

RCAF TODAY

CANADA'S AIR FORCE REVIEW

INSIDE

MAPLE FLAG 49
424 SQUADRON
AIRSHOW PREP
CANADIAN SPITFIRES
75 YEARS OF AIR CADETS
CASARA PROFILE



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The Helicopter Operational Test and Evaluation Facility (HOTEF) at 12 Wing Shearwater, N.S., is testing the capabilities of the new CH-148 Cyclone maritime helicopter. In early May, crews had logged 226 hours of flight testing and "countless" landings on Canadian frigates at sea.

LS Dan Bard Photo



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Photo Pick

A CC-130J Hercules departs into a pink sky at the end of a very successful day at Lachute Airport, northwest of Montreal. The aircraft was on site for the "Girls Discover Aviation in Lachute" event on March 12, 2016, during Women of Aviation Worldwide Week.

Jean-Pierre Bonin Photo

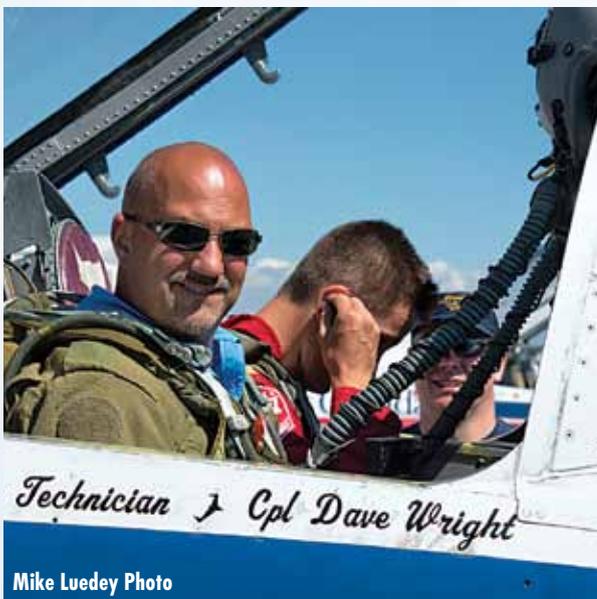
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QUALITY OVER QUANTITY

BY MIKE REYNO
OWNER/PUBLISHER



Every year, as we prepare for the next edition of *RCAF Today*, I have the opportunity to get away from my desk and visit with many of the squadrons across Canada. I look forward to this time of year.

My visit to 4 Wing Cold Lake in early April was particularly interesting. It had been more than 10 years since I had last visited the fighter base. Contributing editor Chris Thatcher was accompanying me for his first visit to the wing. It was admittedly quieter in the skies above than I remembered.

Our tour of 4 Wing during the week included visits with both 401 and 409 Tactical Fighter Squadrons, not to mention 410 Tactical Fighter (Operational Training) Squadron and 419 Tactical Fighter (Training) Squadron. We were also there to see the unveiling of the 2016 CF-18 Demo Hornet.

We learned more about Operation Impact, Canada's contribution to the Middle East Stabilization Force (MESF)—the multi-national coalition against the so-called Islamic State of Iraq and the Levant (ISIL).

Many personnel on base had recently returned from the Middle East. Others were still deployed. Previous experience would dictate that interviews would be conducted in front of the squadrons' commanding officers, who would describe the successes and challenges that were encountered during Op Impact.

Oh, how times have changed. On this occasion, we sat with two fighter pilots and six technicians to learn more about their experiences.

No one had to tell us the rules of engagement for the interviews. We already knew. We weren't there to talk about the politics surrounding the federal government's decision to withdraw the six CF-188s from the Middle East. We were there to talk about the missions that the RCAF flew against ISIL.

During the Hornets' involvement in Op Impact, 1,378 sorties were conducted by the six jets (as of mid-April, another 434 sorties were flown by the single CC-150 Polaris tanker, and 463 reconnaissance missions flown by the two CP-140 Auroras that were also deployed).

The average number of combat missions flown by fighter pilots varied from 10 to 20 missions each. Identified only by their call signs for security reasons, Mouse from 401 TFS flew 17 combat missions over Iraq and Syria, while Darcee from 409 TFS flew 13 missions.

They were just two of the nearly 100 Canadian fighter pilots who flew combat missions between October 2014 and the time that combat operations ceased on Feb. 15, 2016.

Mouse, a former Royal Navy Harrier fighter pilot turned RCAF fighter pilot, said, "[We] were right at the top of the list in terms of our accuracy."

During combat operations, CF-188s were armed with a variety of air-to-surface weapons, including 500-pound GBU-49 Enhanced Paveway II bombs for the first time, which allowed the Canadian fighter force to make an effective contribution to the operation.

"We would always show up with a lot of bombs," said Darcee. Pilots would refer to the CF-188 as the "bomb truck," since it could carry more weapons than the F-16 that some of the allies were flying, and fly further.

"The GBU-49—that capability of height of burst and GPS or laser-guided—was a great weapon to have. That increased our capability from just a laser-guided bomb or a GPS-guided bomb. Rather than carrying a mixed load, we could carry one bomb that would do everything we wanted." Consequently, Darcee added, with only six fighters Canada was able to still have a significant impact on the war.

But with just six fighters on the line, it was paramount to have them mission-ready.

Both pilots said that the fighters' high level of serviceability was indicative of the technicians' commitment. "Two or three times we ended up plugging the gap for other [nations] whose aircraft kept falling out. We would end up extending our on-station time by an hour or two. I think we were very well respected," said Mouse.

But, as they approach 34 years of service with the RCAF, the fighters are showing signs of their age. "We are changing more parts more often," said Sgt Hugo Bouchard, armaments supervisor with 409 TFS. "Those parts are rebuilt and rebuilt and they get tired."

Regardless, the CF-188s did the mission they were called upon to do, and they did it effectively.

It's a familiar scenario across the RCAF, where smaller contingents of aircraft are deployed in support of Canada's allies. For example, the CH-124 Sea Kings assist the Royal Canadian Navy with counter-drug or anti-terror operations around the world; the CP-140 Auroras deliver intelligence, surveillance and reconnaissance services; and the CC-150(T) Polaris provides tanker services in the Middle East. They make a very small—but still very effective—contribution. The same level of professionalism and dedication applies to operations across Canada as well.

This is no surprise. The scope of Canada's contributions typically pale in comparison to our southern neighbors. But does the size of the Canadian contribution matter? Quality has a quantity of its own.

Regardless of the size of the Canadian Armed Forces' participation in international operations, our comparatively small, yet effective, contributions are highly valued by our allies. They are especially missed when they are no longer available. It speaks highly of the dedication and professionalism of the men and women of the RCAF.

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BRIEFING ROOM

ROYAL CANADIAN AIR FORCE NEWS



On Dec. 17, 1939, three months after it had declared war on Germany, the Canadian government signed an agreement with the United Kingdom, Australia and New Zealand to create a massive air crew training program in preparation for the immense air campaign to come.

The Royal Air Force had long eyed Canadian airspace and facilities for training purposes, and

both governments had exchanged proposals and counter-proposals for a program since May 1938. Prime Minister Mackenzie King supported the idea but had withheld his signature until December of 1939, insisting that Canada, not the RAF, would have control of a domestic training plan.

The British Commonwealth Air Training Plan (BCATP) began in April 1940 and was initially intended to

operate 74 schools for three years. By March 1945, when the program finally ended, the extraordinary undertaking had built from scratch or reconstructed over 300 schools, support units and air fields on 231 sites that touched almost 150 communities across the country.

From No. 5 Operational Training Unit in Boundary Bay, B.C., to the No. 2 Flying Instructor School in Vulcan,

The 2016 Demo Hornet escorts Yellow Thunder's Harvard Mk 2 and Mk 4, flown by brothers Dave and Drew Watson, over Cold Lake. The Demo Hornet is painted to commemorate the British Commonwealth Air Training Plan (BCATP), which gave birth to the 400-series squadrons. **Mike Reyno Photo**



400 SERIES SQUADRONS CELEBRATE 75 YEARS

BY CHRIS THATCHER

Alta., the No. 6 Air Observer School in Prince Albert, Sask., the No. 1 Radio Direction Finding School in Leaside, Ont., the No. 9 Bombing and Gunnery School in Mont-Joli, Que., and the No. 2 Air Navigation School in Pennfield Ridge, N.B., the BCATP left its mark on communities large and small in every province but Newfoundland and Labrador, which had yet to join the Dominion of Canada.

In total, 131,553 pilots, navigators, wireless operators, air bombers, air gunners and flight engineers graduated to serve in the war effort: 72,835 for the newly established Royal Canadian Air Force; 9,606 for the Royal Australian Air Force; 7,002 for the Royal New Zealand Air Force; and 42,110 for the RAF, over 5,000 of whom were aircrews from Poland, Norway, Belgium and others countries flying British aircraft.

The Royal Canadian Air Force will celebrate this remarkable achievement in 2016 with events from coast to coast. But the Allied air training plan also marked a pivotal moment in the RCAF's formative history.

Thanks to a brief clause in the BCATP agreement known as Article XV, two vague yet essential sentences gave birth to the 400 series squadrons that form the modern air force of today.

"The United Kingdom Government undertakes that pupils of Canada, Australia and New Zealand shall, after training is completed, be identified with their respective Dominions, either by the method of organizing Dominion units and formations or in some other way, such methods to be agreed upon with the respective Dominion Governments concerned. The United Kingdom Government will initiate inter-governmental discussions to this end."

After the agreement was signed on Dec. 17, 1939, Canada and the United Kingdom began negotiations to form at least 25 RCAF squadrons overseas, on top of the three that had already been deployed. That led to a supplementary agreement, signed in January 1941, establishing the formation of the squadrons, which began coming into existence on March 1, 1941.

It was an auspicious moment for Canadian aircrews. During the First World War, they had served as members of the British forces. Article XV and the 1941 sub-agreement meant that they would now fly as Canadian squadrons, under Canadian command.

According to the RCAF's history of the BCATP, the new squadrons were numbered from 400 to 491. The three already deployed overseas—1, 110 and 449—were renumbered as 401, 400 and 402 Squadrons in March 1941. "The first new squadron, 403 Squadron, was formed on March 1 and others soon began making their appearance."

From fighter to transport to tactical aviation, many of the operational and training squadrons that comprise the modern-day RCAF can trace their history back to those formative months 75 years ago.

"Our squadron history is unbelievable," said Capt Chris Mileusnic, an air-to-ground officer and the resident historian of 401 Tactical Fighter Squadron. "The more I have dug into it, the more remarkable it is: 186.5 kills and it may have been more. That was the official World War II tally."

As Dr. Richard Mayne, the director of RCAF History and Heritage, wrote:

"... for Canada, the impact of the BCATP was immeasurable. As a relatively young country, Canada was handed the lead of a key Allied program that it tackled with relatively few hitches. Not only was it a tremendous military success story, but the BCATP was also strongly supported by other government departments and civilian organizations—making it a truly national effort that helped build Canada's impressive post-war aviation infrastructure."

RCAF HAS 'OPTIONS' FOR TANKER SUPPORT: HOOD

BY CHRIS THATCHER



A CC-150 Polaris from 437 Transport Squadron in Trenton, Ont., provides air-to-air refuelling to CF-188 Hornet fighter aircraft from 409 Tactical Fighter Squadron in Cold Lake, Alta. **MCpl Marc-Andre Gaudreault Photo**

A decision on the Royal Canadian Air Force's next air-to-air refuelling tanker will remain in a holding pattern until the government makes a decision on its next fighter jet.

"[O]nce a decision is made on the next fighter aircraft, the next decision will be the tanker replacement," LGen Mike Hood, commander of the RCAF, told the Commons Standing Committee on National Defence on April 14.

Hood was responding to questions by committee members about the refuelling capability of the air force and the schedule for a replacement program.

The RCAF operates a fleet of five Airbus A310-300s, known as the CC-150 Polaris, that were acquired in 1992 from Canadian Airlines. Under the multi-role tanker transport program, two were converted to air-to-air refuellers in 2008 to support the CF-188 Hornet fighter jets. Operated by 437 Transport Squadron at 8 Wing Trenton, Ont., the aircraft are expected to retire in 2026. However, with one of the tankers in maintenance, the RCAF has just one for deployment and Members of Parliament questioned whether the air force could meet its obligations.

Hood told MPs the service does not have any concerns meeting its air-to-air refuelling requirements.

"[I]t should be noted...that the majority of the time in our NORAD response there are American tankers on standby. There's one in Bangor, Maine, and another one in Oregon. When we launch our F-18s, it's quite often [with] U.S. tanker support," he said, adding that "quite often we have a tanker, a C-130, out of Winnipeg that's available."

The RCAF has also leased tanker support when necessary, he said, such as during the recent return of CF-188s from Operation Impact in Kuwait. In fact, even though Canada deployed a CC-150 to Kuwait, pilots from 4 Wing Cold Lake told *RCAF Today* that the majority of their refuelling on missions was from American aircraft and other allies.

"There are options that will allow us to mitigate whatever program challenges we have," he said. "I will tell you, however, that the plan all along was to choose a fighter and then make sure that the tanker capacity was there... because we know we have to replace the Airbus."

At the Air Force Outlook in Ottawa on April 7, 2016, senior officials outlined a CC-150 replacement program known as Strategic Tanker Transport Capability. "[The] goal is to deliver a strategic airlift, air-to-air refuelling and VIP transport capability to meet domestic and expeditionary requirements," according to a slide presentation.

Currently in the initial identification phase, the RCAF hopes to enter options analysis in 2018 and issue a request for proposals in 2021, followed by a contract award in 2022. Delivery of the first tankers would almost coincide with the arrival of the future fighter jet. The air force has announced a life extension program to see the Hornets out to 2025.

A decision on the Polaris tanker could also have repercussions for the RCAF's fleet of four CC-130 Hercules that are used for tactical air-to-air refuelling to support the NORAD mission and fighter training exercises. The H-model Hercs have been operated by 435 Transport and Rescue Squadron at 17 Wing Winnipeg, Man., since 1992 and will reach the end of their expected service life in 2021.

Will they undergo a life extension program or will they be retired and replaced, perhaps with a newer J-model CC-130? In an email, the RCAF said, "We are looking at all the options for the future of air-to-air refuelling to support the refuelling capability offered to our fighters."



Watch the video **HERE!**



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RCAF RETIRES ITS LAST LEGACY CC-130E HERCULES

BY ANDY CLINE AND KEN POLE

On April 5, 2016, the RCAF retired its final CC-130E Hercules after 51 years of service.

Making the short flight from CFB Trenton, Ont., where it has served for many years, the aircraft arrived at Rockcliffe Airport in Ottawa at its new permanent home, the Canada Aviation and Space Museum (CASM).

The Hercules has served the RCAF since the acquisition of four B model aircraft in 1960. Later sold to the Colombian government in 1969, the success of the B models led to the acquisition of a large fleet of 24 brand new CC-130E models, starting in 1964.

The donated CC-130E has had a long and exemplary career. The longest-serving Hercules in RCAF inventory, it entered service on Feb. 9, 1965.

As of May 2015, the donated plane had accumulated more than 47,000 hours of flying time, which is virtually unheard of in the Hercules world. It has had several wing replacements over its career, along with numerous equipment upgrades.

HISTORY IN FLIGHT

A blazing sun lit the ramp at CFB Trenton as a number of dignitaries boarded "Tiger 307" for the short flight to Rockcliffe Airport. RCAF commander LGen Mike Hood was the senior official aboard. He knows the Hercules well, having been a Hercules navigator and later serving as commander of at 8 Wing Trenton.

After "Tiger 307" took off from Trenton, it climbed to altitude and six 424 Squadron search and rescue (SAR) technicians jumped out, parachuting down to land in front of the 424 hangar.

The aircraft then made two spirited "on-the-deck" flypasts before pulling up and heading for Rockcliffe. The flight to its new home at the museum used up almost all of the last two hours of flight time left on the aircraft, for a total of 47,087 flight hours.

Tiger 307's arrival at Rockcliffe was witnessed by many delegates and invited guests, museum patrons and aviation enthusiasts. As it taxied in, a Canadian flag was flown out of one navigation port on the roof, a testament to over 50 years of service to Canada. As the engines wound down for the last time, a round of applause arose from the crowd.

A crew of seven 424 Squadron technicians followed the plane to Rockcliffe in order to prepare the aircraft for permanent exhibition. With a "harvest list" of components in hand, the crew was tasked with removing and replacing numerous still serviceable parts of the aircraft with older, time-expired parts, including the engines, propellers, radio and radar. This operation was slated to take about a week.

The donated Hercules was the last one in the fleet still equipped with the old steam gauges.

THE ARRIVAL

Within minutes of landing at CASM, the Herc was taxied up to the museum's main building for a brief handover ceremony.

"While many would say this is actually a day to lament and be sad, I'm at the other end of the spectrum," Hood told guests. "This is something we should celebrate; this aircraft going into this wonderful museum, where generations of future Canadians are going to understand the history of the CC-130."

Among the dignitaries on hand at the museum was Karen McCrimmon, the new Liberal Member of Parliament for the Ottawa-area riding of Kanata-Carleton. McCrimmon was the RCAF's first female air navigator and also the first woman given command of an operational unit, 429 Transport Squadron, also based in Trenton, in 1998.

Replaced by newer H models, this particular Herc was the last operational E model, having spent what Hood said was "pretty well the last 15 years" with 424 Transport and Rescue Squadron, flying SAR missions in one of the largest SAR regions in the world.

The crew and passengers pose in front of the CC-130E Hercules at 8 Wing Trenton just before boarding for its final flight to Rockcliffe. Most of the passengers had flying experience on this very aircraft at one point or another. **Andy Cline Photo**

 Watch the video **HERE!**





One phase of the CT-114 project includes firing ejection seats with mannequins from a ground test vehicle, the "Black Thunder." The test team observes the ejection path of the mannequin, including how high it goes, at what height the parachute canopy is stable, and the mannequin's descent rate. **Cpl David Tomes Photos**



AETE TESTS NEW PARACHUTE SYSTEM FOR TUTOR

In late April, the Aerospace Engineering Test Establishment (AETE) tested a modernized parachute for the CT-114 Tutor, a 1960s-era aircraft that is still flying with 431 Squadron's Snowbirds jet team and with AETE itself. The goal was to investigate the possibility of improving pilot safety by making key modifications to the Tutor's existing escape system.

Phase 2 of the Tutor escape system project included firing ejection seats and mannequins from a ground test vehicle. This vehicle, known as "Black Thunder," is essentially a powerful pick-up truck with a modified bed that can fire an ejection seat. The test team observed the ejection path of the mannequin, how high the mannequin went, at what height the parachute canopy is stable, and the mannequin's descent rate.

Earlier that same month, Phase 1 of the testing had included drops from a CH-146 Griffon helicopter to measure parachute deployment characteristics and assess the performance of a modernized emergency escape parachute.

About 40 AETE personnel have been working on the Tutor project since last September, with testing beginning this spring.

Escape system technology has progressed greatly since the Tutor was brought into service. As a result of the

aircraft's life extension beyond 2020, AETE is currently gathering data to see if the performance of the CT-114 escape system can be improved by using a more modern parachute, and by reducing some of the timing between critical events in the ejection sequence.

"To install an all-new ejection system is complicated and expensive," explained Col Michael Barker, the commanding officer of AETE. "The CT-114 Tutor parachute trial is an interesting project because just some tweaks to the existing system could bring an increased level of safety for a relatively low cost."

The project is custom-made for AETE. Whether it's testing new aerospace equipment or looking for ways to improve existing materials, testing at AETE ensures the ever-increasing safety of Canada's men and women in uniform. On average, AETE manages about 30 projects of various complexities at any given time.

"Often, people who are not involved in flight test are surprised by the amount of work required to test a new capability," added Barker. "AETE personnel are often the first people to do something. We can't always be certain of the result. The planning for each test program involves determining which data need to be collected and how to do it, and what risks will be encountered and how to mitigate them. The more time

we spend preparing for a test program, the more we'll increase our chances of it going smoothly."

STRIKING THE RIGHT BALANCE

During the last two years as AETE's commanding officer, Barker has worked to streamline flight testing by striking the right balance between the test process, the rigour of the tests, and the level of risk associated with flight testing equipment.

As for his hopes for the facility's future, he is unequivocal: "I hope that AETE continues to find innovative ways to carry out its mission more efficiently—meeting the unit's flight test mission, with fewer resources. In the spirit of the Defence Renewal strategy, I hope we continue to get better at what we do. We'll achieve that by cooperating with allies and partners, using new technology, and showing innovation in solving problems," concluded Barker.

Under the Defence Renewal initiative, the government is currently looking at new ways and means of modernizing and making AETE's important work ever more efficient and effective. This could even involve moving the unit to the Ottawa area, reported the *Ottawa Citizen* on April 25.

In the meantime, AETE's important work continues.

ROYAL CANADIAN AIR FORCE, NAVY TRAIN SAILORS

BY CAPT MARVIN TAYLOR

History was made March 9 to 11, 2016, when the Canadian Forces Aerospace Warfare Centre, at 8 Wing Trenton, Ont., and the Canadian Forces Naval Operations School at Canadian Forces Base Halifax, N.S., united in the virtual battlespace to provide students on the Royal Canadian Navy's Anti-Air Warfare Controller Course with realistic training.

The training was assisted by maritime fighter controllers (the naval equivalent of aerospace control officers, who are responsible for the conduct of aerospace surveillance, warning, and control of airborne objects throughout Canadian airspace). An integral part of the Canadian air navigation system, they also provide control to civilian and military aircraft during combat and training operations worldwide, and select global international pilots.

For the first time, distributed mission operations centres at the Warfare Centre and at the Naval Operations School linked up to provide simulation capabilities for training purposes in accordance with *RCAF Simulation Strategy 2025*.

This distributed mission training used both virtual and constructive simulations in its virtual battlespace. Virtual

simulations, or real people operating simulated systems, included the pilots flying CF-188 simulators at the Warfare Centre and the maritime fighter controllers and Anti-Air Warfare Controller Course students operating in the Naval Operations School in Halifax. Constructive simulations, or computer-generated entities, were used to simulate enemy aircraft and ships, and civilian airliners.

Previously, Anti-Air Warfare Controller Course students trained using "tabletop" exercises, with their instructors playing the RCAF pilot and maritime fighter controller roles. However, the realistic environment—students liaising with actual Hornet pilots flying simulated combat air patrol missions and embedded maritime fighter controllers—brought a new dimension to the training and made the students' learning more effective.

The students were taught to manage their missions based on their aircraft's available fuel, and were forced to incorporate air-to-air refuelling into their plans.

They received feedback from the pilots and maritime fighter controllers on combat air patrol employment, identifying dangerous situations, unrealistic employment of the CF-188s, and identifying more efficient and better tactical employment for the fighter jets.

The week was so successful that the Canadian Forces Naval Operations School is recommending examining other opportunities to replace current training techniques with distributed mission training.

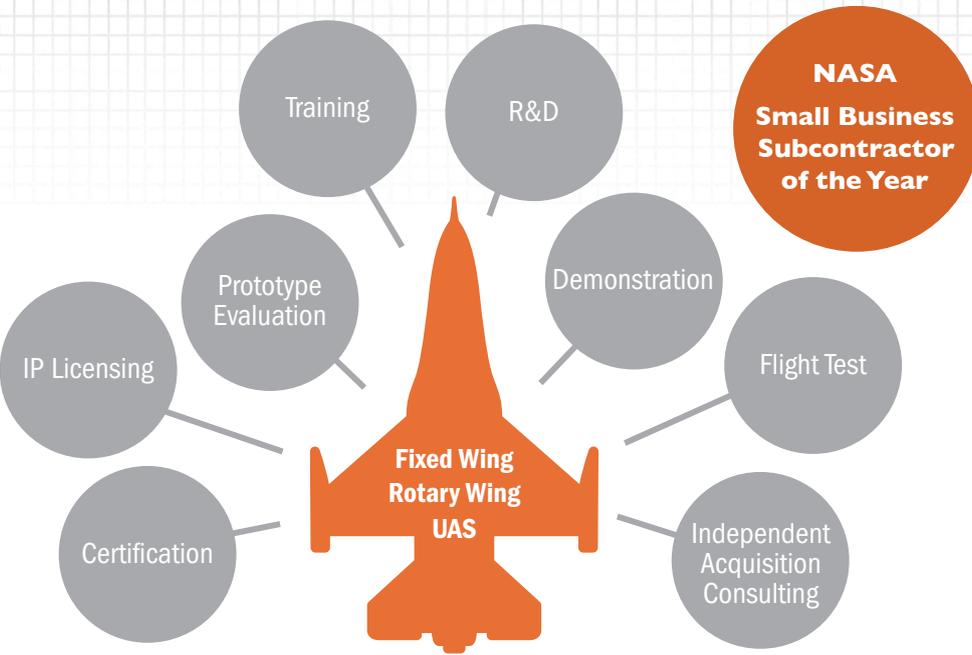
The Canadian Forces Aerospace Warfare Centre continues to grow and expand its capabilities, in conjunction with 1 Canadian Air Division, and is ready to take on more force-generation roles and assignments. The benefits of this type of training are immense because Canadian Armed Forces' resources are limited and expensive. Military personnel train in a safe environment, and students have the opportunity to interact with qualified personnel in a realistic environment. In addition, training scenarios can be created that could not otherwise be experienced.

The Warfare Centre and the Naval Operations School have proven that their distributed mission training capabilities provide a more cost-effective and efficient means to train personnel and increase force-generation output while having the same number of operational platforms. Forces that fight together should train together.



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From left to right are Lt Karl Mueller, USCG; Frank Snelgrove, DFO; Capt Dallas Bregg and Capt Dave Howard, RCAF; Lt(N) Esther Nightingale, Royal Canadian Navy (RCN); Cdr Christopher Barrows, USCG. DND Photo

OP DRIFTNET TEAM RECOGNIZED BY U.S. COAST GUARD

BY LUCY ELLIS

A team of Canadian Armed Forces (CAF) members and Fisheries and Oceans Canada (DFO) personnel received a commendation from the United States Coast Guard (USCG) for their actions against illegal, unreported, and unregulated driftnet fishing in the northern Pacific Ocean during Operation Driftnet in 2014.

On Feb. 24, 2016, the CAF and DFO members involved in the operation were presented with the USCG Special Operations Service Ribbon by Cdr Christopher Barrows, deputy chief of enforcement for USCG District 17, Juneau Alaska, and Rear Admiral Gilles Couturier, commander Maritime Forces Pacific. The award ceremony occurred at Canadian Forces Base Esquimalt, B.C.

In May 2014, the RCAF conducted 11 surveillance patrols based out of Hakodate, Japan, during Operation Driftnet.

On May 20, 2014, an RCAF CP-140 Aurora patrol located and photographed a suspicious vessel, the *Yin Yuan*.

"It can get pretty mundane flying around looking at the radar for ships," said Capt Dallas Bregg, the co-pilot during this mission. "You don't expect much, but on this flight we dropped through the clouds down to about 300 feet ASL [above sea level], saw the ship and instantly knew this was a driftnetter—it didn't have its AIS on and you could tell by the distinct rigging."

AIS is an automatic tracking system that is used to transmit data about a ship's location to nearby ships and satellites. The CP-140 Aurora is capable of picking up the signal, provided that the ship in question has the system turned on.

Frank Snelgrove, the DFO subject matter expert on-board the Aurora, identified signs of driftnet fishing on the vessel. It was rigged up with a pipe that carried a net from the forward part of the ship to the stern, and there were nets and buoys on deck.

The Aurora conducted a number of passes over the *Yin Yuan* to obtain photographs and videos. The ship had no clear markings and flew a Japanese flag.

"As we flew by they pulled down their flag and you could see the crew trying to hide on the upper decks," said Bregg. Although the *Yin Yuan* tried to take evasive action, Japanese officers onboard the Aurora were able to tell that it was misrepresenting itself.

"Through the second and third pass I started hailing the vessel on Channel 16 VHF," said Snelgrove. The radio channel is used internationally and would have been monitored by a legitimate vessel. The ship was hailed three times but it did not respond.

The information was relayed to USCG District 17. The Aurora crew took note of the course and speed of the *Yin Yuan* and located it again the next day. They

relayed the position to USCG Cutter *Morgenthau*, which had Chinese authorities on board, and the *Yin Yuan* was intercepted on May 22. The ship attempted to discard its illegal equipment before being boarded.

The illegal Chinese-registered vessel was in possession of approximately half a ton of salmon. The ship was also in violation of international pollution regulations. It was transferred to the custody of the Chinese Coast Guard shortly after being intercepted by USCG Cutter *Morgenthau*.

In September 2015, Chinese officials found the *Yin Yuan* guilty of driftnet fishing; legal action was taken against the implicated crew members and the ship was sent to be scrapped.

The USCG ribbon recognizes the impact that the Canadian team had on this international operation. "I felt it was important to be there and to be part of the deterrent, to participate," said Bregg. "These are ships that carry kilometres and kilometres of netting that drift just below the surface for days, catching everything in the ocean indiscriminately. They're terrible things."

Operation Driftnet is conducted annually under a memorandum of understanding with DFO. The success of this mission and the strength of the partnership between all nations involved acts as a strong deterrent to those who would conduct high seas driftnet fishing in the northern Pacific.

NRC TESTS NEW SNOW TRACKING METHOD

BY CHRIS THATCHER

Aerospace researchers with the National Research Council of Canada (NRC) may have uncovered a way to detect very recently disturbed snow that could help search and rescue (SAR) crews find lost snowmobilers, backcountry skiers or hikers.

And like many discoveries, this one happened by accident.

The “incidental finding” occurred while scientists were working with the Canadian Armed Forces on a targeting project at Canadian Forces Base Valcartier. Snowfall had grounded their aircraft for a day, but when they resumed looking for targets from the air over a designated area, data from their hyperspectral imaging system showed red lines indicating changes in the snow density from what they had recorded two days earlier.

“I took the map that we had created to the ground folks and talked with them about it, and they said, ‘Yes, that was where we were walking in the snow setting some more targets.’ That clued me in to the fact that what we were seeing was the most recently disturbed snow,” explained Dr. George Leblanc, an airborne research officer with the NRC’s aerospace division.

Where earlier research efforts have focused primarily on disturbed versus non-disturbed snow, Leblanc

admitted he might have “fallen backwards” into a way to differentiate recently disturbed snow from less recently disturbed snow. This could help determine the most freshly used snowmobile trail or skiing or hiking path, even if they are well worn by previous users.

“If we can get, from the air, an indication of the last path of travel...hopefully this method cuts down on the time it takes to figure out where a person went,” he said.

As snow compacts, its crystal properties change. The NRC’s test aircraft carries two hyperspectral imaging systems, a visible near infrared system and a shortwave infrared system. What Leblanc and his fellow researchers found was an “effect” in the shortwave infrared that captured the difference in water molecule absorption as the snow was compacted by the ground team.

Though the finding has obvious implications for SAR crews, it would also be of interest to border security and special operations forces. However, because the discovery was the result of happenstance, the NRC has not yet found research partners for the project.

Leblanc, who has been with the NRC for 15 years and leads a team of hyperspectral and aeromagnetic

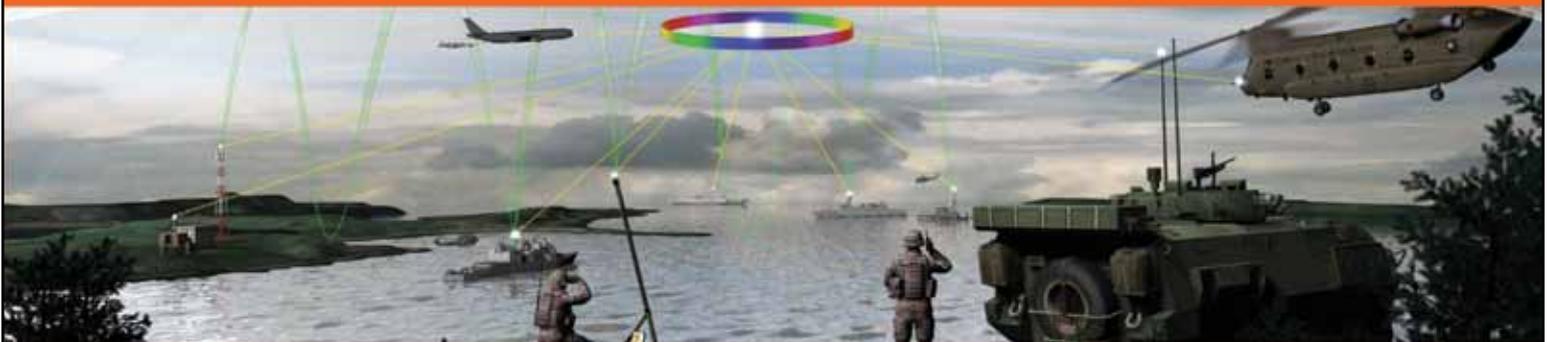
professionals, said the results are so new that further testing is required to understand how well this works in a range of scenarios. “The only scenario that we have tested so far seems to be one that works. And I am certain there are lots of scenarios where it doesn’t work, but we don’t know what those are. What we need to know are the limitations of this method.”

The NRC has been trialling the technology with a manned aircraft this winter and intends to gather more data in various scenarios with an unmanned aircraft next winter.

While the finding was obtained with a hyperspectral camera, Leblanc said testing will be done to determine the optimal wavelengths for the change in snow density detection, and a software application could be inserted into a specific camera set to the correct wavelengths.

“When this is operational, I can guarantee it is not going to be a hyperspectral system, because it provides too much data. And you don’t need it. There are probably three to five wavelengths that really are important for this,” he explained. “We are developing the software to take that data we collect and extract this information.”

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GREENWOOD MUSEUM PRESERVING STORY OF PIASECKI/VERTOL H-44

BY BEN FORREST

When Paul Blinn looks at the Piasecki/Vertol H-44 helicopter he's helping restore for Greenwood Military Aviation Museum, he sees traces of the Boeing Vertol CH-113 Labrador that succeeded it.

Both are tandem-rotor aircraft used for search and rescue missions in the Canadian Armed Forces and both are shaped a bit like tropical fruit.

The H-44's nickname was the 'Flying Banana,' and the Labrador is vaguely similar, with nose and tail sections that rise upward from a long, tube-shaped body.

"The parts and pieces are just slightly different but you can see where they're all related, family-wise," said Blinn, 56, a retired Royal Canadian Air Force (RCAF) warrant officer and flight engineer who flew Labradors.

"[The H-44 is] a great piece of history. That's the thing we're working on."

Blinn is leading a six-person group of retired volunteers in restoring the H-44 at the museum, which is located at Canadian Forces Base Greenwood in Nova Scotia's Annapolis Valley. The H-44 flew with 103 Rescue Unit out of RCAF Station Greenwood around 1961.

Work began in June 2014 on the tail section of the helicopter, which Maj Robert Johnson, the museum's general manager, discovered on a trip to the Reynolds Heritage Preservation Foundation in Wetaskiwin, Alta.

A snowplow is said to have struck the nose section of the helicopter, rendering it impossible to rebuild.

The crew acquired the nose of a United States Army H-21—a version of the same helicopter—and plans to modify it to H-44 specifications, bolt the two halves together and paint them in 103 Rescue Unit's red, white and blue livery.

Cockpit material and other parts will come from a third aircraft the museum had trucked up from North Carolina, said Malcolm Uhlman, another crewmember.

"We haven't got the engine, but we're still looking," he said.

The museum has embarked on many restoration projects, including a CP-107, a P2V Neptune, a CT-133 Silver Star, an Avro Anson, a C-47 Dakota, an Avro Lancaster and a Labrador helicopter. The museum is also in the process of restoring a Bristol Bolingbroke.

"When you get those things finished and in the air park and you get the old veterans that come along—some of them aren't that old, but they flew the deck or in a Dakota, and they say, 'What a lovely aircraft that was.'

"Or, in the Argus ... 'I worked on those engines.' They're wowed to see it and be able to walk up and touch it. So



The restoration team. Back row, from left: Larry Abbott, Paul Blinn (team leader), Peter Miller and Greg MacWah. Front row: Malcolm Uhlman and Chris Young. Greenwood Military Aviation Museum Photo



Workers lower the tail section of the Piasecki/Vertol H-44 helicopter. Malcolm Uhlman Photo

to me, that's what it's all about," said Uhlman.

The crew has logged more than 2,500 man-hours on the H-44 project so far, with plans to finish the tail section by June. Work on the cabin and cockpit section is expected to take another two years.

A major challenge has been acquiring missing parts, including seats and a rescue hoist. Along with an R1820-103 engine, Blinn and the crew are still looking for auxiliary fuel tanks and various other pieces.

"We don't let it bother us that much," said Blinn. "If we've got an engine, great. If we don't, we don't. That's just part of it. We can do lots of work with-

out trying to find all that stuff for the time being. The aircraft itself will basically be there."

The restoration work has been a labour of love for Blinn, who feels connected to the H-44 through his experience with Labrador rescue helicopters.

"It's something we have to grab hold of, because it's part of our history," he said.

"In order to go forward you've got to know where you came from, and aircraft are exactly the same way." ✈

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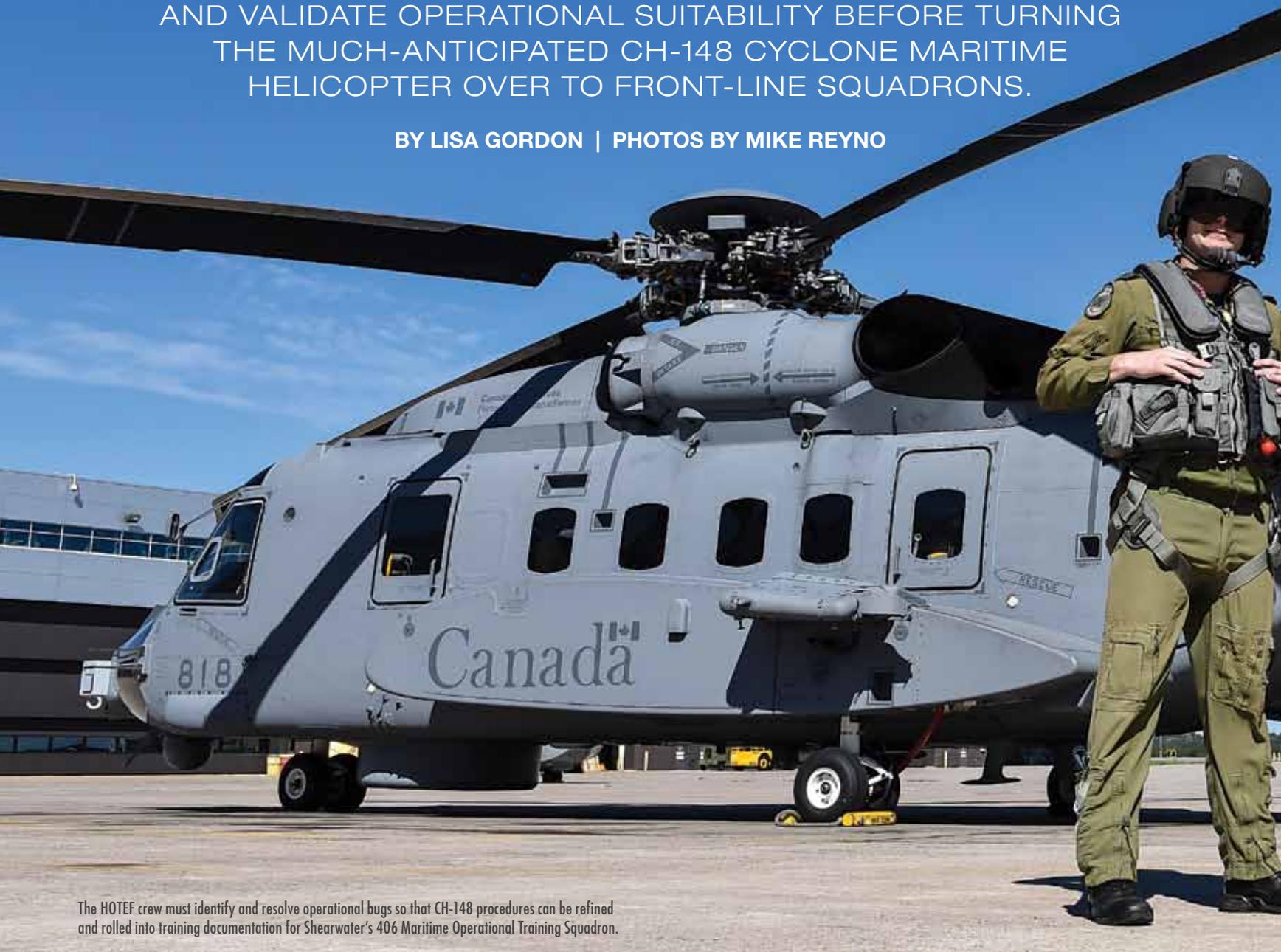


FLYING THE

FUTURE

12 WING SHEARWATER'S HELICOPTER OPERATIONAL TEST AND EVALUATION FACILITY (HOTEF) IS WORKING TO DEVELOP PROCEDURES AND VALIDATE OPERATIONAL SUITABILITY BEFORE TURNING THE MUCH-ANTICIPATED CH-148 CYCLONE MARITIME HELICOPTER OVER TO FRONT-LINE SQUADRONS.

BY LISA GORDON | PHOTOS BY MIKE REYNO



The HOTEF crew must identify and resolve operational bugs so that CH-148 procedures can be refined and rolled into training documentation for Shearwater's 406 Maritime Operational Training Squadron.

The maritime helicopter community at 12 Wing Shearwater, N.S., is living through some exciting times. So far, 2016 is shaping up to be the year that steady, measured progress is being made in the testing and evaluation of the CH-148 Cyclone for its operational suitability and effectiveness in theatre.

While the Cyclone procurement has become synonymous with delays and cost overruns, the folks at 12 Wing prefer to focus on the positive progress that's being made toward initial operating capability (IOC), projected for early 2018.

"We're achieving exactly what this period in the program was intended to achieve: working out the bugs in operating the aircraft and figuring out how to take this developmental weapons system and put it into an operational environment," said Col Peter Allan, 12 Wing commander. "In my view, we're doing exactly what we planned to be doing during this period."

The Cyclone test program, under the direction of 12 Wing Shearwater's Helicopter Operational Test and Evaluation

Facility (HOTEF), had accumulated 226 hours of flight testing as of May 4, 2016. The bulk of those hours had been logged since last September.

Allan spoke to *RCAF Today* in early April, at which time he reported that Shearwater had taken delivery of eight interim CH-148s out of the 28 helicopters ordered by the Canadian government, but only five were on base.

Three original block 1.0 helicopters were in the hangar, plus two capability release 1.1 aircraft with upgraded engines and mission systems.

The block 1.0 helicopters are equipped for ship- and shore-based operations, surveillance, reconnaissance, search and rescue (SAR), and utility work such as slinging and hoisting.

The 1.1 capability release introduces anti-submarine warfare (ASW), Link 11 and secure radio capabilities. By and large, the new helicopters contain all the hardware that will be needed; what is still outstanding is a fair bit of software and the associated testing.



Watch the video [HERE!](#)



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The CH-148 Cyclone (foreground) offers a generational leap in technology and capability over the CH-124 Sea King (hovering) that it will replace.



HOTEF has returned three of 12 Wing's helicopters to the manufacturer, Sikorsky, for block 2.0 upgrades—which will be representative of the full weapons system.

"[With the Block II aircraft,] we'll get tested and accepted mission systems that will include sonar and radar capabilities, FLIR [forward looking infrared], and electronic sensing systems and capabilities," explained Allan. "We're aiming for acceptance of Block 2.0 aircraft in June 2018."

OPERATIONAL TESTING

The Cyclone underwent five months of ship helo operating limits (SHOL) trials beginning in January of 2015, before the program was picked up again in January 2016. Aboard the HMCS *Halifax* frigate, tests and trials have been performed in association with Sikorsky to establish the safe parameters and best practices for at-sea operations.

"That envelope gets passed to HOTEF," explained Maj Travis Chapman, HOTEF's commanding officer, who is overseeing the Cyclone's initial operational testing and evaluation (IOT&E) on behalf of the Department of National Defence (DND).

"We work within that SHOL envelope to validate it and refine the procedures aircrew use to land on the ship and do our deck utility work, such as hoisting and slinging, and from a maintenance and

operational perspective we refine how we operate the aircraft from the ship," he said.

Some substantial modifications were made to Canada's frigate fleet to accommodate the CH-148, including changes to the 'bear trap' helicopter hauldown system, flight deck reinforcements, and revisions to the systems that straighten and support the aircraft. Some minor adjustments were made to hangar interiors, while ship lighting was also updated to work with the Cyclone's night vision goggle capability.

On Jan. 27, 2016, the first CH-148 Cyclone manned by an all-RCAF crew settled onto the deck of HMCS *Halifax* off the coast of Nova Scotia. The successful landing was a milestone event for HOTEF.

"That was an opportunity for HOTEF crews to get out over the deck and learn the techniques developed in earlier testing for the best way to land a Cyclone on a deck," noted Chapman. "Then, in March with HMCS *Montreal*, HOTEF did the first embarkation of a helicopter detachment with a Cyclone. We were out for about a week, flew 20 flight hours, and continued to evolve what we can do with the aircraft at sea."

HOTEF—which actually has care and control of the CH-148 helicopters at 12 Wing—works to test and assess the Cyclone, developing procedures and validating doctrine before the new maritime helicopter can be turned over to front-line squadrons. The



The Cyclone has both a rotor-folding system and a folding tail rotor to allow it to fit into the hangars aboard ships at sea.



The Cyclone has a fully articulated four-blade hingeless main rotor.



The Cyclone is equipped with a rear ramp.



All together, 40 technicians have been trained on the Cyclone.

unit's job is to identify and resolve operational bugs so that procedures can be refined and rolled into training documentation for Shearwater's 406 Maritime Operational Training Squadron. The goal is to ensure there are no surprises when the Cyclone goes fully operational.

Since then, Chapman reported, HOTEF crews have done "countless" landings and takeoffs from the ship's deck. "In some respects we've found quite a few bugs, but I'm quite proud of that," said Chapman. "We want to identify where we can improve it for the line fighters."

Embarking on a ship has been enlightening. As an example, the means of identifying and documenting helicopter maintenance at sea was initially a challenge that has since been conquered.

"We were doing this on a ship for the first time, and had some issues with connectivity and validating the data. About two to three weeks before we embarked we were able to develop, trial and validate a new and sufficient method to document that maintenance and support the ongoing testing at sea."

The IOT&E phase is expected to continue over the next year and half on the block 1.0 configuration, according to Chapman.

"We will be delivering certain key enablers to allow the commencement of conversion training. But even after conversion training begins, IOT&E continues, as we continue to add capabilities to the initial definition," he explained.

FUTURE FORWARD

So far, HOTEF pilots say they are impressed with the Cyclone, which will eventually replace the RCAF's fleet of 50-plus-year-old CH-124 Sea Kings. The new helicopter's fly-by-wire capability represents a big leap forward for maritime helicopter pilots who were used to legacy hydraulics and old bellcranks.

"It's definitely a very capable aircraft," Capt Erik Weigelin, a CH-148 operational test pilot with HOTEF, told *RCAF Today*. "The fly-by-wire gives us the capability to move the aircraft where we need it to be. The Sea King is very manual and labour intensive; both pilots spend a lot of time flying that aircraft. But with this one, I'm telling the aircraft what I need done. I can program it to be where I need it to be, and be confident that it will get there, and it will be rock steady."

Weigelin said CH-148 features like GPS positioning and inertial navigation make hovering easy, so pilots can concentrate more on "fighting" the machine.

There is no doubt the maritime helicopter pilot role is changing with the advent of the Cyclone. Pilots are closely integrated with the back of the helicopter now, and have the ability to fight the aircraft from the cockpit. In fact, it's possible to imagine that one day the CH-148 may be flown by a single pilot, with another crewmember doing tactical work beside them. But Chapman said that's a long



Some substantial modifications were made to Canada's frigate fleet to accommodate the CH-148, including changes to the 'bear trap' helicopter hauldown system, flight deck reinforcements, and revisions to the systems that straighten and support the aircraft. **LS Dan Bard Photo**



On Jan. 27, 2016, the first RCAF aircrew successfully landed a Cyclone on a Canadian warship at sea, HMCS Halifax. The frigate has been extensively utilized for Cyclone at-sea testing. **OS Raymond Kwan Photo**

way off. "We fly with two pilots and a tactical crew in the back in the maritime helicopter community, as we've always done."

In the meantime, HOTEF crews are acclimatizing to a new platform that includes—or will include—an integrated mission system (IMS) with such modern features as electronic surveillance measures (ESM); radar warning receiver (RWR); multi-mode imaging radar; electro-optical infrared (EO/IR) turret optics, passive acoustics and ASW active dipping sonar, all with direct applicability to the maritime role.

The Cyclone's sonobuoy processor is actually an evolution of that used on the CP-140 Aurora long-range patrol aircraft. "We add the active sonar capability, low frequency and long ranges, which will be a great contributor to ASW," said Chapman. "Passive [sonar] is very good, but submarines are also very quiet these days."

Despite periodic upgrades to the Sea Kings over their extensive lifetime, the coming of the Cyclone catapults Shearwater's maritime helicopter community several generations into the future.

"This aircraft will bridge the gap," said Chapman. "Once we get this aircraft to the fleet, I'd put it up against any other maritime helicopter in the world. I can't think of anything we won't be able to do once it's all said and done."

Added Weigelin: "There is more efficiency; we can find a lot more, a lot faster. Detection and tracking ranges are exponentially larger. We can fly out of Shearwater, and 80 miles away we can image a ship and I can tell you what kind it is. You can't do that on the Sea King."

STAGED GROWTH

Allan said facilities at Shearwater are growing incrementally to keep pace with the demands of the Cyclone program.

"Operational support cells are being set up within 12 Wing," he reported. "The transfer date of the training facility from the contractor to the wing is still to be determined. However, we've started moving 406 Squadron personnel into the building to work with the contractor and manage training. The building and facility will come to us in due course."

To date, 19 HOTEF aircrew have been certified on the CH-148, with the eighth Cyclone pilot starting training in April, producing four test crews. On the maintenance side, 16 additional trained maintainers were added to the initial cadre, bringing the total up to 40 technicians in all.

"We've all been through the training centre," said Chapman. "Aircrew and techs are able to operate and maintain this aircraft through the full spectrum of what it's been approved to do so far. It is a blocking strategy."

Allan said the big challenge with making the technological leap from Sea King to Cyclone is figuring out how to manage the new systems and how they contribute to the overall battle space.

"The big thing that comes with that, of course, is there is a huge tail that has to support all of that," he continued. "It's not just a matter of the operator in the aircraft knowing how to turn the system on and get data out—you have to feed it with data up front, so it can recognize what it's seeing. Then you have to be able to pull the data out afterwards and be able to exploit it."

Since the Sea King doesn't have the capacity to bring in that volume of information, changes must be made to the Wing support system.

Experienced personnel, both aircrew and maintainers, are being tapped from the CP-140 Aurora operation; from 3 Canadian Forces Flying Training School in Portage la Prairie, Man.; and from the CH-147F Chinook program.

"We're learning from the Aurora experience and even the fighter experience as well," said Allan. "It's a jump in technology but it's not unprecedented. It's about training and taking the incremental steps that we can take right now, with the tools that we have, so that we are more aware of what's going to be demanded of us as we move to the modern weapons system."

NEXT STEPS

At the end of the day, Canada is the lead customer on a developmental aircraft program. Slow progress is to be expected, according to 12 Wing personnel.

"We're not taking a system in operation somewhere and implementing it here," emphasized Allan. "We're working our way through this development; it's exciting for 12 Wing, but it's a difficult slog to work through that kind of process."

Not surprisingly, serviceability is one area where there are many challenges to surmount. The Cyclone is a complicated helicopter, and keeping it airworthy is one of the most difficult aspects of the program. However, Allan noted that Sikorsky has been working through those issues in conjunction with the RCAF. "When I consider where we were in June of last year, versus where we are today, I am very happy with the momentum we're gaining."

The RCAF has been flying Sea Kings for more than 50 years, added HOTEF's Chapman, and a lot of those procedures are tried and true. "Everything we do on this aircraft is brand new, whether we're dropping an engine in or changing another component, so we learn something new every day. Some days our successes are bigger than others, but every day is measurable."

In terms of program priorities and next steps, the HOTEF team is focused on completing IOT&E. At that point, the Cyclone will be released to service and crew conversion training will begin.

"With that [IOT&E] completed, I expect to go to the [RCAF] commander to obtain a release to service in roughly April of 2017," said Allan. "That will enable us to begin conversion training. Initial operating capability is targeted for early 2018."

The last Sea Kings are set to retire by the end of that same year, and Allan admitted that 12 Wing will feel a bit of an operational pinch during the transition. "It will leave us in a space where we will have fewer operational crews on maritime helicopters than we would like, but we will sustain the capability to deploy."

Unfortunately, despite the progress being made, HOTEF crews won't have the chance to show off the Cyclone's capabilities during the 2016 edition of the Rim of the Pacific Exercise (RIMPAC), the world's largest international maritime warfare exercise.

"It will not be ready," confirmed Allan. "That's as much an issue of timing as it is readiness of the weapons system itself. We'll be back in training mode during RIMPAC."

Regardless, he expects that when the Cyclone does become operational, it will eventually be tasked with fulfilling a variety of different missions in addition to the usual maritime helicopter role.

"As we look across the air force as a whole right now, there is a drive to use all of our aircraft to the best of their capability, including in non-traditional areas," concluded Allan, specifically referencing the CP-140 Aurora's recently expanded overland intelligence, surveillance and reconnaissance (C4ISR) role.

"I think we'll see the Cyclone used outside of the maritime roles that are initially intended for it. Today, we are flying in formation together as an air force—we're a small air force, we don't have a specific fleet for everything we want to do. So we work together."

Co-operation is a concept that is very evident at 12 Wing Shearwater, as personnel work to introduce the CH-148 Cyclone's new technology and cutting edge capabilities to Canada's maritime helicopter community.

Lisa Gordon is editor-in-chief of Skies and RCAF Today magazines. Prior to joining MHM Publishing in 2011, Lisa worked in association publishing for 10 years, where she was responsible for overseeing the production of custom-crafted trade magazines for a variety of industries. Lisa is a graduate of the Journalism program at Ryerson University.



Cyclone initial operating capability (IOC) is targeted for early 2018. In the meantime, the last Sea Kings are set to retire by the end of that same year. This could create a bit of an operational crunch, with fewer crews on maritime helicopters during the transition period. **LS Dan Bard Photo**

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The serviceability of Canada's CF-188 Hornets during Op Impact was never lacking. In fact, the jets were sometimes called upon to fill in for other nations whose aircraft were unserviceable. However, many of the aging fighters have developed "quirks" that neither the pilots nor the maintainers can explain. **DND Photo**



SIGNIFICANT **IMPACT**



CANADA'S FLEET OF CF-188 HORNETS HAVE PERFORMED ADMIRABLY IN THEATRE, BUT TECHNICIANS SAY THE JETS' AIRFRAMES ARE SHOWING THEIR AGE—TO THE POINT WHERE MORE THAN A TECHNOLOGY UPGRADE MAY BE NECESSARY.

BY CHRIS THATCHER

A CF-188 Hornet pilot who flew in Operation Impact can vividly recall his first mission in northern Iraq. A United States special forces team near Sinjar was receiving heavy mortar fire from a nearby orchard. When the Canadian CF-188 Hornet fighter pilot came on station, a Predator drone had been monitoring the area for several hours and had identified the location of two mortar positions about 800 metres apart. The unmanned aerial vehicle (UAV) relayed the precise coordinates. He verified both and plugged them into two Boeing GBU-38 500-pound GPS-guided bombs. Then, he fired.

Despite the distance between the mortar positions, the bombs struck both targets at exactly the same moment.

"It demonstrated the level of technology we have invested in with these weapons," said Mouse [identified only by his call sign for security reasons], a weapons and tactics officer with 401 Tactical Fighter Squadron in Cold Lake, Alta. "An hour later, we were able to take out two of the regional commanders who were trying to flee in a vehicle. The special forces guys were very happy with us that day."

That assessment of the CF-188 Hornet and its capability in Iraq is shared by most of his colleagues. In interviews with returning pilots and technicians at the tactical and operational training squadrons at 4 Wing Cold Lake, in early April, *RCAF Today* heard repeatedly that while the Royal Canadian Air Force's fighter jet might have surpassed its 30th year of service, upgrades to weapons, sensors, avionics, communications and the airframe over the past decade have made it a premium platform that exceeded expectations in theatre.

The CF-188 has received extensive upgrades, which included Boeing's Joint Helmet Mounted Cueing System to improve weapons targeting. **Capt Andrew Jakubaitis Photo**



Despite Canada's very restrictive rules of engagement that often required a legal opinion before dynamic targets could be engaged, the capability of the Hornets and their aircrews, especially in close air support missions, was well respected.

"[We] were right at the top of the list in terms of our accuracy," said Mouse, who flew 17 missions, many over six hours in duration, during his two-month tour. "And our serviceability was fantastic. Two or three times we ended up plugging the gap for other [nations] whose aircraft kept falling out. We would end up extending our on-station time by an hour or two. I think we were very well respected."

The CF-188 arrived in theatre with new and upgraded weapons and sensor systems, including the Raytheon Enhanced Paveway II (GBU-49) bomb with a dual weapon rack, which allowed the aircraft to double the number of weapons it could carry. With Link 16 data exchange, a FLIR [forward looking infrared] sniper pod and three external fuel tanks, pilots dubbed it a "bomb truck," with more weapons than an F-16 Falcon and greater speed than the venerable A-10 Thunderbolt.

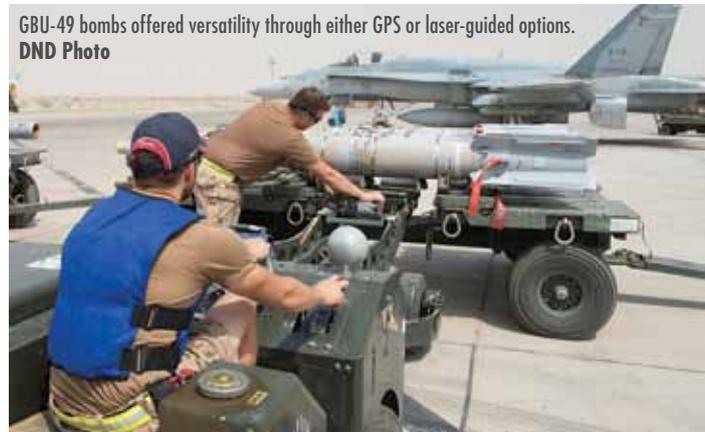
"We would always show up with a lot of bombs," said Darcee [his call sign], the deputy operations officer at 409 Tactical Fighter Squadron. "The GBU-49—that capability of height of burst and GPS or laser-guided—was a great weapon to have. That increased our capability from just a laser-guided bomb or a GPS-guided bomb. Rather than carrying a mixed load, we could carry one bomb that would do everything we wanted."

Consequently, he said, Canada was able to contribute just six jets and "still have a significant impact on the overall execution of the war. Our serviceability was excellent. Everything was covered in sand, so you would expect a lot of electronic issues, but the technicians were great. And in that 55-degree heat, the aircraft could still function and operate without overheating.



In Iraq, pilots dubbed the CF-188 a "bomb truck," with more weapons than an F-16 Falcon and greater speed than the A-10 Thunderbolt. **DND Photo**

GBU-49 bombs offered versatility through either GPS or laser-guided options. **DND Photo**



That capability, however, comes with a caveat. The aircraft is showing its age.

"The airframe is getting old in the way that a 30-year-old car would be," said Mouse. "It is not the radar and the electronics that we worry about, it's the hydraulic lines and landing gear and things like that, the nuts and bolts of the plane."

Many of the Hornets, he said, have developed "their own personality" and will exhibit quirks that neither the pilots nor technicians can explain. Working with the latest technology and the multitude of UAVs in theatre, for example, could set off warning systems in the jet's cockpit. "They are 21st century transmissions and some of our equipment is from the late '80s, [so] the UAVs would send weird signals that would set off some of our equipment."

"[The Hornet] has great sensors and systems; they are not all necessarily interlinked," added Darcee. "From a pilot perspective, it is workload intensive to switch from different displays and move different sensors that you may need through the course of a mission. There are a lot of software upgrades where the Hornet's computers are now maxed."

UPGRADE ISSUES

With no decision expected any time soon on when the government will reignite the CF-188 replacement program, the RCAF is mulling over options to extend the service life of the Hornets to at least 2025.

In an April 2016 interview with the *Ottawa Citizen*, LCol Jean-Marc Brzezinski, head of a new fighter capability office stood up in September 2015, said that, for an upgrade program to make financial sense, the air force had a small window in which to approve a plan and issue contracts.

Aircraft improvements could include communications equipment, avionics, and weapons, but those would all need to be completed by 2021, he said. "If you start spending a lot of money in 2023 or 2024, and the aircraft is no longer being supported past 2025, then it doesn't become economically viable." One option, he said, remains the status quo: "carry on the maintenance practices."

Acquired in 1982, the Hornets have already been through a three-phase modernization program that began in 2002 and concluded in 2014.

While adding new technology has enhanced the aircraft's performance, many of the technicians with whom *RCAF Today* spoke said problems are emerging that suggest more than an upgrade is necessary.

"We are changing more parts more often," said Sgt Hugo Bouchard, armaments supervisor with 409 Squadron, who served as the first armaments supervisor in theatre. "Those parts are rebuilt and rebuilt and they get tired. All of the mechanical parts in the airframe start to become tired."

An air weapons technician with the CF-188 since 2002, who also worked for five years on the CP-140 Aurora, Bouchard said the jet has changed so often that he has to "double check all the time" to make sure he has the right part or procedure.

"We are sitting at 5,000 to almost 7,000 hours on many of these airframes," said MCpl James Sobkowich, an aviation instructor with 10 Field Technical Training Squadron (FTTS), the transitional step for Hornet technicians between their *ab initio* technical training at 16 Wing Borden, Ont., and no-fail work with frontline squadrons, who deployed to Kuwait for six months.

"The structural fatigue alone causes all kinds of issues. I have seen cracks in structural sparring when we have gone through periodic inspections. The way the flight control system is designed



The CF-188 arrived at Op Impact with new and upgraded weapons and sensor systems, including the Raytheon Enhanced Paveway II (GBU-49) bomb with a dual weapon rack. This allowed the aircraft to double the number of weapons it could carry. **DND Photo**



The Hornet's landing gear was originally designed for carrier-based operations, rather than for the extensive taxiing it must do during land-based service in Canada. **DND Photo**



Maintenance staff say they must change parts on the CF-188s more often as the jets age. **DND Photo**



The Hornet has over 80 per cent Kapton wiring, which is beginning to fail and must be changed. **DND Photo**

to work, it is completely digital and the computer assumes a straight airframe, which is not always the case. There are some cases where we have to compensate for that by rigging the flight controls a specific way to keep the aircraft from rolling un-commanded."

The aircraft has been "designed to be extremely forgiving with upgrades," said MCpl Kris Erling, an avionics instructor with 10 FTTS, noting that much of the software is plug-and-play. But the age of the airframe can cause "peripheral problems not related to your specific system. You may have a very expensive component that will be damaged because of water or fuel or oil."

He said the aircraft has over 80 per cent Kapton wiring which is beginning to fail. "It shows failure within 100 hours in a humid environment. So, we are seeing a lot of wiring bundles that need to be changed. And when we are working on those older things, you will notice damage as well."

The addition of more smart weapons and sensors that are now operating for longer periods has put a strain on the generator control unit (GCU), said MCpl Steve Pollard, an air weapons instructor who deployed on Op Mobile over Libya in 2011.

"If you put a lot of strain to maintain all these electronic components and a GCU fails in flight, well, you have one back-up. And we have seen that so many times. Luckily, a lot of them were failing on start or on shut down. [But] a critical component could fail as a result of all this strain."

Sobkovich noted that the F-18 landing gear was designed for carrier-based operations with sudden hard stops rather than extensive taxiing. "Coupled with the age of the airframe itself, we see a lot of landing gear issues where it doesn't come down and lock," he said.

Despite their concerns, the technicians had nothing but praise for the performance of the Hornets. And adapting to new systems should be standard practice for most, observed WO Bruce Cassar-Torreggiani, an air maintenance superintendent at 10 FTTS who has multiple tours under his belt and has worked on the CF-188 since 1988.

"When we adopted FLIR pods prior to going into the Kosovo campaign, we had no experience with FLIR pods whatsoever. It was a steep learning curve for all our personnel. When GPS came online in the mid-2000s, we had no experience with it, and now we are using GPS-guided bombs. It is pretty critical that we have

a strong understanding of the technology we are adding to this airframe as it develops.”

Should the RCAF proceed with an upgrade project, the pilots have a small wish list based on recent operational experience. It includes a forward-firing weapon for air-to-surface strikes, an improved missile approach warning system, moving the sniper pod from the left hip to the centreline of the aircraft, and the GBU-54 laser JDAM (joint direct attack munition) currently used by the Americans and often preferred by joint terminal attack controllers in theatre.

To upgrade or not to upgrade? That answer may depend on how long the government takes to reach a decision on the next steps in a replacement program. But for pilots and technicians, many of whom gained invaluable and rewarding experience with the CF-188 on Operation Impact, the focus has already shifted to the future fighter jet.



Chris Thatcher is a freelance writer specializing in defence, security and technology issues.



Acquired in 1982, the Hornets have already been through a three-phase modernization program that began in 2002 and concluded in 2014. Will the government opt to upgrade them once again? **DND Photo**



Building a **BACKBONE**

THE RCAF IS MOVING TO CONSTRUCT A PERMANENT DATA-SHARING NETWORK THAT WILL SUPPORT ITS OVERALL C4ISR STRATEGY.

BY CHRIS THATCHER



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Formerly known exclusively as a submarine hunter, the CP-140M Aurora has demonstrated its capability as an overland intelligence, surveillance and reconnaissance platform, ever since it was successfully deployed in that capacity in 2011 during Operation Mobile in Libya. **Michael Durning Photo**



Two CP-140 Auroras have been instrumental during Operation Impact, flying intelligence, surveillance, and reconnaissance missions in support of coalition air operations in the fight against ISIL. DND Photo

The call was urgent. The Royal Canadian Air Force (RCAF) was weeks away from deploying to Kuwait to begin operations in Iraq and its long-range patrol aircraft needed the ability to stream data, particularly video, to commanders in near-real time. Could IMP help?

IMP Aerospace was the prime contractor on the CP-140 Aurora Incremental Modernization Program (AIMP), an ongoing multi-phased project to upgrade the avionics and mission systems on the CP-140, and well positioned to respond.

Within weeks of that October 2014 call from LGen Yvan Blondin, then the commander of the RCAF, officials from National Defence, IMP and L-3 Electronic Systems Services were mapping out a plan that would see an interim beyond-line-of-sight (iBLOS) satellite communications system installed on the first of three aircraft.

"It was a case where everybody was brought online very quickly and worked in an extremely cooperative manner," Tom Galley, IMP's executive vice-president, recalled.

Blondin's call wasn't completely out of the blue. During an Arctic experiment in January 2013, a CP-140 equipped with a BLOS system had successfully streamed live video from just below 80 degrees north over a distance of nearly 4,000 kilometres to 14 Wing in Greenwood, N.S. All the parties knew the capability worked. The question was, could it be delivered and installed in under three months?

For a maritime patrol aircraft that had begun life as a submarine hunter, the CP-140 had, since 2011 on Operation Mobile over Libya, acquired a reputation as a formidable overland ISR (intelligence, surveillance, reconnaissance) platform. Block 3 of the modernization program had installed a communications architecture that made the insertion of BLOS data streaming possible, but the next upgrade to make it a permanent feature on

the Aurora wasn't scheduled to begin for at least another year.

That the military and industry partners were able to fast-track the capability is a testament to their personnel, many of whom worked right up until the late-December deadline. But the rapid introduction of iBLOS in a combat zone triggered difficult questions about how the air force gathers and distributes ISR data.

Who were the consumers—Canadian commanders in theatre or at home? Analysts? Members of the broader coalition?—and how would they use the information? What information, and how much, would each one need? Where would the data be stored and analyzed? On what software would it be used? And, in what formats would it need to be provided for each consumer?

"It was definitely an awakening," said Col François Beaupré, the head of directorate of air domain development (DADD). Formally stood up in 2013, DADD was tasked with consolidating the development of an array of functions around the dissemination, defence and exploitation of data: cyber, space, C4ISR, electronic warfare and signals intelligence, data fusion, and analysis.

While the RCAF's signals community had extensive experience working with the Five Eyes partnership of Canada, the United States, United Kingdom, Australia and New Zealand, and had well established protocols for data exchange, coalitions present unique challenges. Before they could develop a concept of support for Op Impact, they first had to develop a concept of operations to manage, move, and analyze the data, and deliver it via the most appropriate feed to decision-makers.

"We're trying to figure out how to knit all of those entities together, come up with the concept of operations that makes sense for everyone," said Beaupré.

TOWARDS A PERMANENT NETWORK

Capturing and disseminating video data is not new for the RCAF—sensor-equipped aircraft were used during the G8/G20 Summits in 2010 to feed data to decision-makers—but it has often been done in an *ad hoc* manner. With Block 4 of the AIMP now under contract and BLOS communications one of several upgrades planned for the Aurora aircraft—Link 16 data exchange network access and an infrared counter measures suite are among the others—the air force wants a permanent architecture for the network that provides the backbone for C4ISR (command, control, computers, communications, intelligence, surveillance, reconnaissance).

Operation Impact forced the RCAF to exercise a muscle it had allowed to “atrophy,” said BGen Philip Garbutt, director general of air force development. “[BLOS] provides us this transformational capability” to solidify the frameworks for intelligence sharing and the processes for PED (processing, exploitation and dissemination), what he called the “tail” necessary to support the effective use of data.

“With the ‘i’ in iBLOS, it is still *ad hoc*,” Beauré acknowledged. “We

which is something we weren’t focusing on in the past,” he said.

Traditionally seen as an enabler to commanders in operations, the signals community is going to have to become a provider of “mission assurance,” Beauré added. Resilient networks with sufficient capacity, availability and endurance must become the norm. “When commanders at all levels—in a cockpit, a division, a joint force headquarters—press the button and say, ‘deliver that effect,’ the right things must happen. It is a matter of building expertise, of building credibility.”

The RCAF’s C4ISR strategy now dovetails with a larger Canadian Armed Forces C4ISR strategy released by the vice chief of the defence staff in late March. Among other things, “it talks about consolidating all of our ground assets so that they will all look the same,” said Beauré. “We have a good appreciation because of our experience with a multitude of interim solutions.”

The air force is completing a project known as TIC3 Air that will deliver RCAF-owned ground stations to move data. “It is the interface between what is on the aircraft and on the ground, and then the devices that will integrate into the national network,” which will then integrate with the alliance or coalition network,” he explained.



“IN ADDITION TO NEW SYSTEMS BEING INTRODUCED INTO THE CP-140, THERE ARE ISR CONSIDERATIONS FOR UNMANNED AERIAL SYSTEMS, THE CH-148 CYCLONE, CH-146 GRIFFON AND, OF COURSE, THE FUTURE FIGHTER.”

need to figure out the new concept of operations and support, and building increased capacity, timeliness, and resilience for systems that we previously were used only for command and control (C2).”

The RCAF is also striving for a single “joint” network rather than separate Army, Navy and Air Force systems.

“The more points of entry you have in a network, the greater your attack surface,” said Beauré. “It is too difficult to defend a mesh network where we all interface with each other. If we have a more consolidated, unified network, it is easier to defend.”

That, of course, requires greater fusion of data to provide commanders with a single, comprehensive operating picture, a nut Beauré admitted the CAF is still working to crack.

“We are figuring out how to do PED. We are working with Canadian Forces Intelligence Command ... [and] the architecture we are proposing is a Five Eyes preferred approach called CGS (ours will be CGS CAN). This is still a work in progress. These are solutions developed by the Americans, but offered to the Five Eyes community. Similar to the existing iBLOS architecture, we would use the American solution for talking to the coalition, rather than Canada having to interface directly with the coalition.”

While that joint construct minimizes cyber vulnerabilities—the Forces are in the process of developing a “purple” occupation of cyber operators—Beauré said each service may be tasked to defend their own weapons systems and certain aspects of their networks. “Some things on the weapons systems are so unique to the air force that we may need different appliances than those that exist for the rest of the network, which is Internet-protocol based.”

For DADD, that means ensuring there is a unified approach to sensor and data exchange systems across all air force platforms, and that what is delivered is able to integrate with the larger network. “Those systems need to be engineered to be defensible,

DRIVEN BY TECHNOLOGY

The development of a permanent network architecture also has implications for both new aircraft and upgrade programs. In addition to new systems being introduced into the CP-140, there are ISR considerations for unmanned aerial systems, the CH-148 Cyclone, CH-146 Griffon and, of course, the future fighter.

The architecture required to support information sharing among fighter jets and with ground stations will be extensive. “Without getting into the classified realm, fifth generation aircraft have an enormous informational tail that is beyond anything we have seen in the fourth generation environment,” said Garbutt. “The burden that places on secure networks and sharing information across those networks is enormous.”

But it’s not an investment the Air Force is prepared to make until it knows more about which aircraft it will fly.

On April 6, the federal government launched public consultations intended to inform a defence policy review. While a new policy is unlikely to dramatically alter programs already funded and underway, such as selection of the next fixed-wing search and rescue aircraft or bringing new fleets of CC-130J Hercules transport aircraft and CH-147F Chinook helicopters up to full operational capability, it could influence priorities and capabilities in future major capital procurement projects.

The RCAF has over 200 large and small projects underway and some have what Garbutt called “programmatically interdependencies.” Determining which fighter jet will replace the CF-188 Hornet, for example, will influence the requirements for the next aerial refueller and the fighter lead-in trainer.

"The technology in that future fighter [will drive] how we prepare future fighter pilots," Garbutt observed.

The policy review, expected to be completed by early 2017, is independent of the fighter replacement program. But it could alter the timetable for a new fighter, which has been in a holding pattern since the government reset the program in 2012. The RCAF is evaluating a plan valued at up to \$500 million to extend the life of the current fleet of Hornets until 2025.

The defence review could also shape key decisions about the acquisition of an unmanned ISR platform. After more than a decade of analyzing options for a Joint Unmanned Surveillance Targeting and Acquisition System (JUSTAS), the project is becoming a priority. Experience with leased options in Afghanistan have greatly helped "inform the high level mandatory requirements," Garbutt said, and a submission to the Treasury Board for funding is expected soon.

Though the primary function of a UAV would be ISR, the air force is also seeking a precision strike capability for expeditionary operations. The policy review could determine the government's position on armed drones and whether the RCAF acquires a single platform or a mixed fleet, though RCAF commander LGen Mike Hood has said "right now it is most definitely a single system."

On the helicopter front, the review is unlikely to affect the Cyclone, but could inform how the RCAF proceeds with the Griffon.

Following a new agreement between the government and prime

contractor Sikorsky in June 2014, 28 CH-148 maritime helicopters are being delivered under a developmental strategy in two blocks. The first six Cyclones were delivered to 12 Wing Shearwater, N.S., in Block 1 configuration in 2015, allowing the RCAF to begin retiring the Sea Kings. The rest are expected by 2018; all 28 will be Block 2 compliant by 2020. However, there is some doubt about that schedule. In the recent federal budget, \$90 million was deferred from the project budget to 2021, according to the *Ottawa Citizen*.

The Griffon, on the other hand, is starting to experience "obsolescence" issues with parts that Garbutt said could affect aircraft reliability and availability. The RCAF is weighing options on whether to replace or extend the life of the fleet until 2030.

All of these aircraft, new or modernized, will represent nodes on an expanding Air Force network. Beaupré admitted that until the delivery of a Forces-wide C4ISR strategy, DADD had been limited in the guidance it could provide to the project teams inquiring about sensor selection and network standards as they develop the requirements for each platform. He said the directorate will now have a stronger voice in those deliberations.

"If we are not invited to the table, we need to inject ourselves," he said. "It was amazing what the RCAF was able to deliver with iBLOS, but it was very painful. We need to ensure those stressors are removed by getting involved early in the process. Now that the CAF have a strategy and vision, the C4ISR community is on a better footing to support the Air Force in its own force development." 



Once operational, the Cyclone will also be able to provide an ISR capability.
Cpl True-dee McCarthy Photo



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One of the central tenets of the Canadian Army's future operating concept of adaptive dispersed operations (ADO) is movement: the ability to aggregate and disaggregate forces to deliver coordinated action across a widespread and complex battle space.

While the Army has invested heavily in upgraded light armoured vehicles, tactical patrol and armoured logistics trucks, movement by air will be integral to its operations.

"Tactical aviation plays a key role in being able to bring together those forces and then move them, either from a logistics or operational perspective, thereby increasing the tempo of operations that you can maintain," said Col Scott Clancy.

As commander of 1 Wing Kingston, Ont., Clancy is leading the implementation of a new force employment concept for tactical aviation. Drawn from the lessons of the Air Wing deployed to Afghanistan in 2008, the concept aims to streamline resources and build the Royal Canadian Air Force's fleets of Bell CH-146 Griffons and Boeing CH-147F Chinooks into a finely-tuned aviation unit able to integrate with the army's managed readiness plan.

That integrated model will be on display when 408 Tactical Helicopter Squadron joins with 1 Canadian Mechanized Brigade Group, both of Canadian Forces Base Edmonton, for Exercise Maple Resolve in Wainwright, Alta., from May 18 to June 7. Maple Resolve is the culminating event in a series of training exercises that will confirm both are ready for operational deployment. As of July 1, the aviation unit and Army brigade will take over from 5 Canadian Mechanized Brigade Group and 430 Tactical Helicopter Squadron as the deployable high readiness task force.

The road to high readiness is paved with exercises intended to stress the capabilities of the integrated air and land team. From command post exercises such as Unified Resolve—a test of unit leadership and the limits of command and control—to live-fire training like Promethean Ram, the final step before confirmation in which the air task



ON THE MOVE

TACTICAL AVIATION WILL HELP CARRY THE CANADIAN ARMY'S FUTURE OPERATING CONCEPT.

BY CHRIS THATCHER



While the Army has invested heavily in upgraded light armoured vehicles, tactical patrol and armoured logistics trucks, movement by air will be integral to its operations. Cpl Daniel Salisbury Photo

The new force employment concept for tactical aviation aims to streamline resources and build the RCAF's CH-146 Griffon (bottom) and CH-147F Chinook (top) fleets into a finely-tuned aviation unit able to integrate with the army's managed readiness plan. **Mike Reyno Photo**



force provides reconnaissance and fire power support to the combat team, the objective is to foster relationships that will endure onto the chaotic battlefield, Clancy said.

Lessons from those previous exercises and from the experience of 430 Tactical Helicopter Squadron have been captured and passed on. At various points, key members of 430 Squadron, including its then-commanding officer, LCol Jeannot Boucher, were present to mentor their 408 peers.

"Even though we go through a formal process of after-action reviews, nothing replaces the human contact of a guy who has just been through it," said Clancy, adding it has been critical to ensure that readiness "is not just a point of light," but rather a continuous state supported by a demanding training regime.

At Maple Resolve, the focus for LCol Trevor Teller, commanding officer of 408, and his team will centre on the decision-making of the tactical operations centre "and his ability to fight, move and fly at the same time," Clancy explained. "That represents the toughest thing that he, his leadership team and the troops underneath them are going to have to do. He will be forced to move the battalion over a significant amount of distance; he will be forced to fly and conduct flying support operations while he is moving; and he will be forced to deal with force protection and security issues along with the pure logistics of living in the field, which can cause some significant issues."

LESSONS FROM AFGHANISTAN

The force employment concept has its roots in the planning, deployment and sustainment of the helicopter task force in Afghanistan. The eight Griffons and six rapidly acquired D-model Chinooks demonstrated just what an integrated capability could provide to commanders supporting troops on the ground and faced with improvised explosive device-infested roads.

The catalyst, however, was the arrival of 15 F-model Chinooks at Garrison Petawawa, Ont., delivered between June 2013 and June 2014. "[That] provided us an opportunity to look at the entire wing and organize it functionally around our deployed operational structure," said Clancy.

Previously, tactical helicopter squadrons had been deployed with the brigades with which they resided. Afghanistan proved the need for "a blend of both Griffons and Chinooks formed as an air task force" to work with the Army, said LCol Chris McKenna, the commanding officer of 450 Tactical Helicopter Squadron. He served as a liaison officer and air assault planner for Canada's Special Operations Task Force under the U.S.-led Operation Enduring Freedom and, later, as the commanding officer of the Chinook flight in theatre.

Consequently, while the two fleets might occupy separate bases, Clancy explained they will deploy as a combined unit to deliver the three main roles of tactical aviation: firepower, reconnaissance and mobility. Now, when a tactical aviation squadron deploys with an Army brigade, its commander will serve as the helicopter commander in theatre, supported by his own headquarters, logistics and maintenance elements, and able to deploy a mix of Griffons and Chinooks that can be scaled up or down as required.

The force employment concept not only repositioned operational capability, it also addressed a number of organizational concerns. With all of the squadrons struggling to fully man two lines of maintenance technicians, the wing pared down each squadron to a single line and re-rolled the remaining resources into a dedicated air maintenance squadron (400) at CFB Borden, Ont. It also made force generation of air crews the sole responsibility of 403 Helicopter Operational Training Squadron in Gagetown, N.B., and handed test and evaluation of technical and operational air worthiness to 438 Tactical Helicopter Squadron in St. Hubert, Que.

Multi-tasking, a common occurrence at many of the squadrons, gave way to a more streamlined focus. "Everybody has a specific mission role and their product is now vital to the entire organization," said



The road to high readiness is paved with exercises intended to stress the capabilities of the integrated air and land team. **Cpl Nicolas Tremblay Photo**



The force employment concept is rooted in the lessons learned from Afghanistan, where CH-146 Griffons (shown here) and Chinooks proved their worth carrying troops over roads infested with explosive devices. **Cpl Darcy Lefebvre Photo**

Clancy. "Integration is one of the key vectors within the wing and one of the underlying themes within the force employment concept."

Anticipating that change might take a while to set in, Clancy had asked for "institutional patience." But already, he said, there are signs of improved efficiency and capability.

400 Squadron, for example, will meet a goal of 20 inspections per year in 2016, much sooner than Clancy had expected given a delay in infrastructure improvements to maintenance facilities.

"They are projecting that next year they will reach beyond that. I did not expect that economy in this timeframe."

The squadron has also become a purveyor of best practices on the aircraft, helping frontline squadrons achieve better flying rates. "Availability and serviceability of the Griffon has never been an impediment to any commanding officer achieving any of his training objectives," said Clancy.

At 403 Squadron, the single focus on training has resulted in revamped courses better aligned with the line units and validated the quality of aircrew training. "These are dashboard items that ... ensure you are professionalizing your school house in the best way possible. We haven't seen these for a while."

The rapid pace at which the Chinook has lifted into service has tested its new training system at 450 Squadron in Petawawa.

The squadron has a mandate to be able to indefinitely sustain the aviation unit overseas without impacting the training regime for either aircrew or technicians, Clancy said.

"The integrated Canadian industry system that we have put in place for that, with CAE and Boeing, depending on whether it is technician or aircrew training, is working very well. We have two tactical sub-units already built and the third is being built as we speak. That means once I get the third one training, I can have one in theatre, one out of theatre, and one prepping to go. We are on track to do that in the next six to nine months."

A CH-135 Twin Huey and Griffon pilot, Clancy has seen plenty of simulation systems over the years. But he admitted he has been "amazed" at how computer-based training and simulation have been incorporated into technician training.

"We are only beginning to leverage the capability of this as our instructors get better and better. These training modules are fantastic."

FRONT EDGE CAPABILITY

While the Griffon and Chinook often fulfil synchronized roles in the air task force, they are at opposite ends of their operational lifecycles. As the Chinook ramps up to full operational capability, the Griffon is approaching a difficult decision point for the RCAF.

Among Chinook F-model fleets, the CH-147F is a "front edge" capability that has the attention of other nations, Clancy acknowledged.

Canada made 30 modifications to its U.S. Army counterpart, including extended range fuel tanks that double the flying time of the standard model Chinook; an L-3 WESCAM MX-15 electro-optical/infrared sensor; and a digital automatic flight control system for enhanced situational awareness and a degree of automation when landing in degraded visual environments.

The centrepiece, though, will be an electronic countermeasures suite that includes engine signature suppression; an engine air





FAR LEFT: The air task force provides reconnaissance and fire power support to the combat team.

Sgt Jean-Francois Lauzé Photo

LEFT: At Exercise Maple Resolve, the focus will be on the decision-making at the tactical operations centre and the "ability to fight, move and fly at the same time."

MCpl Louis Brunet Photo



While the Griffon has its limitations, notably as an escort to the faster Chinook, experience has taught the air task force how to tactically operate the CH-146 so that its escort and firepower capabilities are alongside the Chinook during the critical stage of a mission. **Mike Reyno Photo**

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While the Griffon (right) and Chinook (left) often fulfil synchronized roles in the air task force, they are at opposite ends of their operational lifecycles. **Mike Reyno Photo**



The CH-147F provides new capabilities for the Air Force and Army. **Cpl Geneviève Lapointe Photo**



Canada's CH-147F is a "front edge" capability that has the attention of other nations. **Sgt Jean-Francois Lauzé Photo**

particle separator; and an advanced counter missile system. That "groundbreaking system," expected to be delivered in 2016, has been delayed by seven to nine months, Clancy explained, due to ongoing testing and evaluation and software engineering issues the manufacturer is resolving.

"We have an 85 per cent solution," he said, noting that program was always intended to be evolutionary. "There are some elements we are on the verge of delivering that are knocking it right out of the park. Its ability to fly in icing is something we didn't [expect]; it's fantastic. We have some other evolutions in the capability that we want to bring in, but for all intents and purposes we have everything we want to make it operationally ready to deploy."

On the other hand, like any 20-year-old vehicle, the Griffon is showing its age.

BGen Philip Garbutt, director general of air force development, has said parts for the airframe and components for the cockpit are becoming more difficult to find. But Clancy observed: "We have not felt any limitations with respect to operating the 146 because of that yet."

While the Griffon has its limitations, notably as an escort to the faster Chinook, experience has taught the air task force how to tactically operate the CH-146 so that its escort and firepower capabilities are alongside the Chinook during the critical stage of a mission.

"The Griffon just has to be understood to be operated within its envelope," said Clancy. "Afghanistan taught us this, and we have re-jigged all of our training to maximize the capability of the Griffon without compromising any of the fundamental safety regimes. It is about finding the right balance between those tactical imperatives and the limitations in the machine and making them all work to our benefit."

Internally, the RCAF is analyzing options for either a replacement program or a life-extension project that would see the helicopter into the 2030s by upgrading the analog cockpit and electronic warfare systems and installing digitally controlled engines. Clancy would also like to see the inclusion of digital downlinks to share information with the army in near-real time. Neither option, however, is funded in the current investment plan.

The improvements to tactical aviation operations, training, maintenance, and testing and tactical development are all reflective of a more integrated and streamlined approach. Exercise Maple Resolve will confirm the readiness of the next air task force for deployment anywhere around the world, but the evolution of the force employment concept is confirmation that 1 Wing is on the right track. 

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ALWAYS ON GUARD

424 “TIGER” TRANSPORT AND RESCUE SQUADRON STANDS READY TO RESPOND TO SEARCH AND RESCUE CALLS IN A REGION LARGER THAN EUROPE.

BY CAPT DAVID LAVALLEE

With its members known as the “Tigers,” 424 Squadron has been operating as a transport and rescue unit since 1968. Sgt Paz Quillé Photo



The wind howls as it tosses the small fishing boat around in the frothing waters off the coast near Igloodik in Nunavut, the tiny vessel barely visible in the dark grey light of autumn. The two figures in the boat clutch their soaked jackets around themselves in a vain effort to stay warm.

For nearly 48 hours, the storm has blown furiously without stopping, and the fishermen have no food and barely any fresh water remaining. Temperatures are below freezing as the snow and seawater lash the boat mercilessly. They know their chances of surviving this ordeal were slim to begin with, and are diminishing with each passing hour.

But just when it seems all is lost, they hear what sounds like an aircraft flying low overhead. A few minutes later, they see two men swimming towards them, pulling an inflatable raft. As the swimmers pull themselves from the water into the boat, the beleaguered fishermen see they are clad in bright orange clothing—the sure mark of search and rescue (SAR) technicians of the Royal Canadian Air Force (RCAF). The newly arrived pair pulls their supplies into the boat and secures the inflatable raft alongside, saying, “We’re from 424 Squadron, and we’re here to help.”

This is a fictional scenario, but one of many such situations that the men and women of 424 Transport and Rescue Squadron, based at



Watch the video **HERE!**

To respond to different scenarios, the squadron employs two very different aircraft: the CC-130 H-model Hercules, shown here, and the CH-146 Griffon helicopter. **Galen Burrows Photo**



8 Wing Trenton, Ont., could find themselves responding to.

"A search and rescue mission can happen at any time, night or day," said LCol Dany Poitras, the squadron's commanding officer. "We don't get to choose the scenario; all we can do is ensure our people are properly trained and ready to respond."

With its members known as the "Tigers," 424 Squadron has been designated a transport and rescue unit since 1968. Its origins lie in the Second World War, when 424 Squadron stood up as a bomber unit and changed to a fighter squadron post-war before its current designation. Its "Tiger" moniker was earned when the squadron was adopted by the City of Hamilton, Ont., and styled itself after the city's football club, the Tiger-Cats.

While 424 Squadron still undertakes transportation missions with other units at 8 Wing that focus exclusively on transport (primarily supply runs to Canadian Forces Station Alert on Ellesmere Island, Nunavut), the squadron's primary mission is SAR.

"Search and rescue is a highly challenging mandate," said Poitras. "But at the same time it is also extremely rewarding, as you truly do make a difference for others."

The "Tigers" share responsibility for providing primary SAR coverage for the Trenton Search and Rescue Region (SRR) alongside Winnipeg-based 435 Transport and Rescue Squadron. The Trenton SRR encompasses the landmass of Ontario, Manitoba, Saskatchewan, Alberta, two-thirds of Québec, the Northwest Territories and Nunavut (except the southeastern half of Baffin



ABOVE: Once they arrive on site, SAR techs often have to battle tough or even extreme conditions on the ground to get assistance to those who need it. **Sgt Paz Quillé Photo**

BELOW: While 424 Squadron still undertakes some transport missions, its primary mission is search and rescue. **Galen Burrows Photo**





Although its beginnings were in combat, today the squadron's chief enemies are more relevant to search and rescue: time and the elements. **Katrine Laframboise Photo**



SAR technicians are trained to parachute and hoist from aircraft, and to not only survive in extreme weather conditions, but to ensure their patients make it as well. **Sgt Paz Quillé Photo**



Whenever the squadron isn't actively tasked on a mission, its members are training. **MCpl Krista Blizzard Photo**



The "Tigers" share responsibility for providing primary SAR coverage for the Trenton Search and Rescue Region (SRR) alongside Winnipeg-based 435 Transport and Rescue Squadron. **Mike Reyno Photo**

RESCUE 491

On July 24, 2014, aircraft and personnel from 424 Squadron were called upon to make a difficult rescue near Wawa, Ont. A hiker had fallen from a cliff in a remote area, and was lying on a small ledge over a deep crevasse overlooking a fall of more than 360 metres.

The Hercules arrived on scene first, just as darkness fell, and deployed two SAR techs approximately three-quarters of a kilometre from the hiker's location. The standby Griffon (Rescue 491) arrived not long after, but the combination of terrain and darkness (even with the Hercules providing illumination) made an extraction impossible.

Rescue 491 deployed two SAR techs to support the two already on scene. After a difficult hike in tough terrain, the SAR techs were able to reach the patient and provided life-saving medical care and support while they awaited extraction.

The next morning, Rescue 491 was back on station with a fresh crew. In a very tight space in the crevasse, the crew was able to safely hoist the patient over 60 metres into the helicopter, followed by two of the SAR techs, before bringing the patient to hospital in Sault Ste. Marie, Ont. Rescue 491 returned to the site to pick up the remaining two SAR techs before returning to base.

The very difficult conditions in which this rescue was successfully executed are indicative of the courage, perseverance and teamwork required in the challenging world of SAR, a standard that 424 Squadron lives up to each and every day.

424 SQUADRON PERSONNEL INVOLVED IN THE WAWA RESCUE:

Aircraft commander: Capt David McGilvray
Flight officer: Capt Jean-Benoit Girard Beauseigle
Flight engineer: Sgt Glenn Gallant
SAR Techs: WO Lee Bibby, MCpl Brent Nolasko

Second Griffon crew:

Aircraft commander: Capt Chris Hill
Flight officer: Capt Rob Landriault
Flight engineer: Cpl Ian Cleaton

Hercules SAR techs:

MCpl Eric Beaudoin, MCpl Oliver Willich

Island), all of Hudson Bay and Canada's portion of the Great Lakes.

All told, it spans an area greater than 10 million square kilometres and includes terrain as diverse as open water, prairie, mountains, dense boreal forest, boggy tundra and the frozen Arctic.

"The challenge is always distance," said Maj Jean-Paul Landry, the squadron's deputy commanding officer, noting that getting to people in distress as quickly as possible is critical.

It's a huge area and a great responsibility, one the men and women of 424 Squadron take seriously. To respond to the many different scenarios it may face, the squadron employs two very different aircraft: the H-model CC-130 Hercules fixed-wing airplane and the CH-146 Griffon helicopter.

Both aircraft bring advantages and challenges, but their respective capabilities provide 424 Squadron with the flexibility

to respond to a wider variety of SAR situations. The Hercules has the range and endurance for long-distance missions, often in the northern reaches of Canada, while the Griffon can deploy quickly for short-range missions and is able to hover in place, an important capability when operating over the Great Lakes.

One of each aircraft, with their respective crews, is kept on a 30-minute standby posture (meaning the aircraft must be en route to its tasked location within 30 minutes of receiving a call) during normal working hours, and a two-hour posture the rest of the time. However, this standby period is adjusted so that the unit remains on high alert during statistical peak seasons such as the busy summer months.

Of course, aircraft aren't much use without the people who operate and support them. The squadron has approximately 200 personnel in its ranks, including civilian contractors. This ranges from the aircrew who fly and operate the aircraft to the technicians who maintain the airframes to the administrative support staff that keep the entire squadron machine running.

Arguably the most recognizable members of the team are the SAR technicians, who are essentially paramedics trained to parachute and hoist from aircraft, and to not only survive in extreme weather conditions, but to ensure their patients make it as well.

WO Aaron Bygrove is the squadron's SAR tech leader; he is responsible for ensuring the SAR techs on the line each day for duty are properly trained and ready to do their jobs.

Having served in most SAR squadrons in the RCAF, Bygrove has a great deal of experience on the line and understands the realities of his profession.

"Serving as a SAR tech is, at different times, challenging, rewarding and even heart-breaking," he said. "But we love it."

Although its beginnings were in combat, today the squadron's chief enemies are more relevant to SAR: time and the elements. SAR techs can only do their jobs if they can get to the people who need help in a timely manner. Often, the aircraft is able to get to people in distress without difficulty; just as often, however, getting past the "search" to the "rescue" proves extremely hard, and sometimes the people the aircraft is looking for simply can't be found.

Getting to the location of people in distress as quickly as possible is paramount, and once there, the SAR technicians often have to battle tough or even extreme conditions on the ground to get assistance to those who need it.

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In the SAR realm, the squadron is always training for a variety of different types of missions, because they never know what type of call will come in next. PO1 Christopher Evanson Photo



In order to reach their destination as quickly as possible, the on-duty aircrew has to do things differently than would be expected for non-SAR squadrons. Normally, every flight involves hours of planning. But when the crew has to be airborne within 30 minutes, there simply isn't time for that. A quick plan is drawn up before departure, and any other required planning is done en route.

Because of these kinds of exigencies, training is paramount to 424 Squadron's readiness to execute its SAR mission.

"In the majority of RCAF daily operations, personnel train and plan for a known task or mission and then they execute the mission. In SAR, we are always training for a variety of different types of missions, and we never know when and where the next SAR mission will be," said Landry.

As a result, whenever the squadron isn't actively tasked on a mission, its members are training.

"We arrive at the unit at the beginning of each day with a training plan in mind, with the understanding that we may be tasked at any time and have to immediately change from the

training scenario to a real SAR mission," continued Landry.

It's clear there are high expectations for 424 Squadron each and every day, but as is the case with any unit, there are only so many resources the squadron can bring to bear on its missions. Working with external partners is key, and 424 Squadron regularly trains and works with the Canadian and United States coast guards, the Civil Air Search and Rescue Association (CASARA), Sauvetage et recherche aériens du Québec (SERABEC), the Royal Canadian Mounted Police, and local police and fire departments to maximize capability to respond to SAR calls.

With a large region to help keep watch over, 424 Squadron will continue training and responding to calls.

"The responsibility for SAR can't be overstated, nor can its challenges, but the men and women of 424 Squadron have consistently risen to the occasion," said Poitras. "And we'll keep doing that, to quote the SAR motto: *So that others may live.*" 

Capt David Lavallee is in Public Affairs at 1 Canadian Air Division/ Canadian NORAD Region.

This summer, Canadians and Americans from coast to coast will appreciate the efforts of the RCAF's meticulous and talented demonstration pilots that fly with the Snowbirds and the CF-18 demo team. The teams will appear at a number of small and large shows throughout North America, from Wetaskiwin, Alta., to EAA's AirVenture, in Oshkosh, Wis., where the Snowbirds will be appearing for the first time since the mid-1980s.
John M. Dibbs/EAA (airventure.org) Photo

 Watch the video **HERE!**





ON THE **ROAD** AGAIN

AS AIRSHOW SEASON APPROACHES, *RCAF TODAY* CHECKS IN WITH CANADA'S TWO MILITARY AIR DEMONSTRATION TEAMS, TO DISCOVER HOW PRE-SEASON PREPARATIONS MAKE FOR PERFECT PERFORMANCES.

BY ROBERT ERDOS



The Snowbirds complete nearly 100 practice flights from their home at 15 Wing Moose Jaw, Sask., before each airshow season. **Stuart Sanders Photo**



Each year's Hornet routine evolves, but changes are based upon technical experience rather than creative whim. **Stuart Sanders Photo**



 Watch the video **HERE!**

Conversation is difficult while a CF-188 Hornet's afterburners are tearing the sky to shreds. Over Air Force Beach in Comox, B.C., the RCAF's airshow Hornet, in the stunning yellow paint scheme commemorating the British Commonwealth Air Training Plan, was being put through its paces. RCAF demonstration teams come to Comox every April to perfect their performances in preparation for the summer airshow season.

While 2016 demo Hornet pilot, Capt Ryan "Roid" Kean, thundered overhead, I got a chance to chat with the 2015 demonstration pilot, Capt Denis "Cheech" Beaulieu.

Beaulieu's role in the work-ups was to observe and critique Kean's performance, and to provide a source of experienced feedback before they took the show on the road. It is a steep learning curve from operational fighter pilot to airshow performer. Kean was selected in early 2016, and his first airshow practice flight was in March.

The Comox deployment isn't just for practice, however. The Air Force demonstration teams—both the Snowbirds and the Hornet demo team—won't deploy until they receive Air Force approval. By tradition, the practice sessions culminate in a final demonstration

for the Commander of 1 Canadian Air Division (1 CAD). Immediately afterwards, the teams commence their busy summer show schedule. Kean and his team will be in motion almost continuously from early May to the end of October, hitting 34 sites and flying over 30 performances. The demonstration Hornet flies about 150 hours during the season, inclusive of training, transit and performances.

PRACTICING THE ART OF THUNDER

With its ear-splitting roar, the Hornet's performance was artful and creative; an expressive demonstration of the jet's capabilities. I asked Beaulieu whether each demo pilot designs his own routine. He admitted that each pilot wants to personalize the performance to some extent, but added, "Who am I to reinvent the wheel? I'm not a professional airshow pilot. I'm a fighter pilot."

Each year's Hornet routine evolves, but based upon technical experience rather than creative whim, and within the guidelines of the RCAF's approved Air Demonstration Manual.

A good example of the feedback of experience into the airshow routine was the outcome of a roll coupling incident that Beaulieu experienced during the 2015 Canadian International Air Show in Toronto.



A quirk in the Hornet's flight control system resulted in an accidental overstress of his jet during a rapid vertical roll. Consequently, Kean will avoid sustained maximum roll rates, limiting his rolling maneuvers to sequential 270 degree banks. The change makes the routine not only safer, but possibly more dynamic for the audience.

Two shows are rehearsed, to account for the possibility of unfavourable weather. The "high show" can be performed if the cloud ceiling is above 5,000 feet. A ceiling of 1,000 feet is required for the "low show."

TEAM EFFORT

Every good performance relies upon behind the scenes support, and that applies to the Hornet demo team. Maj Eric Martinat, special events lead coordinator for 1 CAD, leads the supporting cast. One of his staff attends each Hornet demonstration. Martinat described their primary role as representing the RCAF commander wherever the Hornet appears. They oversee adherence to safety standards for airshows, along with serving as announcers and managing myriad other administrative tasks. The 1 CAD staff manages not only the two dedicated demonstration teams, but also handles the over 400



Snowbirds are immersed in formation flying as they are gradually introduced to the elements of their airshow routine. **Stuart Sanders Photo**



2016 Demo Hornet pilot Capt Ryan "Roid" Kean flies a dynamic and appealing routine during his air show performance. **Mike Reyno Photo**



The learning curve is steep for new Snowbirds pilots with 431 Air Demonstration Squadron. For the team, practice does indeed make perfect. **Stuart Sanders Photo**

At full throttle and at low altitude, the Hornet consumes about 6,000 pounds of fuel per hour. Engaging the "burners" increases thrust by over 50 per cent, but results in a staggering fuel flow of up to 1,000 pounds per *minute*. **Mike Reyno Photo**



annual requests for public displays of RCAF aircraft.

Keeping the complex Hornet serviceable throughout its protracted summer deployment is a logistical challenge. Support is provided by two maintenance teams: one from 4 Wing Cold Lake, Alta., and the other from 2 Wing Bagotville, Que. The Wings split the support duties throughout the summer, depending upon the show location. Each team consists of a well-stocked truckload of tools and equipment, manned by four technicians drawn from a pool of volunteers.

While the maintenance and support personnel get home for a rest, there is only one demo pilot, so no back-up is possible in the event of illness. I asked Beaulieu about how injury or sickness would affect the schedule. "We don't get sick," he offered, smiling. "We're superhuman." I'm fairly sure he was joking.

HORNET ON DISPLAY

Over the sound of Kean's performance, Beaulieu attempted to describe the experience of flying the Hornet. The airshow routine isn't tame, even by Hornet standards. It extracts most of the agility and performance that the Hornet can muster, and is, in Beaulieu's understated terms, "physically demanding."

Watching the routine, I readily believe it. Manoeuvre loads range from -1g during inverted passes to a punishing +7g.

The famous "high alpha" pass, where the Hornet staggers past the show line in slow flight with the nose pointed skyward, peaks at the Hornet's limit of 25 degrees angle of attack. During the low speed pass, the announcers offered the interesting insight that the Hornet's minimum speed was about the same as the maximum speed of the Tiger Moths and Finches that served in the British Commonwealth Air Training Plan. The high alpha pass was raised from 300 feet to 500 feet above ground following a 2010 CF-188 crash during a practice performance in Lethbridge, Alta.

The Hornet's high speed passes, a noisy crowd favourite, can reach 630 knots. That's 1,167 kilometres per hour, if you want to visualize it in highway speeds. Of course, the Hornet can go faster, but not without breaking glass. During the routine the Mach meter peaks at 0.95 Mach.

Of course, that sort of performance, with the engines in afterburner much of the time, makes the Hornet a thirsty bird. Taking off with a full internal fuel load of 9,600 pounds, the jet lands just 18 minutes later with less than 2,000 pounds remaining. At full throttle and at low altitude, the Hornet consumes about 6,000 pounds of fuel per hour. Engaging the "burners" increases thrust by over 50 per cent, but results in a staggering fuel flow of up to 1,000 pounds per *minute*.

Despite all of the noise and thunder, or perhaps because of it, the Hornet demonstration routine is dynamic and appealing; enhanced by a lively selection of music. As a perk of the job, the demonstration pilot gets to pick his own tunes.

Kean let his wife, son and parents each select a song. Beaulieu quipped with a smile that he thought, "the tunes were much better last year."

Kean would likely disagree, but he was busy turning jet fuel into artful thunder.

SNOWBIRDS: GET SET ... GO!

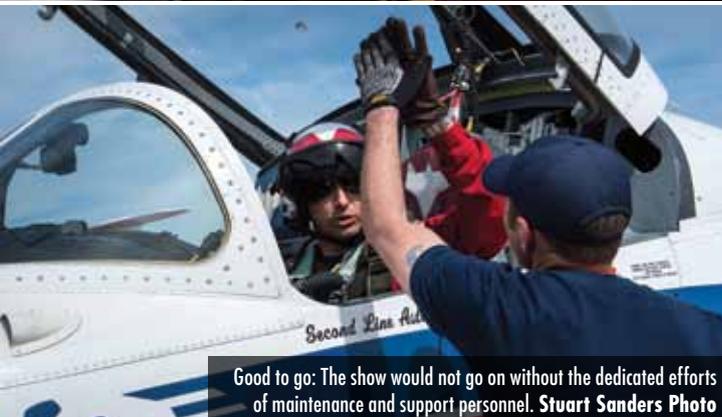
The learning curve is steep for new Snowbirds pilots with 431 Air Demonstration Squadron. Imagine the challenge. All military pilots are introduced to formation flying and basic aerobatics during flight training, but that doesn't prepare them to do formation aerobatics, and certainly not in a nine-plane formation!

The Snowbirds' time-tested solution is practice, practice, practice. The process starts with conversion training on the CT-114 Tutor jet, as today's air force pilots will not previously have flown it. Then, almost immediately, Snowbirds are immersed in formation flying as they are



Capt Matthew 'Hitman' Hart, who flies the second line astern position as Snowbird 5, prepares for a training flight at 19 Wing Comox, B.C. **Stuart Sanders Photo**

 Download this wallpaper **HERE!**



Good to go: The show would not go on without the dedicated efforts of maintenance and support personnel. **Stuart Sanders Photo**



Behind the scenes, there is a tremendous amount of work that goes into keeping the aircraft show-ready. **Mike Luedey Photo**

gradually introduced to the elements of their airshow routine.

Seasoned Snowbirds pilots initially fly with new team members, demonstrating new manoeuvres progressively until the new pilots are "cleared solo," gradually building a high level of fundamental formation flying proficiency.

After nearly 100 practice flights from the Snowbirds' home at 15 Wing Moose Jaw, Sask., one would think they would be ready to take the show on the road. Not quite. Deployed airshows present a unique set of challenges and distractions: different facilities, varying terrain, challenging show lines. Flying the routine is tough, but doing it at a different location each week is an additional

challenge. The team's annual April deployment to Comox allows the Snowbirds to road test their act.

Snowbird 1, Team Lead Maj Yanick "Crank" Gregoire, described the Comox deployment as "where it all comes together." Comox affords the team a chance to practice over-the-runway airshows and over-water performances. Comox's wide runways also let them practice "5+4 plane" formation takeoffs.

Much of their time in Moose Jaw is spent practicing the bits and pieces of the performance in what Gregoire calls a "logical building block approach" to training, but the entire airshow typically only comes together in the days immediately prior to



The Tutor jets aren't exactly brand new anymore, and keeping them in top condition is an increasing challenge as they embark upon 25,000 miles of travel each season. **Mike Luedey Photo**



Support staff have been called the "backbone of the Squadron." **Mike Luedey Photo**



Even early in the season, the Snowbirds act is polished and precise. **Stuart Sanders Photos**





The team's annual April deployment to Comox allows the Snowbirds to road test their act. **Stuart Sanders Photo**

departure from Moose Jaw. Video taken from the show line, supplemented by the Snowbirds' new "TankCam," is used as a training aid. A certain amount of tweaking and fine tuning of the show necessarily occurs in Comox.

It's quite a spectacle for the happy residents of Comox. Each practice is a delightful informal airshow for the crowds gathered on Air Force Beach. If the performances are "just for practice," you can't tell from the ground. Even at this early stage of the season, the Snowbirds act is polished and precise; nine jets performing elegant formation aerobatics with up to four feet of wing overlap. Formation changes are crisp and symmetric. Rejoins are boggling to watch. At times all nine jets are converging from different directions; a tight formation seemingly coalescing from mayhem.

CONTINUOUS IMPROVEMENT

After one practice, I attended the team's debriefing. The Snowbirds debrief each practice and performance the same way that they fly: with discipline and professionalism.

Debriefings follow a fixed format led by Gregoire. There is no idle chatter. The sequence of events is reviewed chronologically, during which each team member takes a turn summarizing the strengths and weaknesses of his own performance in the Snowbirds' unique and inscrutable formation flying language.

I was amazed at the pilots' seemingly photographic memory of detail. No item was too small to escape analysis, and no one shied away from criticism. Each team member had specific points to refine, and ended his self-debriefing with an assessment of whether he met his personal mission objectives. I believed I could still tell who was new to the team and who was a "veteran" of a previous season; the experienced hands offered tips and mentorship to those embarking on their first airshow tour.

The Tutor jets aren't exactly brand new anymore, and keeping them in top condition is an increasing challenge as they embark upon 25,000 miles of travel each season. The Comox deployment puts the Snowbirds maintenance team to the test, away from their base for the first time with only 11 technicians to oversee 11 jets.

Cpl Andrew Valentine has been with the Snowbirds' Air Maintenance Flight since 2011, and I asked him what his biggest surprise was when he joined the Snowbirds. His reply was "the huge amount of work behind the scenes" to keep the aircraft show-ready. Gregoire was quick to agree, offering that, "The blue suits are the backbone of the Squadron."



The Snowbirds debrief each practice and performance the same way that they fly: with discipline and professionalism. **Mike Luedey Photo**

The Snowbirds and Hornet airshow practices in Comox culminate in a final "test," which consists of an acceptance show for MGen David Wheeler, the Commander of 1 Canadian Air Division. After the long grind of training and practice, only the commander's final approval will allow the RCAF's air demonstration teams to take their show on the road.

This summer, Canadians from coast to coast will appreciate their efforts.

Robert Erdos is a contributing editor for RCAF Today and Skies magazines. He is a professional test pilot with over 8,000 hours of flying experience on a wide variety of aircraft. A graduate of the U.S. Navy Test Pilot School, he is a former RCAF test pilot who now works as an Experimental Test Pilot for the National Research Council in Ottawa. In his spare time, he does formation and airshow aerobatic flying as a pilot for Vintage Wings of Canada.







Download this wallpaper **HERE!**

Stephen Grey points the business end of Spitfire Mk IX ML417 towards the lens while the aircraft was with The Fighter Collection at the Imperial War Museum Duxford. It wears the colours it bore during and beyond D-Day with 443 (Hornet) Squadron RCAF.

CANADIAN SPITFIRES

THREE LEGENDS STILL FLYING IN THE UK.

BY LCOL ROBERT "CRICKET" RENNER, USAF (RETIRED)
PHOTOS BY JOHN M. DIBBS

Stephen Grey pilots Spitfire Mk V EP120, former mount of Canadian Ace Squadron Leader Geoffrey Northcott, just west of the Imperial War Museum Duxford in July 2015.



Viewed by many as *the* iconic fighter of the Second World War, the Supermarine Spitfire is one of the few aircraft that was produced throughout the entire conflict.

Well known for its role in repelling the Luftwaffe onslaught during the Battle of Britain, the Spitfire was also the aircraft flown by many RCAF 400-series squadron fighter pilots.

Some of the aircraft flown by those young Canadian pilots are still flying today. Here, we meet three of them.

SPITFIRE MK VB EP120, 402 "CITY OF WINNIPEG" SQUADRON

Owned by Stephen Grey's The Fighter Collection and based at the Imperial War Museum, Duxford, Cambridgeshire, EP120 is probably the most famous Canadian Spitfire still existing. Built at Castle Bromwich in 1942, it initially went to 501 Squadron on June 4th of that year, where she flew in support of the Dieppe raid.

During one of these missions, Wing Commander Patrick Gibbs, flying

EP120, shot down a Do217. On Sept. 9, 1942, EP120 was transferred to 19 Squadron, and on April 22, 1943, EP120 was assigned to 402 Squadron (RCAF) and to the officer commanding and Manitoba native, Squadron Leader Geoffrey Northcott, DSO, DFC and Bar.

Credited with a total of nine air-to-air kills, Northcott achieved six of them while flying EP120. Escorting Beaufighters against a German convoy off the Dutch coast on June 27, 1943, Northcott achieved his first kill in EP120, modified with clipped wings, against a Bf109 and earned his first DFC. Leading the squadron on an escort mission on Aug. 2, he shot down two more Bf109s and earned a bar to his DFC. On Aug. 22 while escorting USAAF B-26s, Northcott and EP120 combined to shoot down an Fw190, and another Fw190 fell to the team on Sept. 4. On Oct. 3, they damaged a Bf109, and on Oct. 24, shot down a Fw190 (EP120's seventh kill). With seven confirmed kills, she is probably the most victorious Second World War aircraft still flying.

Damaged on Feb. 12, 1944, in one of several accidents it sustained during its career, EP120 returned to the manufacturer for

repairs until June 8. Serving with various training units for the rest of the war, EP120 was grounded as an instructional airframe from June 1945 and eventually continued to serve as a "gate guardian" until 1968. She became a movie star as a static aircraft in the *Battle of Britain* film, then once again served as a gate guard until purchased by The Fighter Collection in 1993.

Restored by Historic Flying at Audley End, EP120 flew again for the first time on Sept. 12, 1995. She can still be seen in the skies over England, proudly wearing her AE-A code from her 402 Squadron (RCAF) days.

SPITFIRE MK IXC (T9) MJ627, 441 "SILVER FOX" SQUADRON

Rolling out of the Castle Bromwich factory as an LF.IXc on Dec. 4, 1943, MJ627 entered service with 441 "Silver Fox" Squadron (RCAF) on Sept. 25, 1944, in Belgium, wearing the codes '9G-Q.'

On Sept. 27, 1944, pilot officer Sidney Bregman was patrolling around Arnhem in MJ627 when his engine stopped momentarily after his external fuel tank fell off, and he switched to his internal



Richard Verrall pilots MJ627 in the skies over Kent. As a single-seat Mk IX, this machine claimed a 109G destroyed over Arnhem in Sept 1944.

MJ627 barrels in on the camera ship. Experience flights in this aircraft are offered from the famous former Fighter Command airfield of Biggin Hill in Kent.



fuel. Now somewhat behind the rest of his squadron, he looked over his shoulder and saw a German Bf109. Firing on the German fighter, Bregman and MJ627 were credited with a Bf109 victory using only 11 cannon shells.

In December 1944, 441 Squadron was posted, along with MJ627, to the Orkney Islands, Scotland. Engine problems resulted in a forced landing for MJ627 on March 9, 1945. Classified as "beyond repair on site," MJ627 was sent off for repairs and subsequently stored.

In July 1950, Vickers Armstrong Ltd. purchased MJ627 for conversion into a T9 two-seat trainer, and delivered it to the Irish Air Corps as IAC158 in June 1951.

MJ627 flew with the Irish until 1960, when it became an instructional airframe for three years prior to being sold to Film Aviation Services. Used for spare parts for other movie star aircraft, MJ627 next passed to Tim Davies in 1964, who stored her until Maurice Bayliss bought her in 1976. Having been fully restored, MJ627 flew again for the first time on Nov. 8, 1993, piloted by famed Spitfire pilot Squadron Leader Paul "Major" Day, 50 years after its first flight.

Damaged in a wheels-up landing at Coventry Airport on April 25, 1998, because the landing gear would not lower, she was restored yet again, getting airborne on Feb. 14, 2002. (As an aside, the author was lucky enough to get airborne in MJ627 with Day in 2002—she flies like a fighter should!)

Sold in 2014 to Richard Verrall's RV Aviation, then subsequently transferred to Warbird Experiences Ltd. at Biggin Hill, she now offers passengers the thrill of experiencing the graceful Spitfire. MJ627 proudly wears the 9G-Q markings from her time with 441 Squadron (RCAF), including D-Day invasion stripes.

SPITFIRE LFIXC ML417, 443 "HORNET" SQUADRON

Also built at Castle Bromwich in early 1944, ML417 was allocated to 443 "Hornet" Squadron (RCAF) on June 2, 1944. This was the squadron led by famous RAF fighter ace James Edgar "Johnnie" Johnson.

Coded 2I-T, ML417 saw action on D-Day, and by late June was flying out of St. Croix-sur-Mer, Normandy.

On June 26, Flight Lieutenant W. A. Prest damaged an Fw190 over Rouen, and on July 13, he damaged another Fw190 over Normandy. On Sept. 29, RCAF pilot Flight Lieutenant Rooney A. Hodgins DFC shot down two Bf109s while flying ML417 over Nijmegen. Subsequently flown by 442, 401 and 441 Squadrons, ML417 was eventually stored in August 1945.

Sold back to Vickers-Armstrong in October 1946, ML417 was converted to a two-seat trainer for the Indian Air Force and delivered in October 1948. She became HS543 with the IAF, and eventually went to the IAF Museum by 1967. Bought by U.S. Senator Norman Garr in 1971, she was delivered to the U.S. and a restoration was started in Colorado.

In 1980, ML417 was sold to Stephen Grey and returned to her native England. Restored at Booker by Personal Plane Services as a single-seat Mk IXc, ML417 took to the skies again on Feb. 10, 1984, and was operated by The Fighter Collection from Duxford.

Suffering a landing gear collapse in 1999, ML417 received a major overhaul and flew again on June 18, 2001. Sold to Tom Friedkin in 2001, ML417 now flies in the U.S. and still wears the code 2I-T. As an LFIXc, ML417 has clipped wingtips, which increases the Spitfire's roll rate.

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FLAG

The only international participants that will be bringing fighter aircraft to Maple Flag this year will be the French Air Force, with its Mirage and Rafale fighters. Canadian CF-188s will figure prominently in the exercise. They will participate as blue air, and also as red air along with Discovery Air Defence's Alpha Jets. **Amboise Cyril Photo**

 Watch the video **HERE!**

Maple Flag is back. The annual international exercise designed to prepare pilots for the rigours of their first combat missions will resume once again above 4 Wing Cold Lake, Alta., in June.

First run in 1977 following a post-Vietnam War finding that 90 per cent of aircraft losses occurred during the first 10 combat missions of an operation, Maple Flag evolved from the United States Air Force-run Red Flag to become an annual event that regularly attracted close to 100 aircraft from a dozen countries.

In recent years, however, actual operations have forced the Royal Canadian Air Force to cancel or downsize the exercise.

It was put on hold in 2011 due to Canada's participation in Operation Mobile over Libya, combined with the Forces-wide JOINTEX in 2013, downsized to a Canadian-only training event in 2014, and cancelled in 2015 as most CF-188 Hornet pilots gained operational experience on Op Impact over Iraq and Syria.

While the on-again, off-again schedule of the past five years has reduced the number of participating countries and aircraft for 2016, the goal remains the same.

"The primary objective is to increase survivability of the first 10 missions when losses are historically the highest," said Capt Mike York of the Air Force Tactical Training Centre and the senior mission monitor for Maple Flag.

Perhaps mirroring recent events in Ukraine or the first Gulf War, Maple Flag 49 will be based on a state-on-state conflict against a near-peer that involves a coalition response to the invasion of a neutral country.

About 45 aircraft are expected to participate, including the CF-188 Hornets, CC-130(T) Hercules air-to-air refuellers, CC-130J Hercules and CC-177 Globemaster III transport aircraft, a CP-140 Aurora, and CH-146 Griffon tactical helicopters.



UNFUURLS

THE WORLD CLASS COLD LAKE AIR WEAPONS RANGE IS SET TO HOST MAPLE FLAG 49 IN JUNE. WHILE THE 2016 EXERCISE IS SCALED DOWN IN SIZE, IT IS STILL EXPECTED TO DRAW 45 AIRCRAFT THAT WILL PARTICIPATE IN A SIMULATED COALITION RESPONSE TO A STATE-ON-STATE CONFLICT.

BY CHRIS THATCHER

The international contingent will include a USAF E-3 Sentry AWACS (airborne warning and control system) and two C-130J Hercules, a Royal Air Force E-3 AWACS, and French Air Force Mirage 2000-5 and Rafales. Aggressor air will be provided by four Canadian CF-188s replicating Russian threats and six Discovery Air Defence Services Dornier Alpha Jets.

In addition, Maple Flag will feature large contingents of German and Belgium special operations forces (SOF)—each involved in one of the two periods of the exercise—to provide live joint terminal air control (JTAC) for the fighter jets.

The month-long exercise will be divided into two periods of two weeks each, with about 19 missions per period, and the scenarios will be repeated for each period. About 1,325 sorties are expected.

Though the number of participants, especially U.S. aircraft, may

be down from previous years, there will be plenty of observers from the U.S., U.K., Europe, Australia and the Middle East attending during period two.

The scenarios themselves will involve a mix of pre-planned strike missions and time-sensitive targeting, each lasting about 90 minutes. “That’s our core fundamental,” York explained. “That is the role we believe we will contribute the most to in the next state-on-state conflict. In many of these missions, you are going to have to transit over 150 miles [of contested air space] to get to your targets. You’ll have to fight your way in; fight your way out.”

The pre-planned strike missions will involve bomb drops deep into enemy territory riddled with surface-to-air and air-to-air threats. Time sensitive targeting, the more common missions for most of the Canadian pilots in Iraq and Libya, will involve re-tasking once



Six Discovery Air Defence Dornier Alpha Jets, along with four Canadian CF-188s, will provide aggressor air during the exercise. **Michael Durning Photo**



CH-146 Griffon tactical helicopters will be among the dozens of aircraft expected to participate. **Derek Heyes Photo**



Cpl Maxime Rouleau (left) and Cpl Cindy Bergeron (right), weapons technicians from 425 Tactical Fighter Squadron, install a laser-guided training round on an RCAF CF-188 Hornet fighter. **MCpl Marc-Andre Gaudreault Photo**

airborne based on the commander's direction or in response to a SOF request relayed through the combined air operations centre and the AWACS overhead. "It is a real challenge for us and really good training for the special forces guys," who will be calling in strikes and manoeuvring around bomb drops almost every day, said York.

In anticipation of a counter-offensive after two hard days of air strikes, the coalition will adopt a defensive posture on the third day, draw a figurative line across the battle space, and attempt to block any counterpunch from red air to regain territory. "That is a fun day," said York. "It is 100 per cent air-to-air, and usually a good mix-up."

That mission will also focus on improving air launch cruise missile defence. Because of its low radar reflection, finding one can be "quite challenging and we won't have a lot of indication that they've launched," York explained. "Sensor management is quite difficult and the AWACS is going to have to optimize his look to try and help give us some point-outs. In this mission, C-130 Hercules will replicate Russian bombers and the French Mirages will replicate Russian fighter-bombers."

The fourth day of the cycle will involve one of the most challenging scenarios, a joint personnel recovery mission (JPRM) replicating the search and rescue of pilots shot down behind enemy lines. A CC-130 Hercules will drop 200 special forces deep into enemy territory to locate two downed pilots and extract them via a Griffon helicopter, while defending against an array of threats.

"You are going to be vulnerable to red air for a long period of time to pick those guys up, and it can get quite confusing as to who is whom when you are looking from 30,000 feet," York noted. "And once the enemy land force gets in close proximity of the pilots, you have to weigh whether it is worth dropping a bomb."

The Hornets will be dropping laser-guided, GPS or conventional bombs on every mission, from 500 up to 2,000 pounds, depending on the size and arrangement of the targets.

In keeping with the times, Maple Flag 49 will also be going digital. For the first time, most players will have Link 16.

"Most close air support is done via radio," York explained. "The guy on the ground describes the situation he sees, and then you get your sensors into that target area and locate what you are both talking about. This year, we are trying to move this 100 per cent digital. Your target will be pushed to you via Link 16 before you have even crossed into enemy territory. The JTAC will have a digital link to your sensors, so what he looks at on his iPad, you will be seeing on your targeting pod."

TURNING POINT

A "world class" airspace of over 11,600 square kilometres, the Cold Lake Air Weapons Range can offer a level of realism that is almost unique among training facilities. The range includes 90 target areas containing just under 2,000 desired points of impact (DPI) located in large and small urban areas composed of sea container structures, some as high as five storeys; mock airfields complete with runways, ramps, taxiways, dispersal areas and buildings; bridges; and static and mobile vehicles such as buses, tanks and missile launchers. "We're anxious to show it off internationally," said York.

The Russian-replicating surface-to-air missile (SAM) systems will include the NATO-named SA-11 Gadfly, the SA-6 Gainful and two highly mobile SA-8 Geckos, all with the correct profile and threat emitters. "When you are engaged by a surface-to-air missile and your sensors cue to that threat, they will observe a multi-spectral threat that is 95 per cent equivalent to the actual threat, both visually and radar signature," he said. "At the same time pyrotechnics will be automatically fired from that location, further increasing the realism. Replicated air-to-air threats will include Russian Su-27 and Su-30SM fighter jets as well as Chinese J-10 and J-11 fighters. The contracted Alpha jets will role play MiG-21s."

Replicated air-to-air threats will include Russian Su-27 and Su-30SM fighter jets as well as Chinese J-16 fighters. The Dornier Alphas jets will role play MiG 21s.

Throughout the exercise, four range training officers will monitor all frequencies to do real time kill removal of both red and blue air, said York. "To us, it makes it so much more realistic."

The return of Maple Flag in 2016 also marks a turning point for the exercise. In past years, organizers tried to keep it revenue neutral, offsetting RCAF costs with fees from participating nations. The Air Force Tactical Training Centre now has a firm annual \$1.5 million budget and a green light to "run it, make it great and if it costs us money, it costs us money," said York. "What we are really trying to do is rebuild this as an annual exercise."

In recent years, because of the uncertainty, invitations were often sent late in the fiscal planning process of countries like the U.S. That won't be the case going forward. According to York, many are already committed to future Maple Flags and the invites will be sent with plenty of time to plan. 



Paratroopers from the 3rd Battalion, Princess Patricia's Canadian Light Infantry are transported to an RCAF CC-130 Hercules. **MCpl Marc-Andre Gaudreault Photo**



A CC-130 Hercules will drop 200 special forces deep into enemy territory to locate two downed pilots and extract them via Griffon helicopters, while defending against an array of threats. **Mike Reyno Photo**



CF-188 Hornet fighter aircraft participating in Exercise Maple Flag 2013 taxi on the tarmac at CFB Cold Lake, Alta. **MCpl Marc-Andre Gaudreault Photo**



The month-long Maple Flag 49 will be divided into two periods of two weeks each, with about 19 missions per period. A single CC-177 Globemaster III will also be taking part in each day's missions. **Steve Bigg Photo**



Watch the video **HERE!**

Since the gliding program was established in 1965, it has become an integral part of the air cadet experience. To date, more than 15,000 cadets have completed the course. **Eric Dumigan Photo**

75 YEARS of Air Cadets

ORIGINALLY CREATED IN RESPONSE TO WARTIME NEED, THE ROYAL CANADIAN AIR CADET PROGRAM HAS HAD A FAR-REACHING EFFECT. TODAY, 1 OUT OF EVERY 5 CANADIAN PRIVATE PILOTS WAS ONCE AN AIR CADET.

BY SITRAKA RAOELIMANOHSOA

This year marks an important milestone for the Royal Canadian Air Cadet (RCAC) program and the Air Cadet League of Canada, as they will be celebrating their 75th anniversary.

To mark this important year, a gala commemorating the signing of the Charter that brought the air cadet movement to life took place on Nov. 21, 2015, at the Canada Aviation and Space Museum. Both past and present cadets were celebrated during an evening of entertainment, history and recognition.

Among the special guests that evening were 40 air cadets from across Canada, who had participated in a three-day Air Cadet Leadership Symposium during the few days leading up to the Saturday dinner. These air cadets have demonstrated their excellence, leadership and commitment to the ideals of the air cadet program, and were brought together to share their insights and ideas on the symposium theme, "The next 75 years of Air Cadets."

But, before embarking on future planning, it is important to understand the past.

During the Second World War, there was a critical need for planes—and for trained young men to fly them. It was against this backdrop that the idea of preparing a select corps of teenaged boys to take their places as aircrew in the Royal Canadian Air Force (RCAF) grew. On April 9, 1941, the Air Cadet League of Canada was established to train young men for service overseas. Canada's national flying ace, Air Marshal Billy Bishop, was among the organization's founders.

By September 1944, the cadet movement had reached its peak wartime strength of 374 squadrons, more than 29,000 cadets, 1,750 officers and instructors, and another 2,000 civilians who supplied financial and other support. Within three years, the League had built a successful war effort air training program through an outstanding collaboration between military and civilian community partners.

During its formative war years, the League's primary purpose was military. However, service clubs, educators, boards of trade and veterans groups quickly saw the League's long-term role as a future civilian organization that could encourage Canadian youth to become good citizens and strong leaders. These remain pivotal goals for air cadets today.

One popular innovation was the introduction of the Power Flying Scholarship Program in 1946. Power flying courses continue to be offered during summer camps, where cadets are trained on powered light aircraft through civilian flying clubs. Since its inception, more than 18,000 air cadets have completed the program.

The unification of the Canadian Armed Forces (CAF) in the mid-1960s marked another significant shift for the League. Unification resulted in the closing or amalgamation of many air bases. Air cadets were no longer being provided with sufficient flight opportunities. In response to this reality, a gliding program was launched by the League in 1965.

Since that time, gliding has become an integral part of the cadet experience; on average, more than 50,000 glider familiarization flights are conducted each year, making it the largest glider program in the world. To date, more than 15,000 cadets have completed the course, with approximately 90 per cent graduating with the glider pilot designation.

Recent statistics reveal that one out of every five private pilots in Canada at the present time was a former air cadet. In addition, 67 per cent of the commercial airline pilots flying today got their start as an air cadet.

These numbers are a great testament to the important impact of Air Cadets on the careers of many Canadian pilots.

Here are just a few testimonials:

"My career in the RCAC was brief, yet rewarding. I joined the 177 Air Canada Squadron of the RCAC in 1975 to obtain my glider licence on the recommendation of a friend. I was selected for the 1976 gliding scholarship in Rivers, Man. During 1977, I was awarded the powered flight scholarship as well. I was awarded the "Top Cadet in Manitoba" at the conclusion of both courses. Currently, I am a qualified pilot holding an airline transport pilot licence (ATPL). Some highlights of my career: I have physically stood on both the North and South geographic poles; I operated in North and South America, Antarctica, Asia and Africa; and I have done ferry flights from Canada through Europe to Asia and Africa. Most of my career has been with turbine-powered propeller aircraft, notably the DHC-6 Twin Otter and the Dash 8. Seems that the "airline" type of flying was not my thing. I suspect I had more of an adventuresome spirit! Who knew that when I began with the Royal Canadian Air Cadet organization I would still be involved in aviation after 40 years! This year marks my 40th year as a pilot (1976-2016). I am thankful and grateful that I was selected to attend both gliding and powered flight scholarships. Thank you, Royal Canadian Air Cadets!" — Michael Kruger

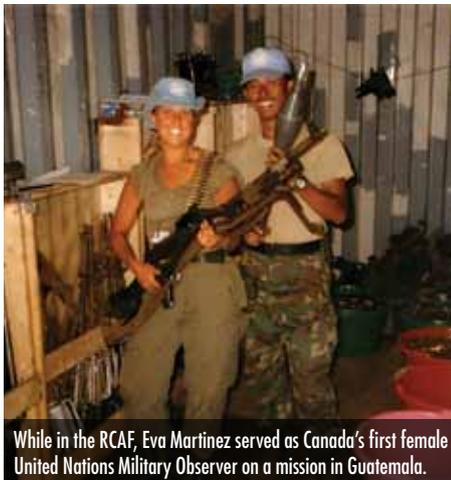
"I joined the Air Cadets by following a friend who told me to go with him: it would be fun! So I followed him, joined, and was on 643 Squadron for five years. I then joined the Air Force as a pilot, got to fly F-18s, and left 12 years later to become a commercial pilot. I am now a Boeing 767 captain at Air Canada. All because of the Air Cadets! — Michel Mondou

"I started in 1950 with the Winnipeg Optimist Squadron and then Gordon Bell Squadron, where I received a scholarship in 1954 at the Winnipeg Flying Club. At the same time, I was in 402 Aux from 1953-55. In September 1955, I joined the RCAF and became a pilot; the selection was probably based on having a pilot licence. I remained in the RCAF until the summer of 1964. In the fall of 1964, I joined CP Air and retired in 1996 as a captain on the 747-400. As luck would have it, I was asked to be the reviewing officer of the Etobicoke squadron about 10 years ago. A nice finish to a flying career started with Air Cadets." — William Davidson

"I joined No. 1 West Montreal Air Cadet Squadron in 1956 at the invitation of my best friend in high school, John C. Wilson, and I never looked back. My school academic record met the minimum standard to graduate, and was entirely opposite to my very successful four years in Air Cadets. I rose through the ranks to flight sergeant at retirement, collecting awards for the most proficient cadet three times, best rifle shot three times, power flying scholarship 1958 and 1959, and the international exchange visit to Britain. During the visit, I met the Queen Mother, Princess Anne, and Prince Charles, and sat in Douglas Bader's (Film - Reach for the Sky) Spitfire at his base at RAF Tangmere. I joined the RCAF in 1959 and graduated with the coveted pilot wings in 1961. After 23 years in the RCAF and 14 years as a civil aviation inspector with Transport Canada, I retired with 10,500 hours in 26 types of aircraft and became a ground school instructor with 742 National Capital Air Cadet Squadron for eight years. I'm presently a member of the Air Cadet scholarship selection board in Ottawa and hope to assist in this function for many more years. I attribute my personal and professional success as a pilot to the training received in Air Cadets and regard the Air Cadet League as a priceless Canadian organization." — Capt George E. Mayer



Leaders of tomorrow at an Air Cadet Leadership Symposium. Air Cadet League Photo



While in the RCAF, Eva Martinez served as Canada's first female United Nations Military Observer on a mission in Guatemala.



Pilot Michael Kruger got his start in Air Cadets and has been flying for 40 years.

From the Schweitzer 2-33 to Afghanistan and back again:

Joining 246 Squadron of the Royal Canadian Air Cadets at the age of 12 changed the course of my life. The training gained at the squadron, combined with attending training camps every summer, develop cadets into disciplined members of society. In the spring and the fall, the Air Cadet gliding program conducts familiarization flights at gliding centres across the country using Bellanca Scout and Cessna L-19 tow planes and Schweizer 2-33A gliders. I, like all Air Cadets, had the chance to complete familiarization flights and to take the controls of the glider while under the careful watch of senior cadets and instructors. Taking these first flights in a glider instilled the love of flying for many, including myself, and the desire to pursue further training. I was lucky enough to move on to the next step, which is the full glider scholarship program in Trenton. During this six-week course, 29 dual and 20 solo flights are completed, leading to a Transport Canada glider pilot licence. Thousands of Canadians in civilian aviation and the military, including astronauts Col Chris Hadfield and LCol Jeremy Hansen, started their flying careers with the Air Cadet glider pilot scholarship program. Many also go on to a power scholarship, leading to a private pilot's licence.

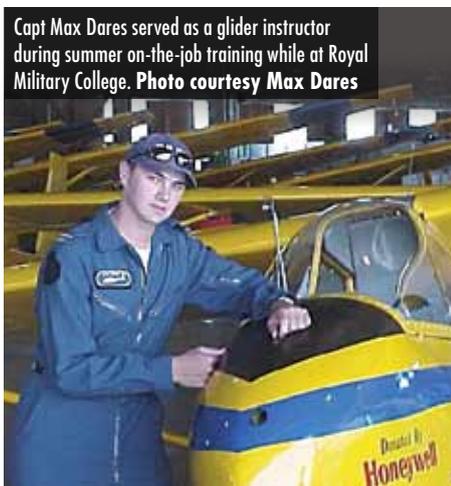
The discipline gained through the Air Cadet program helped with my selection for the Royal Military College of Canada (RMC). RMC offers a degree consisting of four pillars: academics, physical fitness, second language training, and military training. The close group of friends you make at RMC will last a lifetime because you get

through the program together, from the gruelling recruit obstacle course to graduation. Taking a wide variety of arts courses in addition to our full complement of engineering courses certainly didn't make the challenge any easier. Summers consisted of second language training, primary flying training (Phase 1 of pilot training), and "on-the-job training" summers. I was able to go back to my roots with the Air Cadet gliding program and work as a glider instructor and tow pilot for the OJT summers.

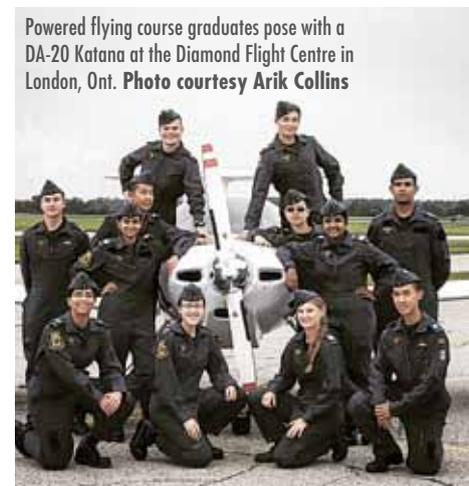
Following graduation from the Royal Military College and commissioning as a second lieutenant, I was off to basic flying training (Phase 2) in Moose Jaw, Sask., to fly 100 hours on the CT-156 Harvard II aircraft. This is a turboprop aircraft with a 1,300-horsepower PT-6 engine. On this very demanding course, we learned clearhood (VFR flying including circuits and aerobatics), low level navigation at 500 feet AGL and 240 knots groundspeed, instrument flying, and formation flying. This course is where you really learn the fundamentals of military flying. At the end of the course, you are selected for helicopters, fast jet, or multi-engine aircraft. The needs of the forces come first, but they try their best to get everyone what they want.

Following selection, multi-engine and helicopter pilots return to Portage-la-Prairie, Man., for Phase 3 pilot training on the King Air C-90B or CH-139 Jet Ranger, and those selected for fast jet remain in Moose Jaw for further training on the Harvard II and then the Hawk for fighter lead-in training. The culmination of this level of pilot training results in the awarding of your Canadian Armed Forces pilot wings.

Following multi-engine training, I was posted to 436 Squadron in Trenton, Ont., to fly the CC-130H Hercules aircraft in the tactical airlift role. During this tour, I was able to use the valuable lessons



Capt Max Dares served as a glider instructor during summer on-the-job training while at Royal Military College. Photo courtesy Max Dares



Powered flying course graduates pose with a DA-20 Katana at the Diamond Flight Centre in London, Ont. Photo courtesy Arik Collins



A Bellanca Scout tow plane and a Schweizer 2-33A glider. **Eric Dumigan Photo**



More than 50,000 glider familiarization flights are conducted each year. **Katrine Laframboise Photo**

learned in Air Cadets, RMC, and pilot training during four two-month deployments to Afghanistan. Commanding a four-engine turboprop aircraft, including crew and 90 passengers, while in a high-threat area of the world, at the age of 27, was only possible because of the high level of training I had received.

I then had the opportunity for an exchange posting with the United States Marine Corps flying the KC-130J Super Hercules tanker. The purpose of the exchange program is to share our tactics and procedures with other nations and bring lessons learned from other nations back to Canada. Following upgrade to aircraft commander, I was back in Kandahar for a seven-month deployment flying all roles with the KC-130J. This involved logistics runs (moving cargo and passengers), battlefield illumination with flares, air-to-air refuelling of Harriers conducting close air support, and aircraft delivered ground refuelling (refuelling helicopters and ground vehicles with the Herc with all engines running).

I now work in wing operations at 8 Wing Trenton as deputy of current operations and am learning another side of the aviation profession.

Air Cadets, and specifically the Air Cadet gliding program, instilled in me the love of flying and the self-discipline required to be successful at the Royal Military College and the pilot training within the Royal Canadian Air Force. Working in wing operations gives me the chance to return to my roots and fly the Bellanca Scout tow plane and instruct today's Air Cadets on the Schweizer 2-33A glider, while inspiring the next generation of cadets to pursue their own career in aviation or other life goals. "To learn; to serve; to advance."

– Capt Max Dares, deputy current operations, 8 Wing Trenton

Pilots are not the only ones who have benefited from the Air Cadets. As this other testimonial shows, being part of the organization can lead to many more careers in a variety of fields.

"I joined 666 Civitan Squadron in Toronto when I was 14, after seeing some cadets at the local mall for Tag Day. I asked them to tell me about the program and their enthusiasm and pride were so contagious that I wanted to be a part of that. We had a lot of glider and power pilots at the squadron, so in an effort to balance the skill set I went the leadership route. My time at Senior Leaders in Cold Lake, Alta., followed by the international exchange to Hawaii, were definite highlights of my time with cadets. I was the first female cadet in the history of the squadron to make chief. I went on to join the Royal Canadian Air Force and served as an aircraft maintenance engineer for 13 years and now, even in the private sector working as an aerospace professional, I draw on the leadership lessons that I learned while in the air cadets every day. I stay connected with the program and recommend it to youth at every opportunity. Recently, I served in the Air Cadet League's Ontario Provincial Committee's Board of Governors." — Eva Martinez

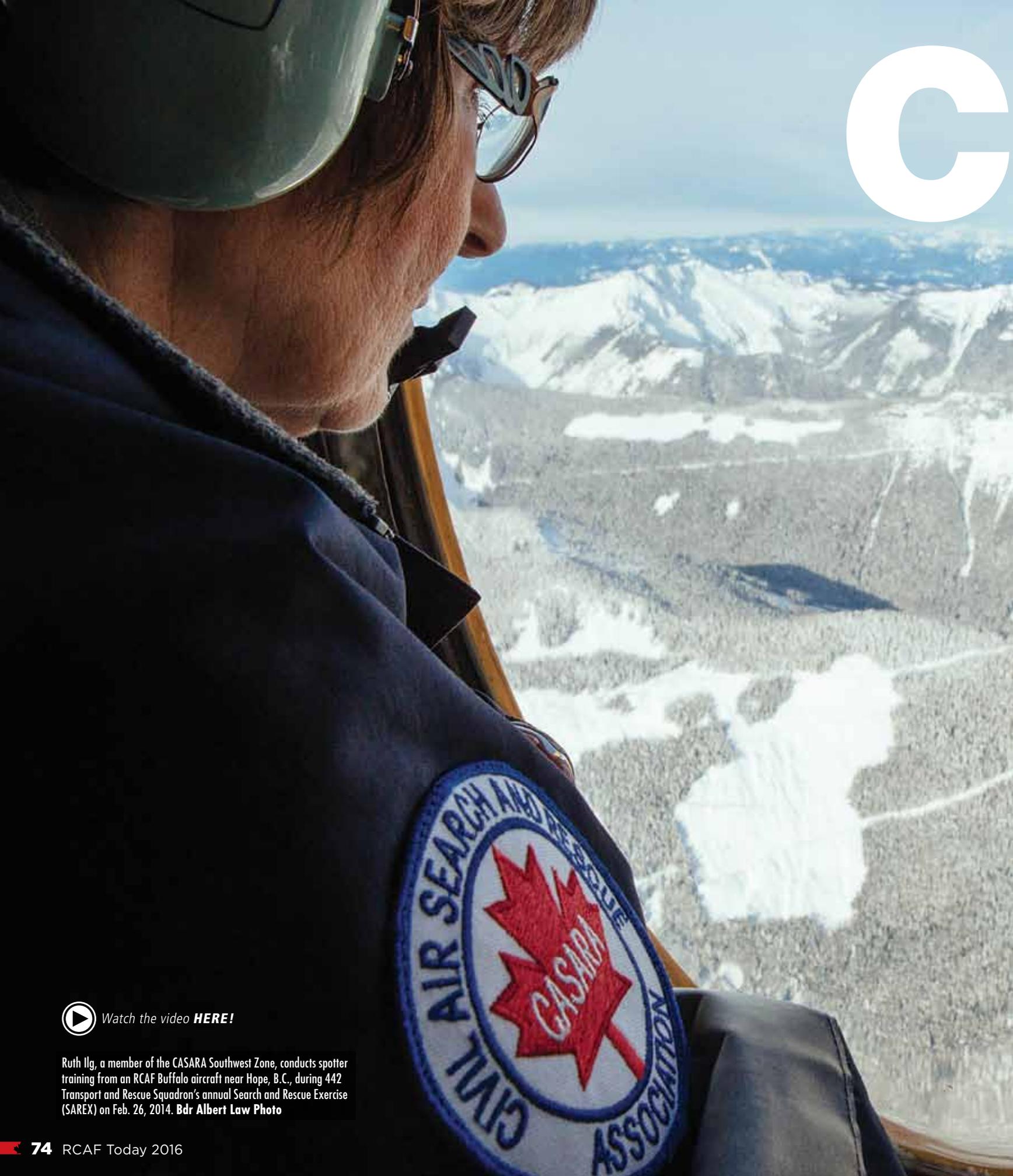
This year not only commemorates 75 years of a successful youth development program, but also all of those past and present air cadets that have developed or will develop into the great leaders and citizens of this country.

If you are a former air cadet who would like to share your story and join the Air Cadet alumni, visit www.aircadetleague.com.

The RCAC gliding program is the largest of its kind in the world. **Eric Dumigan Photo**



C



 Watch the video **HERE!**

Ruth Ilg, a member of the CASARA Southwest Zone, conducts spotter training from an RCAF Buffalo aircraft near Hope, B.C., during 442 Transport and Rescue Squadron's annual Search and Rescue Exercise (SAREX) on Feb. 26, 2014. **Bdr Albert Law Photo**



Civilians

ON CALL

CANADA IS RESPONSIBLE FOR COORDINATING SEARCH AND RESCUE SERVICES OVER A VAST GEOGRAPHIC AREA. FOR 30 YEARS, VOLUNTEER MEMBERS OF THE CIVIL AIR SEARCH AND RESCUE ASSOCIATION HAVE BEEN THERE TO LEND THE RCAF A HAND IN TIMES OF NEED.

BY KEN POLE

Every year, the Royal Canadian Air Force (RCAF) responds to approximately 1,000 search and rescue (SAR) taskings.

Inherent in those missions is the monumental challenge of providing aeronautical SAR services over 18 million square kilometres of land, lakes and oceans—an area that is one-and-a-half times the size of Canada.

The Air Force is supported in its search and rescue mission by a number of civilian partners, including the Civil Air Search and Rescue Association (CASARA)—a volunteer organization sponsored and funded by the Department of National Defence (DND).

Established in 1986, CASARA contributes trained members who fly on civilian aircraft in support of SAR taskings. In addition, these civilian volunteers may fly along on RCAF aircraft, bringing an extra pair of vigilant eyes to the mission. Indeed, CASARA members are frequently credited with spotting downed aircraft, foundering ships or missing persons.

AUGMENTED RESPONSE

The RCAF has four primary aircraft types available for SAR missions, tasked by the Joint Rescue Coordination Centres (JRCCs) in Halifax, N.S.; Trenton, Ont.; and Victoria, B.C.

The Lockheed Martin CC-130H Hercules and the de Havilland Canada CC-115 Buffalo fleets provide the fixed-wing component of a SAR mission, while rotary-wing support is delivered by Bell CH-146 Griffons and the larger AgustaWestland CH-149 Cormorants.

These can be augmented not only by Lockheed Martin CP-140 Aurora long-range patrol aircraft and Sikorsky CH-124 Sea King helicopters, but also by civilian aircraft flown by CASARA volunteer pilots, as well as Canadian Coast Guard ships and helicopters.

CASARA members played a prominent role in the rescue of three Nunavut residents earlier this spring, who had been missing for a week in the Pangnirtung area of Baffin Island.

The group was first spotted by the crew of a de Havilland DHC-6

Twin Otter operated out of Iqaluit by Calgary-based Kenn Borek Air Ltd., which in turn relayed their position. The rescue was then performed by a CH-149 Cormorant crew dispatched by the Joint Rescue Coordination Centre (JRCC) from 413 Transport and Rescue Squadron in Greenwood, N.S.

Ed Zebedee, the Nunavut government's director of protection services, told *RCAF Today* that the Twin Otter had been tasked by his department; accordingly, CASARA members on board the aircraft were considered "employees of the territorial government" for the purposes of the mission.

That technicality aside, there's no discounting the commitment of CASARA volunteers, an invaluable coast-to-coast-to-coast resource.

The association has segmented each province and territory into zones, in which 104 organizations are responsible for coordinating SAR assistance.

That help is provided by some 2,800 highly-trained members who log thousands of hours annually. These volunteers include pilots, navigators, training officers, spotters, search coordinators, electronic search specialists, radio operators and administration staff, all of whom train regularly and have access to 360 aircraft.

Each provincial member organization has a CASARA liaison officer—RCAF personnel who ensure, through regular evaluation in an operational environment, that each zone maintains its efficiency and effectiveness.

"Interoperability plays a role in our operations," Mike Daniels, CASARA's vice president, financial and administration, told *RCAF Today*. "Many of our member organizations have memorandums of understanding with other agencies, such as provincial and federal law enforcement, Parks Canada and the Ministry of Natural Resources."

Daniels is a founding member of CASARA and has twice been its national president. He completed two years of service with the Royal Air Force as a young Yorkshireman, before moving to Canada in

1956 and serving as an RCAF reservist for more than 30 years.

Daniels has owned and operated an air charter service and was one of Transport Canada's first designated flight test examiners. As an engineering pilot in the private sector, he worked on the development of many escape and rescue systems still in use, and helped to introduce civil SAR to Nunavut.

Currently the owner and CEO of Mach1 Aviation Consultants Ltd., Daniels was in Ottawa last November when CASARA received a prestigious award from The Honourable Company of Air Pilots (HCAP), which was founded as the Guild of Air Pilots and Air Navigators in London in 1929 "to ensure that pilots and navigators . . . were accepted and regarded as professionals."

Daniels was accompanied by St. John's, N.L.-based Brian Bishop, CASARA's vice president, training and operations.

HCAP Master Chris Ford—a retired Royal Air Force squadron leader with 18,500 flying hours over 39 years—presented the Master's North American Trophy to CASARA at the Canada Aviation and Space Museum.

Appropriately staged in front of the museum's RCAF Boeing Vertol CH-113 Labrador, the event recognized the "outstanding, enduring and meritorious contribution" by CASARA to Canada's complex SAR environment. The organization not only frees up military resources, but also frequently uses aircraft which are more cost effective and crewed by personnel with critical local-area knowledge.

The DND currently has a five-year agreement through which it provided nearly \$3.1 million in the 2014-2015 fiscal year to CASARA for outreach, recruiting and training programs. Supplementary support is also available if required; however, any unused funds must be returned to DND at the end of each year.

"We work judiciously to ensure all our budgeted funds are well spent," Daniels said, acknowledging that "the RCAF continues to be a generous partner." He also said that CASARA has worked

"extremely hard to earn their trust" as it builds its national footprint.

"We've been doing stuff with 424 Transport and Rescue Squadron [which flies Hercules and Griffon aircraft out of Trenton, Ont.] which you could never have done five, 10 years ago," he said. "For example, we have groups of three or four spotters who sign in at Trenton on Fridays, and stay on-base in the Yukon Lodge. Then they're on call with 424, and they go pick up their gear and fly."

CASARA also participates in SAREX, a major military SAR exercise held annually at various locales. In turn, whenever possible, the RCAF participates in CASARA exercises. Additionally, CASARA training can also see a civilian playing the role of a lost pilot so that military crews can practice airborne intercepts, and CASARA has also participated in trials with remotely-piloted vehicles flying top cover on simulated missions.

Asked if he could figure out the dollar value of CASARA's contribution to the SAR effort in Canada, Daniels demurred, saying that he expected that the DND could easily determine whether the government was getting value for money.

In fact, in a published review of operations from 2008 to 2013, DND said it was "important to note that CASARA remains an important asset, particularly for its surge potential." As well, the report recognized CASARA's value in the North, as increased economic development and tourism activity could possibly lead to "an increase in incidents that require a SAR response."

According to Maj Steve Neta, senior public affairs officer, 1 Canadian Air Division and Canadian NORAD Region Headquarters, "CASARA is a valuable part of the Canadian SAR system. Working alongside the RCAF, CASARA aids in the prosecution of myriad missions. Whether contributing spotters, locating an emergency locator transmitter, dropping emergency kits in the Arctic or flying search missions, CASARA provides significant contributions to SAR."

The annual DND contribution to CASARA covers geographic

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regions south of 60 degrees. The funding arrangement changes considerably for operations at higher latitudes.

CASARA contains its training costs through discounted charter agreements with private operators such as Kenn Borek Air in Iqaluit and Adlair Aviation in Cambridge Bay, Nunavut.

"But when we go into 'SAR Actual' mode, that comes out of JRCC funding," explained Daniels. Nevertheless, because cost controls are an ongoing challenge, "We stay on top, we train hard and we are on call 24/7. We fly, navigate, and spot the mission. When the case number comes in from the JRCC, the plots and coordinates are given and airborne we go."

NORTHERN SAR

Daniels recalled being asked by DND whether CASARA could have "a bigger footprint" in the Arctic. "We said we'd give it a try and . . . they knew they could depend on us."

So in 2012-2013, Daniels and Bishop set up shop in Nunavut's Hall Beach, Gjoa Haven, Arctic Bay and Pond Inlet. "Those organizations are now stood up and operational."

Also tasked with Arctic coverage are Hercules transports from 435 Transport and Rescue Squadron, based at 17 Wing in Winnipeg, as well as Yellowknife-based 440 Transport Squadron, also part of the 17 Wing hierarchy, which operates four CC-138 Twin Otters.

The Yellowknife operation is the only formed Canadian Forces unit based full-time in the North. While it has no dedicated SAR capability, it does conduct search and rescue missions as a secondary resource.

Daniels said 440 Squadron supports the indigenous Canadian Rangers, whom he described as "great people to work with" because of the depth and breadth of their knowledge of the Arctic. Recently, senior CASARA personnel participated in several consecutive days of training with RCAF liaison staff in Western Nunavut.

Daniels' first trip to the North was in the mid-1990s to Frobisher Bay (now Iqaluit). He and Doug Betts—with whom he wrote an Arctic Training Operations Plan which is still in use—built the initial CASARA presence there "from scratch" before "bogging off" across the Arctic archipelago to Rolute Bay and Cambridge Bay to do likewise.

"Those organizations continue to be self-perpetuating, but the critical issue is to ensure that we get the training visits in; that you do

give them the exercise, and that you ensure they have everything they need. It's important to look after our volunteers," continued Daniels.

"That comes down to proper equipment or even the critical issue of insurance. Once a volunteer becomes a member of CASARA, we have a very good insurance policy to protect them. We could not, nor would we, function without it."

Asked how medical emergencies are handled, Daniels stressed the need for good communications with RCAF crews. He said that "nine times out of 10, we do the spotting and locating, not the rescue."

That said, CASARA members are sometimes the first to arrive on scene, necessitating more first aid courses and, of course, the money to pay for them.

While some other countries, such as the United States with its Civil Air Patrol, have similar volunteer SAR programs, there's growing interest in the Canadian model.

"One thing's for sure: the CASARA concept works," Daniels said. "It's all about setting a benchmark, it's all about teamwork, and it's all about the government recognizing the need and being able to plan to utilize civilians where it's going to stretch the military a bit too far."

It should be no surprise that CASARA's important role in the country's SAR capabilities is not without risk. Over the years, it has lost 10 members whose names are on a remembrance cairn outside of RCAF 17 Wing headquarters in Winnipeg.

Nevertheless, Daniels is clearly buoyed by the fact that "we have 2,600 like-minded people who continue to volunteer" and is confident that CASARA has room to grow.

"Have we reached its greatest potential? Personally, I think not. I have no idea what that is, either, but we do have some extremely bright young people who are continuously looking for a way ahead."

Having never finished an engineering degree ("probably a service to aviation," he says), Ken Pole has had a lifelong passion for things with wings. The longest-serving continuous member of the Parliamentary Press Gallery in Ottawa, Ont., he has written about aerospace in all its aspects for more than 30 years. When not writing, he's an avid sailor and photographer.



The RCAF's fleet of CC-115 Buffalo aircraft is a mainstay of West Coast SAR.
Jean-Francois Dupont Photo

ROYAL CANAD



CANADAIR CT-114 TUTOR (25)



BOEING CF-188 HORNET (77)



AIRBUS CC-150 POLARIS (5)



LOCKHEED MARTIN CC-130J SUPER HERCULES (17)



LOCKHEED MARTIN CC-130H HERCULES (12)



DE HAVILLAND CANADA CC-115 BUFFALO (6)



BOMBARDIER CT-142 DASH-8 (4)

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DORNIER ALPHA JET (13)

IAN AIR FORCE



BOMBARDIER CC-144 CHALLENGER (4)



BOEING CH-147F CHINOOK (15)



BOEING CC-177 GLOBEMASTER III (5)



SIKORSKY CH-148 CYCLONE (28)



SIKORSKY CH-124 SEA KING (21)



LEONARDO CH-149 CORMORANT (14)



BELL CH-146 GRIFFON (85)



DE HAVILLAND CANADA CC-138 TWIN OTTER (4)



LOCKHEED MARTIN CP-140M AURORA (16)



BELL 412CF OUTLAW (9)



BEECHCRAFT CT-145 SUPER KING AIR (2)



GROB G120A (11)



BAE CT-155 HAWK (15)



BEECHCRAFT CT-156 HARVARD II (24)



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INSIGHT

2016 SUPPLIER SHOWCASE

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Brought to you by Skies

Your ISR SOLUTION

BY JAMES CARELESS | PHOTOS COURTESY OF TEXTRON

When customers need airborne solutions for their intelligence, surveillance and reconnaissance (ISR) missions, they turn to Textron Aviation. As the manufacturer of trusted, time-proven Beechcraft and Cessna fixed-wing aircraft, Textron Aviation offers the broadest lineup of ISR mission platforms in the industry.

In fact, Textron Aviation's entire product range is available in special mission configurations, all built using innovative technologies and advanced engineering techniques for nearly every conceivable kind of military mission. Available modifications include factory special mission kits, service centre special mission kits, and those from third-party integrators.

The Textron Aviation family of aircraft—comprised of single and multi-engine pistons, turboprops and jets—provides the high performance and flight characteristics required to fit all special mission profiles, all backed by the industry's most capable global service network.

"Our customers around the globe look to us for solutions to their ISR missions and critical applications such as airborne law enforcement, air ambulance, flight inspection, aerial surveillance, training, utility transport, amphibious operations and more," said Tom Hammor, president of Textron Aviation's defence company.

The company's special mission clients include many agencies and departments of the United States government, international governments and militaries, airborne law enforcement operators, critical care air medical operators, airlines, and training academies.

"Whatever their requirements, we work with each customer to offer customized integrated solutions to meet their operational and budgetary requirements," said Hammor.

The best way to illustrate the versatility of Textron Aviation aircraft for ISR missions is to look at specific examples such as the ISR-enabled Cessna Grand Caravan EX, Beechcraft King Air 350ER, and the Cessna Citation Series.

The special mission Grand Caravan EX is a proven, rugged, reliable single-engine turboprop platform used most commonly for ISR and airborne law enforcement



missions. Electro-optical/infrared (EO/IR) turrets and sensor operator stations are customized and fitted into the Grand Caravan EX to meet each customer's specific requirements.

Sensors can be integrated for covert operations as well, by retracting the EO/IR camera into the aircraft when not in use. This aircraft is an efficient platform for ISR that affords an excellent combination of range and low operating costs, with high payload and extended loiter, to spend more time on station for surveillance. The Grand Caravan EX is also a versatile utility aircraft that serves many missions and can be easily reconfigured for cargo transport, air ambulance, parachute operations, external fuel, agricultural spraying and insect control. It also has strike capability with hard-point provisions on the wings.

The King Air 350ER is a respected twin-turboprop aircraft proven for ISR and maritime patrol missions by U.S. and international military operations. This aircraft can be customized for virtually any mission. One of the most renowned versions of the King Air 350ER ISR platform is the MC-12 "Liberty" aircraft.

Talk about versatile: The King Air 350ER can be outfitted with radomes, EO/IR camera kits, sensor operator workstations, line-of-sight and SatCom data links, voice communications suites and aviation survivability equipment. This aircraft has impressive loiter

performance, and in an ISR or maritime patrol configuration, can go outbound for over 300 nautical miles, loiter for more than six hours, and then return for over 300 nautical miles. The King Air 350ER provides extended range fuel tanks and landing gear that can afford operations up to 17,500 pounds max gross weight.

Textron Aviation continues to advance the King Air product line with innovative product enhancements and most recently, the Pro Line Fusion avionics system is now standard on all King Air models. Many of the ISR options for the King Air 350ER have recently been certified on Fusion-equipped aircraft.

For those who prefer turbofan jet powerplants, Textron Aviation has provided a multitude of special mission solutions for its Cessna Citation jet product line. For instance, the Sovereign+ can be modified with retractable ISR sensors, hard-point provisions, operators' stations and other options required by special mission customers.

Now, Textron Aviation isn't the only manufacturer of special mission aircraft. In assessing which aircraft to buy, purchasers should consider all aspects of special mission deployment and support.

"Aircraft specifications and initial acquisition costs are certainly important considerations. But purchasers are well served to take into account available mission equipment, payload and range requirements, and life cycle costs when determining which aircraft will best meet their needs," said Hammor.

This is where Textron Aviation's broad product line and special mission expertise can make the decision easy.

"We are experts when it comes to special



mission applications for our aircraft and we understand the concept of operations [CONOPS] behind mission requirements. With this expertise we are able to craft an elegant solution for the mission at hand that minimizes the impact to aircraft handling qualities and performance. In addition to our industry-leading special mission platforms we provide customers the most capable support network to ensure a seamless ownership experience," said Hammor. With 21 company-owned service centres, nearly 200 authorized service facilities and more than 60 mobile service units, Textron Aviation has its customers covered.

The bottom line: When it comes to special mission aircraft, Textron Aviation has a truly wide range of aircraft and configurations to choose from, all backed by a global support network. ✦



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BY JAMES CARELESS | PHOTOS COURTESY OF CAE

From the CH-146 Griffon and CH-147F Chinook to the CC-130J Hercules and the CP-140 Aurora, CAE supports training for Royal Canadian Air Force (RCAF) pilots who fly them all.

"We are the RCAF's complete, end-to-end training partner," said Mike Greenley, CAE Canada's vice-president and general manager. "Working closely with the RCAF, we help train the world's best military

it drives the direction, commitment and investment the company will make in trying to achieve that vision for customers like the RCAF," said CAE's Greenley. "We have put considerable effort and investment into exploring how we can help the RCAF at the overall 'training system' level achieve their training and readiness objectives, and this has led to actions such as the acquisition of the NATO Flying Training in Canada program."

program, plus full maintenance and operation of the aircraft, are managed by CAE as the prime contractor.

CAE also operates the NFTC base facilities and delivers the ground school classroom and simulator training, all under the supervision of Canada's Department of National Defence.

"Our fleets of Harvard and Hawk aircraft have proven to be highly effective in

drawn-out process," said Greenley. "Since CAE is responsible for it all, we can make these changes quickly and efficiently."

CAE's training systems integration capabilities are also on full display at Garrison Petawawa, northwest of Ottawa, Ont. Here, in support of the RCAF's 450 Tactical Helicopter Squadron, CAE supports the CH-147F Chinook aircrew training program.

In February 2016, the RCAF graduated its

“We are honoured to play a role in helping the RCAF prepare for the missions they are asked to perform at home and abroad.”

— Mike Greenley, vice-president and general manager of CAE Canada

pilots using an integrated mix of classroom, simulator, and live flying instruction, all leveraging CAE's experience and expertise as a training systems integrator."

CAE was founded in 1947 by former RCAF officer Ken Patrick, and has become one of Canada's true global success stories in the aerospace and defence industry. In recent years, the company has established a clear vision focused on being recognized as the global training partner of choice, and CAE now delivers training to over 120,000 military and civil aviation crewmembers each year.

"Being a global training partner of choice is an important vision to understand because

NATO'S FLIGHT SCHOOL

CAE's October 2015 purchase of Bombardier's Military Aviation Training unit made CAE the prime contractor responsible for the NATO Flying Training in Canada (NFTC) program. The NFTC is jointly based at 4 Wing Cold Lake, Alta., and 15 Wing Moose Jaw, Sask.

Recently, CAE announced the NFTC had delivered more than 350,000 hours of live flying training since the program started 16 years ago using the CT-156 Harvard (Beechcraft T-6) and CT-155 Hawk (BAE Systems Hawk) fighter. The NFTC's live flying training

helping produce high-quality military pilots, and we congratulate the many industry and military professionals over the years who have contributed to reaching this milestone," said Col Alex Day, RCAF commander at 15 Wing Moose Jaw.

Because CAE handles all aspects of the NFTC, the company can keep the training program tightly attuned to students' needs and RCAF requirements.

"If you had five contractors on a program like this, making changes to the training as requested by the RCAF could be a long,

first class of CH-147F Chinook helicopter aircrews who took part in the new RCAF/CAE comprehensive field trials course. A total of 10 RCAF CH-147 Chinook aircrew—six first officers, two flight engineers, and two loadmasters—officially graduated following an intensive 24-week classroom, simulator and in-flight course.





"Our partnership with CAE has been the key to delivering this high level of training and simulation," said LCol Chris McKenna, commanding officer of the RCAF's 450 Tactical Helicopter Squadron. "This graduation represents years of work both in the RCAF and in CAE, all focused on

ensuring our crews have the best possible training and exposure on this incredibly advanced combat-capable aircraft."

LOOKING AHEAD

To take its RCAF training capabilities to the next level, CAE has joined with Draken International, operator of the world's largest fleet of privately-owned fighter aircraft, to bid for the federal government's Contracted Airborne Training Services (CATS) program.

CATS is intended to provide RCAF pilots with adversary and threat training, electronic warfare expertise and target towing operations. The CAE/Draken proposal would offer RCAF pilots realistic and challenging adversary training by pitting the RCAF's CF-188 Hornets against CAE/Draken A-4 Skyhawk fighters equipped with CF-188 equivalent modern avionics and radars.

"When you're training to fight enemy aircraft, you want to train fighter-on-fighter, not fighter-on-trainer," said Greenley. "The upgraded A-4 Skyhawk fighters we are offering as part of our training service provides a real-world adversary worthy of Canada's CF-188 pilots."

The bottom line: CAE is and will remain one of the RCAF's trusted, proven, and reliable pilot training partners, today and into the future.

"It is a privilege to undertake the training of Canada's world-class military pilots," said Greenley. "We are honoured to play a role in helping the RCAF prepare for the missions they are asked to perform at home and abroad." ✈



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When it comes to maintaining, repairing, and overhauling all variants of the venerable C-130 Hercules (both civilian and military models), Cascade Aerospace is the Lockheed Martin-certified facility to go to in British Columbia.

The company's 230,000-square-foot operation in Abbotsford—which has direct airside access to the Abbotsford International Airport—is a modern maintenance, repair, and overhaul (MRO) facility built in 2000 that is tailored to servicing C-130, L-382, L-100 Hercules and C-130J Super Hercules aircraft.

Cascade also services all models of Boeing 737/757s, plus Bombardier Q400, Dash 8 series, CRJ 100/200 regional aircraft and CL-215 and CL-215T water scooper aircraft.

When it comes to keeping the Hercules flying, Cascade Aerospace does it all. Its Lockheed Martin-certified technicians provide Hercules aircraft with light and heavy maintenance checks (A through D level/intermediate and depot level); major structural inspections and repairs; and component repairs and overhauls.

The Royal Canadian Air Force (RCAF) and civilian Hercs parked inside the company's spacious service hangar are also supported with corrosion prevention control;

supplemental structures inspection; bridge maintenance and maintenance planning; and overall operational support throughout their lifespans. And should a Hercules break down somewhere else, Cascade Aerospace's technicians are ready to help with fly-in and aircraft on ground (AOG) support.

"Choosing a Lockheed Martin-certified facility to work on your Hercules is akin to having your Ford serviced by Ford-trained mechanics, who only use genuine Ford parts," said Ben Boehm, Cascade Aerospace's executive vice-president and chief operating officer.

"By choosing our company, you know that Lockheed Martin has checked and verified our repair processes and that we only use parts that this manufacturer has approved. When your people are flying the kind of demanding, critical missions that are routinely assigned to the Hercules, of course you want your aircraft maintained to the OEM's [original equipment manufacturer's] specifications; especially since this service is competitively priced."

To speed the C-130 repair process while keeping costs low for clients—without sacrificing quality—Cascade Aerospace uses the latest in MRO technology and management in its Abbotsford facility. The technology

CANADA'S C-130 REPAIR FACILITY

CASCADE AEROSPACE IS CANADA'S LOCKHEED MARTIN-AUTHORIZED C-130 MAINTENANCE FACILITY. **BY JAMES CARELESS | PHOTOS COURTESY OF CASCADE**



includes: hangar floor computers for quick access to technical data and parts ordering; automated tool and part delivery to the shop floor; bar-coded time and materiel management system; vending machines that allocate consumables to each job; overhead cranes for easy removal of engines, tails and stabilizers; and specific support shops (avionics, electronics, machine shop, structures, paint shop, component repair and overhaul).

Lockheed Martin so trusts Cascade Aerospace to repair the Hercules, that the company has become the only non-OEM/non-government MRO authorized to perform the first Block 7.0 upgrade installation on the C-130J Super Hercules.

Cascade Aerospace is doing the Block 7.0 upgrade on all 17 RCAF CC-130Js. The upgrade adds 29 capabilities such as the Link-16 tactical data link (providing enhanced situational awareness by linking voice and graphic communications between allied aircraft); and a new flight management system with vertical navigation and coupled auto throttle capacity.

Canada will be the first CC-130J operator to accomplish a full fleet Block 7.0 upgrade, which is scheduled to be completed in October 2016.

"Cascade Aerospace's based-in-Canada expertise has made our company the go-to source for C-130 owners not only in this country, but around the world," said Boehm.

For instance, the Mexican Air Force (MAF) recently brought two of its C-130 aircraft to Cascade Aerospace's Abbotsford hangar for modernization and sustainment under a comprehensive programmed depot maintenance (PDM) program.

The upgrades to the MAF C-130s included the installation and integration of advanced Rockwell Collins avionics suites; digital fuel quantity indication and engine instrument display systems; and the incorporation of short pod auxiliary power unit (APU) modifications in the two aircraft. Cascade also provided operational and technical training for MAF personnel on this new technology.

"The foundational skills and knowledge developed through our CC-130 fleet management program for Canada have given us the capability to leverage our services into the international market," said Boehm. "Working in conjunction with Canadian Commercial Corporation [CCC], we were able to take advantage of this government-to-government contracting model, which de-risks the program for all parties. We are looking forward to being Mexico's long-term service support provider of choice."

For Hercules operators around the globe, the message is clear. Cascade Aerospace has the Lockheed Martin-certified knowledge, technicians, and modern equipment to keep all Herc variants properly serviced and ready for flight.

"Given just how important the C-130 is to civilian and military operators alike, it is vital for these operators to know where they can find reliable, affordable, and effective certified service," said Boehm. "Cascade Aerospace is such a destination. We are here to help keep your Hercules aloft—and our track record proves it." ✈

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“Cascade Aerospace's based-in-Canada expertise has made our company the go-to source for C-130 owners not only in this country, but around the world.”

— Ben Boehm, Cascade Aerospace executive vice-president and chief operating officer.





IMP Aerospace and Defence, a proud Canadian company, has been a trusted partner to Canada's military for decades, supporting both Canadian and international aircraft fleets while also providing manufacturing support to original equipment manufacturers (OEMs).

More than 2,400 employees provide support services at multiple locations from coast to coast through six separate operating units: IMP Aerospace; Cascade Aerospace; Canadian SAR Helicopter; IMP Aerostructures; IMP Electronic Systems; and IMP Naval and Land Services.

"As a consequence of the in-service support [ISS] work that we do, all of our operating units have very close working relationships with their respective customers, in some cases on virtually a day-to-day basis," said David Gossen, president of IMP Aerospace and Defence. "To be successful, the key is to maintain our focus on our customers, and our employees are central to that effort."

Given the long in-service lives of modern aircraft fleets and the challenges associated with keeping them airworthy and up-to-date with modern mission

systems, it's essential to have long-term strategic relationships with both operators and OEMs.

"As ISS requirements evolve throughout the life of a program, our offerings expand accordingly," said Gossen. "We are able to leverage our knowledge and experience to meet the needs of both existing and new customers."

Canada has always been, and will continue to be, the company's core customer and focus, Gossen added. Over many years, in parallel with Canada's evolving needs, IMP has developed a comprehen-

sive, world-class ISS capability, including all levels of maintenance, engineering, integrated logistics support, publications and supply chain management.

"Canada's standards for the maintenance of their aircraft are among the highest in the world," said Gossen.

"IMP and RCAF personnel have worked very closely together to ensure the maintenance programs have evolved as necessary to meet all airworthiness and operational requirements."

An example is the CH-124 Sea King helicopter, which IMP has supported for

RAISING

IMP AEROSPACE AND DEFENCE GOES ABOVE AND BEYOND TO MEET THE HIGH STANDARDS OF CANADA'S DEPARTMENT OF NATIONAL DEFENCE, A NECESSARY MEASURE THAT BENEFITS BOTH CANADA AND CLIENTS AROUND THE WORLD.

BY BEN FORREST | PHOTOS COURTESY OF IMP

the past 40 years by following a rigorous program including all levels of maintenance, corrosion control, and component repair and overhaul. There have also been major mid-life updates, including the complete replacement of the primary fuselage structure, the total re-wiring of the aircraft, and the addition of new avionics and mission systems to meet changing—and at times immediate—operational requirements.

“In addition to our personnel strengths mentioned previously, it would be impossible to maintain aircraft with 40-plus year service lives without the aircraft technical data package from the aircraft manufacturer,” said Gossen. “Our engineers use this information continuously in order to develop repair schemes and modifications, and conduct engineering studies as required, including comprehensive life extension programs.” IMP technicians also work from original drawings to manufacture structural detail parts and to carry out complex structural repairs.

“The importance of acquiring access to OEM technical data at the time of aircraft acquisition cannot be overstated,” said Gossen.

A great deal of responsibility comes with servicing military aircraft. It concerns not just the safety of pilots and soldiers, but also the freedom and protection of people in Canada and around the world.

Gossen admitted that responsibility weighs heavily on IMP Aerospace and Defence, motivating the company to go above and beyond to ensure the job is done right.

(OWSS) contract, as well as the structural life (re-winging) project (ASLEP) and the avionics modernization project (AIMP). IMP Aerospace and Defence also delivers total ISS for the CH-149 Comorant search and rescue helicopter, and the CC-130 OWSS program for Canada’s legacy fleet of Hercules aircraft. In addition, Cascade Aerospace provides a number of aircraft maintenance services in support of the new CC-130J Hercules.

IMP Aerospace and Defence has also extended its reach outside Canada, serving commercial and military operators from around the world.

The company is completing a re-wing program for the Royal Norwegian Air Force fleet of Lockheed Martin P-3 Orion aircraft, which is similar to the work it does on the RCAF Aurora fleet. On the C-130 Hercules, Cascade Aerospace recently completed a depot level maintenance program and avionics upgrade for the Mexican Air Force. In addition, the company is also carrying out a number of maintenance and engineering projects for customers around the world.

“The Sea King, P-3, C-130 and CH-149 [AW101] continue to be operated globally, and we are in active discussions with several countries,” said Gossen.

to quickly adjust to changing requirements, the creation of high-skill jobs and the added benefit of export potential,” he added. “This is very similar to the underlying tenets of the government’s National Shipbuilding Procurement Strategy, and is consistent with the approach followed by most nations around the world.”

Meeting the requirements of Canada’s Department of National Defence (DND) demands that IMP raise the bar on itself,



THE BAR

“A large percentage of our employees, in all departments and across all levels from the hangar floor to the executive offices, are former servicemen and servicewomen,” he said. “Their knowledge and understanding of the operational demands that the military places on its personnel and equipment become infused into our company and into all our employees—it is simply an integral part of who we are.”

IMP Aerospace and Defence is involved in numerous projects for the Royal Canadian Air Force. Work on the CP-140 Aurora patrol aircraft includes the comprehensive optimized weapon system support

“In addition, we are discussing maintenance, modernization and missionization projects with operators and governments around the world on a multitude of different platforms.”

Over the past several years, IMP has worked closely with Canada’s federal government in the development of a long-term defence and procurement strategy, Gossen explained.

“Our goal is to continue to work with Canada to develop an ISS model which provides maximum value to Canada, including the sovereign control over the support of its military assets, the flexibility

and this sets the stage for attracting international customers.

“When we are successful internationally, everyone benefits even more—Canada, DND, and the company,” said Gossen.

“IMP Aerospace and Defence is extremely proud of the decades of in-service support that we have provided to the RCAF, and we are totally committed to continuing this proud heritage into the future on both existing and new programs.”



IMP AEROSPACE & DEFENCE



L-3 MAS, A RENOWNED LEADER IN AIRCRAFT
IN-SERVICE SUPPORT TO THE ROYAL CANADIAN AIR FORCE,
CONTINUES ITS PUSH FOR GREATER MARKET SHARE.

BY KEN POLE

With deep roots in the Canadian aerospace sector, as well as an enviable list of international clients, L-3 MAS continues to build its reputation as a leading provider of integrated in-service support (ISS) services.

Its approximately 700 dedicated personnel not only provide ISS services, including aircraft maintenance and modifications, systems integration and life cycle management, but also offer technical publications services, aerostructure design and certification work.

Owned by L-3 Communications Holdings Inc., L-3 MAS began as Canadair and morphed into Bombardier Defence Services (BDS) before becoming an L-3 subsidiary in 2003.

The company's long-standing relationship with the Royal Canadian Air Force

(RCAF) has been a true "win-win" partnership that has successfully kept fleets operational long past planned retirement dates, most notably the Boeing CF-188 Hornets, the newest of which were produced in 1988. Next October, the company will proudly celebrate the 30th anniversary of this contract.

**RIGHT INFORMATION,
RIGHT PLACE, RIGHT TIME
FOR SUCCESS**

Since Canada was the first international customer to buy the F/A-18 Hornet and because it decided at that time to proactively acquire the data rights for the ISS of the aircraft, it was possible to develop value-added, in-country expertise.

Right from the beginning of the support

contract, L-3 MAS worked hand-in-hand with the RCAF to develop an in-depth Canadian expertise in aircraft maintenance and ISS, making L-3 MAS one of the world leaders in the structural maintenance and life extension of these complex aircraft.

This accumulated expertise has also helped L-3 MAS to win major ISS contracts with the Australian, Finnish and Swiss air forces, as well as, most recently, with the United States Navy (USN).

"We were very excited to hear that the USN selected L-3 to do the depot maintenance of their F/A-18 Hornet A/B/C/D models. Winning this contract was a major achievement for us since it is the first time ever that U.S. Navy front-line fighters have come to Canada for major maintenance," said Jacques Comtois, vice-

president and general manager of L-3 MAS.

"The pursuit of this contract took many years before we achieved this major success and we are really proud of the capabilities and professionalism that our employees demonstrate daily. This contract award is a true recognition of our abilities."

For logistical reasons, Australia, Finland and Switzerland prefer their F/A-18 ISS work to be done in their home countries using their own industry, but they have contracted with L-3 MAS because of its globally unique expertise in mapping out fleet lives, performing predictive failure analysis and developing full-life modifications and repairs. These solutions come with powerful, homegrown software tools that were specifically developed for this application.



Michael Durning Photo



DIVERSIFIED FLEET, DIVERSIFIED SUCCESS

L-3 MAS' in-depth expertise developed around the F/A-18 fleet has allowed it to grow its market share in the aircraft and helicopter ISS areas by capturing many long-term contracts with a number of customers.

The first one was for the CT-114 Tutor (the Canadian Forces Snowbirds demonstration aircraft), where L-3 MAS retained the data rights upon the sale of BDS to L-3. The company now offers technical investigation and engineering support services for second- and third-line maintenance, the structural integrity program, build-to-print manufacturing, and much more. Subsequently, L-3 MAS won the ISS contract for the CH-148 Cyclone fleet, which will replace the CH-124 Sea King as Canada's main shipborne maritime helicopter.

In 2012, the company won the interim ISS contract for the CC-150 Polaris fleet and followed that up by winning a long-term, multi-year contract a year later. Currently, L-3 MAS has employees working directly with Canada's Department of National Defence (DND) to support the CC-150 fleet on deployment, which represents another notable achievement, to have civilians deployed in an operational theatre.

Finally, the company won two ISS contracts on the CH-147F Chinook helicopter where it provides technical publications services and support and test equipment.

Despite all these achievements, L-3 MAS is not about to rest on its laurels.

"Our vision is to be the premier in-service support integrator in Canada," said Comtois matter-of-factly, noting



Steve Bigg Photo



Mike Reyno Photo

that ISS was one of the key capabilities highlighted in a defence procurement report submitted to the federal government in early 2013.

"We had a vision in mind and have developed our capabilities around it to make sure we reach our goal. We know that whatever type of weapon system the customer has—vehicle, aircraft, helicopter or ship—we have the proven credentials to be their ISS provider of choice."

INNOVATION AT L-3 MAS

From that long-term vision, L-3 MAS has developed various techniques and tools to differentiate itself in the marketplace. As previously stated, the company developed interactive software to manage all the modifications and repairs available on F/A-18 aircraft. The software enables operators to click on parts of the aircraft they are interested in and quickly identify

all modifications, repairs and inspections applicable to that area.

"Tapping into our experience and capability is so much easier for the operator than having to reinvent these solutions, which would not be a question of months or years; it would take decades in some cases," said Comtois.

L-3 MAS has also developed robotic capabilities allowing operators to perform modifications and repairs at locations where it is physically impossible for a technician to access. As well, it has developed unique robotic shot peening techniques to significantly extend the lives of components before they fail, resulting in tremendous savings for aircraft operators.

Another very exciting project still in development would give technicians virtual access to the drawings and technical publications in servicing aircraft. Having already developed software for interactive

electronic publications for iPad, L-3 MAS is stepping up its game with "smart glasses."

"This will give technicians a hands-free environment—they will no longer be required to hold a tablet. We can even incorporate some 'augmented reality' so that they can actually see systems beyond the skin of the aircraft as if the panels were removed."

Central to the company's efforts to differentiate itself from other service providers, the technology is on track to having a full technology demonstrator by December this year.

CIVIL MARKET

L-3 MAS also plays a role in the civil market, most recently through the delivery of two special mission business aircraft that were significantly modified for an important international customer, who was very satisfied with the performance of these new aircraft.

It is also a strategic partner to Pratt & Whitney Canada for the design and manufacturing of test pylons, a partner with Stelia to perform design and certification work on aerostructure



Derek Heyes Photo

components for the new Global 7000 and 8000 business jets, and working with many customers doing repair and overhaul of components for a variety of aircraft.

While most L-3 MAS personnel are concentrated in Mirabel, Que., providing company-wide engineering and maintenance support, L-3 MAS has many employees located at facilities across Canada, including Bagotville, Que., Gatineau, Que., Cold Lake, Alta., Trenton, Ont., Ottawa, Ont., Petawawa, Ont., Shearwater, N.S., and Patricia Bay, B.C. ✈



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AVIATION PROBLEM SOLVERS

MARINVENT IS THE ALL-CANADIAN COMPANY THAT OFFERS FLIGHT TESTING, CERTIFICATION, INTELLECTUAL PROPERTY, AND EXPERT AEROSPACE CONSULTING SERVICES FOR GOVERNMENT AND INDUSTRY.

BY JAMES CARELESS | PHOTOS BY JEAN LEVASSEUR & MICHAEL DURNING

Whether you are an equipment procurement manager seeking objective, independent analysis of complex competitive bids, or an aviation original equipment manufacturer (OEM) executive seeking an all-Canadian partner to provide flight testing and certification services—Marinvent is the solution to your problem.

Founded by much-honoured engineer John Maris in 1983, Marinvent has amassed numerous awards for its contribution to the aerospace industry from the Aerospace Industries Association of Canada, the New Zealand Ministry of Defence and NASA, among others.

Marinvent provides flight testing and certification for clients using the company's research simulator and specially-equipped Piaggio P-180 Avanti flying testbed. Marinvent's 33 years of experience and success in developing solutions for customers such as Boeing/Jeppesen, the Canadian government, NASA, and the Royal New Zealand Air Force has made this Montreal-based firm the go-to source for government and industry alike.

"We are a trusted expert partner for government procurement organizations, and a cutting-edge research facility for the world's aviation OEMs," said Phil Cole, Marinvent's vice-president of business development. "Marinvent's skilled staff know what both markets need when it comes to reliable, cost-effective, and efficient third-party support, and we do our best to deliver it to them every single time because we live by our reputation."

ADVICE YOU CAN TRUST

When Public Services and Procurement Canada (PSPC), the federal government's central purchasing agent, needed expert and objective support in selecting the Canadian Coast Guard's new light helicopter in 2012, it turned to Marinvent for help.

"PSPC sought our expertise in putting together the request for proposal [RFP] for this project, to ensure that it was fair, complete, and relevant [to] the Coast Guard's flight needs," said Cole. "We assisted in designing objective flight plans for each of the helicopters being considered, so that the bids submitted by their OEMs could be accurately assessed."

The company was subsequently hired by PSPC to be the independent flight director of the light helicopters' flight evaluations. After this project was completed, PSPC selected Marinvent to assist with its medium helicopter program and the associated simulator RFP.

"This PSPC procurement project went well from start to finish, with the result objectively analyzed and the bidding awarded on the basis of solid facts," said Cole.

AN IDEAL DPS PARTNER

The Canadian public is weary of defence procurement processes that go well past deadline and substantially over budget, and the Canadian government has listened. Specifically, the government has launched the Defence Procurement Strategy (DPS) to address this problem.

According to Public Works and Government Services Canada's website, DPS combines "timely and effective decision-making" on major defence procurements while fulfilling the government's commitment to better ensure that purchases of defence equipment "create economic opportunities for Canadians."

The strategy's two-pronged approach means that multinational defence contractors must ensure that their bids provide a high level of Canadian content value (CCV), such as Canadian jobs. Otherwise, these bidders could knock themselves out of the running at the outset.

"As an all-Canadian company, Marinvent offers an extremely high CCV level to any multinational company who partners with us under the DPS," said Cole. "Even without our high CCV, we are the most prominent company in Canada that provides a high level of flight testing and equipment certification independently. This makes us a much-sought-after partner for ongoing procurements such as Fixed-Wing Search and Rescue [FWSAR] and the Joint Uninhabited Surveillance and Target Acquisition System [JUSTAS] unmanned surveillance acquisition program."

Marinvent's P-180 flying testbed backs up Cole's contention. Designed with entirely separated left and right seat cockpit positions (allowing the P-180 to switch from regular controls to onboard experimental avionics systems or even ground controlled flight direction while in flight), plus a removable flight test workstation in the aft cabin, this testbed is the only one of its kind in Canada.

Operationally, the P-180 offers a cruise speed approaching 0.65 Mach at 28,000 feet, and a service ceiling of 41,000 feet. This pressurized twin turboprop has a maximum endurance of about four hours and a range of 1,200 nautical miles.

The P-180's multi-faceted capabilities were used by NASA to help develop the agency's Traffic Awareness Strategic



Aircrew Requests (TASAR) analysis tool. TASAR features a cockpit automation system that provides airline pilots with runway approaches that are wind-optimized and pre-cleared of potential conflicts with other known airplane traffic, weather hazards, and airspace restrictions.

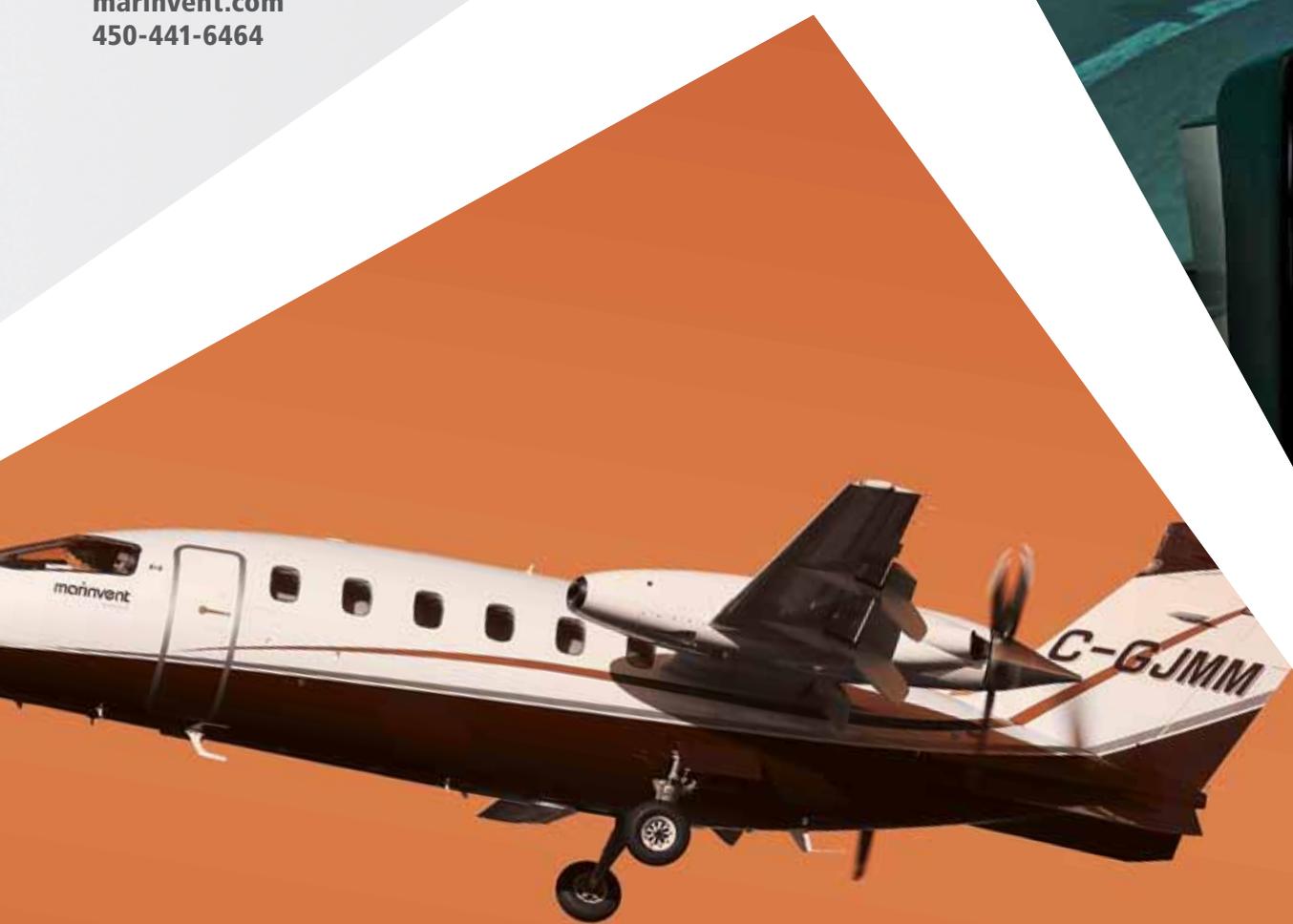
"NASA's engineers were in the back of the P-180 in flight testing their application using live Aeronautical Radio Inc. [ARINC] data fed from the front of the aircraft," said Cole. "They were so happy with the effectiveness of our flying testbed, that Marivent subsequently won NASA's 2014 Agency Small Business Subcontractor of the Year Award through its U.S. joint venture partner."

Clearly, Marivent has what it takes, whether in providing expert analysis to government, CCV-enhanced partnership to industry, or both.

"We built our success on meeting, and exceeding, our customers' requirements to date," said Cole. "We are happy to provide this same level of excellence and commitment to customers in the future, whether they be returning clients, or customers entirely new to us." ✨


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The **TRU** simulation & training solution

TRU SIMULATION + TRAINING COMPLETES TEXTRON'S
FIXED- AND ROTARY-WING PRODUCT PORTFOLIO

BY JAMES CARELESS | PHOTOS COURTESY OF TRU SIMULATION + TRAINING

Purchasing a new aircraft is just the first step for any aviation operator. They have to train their pilots how to fly the aircraft properly and their maintenance staff how to support it reliably. Otherwise, what looked to be a great investment can turn into a costly loss.

Textron Aviation, maker of Beechcraft/Cessna/Hawker fixed-wing airplanes, understands this truth. So does Bell Helicopter, a separate business unit of parent company Textron Inc. This is why Textron Inc. formed TRU Simulation + Training (TRU) in 2014.

TRU is designed to fill in the simulation and training gaps that exist after companies buy an aircraft. And although TRU is new in name, it is well-established in capabilities.

That is because TRU is comprised of two legacy flight training companies—Mechtronix in Montreal, Que., and Opinicus in Lutz, Fla.—plus part of Textron Systems' AAI business and ProFlight, a pilot training centre based in Carlsbad, Calif. Together, these companies bring TRU 25 years of combined experience.

"With the creation of TRU, Textron has built an experienced company that can provide simulators and training for all of the aircraft we make," said Ian Walsh, TRU Simulation + Training's president and CEO.

"This includes providing training for the technicians who will maintain the aircraft, not just those who fly them. Add the backing of Textron's own support network, and TRU provides fixed-wing and helicopter

operators with an end-to-end solution to their aviation needs."

The scope of TRU's capabilities is substantial. The company offers desktop, fixed, and full flight training simulators for everything from the venerable Cessna 172 and Beechcraft T-6B light attack and intelligence, surveillance, and reconnaissance (ISR) aircraft, to Bell 206L4 and Bell Boeing V-22 Osprey helicopters. Boeing has also hired TRU to provide flight training suites for the 737 MAX and the 777X.

"We recently developed a simulator for the Bell V-280 Valor tilt-rotor, which is competing to be the U.S. Army's future vertical lift [FVL] helicopter," said Walsh.

"We showed the V-280 simulator at I/ITSEC 2015



[the Interservice/Industry Training, Simulation and Education Conference] last December. People couldn't wait to get their hands on the controls, to find out what it is like to fly such a revolutionary aircraft."

TRU is also part of the Team Spartan bid for Canada's Fixed-Wing Search and Rescue (FWSAR) Aircraft Replacement Project, partnering with Leonardo-Finmeccanica Aircraft Division, General Dynamics Mission Systems-Canada and DRS Technologies Canada in support of the C-27J aircraft.

"If Team Spartan wins the FWSAR bid, we will be responsible for the design and development of key FWSAR training support system elements including much of the courseware, the full flight simulator, the cockpit procedures trainer and the aircraft maintenance trainer," said Walsh. "This is a great aircraft, and well-suited to meet Canada's search and rescue needs."

TRU's suite of simulators covers the full range of pilot and maintenance technician requirements. On the military side, for instance, the company supplements its standard range of flight simulators with:

Aircraft weapons system trainers, to allow pilots to experience the use of weapons in a realistic simulation environment;

Engineering development stations, to permit engineers to work on various aircraft systems without ever setting foot in an associated full flight simulator; and

Aircraft maintenance part task trainers, where technicians can learn and rehearse maintenance tasks on highly-realistic and responsive training platforms.

"Our goal is to provide everything our customers need to safely and reliably integrate new aircraft into their fleets," said Walsh.

"When you buy an aircraft or helicopter from Textron, you now know that it comes with access to every level of training and maintenance



support you will need. This is what sets TRU apart from our competition. We have the proven Bell, Beechcraft, Cessna, and Hawker products today's operators want, plus everything to get them flying and keep them in the air."

It helps that Textron Aviation is owned by Textron, Inc. Ranked No. 219 on the Fortune 500 list of largest U.S. companies, Textron earned about US\$13.4 billion in 2015 alone, with non-U.S. revenues accounting for more than 35 per cent of that total.

"Aviation is an expensive, capital-intensive business," said Walsh. "It makes sense for aviation customers to seek out suppliers who have deep enough pockets to play in this space year after year, no matter the market's ups and downs. Textron Aviation is such a company."

Put the pieces together, and TRU Simulation + Training completes Textron Aviation and Bell Helicopter's end-to-end aviation offerings to

both fixed-wing and helicopter clients.

"We understand the challenges of the aviation business, from the smallest single-plane civilian charter operator to the largest military air force," said Walsh. "This is why we grasped the need to add simulation and training to the aircraft purchasing package, and why we built TRU out of the best legacy companies we could find. The winners are our customers, because they now have a truly one-stop shopping solution to fulfil their aircraft acquisition needs." ✦



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TRAINING

AN UNPRECEDENTED FEDERAL GOVERNMENT INTERDEPARTMENTAL AGREEMENT HAS HELPED A CANADIAN COMPANY TO BUILD AN ENVIABLE PROFILE IN AIR COMBAT TRAINING.

BY KEN POLE
PHOTOS BY HENRI-PIERRE GROLLEAU

Discovery Air Defence is all about new horizons, pushing boundaries and going beyond, the ultimate aim being to hone the skills of current and future combat pilots and support crews at home and abroad.

For more than a decade, DA Defence has been the exclusive supplier of Contracted Airborne Training Services (CATS) to the Canadian Armed Forces (CAF). It also provides joint terminal attack controller training for Canada's special operations and Army personnel, electronic attack training for Royal Canadian Air Force CF-188 Hornet crews and the Royal Canadian Navy, as well as live-fire target practice. It recently achieved more than 57,000 accident-free flight hours.

Canada was one of the first members of the North Atlantic Treaty Organization (NATO) to pursue the contracted approach as a partial answer to increasingly stringent military budgets and shifting priorities.

DA Defence president Paul Bouchard is determined to preserve the company's edge. "We just submitted our highly compelling CATS solution to the Crown in

February," he told *Insight*. "It is the only true-Canadian solution for the next generation of Contracted Airborne Training Services. Our engineering and airworthiness teams have invested considerable effort in developing our CATS solution to meet Canada's evolving airborne training and combat support needs in the next decade and beyond."

But it's about more than CATS. "As a key Canadian defence partner, we operate fully embedded and in formation with the RCAF," said Bouchard. "We help to preserve valuable frontline fighter fleet life, increase operational readiness of the Army, Navy and Air Force, and drive significant savings from alternate service delivery to fund higher DND [Department of National Defence] priorities. Other air forces are actively looking at the Canadian model to realize similar economic and operational benefits."

And it's also about more than cost savings. "It's about optimizing combat training for Canada," he said. "It's about providing the right numbers and types of aircraft, equipped with the right technology, all flown by highly-experienced adversary pilots. It's about making sure that Canada and its allies are ready to face the evolving threats of the 21st century when called upon."

Private-sector competitors are looking at the Canadian model, too, but Bouchard said, "We have set the bar for future programs as well as other companies in

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our rapidly expanding industry." So much so, that "our customers often remark about the experience and commitment of our crews that go the extra mile to provide the best possible air combat and combat support training."

The DA Defence team is comprised of 240 dedicated professionals in Canada, the United States and Germany.

"We have a very dynamic team here, ranging from highly-experienced pilots, many of whom are highly-qualified fighter weapons instructors, leading red air training in the skies," said Bouchard. "Our engineers, technicians, logisticians and support personnel ensure smooth operations. Our entire team shares our common values of safety, teamwork, focus, innovation and integrity."

Before flying aircraft, DA Defence spends hundreds of hours over several months tearing them down to depot-level inspection standards to ensure optimal safety levels and a 98 per cent serviceability rate. In addition, aircraft are maintained to standards beyond original equipment manufacturer specifications and in accordance with Transport Canada approved maintenance schedules, setting the company apart from its competition.

It recently added to that distinction by opening a new state-of-the-art hangar in Bagotville, Que., home to its Aircraft Maintenance Centre of Excellence. "And we're making great strides at our Global Operations Centre in the heart of Canada's aerospace cluster in Montreal," said Bouchard.

While the team is clearly committed to excellence and dedicated to customer service, DA Defence credits an unprecedented memorandum of understanding (MoU) between Transport Canada and

the DND for paving the way to success.

As it happened, U.S. companies providing services to Canada's military had been doing so without the appropriate air operator certificates or authorization to conduct commercial operations in Canada. However, Canada's *Aeronautics Act* specifies that the Minister of Transport has fundamental regulatory oversight but that "any matter relating to defence" is the jurisdiction of the Minister of National Defence or the Chief of the Defence Staff.

At the time, Transport Canada said it really had nothing to do with them because the training was totally a military operation. DND agreed, acknowledging that the RCAF was receiving "commercial" services. So the departments drafted the MoU, which DA Defence has described as "the gold standard which our allies try to replicate."

The MoU proved its worth when DA Defence scored a major international coup by securing a contract to provide aggressor training to the German Luftwaffe. In early 2015, it began flying upgraded Douglas A-4N Skyhawks which have been busy ever since. Earlier this year, the Skyhawks flew as aggressors in the Luftwaffe's first Eurofighter Fighter Weapons Instructor Course.

DA Defence also flies IAI Westwind special mission aircraft and Dornier Alpha Jets and plans to expand its training capabilities by acquiring F-16 Fighting Falcons.

"We are the only company in the world with access to a significant number of operational, demilitarized F-16 aircraft," said Bouchard.

Its mixed fleet enables DA Defence to provide aircraft suited to individual training requirements.

Dr. Stefan Petersen Photo



F-16s would be appropriate platforms for F-35 Lightning II, F-22 Raptor or Eurofighter Typhoon aggressor training. "A dedicated fourth-generation supersonic aggressor that is equipped with radar, EW [electronic warfare] and networkability, operated at a fraction of the cost of in-house assets, is incredibly attractive," Bouchard concluded. "All of our fleets are operated and maintained to the same airworthiness and safety standards that Discovery Air Defence is renowned for." ✦

THE ONLY CANADIAN SOLUTION FOR NEXT-GEN CATS.



*F-16 is subject to U.S. government approvals as to acquisition, configuration and end use.

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