with a faulty transponder showing it at 60,000 feet, but the call prompted the CAOC to consider an intercept from a CF-188 Hornet on NORAD quick reaction alert (QRA) duty.

"That is our daily existence," said BGen Christopher Ireland, who was on the floor that weekend. "On any given day, the CAOC is bouncing between the defence of North America and providing air power to take care of Canada's needs domestically and internationally. And then we're on call for the other no-fail mission, search and rescue."

Ireland, a U.S. Air Force officer, is the deputy CANR commander and deputy Joint Force Air Component Commander (JFACC) for Canadian Joint Operations Command (CJOC) in Ottawa. He said the Air Force effort that weekend was illustrative of a structure that is both highly responsive and extremely compressed.

The CAOC is under the direct command of the commanding officer of 1 CAD, who also serves as the JFACC for CJOC, the CANR commander for NORAD, and the commander of the Trenton search and rescue region, which covers approximately 10 million square kilometres of Canadian territory. Those four hats were all in evidence as events unfolded.

When the first call came in, staff were able to immediately harness SAR resources that are on high alert every day. By Thursday afternoon, the response had transitioned to a

domestic operation, known as Op Lentus, and responsive to CJOC under the JFACC hat. All the while, the NORAD mission was never out of mind.

"All the same people in the headquarters working the same problem, but doing it with the commander's different hats on," observed Ireland. "In a bigger air force like mine, all those things would be divided amongst multiple headquarters…all having to coordinate with each other and with the headquarters that would be the force employer, negotiating which aircraft and when they would start working.

"At the CAOC, it is all done on the move because it is the same people representing the same boss. In a military scheme where the scale is not enormous, you get a massive amount of efficiency and effectiveness of having that multi-hatted relationship, because you can pivot quickly and not be burdened by your institutions and bureaucracies," he said.

"You do it safely and professionally, but at great speed, which is phenomenally unique for me from an American perspective. The speed at which the RCAF does business, the agility and the flexibility that it has to go in different directions, has been eye-opening."

EYES ON ALL AIRCRAFT

The CAOC was stood up in July 2009 as part of a modernization of Air Force operations and the need for more coordinated command and control over a range of air assets. Its first major operation was under the NORAD banner, monitoring and defending the airspace over the Vancouver 2010 Winter Olympics. A decade later, it is often described as the nerve centre of the RCAF, with an eye on every aircraft conducting operations in Canada, North America and overseas, and on aircraft supporting training exercises at home and abroad. Part air traffic control, part mission management and logistical support, part obscure problem-solver, it never sleeps.

When *RCAF Today* visited on an overcast spring morning this year, the CAOC was actively coordinating the movement of six CH-146 Griffon helicopters from bases in Ontario, Quebec and New Brunswick as Canadian Armed Forces joint task force commanders in the Atlantic, East and Central regions of the country requested reconnaissance and surveillance of swollen rivers and flooded towns and cities in all three provinces on behalf of civilian agencies.

The six helicopters were just a small part of the aircraft picture on the four massive screens that dominate the secure room. In Mexico, a broken CC-177 Globemaster was still on the tarmac, waiting for a part and mobile repair team. The plane had been participating in an exercise with the Mexican Air Force and had served as the transport for RCAF commander LGen Al Meinzinger, who was now heading home on a CC-130J Hercules.

In addition, two CP-140 Auroras were participating in a United Kingdom anti-submarine warfare exercise called Cable Car and CH-147F Chinook and Griffon helicopters as well as CC-130 Hercules were preparing for Exercise Maple Resolve in Wainwright, Alta., the Canadian Army's largest annual training and validation exercise.

Over the Caribbean, an Aurora was conducting counter-narcotics and human smuggling operations as part of Op Caribbe from El Salvador; in Mali, Griffons and Chinooks were providing transport and medical evacuation to coalition forces on Op Presence; in Iraq, Griffons were transporting special forces and other military leaders and equipment on Op Impact; in the Mediterranean, a CH-148 Cyclone helicopter aboard HMCS *Toronto* was supporting Op Reassurance; and various CC-177s and CC-130Js were helping sustain operations in Mali, Iraq, Latvia and the Ukraine.

That air traffic didn't include the two most critical national sovereignty operations, SAR and Noble Eagle. That morning SAR assets from Griffons to CH-149 Cormorants, CC-115 Buffalo and CC-130H Hercules were on 30-minute standby at bases from

Greenwood, N.S., to Trenton, Winnipeg and Comox, B.C. On average, SAR crews respond to over 10,000 incidents a year. And in Cold Lake, Alta., and Bagotville, Que., pilots and CF-188s were on alert to be scrambled under the NORAD mission.

Aircraft may belong to the squadrons and Wings from which they operate, but when the CAOC receives a request for an air asset from CJOC, a Regional Joint Task Force commander, an Air Task Force commander or the Army or Navy, that asset becomes CAOC responsibility. Flight plans, diplomatic clearances, dangerous goods requirements—all coordination and paperwork are managed and tracked from the CAOC.

And if an aircraft breaks down on operations? That, too, is often handled from the Centre, which processes almost every request from a theatre of operations on behalf of the RCAF. In fact, when Joint and Air Task Force (ATF) commanders depart for foreign soil, the CAOC telephone number is never out of reach.

"Before they go out the door, we give the ATF commander a brief. They are told, 'If ever there are any doubts, call the CAOC. We will figure it out,' " said Col David Proteau, an Aurora air combat systems operator and the CAOC director.

He had doubts about preserving his sanity after the first few months in the Centre. Today, though, "it is by far the most rewarding job I have ever had," he said. "It's the most dynamic job I have had and the most challenging in my 32 years. But the sense of accomplishment is unlike anything else. We get great people. No matter where or what trade they come from, they all develop this operational mindset."

Added Col Chris Shapka, deputy CAOC director and mission support division chief: "It's different every day. You don't know what you are going to be working on until you come in each morning."

LARGE SCOPE, LIMITED PERSONNEL

The CAOC includes the Air Operations Centre (AOC), which is staffed at all times by a senior operations duty officer (SODO) on a 12-hour shift, a defensive duty officer, and two defensive duty technicians. An on-duty chief of combat operations, or CCO, is continuously in touch with the CAOC, and a general officer is always either in the building or on-call.

As things heat up, computer stations arranged in an inner and outer ring are staffed by experts in combat plans, air mobility, mission support and intelligence, each linked to a cell elsewhere in the building. There are also advisors constantly on-call: a division surgeon to advise on health requirements for deployments or coordinate medical evacuations, legal and public affairs officers, a CBRN (chemical, biological, radiological and nuclear) defence specialist, and others.

For an operation like Lentus, a crisis action team often fills the room to handle the varied requests from the military and civilian agencies such as the RCMP and Nav Canada.

By managing the many operational details, the CAOC allows the RCAF's Wings to concentrate on generating aircrews and commanders in theatre to focus on their mission, explained LCol Justin Boileau, an aerospace controller and the CAOC's regular CCO.

But the Centre is "stretched pretty thin," he acknowledged. An international study conducted in 2013 concluded the optimal establishment for a CAOC was about 225 personnel. Given the size of the RCAF, a more realistic number would be around 135. The CAOC currently manages with just over 50 staff, said Proteau.

"The scope of the work is no different than what it is in the U.S. Air Force," said Ireland. "It is a massive scope. In my air force there are thousands of people on different staffs taking

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The CC-177 Globemaster is the most in-demand aircraft for the Combined Aerospace Centre's air mobility division to manage; a limited number of aircrews adds to the challenge. **Rich Cooper Photo**

on those problems. On the hard, deeper, more complex problems, the lack of scale is challenging."

Sufficient staffing could be addressed through a CAOC modernization project, which is in the early stages of assessing requirements, facility improvements, connectivity of secure and nonsecure communications with NORAD and CJOC, and investments in technology. It will also deal with continuity of operations if the CAOC is forced to relocate to another building or another base.

The current limit on available personnel is mitigated somewhat by a robust planning process. Deliberate long- and short-term planning is handled by a team at 1 CAD, but once those plans are complete, they feed into the Total Air Resource Management plan, a document detailing exercises and operations that will need support over the next 12 to 18 months. That is updated with a biweekly Master Aerospace Action Plan that includes new Requests for Effects (RFE) from operational commanders and sister services and the current SAR posture, which is in turn translated into Air Tasking Orders for the commander of 1 CAD to sign off. The cycle is ratchetted up to every 72 hours during a NORAD mission or a war.

As the old adage goes, no plan survives first contact. "It always gets disrupted," said squadron leader Richard Cooke, a British exchange officer and the combat plans division chief, but the overall plan provides a common starting point on which to pivot when the CAOC is required to adapt on the fly.

Every RFE is entered into a database that feeds the CAOC. Commanders may request a specific fleet to satisfy their airlift request, but the air mobility division determines what is available and the most effective way to move passengers, equipment or supplies.

"We are maxed out, so we don't want to fly an airplane empty if we can avoid it," said Maj Dana Sponder, who oversees a team of 12 people to monitor and task all RCAF airlift, whether it is via CC-150 Polaris or CT-145 King Air. "We'll fit in as many jobs as we can."

One of her challenges is that different countries have very different reporting requirements for aircraft and dangerous goods transiting or entering their airspace. Sponder's team coordinates diplomatic clearances, but the reporting timelines vary from one hour for some countries to 30 days for others. If an aircraft is delayed or the schedule is changed, it can result in a new request being filed or new routing, clearances and approvals.

"I didn't realize how many fingers I have in everyone else's business," she said.

Operations Presence and Impact are currently her most demanding, but even the deployment of a CP-140 Aurora on an operation or exercise can tax resources; the maritime patrol aircraft require a CC-177 Globemaster just to move its support equipment, a challenge given that the fleet is the most in demand but has limited crews to fly them.

"The big piece is last minute changes," she said. If a high priority task is activated on short notice and a mission must be cancelled, or even if a plane breaks down anywhere, "we are forced to rejig the Tetris puzzle."

"A lot of different factors determine how to get people and parts into theatre," acknowledged LCol Chris Shapka. As the mission support division chief, he and a small team problem-solve issues with aircraft maintenance, logistics, telecommunications and construction engineering. A desk officer for each functional area resides in the CAOC, a phone call away from any theatre.

When he spoke to *RCAF Today*, his team was sourcing parts for the broken CC-177 in Mexico, trying to resolving an IT problem with SAP-based resource planning program in Mali, and ensuring a mobile repair team was on its way to Oman to repair a Cyclone helicopter.

The Cyclone, he admitted, was "the fleet with the greatest discovery at the moment." Any problem with the new maritime helicopter, which only achieved initial operating capability in June 2018, is often the first experience for maintenance technicians. "Every time something happens, it is the first time it has ever happed," and the Air Force works with manufacturer Sikorsky and its suppliers to get parts into theatre.

Five CC-130 Hercules were part of an airlift from Pikangikum in late April as a massive forest fire neared the First Nation community. **DND Photo**

The Combined Aerospace Operations Centre managed the evacuation of almost 1,800 residents from Pikangikum during a 96-hour period. **DND Photo**

The Combined Aerospace Operations Centre is located in 1 Canadian Air Division headquarters in Winnipeg. **DND Photo**

The CH-148 Cyclone helicopter from HMCS *Toronto*, gets into position over the Mediterranean Sea during diver deployment training during Operation Reassurance in April 2019. **MCpl Manuela Berger Photo**

The CAOC even keeps tabs on all aircraft involved in special events, from flyovers of the NBA championship celebrations, the Grey Cup and Canada Day to the Snowbirds and CF-18 Hornet Demonstration teams. Those events might not seem like core missions for the Centre, but they require planning, logistics and support, said LCol Darryl Shyiak, a current Reservist and a former Snowbird lead who serves as the special events division chief.

As with any other RFE, special events are incorporated into the master plan and often supported with a ground team that can include a flypast director to coordinate timing and a safety pilot to provide a second set of eyes for demonstration pilots.

"Everything to support the team is done here," said Shyiak, noting that if the Demo Hornet breaks down, sourcing spares is an immediate priority.

While each division of the CAOC can take centre stage at times, the stage manager behind the curtain is the senior operations coordinator. Michel Tremblay, a former aerospace controller and the deputy director of the CAOC when it was first stood up 2009, monitors all requests from across the Canadian Armed Forces.

"We have the pulse of the centre," he said of his team during a brief pause in Op Lentus requests. If an aircraft breaks or is delayed, disrupting the plan, he must be aware of contingencies and which Wing or squadron can "plus up."

The centralization of expertise in the CAOC and the multi-hatted construct of 1 CAD has significantly improved decision-making, he observed. "We (the CAOC) are there to facilitate all these different hats. We don't have that many aircraft and there are a lot of competing taskings."

MITIGATION AND RISK MANAGEMENT

Balancing competing demands for resources is a constant challenge that is "more art than science," said Proteau. The no-fail missions of SAR and NORAD might take precedence, but even then, the CAOC has to be conscious of robbing force generation to pay for force employment, and the longer-term consequences when training is compromised.

The master planning process attempts to factor squadron training requirements into aircraft availability, but the Air Force will often push ahead if a job needs to get done, he said. The CH-147F Chinook is probably the best example of a new fleet that deployed to meet an urgent demand. Consequently, some of the maintenance is being learned in Mali, he said, and "deployment has had an impact on [450 Squadron's] force generation capability."

Even recurring support missions will face difficult decisions. If a J-model Hercules is providing sustainment to Op Impact, but needed by Special Operations Forces Command in Africa, "do I cancel Impact to support SOFCOM or wait several days because Op Impact is too critical?" asked Proteau, noting the answer is "rarely clearly defined" and often involves accepting some risk.

While that may mean the CAOC drops a ball from time to time, "we will pick up on the first bounce. Rarely do we say no to something critical. We often scratch our heads and find a way we can do both."

The binational relationship of NORAD mitigates some of that resource management, said Ireland. Canada and the U.S. can share fighter response and air-to-air refuelling capabilities if other aircraft and crews are unavailable.

"Those decisions are fully informed by the context of the moment," he said. If a scenario like Thursday's unfolds, "we will check with the intelligence division [about potential threats], and then assign resources, after consulting with NORAD and CJOC. I can do that knowing I'm not robbing any one mission to pay the other."

Chris Thatcher *is editor of* RCAF Today *and a contributing editor to* Skies.

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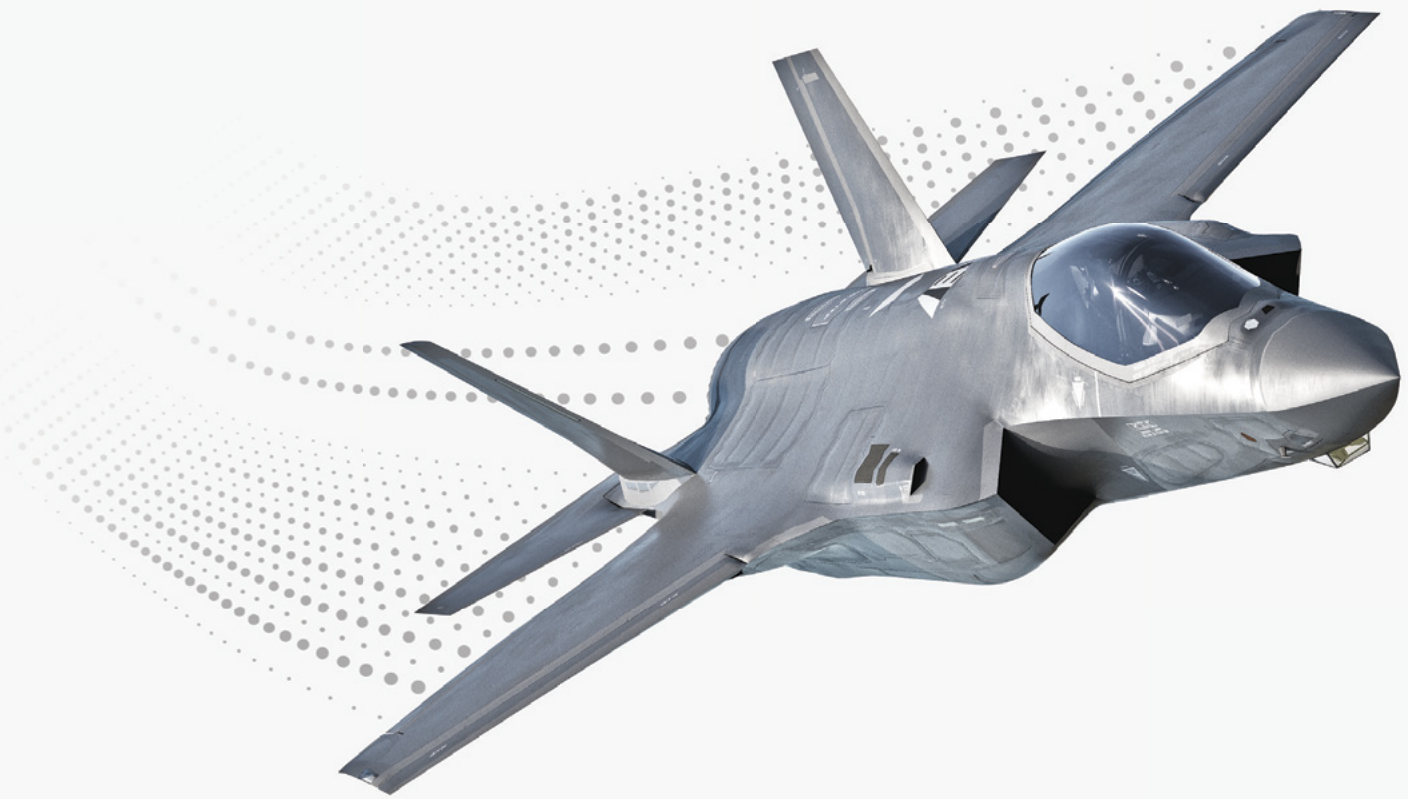

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THE RUBIK'S CUBE OF Fighter Procurement

POLITICIZATION OF THE CF-188 HORNET REPLACEMENT PROCESS IS HARMING THE RCAF'S ABILITY TO SELECT THE FUTURE FIGHTER THE NEXT GENERATION OF AVIATORS REQUIRES.

BY ALAN STEPHENSON

Purchasing a fleet of fighter aircraft is a complex process with many variables and the Canadian government has a duty to ensure the billions of procurement dollars are properly spent. The interplay between the four dimensions involved in military procurement—military, technological, economic, and political—defies simple analysis.

Unfortunately, the politicization of the CF-188 replacement has led to significant misinformation and distortion of the factors surrounding this essential capital procurement. Conflation of idiosyncratic design features, such as stealth and one versus two engines, into critical determinates undermines public understanding of the four dimensions that constitute military procurement decision-making.

The 2017 defence policy, *Strong, Secure, Engaged* (SSE), directed the Canadian Armed Forces (CAF) to ensure Canadian sovereignty, defend North America, and engage in extraterritorial missions. The Royal Canadian Air Force (RCAF) responded to its responsibilities to support

CF-188 Hornets from 401 Tactical Fighter Squadron at 4 Wing Cold Lake, Alta. **Mike Reyno Photo**

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Lockheed Martin F-35 Lightning II Joint Strike Fighter. **Larry Grace Photo**

Boeing F/A-18 Super Hornet. **Aaron Foster Photo**

these commitments with a thorough, capability-based Statement of Requirements (SOR) for the Future Fighter Capability Project (FFCP), taking critical functionalities of operating in the future battlespace and emerging technologies into consideration. The SOR was prepared using a professional, evidence-based U.S. Defense Acquisition Test and Evaluation Management framework to ensure it met the rigorous standard the Auditor General of Canada's 2012 Spring Report said the previous CF-18 replacement documentation lacked.

CLEAVAGES

Four pre-qualified suppliers are expected to submit bids: Lockheed Martin (F-35 Lightning II), Boeing (F/A-18 Super Hornet), Saab (Gripen E), and Airbus (Eurofighter Typhoon). Their fighters represent two significant groupings or cleavages. The first is technological/sustainability, namely between fourth- and fifth-generation fighter aircraft and revolves around long-term sustainment costs and future technological adaptability.

The second is commercial/security, specifically European (Eurofighter/Gripen) versus American (F-35/Super Hornet) and enmeshes national security compliance with the government's desire for tailorable economic packages. The specificity of these cleavages is important to understand as they have repercussions in each of the four decision-making dimensions.

Although there has been much debate regarding the definition of fifth-generation fighters, the distinction between fourth- and fifth-generation fighters rests in the design concepts. Adapting to evolving technologies, fifth-generation fighters are purpose-built low-observable designs to enhance survivability against increasingly lethal defensive missile systems. Fourth-generation fighters are based on proven 1970/80 platform designs that have been updated with contemporary avionics and sensors, but are highly vulnerable to modern air defence systems. Fourth-generation aircraft have very limited growth potential in their architecture and long-term sustainability is questionable.

The European versus American cleavage revolves around the emphasis that the government places between security and economic interests. These often-competing issues transcend all four dimensions as national security issues intersect both the desire for political economic largesse and commercial/U.S. national security concerns, which can result in modification of military/technological requirements through political interventions.

OPERATING ENVIRONMENT

Canada's geostrategic position and alliance commitments constrain the choices that are available. Canadians need to understand that the international security environment directly shapes the North American strategic defence posture and that NORAD is central to that defence. This makes airspace defence an issue of 'complex sovereignty' as NORAD functions both as guarantor of Canadian, as well as American, airspace sovereignty and is the principal defender of North America from air attack. Canada's next fighter aircraft will need to be factored into the future multi-domain battlespace that is being constructed by the United States, and not simply through the notional threat-to-Canada environment of the moment.

Geostrategically, the U.S. employs a three-layer approach to its national security. Protection of the 'homeland' is the first layer and is paramount. As such, the U.S. is obsessive in its commitment to safeguarding its military and technological advantages, first judiciously sharing with Two Eyes partners, then Five Eyes countries, then other allies, if at all.

Although critical to the protection of the homeland, Canada occupies the second layer of U.S. defences—the approaches—and shares a deeply held responsibility to which the U.S. entrusts some of its most technically advanced capabilities through Two Eyes bilateral protocols. To maximize effectiveness, any future fighter must be fully integral to the future North American battlespace, as opposed to simply being integrated and interoperable as is the accepted practice in NATO.

MILITARY DIMENSION

In its primary role, the fighter force acts as a strategic deterrent to those that may wish to challenge Canada's sovereignty. By design, these fighter aircraft are essential in the binational NORAD command and control (C2) structure. This makes the fighter force unique in that they are the only Canadian military force that is operationally interdependent with the U.S. in day-to-day operations. It is therefore extremely difficult to delink air superiority operations in the first two principal CAF roles identified in SSE, Canadian sovereignty and defence of North America, given the integrated infrastructure and binational C2 arrangements.

Although the four qualified suppliers' fighters will have met the basic high-level mandatory requirements to compete in the FFCP bid, the RCAF has identified sub-system requirements that will ensure they are fully able to operate in current and future battlespace environments. Without these sub-systems, operational risks increase to the point that a future fighter becomes marginally employable in domestic (NORAD) and/or expeditionary (NATO) operations. Each platform will be rigorously assessed through a Measure of Effectiveness and Evaluation scale in the context of an increasingly complex and contested threat environment for interoperability, ability to maintain awareness, capability to discern friend from foe, survivability, and sustainability.

Significantly, the U.S. has embarked on a multi-domain operations concept and the U.S. Air Force (USAF) is currently developing a "Multi-Domain Command and Control (MDC2) [system] – the ability to seamlessly analyze, fuse, and share what was once domain-centric information into a single C2 system that supports all domains and all levels of war." The USAF has partnered with the U.S. Army to explore developmental avenues for Joint and NATO MDC2 integration. This represents the future operational command and control environment that the commander of U.S. NORTHCOM/NORAD will employ in defence of North America and is an acknowledged imperative in the RCAF Future Concept Directive.

The fighter chosen must be technologically advanced enough to be a strategic deterrent and not seen by the U.S. and potential adversaries as a weak link in NORAD. It must be an intrinsic element of the evolving C2 structure. Canada holds a unique and prestigious position in the only binational military command the U.S. has permitted.

Along with this enormous military responsibility, there is little doubt that the U.S. will hold Canada directly accountable for any breaches in the defence of North America that can be attributed to Canada minimizing its commitment to military preparedness. Moreover, Canada benefits greatly from enhanced air defence without paying the costs of establishing a complex, stand-alone Canadian C2 system.

TECHNOLOGICAL DIMENSION

Embracing leading edge technology to gain operational advantage has always been central to air forces worldwide. In most instances, short-term advancements in force development can be accommodated in modern platforms, but there are eventually generational changes that are structural in nature. A future fighter platform that requires a life expectancy past 2060 will need to be adaptable, flexible, and expandable beyond the known current trends.

Emerging technologies like artificial intelligence will change the dynamics of decision-making, not only in the platforms but in the C2 system as well. The cyber domain will be both an enabler and a threat as sophisticated systems become ever more reliant on computation and information networks. Space is becoming prevalent in all aspects of military operations. Importantly to Canada, the RCAF leverages U.S. space capabilities for remote northern operations and is the only ally on the system.

Gen David Goldfein, USAF Chief of Staff, sees a fifth-generation fighter as a computer that happens to fly and part of the connective tissue under the concept of multi-domain operations.

The by-design fighter characteristics of sensor information fusion, advanced weaponry, increased survivability through low observability, and networked-enabled mission support are essential aspects of the next generation of fighter aircraft.

Although the multi-domain concept envisions an open architecture for allies to 'plug and play,' the American approach differs to that of some European nations who are developing sixth-generation fighters of their own while keeping fourth-generation aircraft long enough for the transition expected in the mid-2040s.

As there are significant commercial and national security interests in maintaining military and technological advantages by the U.S. government, fighter manufacturers, and equipment suppliers, there will inevitably be significant resistance to enabling non-American fighter aircraft access to advanced, sensitive technology should Canada choose a European model.

Canada may have to do without a desired system given Two Eyes/Five Eyes restrictions or will likely have to pay exorbitant amounts to have the equipment integrated into the Operational Flight Program (OFP) as access to intellectual property (IP) is highly contained.

However, the main question regarding purchase of fourth-generation fighters revolves around how long they can remain technologically relevant into the future advanced operational and threat environments without restrictions to their intended roles.

ECONOMIC DIMENSION

At $15 to $19 billion, the FFCP will be the second most expensive procurement in Canadian history. The government has a fiduciary responsibility to exercise due diligence in seeking the most cost-effective solution and the best-value for money. This concept, however, is complicated as various actors within the decision-making process have differing responsibilities with conflicting priorities that compete for short-term and long-term interests.

Therefore, the process of shaping the bid through mandatory requirements and weighting of evaluation criteria in the final request for proposals (RFP) becomes a significant tool in the determination of preferred outcomes. In the FFCP bid process, two issues of concern to an open and transparent competition have arisen.

The first involves the government's determination to optimize competition through ensuring enough qualified bidders. In response to Dassault's decision to withdraw from the bid process due to difficulties in meeting mandatory Two Eyes/Five Eyes requirements, the government stated it would evaluate bids in a different way and require non-compliant companies to identify a solution to meet the deficiencies.

This deferment effectively changes military requirements and opens the possibility of purchasing incompatible equipment that meet a lower threshold. It begs the question of how a foreign business entity can provide an acceptable solution that requires U.S. government approval from the Departments of State, Commerce, and Defense to sanction any inclusion of U.S. classified capability.

Secondly, the Canadian government has a long-standing policy to ensure defence dollars are reinvested into meaningful economic benefits. Offset obligations have become a favourite tool to meet socio-economic goals; however, this approach can undermine the goal of acquiring the best military solution when development objectives become the political imperative. By indirect means, the government of the day can shape a military procurement to meet its short-term interests through Industrial and Technological Benefits (ITB) requirements.

In the case of the FFCP acquisition, the ITB requirement is problematic for a "fair and transparent" process, in part due to conflicts with agreements signed between Canada and the U.S. as part of Canada's participation in the Joint Strike Fighter (JSF) program. The most recent changes to the draft RFP have been made to better balance the competition in recognition of Canada's obligations as a member of the program; however, rivals have pushed back using ITB arguments to maintain competitive advantage. Without a transparent levelling of the ITB assessment criteria contained in the final RFP, the spectre of the Liberal government's promise, "We will not buy the F-35 stealth fighter-bomber," becomes a reality through other policy means.

Retention of the ITB requirement and preservation of a large bidder pool also stems from short-term parochial interests of the governing party. In an election year, the promise to assemble aircraft in Canada certainly provides work-related incentives, but one must question the long-term economic benefits and export potential of building fighters in a country that refuses to sell civilian helicopters to the Philippines.

Additionally, the offer of complete transfer of IP for non-American platforms is a double-edged sword. Without the benefit of a large pool of resources, the costs associated with developing and continually modifying the OFP, the embedded software that performs the functions and sub-functions necessary for aircraft weapon systems to operate, are huge. Getting the OFP wrong results in accidents such as the recent Ethiopian Airlines Boeing 737 Max crash. Attempting to integrate discordant equipment into unique platforms is difficult and imprecise. Modifying military requirements to meet short-term parochial socio-economic interests and benefits can entail unintended costs and consequences.

Furthermore, each fighter manufacturer has commercially sensitive IP that it protects vigorously. As two European groups have recently announced plans for the development of 'sixth generation' fighters, the U.S. will undoubtedly be far more protective of inadvertent transfer of advanced technologies to competitors, thus limiting the adaptability of non-American fighters for Canadian use.

The RCAF knows well the synergistic savings that accrue when operating a common fighter with Canada's principal ally. Sustainment is the most costly, complex and challenging aspect of the lifecycle cost, making this element singularly important to the Department of National Defence. Most air forces are looking to divest themselves of fourth-generation fighters by 2040, nine years after FFCP is scheduled to achieve full operational capability. Sustaining a diminishing or orphan fleet of aircraft until 2060 would be prohibitively expensive and operationally irrelevant.

Fifth-generation fighters are not without their procurement and sustainment problems; U.S. defence officials have questioned the initial capital costs and the affordability of maintaining the fleets. However, F-35 Joint Program Office (JPO) reports estimate the cost of Lot 14 F-35A aircraft will decrease to US$76.8 million, making the initial procurement comparable to or cheaper than some of its competitors.

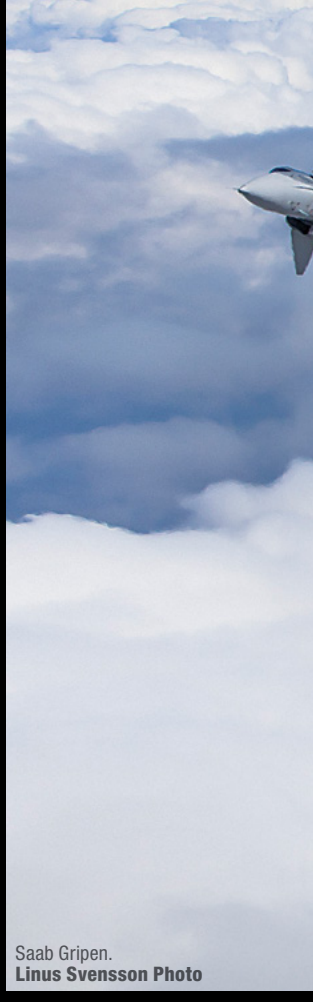
Additionally, the JPO has been directed to focus on substantially improving sustainability. In October 2018, Belgium's government chose the F-35 over the Eurofighter primarily on price and the savings benefits accrued over the 40-year life of the aircraft from a projected production pool of 3,000 aircraft, defying the myth of the F-35 being an overpriced fighter.

POLITICAL DIMENSION

Politics is ubiquitous in issues of national security. Governments must determine Canada's defence needs, articulate the way they are to be achieved, provide the means to meet the stated requirements, and sell these decisions to the electorate. Unfortunately, under Canada's parliamentary system, the cycle of major Crown projects is progressively out of sync with the electoral cycle and political parties take short-term advantage of the procurement process.

Military needs, the basis for spending the money in the first place, have been obfuscated in the replacement process and significant political capital has been expended through bipartisan mismanagement. One must question the utility and fairness of a competition when the current government is on record making disparaging statements about both American products. SSE sets a very high standard for the fighter force to meet, but governments must stop manipulating the requirements and respect military advice for this to be achieved.

The U.S. is not only an ally, but a partner in NORAD, and



Saab Gripen.
Linus Svensson Photo

Eurofighter Typhoon.
Airbus Photo

it must wonder how reliable and trustworthy Canada truly is as it witnesses the dithering over an essential element of its shared defence structure. With negotiations on the replacement of the North Warning System imminent, Canada needs to consider American tolerance of continued lopsided cost-sharing arrangements. Without a greater strategic outlook on this procurement, Canada puts its reputation as a trusted neighbour, as well as the significant cost-savings it enjoys as an integral partner in defence of North America, at risk.

Since there are few votes to be had for defence issues, long-term geostrategic considerations have been minimalized by successive governments through competition in domestic politics. In an election year, there is great temptation for political interference in the procurement process for political advantage in the guise of regional benefits.

Granted, philosophical differences are in play between political parties that will affect how they view economic benefits to Canada. However, if this is a deterministic factor, then the government has an obligation to state this clearly. Otherwise, unwarranted political interference in shaping the process to favour a specific outcome has a deleterious effect on the professional women and men in the military and public service who see the political spin for what it really is, the self-interest of political parties.

CONCLUSION

The government's choice to ensure a competitive process with more than three bidders has resulted in modifications to the assessment of mandatory criteria in critical operational functions, lowering the threshold of performance measurements identified by the RCAF. Suitability and adaptability to Two Eyes/Five Eyes requirements will be a crucial operational determinant. However, application of the current ITB policy and the points awarded for the economic offset portion in the RFP appears to undermine the primacy of meeting military needs.

Canada is a North American state with responsibility to protect not only ourselves but our most important strategic partner and neighbour. To maximize effectiveness, any future fighter will need to be fully integral to the North American battlespace. The deputy minister of National Defence has stated that capability is the core component in the procurement process. Allowing economic benefits to prevail over capability during evaluation inevitably changes the empirical equation of the stated government policy that initiated the purchase in the first place.

The choice of a future fighter is critical and should have bipartisan support since it now occurs every two generations. To put this into human terms, the first new pilots eligible to fly the next fighter will be graduating from high school this year. Those in kindergarten will have served 35 years in the RCAF by the time the next fighter is purchased.

When one reflects on the costs involved and the changes that will occur over the next 40 to 50 years, the government not only has a responsibility to deliver the best-value to Canadians for the roles it has instructed the military to perform, it also has a duty to ensure Canada's future aviators have the best equipment to perform the hazardous duties they will be assigned. SSE promises this upfront. A fair and balanced competition for the future fighter, uninhibited by overt political interference, needs to occur to ensure the right fighter aircraft is chosen.

Alan Stephenson *(Col ret'd) holds a PhD from Carleton University and is a former CF-188 pilot with 3,600 hours flying fighters. He is currently an aviation consultant and a Fellow at the Canadian Global Affairs Institute. This article is adapted from a paper for the CGAI: https://www.cgai.ca/anatomy_of_a_buy_the_four_dimensions_of_procuring_a_future_fighter_for_canada*

Any future fighter must be fully integral to the future North American battlespace. **Derek Heyes Photo**

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Members of Task Force-Mali wait for a CH-147F Chinook helicopter to land at a small arms range near Gao, Mali in 2019. **Cpl François Charest Photo**

DESPITE DIFFICULT FLYING CONDITIONS, THE CANADIAN ARMED FORCES' RAPIDLY CREATED FORWARD AEROMEDICAL EVACUATION HAS BECOME A FORMIDABLE CAPABILITY, EARNING PLAUDITS FROM ALLIES.

BY ELAN HEAD

IN MALI

A CH-147F Chinook and its two CH-146 Griffon escorts form a "coherent package" for forward aeromedical evacuation. **Lloyd Horgan Photo**

On Mali, the environment is not your friend.

That is true for many people in this West African nation, which encompasses vast swaths of the brutally hot Sahara desert and semi-arid Sahel region. But it is especially true if your task is to operate aircraft on complex missions at a moment's notice.

Such is the case for approximately 250 members of the Canadian Armed Forces who are currently in Gao, Mali, to provide a forward aeromedical evacuation capability to the United Nations (UN). The UN established the Multidimensional Integrated Stabilization Mission in Mali (MINUSMA) in 2013 with the aim of stabilizing the country after the previous year's Tuareg rebellion; since then, it has recorded more than 175 fatalities, making it the UN's most dangerous peacekeeping mission. Yet, even with militant Islamist groups continuing to stoke tensions, the environment itself poses as much of a threat to aircrews here as insurgents on the ground.

First there is the heat, which is relentless and suffocating. Temperatures of 45 C or higher are routine, taxing aircraft performance and pushing avionics to their operating limits. The heat is oppressive under any circumstances, but for aircrew going about their duties in full Nomex and body armor, it is infernal. There are special risks for maintainers, as fluids and metal parts can remain near their operating temperatures hours after a flight. According to Royal Canadian Air Force (RCAF) avionics systems technician Cpl James Hope, "Some of us have already gotten burns on aircraft that have been shut down for three or four hours."

Then there is the dust. Unlike the omnipresent dust in Afghanistan, which tends to be powdery and fine, the dust around Gao is like coarse grit on sandpaper. A Boeing CH-147F Chinook landing off-airport creates an enormous dust cloud that overtakes the helicopter from the rear, first obscuring the visibility of the loadmaster on the ramp, then spitting sand into the cabin before finally boiling up at the nose of the aircraft, turning the view out the cockpit windscreen brown at the most critical phase of flight.

At night, the coarse sand striking the rotor blades creates a visible halo of sparks in a phenomenon that has been dubbed the "Kopp-Etchells effect" (after two soldiers who were killed in Afghanistan in 2009). It is surreally beautiful to witness, but so intense as to be distracting under night vision goggles. The dust chews at aircraft seals and erodes paint off helicopter rotor blades, disrupting their track and balance. On the Chinook, it even grinds down the safety wires on the main rotor blade tips. "If you take a look, you can see the metal is becoming thin and brittle and we have to keep replacing them," said Hope.

To arrive at these everyday challenges, the RCAF had to overcome an even greater hurdle: standing up a forward aeromedical evacuation capability that is brand-new to Canada, then deploying it nearly 8,000 kilometres away.

Canada announced on March 19, 2018, that it would be sending helicopters to Mali as part of Operation Presence, its first large-scale deployment for the UN in nearly 15 years. By Aug. 1, Task Force Mali had achieved initial operating capability (IOC) in theatre. It declared final operating capability—with a total of three Boeing CH-147F Chinooks and five Bell CH-146 Griffon helicopters—just two weeks later.

"I'm really proud of our people," said Col Chris McKenna, the task force commander when *RCAF Today* visited Gao in October. (He has since been replaced by Col Travis Morehen.) "They didn't have a lot of time to prepare for this, but I'm always amazed at the Canadian Forces being able to be so adaptable and flexible and jump into a mission set like this with not a lot of warning."

DEVELOPING A CAPABILITY

The RCAF pulled off something similar a decade ago, when it stood up the Joint Task Force Afghanistan Air Wing to support Canadian soldiers in Kandahar province. When Canada acquired six CH-47D helicopters from the U.S. Army in 2008, it had been 16 years since it had sold its previous Chinooks to the Netherlands. Yet the RCAF managed to train a new generation of Chinook pilots and maintainers and deploy to Afghanistan in less than a year, remaining there until the withdrawal of Canadian troops in 2011.

McKenna, then a major, commanded Canada's Chinooks in Afghanistan. From 2014 to 2016, he served as the commanding officer of 450 Tactical Helicopter Squadron in Petawawa, Ont., where he helped re-establish the RCAF's Chinook capabilities using its new fleet of 15 CH-147F models. It took a while, he said, but the RCAF is "now much further ahead than we were in Afghanistan," particularly with respect to how the Chinooks interact with their escort helicopters, CH-146 Griffons. From a tactical perspective, he said, "I think now what we've arrived at after five years of capability development is a much more adaptable and robust package, which allowed us within about a two- or three-month period to adapt it to Mali."

The trauma bay in the back of the CH-147F Chinook is no easy place to work when temperatures exceed 40 degrees Celsius and you are wearing 50 to 60 pounds of armor. **Lloyd Horgan Photo**

The forward air evac teams include Canadian Army soldiers from the Royal 22nd Regiment to provide force protection and medical assistance. **Lloyd Horgan Photo**

However, one capability that was conspicuously lacking within the RCAF was dedicated forward air evac (in Afghanistan, Canada relied on allies for medevac support). Recognizing this deficiency, the RCAF began laying the groundwork around a year before Canada committed to MINUSMA.

According to McKenna, "we sent our experts all over the world to consult with folks who had done this mission set, to make sure that we were going to adapt best practices." However, these research and development efforts were largely siloed within aviation, medical, and procurement divisions.

"Without a tasked mission, to invest all of the time, money, and resources into collating them into a cohesive package—that had not occurred at the time of the [March 19] announcement," he said. "So that was really our focus post-announcement, to take these individual lines of effort that were ongoing and smash them together . . . to be able to come here to do this job safely."

The forward air evac teams operating in Mali comprise not only RCAF flight crews, but also medical personnel from the Royal Canadian Medical Service and Canadian Army soldiers from the Royal 22nd Regiment, or "Van Doos," who provide a force protection component. A key integration exercise occurred in May, when they all convened in Wainwright, Alta., to validate forward air evac concepts. "Wainwright was the first time we were all together, and it worked pretty seamlessly right off the bat, which was really great to see," said Capt Jackie Ruis, a Chinook pilot.

In addition to their escort role, the CH-146 Griffons provide utility transport in Mali. **Lloyd Horgan Photo**

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With the concepts proven, the next challenge was to package everything up and transport it to a remote airfield in West Africa. Complicating matters was the fact that the runway in Gao, which also serves the French-led counterterrorism effort Operation Barkhane, was under construction at the time of Canada's deployment, making it impossible to land large transport planes there until the work was completed. Instead, the first helicopters were flown via CC-177 Globemaster to Ouagadougou, Burkina Faso; reassembled; then flown over 400 kilometres into Gao.

When the runway finally reopened, it saw heavy use as the Canadians flew in the thousands of tons of materiel needed to sustain a year-long deployment. The task force established an operational support hub over 1,800 kilometres away in Dakar, Senegal, where it based a CC-130J Hercules that still flies regular sustainment missions. But for the initial push, it also used the CC-177 and a contracted Antonov An-225 (for flights from Trenton, Ont., to Dakar) and Ilyushin Il-76 (from Dakar to Gao).

"Some days we had an Il-76, a C-17, and a Herc all landing within an hour of each other," recalled McKenna, pointing out that simply handling so much materiel is a daunting task in itself. As task force commander, the biggest problem he had was determining how to prioritize loads in order to meet the deadline for IOC. "Thankfully our Herc teams in Dakar were unbelievably flexible. They were able to re-prioritize loads within hours for us, to ensure that the next gateway was going to be met. . . . And we were able to get it all done," he said.

A FLYING TRAUMA BAY

Canada hasn't skimped on the service it's providing to the UN, neither from an aviation perspective, nor a medical one. Its forward air evac program, called the Canadian Medical Emergency Response Team (CMERT), is based on the British MERT model, and takes full advantage of the Chinook's spacious cabin to deliver a sophisticated medical capability.

"CMERT aims to bring essentially a resuscitation room right to the point of injury," explained Maj Andrew McLaren, a medical specialist who in October was leading one of three four-person medical teams, each composed of a critical care physician or anesthesiologist, a critical care nurse, and two medical technicians. "We load multiple patients in and we treat it like a trauma bay in a hospital, where we can take all of the technology that we would in a hospital, but moving rapidly towards, say, a surgeon, which is what a patient needs."

Of course, it's not exactly like a trauma bay in a hospital. For one thing, it's hotter. "Just operating in temperatures of 40 or 50 degrees [C] in the back here, with 50 to 60 pounds of armor on, it can be very restrictive," McLaren continued. "Operating as a resus team at home is difficult at times already, but now we have the body weight, and weird body positions, and we're on our knees, and we're in 50 degrees of heat, and we're tethered to a moving platform. And so all of that is stuff that is not taught in medical school, or taught at hospitals at home."

The CH-146 Griffons are equipped with Dillon M134 Miniguns. Four out of five also have GAU-21 .50-cal machine guns. **Lloyd Horgan Photo**

"From the moment it started, there was a lot of work on how to configure the aircraft with patients and ourselves on board," added Maj Marie-Andrée Lavoie, a surgeon and CMERT lead who arrived in threatre in January 2019.

The four core medical personnel—already a large team for a helicopter—are further supplemented by four force protection soldiers with basic medical training. These soldiers ride near the ramp of the Chinook, and are the first to egress on a scene, clearing the way for the medics. However, after the aircraft lifts with a patient, "we incorporate them into the team, so now we're a team of eight, and that allows us to more thoroughly apply the technology and treat more patients," said McLaren.

Meanwhile, the Chinook is always escorted on medevac missions by two armed Griffons, one of which serves as an on-scene commander while the other scans for external threats. According to McKenna, that differs from the approach taken by the Germans who previously provided forward air evac to MINUSMA using NHIndustries NH90s, and who used Airbus Tiger escort helicopters only as threat conditions warranted.

"Our view was that … medevac package is a coherent package of Chinook and Griffon," said McKenna. "To be able to do this safely, we assess having that Griffon there as an on-scene commander, as a top cover, as a potential to provide fire and provide illumination. . . . So that's very Canadian, and we were able to get that all put together and exercised in a short amount of time."

The Canadian teams had also conducted many realistic training missions, in cooperation with ground forces from partner nations. These regular exercises simulate the real thing as closely as possible, from the initial scramble of the crews, to the transfer of volunteer "patients" into waiting ambulances back at the airfield. And they have paid off, according to Ruis, who was a pilot on one of Canada's first medevacs.

"Our training has been so good, it just felt like I was going on another flight," she said. "It's a really good feeling knowing that if someone needs us, we're here to help."

As with any capability that is rapidly introduced, however, there are some lessons, one of which is the need to develop CAF predeployment training. "We don't have a Canadian forward air evac course, so coming back from this experience, we can put all our knowledge together to perhaps build a course to help our future members," said Lavoie. "We've been moving quickly, doing all this training. So now we know exactly what is required."

By mid-June, with approximately three months remaining in the deployment, Task Force Mali had flown over 50 air mobile operations and performed 40 casualty evacuations. The Griffons had flown about 2,200 hours, averaging 200 hundred a month since the mission began, while the Chinooks had over 1,000 hours, or around 100 per month.

PRIDE IN THE MISSION

While the tempo of medevac operations in Mali is relatively low compared to theatres like Afghanistan, the Canadians' mere presence is a mission enabler for partner nations like Germany, which contributes ongoing intelligence support to MINUSMA.

A German officer responsible for force protection, who wished to be identified only as David for security reasons, explained that German troops rarely venture farther from camp than a distance that would allow them to return a critical trauma patient during the so-called "golden hour."

During the month-long gap between the cessation of Germany's forward air evac operations, and the start of Canada's, this distance shrank to just 50 kilometres in a rainy season that turned dirt roads into muddy obstacle courses. With the Canadian capability up and running, "we are basically able to operate in a circle of around 200 kilometres," he said. "Without the helicopters, without forward air capability, we cannot fulfil our mission."

Canada is also using its spare capacity to support MINUSMA with tactical airlift operations, including the insertion and extraction of troops and their gear. In September, for example, the task force used its Chinooks to transport German soldiers to a populated island in the wide, braided Niger River. According to David, the island had not been visited by UN forces in more than three years, and "the capacity of these helicopters gave us the [ability] to stay there overnight" while conducting intelligence missions.

Sgt Maj Sebastian Hoek, a Dutch officer who works with the task force to coordinate tactical airlifts for the Netherlands' Long Range Reconnaissance Patrol (LRRP) Task Group in Mali, praised the Canadians not only for their capabilities, but also for their "can-do mentality."

"They're here to fly, and in everything they do, they show it," he said. "When they see something come up that could be a snag, they think with us, how could we work around this so everything is in order and the mission can go ahead?"

McKenna suggested that the development of a forward aeromedical evacuation capability and the skills being honed during this deployment will have lasting benefits for Canada, both at home and abroad. "As we return to Canada, we have a capability here that we can apply to many other theatres, or even domestically in a disaster," he said. "I think this is just another really good tool in the toolbox for tac aviation in Canada and the RCAF."

In the meantime, he said, Canada's advanced CH-147F Chinooks and capable flight and medical crews are making a real contribution to an under-resourced theatre that's badly in need of their services. El Salvador is supporting MINUSMA with six armed MD 500E helicopters, but there are no other helicopters currently assigned to the UN mission.

"I think Canada is providing something here that's really tangible for the force, and hopefully is being seen as very relevant and helpful," he said. "There's a lot of pride in having such an important mission set and being relied upon by so many, and there's a lot of pride in wearing the blue beret here, and being able to help our partners in West Africa."

—with files from Lisa Gordon

An award-winning journalist, ***Elan Head*** *is also an FAA Gold Seal flight instructor with helicopter and instrument helicopter ratings, and has held commercial helicopter licenses in Canada and Australia as well as the U.S. She is on Twitter @elanhead and can be reached at elan@mhmpub.com.*

Members of the Canadian Armed Forces deployed to Mali pose for a group photo on their ramp in Gao. **Cpl Ken Beliwicz Photo**

To celebrate its 75th anniversary in 2018, 430 Squadron created a specially painted CH-146 Griffon with a falcon on the side – representing the gyrfalcon from the squadron's emblem. The helicopter made numerous appearances during the year, including at the 2018 Royal International Air Tattoo in the U.K. **Mike Reyno Photo**

PROUD & Engaged

IN SPITE OF FREQUENT DEPLOYMENTS, 430 TACTICAL HELICOPTER SQUADRON HAS RETAINED ITS EXPERIENCED PERSONNEL. ITS SECRET? THE QUEBEC-BASED UNIT IS TIGHT-KNIT, TAKING PRIDE IN ITS UNIQUE LANGUAGE AND CULTURE – AND IN A JOB WELL DONE.

BY LISA GORDON

When people are posted to 430 Tactical Helicopter Squadron in Valcartier, Que., they almost never want to leave. That's because the squadron, one of just two French-speaking units in Royal Canadian Air Force (RCAF) tactical aviation, draws many of its members from within the province of Quebec. To them, it's home.

And as everyone knows, it's pretty unusual for military members to be posted close to home.

"It tends to be a very cohesive, very tight unit," said LCol Mike Babin, commanding officer of 430 Squadron. "They are from there; they never want to leave. It is common to find people who have served a total of 15 or 20 years there, which is quite rare."

Babin himself is a good example. Originally from Val d'Or, he is currently serving his third posting at the Valcartier squadron.

But language aside, there is another factor that helps set 430 Squadron apart, and that is the strength of its Reserve force.

"It tends to be healthy; we keep our Reservists for a long time for the same reason, which is they don't want to move," Babin commented. "Some are even putting in exemption requests to serve beyond the mandatory retirement age [of 60]."

Currently, of the squadron's roughly 53 pilot positions, seven are staffed by Reservists.

Under the umbrella of 1 Wing Kingston, which administers tactical aviation, 430 Squadron includes about 290 personnel and flies the CH-146 Griffon helicopter. Generally, said Babin, the squadron is assigned around 15 aircraft, although numbers vary.

"Our job is to support the Army. The operational tempo of the squadron is very high. We are constantly deployed somewhere as a unit or with smaller detachments."

Last year, 430 Squadron was sent to Northern Iraq for Operation Impact. In January 2019, the squadron was also deployed to Mali for Operation Presence, where the Canadian contingent is expected to be based until the end of August.

In 1995, 430 Tactical Helicopter Squadron obtained its current fleet of CH-146 Griffon helicopters. Its approximately 15 aircraft are deployed domestically and internationally. **Mike Reyno Photo**

430 Squadron is busy. This fall, it will prepare yet another detachment for future deployment. **Mike Reyno Photo**

In Mali, the Griffon fleet had clocked a 93 per cent serviceability rate from January to mid-June 2019. **Mike Reyno Photo**

PROUD HISTORY

In 2018, 430 Squadron celebrated its 75th anniversary.

The year included several milestone moments, including a parade through the streets of Quebec City on Sept. 14, 2018, when the traditional Freedom of the City ceremony was held at City Hall. The following day, almost 450 people attended the squadron's 75th anniversary ball at Hôtel Le Concorde.

A specially painted Griffon with a falcon on the side – representing the gyrfalcon from the squadron's emblem – made numerous appearances during the year, including at the 2018 Royal International Air Tattoo in the U.K.

And, after more than two years of research and writing, Canadian aviation author Marc-André Valiquette released a book, *Swiftly & Surely: 430 Silver Falcon Squadron History*, which celebrates the unit in both words and photos.

Formed on Jan. 1, 1943 as an army co-operation squadron in England during the Second World War, 430 Squadron

When a Chinook conducts a medical evacuation in Mali, two Griffons fly alongside as armed escorts. **MCpl Bryan Carter Photo**

was re-designated the following June as 430 Fighter Reconnaissance Squadron.

From 1943 to 1945, it flew P-40 Tomahawk, P-51 Mustang I, and Spitfire XIV aircraft. In 1944, its members participated in the preparations for the Allied invasion of Normandy by flying photo reconnaissance missions and by supporting the 2nd British Army on D-Day.

Disbanded in Germany in 1945 following the war, 430 Squadron was reactivated in North Bay, Ont., in 1951. Equipped with F-86 Sabre aircraft, the unit was sent overseas to France and remained there until disbanded on June 1, 1963.

Two months later, it was reactivated as 430 Strike/Attack Squadron and flew CF-104 Starfighters in Germany until 1970, when it was disbanded for the third time.

On Jan. 1, 1971, the squadron was permanently reactivated as 430 Tactical Helicopter Squadron in Valcartier. Its members flew the CH-135 Twin Huey and CH-136 Kiowa helicopters until 1995, when the squadron obtained its current fleet of CH-146 Griffon helicopters.

A BUSY SQUADRON

Since he returned to 430 Squadron as its commanding officer almost two years ago, Babin said the operational tempo has been very high.

"I have never seen the whole squadron together since I've arrived," he said. "People are constantly deployed."

In addition to the overseas deployments in Iraq and Mali, 430 Squadron has been busy at home, too.

Most recently, it deployed two helicopters this past March to assist in the recovery of an RCAF CC-138 Twin Otter belonging to 440 Squadron, which was damaged during a hard landing on sea ice north of Inuvik.

Then, during spring flooding in Ontario, two 430 Squadron Griffons flew to Borden, Ont., to support Canadian Army relief efforts.

Babin said the squadron is on constant standby for regional response if required.

"We are certainly busy, in the sense that you either just came back from deployment, you are deployed, or you are about to go," said Babin. "Nobody at 430 can say they don't feel the operational tempo. This squadron has been running on a small percentage of its manning. But the tempo is good, it's healthy. I wouldn't say we are overstretched – but we are certainly at capacity. Morale is good, and people are happy."

A high operational tempo could pose challenges when combined with the current personnel shortages being experienced within the Canadian Armed Forces. But Babin said 430 Squadron is lucky to be somewhat of an anomaly.

"We are affected a bit differently from other squadrons in terms of geographic location and pilot demographics," he explained. "At 430 Squadron specifically, we've been faring pretty good. One of the reasons is we're in a geographic location that is attractive. They tend to be happy here. However, we have seen our Reserve force declining slowly."

Babin also noted the Air Force is working to combat the overall labour shortage on several different levels.

"It will come around and stabilize. We just have to figure out many solutions – not one silver bullet. We will have to be creative and figure out what works."

PRESENCE IN MALI

In March 2018, the Canadian government announced it would deploy an air task force to support the United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA).

Originally slated to be a 12-month mission, Operation Presence includes an aviation battalion of about 190 personnel tasked with providing around-the-clock air medical evacuation capability in support of UN ground forces. Its secondary function is to fly utility missions that move troops, equipment and supplies as needed.

The battalion fleet includes five CH-146 Griffons and three CH-147F Chinooks. While a Chinook conducts a medical evacuation, two Griffons fly alongside as armed escorts, ensuring "section integrity."

Maintenance is performed around the clock in Mali. **Cpl François Charest Photo**


A CH-146 Griffon helicopter flies past a haboob (sandstorm) heading towards Gao, Mali. **Cpl François Charest Photo**

The tail rotor of a CH-146 Griffon is cleaned as part of regular maintenance during Operation Presence. **Cpl François Charest Photo**

A 430 Squadron Griffon helicopter participates in an escort mission during Operation Presence. **Cpl François Charest Photo**

Tasked with supporting the Canadian Army, 430 Squadron is experiencing a high operational tempo. "We are constantly deployed somewhere as a unit or with smaller detachments," said commanding officer LCol Mike Babin. **Mike Reyno Photo**

LCol Mike Babin is commanding officer of 430 Squadron and commanding officer of the Op Presence aviation battalion. **Cpl François Charest Photo**

Under the umbrella of 1 Wing Kingston, which administers tactical aviation, 430 Squadron includes about 290 personnel. It has a strong Reserve component. **Mike Reyno Photo**


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The 430 Squadron anniversary bird soars over Quebec City. **Mike Reyno Photo**

Babin – who spoke to *RCAF Today* from Mali, where he is commanding officer of the Op Presence aviation battalion – said 430 Squadron makes up about half of the aviation unit, which also includes members from 450 Squadron in Petawawa, Ont., where the Chinooks are based. The unit is further augmented by members who hail from a variety of supporting units across the Canadian Armed Forces.

Collectively, their function is critical to the UN efforts in Mali.

"We're the only military medevac capability in this mission," explained Babin. "There are over 13,000 troops in Mali for MINUSMA right now, from over 50 countries. There are civilian operators providing varying levels of medical evac, but we are the only military provider in this theatre.

"When it comes to risky, high-threat missions to evacuate soldiers on the battlefield, we are the only ones with the capability to do it here."

The Canadians' presence in theatre allows ground troops – mostly Dutch, until their departure in May, and now German – to extend their range of ground operations, knowing they are backed by a medical evacuation team that will respond within a prescribed timeline.

"Typically, most European nations calculate their [mission] range based on their ability to support medical capability to their troops," continued Babin. "By ground, that is slow. So, the range isn't that far. Before we showed up, they operated in close range to Gao and often deployed a medical team with the troops. After we arrived, they could send soldiers on foot patrols in towns that had never seen a UN soldier before."

Canada's Chinook and Griffon helicopters replaced a German air medical evacuation team that flew different types of aircraft, although none as big as the Chinook.

In preparation for Mali, the RCAF added a weapons kit, sensor cameras, aircraft survival equipment, and countermeasures systems to each Griffon. A weight reduction program saw the removal of certain components, including floor coverings and most of the IFR avionics, allowing the aircraft to eke out some extra power.

TESTING LIMITS

The Canadians face many challenges in Mali, foremost among them the climate. With average daytime temperatures of 44 C, the aircraft are constantly working at their operating limits.

"The Chinook is famous for its ability to operate in extreme environments, but even it is meeting a challenge here," said Babin. "There is no aircraft that is not affected by the heat."

Impressively, as of June 14, the air task force hadn't missed a launch due to aircraft serviceability issues. The Griffon fleet had clocked a 93 per cent serviceability rate since January, with the Chinook at 96 per cent. Maintenance is performed around the clock.

In addition to the climate, Mali's sheer size – coupled with a dearth of refuelling stations and other aviation assets – means the challenge of figuring out how to complete a 700-kilometre round trip medevac mission is significant. In many cases, crews have just minutes to perform a casualty extraction. They compare Mali to Canada's Arctic region: barren, with a hostile climate and few signs of humanity.

In June, Mali's rainy season was looming. Weather was becoming unpredictable, and weather stations are practically non-existent.

Capt Ryan Kelly, an aircraft commander and Griffon section commander from 430 Squadron, said one of the biggest threats is the dreaded haboob – a fierce dust storm that can whip up a wall of sand more than 6,000 feet high.

"When a haboob is happening, you have to be prepared for it to go down to zero zero weather," he told *RCAF Today*. "Weather reporting here is unstable. A lot of times we just have to take off and see if we can help, if the risk assessment warrants it."

Crews must be prepared to make tough decisions. This might mean trying to maintain a lower fuel consumption rate, or landing and idling in a low population area, waiting for the

A CH-146 Griffon helicopter returns to Camp Castor following a training mission in Mali. **Cpl François Charest Photo**

Left: Maj Mathieu Bertrand, Aircraft Commander / DCO 430 ETAH, Middle: Capt Jeremiah Eastwood, First Officer, Right: Cpl Miguel Sigouin, Flight Engineer. **Mike Reyno Photo**

haboob to pass. As Kelly pointed out, landing in the Saharan desert poses its own set of risks inherent with the degraded visual environment.

Since arriving in January, Kelly has flown 150 hours, or about 30 hours per month. He's participated in three medevacs so far.

"All three have been quite different. The first one we did was within a week of my arrival in Mali. It involved an improvised explosive device on a main supply road. Sri Lankans were performing a convoy transport and got injured and so we launched."

Kelly said the target was more than 150 nautical miles away, so the team couldn't recover directly to Gao.

"We had to co-ordinate where we would recover and get fuel. On that one, we got close to the point of incident, and contacted ground troops who had secured the area. We sent the Chinook in – we had only five minutes of play time, they got in quickly and extracted the injured troops. Just in the nick of time, we had to recover to an FOB (forward operating base) to get fuel. Luckily, weather wasn't an issue."

Encased in heavy protective equipment and battling the stifling heat, air task force crews will often consume three litres of water during a flight.

"You come back drenched and still dehydrated," said Kelly. "Somehow your body adapts to it."

CLOSING OFF THE MISSION

Canada's forward aeromedical role in Mali will be assumed by Romania later this year.

Babin said the first troops are expected to arrive in mid-July to begin building the Romanian camp, which should be operational by Oct. 15.

In the meantime, Canada will begin to initiate a gradual departure at the end of July, with medevac capability maintained until the end of August. Logistics personnel will pack up the camp, with the last pair of Canadian boots expected to leave Mali later this fall, according to Babin.

To fill the gap, the commanding officer expects the UN may rely on contracted civilian medevac operators. "There are some good and capable companies here."

As for 430 Squadron, Babin said the priority is to prepare yet another detachment for future deployment.

"We don't know where yet. So, we start with very generic training, then collective training with the Army, and then mission-specific training. If we don't know our destination, we are on what we call 'high readiness.' Every year, we start that cycle again."

He looks forward to fall, when he expects the whole squadron to be together for the first time in a long while.

"The challenge then will be to reconnect everyone into one big family."

In the meantime, hardships continue to be commonplace in Mali. It's an extremely demanding theatre that challenges the endurance of both people and aircraft. But none of that obscures the satisfaction taken in a job well done.

"I am here with a great bunch of people who are extremely motivated and proud to be doing the job we are doing," concluded Kelly. "But that doesn't change the fact that it is very challenging."

— with historical files from Capt Christian Déry of 430 Tactical Helicopter Squadron

***Lisa Gordon** is editor-in-chief of* Skies *Magazine. Contact her at lisa@mhmpub.com.*

Capt James Hodgson is on a three-year exchange with the French 1er Régiment d'Hélicoptères de Combat.
Olivier Le Comte Photo

Flying the Gazelle

HE MIGHT NOT BE ON OPERATION PRESENCE WITH 430 TACTICAL HELICOPTER SQUADRON, BUT CAPT JAMES HODGSON IS NONETHELESS FLYING FROM A BASE NEAR GAO, MALI—WITH A FRENCH GAZELLE.

BY CHRIS THATCHER

Capt James Hodgson was probably always destined for a mission in Mali. A Bell CH-146 Griffon pilot for three years with 430 Tactical Helicopter Squadron (THS) in Valcartier, Que., he likely would have deployed with the squadron to Camp Castor, a United Nations base near the central city of Gao, as part of an air task force providing transport and forward aeromedical evacuation in tandem with Boeing CH-147 Chinook aircrews, medical personnel and force protection teams.

Instead, he waves periodically to the Griffon crews transiting the austere Mali terrain as he pilots an Aérospatiale Gazelle SA 342 M1 with the 1er Régiment d'Hélicoptères de Combat on Operation Barkhane, a French-led stabilization and anti-insurgent mission across the five Sahel nations of Burkina Faso, Chad, Mali, Mauritania and Niger, which includes a detachment of some 1,000 personnel based near Gao.

"They are physically located not too far from me, but there's very little cooperation between those operations," he said. "I see them flying quite regularly but I don't interact with them much, unfortunately."

Since October 2017, Hodgson has been an exchange officer with the combat helicopter regiment in the northeastern French city of Phalsbourg, part of the Army's light aviation brigade, known as Aviation Légère de l'Armée de Terre (ALAT). The three-year exchange can often be eye-opening for young Royal Canadian Air Force (RCAF) officers, introducing them to a different social and military culture and obliging many to consider other ways of planning and conducting operations.

Earlier this year, the regiment was part of Operation Barkhane, a French-led stabilization and anti-insurgent mission across Sahel. **ALAT Photo**

For Hodgson, it has meant a move with his common law spouse to a new home near Strasbourg and a test of modern communications to remain connected with family back in Canada. "I think not only in my work life, but also in my social life and home life, this exchange has been very beneficial and has caused me to reflect on what we consider normal," he said in an interview during a pause in operations from Mali. "It gives me and my family a better perspective on life."

That change in viewpoint has been particular evident during exercises and operations. Though Hodgson had a combat tour with 430 Squadron under his belt as part of the first rotation to assume responsibility from 427 Special Operations Aviation Squadron in late 2016 for support to Canadian and coalition special forces operating in northern Iraq, he began flying the Gazelle at the equivalent of an operational training unit, learning everything from basic to tactical handling, instrument flying and night operations.

While the Griffon is a multirole workhorse, the Gazelle is a lighter and more agile platform with a narrower reconnaissance and attack role, and one of three helicopters operated by the regiment. The unit also flies the Eurocopter EC665 Tiger attack helicopter and the NHIndustries NH90 transport aircraft.

"Having all those assets centralized at the same unit means the spectrum of tasks that they can be asked to accomplish is much broader," said Hodgson, noting that the Gazelle rarely operates on its own; rather, it is integrated with other regiment assets "that all compliment each other with their capabilities."

Where the Griffon has a crew of three, the Gazelle operates with just a captain and a pilot, each with distinct roles.

"It means more responsibility shared among fewer people, so there is a period of learning the new procedures [and] appreciating the way the aircraft handles—it is much more forgiving than the Griffon in terms of manoeuvres," said Hodgson, who received his Wings in April 2014.

"The roles of each helicopter and of each crew member within those helicopters are very specialized and separated compared to what we would see in Canada. In France, the role of the aircraft captain is that of managing the mission, managing the sensor systems. And the role of the pilot, which is the equivalent of the co-pilot in Canada, is to operate the aircraft safely and enable the efficient use of the sensor systems by the captain."

Tactical aviation is also far more integrated with the Army. RCAF squadrons align exercises and prepare for operations with the Canadian Army's light infantry battalions, but in France the ALAT is a direct branch of the Army.

Still, the mission is often similar. Like the WESCAM MX-15 electro-optical and infrared sensor on the Griffon, the Gazelle carries thermal imaging capability mounted above the pilot for reconnaissance and to support targeting for an anti-armour missile system when in the attack role.

"The general idea is the same of locating and characterizing the enemy," said Hodgson. "However, the Griffon also has a variety of other roles that are not applicable to the Gazelle, such as transporting troops, parachuting, and rappelling, among others."

The Gazelle, however, can also be configured as a sniper platform. An M1 variant with the thermal optics and missile system stripped out is often used for fire support. "In the backseat we will carry an elite marksman from the French mountain commando regiments to engage targets," he explained. "By stripping out the camera system, it lightens up the aircraft and gives us better endurance and we are able to intervene as required at greater distances."

That can be a challenge in turbulent conditions, he noted, but the Gazelle has a stabilization system and is surprisingly powerful for its weight and size. And in the hot and humid conditions of the Sahel, it has few competitors. "It manages the heat better than the average other helicopters in the area."

INFORMATION EXCHANGE

As the position implies, an exchange officer is both a resource for different ideas and a recipient of new thinking. Selection is based in part on a willingness to share the experience. (It's also based on being fluently bilingual, though Hodgson quickly discovered his French and the many dialects throughout France differ significantly.)

As a combat tour veteran in Iraq, Hodgson brought operational experience in hot and dusty conditions to a regiment of young aircrews. He also came with an approach to mission planning that has been developed over many years by 1 Wing, the RCAF's tactical aviation command.

"We have a very structured process for preparing large-scale missions, and that is something on operations I have been able to share with some of the other pilots and aircraft commanders. It exists here, but it is not written down and as concrete as it is for us in 1 Wing," he said.

Among the many lessons he is hoping to bring back is some fresh thinking for dealing with power lines. Because exercises and operations are often conducted over heavily populated areas, French helicopter crews have in the past experienced a high incidence of wire strikes. "They have a very rigorous set of procedures that enable the helicopters to safely accomplish their mission day or night and avoid these potentially unseen power lines—being able to manoeuvre above or even below them in some circumstances—which is something that doesn't really exist in our doctrine in Canada."

Hodgson has another year remaining and expects to continue the progression of a typical French pilot, honing his skill on the Gazelle. Already, he has participated in a large combat brigade-level exercise that involved over two dozen helicopters—"definitely more complex than I have been able to participate in in Canada."

Prior to deploying to Mali, he completed a course on how to safely operate the helicopter at night, guided by the aircraft captain using the thermal imaging camera. He's now hoping for an opportunity to change seats and train in the captain's role, acquiring the techniques for locating power lines, navigating difficult situations, and guiding missiles to target with the thermal imaging system.

There's also the possibility of another deployment. Hodgson said the regiment would likely have a pause after its mission in Mali, but French tactical aviation is active in a number of theatres.

As for his next posting in Canada, nothing has been confirmed. But with the experience he has acquired, one option on his radar is teaching advanced tactics at 438 THS in St. Hubert, Que.

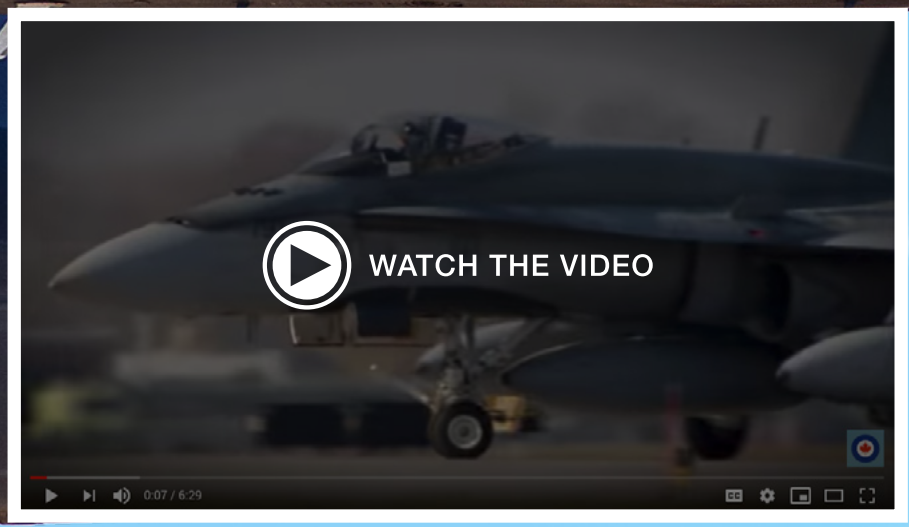
"I'm definitely hoping this exchange will give me the opportunity of sharing some of my experience and perhaps evolving the way we do things in Canada based on some of what I've learned over here."

More agile than the CH-146 Griffon, the Gazelle performs a similar reconnaissance role. **Olivier Le Comte Photo**

The lighter Gazelle handled the heat and humidity of Mali better than the Griffon flown by Hodgson's fromer 430 Squadron members. **Olivier Le Comte Photo**

The Gazelle can also be configured as a sniper platform. **ALAT Photo**

The Air Force will accept more contracted instructors for basic aircrew and Operational Training Unit production. **Galen Burrows Photo**



Below GLIDEPATH

HOW CAN THE ROYAL CANADIAN AIR FORCE CHANGE ITS PERSONNEL STRATEGY TO KEEP THE WORLD'S MOST TALENTED PILOTS FLYING OPERATIONAL MISSIONS? WITH A FEW SIMPLE CHANGES TO PILOT CAREER MANAGEMENT PRACTICES.

BY ANDY COOK

Any military pilot flying a precision approach radar (PAR) or "talk down" approach knows that if the controller calls them "below glidepath," the next instruction they get will be "adjust rate of descent."

The concept is simple: If you descend too far below the ideal trajectory, you may not make it to the runway. Reducing the rate of descent is necessary to get back on the approach path.

Just as an aircraft tries to maintain an ideal descent rate to touchdown, so too do air forces around the world try to maintain an ideal number of pilots to fly those approaches. When they get it right, air forces recruit and retain sufficient pilots to exactly offset the retirement of experienced veterans. But the Royal Canadian Air Force (RCAF) is falling victim to a seemingly voracious appetite for pilots in the commercial sector; and as such, it is descending well below the ideal personnel glidepath.

Deliberate measures must be taken to reduce the current exodus of trained pilots if the Air Force wishes to maintain full operational capability in the future. What can the RCAF do to promote the retention of experienced pilots? The simplicity of some answers might surprise you.

A November 2017 article in *Air Force Times* noted that even though United States Air Force (USAF) pilots could be offered as much as US$455,000 to sign on for up to 13 years of continued service, very few pilots were doing so.

Given our American counterparts' lacklustre response to their retention bonuses, and given that many RCAF pilots are leaving for fixed initial salaries which are about half of what they made in the Air Force prior to retirement, it's not surprising that an April 2018 report on RCAF pilot releases found that pilots were not leaving to make their fortunes on the outside.

Clearly, if someone is willing to give up a career in the RCAF to make 50 per cent of their military salary initially, bonuses will not be an effective retention mechanism. If money is not the answer, what is?

According to that same April 2018 research, geographic stability and issues such as family health care and education were uppermost in the minds of RCAF pilots who sought voluntary release. My own personal experience as a military commander confirms that conclusion. I met many pilots and other Canadian Armed Forces (CAF) members over the years who cited the CAF posting system as a major stressor in their lives.

As a former personnel officer (or career manager), I can confirm that the CAF believes a broad variety of geographic and operational experiences make for a well-rounded officer or non-commissioned member. As a result, once an individual has been in one location for a significant period of time, the pressure to move that individual—quite literally for the sake of moving them—results in a new posting.

Each military move costs taxpayers approximately $40,000. And despite the challenges associated with family members trying to find new jobs, make new friends, find new doctors and deal with new school systems in the new place of duty, "Service Before Self" means that the military member and their family are expected to uproot themselves in the interest of serving Queen and Country.

Postings are not as stressful for all RCAF members. Some like the excitement and new experiences, especially early on in their careers. But many others find

those moves stressful. I have personally met members who were forced to outlay tens of thousands of dollars to provide continuity of health care when moving from one province to another (due to provincial discrepancies on treatment funding and waiting lists for those treatments). And I've met a family who (after several quick postings at an unforeseen rate) fell victim to a softening real estate market and went from having a comfortable retirement plan to avoiding personal bankruptcy by only a hair's breadth.

Like these examples, many experienced RCAF pilots make the decision to leave when faced with a new posting they feel will place too much stress on their family. Faced with a choice of disrupting the family or taking a 50 per cent pay cut for a few short years before making more than their current salary as an airline captain, many RCAF pilots choose the latter and endure the short-term financial pain for the longer-term family stability afforded by not moving.

As such, they leave the RCAF because they come to a point where they must choose between Air Force and family. But what if the RCAF could change its personnel policies to understand that as pilots gain experience, they also start families, and eventually those families become more important to them than the RCAF? How could the RCAF change its personnel strategy to keep the world's most talented pilots flying operational missions as opposed to flying the red-eye between Toronto and Calgary?

First and foremost, the RCAF should run its personnel management more like a business, by maximizing its return on a very significant training investment. At present, newly-trained pilots are required to serve seven years in the RCAF after receiving their military Wings. But many of those new pilots spend more than a year waiting to train on their operational aircraft, and that training often takes several months. By the time they are operationally trained, many pilots have expended up to two years of that seven-year commitment waiting for training! This is a waste.

At a minimum, the seven-year obligatory service period should be amended to begin after completing operational training as opposed to Wings qualification. And postings within that seven-year period should be avoided where possible.

For some aircraft types and remote locations with fixed tour-of-duty lengths (e.g. Twin Otters in Yellowknife), a second posting within the seven-year restricted release period may be necessary. But where it is not, retaining pilots on the same aircraft type—or at least in the same geographic location—is good for the pilot (it promotes family stability) and good for the taxpayer (the return on that $3.5 million initial training investment is maximized and a $40,000 move at public expense is avoided).

With a more business-like pilot HR strategy, RCAF pilots would be streamed to their operational aircraft quickly, their seven-year restricted release period would begin when they become operationally trained, and they would fly that first aircraft for as much of that period as possible. That seven-year period, then, would form the bedrock of RCAF personnel planning.

At that seven-year point, pilots would be faced with a decision. Several options would be available at this point: Release to the private sector; apply to become eligible for command and senior flying positions; apply to become a member of a non-flying air ops occupation focused on supporting flying operations (e.g. Combined Aerospace Operations Centre, Wing operations, etc.); or become an instructor pilot (IP) at basic or advanced flying training schools or operational training units (OTUs).

Depending upon vacancies at flying units at the time, pilots completing their seven-year obligatory service period could also be offered short contracts of one to three years to remain flying at their current unit, with salary incentives dependent on the length of the interim contract.

Each of these options should involve a modest period of obligatory service and pay increases commensurate with the complexity of the aircraft flown, the pilot's responsibilities, and comparability with similar roles in the civilian world.

Those who chose release would be thanked for their service. Those who applied for and were selected for the command stream would receive leadership professional development training and experience and would be eligible and expected to take on more senior (and Joint) roles and responsibilities. Those who chose to apply their previous expertise to operational support issues would become critical mission enablers. And those who wished to (and were identified as possessing the skills to) train *ab initio* or advanced pilots would have the opportunity to continue to fly regularly and impart the lessons learned in their seven-year obligatory service period to less experienced pilots.

Just as the RCAF tried to create a positive, family-friendly environment in the seven-year obligatory release period, so too should it make it attractive to pilots to remain in the RCAF following that obligatory service. Instead of forcing them to move, the RCAF should offer a range of options from which pilots choose to further their careers. Where possible, post-obligatory service contracts should reflect an organizational commitment to family stability (moves should occur only for those who desire them, where possible).

With a more business-like pilot HR strategy, RCAF pilots would be streamed to their operational aircraft quickly and their seven-year restricted release period would begin when they become operationally trained. **Mike Reyno Photo**

Many experienced RCAF pilots make the decision to leave when faced with a new posting they feel will place too much stress on their family. **Cpl Dominic Duchesne-Beaulieu Photo**

Further, compensation for members who apply for and are selected for follow-on roles should be competitive with civilian equivalent roles.

If the RCAF implemented these changes correctly, only a small fraction of the total cadre of pilots trained would be eligible for conversion to a follow-on contract. Dollar amounts for pay differentials would not be overly high and if the RCAF implemented a sub-occupation of the main pilot occupation (e.g. senior pilot), it would be more strategically palatable to initiate a pay scale in line with similar skills in the commercial sector, as the military already has for physicians and lawyers.

Above all, RCAF strategic leaders must understand and accept that the RCAF they joined was the RCAF of the 1980s. The world has changed, and the RCAF must change as well if it hopes to attract and retain talent.

The RCAF must discard its current employment methodology which wastes significant portions of obligatory service and forces pilots to move for the sake of moving, regardless of the cost to the family. With some simple policy changes, it can maximize the return on the initial training investment—with a long and stable period of obligatory service following initial operational training. Most importantly, with a focus on family and geographical stability, the RCAF may just prove that it can develop a sustainable and efficient pilot retention model that is reliable, predictable, and relatively immune from external commercial "boom and bust" cycles of pilot hiring.

By changing to a model whereby RCAF pilots bid for follow-on employment after their obligatory service—and are well compensated to do so—the RCAF could demonstrate the agile policy development necessary to retain talent in the face of a global pilot shortage. Doing so would stem the outflow of trained pilots to commercial cockpits and bring the RCAF pilot management system back where it should be: "On course, on glidepath."

Colonel (ret'd) Andy Cook *is a former RCAF pilot with over 28 years of experience. He has flown the CT-114 Tutor, CC-130 Hercules, and CC-150 Polaris operationally. During his time in the RCAF he also served as a career manager, and commanded at the deployed, unit, and Wing levels. He is currently employed as operations manager and director of flight operations at West Wind Aviation in Saskatoon, Sask.*

TYPHOON SEASON

AS THE FIRST RCAF EXCHANGE PILOT WITH ROYAL AIR FORCE NO. 6 SQUADRON, CAPT JORDAN RYCHLO IS BLAZING HIS OWN TRAIL ON THE EUROFIGHTER TYPHOON.

BY CHRIS THATCHER

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As the first RCAF exchange officer with RAF No. 6 Squadron, Capt Jordan Rychlo is "learning to walk again" on a Eurofighter Typhoon. **Jamie Hunter Photo**

Capt Rychlo before taking flight with the Typhoon. **RAF Photo**

Landing the Typhoon with a drag chute on an exercise. **RAF Photo**

Completing a pre-flight check before take-off. **RAF Photo**

When the time comes to begin evaluating the candidates for the Royal Canadian Air Force next-generation fighter, Capt Jordon "Leak" Rychlo could well be the Air Force resident expert on the Eurofighter Typhoon.

For the past year, he has served as an exchange officer with the Royal Air Force No. 6 Squadron at Lossiemouth in northern Scotland, a unit known as the flying can openers for their prowess at killing tanks in North Africa during the Second World War.

Rychlo doesn't expect to have a vote in the eventual competition, but after numerous exercises and operational missions flying the Typhoon FGR Mk IV fighter jet with a frontline squadron, he will have plenty of insight into the capability of the aircraft, if he is asked.

A graduate of the University of Saskatchewan who had his eye on medical school if the "pilot thing" didn't work out, Rychlo earned his Wings in 2012 and joined 410 Tactical Fighter Operational Training Squadron in Cold Lake, Alta., the following year. Though the thrill of flying a CF-188 Hornet won't soon be forgotten, the Typhoon has been an exhilarating step up, he admitted.

"They are jets at completely the opposite ends of the [lifecycle] spectrum, which is presenting a very good opportunity for me to see both," said the former resident of Outlook, Sask.

However, while the Typhoon and the RCAF's legacy Hornet are vastly different in appearance and design, both are employed in similar roles, he noted. The Hornet was designed from the ground up as a multirole strike fighter meant to operate off ships and able to fly at slow speeds, while the Typhoon is better suited to flying high and fast and attacking targets from long ranges. But both jets have been deployed as part of coalition operations against the Islamic State over Iraq and Syria and both provide quick reaction alert (QRA) to long-range Russian and other aviation nearing domestic airspace.

"They are doing exactly the same mission as we would," Rychlo said of No. 6 Squadron. "They use the aircraft in an air-to-air role and for offensive counter-air, defensive counter-air just like we would use the Hornet. But each jet has its own strengths and weaknesses that each country tends to capitalize on."

The effect of the Typhoon's big delta wing and other attributes, however, became instantly apparent once he stepped into the cockpit.

"You can really notice the difference when you are up at 30,000 to 40,000 feet in the Typhoon and you are not slowing down, the jet isn't suffering from the thin air like a multirole fighter like the Hornet would."

As he's grown more comfortable in the cockpit, he's developed a greater appreciation for the jet's capabilities. The Typhoon was designed as an air interceptor and air superiority aircraft that only later added bomb dropping to its arsenal, which means "it is differently integrated into the aircraft," he said. "That has taken some getting used to."

So too has been the leap from the Hornet's slower speed to the Typhoon's power and rate of turn. "It is much more punishing to fly. I can pull and sustain 9 Gs in the Typhoon as long as I want, whereas the Hornet, you'd pull 7.5 to 8 Gs and it bleeds energy very quickly, which has its advantages in a dogfight too. The Typhoon is an extremely powerful and fast aircraft."

The aircraft is in the process of incorporating new weapons, including the Storm Shadow low-observable air-launched cruise missile, the Meteor radar-guided beyond visual range air-to-air missile, and the Brimstone air-to-ground attack missile. "That has been exciting to learn these new weapons," he said. "They help make the Typhoon really shine."

Due to sovereignty-related issues, Rychlo has not been permitted to work QRA duty in the United Kingdom, but the role is similar to the NORAD mission RCAF fighter squadrons perform, intercepting Russian aircraft approaching national air defence identification zones, he explained, though the RAF's approach is different than the binational command of NORAD.

"It has been interesting to see that and gain that fresh perspective," he said. "You get the same result out of two very different ways of doing things. And the result is a very effective, very professional air force. That will be valuable to bring back to Canada."

As a Hornet pilot with experience in close air support missions, Rychlo is helping train RAF pilots as they prepare for deployment to Op Shader against ISIS. **Jamie Hunter Photo**

CANADIAN EXPERIENCE

That Rychlo is getting this opportunity is due as much to fortuitous timing as anything. A pilot with 409 Tactical Fighter Squadron in Cold Lake, he had just assumed lead pilot status for a four-ship and completed his first operational tour as a wingman on Operation Impact over Iraq in 2015 when the exchange was posted in 2016.

"I was in the right place in my career," he acknowledged, "and I had a boss at the time who was willing to go to bat for me."

His exchange began in October 2017 with five months of operational conversion training on the Typhoon at RAF Coningsby, in Lincolnshire, before returning to Canada to pack and move his pregnant wife to Scotland for the next three years.

Because the position is new, however, Rychlo did not get the benefit of a predecessor to pass on guidance and answer any questions. Consequently, he's had to do some trailblazing as the first RCAF pilot to fly the Typhoon with No. 6 Squadron.

"It's not to say the RAF guys weren't a big help, it is just that it is good to have a perspective from someone who comes from the same background," he noted.

As the squadron exchange officer, he brings a different perspective on tactics, weapons and terminology that can help bridge any future interoperability divide when the RAF and RCAF deploy together. But he also has a role training the RAF's newer fighter pilots as the squadron prepares for deployment to Operation Shader, the U.K.'s ongoing military intervention against ISIS from a base in Cyprus.

"[Part of] my job is to provide experience to 6 Squadron," explained Rychlo. "Being an experienced fighter pilot, they can use me to fill qualifications that they may not be able to put a new pilot in. My job is to fill whatever role the squadron needs me in, and to provide that fresh perspective on how they train their guys.

"Close air support is an art and science, and to do it properly requires a certain level of experience, and I feel confident in my ability to train the new pilots," he added. "That's experience that you can gain somewhat in training, but there is nothing quite parallel to doing the real thing, working with JTACs [joint terminal attack controllers] and looking at real targets. There are numerous guys on the squadron who do just as well in that role, but because I have that [operational] experience, I can provide information on maybe specializations that other guys on the squadron might not have. And coming from a Hornet background, the Hornet really shines in the close air support role."

While integrating with the squadron was almost seamless—"fighter pilots are the same wherever you go," observed Rychlo—learning to fly the Typhoon began with a steep learning curve.

"When you have a lot of experience on one aircraft, learning to fly another one, especially one as unique as the Typhoon, is almost like learning to walk again. It is a humbling experience."

Since joining the squadron, Rychlo has primarily focused on training. But he did get a taste of QRA duty during a deployment to the Falkland Islands in late March—the rules are a little different outside of the U.K.—and he experienced the challenge of a large-scale multinational exercise in late May during Arctic Challenge Exercise 2019 (ACE 19), an event hosted by Sweden, Finland and Norway. He's now preparing to deploy with the squadron in September to Op Shader, his second mission in the region.

Among the many highlights after a year into the exchange, the greatest has been working with RAF pilots, he said. "It has been fantastic to learn their culture and see how they do business. They have taken me in as one of their own, which I really appreciate." He has also adapted easily to life in Scotland. His wife gave birth to their first child, Logan, on Jan. 1, 2019. "We have a little Scotsman."

As to that callsign—which he is often asked to explain to U.K. colleagues—let's just say it involves one too many hours in a cockpit flying close air support in northern Iraq with a leaking piddle-pack. No further explanation needed.

On July 18, 2018, hundreds of people gathered on a Halifax jetty to say goodbye to 240 military personnel on board HMCS *Ville de Quebec*.

Amidst thick fog and rain, families and friends waved goodbye to the Royal Canadian Navy frigate that was making history as it carried the new CH-148 Cyclone maritime helicopter on its first operational deployment.

The ship was setting course for Operation Reassurance, where it joined Standing NATO Maritime Group Two (SNMG2) in the Mediterranean Sea. During the six-month deployment, *Ville de Quebec* (VDQ) and its Cyclone conducted surface patrols and subsurface surveillance while participating in training exercises to ensure combat readiness.

The helicopter—callsign "Avalanche"—flew more than 500 hours and 170 missions while at sea. By all accounts, its first operational deployment was a resounding success.

Maj Erik Weigelin commanded the ship's helicopter air detachment (HELAIRDET), which included 21 members of the Royal Canadian Air Force (RCAF)—eight aircrew, one mission support member, and 12 technicians from the aviation systems, avionics systems, aircraft structures, and air weapons trades. All were members of 423 Maritime Helicopter (MH) Squadron at 12 Wing Shearwater, N.S.

"This first operational deployment of the Cyclone has been a great experience for the members of the HELAIRDET and myself, as we have all been involved in the Cyclone project for many years," said Weigelin following the mission's conclusion on Jan. 21, 2019.

LEADING the WAY

AS THE FIRST AND ONLY OPERATOR OF THE CH-148 CYCLONE MARITIME HELICOPTER, THE ROYAL CANADIAN AIR FORCE IS SETTING ITS OWN COURSEAND LEARNING NEW LESSONS EVERY DAY.

BY LISA GORDON

"The maritime helicopter community has long been waiting to finally see the Sea King replacement in action. The Cyclone has performed beyond our expectations for a first deployment, and that success is a direct result of the motivation and dedication of the members of the detachment. To be the ones who deliver the new 'Wings for the Fleet' was a great honour."

While aboard the ship, the HELAIRDET marked several impressive firsts, including carrying out the first-ever 400-hour Cyclone inspection. In October, the detachment honed its interoperability with allies while participating in Exercise Trident Juncture, which allowed it to work and train with naval ships, submarines, helicopters, and fixed-wing aircraft from Canada, Norway, Spain, Japan, the United States, and the Netherlands.

Cpl Conrad Walls from HMCS *Regina*'s air detachment conducts maintenance on the CH-148 Cyclone helicopter during Operation Projection in the Pacific Ocean in February 2019. **Cpl Stuart Evans Photo**

The CH-148 Cyclone's first operational deployment was successfully concluded on Jan. 21, 2019. The new helicopter performed "beyond our expectations," said Maj Erik Weigelin, commander of the helicopter air detachment on board HMCS *Ville de Quebec*. **Cpl Jessica Fox Photo**

MISSION READY

At the beginning of 2018, 12 Wing commander Col Sid Connor told *RCAF Today* that the Wing was focused on wrapping up the new helicopter's operational testing while transitioning aircrew and maintainers from their previous roles with the Cyclone's predecessor, the CH-124 Sea King.

Their goal was simple: to be mission ready.

Last June, the new helicopter achieved initial operational capability (IOC), a milestone that paved the way for its first deployment. And while Canada's entire fleet of Cyclones flew about 1,200 hours in fiscal year 2017 (April 2017 to March 2018), those numbers increased by two-and-a-half times to 3,000 hours for fiscal year 2018, which concluded on March 31.

"It is a ramp-up for sure," Connor said in a recent interview. "As we train these additional crews and technicians, we're expecting those hours to increase rapidly."

In spring 2019, there were two HELAIRDETS on deployment, and Connor said that is the operational tempo the Wing expects to see over the next few years.

Once the Cyclone program is granted full operational capability (FOC)—targeted for late 2022—it is expecting to have 11 operationally-ready detachments. This includes six at 423 MH Squadron in Shearwater and five more at 443 MH Squadron in Patricia Bay, B.C.

The West Coast squadron received its first Cyclone in August 2018 and flew it alongside the CH-124 last fall. On Dec. 17, 2018, Canada's last four Sea Kings flew over Victoria to mark the type's final in-service flight.

At the time of writing, there were three Block 2 Cyclones allocated to 443 MH Squadron. One was deployed on HMCS *Regina* while the other two were being used for training.

PREPARING FOR FOC

To reach full operational capability, both mechanical and human components will need to be ready. On the mechanical side, that means taking delivery of all 28 Cyclones ordered by Canada, with all of them in the final Block 2.1 configuration.

Currently, 17 aircraft have been received. Thirteen of those are at the Wing and four are back at Sikorsky for upgrades. The helicopters on operational deployment are in the Block 2 configuration, while 406 Maritime Operational Training Squadron at 12 Wing is using older Block 1 models for instructional purposes.

"As we work with the Block 2, we're anticipating the jump to the final configuration of 2.1," said Connor. "That period will start in 2020."

To reach FOC, 12 Wing's people must also be ready. A Cyclone crew includes two pilots, one tactical operator (TACCO) and one sensor operator (SENSO). Aircrew conversion training began at the 12 Wing "schoolhouse" in September 2017 and has continued to ramp up. Pilot conversion training takes about five months, while TACCO and SENSO courses are around six months long.

"We're making good progress on training. We have aircrew courses graduating through this month and when they're done, we'll have 44 pilots trained on the Cyclone," said Connor in March.

He added that 19 TACCOs and 18 SENSOs have also been trained.

On the maintenance side, 375 technicians have finished their basic servicing course for Cyclone towing, refuelling, marshalling, and starts/shutdowns. In addition, 167 aviation systems (AVN), 112 avionics systems (AVS), 24 aircraft structure (ACS) and 16 air weapons systems (AWS) technicians have been certified.

"What that means numbers-wise is that we are about 50 per cent there for aircrews and about 70 per cent there for technicians," explained Connor.

LEARNING LESSONS

Over the five-and-a-half decades that Canada flew the Sea King, countless lessons were learned. In fact, you could comfortably say that 12 Wing was an authority on the venerable maritime helicopter. And if they didn't have the solution to a given situation, it was a sure bet that someone in the global community of Sea King operators would.

It's a different story with the Cyclone. As the type's first operator, Canada is blazing a new trail in maritime helicopter operations. Yet as much as it is learning the ways of the Cyclone, 12 Wing is at the same time the world expert on the platform.

"There are lessons to be learned with this new type that did not apply to the Sea King," said Connor. "As a community, we're operating in discovery mode to learn as rapidly as we can, to learn the idiosyncrasies of the new platform. We need to distribute those lessons among the entire Cyclone enterprise, to set new tactics, techniques and procedures."

Many of those lessons come from deployments, and the Wing commander said those are transmitted in "real time" back to Shearwater. "The detachment on VDQ was in constant contact with 423 Squadron to let folks know what they were encountering and how they were dealing with it."

He cited that first 400-hour inspection at sea as being of particular value to 12 Air Maintenance Squadron back in Shearwater.

"The [HELAIRDET] technicians worked out a plan to minimize the amount of down time. They actually did the inspection in five full work days, which was less than we expected," noted Connor. "They used those lessons for the second 400-hour inspection back at Shearwater. The maintenance team there used the feedback to get that inspection done."

Aircrews also encountered "other entities" while on deployment, and were able to use their communication and sensor equipment to track them. Feedback was transmitted to the schoolhouse so training could be modified accordingly.

Further lessons will no doubt be learned from a Feb. 18 incident where a Cyclone helicopter deployed with HMCS *Regina* experienced what the Air Force called a "hard landing" on the deck of naval replenishment unit (NRU) *Asterix*. No personnel were seriously injured in the incident, which took place west of Kauai, Hawaii.

Connor said the incident happened while *Asterix*—a new commercial vessel converted for military operations—was in the midst of ship-helicopter operational limitations (SHOL) testing to qualify its deck to accept helicopters.

On the day of the occurrence, tests were being done in an expanded wind and ship motion envelope. Connor said those included Sea State 3 conditions with waves up to 1.25 metres

Maj Mike Gray, air combat systems operator, and MWO Ron Carswell, airborne electronic sensor operator, coordinate tactical movements and operate the extensive sensor suite of the helicopter using the Mission Data Management System in the CH-148 Cyclone helicopter during Exercise Trident Juncture in October 2018. **MCpl Gabrielle DesRochers Photo**

Crewmembers of the air detachment onboard HMCS *Toronto* load Raptor, the embarked CH-148 Cyclone with MK-46 torpedoes during Op Reassurance while sailing the Black Sea in April 2019. **MCpl Manuela Berger Photo**

Crew on HMCS *Toronto* move the CH-148 Cyclone helicopter to the flight deck for flight operations in January 2019. **MCpl Manuela Berger Photo**

high and winds of about 20 knots or 40 kilometres per hour.

"Engineering test and evaluation (ET&E) needs to be done by AETE [Aerospace Engineering Test Establishment]," he explained. "So what we were doing there was an AETE test. During the prep, AETE did not have access to a test pilot. So they invoked an MOU [memorandum of understanding] between AETE and Transport Canada, where they used a Transport Canada pilot to do those tests."

The pilot flying the Cyclone at the time of the incident was a former Sea King and AETE pilot who was current on the CH-148 and had flown much of the ET&E for its development.

During the landing, Connor said the Cyclone sustained damage to two main rotor blades and the tail pylon, "the part of the tail after the hinge."

While an investigation is ongoing, he added that the incident was not caused by an issue that would affect the entire fleet.

"Repairs were done in Guam. It was an impressive operation where we had East Coast, West Coast and HMCS *Regina* techs working, with the assistance of Sikorsky, to take a tail pylon off an aircraft on the East Coast. They designed a shipping container for it, and flew it on a CC-177 to meet the ship in Guam."

The helicopter was repaired on board the *Asterix* while it was docked in Guam, then returned to sea.

The Cyclone operates with a fly-by-wire system that replaces traditional mechanical flight controls found on older helicopters such as the Sea King.

An article published by *The Chronicle Herald* after the hard landing incident quoted a retired military helicopter pilot who said the fly-by-wire system means a Cyclone co-pilot would not be able to intervene "quickly enough to stop something like this from happening."

But Connor said that is not exactly true. While the more experienced pilot sits in the right seat of the helicopter—and that's where the AETE pilot was sitting on day of the occurrence—"the left seat pilot can put their inputs in and they'd be recognized."

The Air Force does have the ability to deactivate the left seat controls for training purposes, "but that's not normal."

MINING THE DATA

Along with operational lessons, the RCAF must also learn how to manage the vast amounts of data produced by its new maritime helicopter.

The Cyclone flies further and faster than the Sea King so it covers more area, effectively expanding the eyes and ears of the ship. Its modern electro-optical/infrared (EO/IR) system, along with sonar, sonobuoy processing and imaging radar generates a plethora of valuable operational data that 12 Wing is learning how to mine.

"Our limitation isn't the equipment, it's our level of experience so far," said Connor. "There is a lot more data being collected and recorded compared to before, and that's across all the sensor systems and the aircraft itself."

While data is downloaded from the aircraft and used to inform the maintenance computer system, there is also mission-related information being generated from the various onboard sensors.

"That sensor data is recorded and stored. It is sent back to central agencies in Canada to be examined more thoroughly. Before, we weren't recording mission sets like that, and so part of it is just working the procedure to figure out to what extent that analysis should be examined."

Connor added that the Cyclone's operational data is also used to inform the crews of other RCAF platforms. "Every time we fly, we enrich our databases with more information."

While current Cyclone HELAIRDETs are concentrating on traditional roles such as anti-submarine warfare and search and rescue when required, Connor said he fully expects crews to be asked to do more in the future because of the helicopter's extensive range of capabilities.

GROWING SYNERGY

As it works to reach FOC with the Cyclone, 12 Wing will need every one of its experienced personnel. Unlike other Air Force squadrons, fortunately very few pilots and maintainers are being lured away by civilian jobs. In fact, Connor said the Wing has lower attrition rates than in the past, something he attributes to the excitement of working on the cutting-edge Cyclone.

"Folks are very excited about this capability and once we get aircrew trained on this new equipment, they are keen to operate and deploy. We are not experiencing attrition that we would have considered normal even five years ago."

Looking ahead, Connor said 12 Wing will continue to prioritize training. "That being said, deployment is part of that force generation priority. Until these folks have gone out and used this capability on operations, their learning isn't complete."

As he looks back on the recent experience gathered from the Cyclone's first operational deployments, Connor said the progress over the past year has been amazing. "It's been really satisfying to come up with innovative ideas and turn around good results repeatedly. Our synergy is established and growing."

There's no doubt Connor is proud of the hard work that's been done at 12 Wing, and he's always happy to discuss the new maritime helicopter.

"If people give me a chance to talk about the Cyclone, I'd do it all day."

CH-148 Cyclone just before touch down on the back of HMCS *Montreal* off the coast of Halifax Harbour, during trials in 2016. **Cpl Anthony Laviolette Photo**

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Farewell to the SEA KING

BY RCAF TODAY STAFF | PHOTOS BY HEATH MOFFATT

In December 2018, a crew from 443 Maritime Helicopter Squadron in Patricia Bay, B.C., flew the CH-124 Sea King on its last flight for the Royal Canadian Air Force (RCAF), marking the end of 55 years of service for the venerable maritime helicopter.

A crew from 423 Maritime Helicopter Squadron in Shearwater, N.S., had conducted a similar flight earlier in the year to commemorate the aircraft's final East Coast mission as the squadron prepared for the first deployment of the CH-148 Cyclone that July aboard HMCS *Ville de Quebec*.

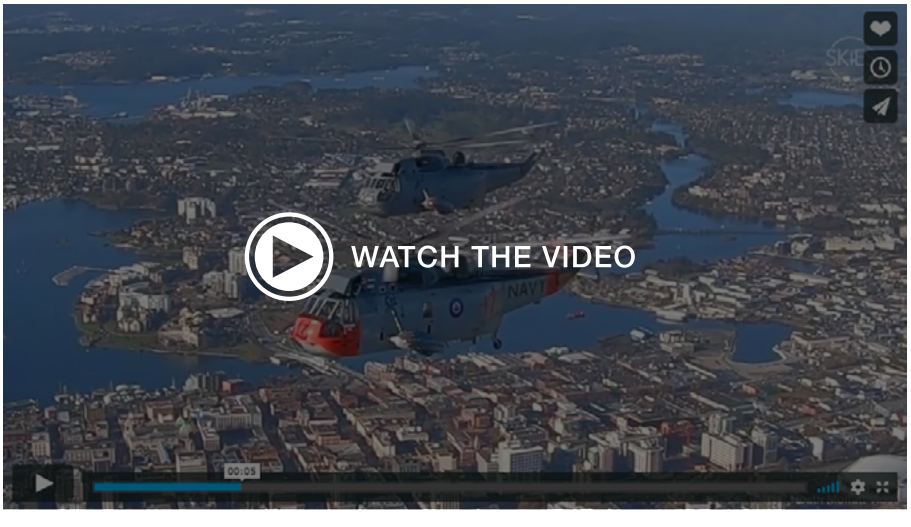
The first CH-124 Sea King arrived in Canada from the Sikorsky plant in Connecticut on May 24, 1963. Since then, it has earned its legendary status in the Canadian Armed Forces, serving with distinction on HMCS *Bonaventure* (the country's last aircraft carrier, retired in 1970), as well as on St. Laurent-class destroyer escorts, Iroquois-class destroyers, auxiliary oiler replenishment ships, and Halifax-class frigates.

No other aircraft in Canadian service has ever commanded such a lasting multi-generational legacy.

The CH-124 Sea King helicopter, which entered service in 1963, conducted its last flight in December 2018.

DOWNLOAD THE WALLPAPER

CH-124 Sea King helicopters from 443 Maritime Helicopter Squadron in Patricia Bay, B.C., fly over Vancouver Island on November 27, 2018.



Retired Maj Paul O'Reilly, 71, spent much of his 34-year career flying the twin engine amphibious helicopter on and off the decks of Royal Canadian Navy warships. He equated the retirement to losing a friend, but said the Sea Kings served as long as they did "because, with constant technological upgrades over the years, they could still do the job."

The Sea King's compact design, combined with fold-up rotor and tail, enabled it to fit neatly in the hangar of a warship after landing on the deck, and its amphibious hull enabled it to conduct water landings in an emergency.

"They got the job done because they handled well," he said. "The Royal Canadian Navy was at the forefront of learning how to put a big helicopter on a small ship, and these helicopters were much more capable than smaller ones because they could travel longer, carry more supplies, and had a more sophisticated suite of detection equipment."

The 28 Sea Kings may be retired, but they are not destined for the scrap heap. Nine will be on public display to ensure their story will never be forgotten. Eight will find homes at various military bases and museums across the country, and one will be displayed at the Canada Aviation and Space Museum in Ottawa.

Another airframe will be retained by the RCAF as a training aid. Three aircraft were demilitarized and scrapped due to their poor condition, with components being recycled where possible. And the remaining 15 and their associated parts were put on the market for approved bidders after controlled goods and military equipment were removed from the airframes.

—with files from Lisa Gordon, Peter Mallett and Chris Thatcher

The success of the Sea King is attributed to the "tremendous people," including aircrews and maintenance technicians.

RCAF commander LGen Al Meinzinger (centre) speaks to media.

The Royal Canadian Navy accepted its first Sea King for shipborne anti-submarine warfare activities on May 24, 1963.

Over 55 years, Sea King crews have flown more than 550,000 hours, or roughly equivalent to flying 7,200 trips around the globe.

A multi-purpose naval helicopter that over the years has conducted counter-piracy, counter-narcotic, counter-terrorism operations as well as humanitarian aid missions, the Sea King during the first Gulf War took on a new role of anti-surface warfare.

NE

Future Aircrew Training (FAcT) is an ambitious program that intends to capitalize on new training technologies and teaching methodologies. **Mike Luedey Photo**

NEXT-GEN Aircrew Training

IT'S COMPLICATED, IT'S MULTIFACETED, AND IT COMES WITH HIGH STANDARDS, BUT IT'S A LUCRATIVE CONTRACT TO THE COMPANY THAT CAN INTEGRATE THREE DISTINCT PROGRAMS INTO ONE TRAINING SYSTEM. HERE'S WHAT THE RCAF REQUIRES.

BY CHRIS THATCHER

Rarely in the life of a large, complex military program do you get the opportunity to reshape it from the ground up. But with two pilot training contracts coming to an end in the mid-2020s, the Royal Canadian Air Force (RCAF) is taking advantage of the moment to "reimagine how we are doing training," said Col Pete Saunders, director of Air Simulation and Training.

RCAF pilots obtain their wings through two contracted training services, Contracted Flying Training and Support (CFTS) and NATO Flying Training in Canada (NFTC), delivered from two schools in Manitoba and Saskatchewan: 3 Canadian Forces Flying Training School (3 CFFTS) at the Southport Aerospace Centre in Portage la Prairie and 2 Canadian Forces Flying Training School (2 CFFTS) at 15 Wing Moose Jaw.

CFTS, delivered by Allied Wings and led by KF Aerospace, ends in 2027 while NFTC, provided by CAE Military Aviation Training, runs until December 2023, with the option for a one-year extension—the program was recently extended from 2021.

At the same time, the RCAF would like to transition in-house training of its air combat systems officers (ACSO) and airborne electronic sensor operators (AESOp) to the same program as pilot training, a move partially driven by the end of service life of their primary training platform, the Dash-8 "Gonzo" in 2028.

"There are things we have done really well, [and] things we probably wouldn't do that way again, so this is an opportunity to re-baseline everything," said Saunders.

By concentrating all aircrew training under one program, the RCAF is requesting one of the more comprehensive and ambitious industry-managed programs worldwide, from courseware and training devices to aircraft and maintenance, instructors and facilities management.

The Future Aircrew Training (FAcT) program hasn't yet released an official price tag, but with NFTC worth about $3.8 billion over 25 years and CFTS valued at $1.8 billion over 22 years, the eventual contract could exceed $10 billion over 20-plus years.

More than 80 companies initially expressed interest in the program and five have been down-selected to offer bids when a request for proposals is released in early 2020: Airbus Defence and Space, Babcock Canada, Leonardo Canada, Lockheed Martin Canada, and SkyAlyne Canada, a joint venture between the two incumbents, CAE and KF Aerospace. A sixth qualified bidder, BAE Systems, withdrew in April.

What they will be asked to bid on boils down to a single word: Output. In presentations to industry over the past two years, Saunders has stressed, "it is not an aircraft acquisition program, it is a training

Pilots on the Bell CH-139 (206) Jet Ranger helicopter prepare the aircraft for take off at 3 Canadian Forces Flying Training School. **Cpl Vicky Lefrancois Photo**

service, [and] what we are contracting for is output. How a successful supplier gets there, I am not that fussed. What I care about is the output."

And that is a straightforward demand: 120 pilots, 40 ACSOs and 36 AESOps, plus or minus 15 per cent, to a defined standard every year. The flexibility to ramp up or down is intended to deal with shortages—the RCAF is at about 82.6 per cent of manning or around 275 pilots short at the moment—the introduction of new fleets like remotely-piloted aircraft systems (RPAS), and the transition from legacy to new airframes when throughput may not be as high.

The numbers are based on demographic shifts and forecasted attrition rates, a "sweet spot" that acknowledges the fact the newer generations may be less likely to enroll for a 25-year career, he said.

The Air Force also wants a program adaptable to technological change as both training systems and teaching methodologies evolve. "Our existing programs are delivering exactly what we are asking for, but they don't have that flexibility baked into them, which then handcuffs the contractor who would love to do things slightly differently, but it comes at a certain cost," said Saunders.

FASTER WINGS

The current training system produces around 100 to 115 pilots each year for the RCAF's fleets of multi-engine, rotary-wing and fighter aircraft. Though the schools delivered a record 116 pilots in 2016, the number has been scaled back to 107 for 2018 to manage a bottleneck developing at many of the operational training units (OTU).

The Air Force revised its selection process about five years ago, from a series of aptitude tests and hand-eye coordination simulators to a computer-based assessment purchased from the Royal Air Force, and has seen a significant drop in its overall attrition rate from about 15 per cent to six to eight per cent.

On average, 155 students from a pool of almost 1,200 are selected for the four-phase program that begins with primary flight training on the Grob 120-A in Portage la Prairie. About 130 advance to Phase II in Moose Jaw for basic flight training on the CT-156 Harvard II turboprop—an additional 10 often remain on the Grob if there is a capacity issue with the Harvard or they suffer from air sickness on the faster aircraft and are likely going to become helicopter pilots.

At the end of Phase II, students are streamed into multi-engine, rotary wing and fast jet. Approximately 35 multi-engine and 60 helicopter candidates will return to Portage for Phase

G-120A Grob aircraft conducts a training flight near the Southport Aerospace Centre in Portage la Prairie, Man. **Cpl Vicky Lefrancois Photo**

The new advanced Bell 206 flight training simulators at 3 CFFTS. **Chris Thatcher Photo**

III advanced flight training on the Beechcraft King Air C-90B or the Bell CH-139 Jet Ranger and Bell 412, while around 30 remain in Moose Jaw for advanced fighter training on the CT-155 Hawk, learning advanced aerobatics, instrument flying, and tactical formation flying.

With Wings proudly pinned to their uniforms, multi-engine and rotary-wing pilots are assigned to operational training units while fighter pilots move on to Phase IV, also known as Fighter Lead-In Training (FLIT), still on the Hawk but at 419 Tactical Fighter Training Squadron at 4 Wing Cold Lake, Alta.

The Air Force is also in the process of analyzing the options for a future FLIT program, but has opted to separate FAcT from the more specialized FLIT requirements.

One of the many objectives of FAcT will be to stream pilots earlier in the process, rather than waiting until the end of basic flight training after Phase II. In preparation for a new program, the RCAF has revised the qualification standards for all its aircrew trades, but especially for pilots to reflect the mission management component of flying more data-generating aircraft.

"There will be a basic flying training phase for all pilots. And then as early as possible, we want to stream them between rotary and fixed-wing," said Saunders. "Then rotary folks will go off and do their basic rotary training and advanced training, be that on one aircraft or two aircraft. On the fixed-wing stream, there will be [additional training] and then they will split again between fast jet and multi-engine."

Whether that is delivered as four distinct phases has yet to be defined, he said, but the Air Force has been working with potential bidders through workshops to develop the training plan. "As long as they meet the standard we have laid out, how we get there will be unique to each one of these qualified suppliers."

The Air Force recently adjusted its training plan to a block approach where student performance is measured by passing certain gates rather than following a linear progression. "The result has been very positive in that we've reduced our extra do-overs, our extra training by half," said Col Denis O'Reilly, commander of 15 Wing Moose Jaw.

By allowing students to focus on areas where they know they need the work and giving them more input into their flights, "it has decreased attrition rates and increased student confidence," he said. "That has allowed us to use these hours more wisely… [I]nstructors are more successful on every trip they take a student on."

ACSOs and AESOps will remain in Winnipeg, but bringing them under the same training program is intended to capitalize on the fact that much of the basic courseware is common to both pilots and systems operators.

Specialized training for future RPAS pilots and weapons systems operators will be done at an OTU, but the initial skills will be to the same standard as other aircrew, said Saunders. "If we determine that the nature of the work is so different that it requires a change in the qualification standard or that we need to make a different stream, then we will have the ability to do that."

The CFTS and NFTC programs are delivered with a mix of 12 Grobs, seven King Airs, 10 Jet Rangers, nine 412s, 22 Harvards and 17 Hawks, and all have an availability rate of over 90 per cent. And at 17,600 hours per year, no one flies Harvards more than Canadian pilot candidates.

However, Saunders has told industry not to assume access to any of the current training fleets. "The [18-year-old] Hawks and the Harvards have done a great job and we're pretty confident they will be fine to the end of the contracts," he said. "But we put a lot of abuse on them. Let's just say pilot training is not kind to aircraft. So those aren't going to be available. Similar with the rotary wing aircraft. We are seeing a clean slate. I'm not telling [qualified bidders] which airplane … as long as it achieves my training objectives."

TRAINING INNOVATION

In 2015, the RCAF released a long-term simulation strategy intended to "transform [the] training system from one that relies on aircraft to one that exploits new technologies to train aviators in a simulation-focused system that creates, in effect, a 'virtual battlespace.' " Leveraging the latest in technology is still an Air Force goal, but the RFP for FAcT will not prescribe percentages for live flying versus simulation training.

"We haven't given them a specific ratio," said Saunders. "We spoke with allies who have introduced programs over the last couple years, and looked at our own experience on the CH-148 Cyclone and the CH-147F Chinook, where we have more modern simulators, and said, 'Is there a sweet spot?' I can't say there is a consensus out there."

Rather, the Air Force has looked at its performance objectives and tried to determine how many can be completed in a simulator. "Our initial cut is probably more flying hours than we are currently getting," he admitted.

Because the Air Force also wants to push more training

Bell 412 helicopters on the flight line at 3 CFFTS. **Jean-Francois Dupont Photo**

A Grob 120-A cockpit task trainer in Portage la Prairie. **Chris Thatcher Photo**

One of seven Beechcraft King Air C-90B aircraft used for Phase III multi-engine training at 3 CFFTS. **Chris Thatcher Photo**

An instructor pilot supervises a student as he prepares a Bell 412 aircraft for flight at the Southport Aerospace Centre in Portage la Prairie. **Cpl Vicky Lefrancois Photo**

At 17,600 hours per year, no air force flies the CT-156 Harvard more than Canadian pilot candidates. **DND Photo**

While live flying could increase under the new program, so too will simulation training in aircraft simulators at 3 Canadian Forces Flying Training School. **Chris Thatcher Photo**

down from the OTUs to the pre-Wings phase of a pilot's development—skills like VFR navigation, night vision systems, and formation flying operating with night vision goggles—Saunders also expects the number of simulator hours to increase. "I want to teach the whys and hows and get them comfortable trusting these things on a much less expensive aircraft," he said.

At present, the majority of simulation flying is done during Phase III of rotary wing (42%) and multi-engine (59%) training. Peter Fedak, a former commanding officer of 3 CFFTS and the site manager for Allied Wings in Portage, said the "pendulum has swung back a bit" when it comes to simulation. The school recently acquired an advanced simulator for the Bell 206, but instead of replacing hours one-for-one, "we are trying to use the sim to the best of its ability and seeing how many things we can take out of the aircraft." In fact, the changes added five days to the training curriculum.

However, the Air Force will be looking to industry for ideas and technologies to improve how students learn. O'Reilly noted training is expensive and industry is well ahead of the military on new methodologies. "I don't think we can be closed minded about it," he said.

Added Saunders: "That is where I think we are going to see the largest differentiator between bidders, is in how they want to get somebody from point A to point B using some of these more advanced technologies. But it has to be cost-effective. I've been very clear that this is not a developmental program. Canada can't be the guinea pig in terms of new and unproven technology."

The RCAF has 22 CT-156 Harvards and 17 CT-155 Hawks, but potential project bidders have been told not to assume access to any of the current training fleets. **Dave Mills Photo**

CONTRACTING EXPERIENCE

All the improvements to the training system won't matter much if the operational training units are unable to absorb Winged pilots more quickly. At present, the Air Force has a bottleneck at most OTUs due to challenges retaining experienced pilots and an operational tempo that has pulled veteran instructors from most fleets for deployments.

That has resulted at times in lengthy delays for some young pilots, observed Fedak. "The gap is longer than we would like and we are seeing some fade and a lot of returns. Because of that wait, we have had to do refresher training for a lot of people who we would love to never see again, unless they come back as instructors."

Saunders said the ideal wait is no more than six months to finish advanced training and then move, get settled, complete some ground school and begin flying at an OTU. "That is motivating and it's also efficient."

As part of FAcT, the Air Force is open to more contracted flight instructors. While industry under both the CFTS and NFTC provides simulator-based instruction, live flying has remained the purview of the military, a commitment that requires around 130 instructors in both locations, said O'Reilly.

"The intent is to allow the OTUs to be better staffed from a uniform perspective, which is where I really need those instructor pilots," said Saunders. As the former commander of 406 Maritime Operational Training Squadron in Shearwater, N.S., when the Cyclone was introduced, he relied on a dozen serving and contracted instructors to manage the conversion from the CH-124 Sea King to the Cyclone.

"Half of those are probably contracted flight instructors on any given day, and you would not be able to tell who is who," he explained. "My focus at the time was to create that one team, one standard, one mission approach. There were things the contracted folks don't teach—tactics that are a classification level beyond what they hold—but they definitely teach everything up to that point, interspersed with our uniform flight instructors."

Transitioning from a program managed by two companies to a single provider of what are now three distinct programs won't be straightforward, even if the winner is the joint venture of CAE and KF Aerospace. Though the two companies have been "very responsive" managing an inter-related program, ensuring the right number of aircraft are on the line each day, students transfer back and forth and "an issue with one creates a ripple effect with the other," noted Saunders. "These are different companies under different contracts with different metrics, so just by the very nature of it, it creates a challenge."

The RCAF, however, has experienced enough fleet transitions in recent years to "have learned what things work well," he said. Through a series of workshops with industry on everything from training plans, to aircraft, to infrastructure that will extend into the fall, the Air Force hopes to present an RFP in early 2020 that is well understood and not subject to unexpected delays.

"I've said, 'I know it isn't going to be a cheap program, but tell me if there is something we are asking for that is going to create a significant cost driver'," he said.

To date he has been getting that type of feedback. Potential bidders, for example, have raised questions about his contention flying hours may increase. "We have provided our rationale based on what we've learned from our allies, but we are not being prescriptive, we are saying, this is what we see as a benchmark. And if you are telling me something different, tell me why."

The Air Force created two documents, *Concept of Training* and *Concept of Training Support*, to guide prospective vendors through the current process, from weather and number of flying days in both locations to meals and accommodation. "I would argue by the time the RFP comes out, most people would have their bids in a 95 per cent completion state because we have been working with them all the way through," he said.

Among other measures, the Air Force will stand up a Training Implementation Working Group led by 2 Canadian Air Division to monitor the process and assess the implications of various decisions once a contract is awarded in 2021.

"It will be very complicated," but when you have that rare opportunity to makes changes, you need to seize it, he said.

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A DARING WING ON D-DAY

THE SQUADRONS OF NO. 143 WING CLAIMED BATTLE HONOURS FOR THOUSANDS OF SORTIES DURING THE COURSE OF THE SECOND WORLD WAR, BUT AMONG THEIR PROUDEST WERE D-DAY AND THE NORMANDY CAMPAIGN.

BY HUGH HALLIDAY

Equipped with the Hawker Typhoon, No 438, 439 and 440 Squadrons constituted No.143 Wing, which was part of the Second Tactical Air Force that would be crucial on D-Day and the Normandy campaign that followed.

As of October 1943, No. 118 (RCAF) Squadron, lately returned from Alaska and the Aleutian campaign, was based at Sea Island in Vancouver, with Curtiss Kittyhawk fighter aircraft. No. 123 (RCAF) Squadron was at Debert, N.S., flying Harvards and Hurricanes while providing reconnaissance and support for army units under training. No. 111 Squadron (RCAF) was at Patricia Bay (Victoria); like No. 118, it was back from Alaska and flying Kittyhawks, waiting for Japanese attacks that never came.

But everything was about to change.

Late in 1943, the Canadian Home War Establishment was changed radically. Six fighter squadrons—half from each coast—were to be transferred overseas to join the Allied forces preparing for the invasion and liberation of Western Europe. Three would become Spitfire units but the three listed above would be equipped with Hawker Typhoons.

As of January 1944, Nos. 118 and 123 Squadrons had reformed at Ayr, Scotland, and renumbered Nos. 438 and 439; the last, No. 111, joined them in February as No. 440 Squadron. Together they constituted No. 143 (Wing), part of the Second Tactical Air Force that would be crucial on D-Day and the Normandy campaign to follow.

In between combat missions, mechanics repair a propeller.

In 1944 and 1945, through France and Northwest Germany, the principal RAF fighter-bomber was the Typhoon. The type entered RAF service in early 1942 amid considerable difficulty; the Napier Sabre was an unreliable engine and tailplane failures killed several pilots.

These technical problems were overcome, but the Typhoon also proved a disappointment in its designed role of medium- and high-level interceptor. On the other hand, it proved to have excellent low-level performance, which initially meant it was very effective against German fighters carrying out hit-and-run attacks on British coastal towns.

Squadron Leader (later Group Captain) Roland Beamont, as commanding officer of No. 609 Squadron, was inventive with Typhoons and aggressive in his outlook. In 1942-43, by day and by night, he conducted "rhubarbs" over France and the Low Countries, running up impressive tallies of enemy locomotives destroyed and damaged. Apart from the hurt inflicted on the enemy, his work demonstrated the offensive capability of the type.

Late in 1942, Typhoons were tested with 500-pound bombs. More was involved than just lifting them; the aircraft had to be seen as practical in delivering them accurately without breaking up in high speed dives and pull-outs. In fact, the type ultimately proved amenable to 1,000-pound bombs, and the choice of weapon became a matter of range versus load on any particular mission.

As of Dec. 31, 1943, the RAF had 20 squadrons available (with many earlier RCAF pilots on strength), and their numbers would grow with the addition of No. 143 Wing.

The Typhoon had virtually zero forward visibility. For maneuvering on narrow taxi strips, it was easier to have a ground crew member sitting on the wing to direct the pilot.

The Typhoons guns are serviced after a mission.

AERIAL PREPARATIONS FOR D-DAY

The diaries of the three squadrons were clearly kept by different personalities. No. 439 Squadron's was maintained by someone with an eye for detail and drama. The chronicler of No. 438 Squadron was the polar opposite—terse, dry, even dull. No. 440 Squadron's fell between these two. No. 143 Wing's diary was in the mould of No. 438 Squadron.

At Ayr, the pilots had to familiarize themselves with the vagaries of the British climate, blackouts, flying procedures in wartime airspaces, and eventually the tactics of ground support. Initially the men believed they would be issued rocket-firing Typhoons, and were disappointed when this mode was abandoned for "Bombphoons." In retrospect, this was probably better, because operational research showed that the rocket was a very inaccurate weapon, much overrated in combat.

They began on Hawker Hurricanes, and four men were killed in flying accidents even before going operational. The first Typhoons arrived on Jan. 29, 1944. Training by sections graduated to flights, then squadrons and sometimes by wing, although there was a general shortage of "Tiffies" until May.

They also took part in their first joint exercises with the army. Lectures dealt with dinghy drill, tank and vehicle recognition, escape and evasion, and the process of moving from base to base, especially after the anticipated move to the continent.

They were transferred south in March and April; on the eve of D-Day they were at Hurn, Hampshire. The first operation was on Mar. 20 when Wing Commander R.T.P. Davidson (a Canadian in the RAF) and three pilots of No. 438 ventured to Cherbourg and Alderney (Channel Islands), firing at troops, a staff car and a horse (the only confirmed casualty). The first wing bombing raids were on Apr. 4 with 500-pound bombs; from the 24th onwards, they began using 1,000-pounders.

The aerial preparations for the invasion were incredibly complex and varied. In the three months leading up to D-Day, every effort was made to destroy the French railway system that would otherwise be used to move German reinforcements. To mislead the enemy, it was necessary to drop two bombs in the region of the Pas de Calais (which the Germans believed would be the landing area) for every bomb that related to Normandy (the chosen Allied site).

The "heavies" of Bomber Command and the U.S. Eighth Air Force hammered yards and repair sites from the Rhine to central France; medium bombers (Mitchells and Marauders) went after targets closer to the Channel coast; fighter bombers attacked any rail target within range. Other objectives included every German radar site from Belgium to Brittany. There were also mysterious targets known as NOBALL sites; aircrews learned eventually that these were V-1 launching sites, and the air attacks delayed the enemy missile assault from mid-May to Jun. 12.

No. 143 Wing lost several aircraft in this pre-D-Day phase, and five pilots were killed in action. Among those missing on May 8 was the redoubtable Wing Commander Davidson, whose engine failed, necessitating a forced landing in France. He evaded capture, joined the Maquis, and spent three months in sabotage work before Allied armies caught up with him.

Another aircraft lost on May 23 was piloted by Flying Officer A.A. Watkins (No. 440 Squadron, Regina). Hit by flak, he parachuted into the Channel and spent five days in his dinghy before being rescued.

BETWEEN A LOTTERY AND RUSSIAN ROULETTE

Pilots reporting to dispersal on June 4 discovered that their aircraft had been repainted with black and white stripes—the famous "invasion stripes" that were to prevent "friendly-fire" incidents, whether with other aircraft or trigger-happy naval gunners. They did not always work. As of 1700 hours on the 5th, all personnel were confined to base and aircrew were called to a briefing. The next day was D-Day.

The first No. 143 Wing strikes were launched between 0645 and 0700 hours with all three squadrons involved. Their targets were concrete blockhouses confronting the 50th British Division and gun positions at Courseulles where the Third Canadian Division was coming ashore.

The invasion had been launched in marginal weather conditions; the ceiling was only 2,000 feet and visibility was further reduced by smoke raised by naval bombardments. Although several direct hits were claimed with 1,000-pound bombs, few defences were knocked out completely; infantry still had to struggle with defenders who had turned houses into fortresses that supplemented the bunkers.

With both sides inextricably mixed in confused fighting, no more air strikes were mounted until late afternoon. Targets had now shifted from the beach area to a few miles inland where the first German reinforcements were beginning to trickle towards the front.

On that first day of the invasion, the Typhoons were confronted with their most dangerous enemies—anti-aircraft fire from rifle calibres to 88-mm flak, which turned life into something between a lottery and Russian roulette. It was absolutely unpredictable.

Sometimes there was none; more often there was some opposition, and always the risk that a bullet or bit of shrapnel would disable the liquid-cooled Sabre engine. At least six wing "Tiffies" were hit on the 6th and one pilot was killed. There would be more. The worst day in wing history was Aug. 12 when four Typhoons were shot down and their pilots killed.

Progress by the army was slow and painful. Behind the troops came the airfield construction teams, but as long as the strips were within range of enemy artillery, there could be little movement of squadrons to the Continent.

For most of June the Hurn-based Typhoons were operating at the limit of their range, which affected their loads. Some distant

A 440 Sqn Typhoon taxis to the runway. The nose art says it all at the time.

May we drop one for you? Typhoon pilots about to take off for yet another sortie against a German strong point in Holland.


F/O Brien Clacken was being interviewed to tell radio listeners in Britain and Canada of his experience on the Normandy bridgehead. Interviewing him is Cpl Don Fairbain, former well known announcer of CBC's Canada wide. Farm Broadcast. Don is a member of the RCAF's No. 1 mobile recording unit operating in France.

A 439 Sqn Typhoon lands after another successful mission over Normandy.

targets were attacked with only a single 500-pound under one wing and a drop tank under the other. No. 143 Wing finally relocated to airfield B.9 at Lantheuil on Jun. 27; proximity to the front restored operational efficiency. However, dust clouds on the strip created real problems for engine maintenance. Determined German resistance confined them to B.9 until Aug. 30, 1944, when the German VII Army was at last routed.

On occasion the aircraft attacked strongpoints only a few hundred yards in front of attacking troops, and the squadron diaries recorded messages of thanks and appreciation from brigades that had benefitted from this support. Dive bombing strikes were more common against targets in the rear—bridges, headquarters, marshalling areas and anything that moved on the roads. Attacks commenced at about 6,000 feet with release at about 2,000 feet, followed by low-level strafing. Vehicles were classified as "destroyed", "smokers" and "damaged." Enemy tanks were small targets and seldom directly hit, but the destruction of a fuel truck was just as effective in disabling armour.

The highlight of the Normandy campaign was mid-August 1944—the battle of the Falaise Gap, when the enemy finally broke and ran. The 18th was the most intensive, with No. 143 Wing flying 176 sorties. Only two involved bombs; the rest were strafing attacks on German columns that included horse-drawn transport.

It seemed as though the entire Second Tactical Air Force was there, hammering the enemy, and trying to avoid collisions. Operations would have been impossible without the herculean efforts of groundcrews at B.9. Typhoons were refuelled and rearmed in nine minutes; a propeller change was affected in 45 minutes; radios were changed in 10 minutes. It was a triumph of teamwork, yet nothing less than what they had been trained to do in field conditions.

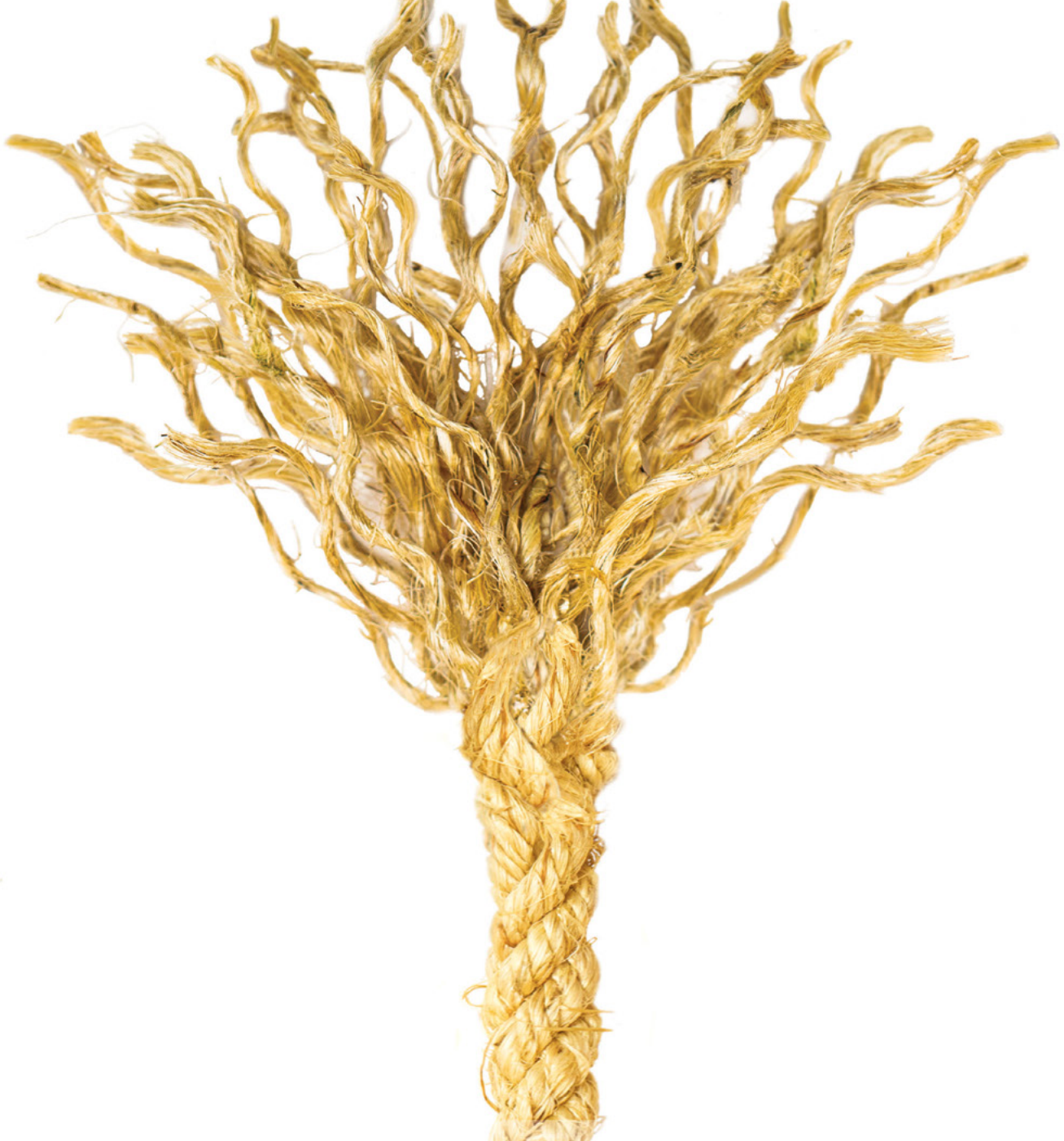
With the enemy on the run, No. 143 Wing was on the move again. It changed bases four times before ending up at Eindhoven, Holland on Sept. 25. It would be there for six months, until the Allied final push over the Rhine. But all that is another story.

No. 143 Wing Typhoons flew their last sorties on May 4, 1945, attacking shipping in Kiel Bay. The three squadrons were disbanded at Flensburg, Germany on Aug. 26, 1945. In the previous 14 months they had flown 13,541 operation hours (12,231 sorties) and dropped 6,393 tons of bombs.

The book, *RCAF Squadrons and Aircraft*, by Sam Kostenuk and John Griffin (1977), gives impressive numbers of tanks and vehicles destroyed or damaged (37 and 750 respectively) as well as locomotives, railway cars and bridges. The figures may be slightly inflated, but there is no doubt that the Typhoons contributed to Allied victory, right up to VE Day.

A total of 78 pilots had been killed in operations or accidents and 12 taken prisoner. There had also been five fatalities among the groundcrew. The units could claim battle honours for Fortress Europe 1944, France and Germany 1944-1945, Normandy, Arnhem and the Rhine, but there can be little doubt that the proudest was Normandy.

Hugh Halliday *is the author of* Typhoon and Tempest: The Canadian Story *(Canav Books, 1992) and ten other titles. His most recent work, with Larry Milberry, is* Fighter Pilots and Observers 1915-1939 *(Canav Books, 2018).*



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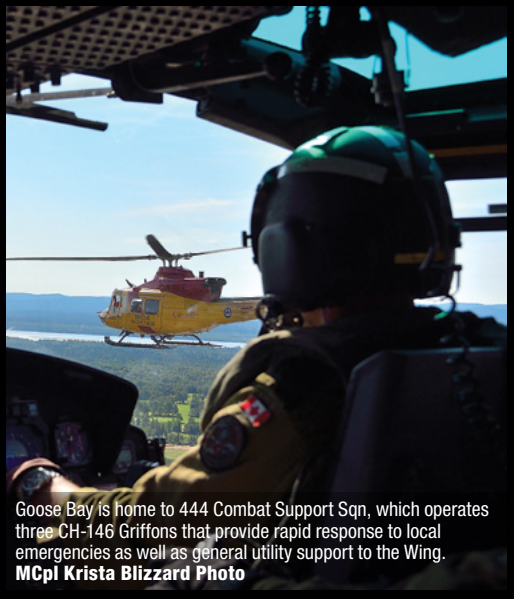
CERTCENTERCANADA

Drummer, MCpl Iain Cleaton, keeps time during Remembrance Day Ceremonies held at the Commonwealth Cemetery at 5 Wing Goose Bay. **MCpl Krista Blizzard Photo**

The German Luftwaffe is still a regular visitor to Goose Bay for various training purposes. **Mike Reyno Photo**

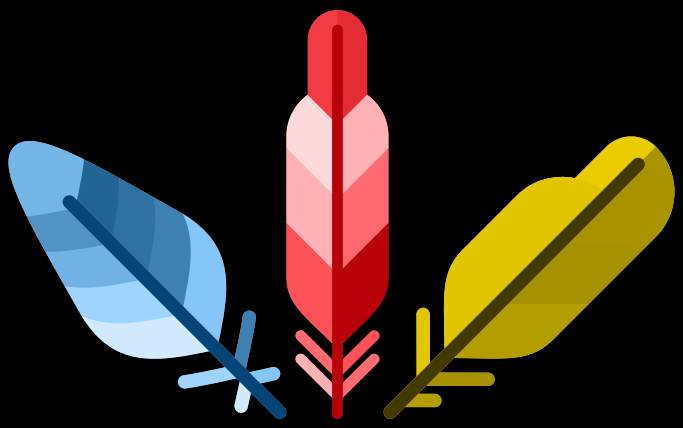
About 700 military members from the Canadian Armed Forces and the United States Air Force, Navy, and Air National Guard deployed to Goose Bay in October 2016 for the Vigilant Shield 16 NORAD Field Training Exercise. **Tech. Sgt. Joshua Garcia Photo**

While Goose Bay maybe one of the smallest Wings in the RCAF in terms of personnel, it is one of the largest in terms of physical size. **DND Photo**



Goose Bay is home to 444 Combat Support Sqn, which operates three CH-146 Griffons that provide rapid response to local emergencies as well as general utility support to the Wing. **MCpl Krista Blizzard Photo**

5 Wing supports the annual Toys for the North program, a project between the RCMP and the military to deliver Christmas gifts to northern communities. **DND Photo**



LITTLE WING BIG EFFECT

5 WING GOOSE BAY MAY NOT BE THE RCAF'S MOST GLAMOROUS POSTING, BUT IN RECENT YEARS IT HAS ONCE AGAIN BECOME A HIVE OF ACTIVITY. ITS SENSE OF COMMUNITY IS ONE MANY EMBRACE.

BY BEN FORREST & MIKE REYNO

One of the best-kept secrets in the Royal Canadian Air Force (RCAF) is 5 Wing Goose Bay, a tight-knit posting in rural Labrador, about four kilometres north of the Churchill River and a near 400-kilometre (km) drive west of the Labrador Sea.

Today there are only about 75 military personnel at 5 Wing, a former U.S. Air Force base that hummed with the activity of about 12,000 people during the Cold War. But despite its small staff, the Wing oversees a massive geographic area—nearly 295,000 square kilometres, roughly the size of the United Kingdom--and it's an important NORAD partner that punches high above its weight.

"We are an isolated location," said LCol Stephane Racle, wing commander. "We are sometimes out of mind, out of sight.

"But there's a lot of good things that happen here ... when we do things well here, we want to make sure that those things get recognized. If we don't make an effort to do that, it's easy to get forgotten."

5 Wing is also home to 444 Combat Support Squadron, whose primary mission is to respond to local emergencies that occur during flight operations and military exercises at the base. The squadron is equipped with three CH-146 Griffon helicopters and also provides a range of support to civil authorities.

Military postings at 5 Wing usually last only three years, but many civilians also work there, and some have stayed for decades. The small staff encourages a level of camaraderie that doesn't exist at some larger Wings, and officers have made morale and well-being a key priority.

"If we don't have that, we can't do anything else," said Racle. "We also encourage, at all levels, people to get engaged in the community."

"Things have changed in terms of what the base is doing," he added. "It's not what we did 10 years ago; it's not what we did 15 years ago; it's not even what we did five years ago, really. But there is a definitive need for what we're able to provide."

The PTA includes a number of structures for urban warfare-type training. **DND Photo**

444 Combat Support Sqn is the only flying unit at 5 Wing. **Geoff Goodyear Photo**

Snow removal at Goose Bay is an almost constant concern during the winter months. **SA Jasmonet Jackson Photo**

Members from the 1st Battalion, Royal 22e Régiment train at 5 Wing's Practice Target Area during Exercise Castor Boréal. **Cpl Danny Drapeau Photo**

The PTA includes an air-to-ground range that allows for precision-guided munition (PGM) drops and door gun training, as well as a 360-degree small arms range and live-fire fighting in built-up area houses. **DND Photo**

A MULTINATIONAL HISTORY

Construction of what is now 5 Wing Goose Bay began in 1941 to accommodate anti-submarine patrol aircraft and staging aircraft for Great Britain during the Second World War.

The area was chosen in part for its strategic location and its excellent flying weather, and the base was also a fuelling stop on the Allies' transatlantic carrier route. A total of 22,500 fighters, bombers and transports built in North America staged through the base during the conflict.

During the Cold War, Allied forces used Goose Bay for low-level flying training on the base's massive 130,000-square-kilometre flying training area. Aircraft dipped as low as 100 feet during these training exercises, taking advantage of the sprawling open spaces and low population density.

In the 1950s a line of radar sites was established along the Labrador coast, and Goose Bay's main responsibilities shifted to surveillance, identification and interceptor control for the Labrador area. Outlying radar sites reported to the U.S. Air Force-manned Melville Manual NORAD Control Centre, near the current base.

5 Wing evolved over the next few decades from a small station to a medium-sized base that supported multinational flying operations, including low-level flying training for the German, Italian and Royal Netherlands air forces. In 1976, all Strategic Air Command units withdrew from the base, and the U.S. Air Force contingent reduced its size significantly.

Fighter jet low-level flying operations over Labrador stopped in 2005, when all Allied forces withdrew from 5 Wing. Today, the Wing's priorities are centred around support to NORAD operations and austere environment training. Achieving this requires a focus on operational excellence and strong relationships within the Labrador community.

"We're very pleased and very proud to say we have an excellent relationship with the community," said Racle. "And when I say the community, I don't just mean Happy Valley-Goose Bay; I mean the whole of Labrador."

A CF-188 Hornet is towed out of the massive former German Luftwaffe hangar at 5 Wing Goose Bay. Canadian fighters are starting to become a regular sight again at 5 Wing where pilots can hone their skills over the near-by range. **MCpl Krista Blizzard Photo**

A TRAINING RANGE FOR ALL SEASONS

The flying environment in Labrador is larger than some European countries, with higher altitude blocks up to 60,000 feet, and complex terrain, licensed drop zones and a training area authorized for both day and night use.

5 Wing's Practice Target Area, located about 65 nautical miles south of Goose Bay, is only accessible by air and has two airstrips that stretch for 5,200 feet and 1,500 feet, respectively.

The facility includes an air-to-ground range that allows for precision-guided munition (PGM) drops, as well as laser engagement capability and helicopter door-gun training. A smaller but equally important 360-degree small arms range allows for live-fire fighting in built-up area structures.

As part of its environmental management commitment, 5 Wing consistently cleans both ranges, gathering an estimated three million pounds of range scrap, transporting it with a CC-130J Hercules aircraft.

"Every year, with the frost and everything, they resurface," said Maj Nicole Deschamps, Wing operations officer. "The guys go out and collect everything they can. We clean it up every year or so."

As of spring 2019, the base expected to have a full fuel farm at the Practice Target Area, allowing helicopters to refuel on site rather than returning to the base during support missions.

"That way they can actually live out there," said Deschamps. "All the crews can come, deploy, live out there, eat out there. We have a kitchen, we just need a cook. We ship everything in."

In 2018 the German Air Force, a frequent visitor, completed several flying operations at 5 Wing, including multiple type ratings for Airbus A319 and A340 aircraft, and low-level night vision goggles training on Airbus A400M aircraft. NORAD carried out a North Warning System (NWS) assessment at 5 Wing last year, and CF-188 pilots from 3 Wing Bagotville, Que., engaged in weapon drops on the practice target area.

MCpl (retired) Keven Martel, a former member of the 12e Régiment blindé du Canada, stopped into 5 Wing Goose Bay on June 17, 2019, as he cycles across Canada to raise funds for the Soldier On Program. **MCpl Krista Blizzard Photo**

Ground activity in 2018 included winter warfare training, U.S. and German special forces training, Exercise Northern Sojourn and Exercise Terra Traverse and multiple Canadian Ranger Patrol Group (CRPG) events.

"When I started on the base in '88 … the base was booming," said Liz Johnson, the Wing properties officer.

Julie Payette, Governor General of Canada, is greeted by Wing Commander, LCol Stéphane Racle and MWO David McDowell, on her arrival to 5 Wing Goose Bay in September 2018. **MCpl Krista Blizzard Photo**

Little Tommy and Frankie Barker were given the honour of cutting the ribbon and officially opening the new Military Family Resource Center on January 24, 2019 at 5 Wing. **MCpl Krista Blizzard Photo**

"The Italians, the British, the Dutch and the Germans were here, so the activity level was incredible. When they left, we went through a [period when] we weren't sure what was going [to happen] to the base. Now we've progressed to more ground exercises, so the scope has changed."

"There's been an increase in the amount of Canadian units that use the Wing for summer and winter training," added Johnson. "Mostly winter, because we have a long winter and a lot of snow."

A SUPPORTIVE COMMUNITY

Just before the end of January 2019, 5 Wing held the grand opening for its new military family resource centre (MFRC), a vibrant building that offers programs for children and teens, as well as mental health services, adult First Aid classes and community orientations for RCAF members.

"We're here to provide support to the military community," said Joan Harvey, executive director at the MFRC. "We're here to provide programs and services, be responsive to their needs in this isolated posting."

The MFRC is a key part of 5 Wing's commitment to good morale, and a direct response to the needs of the community that has seen an increase in young families and small children over the past three years. Since the base population is small, leaders can adjust programming almost immediately.

"We can be more responsive and more flexible in our programming, which is really what you need to be doing in these kinds of locations," said Harvey. "We can reach our people really easily. I think that's probably the uniqueness [of 5 Wing], is our relationship with our families and our members."

MRFC has a staff of 12 who organize large family events throughout the year, including community meals, a winter carnival and an annual block party in June. An Inuit elder visits frequently to teach members how to make mittens, slippers and other crafts.

"She's a bit of a celebrity up here," said Harvey. "It might sound—'Oh just a craft course.' But when you're in an isolated posting … it just brings people out of the house in the winter, interacting with other people.

"It's great for the staff to be around when these courses are going on, because that's when you really get to know people. And you have that relationship built that, if there's an issue or something is wrong, you can usually find out at a really low level before it gets too big."

Communication with the larger community is critical because low-level flying near Goose Bay can impact those living and working in the region, including Indigenous groups in Labrador and eastern Quebec, local wildlife and mineral quarry explorers whose blasting practices can affect low-flying aircraft.

With this in mind, 5 Wing proactively reaches out to ensure aircraft don't negatively affect local populations and industries. Silas Bird, in a community liaison role, serves as the first point of contact for many affected people, including the three Indigenous groups in Labrador.

Wing staff also track local caribou and moose herds, as well as other wildlife, to ensure low-level flying doesn't impact animal populations, either.

"It's a way to deconflict military activity with ground activity," said Bird. "The idea was basically to say, 'Wherever you're going to be, let us know so that we can avoid those particular sites.' "

A CC-130J Hercules taxies to take off from the Practice Training Area (PTA) that is located approximately 65NM from 5 Wing. The Wing constructed a 5,200 feet gravel runway, which is long enough to accommodate the Hercules. **MCpl Krista Blizzard Photo**

ISOLATED, BUT ALWAYS OPEN

In addition to almost 80 military personnel, 5 Wing employs approximately 90 civilians. Around 250 employees of Serco Canada, a service delivery company, provide everything from aircraft control to cleaning, plumbing, carpentry and snow removal.

The latter is one of Serco's main challenges at Goose Bay—the white stuff falls persistently, and blowing snow is a near-constant concern during winter. Another challenge is geography. The ferry to Newfoundland is about 620 km away; the nearest island city, Corner Brook, is another 350 km by car.

"Getting delivery of parts and materials is a challenge," said Tom Wheeler, site manager at Serco for Happy Valley-Goose Bay. "And it's expensive to get some of those parts in here."

Still, the airfield at Goose Bay rarely shuts down, and Serco staff have received glowing reviews from 5 Wing administrators.

"Their air traffic controllers … get nothing but high praise from a DND perspective," said Maj Andrew Vandor, commanding officer of 5 Wing's Mission Support Squadron. "When we get those reports, they come back with very high ratings."

A GREAT JOB TO EMBRACE

Many members of the military staff at 5 Wing play multiple roles. "I have like 10 hats I have to wear at different levels," said Capt Kevin Wilbur, whose official title is Wing Comptroller.

"Everything goes on like every other Wing," said Wilbur, who was previously posted to 15 Wing Moose Jaw, Sask., and 12 Wing Shearwater, N.S. "You just have less people to do it, so you do more things than what you normally do."

Wilbur is part of the financial team at 5 Wing that oversees spending and revenue, but he's also commander of the Wing Auxiliary Security Force (WASF), which supports military police in the event of a massive security incident.

"I am probably the only logistics officer and financial officer in the CAF [Canadian Armed Forces] who's a WASF commander," he said. But it's a lifestyle many come to embrace.

"It's a great job," said WO Nancy Chicoine, the superintendent clerk at 5 Wing. "Goose is one of our best postings we've ever had. We came here with the notion that it was going to be, 'Let's just do it and get it over with and get out of here,' because postings are not generally optional … [but] we have had a fantastic posting here."

You have to go along with the mindset in Goose Bay, she said. You have to find your groove, and the isolation can be a bit much. But you have to make the best of it.

"It can become a real habit to just stay on base," said Chicoine. "But it's really important that you get out and see what Goose Bay is all about. Once you do that, it's a very memorable posting."

***Ben Forrest** is a writer and editor based in southwestern Ontario.*

444 Sqn provides rapid response during training missions at 5 Wing Goose Bay using three CH-146 Griffon helicopters, also performing utility and SAR operations throughout the year.

COMBAT SUPPORT FROM ABOVE

IT MAY OPERATE OVER SOME OF THE MOST ISOLATED AND CHALLENGING TERRAIN, BUT 444 COMBAT SUPPORT SQUADRON HAS EVOLVED FROM FLYING FIGHTER JETS TO BECOME A CRITICAL HELICOPTER UNIT SUPPORTING 5 WING EXERCISES.

BY BEN FORREST & MIKE REYNO
PHOTOS BY GEOFF GOODYEAR

Flying in Labrador can be challenging at times given the ever-changing weather conditions, terrain and remoteness.

On a given day in the remote, sparsely-populated terrain over Happy Valley-Goose Bay and rural Labrador, it is often cloudy or snowing, or both. The winters are brutal and long; the summers are warm and wet, and militaries from all over the world have used this rugged patch of land for austere weather training.

If something goes wrong in one of these training exercises—an injury or any other kind of disaster—the pilots and medical technicians from 444 Combat Support Squadron are there in a hurry. This small but effective crew of 35 military personnel and five civilians provides rapid response during training exercises at 5 Wing Goose Bay using three CH-146 Griffon helicopters. On occasion, aircrews also perform utility transport and secondary search and rescue (SAR).

"We try to have a real team-oriented atmosphere," said Maj Ryan Snider, commanding officer of 444 Squadron. "You're not two ships passing in the night, as many other squadrons and Wings are. You get a chance to interact with people on a regular basis, and get to know them far better than you would at a normal [posting.]"

The squadron, one of three Combat Support squadrons in the Air Force, draws a mix of new recruits and pilots and technicians with previous Griffon experience. Postings usually last three years, and they can be an effective way for new pilots to get their feet wet.

"I love it," said Capt Marc Saucier. "The area can be really challenging, just because everything's so remote. I don't think you find terrain like this anywhere else in Canada, where everything's so far apart.

444 Sqn has a small but very capable team of maintenance and support technicians. **Mike Reyno Photos**

Med techs have recently replaced SAR techs at all three of the RCAF's Combat Support squadrons. Med techs are trained as primary care paramedics and have diverse backgrounds that make them extremely versatile.

"But it's been really good. There's not enough people in Labrador to necessitate us being called out that often in the first place, but what we do, it's pretty different each time."

Pilots in 444 Squadron average about 300 flying hours a year, and the posting can also be a refreshing change for seasoned pilots who transfer from other bases.

"This is nice with the family, because I'm home all the time, other than the odd night," said Capt Neil Gabourie, a Griffon pilot who has also spent time with 427 Special Operations Aviation Squadron at Canadian Forces Base Petawawa, Ont.

444 Squadron traces its history to 1947, where it was originally activated in Rivers, Man. It later transferred to St-Hubert, Que., where it operated the Sabre fighter jets, and then moved to Baden-Soellingen, Germany as part of Canada's commitment to the North Atlantic Treaty Organization (NATO).

The squadron disbanded in 1963, but was stood up about two months later and equipped with the CF-104 Starfighter, which it operated until 1967 before being disbanded again. Five years later the squadron was re-activated and renamed 444 Tactical Helicopter Squadron flying the CH-136 Kiowa. Stood down on Apr. 1, 1992, the squadron was reactivated in Goose Bay in 1993, now equipped with the CH-135 Twin Huey in a rescue and support role. The CH-135 was replaced by the CH-146 in 1996.

Today, the squadron operates out of two large hangars that make up a fraction of 5 Wing's massive infrastructure footprint, supporting NORAD's North Warning System radar sites on utility missions and supporting SAR efforts in the area when CH-149 Cormorant helicopters from 9 Wing Gander are not available.

"JRCC (Joint Rescue Coordination Centre) Halifax will call upon us from time to time," said Snider. "They understand we're not a Cormorant … there are limitations. But they still give us a call and say, 'What can you provide?' And then we'll do our best."

A major development at 444 Squadron over the last year has been the ongoing replacement of SAR Technicians with Medical Technicians on Griffon flight crews. The transition began in 2018 and once complete, Griffon crews will have two pilots, a flight engineer and a med tech on board. Similar transitions are taking place at 417 Combat Support Squadron at 4 Wing Cold Lake, Alta., and 439 Combat Support Squadron at 3 Wing Bagotville, Que.

"The med techs will come to us having already undergone their medical technician training," said Snider. "We'll top up that training to give them familiarization … to operate at the back of the cabin of the aircraft. We'll train them on spotter duties, and then we'll also train them on how to function on the hoist."

Whereas SAR techs can jump out of helicopters to perform rescues at sea, med techs are not trained in skydiving or water diving and are geared toward land-based operations, said Sgt Adam Blackwell, a med

Pilots in 444 Sqn average about 300 flying hours a year, and the posting can also be a refreshing change for seasoned pilots who transfer from other bases.

Like the SAR techs before them, Med techs can be hoisted from the Griffon. However, Med techs are unable to do any sort of water work, including boat operations.

tech. They also use specific hoist, insertion and extraction methods for land-based operations.

Med techs are trained as primary care paramedics and have diverse backgrounds that make them extremely versatile. "We also do a lot of clinical and hospital kind of work—not just emergent care, not just tactical care," said Blackwell. "We are jacks of all trades in the medical field, and used as such in different postings."

Instructed originally by SAR techs during the initial transition, med techs at 444 Squadron have now reached a point where there is a senior lead med tech able to train the more junior members.

Recruiting med techs to the relatively isolated community of Goose Bay can be difficult, but many are quickly attracted to the squadron's warm, tight-knit culture once they arrive.

"It's a bit different," said Blackwell. "But honestly, it's pretty fun. If you are an outdoorsy person, this is the place to snowmobile or have an ATV. The fishing here is pretty amazing, too."

The squadron may have experienced a shift in focus in recent years, but its core mission remains the same. "It's that standby response to military operations," said Snider. "Different customers, different tactics, but the same purpose."

“Given Goose Bay is relatively isolated, it can be

difficult to recruit med techs

to work there. But many have warmed to the squadron’s warm, tight-knit culture once they arrive.”

Double Mission, Single Focus

AS IT MARKS ITS 75TH ANNIVERSARY, 435 TRANSPORT AND RESCUE SQUADRON IS DELIVERING TWO TOP PRIORITY MISSIONS WHILE PREPARING TO BECOME THE KEY PIECE IN THE RCAF TRANSITION TO THE NEW CC-295.

BY CHRIS THATCHER

SAR technician, Sgt Reagan Kruger (left) and loadmaster, MCpl Paul Comeau deploy lifesaving equipment from the ramp of a CC-130 Hercules aircraft. **Cpl Justin Ancelin Photo**

A CC-130H Hercules from 435 Squadron assists in the evacuation of northern Manitoba communities affected by forest fires in August 2017. **Cpl Justin Ancelin Photo**

A CC-130T Hercules from 435 Squadron refuels two CF-188 Hornets from 409 Squadron while enroute to Inuvik, N.W.T. **Cpl Arthur Ark Photo**

435 Squadron has SAR techs and aircrews on standby 24/7. **MCpl Johanie Maheu Photo**

435 Squadron technicians and USAF pararescue members during CHINTHEX 2018 in Thunder Bay, Ont. **Pte Hugo Montpetit Photo**

Capt Devin Rand prepares for an air-to-air refuelling mission. **OS Erica Seymour Photo**

Two CF-188 Hornets perform an air refuel with a CC-130T Hercules on a flight from Canada to Iceland in April 2011 to join Task Force Iceland in support of Operation Ignition. **Sgt Dwayne Janes Photo**

If you've taken a long road trip, you've undoubtedly seen that sign: Last chance for gas. Usually, it's only a warning that the next gas station lies a few hundred kilometres over the horizon. But for the pilots of Royal Canadian Air Force CF-188 fighter jets, the last chance to tank from a CC-130HT Hercules has a fixed date—July 2020.

Next year, 435 Transport and Rescue Squadron, based at 17 Wing Winnipeg, Man., will cap a 26-year air-to-air refuelling (AAR) mission in order to serve as the lynchpin in a plan to transition search and rescue squadrons from their legacy fixed-wing aircraft to the new Airbus CC-295.

"My marching orders are that July 2020, air-to-air refuelling will cease," said LCol John Coffin, commanding officer of 435 Squadron. "And I just heard it again verbally from the division commander [recently], so we are planning accordingly."

The decision is being executed with mixed emotions, he acknowledged. The Chinthe squadron is named for the leogryph, a half lion and half-dragon like creature often seen at the entrances of temples in Southeast Asia where the squadron was first formed in November 1944. Seventy-five years later, it still has that dual personality, simultaneously delivering two high priority missions: Search and rescue and AAR for NORAD fighter jets. It also provides vital air mobility, lifting troops, supplies and equipment into both domestic and international operations.

The transition to a single focus on search and rescue (SAR) might relieve some of the split personality symptoms, but "we will lose a significant part of what makes 435 unique," said Coffin. "And there will be lots of members of 435 who will miss that AAR role."

To appreciate how significant a change that will be, consider that the squadron has in recent years regularly supported CF-188 training exercises in Canada, the United States and as far away as Australia, annually delivered supplies to Canadian Forces Station Alert, the most northern base in Nunavut, been on standby to move troops and equipment for the Canadian Forces Disaster Assistance Response Team to support a humanitarian aid operation, and airlifted supplies to Operation Impact in Iraq.

That versatility is hardly new. Ever since the squadron stood up in Gujarat, India during the Burma Campaign, it has been a vital transport arm, flying everything from the Douglas DC-3 Dakota, to the Fairchild C-119 Flying Boxcar, and the Lockheed C-130B and E-model Hercules before receiving its current HT-models in 1992.

However, air-to-air refuelling and search and rescue have become its defining missions. Squadron Hercs have provided tanking support to both Canadian and U.S. fighters on quick reaction alert duty in the Canadian NORAD Region (CANR), the largest of NORAD's three regions, all the while holding a 24/7 posture to respond to SAR incidents across an area of responsibility that extends from Quebec to the British Columbia/Alberta border, and from the U.S. border to the North Pole. And incidents, whether downed aircraft, lost hunters, distressed boaters or the accidental activation of an emergency locator transmitter, are a weekly occurrence.

Meeting the demands of those primary roles has meant a delicate balance of available resources. 435 Squadron has just four CC-130H Hercules, which can be configured for either SAR or AAR. Given their age, one is often in

Search and rescue technicians from 435 Squadron and a CASARA (Civil Air Search and Rescue Association) volunteer spotter on a CC-130 Hercules aircraft flight during CHINTHEX 2018 in Thunder Bay, Ont. **Pte Hugo Montpetit Photo**

deep maintenance and the others are prone to mechanical problems. Maintenance technicians do their best to return aircraft to service as fast as possible, Coffin said, but resources are sometimes stretched thin.

Fortunately, deciding which priority mission takes precedence is not a choice he has to make. The squadron reports to the commander of CANR for NORAD tanking and to the commander of 435 Squadron's SAR Region (SRR), both of which happen to be the commander of 1 Canadian Air Division (1 CAD) in Winnipeg.

"My job is not to prioritize the task—those missions get directed at us from higher," said Coffin. "My job is to make sure I have people who are qualified and capable of doing their job, [and] also equipment, from the airplanes right down to the wrenches the maintainers use, to parachutes the SAR technicians use, that are ready to go whenever they're needed."

Since the commander of 1 CAD also has the resources of 424 Transport and Rescue Squadron at 8 Wing Trenton, Ont., at his disposal, resources can be reallocated as necessary to deconflict any issues 435 Squadron might encounter between its SAR and AAR tasks.

"He does have some flexibility there," said Coffin, a former commandant of the Canadian Forces School of Search and Rescue. "The commander can leverage Trenton to hold SAR for the entire region while we use our aircraft to do the AAR mission."

The SAR community maintains "great lines of communication" and shares personnel and periodically aircraft among squadrons to cover shortfalls, he said. "The difference for 435 is we are the only Herc squadron that does air-to-air refuelling."

Despite it's no-fail mantra, that doesn't necessarily make SAR the top priority, said Maj Cameron Pow, deputy commander of 435 Squadron. "Ultimately, sovereignty would take precedent. But that's the tricky part about the squadron—it's always a fight for those resources. We report to 1 CAD and say, here is what we have available, what is your choice?"

The squadron maintains a 30-minute posture to be airborne should a SAR incident arise during daytime on weekdays, and a two-hour posture at nights and over the weekend. And although the Hercules have their issues, the expectation is a 100 per cent service availability rate for both high priority missions.

But when a NORAD mission is activated, "just throw a hand grenade in here," said Pow, a former CH-146 Griffon pilot who deployed with 408 Tactical Helicopter Squadron to Afghanistan in 2008-09 and served as an instructor pilot with 15 Wing Moose Jaw, Sask. "Everything then just switches. We still maintain the SAR capability, but that sovereignty mission takes the full attention of the squadron."

"It is an exciting part of the squadron," said Coffin. "And I have amazing people. Because we are the pointy end of the spear, everybody is singularly focused and motivated to get the job done."

Like the rest of the Air Force, though, 435 Squadron has at times been challenged to retain its most experienced personnel. While it is below its full complement of aircrews and maintainers at the moment, Coffin noted the squadron has more than most because of the two priority lines of tasking. "We can leverage that by cross-training individuals to do different jobs and fill gaps within the squadron," he said.

Much of the maintenance on the Hercs is common to both missions, though there is some specialization for techs who work on the refuelling tank, which takes about 12 hours to install and test, and the AAR pods.

But the high tempo of missions has kept maintainers busy. The squadron runs two shifts, day and night, as well as a duty crew that, like an aircrew, is a pager-call away 24/7. "When we launch on a SAR mission, they are there for takeoff, there for recovery…they turn the aircraft around, refuel it, and off we go again," explained Pow.

TO TANK OR NOT TO TANK

While Coffin has his marching orders, he acknowledged a discussion is percolating about what comes next for tactical tanking. The RCAF has a project valued at up to $5 billion to acquire a new strategic tanking and transport capability (STTC) that will replace the CC-150 Polaris. While there is no formal project to replace the tactical tanker, the Air Force believes a future strategic tanker should be able to fulfill the varied support roles performed by the CC-130HT refuellers.

"We foresee that the capacity that is going to be delivered by the [STTC] project will have a lot more flexibility than our current Polaris fleet can deliver," Col Jason Kenny, director of Air Requirements, told *RCAF Today*. "That is going to be able to fulfill our operational requirements as well as our force generation requirements."

At present, just two of the five Polaris aircraft are configured for probe and drogue tanking; the other three provide passenger, cargo and government VIP transport. The Air Force has not specified how many new aircraft it will require, but BGen Michel Lalumiere, director general of Air Force Development, told an industry conference in April there are several critical demands: Greater flexibility to quickly reconfigure from tanking to transport; better interoperability with allies who need boom or probe and drogue refuelling; and endurance to reach any destination in one fuel stop to better manage crew days.

However, the first of the new strategic tankers is not slated for delivery until around 2028, so the Polaris, which has matured its capability significantly from experience during Op Mobile over Libya and Op Impact, will be carefully managed to meet as many of the tactical tanking demands as possible.

"That is our mitigation in the medium-term until we can get the strategic tanker capability project to deliver," said Kenny. "There is an acknowledgement we will have to prioritize and plan things appropriately so we retain our readiness levels, especially as the fighter force continues to grow."

The strategic tanking role is vital to force projection—the

A CF-188 Hornet refuels mid-air from a CC-130T Hercules over the Pacific Ocean during a mission as part of Exercise Puma Strike in 2016. **Cpl Manuela Berger Photo**

435 Squadron installs tanks for air-to-air refuelling on a CC-130T Hercules at 17 Wing Winnipeg. **Cpl Justin Ancelin Photo**

Sgt Kim Blake, 435 Squadron flight engineer, completes pre-flight checks on a CC-130T Hercules prior to departing for Exercise Tipic Strike at Holloman Air Force Base in New Mexico in October 2018. **Sgt Daren Kraus Photo**

CC-150 flew more than 1,150 sorties refuelling coalition fighter jets during a four-year deployment on Op Impact over Iraq and Syria. But the tactical tanker has been essential to fighter pilot training.

"We offload about two to three million pounds of gas every year, mainly in exercises," said Capt Pat Ketsman, a tanker commander and 435 Squadron's chief of air-to-air pilot training when *RCAF Today* visited in April. (He has since assumed responsibility for air-to-air standards.)

"We are a force enabler for the fighters so they can get their force generation done. We work with all the squadrons. Often when they go on exercises, we will meet them halfway, get them to where they are going, and then join them and bring them home after."

With a Hercules tanker orbiting overhead, fighters can conduct multiple revolutions, referred to as vols, against targets without having to land and refuel, which reduces wear and tear on the aircraft and lowers maintenance costs. When 401 Tactical Fighter Squadron deployed in April to Exercise Sandy Fleece in Fort Worth, the supporting Herc increased force generation by about 33 per cent, said Ketsman.

"Fighters are like addicts when it comes to gas. Each 100 pounds of gas is about a minute of flying and we were offloading about 40,000 pounds per vol. That's about 8,000

Capt Marty Walsh from 435 Squadron holds the basket of a CC-130HT Hercules as it is being repositioned after a routine inspection. **Cpl Manuela Berger Photo**

CC-130 Hercules and personnel from 435 Squadron will enable the Air Force transition to the new CC-295 fixed-wing search and rescue aircraft. **Derek Heyes Photo**

minutes. It's a lot of flying time for fighters and they need it. When we are on the go, it's two vols a day, 2.5 hours per vol, and only two hours on the ground in between. It is a huge benefit to have a tanker."

Though Hornet pilots are well trained by the time they begin learning air-to-air refuelling at 410 Tactical Fighter Operational Training Squadron, there's an argument to be made that the Hercs may be better suited—and more cost effective—than a strategic tanker for the role.

The end of the Herc tanking era may be on the horizon, but Pow said many in the fighter community are "pushing forward" concerns about the importance of a tactical tanking capability.

ENABLING TRANSITION

Ceasing AAR operations has a tactical purpose, however. 435 Squadron has been designated the swing force that will allow the rest of the SAR squadrons to transition from their legacy CC-130H Hercs and CC-115 Buffalos to the new Airbus CC-295, beginning with 442 Transport and Rescue Squadron at 19 Wing Comox, B.C., in October 2020.

"The details aren't ironed out, but the plan is for a 435-led, SAR community-supported, detachment of aircrew, maintenance and aircraft that will be situated in Comox for about five months to ensure 24/7 SAR coverage," explained Coffin. "That group will come back to Winnipeg, we'll do some training and reconstitute, and then a similar det will go to Trenton for about two to three months. They'll come back to Winnipeg and then to Greenwood for another two to three months. Then we'll start 435's transition to the CC-295."

The goal is to have all four SAR bases converted to the new aircraft by the end of 2022.

"We have been brainstorming here how we are going to pull that off," admitted Pow. "We are still working on the plan."

Part of the challenge will be managing a shortfall of not only maintainers, but also SAR techs and flight engineers, who will be required for both the CC-295 training and to maintain the current SAR posture with the legacy aircraft. "This will be a whole Herc community-supported transition," he said.

Though that will mark the end of almost three decades of CC-130H operations in the Air Force, Coffin said a lot of aircrew are looking forward to the new aircraft. "Many will miss the legacy of the Hercules and the comfort of being on the bigger aircraft, but the automation and new systems will be a game-changer that will enhance our SAR capability," he said of the CC-295's mission system and sensor suite.

TALES FROM THE PAST

As much as 435 Squadron is looking ahead, 2019 is also a year to reflect on its past. In addition to commissioning artwork of a Chinthe and commemorative tail art for one of the Hercules from Jeff Chester, the artist behind many of the Air Force's demonstration Hornets, the squadron also hosted a gala event at the Canadian Human Rights Museum in late April.

Among the highlights for many was the appearance of Richard Earl, an original member of 435 Squadron who joined the RCAF at age 18 in 1942 and became a wireless radio operator on one of two new Canadian transport squadrons, in India, working on the Dakota DC-3. His vivid and detailed recall of the early years of the squadron was enthralling, said Coffin. "I could have listed to him for hours."

The event also drew a large number of retired squadron members, many with tales and memorabilia to share. "Connecting with the vets was huge," said Pow. "You reflect on your history as you listen to them."

"It was pretty magical," said Coffin. "I am proud to call 435 my squadron."

As for the transition the squadron is about to undertake, after reading about and listening to the stories from the past about "different aircraft, different roles and different bases we have called home…it is just another mark in a rich and amazing history," he said.

And if the CF-188 fighters call one last time for gas? "In the last year, crews have been away 32 of 52 weeks on ops and exercises for AAR only, so I hope it doesn't go more than that," said Coffin. "But I hope the fighter force maximizes our capability in our last year. The crews are ready, willing and able to do it. If the need is there, we will answer."

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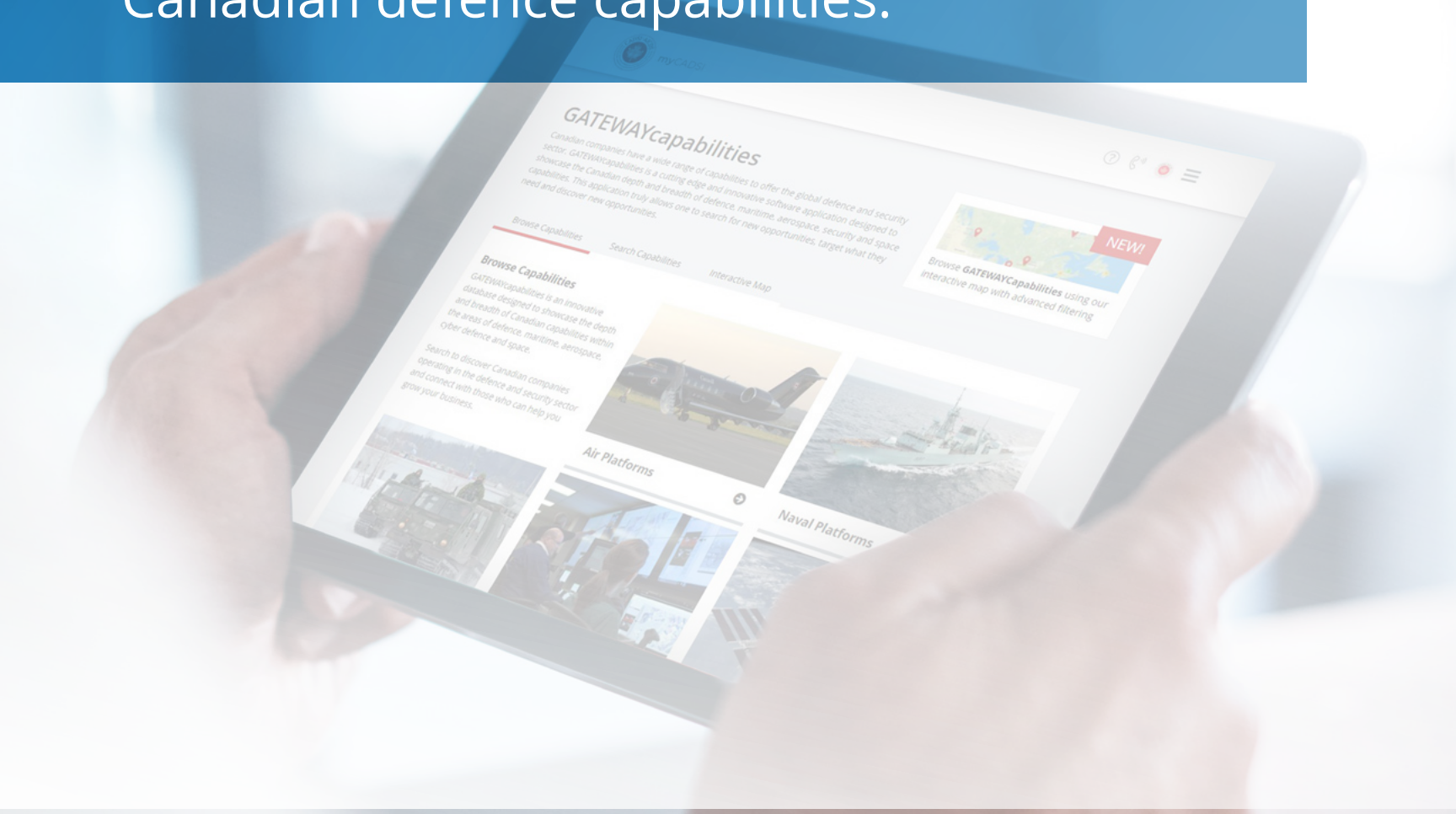

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SYSTE
EXPERTS

FLIGHT ENGINEERS, SPECIALISTS IN THE MECHANICAL AND TECHNICAL SYSTEMS OF FIXED- AND ROTARY-WING AIRCRAFT, ARE CELEBRATING THEIR 75TH ANNIVERSARY.

BY KEN POLE

Flight engineers (FEs) may be a vanishing breed in civil aviation, but not so in the Royal Canadian Air Force (RCAF), where a generally more complex operational environment with evolving systems requires more hands on the flight deck or back in the cabin.

In fact, the military's annual intake of FE candidates has been increased to 30 from 25, and there's likely going to be a similar increase in the not-too-distant future to offset attrition mainly due to an aging demographic.

FEs currently are scattered among seven RCAF fleets. Four are fixed-wing: the Lockheed Martin CP-140 Aurora maritime patrol aircraft, the CC-130H Hercules transport, the de Havilland CC-115 Buffalo search-and-rescue (SAR) platform and the CC-138 Twin Otter. The other three are rotary: the AugustaWestland CH-149 Cormorant SAR helicopter, the Boeing CH-147 Chinook transport, and the multirole utility Bell CH-146 Griffon.

FEs in the RCAF have been celebrating the occupation's 75th anniversary this year, including a formal event in June at 8 Wing Trenton, Ont., which included a memorial rededication in honour of FEs who have died in service since they first flew on Avro Lancaster bomber missions in 1944. A small but important part of the celebrations was the design last year of a new patch for operational flight clothing; it pays homage to the half wing from the Second World War, but also features modern wings on a Maple Leaf background.

The roster of "fallen" FEs also includes three who died more recently. One was killed in Afghanistan in July 2009 when a CH-146 crashed after the pilot lost situational awareness on takeoff from Kandahar Airfield. The two others died in July 2006 when a CH-149 crashed into the sea off Nova Scotia during a night SAR training flight.

Given that there are fewer than 300 FEs among the RCAF's total of some 17,000 regular and primary reserve personnel, it's a small community in which losses are keenly felt. There is, however, an implicit support network, the Canadian Military Flight Engineers Association, which currently has more than 1,300, including some who first flew toward the end of the Second World War and now are well into their 90s.

Historically, the position of FE evolved as aircraft became bigger with more engines and more complex systems. In those wartime Lancasters, monitoring the engines and other critical systems freed the pilot to fly the aircraft. The FE sat in the cockpit to the pilot's right, above the bomb-aimer and in front of the navigator and wireless operator; the rest of the typical seven-man crew were the upper-turret, belly and tail gunners.

Today, as then, RCAF flight engineers are the systems experts, with extensive mechanical and technical training and responsibility for pre- and post-flight inspections.

All aspiring FEs, whether self-identified or recommended for the position, must be an experienced aircraft or avionics technician. Once medically screened to become aircrew, there's a competition and, when selected, they must complete FE basics at 8 Wing and then additional maintenance and flight courses before fleet assignment, explained CWO Neil Thorne, who has spent most of his FE career in helicopters.

Promoted from Master Warrant Officer in mid-June as the senior occupational advisor for FEs, Thorne is a native of Torbay, N.L., which, incidentally, was a Second World War operational base for Canadian, British and American aircrews providing cover for Allied convoys and patrolling the North Atlantic for German submarines.

Although recently posted to 1 Canadian Air Division in Winnipeg, Man., where his new role is to advise commanders of issues facing the community, he spoke with *RCAF Today* from 19 Wing Comox, B.C., as the FE leader of 442 Training and Rescue Squadron, where he managed the CH-149 and CC-115.

M S

A flight engineer from the Force Protection team in Mali participates in an escort mission on a CH-146 Griffon helicopter during Operation Presence in February 2019. **Cpl François Charest Photo**

The role of FEs in the RCAF has generally evolved with the fleets. "The roles on fixed-wing aircraft such as the Hercules and the Aurora are as they have been traditionally," he said. "But the remainder of the fixed-wing aircraft have shifted to cabin duties" such as checklists, assisting in emergencies, and advising the flight deck on system issues.

On the Griffon and Chinook, cabin duties on domestic and international missions include mission kits and manning weapons. On the Cormorant, the FE also operates the rescue hoist, which Thorne said can be "very dynamic" and "not for the faint-of-heart" as missions are often in extremely poor weather.

"It's a very collaborative crew concept" and while "the aircraft commander is the ultimate authority on all RCAF aircraft, the flight engineer has technical responsibility to advise the aircraft commander on serviceability when away from home base," he said.

Not only are FEs an essential link between pilots and military technicians, they also maintain good relations with civilian contractors.

Asked whether an FE can overrule a pilot and declare an aircraft unfit to fly, Thorne replied that "he has the responsibility to ensure that the aircraft is airworthy, absolutely, and will advise the aircraft commander." That being said, "I don't think I've ever seen a commander take a plane flying with an airworthiness issue."

While the command structure for FEs is similar to other RCAF occupations, it differs in some ways. "A corporal will fly 80 per cent of the time while the other 20 per cent will be administrative duties," explained Thorne. The ratio shifts with promotion to where MWOs spend 80 per cent of their time on administration and 20 per cent flying. Once they become CWOs, they become solely administrators.

FE salaries in the RCAF tend to be "on the high end for enlisted personnel" and there's a bonus in the form of flight pay. Thorne said it can be "a motivator for occupational transfer, for technicians to become flight engineers."

He admitted, "there have been times when the occupation has struggled with numbers, through the '70s and '80s especially." As the occupation evolved, "there have been times when its future seemed to be in jeopardy due to … restructuring and civilian job offers."

At times, attrition has outnumbered intake, but that same evolution seems to have generated what Thorne described as "considerable interest within the RCAF for technicians to step up and challenge themselves."

The RCAF's new retention campaign is expected to help. Since assuming RCAF command in May 2018, LGen Al Meinzinger cautioned in a statement to personnel this June that "increasing our intake and our training capacity is not enough … we must nurture an environment where the RCAF's quality of life and quality of service make it more attractive for our members to stay than to leave."

It's almost a no-brainer for Thorne. "It's an exciting career that attracts members looking for a new challenge." While FEs in SAR squadrons have been prime candidates for recruitment by the offshore petroleum sector, he expects the number in RCAF blue "will continue around 290-300 or possibly grow slightly in the next decade or two." Conceding that could change with new aircraft procurements, he said, "I believe we're in good shape for the foreseeable future as long as we continue to be an attractive option for RCAF technicians."

Part and parcel of that effort is an annual working group of senior FEs, mostly master and chief ranks; the latest in February included Col Scott Murphy, the occupational advisor to 1 CAD. "They can be very candid," said Thorne. "Each fleet representative gets up and speaks. We talk about different topics and, of course, there are differing opinions. But at the end of the day, it's a collaborative effort to make sure that we're all on the same team, going in the right direction."

Mentoring is a key factor. "As a peer and as a supervisor, I've found that the time spent with younger members has paid off as they progress in their career," he said. "When I was an (FE) lead at 440 Squadron Yellowknife, I had quite a few corporals working for me on a fairly simple airplane. However, through mentorship, a lot of them have moved forward to more challenging aircraft such as the Hercules and the Aurora.

"Mentoring new members on how to interact with pilots and technicians is important for a positive working relationship. The airmanship component of being an aircrew member sometimes takes a while for younger flight engineers. This isn't something they usually deal with as technicians."

Also, there's the reality that SAR missions can involve picking up casualties. "How we deal with stress and critical incidents is important," said Thorne. "We try to ensure our members are both physically and mentally healthy for their missions." It helps that the community is "tight-knit, very collegial."

But do FEs get the recognition they merit? "That's a tricky question," Thorne replied initially. "I will say this: self-satisfaction means a lot. They don't become flight engineers for the glory, but for the personal satisfaction of serving their country, especially in tactical aviation overseas."

His own career included a deployment as a young corporal when he was a technician with 441 Tactical Fighter Squadron flying the McDonnell Douglas CF-188 Hornets in support of Operation Allied Force, NATO's intervention in Kosovo.

"We have a lot of Flight Engineers helping Canadians every day on search-and rescue missions across the country," he added. "That's the recognition that keeps them going a lot of the time."

Ken Pole *has had a life-long passion for aerospace, writing about all its aspects for nearly 40 years. The longest-serving continuous member of the Canadian Parliamentary Press Gallery, he's also an avid sailor.*

CWO Neil Thorne next to a CH-149 Cormorant at 19 Wing Comox, B.C. **Cpl Jeffrey Clement Photo**

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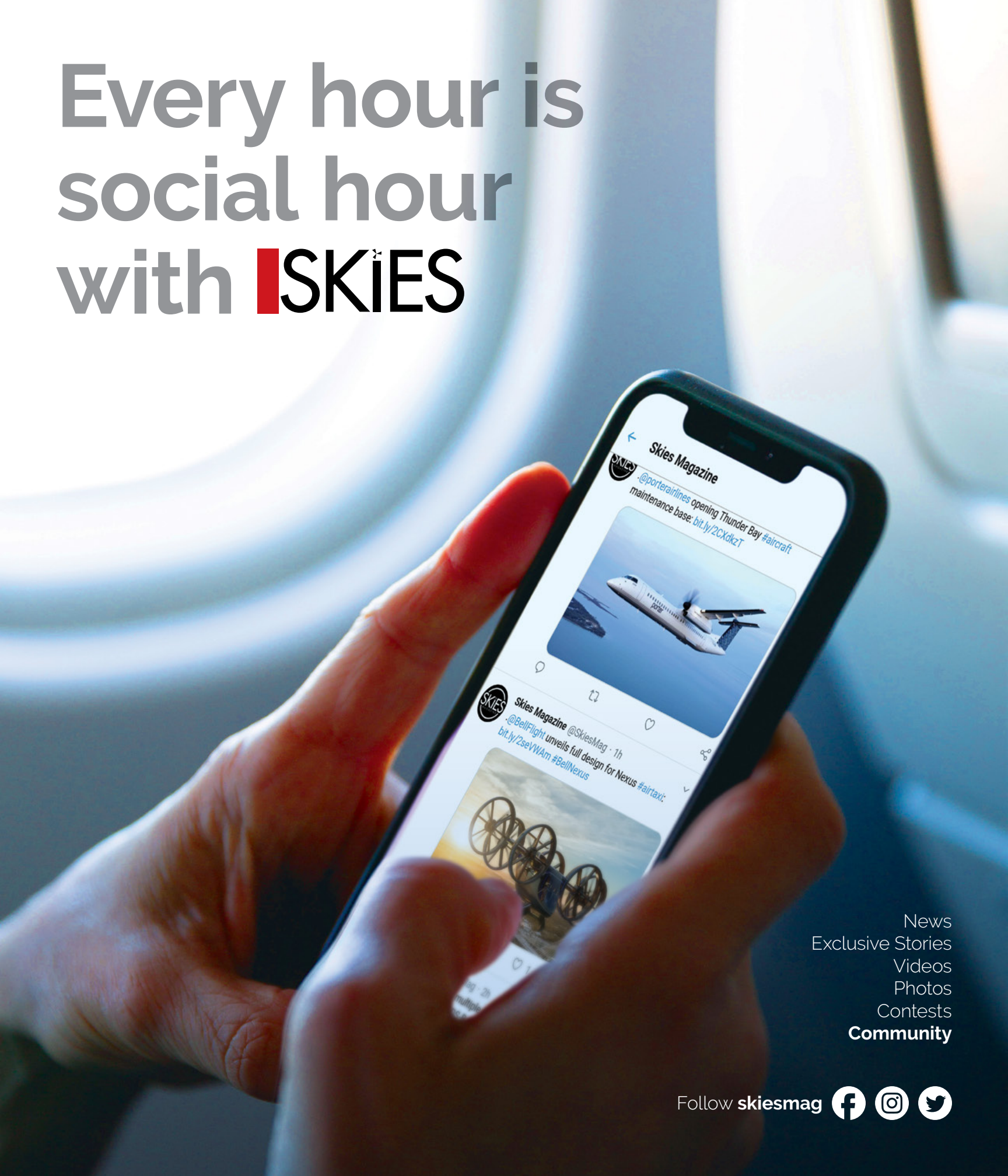

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LOCKHEED MARTIN F-35A LIGHTNING II PERFORMING AT THE BAGOTVILLE INTERNATIONAL AIR SHOW

Multiplied Force, M

THE LOCKHEED MARTIN F-35 IS A HIGHLY CAPABLE, 5TH GENERATION FIGHTER JET THAT IS ALREADY PROVIDING CANADA WITH SIGNIFICANT ECONOMIC BENEFITS.

BY AMITAV DASH

With Canada's Future Fighter Capability Project (FFCP) soon to enter the bidding stage, Lockheed Martin is eager to remind everyone of two things. The first is the superior capability of its F-35 fighter jet. The second concerns the economic benefits Canada is already receiving from being part of the F-35 Joint Strike Fighter (JSF) program—benefits the company says will naturally increase if it wins the FFCP competition.

IT'S A FORCE MULTIPLIER

"With more than 400 aircraft and 200,000 flight hours across the fleet, the F-35 is delivering today and growing rapidly," said Lorraine Ben, chief executive of Lockheed Martin Canada.

This growth phase has already translated into lower unit costs for the F-35.

"We've reduced production cost below [US] $80 million," said Ben. "The world's most advanced fighter is now more affordable to procure than less capable, legacy aircraft."

The ongoing maturation of the JSF program is also ensuring that upgrades are continuing to be developed, which will help keep the F-35 ahead of other future fifth-generation fighters. The recently released Block 4 upgrades include new weapons, a ground collision avoidance system, larger fuel tanks and the ability to partner with unmanned aircraft.

This is in addition to such existing features as: supersonic speed; stealth capabilities with internal weapons capacity; an advanced sensor suite; sensor fusion abilities; an advanced helmet-mounted display system; network-enabled operations; and electro-hydrostatic actuators serving as the primary flight controls.

"There is no question that the F-35 is a real game-changer," said Capt. Andrew Olson, the United States Air Force's F-35A Lightning II demonstration team commander and pilot.

During his team's first performance in Canada at the Bagotville International Air Show in late June 2019, Olson shared his thoughts on the stealth fighter's advanced capabilities and the features that make it a significant force multiplier.

"The top five features that I like to talk about include stealth; sensor fusion; a big engine [at 43,000 pounds of static thrust, the Pratt & Whitney F135-PW-100 is the most powerful engine ever put in a fighter]; endurance; and flight controls."

He further explained: "When we talk about stealth, we are talking about stealth across multiple spectrums. When we talk about sensor fusion, we are also talking about information fusion. Sensor fusion is taking everything my airplane is seeing and presenting it to me. But information fusion is now sharing that across that whole space, receiving other information that's maybe coming in from outside your airplane and putting it all together—you are presented with this situational awareness picture that's just unsurpassed in anything we've seen before.

"And when we see those threats, we have a very powerful engine that gets you away from those threats quickly, which I demonstrate during my air show performance. I also demonstrate the manoeuvrability of the F-35, which doesn't even use thrust vectoring thanks to its sophisticated flight controls."

That combination of superior and continually increasing capabilities with steadily reducing costs is why Lockheed Martin is positioning the F-35 as the best value fighter to replace the Royal Canadian Air Force's (RCAF's) current fleet of CF-188 (CF-18) Hornets.

IT'S AN ECONOMIC MULTIPLIER

Beyond its capability and value, the F-35 has been and is predicted to continue being a boon for the Canadian economy.

To date, Canada's involvement in the JSF program has produced about Cdn$1.8 billion in contracts, about triple the country's investment in the program.

Said Ben: "Over 110 Canadian companies have played a large part in all phases of the development and production of the F-35, resulting in hundreds of Canadian jobs and valuable technology transfer of expertise and skills."

Each fighter jet produced is said to contain about $3 million worth of components from Canadian suppliers. However, as production increases and more aircraft are purchased, Ben said that could go even higher: "As the F-35 transitions into full-rate production, and with its current projection of more than 3,500 jets over several decades, the program has the potential to bring additional manufacturing and production opportunities to Canada."

In addition to aircraft-specific contracts, it is believed that other Canadian businesses will benefit when intellectual property, technological expertise and

Multiplied Benefits

Larry Grace Photo

other vital knowledge gained are applied to secondary business transactions (both civilian and military).

Plus, if Canada does select the F-35 in its FFCP competition, Canadian businesses will have the opportunity to win contracts to help sustain these new RCAF aircraft over their in-service life.

All in all, some estimates say 50,000 jobs could be created over the life of the program (another 50 years).

While estimates and forecasts are not guarantees, the company is quick to point out its 80-year history in Canada. This includes more recent developments, such as the partnership on the F-35 program, Lockheed Martin Canada's billions of dollars of research and development investments and economic contributions, and ongoing contracts it has with its network of 1,400 Canadian suppliers.

IT'S THE RIGHT CHOICE

Beyond economic benefits and advanced capabilities, Lockheed Martin believes another big reason for Canada to choose the F-35 as the RCAF's next fighter jet is the fact that other allies are selecting this platform for their militaries.

"The F-35 is interoperable with the United States, NATO and many of Canada's closest allies," said Ben, "allowing Canada to integrate with the U.S. for NORAD operations and fully participate in coalition peacekeeping operations."

Olson, meanwhile, thinks the choice is obvious and suggests Canada shouldn't let fear stand in the way: "I think in 20-30 years we're going to look back on this moment in time and go, 'Wow, that was a silly thought,' just being afraid of the future and afraid of change."

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STAYING TRU to Form

TRU SIMULATION + TRAINING IS WORKING TO LEVERAGE ITS EXTENSIVE EXPERIENCE AND CANADIAN FOOTPRINT TO SECURE POSITIONS ON THE RCAF'S FACT AND VMT CASE 2 PROJECTS.

BY AMITAV DASH

With the Royal Canadian Air Force (RCAF) preparing to launch its once-in-a-generation aircraft training program, countless companies are vying to be chosen as suppliers on the project. While those players each have strengths in specific areas, few have the kind of simulation and training experience that TRU Simulation + Training does.

Although it was officially formed in 2014, TRU's three main predecessor companies—AAI, Mechtronix and Opinicus—had for decades provided training and simulation solutions for military and civil customers alike. This includes a host of United States Air Force (USAF) programs, such as the B-1B, C-17, C-130, F-16, F-22, F-35 and U-28.

TRU also has a sizable Canadian footprint, in Montreal, Quebec, which will feature prominently should the company be selected for either of the two RCAF training projects for which it's competing.

THAT'S A FAcT

The larger of the two RCAF projects is the Future Aircrew Training (FAcT) program.

TRU is in a unique position for the FAcT competition. First, the company is not tied to any one bid, which means it could conceivably provide simulators for whichever group wins.

"We have worked out partnering deals with some of the primes to provide pilot training devices for the models they select as their training platforms," said John Hayward, senior vice-president and general manager of TRU's government division.

Second, given Textron is its parent company, few competitors have TRU's insights into the Bell and Textron Aviation aircraft that could be part of the winning bid.

Hayward believes some of the five remaining bidding groups for FAcT will include Bell and Textron Aviation Defense models for their training platforms. "This could include the Beechcraft T-6 Texan II, which is currently in use by the RCAF [as the CT-156 Harvard II], a Beechcraft King Air platform for the multi-engine training solution, and perhaps a Bell 429 or 407 for the rotary-wing training solution."

As Hayward pointed out, TRU has off-the-shelf simulator designs it has produced for all these platforms. "These simulators are top-notch. They are the highest-fidelity devices for these platforms, have low lifecycle costs, are easy-to-maintain and exceed the industry's reliability standards."

The simulation and training work TRU has done with these Bell and Textron Aviation platforms is both extensive and high-level.

"For the T-6," said Hayward, "our experience includes on-aircraft training, maintenance training and pilot training courseware. We are in the process of building a T-6 operational flight trainer for the Argentine Air Force's T-6 deliveries.

"For the Bell 429, we have created a [Level D] full-flight simulator [the first to be certified by the European Aviation Safety Agency]. It is an incredible simulator and does the best job of simulating a rotary-wing platform that I've seen in my more than 30 years in the business.

"We've also built multiple King Air full-flight simulators [FFS] and flight training devices, including for the joint venture flight training centre we have with FlightSafety in Tampa, Florida."

If TRU is chosen to supply simulators to the winning FAcT bid, it will manufacture them at its facility in Montreal. That division has over 400 employees and extensive experience building FFS for such air transport models as the Airbus A320, A330 and A350; ATR 72-500 and -600; Boeing 737NG, 737 MAX and 777X; and Bombardier CRJ900.

As Hayward explained, building the simulators in Montreal will not only leverage that division's expertise, "It will help meet Canada's Industrial and Technological Benefits requirement."

While Hayward said TRU would use existing technology and personnel initially, he predicted it would eventually hire additional employees in Montreal and invest in research and development to ensure continuous program improvements.

CASE IS THE POINT

TRU is also planning to compete for the Virtual Maintenance Trainer (VMT) Canadian Advanced Synthetic Environment (CASE) Phase 2 project. Although smaller in scope than FAcT, this program also fits very nicely with the company's expertise and experience.

CASE 2 requires three VMT suites, 25 part-task trainers (PTTs) and in-service support for the Canadian Forces School of Aerospace Technology and Engineering (CFSATE).

As Hayward explained, "This will help [CFSATE] set up an initial training program for RCAF aircraft maintainers. The program will be platform agnostic but will need to be representative of a modern, multi-engine aircraft, like a King Air."

Hayward predicts Canada is looking for a generic program, similar to what USAF currently has. Appropriately, TRU has significant experience with maintenance training for the U.S. military.

"We built all the maintenance training devices for the C-17 program," he said, "and operated those for about 22 years with 99 per cent availability . . . and 100 per cent on-time delivery. We have also supported the F-22 program for almost 15 years, building several maintenance training devices and continuing to update those as the aircraft configuration has changed."

TRU has also built similar training devices for civil customers, including for its training facility with FlightSafety.

"We anticipate using some of the latest virtual reality technology to produce a very high-fidelity aircraft model for the three VMT suites," said Hayward.

Meanwhile, for the 25 PTTs, he said TRU would utilize its experience developing similar trainers for the C-17, F-22 and F-35 platforms.

For either RCAF project—FAcT or VMT CASE 2—Hayward said TRU plans to take the same approach: "Leverage the experience we have providing very similar services and devices for the U.S. and other international militaries to create a very reliable, easy-to-maintain, high-fidelity solution that satisfies or surpasses the RCAF's needs."

"The simulation and training work TRU has done . . . is both extensive and high-level."

READY for an unpredictable FUTURE

THE SAAB GRIPEN E IS WELL-SUITED TO BECOME CANADA'S NEXT FIGHTER AIRCRAFT.

BY GRAHAM CHANDLER

Buying a new all-purpose jet fighter isn't easy. First, there is the difficulty of meeting today's threats, plus the unknowns of the decades beyond 2025 in a world of increasingly fast-paced advances in tactical systems. Then, there are the issues of interoperability with other countries' forces, home defence needs and jobs for Canadians.

Saab, however, believes it has the answer Canada is seeking.

"We've developed a system that aims towards the future," says Stefan Nygren, Gripen E program director for Saab AB in Linköping, Sweden. "It's a system that can handle not only ongoing threats but also adapts to software and hardware in the future. So, we can integrate future software and hardware much faster than before."

Nygren says this inherent adaptability comes from splitting the avionics systems. "The flight critical part—which takes a long time to upgrade, sometimes years—is separated from the tactical part by software partitioning. So, we can isolate and upgrade the tactical side of the fighter much faster without jeopardizing flight safety."

This adaptability also enables the Gripen E to keep up with stealth protection.

Nygren says stealth is an important factor but one that is now based less on external aircraft shape. "The old-fashioned way was the enemy had radar, so you developed an aircraft with a low radar signature. But with Gripen E, we have the ability to share information between aircraft in the air and on the ground, so using many sources at the same time you can look at the threat from different angles. By this, you can actually see the stealth aircraft anyway."

He says a stealth aircraft is designed to be stealthy in one direction, but by using sensors from different angles and fusing radar, electronic warfare and infrared at the same time you can spot it. "In today's battle, you cannot rely on stealth alone. You need stealth-plus. We take that one step ahead to include data sharing so we can see the enemy before they see us."

At the same time, Saab has not overlooked operational basics. For instance, the Gripen E can fly direct from Cold Lake, Alberta, to Inuvik, Northwest Territories, and be ready to deploy from there. While the dogfight is mostly a thing of the past, forward deployability is still important, particularly for countries like Canada and Sweden.

Additionally, being able to perform short takeoffs and landings from dispersed air bases without external support or even a drag chute or arrestor hook can offer a significant advantage in a conflict. The Gripen E provides that: it needs just 600 metres (656 yards) to land and 500 metres to take off, with a 10-minute turnaround, including hot refuelling. If required, a hot engine can be changed out, and the aircraft can be airborne again, within an hour. Moreover, as the Swedish Air Force knows, all this can be done under Arctic conditions.

"So, Gripen E already has the DNA," says Per Alriksson, senior sales executive for Gripen sales and marketing. "It's designed to work when it's bloody cold. We have a permanent air base at 65 degrees [65th parallel] north. That's where we operate, where we fly daily."

Alriksson says the Gripen's DNA offers a distinct advantage to the Royal Canadian Air Force; an advantage that can be seen in the aircraft's interoperability: "We regularly participate in NATO Air Policing—Baltic states and Iceland—as well as other multinational exercises. And Gripen has participated in Exercise Red Flag. As well, Gripen was deployed in the NATO led operation in Sicily in 2011, where we flew more than 650 sorties over Libya."

INDUSTRIAL AND TECHNOLOGICAL BENEFITS (ITB)

Patrick Palmer, executive vice-president of Saab Canada, says the company is ready with potential benefits to Canada: "We have a program for technological transfer, IP [intellectual property] transfer and knowledge transfer from Sweden into many countries already, for example Brazil. And, Canada would certainly fit within that realm."

Palmer reckons the company's transfer program is second to none when it comes to fighter aircraft.

"We're optimistic in terms of being able to meet the requirements of the Canadian ITB, as well as the value," he says. "And, more importantly, we honestly believe it's almost a requirement to create and sustain that capability in Canada. You have to do knowledge transfer; otherwise, as the purchaser, you are really dependent on a number of other countries. As we've seen in the past, that doesn't work out too well, and it doesn't create the sustainability and the high-value jobs that you and I are both looking for."

"Our plan today," adds Palmer, "depending on the final government RFP, would be to submit the full value of the contract for ITB in Canada. It's almost impossible to give a number at this point, but suffice it to say, we think we have a pretty attractive offer."

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STRONG, Secure & ENGAGED

CAE HAS BECOME A GLOBAL LEADER IN TRAINING SERVICES AND SUPPORT, LARGELY THROUGH ITS LONG-RUNNING RELATIONSHIP WITH THE ROYAL CANADIAN AIR FORCE.

BY BEN FORREST

In early 2016, less than six months after CAE completed the acquisition of the NATO Flying Training in Canada (NFTC) program, along with the rest of Bombardier's military aviation training business, the Montreal-based training giant landed another big deal.

CAE announced it had received a contract to provide fixed-wing flight training for the United States Army. This win was a significant achievement for an iconic company that has been a trusted partner of the Royal Canadian Air Force (RCAF) for decades.

It's no coincidence that one achievement followed the other.

"Why was that successful? Why were we able to go and bid that program?" asked Joe Armstrong, vice-president and general manager of CAE Canada and recently named vice-president of business operations for CAE's Defence & Security business unit. "It was partly because of the capabilities that we acquired in Canada delivering to the RCAF."

CAE's relationship with the country's air force runs deep. Ken Patrick, an RCAF officer during the Second World War, founded the company—then known as Canadian Aviation Electronics Ltd.—in 1947, hoping to capitalize on his military expertise.

Patrick and his business partners built the company into a worldwide leader in flight simulation and training, largely as a result of the experience gained through its work for the RCAF.

"Our global success . . . is absolutely driven by the continued co-operation we have with the Canadian government, with the RCAF and with the defence community in this country in general," said Armstrong. "I can't overstate the importance and relevance that the continued relationship that we have today with the RCAF has on our ability to maintain our success in the global market."

CAE is known mainly as a training provider, but the company is also an integral part of the RCAF's operational ecosystem, providing in-service support and operational support to many aircraft fleets.

The most visible example of this is likely the software and systems engineering work CAE has provided—in partnership with L-3 MAS—for Canada's CF-188 fighter jet fleet since the late 1980s. In fact, CAE often deploys employees (many of whom are former RCAF personnel) into theatre to ensure the aircraft operate at maximum capability.

"It's an enormous privilege, and that privilege is, I think, only given through trust," said Armstrong. "This trust is built by ensuring that you can demonstrate that you're delivering the highest quality service, the best capability—a capability that never fails Canadian Forces personnel."

Other military aircraft CAE has extensive experience supporting include the CH-148 Cyclone maritime helicopter, and the CT-155 Hawk and CT-156 Harvard II training fleets that are part of the NFTC program.

An important goal for CAE going forward is encouraging diversity in aviation, especially as militaries and the civil industry grapple with a pilot shortage that is expected to grow worse in the years ahead.

At least 300,000 new pilots will be needed by 2028 to address the global shortage, according to CAE's latest projections. Additionally, because aviation is currently a male-dominated profession—only about five per cent of pilots around the world are women—attracting more female pilots is seen as crucial.

"From our standpoint, tackling gender diversity would absolutely address this imbalance," said Armstrong. "And it gives us access to a talent pool that's nearly twice its current size."

With this in mind, the company launched the CAE Women in Flight scholarship program, which provides financial support to aspiring female pilots.

Another diversity initiative, which CAE announced at the CANSEC trade show in late May 2019, is the Canadian Industrial Leadership Scholarship Award. This joint program, with partners L-3 and Thales, aims to address a lack of gender diversity in leadership positions at many top defence companies. It will offer specially crafted scholarship and internship opportunities for young women in defence and security.

"Young women are often not seeing defence and security as an industry sector that they would be interested in," said Armstrong. He added that academic programs do well at training students in technical skills, but there is not much focus on leadership.

This new program will help bridge the leadership-training gap, offering scholarships and internships to women in STEM (science, technology, engineering and math) disciplines, as well as mentorship opportunities with executives at major companies.

"It's really an opportunity for the three companies to get together and show some great thought leadership and industry leadership," said Armstrong. The plan is to reach out to academic programs across Canada.

In the meantime, CAE's co-operation with the RCAF remains incredibly close and integral to the success of both entities.

"We've had a long history with the RCAF," said Armstrong. "We continue to have a mutually beneficial relationship with them."

At the same time, he noted many challenges on the horizon, including the needs of various aircraft fleets, and attrition and resourcing issues across the military ecosystem.

"I think the nature of that pressure, of the challenges and opportunities that we see over the next five to 10 years, is going to really drive us to be even better," said Armstrong. CAE will be "increasing the depth and the mutual, collaborative nature of the relationships we establish between industry, the Government of Canada and the RCAF."

CAE

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"Our global success is absolutely driven by the continued co-operation we have with the Canadian government, with the RCAF and with the defence community in this country in general"

— Joe Armstrong, vice-president and general manager of CAE Canada

SYNTHESIS is the SOLUTION

SYNTHESIS IS A WEB-BASED SOFTWARE SUITE FROM MARINVENT THAT IS THE BEST WAY TO TRACK AND MANAGE COMPLEX AIRWORTHINESS AND CERTIFICATION PROJECTS.

BY BEN FORREST

In the mid-2000s, as they juggled an ever-increasing portfolio of airworthiness and aircraft certification programs, the staff at Marinvent—a training and consulting firm based on the outskirts of Montreal, Quebec—realized something.

They realized the process of compliance and certification had to be improved. It had to be organized and managed better. It had to become more efficient and easier to schedule, optimize and track.

"We thought there was a lot better way of doing this," said Alistair Chapman, marketing director at Cert Center Canada, a Marinvent sister company that provides independent flight test and aircraft certification services. "That's where [the idea for the Synthesis software suite] came from."

Synthesis is an industry-leading, web-based suite that simplifies the complex process of demonstrating compliance and certifying an aircraft by organizing disparate information into a central database. It uses quality-control software to ensure project requirements are entered properly. It then tracks and connects data from all aspects of the certification process, making it easy to demonstrate compliance and to gauge progress to ensure deadlines are met.

"In any project, you've got people who have different skill levels, different experience and different ways of expressing things," said Chapman.

"One real benefit of Synthesis is it actually levels the playing field. It standardizes all of this . . . [so] they're all speaking the same language, and they'll all know exactly where things are. At the same time, it ensures that nothing is missed in the process."

Synthesis is widely used in the civil market, but defence contractors in Canada and around the world are also utilizing it.

The software was a crucial part of the Canadian Coast Guard's light and medium helicopter procurement processes. It helped track and ensure bidder compliance with project requirements from the bid stage, all the way through to the completion of the government flight test of each candidate platform, which took place before the selection of the winning supplier.

Synthesis is also now integrated with QVscribe software from QRA Corp. of Halifax, Nova Scotia. QVscribe identifies phrasing issues in requirements so they can be clarified before the request-for-proposal process commences.

Synthesis, meanwhile, acts as a compliance mechanism that tracks and ensures those clearly stated project requirements are being met throughout the entire process.

"All militaries face the same issues," said Chapman. "There are a lot of things they want to do. They've got a huge mandate; they've got a huge task ahead of them.

"There are a lot more things they want to get flying, or that they need to upgrade, and the capacity to do that is limited by the number of people who are trained in this process. There are also, of course, time pressure and budget constraints. And, again, this is one area where this tool allows you to really be the most efficient and productive you possibly can be."

Marinvent is in active discussions with several parts of the Canadian Department of National Defence (DND) about implementing Synthesis. The company sees several concrete applications where its software suite could significantly help both the DND and Public Services and Procurement Canada.

"It just makes for a more efficient and robust process," said Chapman. "Synthesis provides the ability to plan and manage procurement programs more efficiently, consistently and accurately—it's an invaluable tool."

Synthesis is part of a larger trend called Industry 4.0, which uses digital technologies to collect and connect to data from every step of the manufacturing process. One goal is to improve quality and reduce or eliminate downtime by using data to indicate when a machine needs maintenance or might break down.

Given that this is where manufacturing and maintenance are heading, it's considered crucial that the Royal Canadian Air Force (RCAF) and other branches of the Canadian Forces keep pace.

However, Chapman said Industry 4.0 is not only about manufacturing and maintenance. "It must [also] be about connecting the entire procurement, manufacturing, delivery, support and disposal process, from cradle to grave, if we are to derive the maximum benefit.

"Connecting what our Canadian Forces need operationally through the procurement process and into delivery to ensure that our men and women in uniform get what they need to perform is all about compliance with well-specified requirements. That's something Synthesis excels at."

On both the military and civil sides of aviation, Chapman sees a growing need to ensure manned and unmanned aircraft are certified and airworthy—a difficult demand to meet because many key workers are at or near retirement age.

"There are so many programs coming, and so many things that need to be done. So, we are actively ramping up our own capacity to be able to help service this increased demand."

The overall goal is to retain this essential capacity in Canada for all who need it, rather than watch it erode. Both Marinvent and Cert Center Canada see the RCAF as a valuable partner with this endeavour in the years ahead.

"We see the need to not only help with servicing peak demand . . . but also to create the possibility to be more efficient in how these tasks are performed at the moment," said Chapman. "That's what it's all about, at the end of the day."


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Requirement
Compliance Artifact(s)
§25.1309 Equipment, systems, and installations.
[531] ☐ Untested
§25.1309 Equipment, systems, and installations.
[532] ☐ Untested
Paragraph description
[533] ✓ Complete
Takeoff Warning System
Avanti Full Test (NC-2.0) (☐ Other incomplete procedures remain)
✓ Flight stability
[534] ☒ Incomplete
Takeoff Warning System
Avanti Full Test (NC-2.0) (☐ Other incomplete procedures remain)
✗ Warning length
[538] ✓ Complete
Retracting Mechanism (Position Indicator and Warning Device)
Avanti Full Test (NC-2.0) (☐ Other incomplete procedures remain)
✓ Retracting mechanism
Avanti Partial (NC-2.0) (☑ All procedures complete)
✓ Retracting mech - position indicator
[539] ☒ Incomplete
Instruments Using a Power Supply - Indication of power supply
Avanti Full Test (NC-2.0) (☐ Other incomplete procedures remain)
✗ Power supply indication
[540] ☐ Untested
Tests and analysis
View requirement
Close
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AIRBUS HAS DEEP ROOTS IN CANADA. AS THE COMPANY CELEBRATES ITS 35TH ANNIVERSARY HERE, IT REMAINS A CRUCIAL PART OF THE COUNTRY'S DNA.

BY BEN FORREST

In 1984, the Canadian and Ontario governments encouraged MBB, a German aerospace company, to establish a new facility in the small border town of Fort Erie, Ontario, part of the Niagara Region and a stone's throw from Buffalo, New York.

At the time, their goal was to create a domestic helicopter industry that would provide well-paying jobs and build an international reputation for exceptional aircraft manufacturing. With the fledgling MBB Helicopter Canada now the market-leading Airbus Helicopters Canada, that goal has been achieved.

"It's pretty impressive to see where Airbus is in Canada today," said Romain Trapp, chief operating officer of Airbus Helicopters North America and president of Airbus Helicopters Canada. "We are one of the most significant aerospace companies in Canada, both in terms of employees and economic impact. At the end of the day, we have reached this scale of success by building confidence in our products, customer by customer."

This year, as Airbus celebrates its 35th anniversary in Canada, the company has 3,000-plus employees in 10 locations across the country and contributes more than $1 billion a year to the Canadian economy. It is a preferred partner in Canada's parapublic and civil aviation sectors, with an unrivalled market share in segments such as utility, law enforcement and helicopter emergency medical services (HEMS). Yet, it plans to broaden and deepen its presence here.

"I believe this is just the beginning," said Trapp. "We have much more to contribute to the Canadian economy moving forward, and we certainly view our operations in Canada as crucial to the continued growth and success of Airbus in the years to come."

Airbus has an 83 per cent market share in Canada's law enforcement helicopter market, and is the sole helicopter provider to the Royal Canadian Mounted Police (RCMP), said Trapp.

On the military side, Airbus Defence and Space Canada and its partners PAL Aerospace, Pratt & Whitney Canada (P&WC), CAE and L3 Wescam have been selected to provide aircraft and training services for Canada's next-

helicopter aircrew training services for the Royal Canadian Air Force (RCAF), Airbus is front and centre in the competition.

It is a key contender to supply the rotary-wing portion of Canada's Future Aircrew Training (FAcT) program, which will include classroom instruction, simulator and flight training, and several on-site support activities for RCAF pilots. The company is positioning its twin-engine H135 as the ideal RCAF training platform, noting it's already in use with several Canadian allies, including Australia, Brazil, Germany, Ireland, Spain and the United Kingdom.

"This is a very reliable aircraft, and a versatile aircraft, which has been proven for a wide variety of missions," said Trapp. "I believe one of the main reasons it has been selected by so many air force and army departments all over the world [is] its flexibility and competitive operating cost, making it an affordable and versatile twin-engine solution for training."

Taking the analysis a step further, Trapp said the H135 would ease the transition to more complex RCAF aircraft like the CH-147F Chinook or CH-148 Cyclone. It's also suitable because all RCAF helicopters are multi-engine platforms with complex mission systems.

"When you move from a single-engine helicopter to a Chinook, you have a huge gap in terms of transition training," he said. "By moving right away and doing your initial training on an advanced twin-engine aircraft, you facilitate and ease the transition to the operational training units and frontline aircraft."

If Airbus and the H135 are selected, it will reinforce a relationship between the RCAF and Airbus that is already crucial to the success of both operations.

"When Airbus is chosen for a government program, the impact can be felt beyond simply selecting a supplier," said Trapp.

He added: "What you do is select a partner to create jobs and to create benefits in terms of economic development within the country, creating a partnership for decades to come. At the end of the day, you are not only selecting a service provider or product; you are selecting a partner."

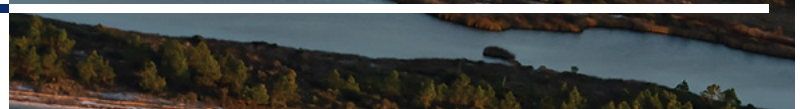
As Airbus looks to the future of its presence in Canada, including its relationship with the RCAF, the company intends to deepen the roots it set down 35 years ago in Fort Erie.

"Our goal is to be the preferred partner of the Royal Canadian Air Force," said Trapp, citing the FAcT program and Tactical Reconnaissance Utility Helicopter program as crucial goals.

On the civil and parapublic side, Airbus has seen several successes in Canada in recent years. This includes key HEMS contracts in Alberta, Saskatchewan, Manitoba and Quebec. The company also saw the delivery of Canada's first H145 helicopter to the RCMP in December 2018.

However, these are simply the most recent manifestations of a relationship that is as closely intertwined with Canadian aviation as any manufacturer in the world.

"Canada is part of our DNA," said Trapp. "We've come a long way in the past 35 years, but, in many ways, we are just getting started."



generation fixed-wing search-and-rescue platform, the Airbus C295W (military CC-295).

"Thanks to these aircraft, we are supporting lifesaving operations across Canada," said Trapp. "The importance of these types of missions is felt by everyone at Airbus."

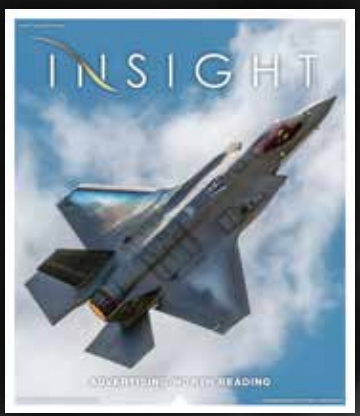
As Canada's Department of National Defence prepares for new

UPDATE ON CANADA'S FWSAR PROJECT

- On Dec. 8, 2016, Airbus won the Canadian government's Fixed-Wing Search and Rescue (FWSAR) competition. It will deliver 16 C295Ws to replace the RCAF's current fleet of CC-115 Buffalo and CC-130H Hercules aircraft.
- The C295W is an affordable, reliable and versatile platform that was selected because it "does less searching and more rescuing."
- The FWSAR contract will have a total value of $4.7 billion if Canada exercises all available options—$2.4 billion for the initial package and $2.3 billion for 20 years of additional in-service support.
- While Airbus is the single point of accountability for the contract, it is implementing FWSAR in close collaboration with several leading Canadian aerospace companies, including PAL, CAE, L3 and P&WC.
- Earlier this year, Airbus rolled out Canada's first C295W:
  - The rollout occurs when all functional tests have been successfully passed; then the aircraft leaves the final assembly line to be parked on the flight line.
  - This is an important development and delivery milestone and is reliable proof of the aircraft's readiness and design maturity.
- Airbus will deliver the first C295W by the end of 2019.
- This project demonstrates Airbus's commitment to creating Canadian jobs, investing in innovation, and supporting RCAF missions at home and abroad.

AIRBUS

airbushelicopters.ca



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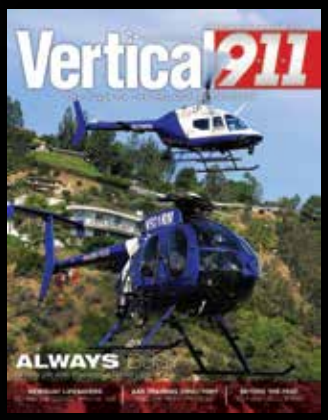
RCAF Today is a special publication produced by *Skies* magazine in association with the Royal Canadian Air Force. Articles highlight RCAF accomplishments and activities at home and around the world. The magazine is a fitting tribute to the hard work, challenges and accomplishments of the men and women of Canada's Air Force.

Delivered bi-monthly, each issue of ***Skies*** is packed with insightful stories, news, reports and feature profiles from all sectors of aviation. We go into the field to tell the stories that define aviation and combine them with breathtaking photography, all in one easy-to-read format.

Delivered bi-monthly, ***Vertical*** is the helicopter industry's premier magazine. Backed with stunning photography and ground-breaking design, we focus on the sectors, operators, and equipment in the world of rotary-wing flight that interest you, making *Vertical* the largest and most trusted helicopter resource in the world.



Vertical 911 is the only helicopter resource focused on the parapublic helicopter industry. It is delivered four times a year to emergency workers on the front lines: medical first responders, police, firefighters and other everyday heroes who save lives and keep us safe. *Vertical 911* was created to highlight the impressive achievements of this sector.

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AVIATION IS

CANADAIR CT-114 TUTOR

431 AIR DEMONSTRATION SQUADRON "SNOWBIRDS"
15 WING MOOSE JAW, SK

BOEING CF-188 HORNET

401 TACTICAL FIGHTER SQUADRON, 4 WING COLD LAKE, AB
409 TACTICAL FIGHTER SQUADRON, 4 WING COLD LAKE, AB
410 TACTICAL FIGHTER OPERATIONAL TRAINING SQUADRON, 4 WING COLD LAKE, AB
425 TACTICAL FIGHTER SQUADRON, 3 WING BAGOTVILLE, QC
433 TACTICAL FIGHTER SQUADRON, 3 WING BAGOTVILLE, QC

BOMBARDIE

412 TRANSPORT SQUADRO

AIRBUS CC-150 POLARIS

437 TRANSPORT SQUADRON, 8 WING TRENTON, ON

LOCKHEED MARTIN CC-130J

436 TRANSP

LOCKHEED MARTIN CC-130H HERCULES

413 TRANSPORT AND RESCUE SQUADRON, 14 WING GREENWOOD, NS
424 TRANSPORT AND RESCUE SQUADRON, 8 WING TRENTON, ON
426 TRANSPORT AND TRAINING SQUADRON, 8 WING TRENTON, ON
435 TRANSPORT AND RESCUE SQUADRON, WINNIPEG, MB

BOEING CC-177 GLO

429 TRANSPORT SQU

DE HAVILLAND CANADA CC-115 BUFFALO

442 TRANSPORT AND RESCUE SQUADRON, 19 WING COMOX, BC

DE HAVILLAND CANADA CC-138 TWIN OTTER

440 TRANSPORT SQUADRON, 17 WING WINNIPEG, MB
(BASED IN YELLOWKNIFE, NT)

BOMBA

402 SQUADRO

CONTRACTE

ALLIED WINGS BELL CH-139 JET RANGER

3 CANADIAN FORCES FLYING TRAINING SCHOOL,
15 WING MOOSE JAW, SK (BASED IN PORTAGE LA PRAIRIE, MB)

ALLIED WINGS BEECHCRAFT KING AIR C-90A

3 CANADIAN FORCES FLYING TRAINING SCHOOL,
15 WING MOOSE JAW, SK (BASED IN PORTAGE LA PRAIRIE, MB)

ALLIED WINGS

3 CANADIAN FORCES FL
15 WING MOOSE JAW, SK (BASE

TOP ACES LEAR 35

CONTRACTED AIRBORNE TRAINING SERVICES

TOP ACES ALPHA JET

CONTRACTED AIRBORNE TRAINING SERVICES

RCA

KIES

S OUR PASSION

R CC-144 CHALLENGER

ON, 8 WING TRENTON, ON (BASED IN OTTAWA, ON)

SUPER HERCULES

ORT SQUADRON, 8 WING TRENTON, ON

OBEMASTER III

ADRON, 8 WING TRENTON, ON

ARDIER CT-142 DASH-8

N, AIR FORCE TRAINING CENTRE, WINNIPEG, MB

BOEING CH-147F CHINOOK

450 TACTICAL HELICOPTER SQUADRON, 1 WING, CFB KINGSTON, ON
(BASED AT CFB PETAWAWA, ON)

BELL CH-146 GRIFFON

1 WING, CFB KINGSTON, ON (BASED AT LOCATIONS BELOW)
400 TACTICAL HELICOPTER SQUADRON, 16 WING BORDEN, ON
403 HELICOPTER OPERATIONAL TRAINING SQUADRON, CFB GAGETOWN, NB
408 TACTICAL HELICOPTER SQUADRON, CFB EDMONTON, AB
417 COMBAT SUPPORT SQUADRON, 4 WING COLD LAKE, AB
424 TRANSPORT AND RESCUE SQUADRON, 8 WING TRENTON, ON
427 SPECIAL OPERATIONS AVIATION SQUADRON, CFB PETAWAWA, ON
430 TACTICAL HELICOPTER SQUADRON, CFB VALCARTIER, QC
438 TACTICAL HELICOPTER SQUADRON, CFB ST. HUBERT, QC
439 COMBAT SUPPORT SQUADRON, 3 WING BAGOTVILLE, QC
444 COMBAT SUPPORT SQUADRON, 5 WING GOOSE BAY, NL

SIKORSKY CH-148 CYCLONE

406 MARITIME HELICOPTER OPERATIONAL TRAINING SQUADRON, 12 WING SHEARWATER, NS
423 MARITIME HELICOPTER SQUADRON, 12 WING SHEARWATER, NS
443 MARITIME HELICOPTER SQUADRON, 12 WING SHEARWATER (BASED AT PATRICIA BAY, BC)

LEONARDO HELICOPTERS CH-149 CORMORANT

103 SEARCH AND RESCUE SQUADRON, 9 WING GANDER, NL
413 TRANSPORT AND RESCUE SQUADRON, 14 WING GREENWOOD, NS
442 TRANSPORT AND RESCUE SQUADRON, 19 WING COMOX, BC

LOCKHEED MARTIN CP-140M AURORA

404 LONG RANGE PATROL AND TRAINING SQUADRON, 14 WING GREENWOOD, NS
405 LONG RANGE PATROL SQUADRON, 14 WING GREENWOOD, NS
415 LONG RANGE PATROL SQUADRON, 14 WING GREENWOOD, NS
407 LONG RANGE PATROL SQUADRON, 19 WING COMOX, BC

D AIRCRAFT

S GROB G120A

YING TRAINING SCHOOL,
ED IN PORTAGE LA PRAIRIE, MB)

ALLIED WINGS BELL 412CF OUTLAW

3 CANADIAN FORCES FLYING TRAINING SCHOOL, 15 WING MOOSE JAW, SK
(BASED IN PORTAGE LA PRAIRIE, MB)

BEECHCRAFT CT-145 SUPER KING AIR

MULTI ENGINE UTILITY FLIGHT, 8 WING TRENTON, ON

CAE BAE CT-155 HAWK

2 CANADIAN FORCES FLYING TRAINING SCHOOL, 15 WING MOOSE JAW, SK
419 TACTICAL FIGHTER TRAINING SQUADRON, 4 WING COLD LAKE, AB

CAE BEECHCRAFT CT-156 HARVARD II

2 CANADIAN FORCES FLYING TRAINING SCHOOL, 15 WING MOOSE JAW, SK

AF T DAY

CANADA'S AIR FORCE REVIEW

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