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IN CANADA

HELI-EXPO  
2018 RECAP

LEGACY 500  
FLIGHT TEST

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DISASTER

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By Kenneth I. Swartz

◆ The Bombardier Q400 is one of Canada's most successful aerospace innovations. It's an aircraft that redefined the role—and the business case—for the turboprop airliner. What's next for the 20-year-old design? **Jan Jasinski Photo**



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### ON THE COVER

You can't get much more Canadian than the Bombardier Q400, which combines a Toronto-assembled airframe with a pair of Pratt & Whitney Canada PW150A turboprop engines built in Longueuil, Que. The Q400 has been a game changer, but will it remain a leader in the future?

Galen Burrows Photo



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**FACEBOOK PHOTO PICK**

This bird is a long way from the warm weather in its native Savannah! Gulfstream was in Iqaluit in early February for cold weather testing of its new G500 and G600 business jets.  
**Brian Tattuinee Photo**

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**TBM**  
**910**

# Column

FROM THE EDITOR  
BY LISA GORDON

Lisa Gordon is editor-in-chief of *Skies* magazine, Canada's largest and most-read aviation industry publication. Contact her at [lisa@mhmpub.com](mailto:lisa@mhmpub.com).



## An optimistic outlook and a spring in our step

As winter draws to an end, we are seeing signs of a healthy resurgence in the aviation industry.

On Feb. 21, 2018, the General Aviation Manufacturers Association (GAMA) released its 2017 annual report, which provides a detailed look at the year's aircraft shipments and billings, among other indicators.

Airplane deliveries were up 2.5 per cent globally, including in the business jet and piston aircraft segments.

Happily, the most encouraging numbers came from the rotorcraft segment of the industry, which seems to have stabilized after a downward spiral in deliveries over the past several years.

involved innovative technologies surrounding future urban air mobility platforms, including Bell's impressive Air Taxi mock-up, where virtual reality technology enabled passengers to experience a sample "flight."

Scott Drennan, Bell's director of engineering innovation, told me at the show that Bell envisions certified vehicles servicing initial pockets of customers throughout inner cities by the mid-2020s.

Many similar initiatives are underway, including Airbus' CityAirbus program, with the first prototype expected to fly by the end of this year. Disruptive technology is coming, and sooner than we might think!

imminent new flight and duty time regulations from Transport Canada.

Published in *Canada Gazette I* on July 1, 2017, the government is in the midst of finalizing the rules before they are released.

Despite protests from several industry associations—all of whom agree that safety is aviation's top priority—the government seems intent to move forward with so-called "science-based" regulations.

The plan could see operators incurring significant cost increases stemming from the need to hire 25 to 50 per cent more pilots—with the need for more crewmembers coinciding with a looming pilot shortage.

As with most situations, there are two sides to this story, with the best solution likely found somewhere in the middle. This would seem to indicate that compromise is required—and that certainly rules out the application of a one-size-fits-all prescription.

As we welcome spring and another busy flying season, our April/May issue delivers a fresh crop of stories that matter to Canadian aviation.

Check out my story on Canadian ultra-low-cost carriers to find out how many operations one analyst thinks the market can support.

Next, Ken Swartz takes an in-depth look at Bombardier's successful Q400 aircraft and considers its future; Ben Forrest reviews the exciting announcements from Canadian companies at Heli-Expo; and Rob Erdos reports on his flight in Embraer's cutting-edge Legacy 500 business jet.

Rounding things off, we have Chris Thatcher's piece on how the military is preparing for a major air disaster in a remote area; and finally, we pay a visit to Conair's Turbo Firecat fleet in France.

Do you have a story idea that matters? Let's talk about it. Contact me by email at [lisa@mhmpub.com](mailto:lisa@mhmpub.com).

In the meantime, here's hoping you'll be able to read this issue of *Skies* outdoors in the spring sunshine. ☀

“WE COULD CERTAINLY SEE FLYING PERSONAL TRANSPORT VEHICLES YEARS AHEAD OF THE JETSONS, WHO WERE ZOOMING AROUND IN THEIR AEROCAR IN THE YEAR 2062.”

GAMA found that helicopter shipments rose by a solid 7.5 per cent, from 861 units in 2016 to 926 units in 2017. Piston helicopters saw the largest increase in sales (17.9 per cent), although turbine helicopter deliveries were also up by 3.9 per cent.

The GAMA numbers were released less than a week before Helicopter Association International (HAI) opened the doors of Heli-Expo 2018 in Las Vegas, Nev., and it's possible they contributed to the decidedly upbeat vibe at the show.

This year, HAI's signature event attracted 17,312 attendees from all corners of the helicopter industry. With 51 aircraft on display and 705 companies exhibiting, there was no shortage of things to see on the show floor.

Some of the most exciting displays

That means aviation's next frontier is really not far away, and we could certainly see flying personal transport vehicles years ahead of the Jetsons, who were zooming around in their aerocar in the year 2062.

In the meantime, spring heralds lots of activity on another frontier, Canada's Far North.

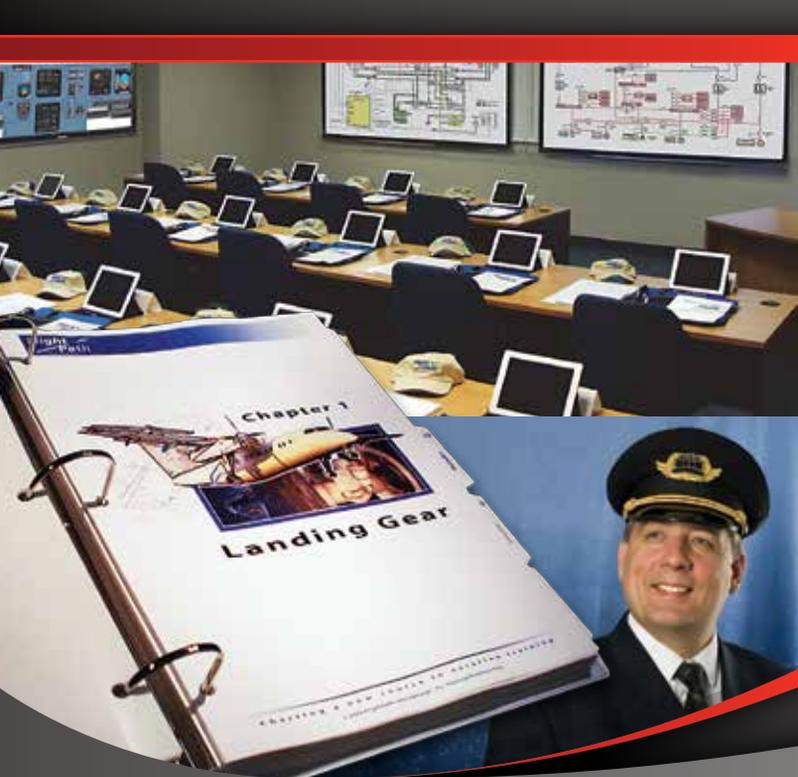
As the Northern Air Transport Association (NATA) gears up for its annual convention, operators maintain an optimistic outlook despite dealing with outdated facilities, inferior infrastructure, a harsh climate and stiff competition.

But perhaps the most serious cloud on the horizon looms on the regulatory front, where operators from coast to coast are concerned about

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# Column

IN THE JUMPSEAT  
BY GLENN PRIESTLEY

Glenn Priestley is the executive director of the Northern Air Transport Association (NATA).



## NATA speaks for northern operators in a climate of regulatory change

One of the most important services any association provides is analysis of government policy, especially complex and long-term initiatives that most members—in NATA's case air service providers—just do not have the time to scrutinize carefully.

Canada's proposed flight and duty time regulation changes provide the most obvious example of trade associations resisting the development of rules that are just not reasonable. The negative response of stakeholders to the rules as published in *Canada Gazette* on July 1, 2017, was unprecedented. NATA, along with other industry associations, formed a coalition to push back against these rules that, while well-meaning, just will not work as intended. Indeed, they will result in unforeseen difficulties when applied to specific operations.

NATA has tried to help the regulator develop rules that work for northern operational realities. On Aug. 28, 2017, NATA met with Transport Minister Marc Garneau in Yellowknife, N.W.T., presenting him with six main concerns about the proposed new flight and duty regulations. He challenged us to provide operational

safety cases of why the new rules will not work, and in fact will hinder northern and remote operational efficiencies. He also challenged NATA to provide scientific logic to support our concerns, and asked us to suggest possible solutions.

NATA provided dozens of case studies on present operations and how the new rules will decrease operational efficiency, with no increase in system safety. We also retained, at considerable investment, an internationally recognized sleep and fatigue expert to provide scientific analysis of the new rules and NATA's solutions.

NATA 42, the annual northern and remote aviation industry conference, is taking place this year in Whitehorse, Yukon, from April 23 to 25. Along with a federal regulatory issues update, there is a range of new issues on the agenda that are important to overall system safety.

The impending legalization of marijuana has provoked a complex conversation as operators struggle to develop policies to manage this initiative. A "Fit to Fly" seminar will provide members with legal and medical answers as well resources to develop specific company policy.

In addition, Bill C-49 amends the *Canada Transportation Act* to enable the Canadian Transportation Agency (CTA) to make regulations establishing a new air passenger rights regime. This new agency will have increased oversight, which is always a concern. NATA is a member of the CTA accessibility committee, and has provided position papers in response to the agency's proposed plans. Senior officials from the CTA will be making a presentation at NATA's 42nd annual general meeting to ensure northern operators are aware of their new responsibilities to meet regulatory requirements.

Flight crew recruitment and retention is also a very important issue to NATA operator members. A skills development panel will address pilot shortages and discuss what can be done.

At the recent Canadian Aviation Regulation Advisory Council (CARAC) plenary session on Feb. 22, 2018, an overview of Transport Canada's transformation plan, with a five-year implementation process to increase fees, was provided. Transport Canada plans to update its user fees for services such as certifying new aircraft and will introduce new fees for all other business lines. According to the regulator, many existing fees have not been updated since the 1990s and no longer reflect the cost of providing the service. Modernizing the cost recovery regime is expected to generate tens of millions of dollars annually in new revenue by 2021 or 2022, putting the department in a better position to carry out its responsibilities.

This is why associations like NATA are important: To hold the regulator accountable. NATA believes safe, affordable and sustainable air service is essential to the economic development of northern and remote Canada. Any new fees will increase the overall cost of travel.

On average, northern Canadians travel by air six times more than people in southern Canada, who have other travel options. For the North, any increase in travel costs results in an increased cost of living. ❏



Jason Miller, Baffin Photography Photo



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# Column

VIEW FROM THE HILL  
BY KEN POLE

Ken Pole has had a life-long passion for aerospace, writing about all its aspects for nearly 40 years. The longest-serving continuous member of the Canadian Parliamentary Press Gallery, he's also an avid sailor.



## The foxtrot files: Frustrating fandangos around fatigue and fighters

Aircrew fatigue has been an issue ever since we were capable of flights of more than a few hours. A huge body of literature, notably by NASA's Ames Research Center in California, proves that tired crews are dangerous and potentially deadly.

But where should we draw the line on flight and duty time (FDT)?

FDT and fatigue have been the focus of an often-heated discussion here and elsewhere as regulators try to come to grips with the issue. Our government advocates for a "one-size-fits-all" policy, with Transport Minister Marc Garneau citing "science-based evidence" in support of his department's proposed prescriptive approach, despite years of discussion with a generally critical industry.

"We need the best available science to ensure that any changes to current regulations are best designed to address the needs of all sectors."

That aside, the debate drags on. NATA said the "link to science is broken," including by unions which obviously would like to have operators hire more aircrew and other personnel, hence building their revenue base while giving them more leverage in contract talks. Mind you, employers must contain their costs if they're to remain in business—and keep employing people.

NATA also believes that Transport's requirement of 10 hours rest between work assignments when away from home and 12 hours when at home is a good example

of a helicopter pilot flying multiple short VFR sectors in a remote environment and a fixed-wing pilot flying a large transport category aircraft in a long-haul international environment," NATA pointed out. "Similarly, northern scheduled operations are vastly different from southern operations."

That's something the industry has tried to make clear countless times during meetings with regulators, many of whom are current or former pilots.

While I'm on the fatigue issue, and I admit it's an awkward segue, how about Canada's tired plan to acquire new fighters? This frustrating fandango, like the FDT discussion, continues to stutter-step along.

I recall seeing a huge Joint Strike Fighter (JSF) banner on a hangar at the 1997 Paris Air Show. This was shortly after Canada confirmed its JSF participation and long after the need for new fighters had been identified. That was more than two decades ago!

At the time, the JSF was a paper airplane, but Canadian officials at the show said participation would give our industry a shot at a global supply chain projected at 2,000 to 3,000 aircraft, the largest internationally co-operative venture of its kind since the Second World War.

Those officials also talked about how our CF-188 Hornets would be at the end of their operational life between 2017 and 2020.

It was a great vision, but as John Lennon wrote in 1980, "Life is what happens to you while you're busy making other plans."

Life and planning in the military procurement world being what they are, the Royal Canadian Air Force (RCAF) could be flying our updated "legacy" Hornets into the 2030s. This despite Defence Minister Harjit Sajjan's insistence nearly two years ago that "we move very quickly" to address a perceived "gap" in the RCAF's capacity to fly more missions simultaneously.

The truth in both situations is, as they say, out there—but where? Mulder and Scully are still too busy on the X-Files. Whiskey Tango . . . anyone? 🍷

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**“WE NEED THE BEST AVAILABLE SCIENCE TO ENSURE THAT ANY CHANGES TO CURRENT REGULATIONS ARE BEST DESIGNED TO ADDRESS THE NEEDS OF ALL SECTORS.”**

Many in the operational community continue to push back. As Glenn Priestley writes on the previous page, FDT is expected to be a hot topic at the Northern Air Transport Association (NATA) annual meeting, conference and tradeshow April 23 to 25 in Whitehorse, Yukon.

Calling the government's plan "broad and arbitrary," NATA believes it will "negatively impact system safety and increase costs to northern communities." The same can be said for smaller operators across the country.

NATA wants Ottawa to defer implementation pending "meaningful consultation" with the industry, adding,

of regulatory wrongheadedness. Current rules mandate an eight-hour "sleep opportunity," which typically means 10 to 12 hours between shifts.

"In this case, the current regulation provides a logical link from the science while the proposed new regulation does not. In fact, one could easily make a plausible argument for more rest time when away from home and less at home," where the association said real rest could be an elusive commodity because of family and other demands.

Then there's the "a pilot is a pilot" stance that underlies Transport's approach.

"There is very little similarity between



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# Column

## FOCAL POINTS BY TONY KERN

Editor of the *Controlling Pilot Error* series, Tony Kern is one of the world's leading authorities on human factors training in aviation. A former lieutenant colonel in the U.S. Air Force (USAF), he served as chief of cockpit resource management plans and programs at the USAF Air Education and Training Command. He is author of three bestselling aviation books: *Redefining Airmanship*; *Flight Discipline*; and *Darker Shades of Blue: The Rogue Pilot*, all from McGraw-Hill.



## The cracked cup

I'm a coffee drinker. Nothing fancy, hot and black. The blacker the better. I like to drink this magical elixir from simple ceramic cups that I have collected over the years at antique stores, garage sales and the like. I have a lot of them.

One of my favourites is a simple white cup that's yellowed a bit with age. It has a beautiful hand-painted scene of a bird dog on point; some kind of Setter. A few years ago, I had left it banging around the floorboard of my old pickup truck a bit too long, and a tiny crack formed from just left of the handle halfway down.

It didn't look too severe, so I decided to fill it up and do a leak check. Sure as heck, after a few minutes coffee began to weep out of the crack. Nothing torrential, but a leak nonetheless. After about three minutes, the weep would result in a brown drop that inevitably fell onto whatever surface the cup was sitting on. It was *broken*.

I was sad and a bit angry with myself for letting this happen. It was one of my

favourite cups; no doubt, it had had a long history well before I adopted it from high on a dusty shelf at that antiques store in Fredericksburg, Va. I couldn't bring myself to throw it away.

So I continued to use it, and do this day, with one paper towel alongside and one underneath to wipe it down every few minutes. In a weird way, I've found that this process actually improves the way I drink coffee.

A swallow or two every couple of minutes, before the leak drips down, seems to keep the coffee from being forgotten and growing cold, like it does in so many of my other non-flawed cups.

Over time, the crack has become a part of the cup's personality, a brown-stained rivulet now adding to its beauty—and perhaps even its usefulness. My cup is no longer flawless, but my personal history with it—and my adaptation to its imperfection—has added to its worth. At least to me.

So the simple moral of this story is that flaws often improve things when we

take some time to look at them and see something other than *brokenness*.

My cracked cup became more beautiful and valuable to me *because* of its flaw—not in spite of it.

In many ways, society's expectations have taken away our ability to be cracked cups—and our ability to recognize flaws in order to appreciate their usefulness.

Like about two billion others, I've got a Facebook account. I'm not addicted to it, but enjoy the connectedness to many people I would have otherwise forgotten. They all seem so happy. Pictures of perfect smiling faces, vacations, and get-togethers stare back at me in two dimensions. Then every so often, I hear that so-and-so got divorced, or is suffering from depression, or their child has a drug problem, and it makes me wonder.

Everyone seems to work hard to project online perfection, and I fear this tendency carries over to our professional lives.

We wear masks to work, and generally try to cover the cracks in our lives with innocuous lies about our well-being, anti-aging creams and other similar nonsense. This is a mistake. A big one.

Professionals aren't perfect. We are all cracked in some small way. When we learn to embrace our flaws, we grow from them. When we hide them, especially from ourselves, we deny our specialness—the very qualities that make us unique and drive us to adapt and improve. When we don't accept the small cracks for what they are, we can become frustrated with our inability to be flawless.

Right about here, I expect some of my longtime readers to be saying, "Hey, isn't this the guy who is always telling us to practice precision and picture perfection? What's up with this 'accept the cracked cup crap?'"

The practice of precision is fully aligned. We all should strive to be better every day, maybe someday even touching the face of perfection for a short time.

Recognizing the cracks is a first step. Some can be fixed, others not. But that's no reason to throw out the cup! 🍻

“PROFESSIONALS AREN'T PERFECT. WE ARE ALL CRACKED IN SOME SMALL WAY. WHEN WE LEARN TO EMBRACE OUR FLAWS, WE GROW FROM THEM.”



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INSIDE

## Edmonton Air One

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ALSO

## Back on board

Canada has recommitted to the NATO AWACS program.

PLUS

## Aurora successor?

Saab is hoping its new Swordfish will catch Canada's eye.

# BRIEFING ROOM

AVIATION INDUSTRY NEWS



## Pearson aims to work smarter, not harder, as it grows

Canada's busiest airport could be one of the first in North America to implement airport collaborative decision-making.



Airport collaborative decision-making (A-CDM) will gather data from airlines, Nav Canada, ground handlers and the GTAA into an accessible situational awareness tool that will increase operational efficiencies. **Eric Dumigan Photo**



Ben Forrest

Airport News

Toronto's Pearson International Airport is keeping pace with the rising demand for air travel in southern Ontario, with ever-increasing aircraft movements and passenger volumes projected to reach about 80 million a year by 2035.

But as the airport prepares for more growth, there's an awareness it needs to work smarter, not harder, to reach its goal of becoming the best in the world.

"We believe we're very good at operating today," said Wil MacMillan, director of airport collaborative decision-making (A-CDM) implementation for the Greater Toronto Airports Authority (GTAA), the organization that runs Pearson.

"But we also believe there's room for improvement, and we believe [A-CDM] is going to be a significant contributor to achieve that vision."

A-CDM is a holistic approach to information sharing within an airport, gathering data from airlines, Nav Canada, ground handlers and the GTAA into a single situational awareness tool that all the players can access. It is expected to create better operational decisions and improve traffic flow.

"We believe this is going to help us with efficiencies at our airport, and it's going to help us drive better utilization of our resources," said MacMillan.

"The ultimate aim of all of this is to enhance the passenger experience, because A-CDM for us is about the flow of aircraft, passengers and baggage."

A-CDM is a step toward so-called "total

airport management," which would use a central system to flag issues anywhere in the airport that cause delays, from customs to passenger boarding and anything in between, and use it to make decisions about when aircraft depart or land.

"We want to move from our current state, which is first come, first served, basically, in a day-of situation, and we want to move to best planned, best served," said MacMillan.

"This system will give all of our stakeholders better data, better information, because we are going to be connecting to the same new system ... for example, Nav Canada will be able to project runway times, and then we will assign variable taxi times—just improve the process flow overall."

All aircraft would have a target start approval time (TSAT), as well as a

prescribed trajectory on the ground. Airlines with multiple aircraft scheduled to leave at the same time would also be able to prioritize those flights, ensuring those with the highest priority take off first.

“Instead of having really long queues, we believe we’ll be able to save a significant amount of fuel burn by reducing taxi-out times,” said MacMillan.

A-CDM has been implemented in 26 airports in Europe, as well as in Singapore, South Korea, New Zealand and India. But it’s believed Pearson would be the first airport in North America to implement the system in this way, with an expected launch date of late 2018 or early 2019.

“We’re building something that is unique to Toronto,” said MacMillan. “But at the same time, we’re also working with the airlines and Nav Canada to develop a model of A-CDM for the national level that other airports can follow if they desire, allowing for harmonization across Canada.”

While A-CDM is intended to improve operations, it remains to be seen if it will benefit business aviation to the degree it benefits scheduled airlines.

“The response is in the details,” said Rudy Toering, interim president and CEO of the Canadian Business Aviation Association (CBAA).

“Business aviation only represents six per cent of total movements at Pearson and to date the ‘first come, first served’ ability to depart and arrive as required, with the expert assistance from Nav Canada, has worked extremely well.”

Toering said he hadn’t seen enough about A-CDM to have an opinion on its benefits or drawbacks to business aviation.

“I have spoken at length with Wil MacMillan at the GTAA and we will continue our dialogue with an open mind,” he said.

“The primary purpose of corporate aircraft around the world is to provide corporations with a business tool that is a time machine that delivers the users flexible arrival and departure times.

“That business advantage need will drive our discussions with the GTAA so that we all fully understand the impact of these changes.”

As for MacMillan, he sees A-CDM as a step toward improving the airport experience for passengers as well as operators, and a step toward becoming the best in the world.

“Everything that we are doing is aimed to fit our overall strategy and our vision,” he said.

“And absolutely, this is designed with that in mind—how do we help ourselves get better and help all our stakeholders get better as well, inclusive of both general and commercial aviation?”

In March 2018, Pearson airport was named the best large airport in North America according to a passenger survey performed by Airports Council International, the global organization representing the world’s airports. ✨

# Pipistrel Alpha Electro comes to Canada



Ben Forrester  
General Aviation News

Cruising steadily over British Columbia’s lower mainland, the only noise inside the cockpit of the Pipistrel Alpha Electro, a fully-electric two-seat trainer, is the gentle thrum of its propeller.

“It’s pretty quiet,” said James Douma, a software developer from West Vancouver who is the aircraft’s first Canadian customer.

“It’s like an electric fan, I guess, is the closest thing ... you can talk with your passenger quite comfortably without the headset.”

The sound has also drawn comparisons to the whirring spaceships in *The Jetsons* cartoon, and Pipistrel hopes it will be frequently heard at flight schools around the world.

“Its sole design purpose is to fly circuits in the training environment,” said Jonas Boll, owner of Pipistrel Canada, the Slovenian planemaker’s Canadian distributor.

“However, we have found it will travel a distance of 150 kilometres at a cruise speed of 212 kilometres per hour, landing safely with approximately 40 per cent battery charge remaining.”

“If you are flying full speed, it has approximately an hour of useful flight time, plus the half-hour reserve ... it does well in densely populated areas, where there are multiple airports within a 150-kilometre radius.

“As battery technology improves, so will this aircraft’s capabilities. And for training purposes it’s perfect, because most training flights are 50 minutes to an hour.”

Another key selling point, to flight schools as well as private pilots, is reduced operating and maintenance costs.

It takes less than an hour to charge the Alpha Electro, at a cost of \$1.50 for customers using the power grid in B.C., compared with about \$40 to fill up a comparable aircraft with aviation gasoline.

The Alpha Electro’s 50 kilowatt motor has only one moving part—the bearing—and increases to 60 kilowatts of power for one minute at takeoff. Maintenance is said to be simpler and more inexpensive than with traditional aircraft.

“My maintenance is going to be almost nothing,” said Douma. “I’m not doing oil changes and all these sorts of things that you have with a regular airplane.”

The Alpha Electro is small and relatively light, measuring 6.5 metres (21.33 feet) from tip to tail, with a 10.5-metre (34.4-foot) wingspan and a maximum takeoff weight of 550 kilograms (1,212 pounds).

Its best endurance speed is 85 knots (157 kilometres per hour), with a cruise speed of 115 knots that only reduces its range by three per cent when compared to endurance speed.

The aircraft has a maximum climb rate of 1,220 feet per minute, and its motor doesn’t require a warm-up period.

“It’s just a matter of making sure that issues that are specific to Canada are addressed,” he said.

“For example, currently the airplane doesn’t have provisions for cockpit heat, but that’s something that I’ve brought up with the engineers, stating that if we want this thing to fly in Canada, it’s mandatory ... and that shouldn’t be an issue. It’s just something that we haven’t put in place yet.” ✨



It takes less than an hour to charge the Alpha Electro, at a cost of about \$1.50 for customers on the power grid in B.C. Pipistrel Canada Photo

# Edmonton Police Service welcomes Airbus H125



The new H125 is the third Airbus aircraft to be operated by the Edmonton Police Service. **EPS Photo**

The Edmonton Police Service (EPS) has taken delivery of its third Airbus helicopter, an H125, which will allow for greater in-air coverage and policing of the growing city of Edmonton. When combined with other policing resources, the H125 will add increased operational efficiency, fitting the ever-expanding role of EPS. "With the continued growth of the city, the mobility of criminals across the

region, and the need for greater public and officer safety, a new helicopter with enhanced capability is required," said Greg Preston, acting police chief. "Because the new Air One is better, stronger, and faster than our previous helicopters, we can provide a greater level of safety and support across the city."

In addition to emergency response, the H125 will be utilized for air patrol and surveillance, supporting ground missions, providing real-time information surrounding emerging circumstances, and managing in-progress incidents.

The H125 was selected because of its capabilities during high-speed pursuits, particularly its excellent manoeuvrability. Equipped with a FADEC engine, the H125's modular design creates ease of maintenance, resulting in an increased rate of availability.

EPS took possession of an H120 in 1999, followed by delivery of a second H120 in 2009. ✦

## Viking endorses first component centre for Canadair firefighting aircraft

Viking Air Limited of Victoria, B.C., has selected Antavia - AMETEK MRO of Campsas, France, as the first factory-endorsed component centre (FECC) for the global fleet of Canadair aerial firefighting aircraft.

Under Viking's FECC Program, Antavia will be responsible for providing authorized maintenance services on landing gear for Canadair CL-215, CL-215T, and CL-415 aircraft.

Antavia is a leading aircraft service company with almost 20 years of experience providing maintenance support to the Canadair fleet. Its central location in France is well-situated to service the densely-populated European fleet.

"The selection of Antavia to join Viking's worldwide customer support network was a natural fit due to their shared commitment of providing aerial firefighting aircraft customers with first-rate service and uninterrupted support," said Gregory Davis, Viking's vice-president of customer service and product support.

Viking's success in giving new life to the aerial firefighter program has included establishing and further developing business relationships with key suppliers to improve support of the aircraft.

Since 2016, Viking and Antavia have been working together to improve shop turn-around times and spare parts availability, as well as provide engineering solutions that minimize aircraft maintenance downtime. ✦

Since it acquired the CL-415 waterbomber program from Bombardier in 2016 (which covers earlier CL-215 variants as well), Viking Air assumed responsibility for product support, parts and service. **Gerard Joyon Photo**



**Field Maintenance for Bell 206, 206L, 205, 212, 412 and Robinson R22 and R44.**

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# Canada to support NATO Airborne Warning and Control System program



► Ken Pole

Military News

Canada is renewing its financial contribution to the NATO Airborne Warning and Control System (AWACS), partly restoring a long-standing commitment terminated by the former Conservative government nearly seven years ago.

“NATO is a cornerstone of Canada’s international security policy and is one of our most important multilateral relationships,” said Defence Minister Harjit Sajjan in a Feb. 14 statement during a visit to the 29-country alliance’s headquarters in Brussels, Belgium.

“AWACS is a key NATO capability that we will support by contributing to its operations and support budget. We have committed to keeping Canada engaged in the world, and continuing to commit

ourselves to NATO and its missions are important steps toward that goal.”

Canada’s immediate commitment is for funding rather than personnel, to the tune of between \$17 and \$20 million annually. However, the Department of National Defence (DND) told *Skies* in an email that “the potential for RCAF members to service . . . will be explored at a later date.”

DND acknowledged that intelligence, surveillance and reconnaissance are “increasingly relevant in today’s security environment,” in which the alliance has significantly increased AWACS missions.

This includes missions in central and eastern Europe, where Canada is leading a multinational NATO battle group based in Latvia.

Set up in 1978 and formerly known as the NATO Airborne Early Warning & Control (NAEWC) Force, its fleet of 16

E-3A modified Boeing 707s is based in Geilenkirchen, Germany.

The E-3A operations are staffed by approximately 1,400 military and civilian personnel.

Also used for command-and-control purposes as well as fighter control and search and rescue support, the E-3As are identifiable by the distinctive radar dome atop the fuselage.

Their usual operational altitude of approximately 10 kilometres (32,800 feet) enables their multinational crews to monitor airspace within a radius of more than 400 kilometres, digitally linked to ground, sea, and airborne commanders.

A typical mission lasts eight hours, during which their pulse Doppler radar can distinguish between targets and ground reflections, giving early warning of low- or high-flying aircraft operating over the territory of a potential aggressor. ✈

The NATO AWACS fleet of 16 E-3A modified Boeing 707s is based in Geilenkirchen, Germany. The aircraft are easily identifiable by the distinctive radar dome atop the fuselage. **DND Photo**





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The final configuration of Saab's Swordfish Maritime Patrol Aircraft (MPA) will be determined by customer requirements. However, the platform will share 70 per cent commonality with its GlobalEye sibling; that aircraft is already in production. **Saab Image**

# Saab makes headway on airborne surveillance family



► **Lisa Gordon**  
*Military News*

As it jockeys to position its single-engine Gripen as Canada's next fighter jet, Sweden's Saab is also making steady progress on a new family of airborne surveillance aircraft built on the Bombardier Global 6000 business jet platform.

Eventually, it hopes that one of those platforms will be selected to replace Canada's aging fleet of CP-140 Aurora maritime patrol aircraft.

On March 14, 2018, Saab celebrated the first flight of its GlobalEye airborne early warning and control (AEW&C) aircraft, capable of flying missions over air, sea and land. The aircraft had been unveiled to the media a few weeks before, on Feb. 23, and is currently in production. Its launch customer, the United Arab Emirates Armed Forces, placed the initial order in November 2015.

Another variant of Saab's airborne surveillance family is the Swordfish MPA, a multi-purpose aircraft targeted at anti-submarine warfare (ASW), anti-surface warfare, long-range search and rescue (SAR), and maritime ISR (intelligence, surveillance and reconnaissance).

The Swordfish will have 70 per cent commonality with the GlobalEye, with the remaining 30 per cent of the aircraft's unique systems dependent on a customer's specific needs. It is this platform that Saab

hopes to pitch to the Canadian government as the Aurora successor.

Saab also has plans for a SIGINT aircraft, a specialized signals intelligence jet that will be highly customized on a case-by-case basis.

"ISR is becoming more and more important," said Jonas Härmä, head of sales and marketing, Saab Airborne Surveillance Systems. "Things are changing really rapidly. You cannot handle what you don't know—our systems provide the end user with situational awareness. They find, detect and track a wider range of objects over an extended range."

AEW&C can extend low level radar coverage up to 10 times, increasing the early warning time from two minutes to 20 minutes when compared to conventional ground-based radar.

Härmä added that new types of conflicts and threats emerging in non-traditional domains are creating new demands for safety and security. In his opinion, the ability to continuously assess a developing situation will be most critical.

"In practice, it's very often these complex theatres where you have normal everyday life going on in parallel with a war situation. You need to handle so many aspects. We'll probably see more crises and war situations; the enemy today hides in the general public."

After an exhaustive evaluation of available platforms for its new family of aircraft, Saab selected Bombardier's Global 6000.

"We filtered out the best possible fit for our mission profile and what we were trying to achieve from an operational perspective," Härmä told *Skies*.

With a potential range and endurance of 12 hours, the Global 6000 provides a strong vehicle to carry heavy AEW&C equipment and sensors. Up front, its Rockwell Collins Pro Line Fusion-based Vision flight deck allows operations even under harsh conditions, while the cabin's low noise and pressurization create a comfortable environment for extended surveillance missions.

"We went through a truckload of potential platforms, and we opted for the business jet size for several reasons. We have ample growth potential and reserves of space, weight and power provisions, without going overkill on platform size. It has good performance and since it's a business jet, it needs very little logistical support."

Green aircraft are purchased from Bombardier and flown to Sweden, where all AEW&C modifications are done by Saab. Härmä said Bombardier has provided engineering advice and remains the holder of the aircraft type certificate, while the added modifications are covered by a supplementary type certificate (STC) held by Saab.

Steven Murphy, Swordfish product manager, noted that older maritime surveillance aircraft—including the P-3 Orion (upon which the CP-140 Aurora is based)—were built larger for a reason.



The GlobalEye logged a successful maiden flight on March 14, 2018. The launch customer for the aircraft is the United Arab Emirates. **Saab Photo**

“Those platforms needed to be that big due to the equipment racks, size of sonobuoys, etc. But now, [as equipment gets smaller] the customer ends up with more units and more sensors in the air for less cost,” he said.

“We’re up to three times the amount of sonobuoys that are on board the CP-140—the important thing there is that you could have 10, 12, or 50 hours endurance, but once the sonobuoys are gone, the ASW mission comes to an end quite quickly.”

Murphy, an ex-Royal Air Force pilot who served an exchange with the RCAF in Greenwood, N.S., helped bring the Block III Aurora into service.

“The Block III and Block IV Aurora are right up there in terms of capability, sensors and tactics. Going forward though, one challenge is that the CP-140 airframe is old.”

The RCAF’s fleet of CP-140 Auroras was procured in the early 1980s and was tasked primarily with ASW, although the aircraft also supports illegal fishing, immigration, pollution and drug trafficking investigations, and has recently extended its repertoire to include over-land missions.

### SWEET SOLUTION?

Saab is currently looking for a launch customer for the Swordfish. While the final aircraft configuration depends on customer requirements, the GlobalEye undertook its first flight within 28 months of its launch customer contract signing. Saab hopes the Swordfish would make similar progress.

Besides Bombardier as the Global 6000 manufacturer, Peterborough, Ont.-based Flying Colours is handling the interior completions on both the GlobalEye and the Swordfish.

Other Canadian partners in the Swordfish project include CAE (magnetic anomaly detection), General Dynamics Mission Systems Canada (acoustic processing suite), and Ultra Maritime Systems (sonobuoys).

The aircraft will feature a mission management system with five operator stations, two observer positions, a



Saab Graphic

crew rest/planning area, a lavatory and a galley, with sonobuoy launchers, control systems and storage in the rear.

“I think we’ve come up with a pretty sweet solution which will fit most known concepts of operations,” concluded Härmä. “ASW is the main, with general ISR, SAR, combat SAR, and a central node in terms of addressing SAR missions. In terms of adaptability, growth potential is still there.”

In February 2018, Canada agreed to join a NATO coalition of eight countries seeking to jointly purchase a new fleet of maritime surveillance aircraft. While a statement of requirements is anticipated by the end

of this year, contenders are expected to include the Boeing P-8 Poseidon and the Airbus A319 maritime patrol aircraft, as well as the new Saab Swordfish.

Speaking about the agreement, Murphy concluded, “There is a real emphasis on anti-submarine warfare. That is where I think we’re on track with the Swordfish.”

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# PlaneSPOTTING



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● ABOVE: **Dennis Benett** took this early-evening photo of WestJet's new Boeing 737 MAX 8 taxiing for the runway at Toronto's Pearson International Airport.

● RIGHT: Boom! A U.S. Air Force F-35 Lightning II streaks past at the London International Airport during Airshow London last September.  
**John Chung Photo**





## PHOTOS FROM OUR READERS

Skies highlights photos posted on [skiesmag.com](http://skiesmag.com) and [facebook.com/skiesmag](https://facebook.com/skiesmag)

● **BELOW:** A trio of RCAF CH-146 Griffons from 408 THS flies over the Golden Gate Bridge in San Francisco on the way back to Edmonton, Alta. The squadron was in the U.S. in March for training in Twentynine Palms, Calif. **Anthony MacLeish Photo**

● **BOTTOM:** Based in Yellowknife, N.W.T., **Stephen M. Fochuk** is well known for capturing images of aircraft in action in the Canadian Arctic. This time, an Air Canada Express CRJ900 operated by Jazz Aviation takes off into sunny skies at the Yellowknife Airport.





# THE FIGHTER

# 5

Canada has approved the suppliers list for an eventual competition to replace its CF-188 Hornet fighter jet fleet.

► BY CHRIS THATCHER

**F**ive teams have been approved to submit proposals for a fighter jet to replace the Royal Canadian Air Force (RCAF) fleet of CF-188 Hornets.

The teams, comprised of foreign governments and their aircraft manufacturers, were confirmed by Public Services and Procurement Canada (PSPC) on Feb. 22 as part of an approved suppliers list for an eventual competition.

The government had asked all interested suppliers and supporting governments to register for a suppliers list by Feb. 9. Only companies on the list will be invited to submit bids when a request for proposals (RFP) is issued in spring 2019 for a competition expected to be worth between \$15 and \$19 billion.

Eligible aircraft include Lockheed Martin's F-35A Joint Strike Fighter and Boeing's F/A-18E/F Super Hornet, both

While the competition for new fighter jets is underway, Canada's interim plan is to buy 18 F/A-18A/B Hornets from Australia while also upgrading the RCAF's fleet of 76 CF-188s. The government hopes the Hornets from Down Under will begin arriving in the summer of 2019. **Stuart Sanders Photo**



Despite Prime Minister Justin Trudeau's now-famous 2015 campaign promise that, "We will not buy the F-35 stealth fighter-bomber," the once dark horse is back in the running. **Dave Mills Photo**



Sweden's Saab tends to market its JAS 39 Gripen to countries looking for a capable and affordable swing-role fighter. Besides the F-35, it is the only other single-engine fighter in the Canadian competition. **Saab Photo**

from the United States; France's Dassault Aviation Rafale, with support from Thales and Safran Aircraft Engines; Sweden's Saab JAS 39 Gripen; and the United Kingdom- and Northern Ireland-supported Eurofighter Typhoon.

While a suppliers list is not unusual in defence procurement projects, making a foreign government rather than a defence company the primary point of contact is new.

"The consideration for us has been the nature of the fighter capability that we are looking for, and the fact that the solution is necessarily going to involve some highly controlled technologies, and the requirements to exchange information at a significant security level," Troy Crosby, PSPC's director general for major defence

Once thought to be the favourite contender, the outlook for Boeing's F/A-18E/F Super Hornet is more uncertain following a trade spat between Bombardier and Boeing over C Series passenger jet sales in the U.S. **Boeing Image**



The twin-engine Eurofighter Typhoon is a collaboration between the U.K., Germany, Italy and Spain. All four founding nations use the aircraft in their own air forces. **RAF Photo**



Dassault bills its "omnirole" Rafale as equipped with multi-sensor data fusion driven by an upgradeable modular data processing unit, incorporating commercial off the shelf components. **Dassault Photo**



projects, told *Skies*. "[It] ensures we are working through an organization that has a real awareness and experience with the kind of solution we are looking for."

With the list finalized, the government will now begin formal engagements with the teams over the next 12 months to "get more into the details of how we are going to put the solicitation document together," he explained.

An RFP for 88 advanced fighter aircraft, initial weapons and ammunition, spare parts, supporting infrastructure, pilot and maintenance technician training, and through-life sustainment is expected in early 2019 and a contract awarded in 2021 or 2022. The first aircraft should be delivered in 2025.

In the interim, to meet its NATO and NORAD commitments, the government is pursuing a plan to acquire 18 F/A-18A/B Hornets from Australia while also upgrading the RCAF's fleet of 76 CF-188s.

Patrick Finn, assistant deputy minister, Materiel, told the House of Commons defence committee in early February that Canada had received a letter of cost proposal from Australia. "That is going through final cost validation by our [chief financial officer] and others...[but] we've signalled that we want to receive them," he said.

The government hopes to have a deal confirmed by the end of fall 2018 to then start receiving the first aircraft by summer 2019. Under International Traffic in Arms Regulations (ITAR) regulations, Australia must first obtain approval from the United States to transfer controlled goods to a third party. Finn said that process was underway.

Canada and Australia will then "negotiate which jets Canada receives based on the expected retirement date of the various Australian aircraft," said a defence department spokesperson.

That will also include negotiations over the final cost of the aircraft. Finn said the government had set aside "about half a billion" for aircraft, weapons, parts, infrastructure and "a whole bunch of things we need to do" such as structural modifications to bring the Australian jets to the same standard as the Canadian Hornets.

The proposed life-extension program for the CF-188 fleet would allow the RCAF to continue flying the Hornets until 2032, when the last of the new replacement aircraft are expected. The CF-188s began entering service in 1982 and the Air Force originally planned to retire the fleet by 2025.

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“BOEING AND LOCKHEED MARTIN REGISTERED WITH THE U.S. GOVERNMENT FOR THE SUPPLIERS LIST, BUT QUESTIONS REMAIN AS TO WHETHER EITHER COMPANY WILL RESPOND TO AN EVENTUAL RFP.”

Postmedia, citing a report by National Defence and the Canadian Armed Forces prepared in December 2014, reported that an upgrade program to extend their lifespan into the 2030s could cost up to \$1.5 billion.

Although both Boeing and Lockheed Martin registered with the U.S. government for the suppliers list, questions remain as to whether either company will respond to an eventual RFP.

Boeing opted out of an industry day in January attended by about 200 representatives from 180 Canadian and international companies, at which federal officials outlined the acquisition plan. At the time, officials reaffirmed that bidders would be at a disadvantage if they were assessed to have caused economic harm to Canada, a measure labelled by some as the “Boeing clause” for the company’s dispute with Bombardier.

In a statement, Boeing spokesperson Scott Day said the company would evaluate its participation in the future fighter process “after the government outlines the...procurement approach, requirements and evaluation criteria.”

Meanwhile, Lockheed Martin has expressed concerns about the government’s insistence on applying its Industrial and Technological Benefits (ITB) policy that would require “the winning supplier to make investments in Canada equal to the value of the contract.”

Under the Production, Sustainment and Follow-on Development Phase Memorandum of Understanding (PSFD MOU) signed in 2006 by all partner nations in the F-35 JSF program, Canada agreed to an industrial participation approach known as “best value” that would preclude the application of “offsets” such as Canada’s ITB policy.

A report prepared in 2012 on Canada’s industrial participation in the program noted that while the MOU was not “an irrevocable decision to forego the application of [the ITB policy] to its procurement of next generation fighter capability,” Canada could only do so if it exited the F-35 JSF program and sacrificed “preferential access to JSF industrial opportunities.”

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**CHRIS THATCHER**

Chris Thatcher is an aerospace, defence and technology writer and a regular contributor to Skies.



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# BARE TRAVEL



# BONES

Competitors in Canada's ultra-low-cost airline industry are in a race to attract a new breed of air traveller—one who feels no allegiance to any particular brand. **BY LISA GORDON**



Kelowna, B.C.-based Flair Airlines (which took over ticket reseller NewLeaf Travel Co. Inc. last June) currently operates a fleet of seven Boeing 737-400s. Plans are underway to keep the planes busy in the winter by adding scheduled flights into the United States and charters into Mexico, thereby reducing dependence on the Canadian market. **Mike Luedey Photo**



WestJet's Swoop is supposed to begin flying this June with a fleet of four Boeing 737-800s. However, the airline is currently negotiating a first contract with the Air Line Pilots Association and there are reportedly unresolved bargaining issues. **WestJet Image**

**C**anadian airport ramps are crowded with the ghosts of airlines past. Does anyone remember Skyservice Airlines? How about Canada 3000, Jetsgo or Zoom? Or maybe you travelled on CanJet, Roots Air or Harmony Airways? These are just some of the defunct airlines that tried—and failed—to make a go of it in the Canadian airline industry.

This country is notoriously tough on operators who dare to compete with the reigning duopoly of Air Canada and WestJet. Together, the two controlled a whopping 70 per cent of domestic market share in 2017, according to market research portal Statista.

And yet, a May 2017 North America airline satisfaction survey performed by J.D. Power found that Air Canada bottomed out in the traditional carrier category, with a mere two out of five stars. Likewise, WestJet only landed two stars in the low-cost carrier category, leaving the distinct impression that Canadians would appreciate—indeed, welcome—other travel options.

### A MATTER OF TIMING

Let's go back a few years to when the Canadian dollar was soaring in 2012, and so was the cost of aviation fuel. As domestic airlines raised ticket prices in response, many consumers elected to drive across the border to fly from a U.S. airport. In many cases, they saved themselves hundreds of dollars.

That same year, the Conference Board of Canada reported that roughly five million Canadians crossed the border by land in order to catch flights from American airports. The organization said this exodus was driven by a "perfect storm" of factors, among them wages, fuel prices, taxes, and fees for airport and navigation services.

"Together, these are providing a 30 per cent cost advantage to U.S. carriers," wrote the board's Vijay Gill in a now six-year-old report titled, *Driven Away: Why More Canadians are Choosing Cross Border Airports*.

Gill noted that changes in Canadian policies could bring millions of passengers back to domestic airports and help to counter the U.S. carriers' cost advantage. This advantage was attributed to a mix of factors, including high fees and taxes levied by Ottawa and the provinces, as well as air carrier productivity and more aviation-friendly policies south of the border.

But it looks like the biggest factor driving Canadians to fly from domestic airports was simply the exchange rate. Today, the Canadian dollar is worth about 77 cents compared to the U.S. greenback. Contrast that to 2014, when the loonie started the year at 94 cents U.S., and suddenly crossing the border to fly with a U.S. carrier doesn't seem so appealing.

In fact, data from the U.S. Bureau of Transportation Statistics shows that four out of five border airports popular with Canadians saw their passenger traffic decline in the first 10 months of 2015,



“A carrier should have \$50 million for a start-up with narrow-bodies,” asserted Robert Kokonis, president and managing director of AirTrav Inc., a Toronto-based aviation consulting firm founded in 2001. “The top reasons airlines go out of business are under-capitalization, going into the wrong markets, and expanding too fast. This business burns money. The costs are high over the short term and volatile, but dealing with the economy and competition requires a buffer.”

(Both Canada Jetlines and Enerjet’s FlyToo venture received immediate exemptions in late 2016 to allow them to pursue more foreign investment.)

But while consumers may be rubbing their hands with glee as they contemplate cheap no frills travel, industry analysts say there’s no way the Canadian market can support all of the ULCC contenders trying to get off the ground.

### IT’S TOUGH OUT THERE

Canada has traditionally been a merciless proving ground for any airline.

There are several reasons why, and the first is simple geography. While this country is about one tenth the size of its southern neighbour population-wise, Canada’s territory is massive, spanning 5,063 kilometres from Victoria, B.C. in the west to St. John’s, N.L. in the east. Not to mention the fact that flying from its southernmost point in Lake Erie to its northern tip on Ellesmere Island would necessitate traversing more than 4,600 kilometres.

And in this vast land, there aren’t very many people. According to Statistics Canada’s 2016 census data, 66 per cent of the country’s 35 million citizens live within 100 kilometres of the U.S. border, in an area that represents only about four per cent of Canada’s total territory.

“We have a low population density,” said Kokonis. “In the U.S. and in Europe, there is a denser population that is more evenly spread east-west and north-south, so if you have a hub-and-spoke [airline] operating model, you can go in any direction.”

This means that while Canada offers airlines a handful of lucrative shorter routes to populous destinations (the Toronto-Montreal-Ottawa triangle, for example), covering the country also means flying long hauls that don’t necessarily have the passenger demand to support them. Those lengthy flights require more fuel, and Canadian operators are forced to utilize more expensive airports in major centres due to a lack of secondary airports, which generally have lower landing and terminal costs.

Kokonis added that airlines and airports face other hurdles in the form of high taxes, fees and charges from both the federal and provincial governments—all contributing to the fact Canada is the only major western power that has not seen a successful ULCC

start-up. Also complicating the cost picture for upstarts is Canada’s small economy of scale relative to the larger U.S. market, making it that much more challenging to keep non-fuel unit costs down.

### A NEW BREED OF TRAVELLER

For the past five years or so, there’s been talk of new players in the Canadian airline industry; ULCC upstarts who aim to challenge the Air Canada/WestJet duopoly by targeting what Kokonis called a new breed of traveller.

“There is a certain segment of the population that doesn’t travel by air, or very rarely,” he said. “ULCCs are less about stealing passengers than accessing a new market.

“This new breed of traveller is totally unallied. They will switch to a different carrier with the snap of a finger; there is no affinity. For airlines, unless they have a product to satisfy that type of traveller, they will lose them to whoever else has a stripped-down version of economy or coach.”

Kokonis thinks WestJet saw an opportunity to capture that no frills passenger market and broaden its customer base. So, rather than losing business to another ULCC, the Calgary-based carrier decided to launch its own ultra-low-cost brand.

Announced in September 2017, WestJet’s Swoop is supposed to begin flying this June.

which roughly corresponds with the loonie’s decline. There have even been reports of the pendulum swinging in the other direction, with American licence plates now filling the parking lots at Canadian airports.

A weaker loonie has a big impact on how consumers book travel, and these days they’re choosing to shop—and fly—from home.

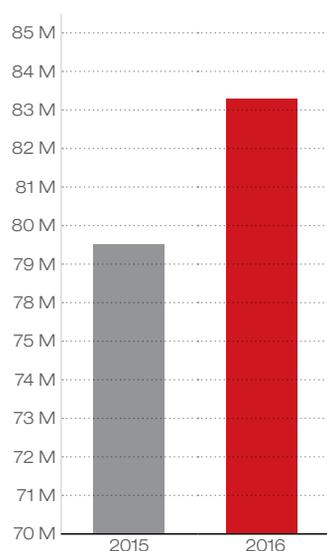
And what do shoppers like most? Competition, because competition means options. Everyone loves a good deal, especially on travel.

To some, the time is ripe for the advent of Canadian ultra-low-cost carriers (ULCCs).

Recently, the Liberal government tabled Bill C-49 to amend the *Canada Transportation Act*, which will raise the limit of foreign investment in Canadian airlines from 25 per cent to 49 per cent. The change provides air carriers with greater access to capital; thereby making the idea of a Canadian ULCC more feasible.

### DOMESTIC TRAVEL TREND

Statistics Canada reported on air carrier activity at Canadian airports in 2016. The numbers reveal a 4.8 per cent increase in domestic sector flying over the previous year.



Source: Statistics Canada

# THE FLAIR FORMULA: ULCC with a Canadian twist

► BY BRENT JANG

**J**im Scott makes no apologies for Flair Airlines Ltd.'s business strategy that deviates at times from what you might expect from an ultra-low-cost carrier (ULCC).

The rule of thumb for ULCCs is to operate at secondary airports, but Flair added Toronto Pearson International Airport and Vancouver International Airport to its network in mid-December of 2017.

"It's easier to fill the airplanes going into the major centres," said Scott, who took over as Flair's chief executive officer in January 2018.

While Scott inherited Flair's route map when he became CEO, he defends the decision to add Toronto and Vancouver to the company's list of Canadian destinations.

"Even when we go higher up in our ticket price, as long as we're lower than what's already on the market, it works," he said in an interview.

Flair's other destinations are Edmonton, Winnipeg, Hamilton and two B.C. communities—Kelowna and Abbotsford.

Scott said consumers are seeking bargains

in order to make it worth their time to drive from Toronto to Hamilton or from Vancouver to Abbotsford.

He said there are many factors that play into Flair's decision-making process, acknowledging the higher landing fees in Toronto and Vancouver compared with landing charges at secondary airports.

Since Flair doesn't fly non-stop between Vancouver and Toronto, the catch behind the discounted fare is that you need to board a connecting flight to arrive at your final destination.

"We're adapting the ULCC strategy for Canada. Canada is unique. It doesn't have that much population density," said Scott, who is a former pilot. "Secondary markets are tough to fill in the off-peak seasons. In the summer, they're great."

Plans are underway to keep planes busy by moving some of Flair's capacity in the winter schedule to incorporate scheduled flights into the United States and charters into Mexico, thereby reducing dependence on the Canadian market.

(Cont'd on p. 36)

Industry analysts were surprised when Flair Airlines added service to Vancouver International and Toronto Pearson International. Traditionally, ULCCs stick to smaller secondary airports that have lower landing and service fees. **Mike Luedey Photo**



Hamilton International Airport is attracting interest from ULCCs. In 2017, the airport welcomed 599,146 passengers, up 80 per cent from the previous year. **HIA Photo**

Located about an hour's drive from Vancouver, Abbotsford International Airport is another key destination for ULCCs. In 2017, the airport processed 677,653 passengers. **Mike Luedey Photo**

Calgary-based Enerjet's FlyToo is another ULCC hopeful. Funding is still being arranged. **FlyToo Image**



Initially, it will operate four Boeing 737-800s, but WestJet plans to grow to six aircraft by September and to 10 by spring 2019. It hopes to begin serving U.S. destinations later this year, subject to regulatory approval.

“Swoop is Canada’s first true ULCC that will compete in the price sensitive leisure segment,” said then-WestJet president Gregg Saretsky in February. “It will bring unbundled airfares to Canadian travellers that are approximately 40 per cent lower than those available in the market today. They will also have the option to purchase additional services such as carry-on baggage, extra legroom, or contact centre support, for a modest fee.”

That, in a nutshell, is the ULCC formula: aircraft with higher density seating serving smaller secondary airports, offering low base fares sold online, with added fees for pretty much everything else—including carry-on and checked baggage, priority boarding, seat selection, meals, and on-board entertainment. Basically, the ticket price

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"We're adapting the ULCC strategy for Canada," said Flair Airlines CEO, Jim Scott. Flair flew about 400,000 passengers in 2017 and forecasts that it will carry one million people this year. **Flair Airlines Photo**

(Cont'd from p. 34)

Flair's fleet consists of seven Boeing 737-400s, with the goal of adding two Boeing 737-800s some time during the winter 2018-19 flying schedule. By the end of next year, the goal is to have a total of 13 planes in the fleet.

No decision has been made yet on an aircraft type in the long term, after Flair phases out the Boeing 737-400s.

Flair flew about 400,000 passengers in 2017 and forecasts that it will carry one million people this year and 1.5 million next year.

Flair's predecessor, NewLeaf Travel Co. Inc., launched in July 2016 as a ticket reseller of flights operated by Flair, then a charter carrier. In June 2017, Kelowna-based Flair acquired NewLeaf and rebranded itself with a new livery and also transitioned to become a scheduled airline.

Jim Young, who worked in the first half of 2014 as president of Canada Jetlines Ltd., emerged in 2015 as NewLeaf CEO. He lost his job when Flair bought NewLeaf last summer. But Scott said Young has been retained as an adviser.

Scott is co-founder and a former executive at Jetlines. He served as Jetlines CEO from 2013 to May 2017. While Jetlines has yet to launch, Flair already employed 225 workers and had 50 contractors in early 2018.

Top Flair personnel include Chris Lapointe, vice-president of commercial operations, and Bill Hardy, vice-president of operations.

Jim Rogers, who co-founded Kelowna Flightcraft (now known as KF Aerospace), sold his shares in Flair in January 2018, to an investment group led by B.C. businessman Jerry Presley. Presley, who serves as Flair's executive chairman, now leads a private group of investors that holds a majority stake.

Efforts to reduce the cost per available seat mile (CASM) and make efficiency

gains are ongoing, including persuading more consumers to book directly on Flair's website. Scott said he has noticed that millennials prefer to book their flights online.

Flair temporarily dropped its \$30 fee for carry-on bags in December. The carrier is back to charging the fee, but gives consumers the option to choose from unbundled or bundled fares. "You can buy the unbundled, bare-bones ticket, and add more things. The bundled service is cheaper than adding everything together," he said.

One of the so-called frills that costs more money is extra legroom. Forty-six of the Flair Boeing 737-400's 156 seats have extra legroom (the first five rows, plus the two rows with the emergency exits).

Robert Kokonis, president of airline consulting firm AirTrav Inc., said it will be challenging for Flair to ensure its total revenue per available seat mile, including fees for roomier seats, will be higher than its overall CASM, given the relatively low seat density of Flair's aircraft. Keeping CASM ultra-low is critical for ULCC success. WestJet's Swoop entrant, by comparison, will offer 189 seats on its Boeing 737-800 aircraft.

Scott acknowledges the competition posed by Swoop in the ULCC space, but emphasizes that he isn't losing any sleep over what Jetlines or other prospective rivals might be doing, such as FlyToo.

"We can only really react to those who are publishing schedules and have inventory in the market," he said, adding that on some routes, Flair's jet service has the advantage over rivals operating turboprops.

"We're customer focused. If there are competing flights at the same price point, we want people to fly us. We want to be the better brand," said Scott. "Whenever we go into a market, we stimulate the market. We want to win the hearts and minds of consumers with service and not just price." ■

includes a (cramped) seat and nothing more.

"Canadians like low fares," said Saretzky. "We've always said that in this segment of the market, he with the lowest cost wins, and Swoop is purpose-built to compete effectively to generate accretive results for WestJet from the day of its first flight."

Barely a few weeks after making these remarks, however, Saretzky suddenly retired from WestJet on March 8, 2018. He is succeeded by Ed Sims, who has had a 30-year career in tourism and aviation, joining WestJet in May 2017 after serving as CEO to Airways, New Zealand's air navigation services provider.

The sudden management change took some industry analysts by surprise.

In an interview with BNN, Raymond James analyst Ben Cherniavsky said it is now "more likely that the path may change for WestJet."

He said the airline has undergone tremendous change over the past few years as it launched regional carrier Encore, expanded its mainline focus to international destinations, and unveiled plans for Swoop.

"The beauty of WestJet in the early days was how simple their business model was. As all of this complexity went into the business, that became the standard narrative around this company, of too many balls in the air and too much change.

"We will have to wait to hear what the vision of new leadership is, and if all of these new initiatives are still part of the plan. We are left with a fair amount of uncertainty," said Cherniavsky.

Saretzky's departure comes in the midst of WestJet's negotiations for a first Swoop labour contract with the Air Line Pilots Association, which represents about 2,000 WestJet mainline and regional pilots. The airline said on March 7, the day before Saretzky left, that it was still on course for a June launch.

While Swoop apparently still aims to be ready for takeoff this summer, one low-cost carrier is already in the air and looking to expand.

Kelowna, B.C.-based Flair Airlines (which took over ticket reseller NewLeaf Travel Co. Inc. last June) currently operates a fleet of seven Boeing 737-400s. Its new CEO, Jim Scott, said the carrier is adapting the ULCC model to fit the Canadian market. (*See sidebar on page 34 for more on the Flair formula.*)

"A lot of eyebrows were raised when Flair announced they would launch a few flights into Toronto and Vancouver, when they were also going to Hamilton and Abbotsford," said Kokonis. "I think you have to use the secondary airports where you can and then focus otherwise on Edmonton, Winnipeg, Halifax, etc., and avoid Vancouver, Calgary, Montreal and Toronto. I would argue that in Canada, if you try to go up against WestJet or Air Canada at their major airports, it will be a losing proposition."

Also circling the ULCC arena are two other would-be contenders: Canada Jetlines and FlyToo.

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Jetlines will not be launching this June as originally planned. The Vancouver-based airline said on March 14, 2018, that it has had trouble finding aircraft to lease. **Jetlines Photo**



Jetlines, which has been talking publicly about its plans since November 2013, hit some turbulence on March 14, 2018, when it announced it would not be flying by June as previously anticipated. The company said in a press release that it has been unable to secure a fleet as planned, blaming a “tightened” market for leased aircraft.

While the new carrier has assembled an experienced management team and negotiated agreements with airports in Hamilton, Abbotsford and Halifax, a lack of aircraft means it will not launch in time to take advantage of the busy summer flying season. “The big danger facing Jetlines is we have one massive cycle in seasonality in Canada,

plus Christmas, etc.,” commented Kokonis. “Summer is the best time to make money, June to August. If you don’t have airplanes in the air by then, you miss out.”

Meanwhile, Calgary-based charter airline Enerjet is also hoping to start a new ULCC venture called FlyToo. It has been working to get Canadian Transportation Agency Approval on its funding structure for over a year. And although it’s not a no frills carrier, Air Canada’s lower-cost leisure division, Rouge, will certainly be strategically deployed to counter ULCC upstarts, said Kokonis.

“We’re seeing Air Canada put Rouge on city pairs where there is not a lot of business traffic; Toronto to Kelowna, for example. You will see Rouge expanded, with more domestic and transborder flying.”

**SURVIVAL OF THE FITTEST**

The Canadian ULCC market is obviously attractive to several operators, but only the leanest will survive.

It will all depend on how successful ULCCs are at attracting that new breed of air traveller—people who don’t typically fly now, but would if the price was low enough.

“If the ULCCs really do stimulate the market, I think we have space for two of them,” concluded Kokonis. “It also depends on how far they want to expand. If we’re talking southbound to the U.S. and maybe even a few sun destinations, there is definitely space for two ULCCs, but not more.”

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The Q400 combines a Toronto assembled airframe with a pair of powerful 5,000-horsepower Pratt & Whitney Canada PW150A turboprops built in Longueuil, Que., to create the fastest and largest capacity turboprop airliner in production today. **Jan Jasinski Photo**



# BRAND

## AMBASSADOR

Bombardier's 20-year-old Q400 turboprop is a shining example of Canadian aerospace innovation. But with its Downsview home up for sale, what does the future hold for the platform?

BY KENNETH I. SWARTZ

**E**very day, more than 550 Bombardier Q400 turboprops fly passengers across the skies of more than 40 countries.

Twenty years ago, the prototype Bombardier Dash 8 Series 400 (later Bombardier Q400) flew for the first time from Runway 13-33 at Toronto's historic Downsview Airport, on Jan. 31, 1998.

In the years since, the 360-knot (667 km/h) Bombardier Q400 has become a brand ambassador for the Canadian aerospace industry, combining a Toronto-assembled airframe with a pair of powerful 5,000-horsepower Pratt & Whitney Canada PW150A turboprops assembled in Longueuil, Que., to create the fastest and largest capacity turboprop airliner in production today.

Some in-service Q400s are flying routes long served by turboprops. Others have replaced or are complementing jet service. As well, the Q400 is widely used to connect city pairs that never had direct air service before.

The Q400's ability to offer turboprop economics with jet performance has made it the most popular modern regional aircraft in Canada, with a strong customer base in Europe, Africa and the Asia-Pacific region, too.

Selling turboprops is more challenging for Bombardier than a decade ago, when the Q400 was part of a four-member turboprop family that also included the Dash 8 Series 100, Q200 and Q300, spanning the 37- to 76-seat market.

Production of the smaller 37- and 50-seat Dash 8s ended

Todd Young, vice-president and general manager of customer services for Bombardier Commercial Aircraft, stands in front of the Q400 assembly line in Downsview. **Warren Liebmann Photo**



Bombardier is working with Toronto-Dominion Bank to sell its Downsview, Ont., location, which includes the factory and runway. Many are opposed to the sale, including the employees' union. **Eric Dumigan Photo**



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in 2008-2009, as airline orders declined with rising fuel prices. To be sure, there was lots of government interest in the Q200/Q300 for special mission applications (e.g. maritime patrol, search and rescue, and aerial surveillance) but Bombardier elected to reallocate the floor space in Toronto to higher value Global business jet and Q400 production.

In the decade since, France-based competitor ATR has outsold Bombardier in most turboprop markets except for North America; that is, until the late 2017 sale of 30 new ATR 72-600 freighters to FedEx and Nordic Aviation Capital's early 2018 deal to lease at least 20 new ATRs to Florida-based Silver Airways.

Essentially, the 42-seat ATR 42-600 and 70-seat ATR 72-600 cost less to acquire and operate on short routes, whereas the high-speed Q400 has more passenger seats, better productivity and superior economics on longer jet routes, and can generate more revenue passenger miles (RPMs) per day.

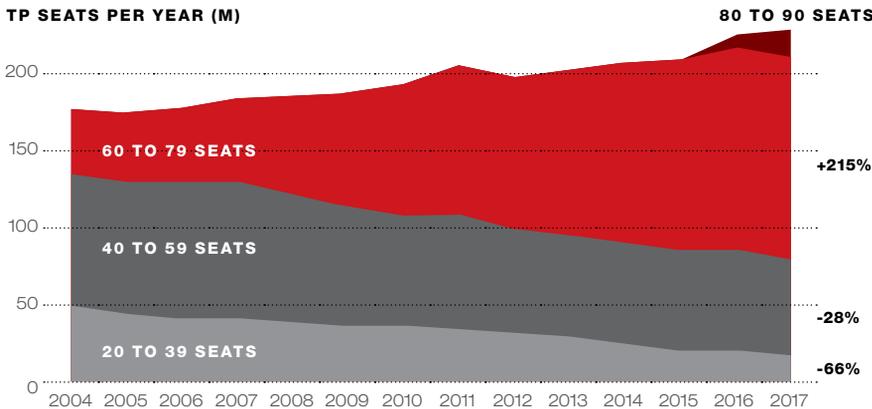
Bombardier claims that the faster Q400 has the same trip cost as an ATR72 and can carry up to 14 more passengers, but more airlines have selected ATRs for shorter-haul missions.

Elsewhere, the Q400 is also being utilized in non-airline markets as a package freighter and aerial firefighting aircraft, and is in development as a missionized intelligence, surveillance and reconnaissance (ISR) platform.



**TURBOPROP CAPACITY DEMAND GROWTH**

Bombardier says a new turboprop segment is emerging in the 80- to 90-seat class as more airlines order larger-capacity Q400s. In addition, as fleets of 20- to 39-seat and 40- to 59-seat turboprops retire, they are being replaced with larger capacity turboprops.



Source: Bombardier

## NEW ORDERS

Bombardier has always maintained that regional jets and turboprops are complementary aircraft technologies that offer regional airlines the ability to match seating capacity to passenger demand, direct operating costs (DOCs) to revenue per available seat mile (RASM), and speed to stage length.

Regional airlines have accelerated their shift to larger aircraft, both turboprop and jet. Increased capacity and lower operating costs per seat of 60- to 99-seat aircraft have led to their rapid expansion as the “new” base of regional aircraft fleets.

Last year, Bombardier Commercial Aircraft (BCA) delivered 30 Q400 turboprops (compared to 26 CRJ series regional jets and 17 C Series single aisle jets) and received orders for 42 new Q400s, including a record order for 25 high density, 90-seat Q400s from SpiceJet of Gurgaon, India (with 25 options), to open up new regional routes serving Tier 2 and Tier 3 cities across that country.

“We are proud to sign this agreement as it is another demonstration of the Q400’s superiority in the turboprop market ... the repeat order will increase the Q400 aircraft fleet in the fast-growing market in the Asia-Pacific region, and will launch the high-density 90-passenger model of the Q400 aircraft in India,” said Fred Cromer, BCA president, at the 2017 Paris Air Show.

“This is also compelling evidence that the demand for turboprop aircraft is healthy in short- to medium-haul markets that can’t economically support jets that are more expensive to operate.”

Since 2010, SpiceJet has taken delivery of 15 Q400 aircraft and leased others. The airline currently operates 20 Q400 aircraft in a 78-seat configuration to domestic and international destinations.

Also in Paris, Philippine Airlines, Inc. announced the exercise of its seven Q400 purchase rights (boosting its Q400 fleet to 12), with the new aircraft to be the first in an 86-seat, dual class configuration. And Ethiopian Airlines revealed a previously undisclosed order for five Q400s—the airline’s fourth reorder—to boost its fleet to 24 Q400s, the largest fleet in Africa.

Bombardier executives readily admitted last September that the Q400 and CRJ had not received the required “focus and messaging” while the company struggled to win C Series sales, but the leadership is now “turning that around” and is reportedly focused on “rebuilding its (order) backlog.”

The mid-2017 announcements signalled that there is still strong customer demand for the Q400, and Bombardier’s renewed efforts to win Q400 sales are achieving results.

## DAWN OF THE DASH 8

The Dash 8 turboprop was conceived in the late 1970s when de Havilland Canada

was owned by the Canadian federal government. U.S. airline deregulation was stimulating sales of four-engine, 50-seat de Havilland Dash 7 short takeoff and landing (STOL) aircraft, but what regional airlines really wanted was a twin turboprop optimized for hub and spoke route networks.

Airline deregulation south of the border was also a catalyst for Pratt & Whitney Canada to develop the PW100 family of modular turboprop engines for commercial aircraft in the 30- to 70-seat class.

The first 37-seat Dash 8 Series 100 (DHC-8-100) entered service with norOntair in northern Ontario in 1984, and the first 50-seat Dash 8 Series 300 (DHC-8-300) with Time Air in 1989.

Boeing bought de Havilland Canada in 1986 and engineers were soon designing a high speed 70-seat Dash 8 Series 400 (DHC-8-400) to replace older technology jets in the 65- to 100-seat class. The new Series 400 was on the brink of official launch in 1990 when Boeing put de Havilland up for sale.

When a deal to sell de Havilland to arch rival ATR was blocked by the European Commission, Bombardier teamed up with the Government of Ontario (as a 49 per cent equity partner) to buy the company. Federal and provincial agencies pledged almost \$600 million to revive the Toronto aircraft production operation. (Ontario sold its 49 per cent interest in 1997).



About 560 Q400 turboprops have been delivered from Bombardier’s Toronto factory and are flying for more than 60 different customers, including 15 added in the last five years. **Warren Liebmann Photo**

Some of the airlines flying the Q400 on routes greater than 700 nautical miles include Porter Airlines, based at Billy Bishop Toronto City Airport. **Gerald Allain Photo**



## Q400 LAUNCHED

Bombardier Regional Aircraft launched the Dash 8 Series Q400 turboprop at the 1995 Paris Air Show, powered by a pair of new P&WC PW150 turboprops driving six-blade Dowty Aerospace propellers. The PW150 had almost twice the power of any other PW100 engine, giving the Dash 8-400 a cruise speed of 360 knots, significantly faster than the 285-knot Dash 8-300 (and the ATR 72).

The new aircraft was also outfitted with an active noise and vibration suppression (ANVS) system to provide a cabin as quiet as a regional jet. When the entire Dash 8 family received ANVS systems, it was rebranded the Q Series (Q for quiet) and the Series 400 became the Q400.

Development of the Q400 was expected to cost \$450 million, with Bombardier and its risk-sharing partners roughly splitting the cost. Eighteen months later, the company also launched the 70-seat CRJ700 regional jet to provide 50-seat CRJ100/200 customers with a larger aircraft option.

The first Q400 entered revenue passenger service with SAS Commuter in February 2000, replacing Fokker F50s. Large orders were placed by early adopters Horizon Air in the U.S. (part of the Alaska Group) and Flybe in the United Kingdom, which became the aircraft's largest international customers.

## Q400 NEXTGEN

In 2008, the Q400 NextGen was announced as a further evolution of the aircraft's development, with the "passenger experience" further enhanced by a brighter cabin with LED lighting, new ceiling panels and dished window sidewalls, and larger overhead bins that could accommodate more than 50 standard roller bags.

After initial teething problems, worldwide Q400 demand increased as jet fuel prices quadrupled between 2002 and 2013 from US\$0.72 a gallon to US\$2.98 per gallon. That's when Q400 deliveries soared from nine aircraft in 2003 to 56 aircraft in both 2011 and 2012, before stabilizing at about 30 aircraft a year.

## MARKET OUTLOOK

Bombardier's 2017-2036 commercial aircraft forecast released last September said 5,750 new large regional aircraft in the 60- to 100-seat class will be required in the next 20 years, worth US\$240 billion. Turboprops and regional jets have shared this market evenly for the past decade.

This year, Bombardier is introducing a new cabin standard for the Q400 to increase the baseline seating capacity, which also provides a 20 per cent lower seat cost advantage compared to other turboprops.

The old configuration was 74 seats with a

large forward baggage bay and two individual galleys at the back of the cabin. The new cabin standard has 82 seats and a large single galley at the back of the aircraft. The forward cargo compartment (located opposite the boarding stairs) has been removed and three additional windows added to provide a brighter, more spacious interior.

Not only does this open up the front of the aircraft, but it also provides airlines with more ways to make revenue. For example, the aircraft can be delivered with 90 seats at 28-inch seat pitch; 82 seats at 30-inch pitch; 74 seats with eight business class seats; or as a 50-seat cargo-combi with a 9,000-pound-capacity cargo compartment with 1,150 cubic feet of space (currently in service with Japan's Ryukyu Air Commuter Co).

In addition, the forward passenger door on the Q400 is compatible with airport jet bridges to provide a seamless passenger experience. (Most ATRs have a rear passenger door.)

In the field, the Q400's powerful PW150 engines provide a better climb rate, single-engine ceiling, and greater revenue-producing payload capability in hot weather and at high altitude airfields.

Including the Q400 NextGen upgrade, Bombardier said it has invested \$300 million in upgrades over the past decade, including cabin improvements (e.g. extra seating, business class, drop down oxygen, cargo-combi, wireless IFE), avionics (e.g. ADS-B, RNP,



“THE Q400’S ABILITY TO OFFER TURBOPROP ECONOMICS WITH JET PERFORMANCE HAS MADE IT THE MOST POPULAR MODERN REGIONAL AIRCRAFT IN CANADA.”

This year, Bombardier is introducing a new cabin standard for the Q400 to increase the baseline seating capacity. It can now be delivered with up to 90 seats. **Bombardier/Rick Radell Photo**



TCAS 7.1), and operating approvals (e.g. airport operations up to 14,000 feet and narrow and sloped runway approvals).

Today, the Q400 has the longest maintenance intervals, with A-checks at 800 hours and C-checks at 8,000 hours, which provide a 20 per cent direct maintenance cost advantage and will reduce aircraft down time by up to 270 flying days (compared to competing turboprops).

### BY THE NUMBERS

About 560 Q400 turboprops have been delivered from Bombardier’s Toronto factory and are flying for more than 60 different customers, including 15 added in the last five years.

The Bombardier sales team struggled to line up customers for the Q400 in the late 1990s and early 2000s, when many regional airlines were re-equipping with regional jets and executives were reluctant to bet their careers on a new turboprop.

Since the Q400 was launched, the largest new customers have included Air Berlin, All Nippon Airways, Austrian Arrows (formerly Tyrolean), Chorus Aviation (Jazz), Colgan Air/Pinnacle, Ethiopian, Eurolot, Flybe, Frontier, Horizon, JAL/Japan Air Commuter, Luxair, Porter, Qantas, SAS Commuter, Spicejet, WestJet Encore and Wideroe. Many of these airlines traded up to the Q400 from smaller Dash 8s. A large number of Q400s are now owned and traded by major leasing companies.

In 2007, Q400s were serving about 400 routes. Today, they serve about 1,200 routes, according to the Diio schedule database.

Some of the airlines flying the Q400 on routes greater than 700 nautical miles include Porter in Canada, SATA in the Azores, Ethiopian in Africa, and four European carriers: airBaltic, Austrian Arrows, Flybe and Luxair.

Already a large Dash 8 customer, Horizon, part of the Alaska Group, saw the Q400 as an ideal fit for its route network and has ordered 54 new aircraft (52 delivered) from Bombardier, which it flies on short and long (over 600 nautical mile) routes. When fuel prices increased, Horizon was lauded for its fuel efficient Q400 fleet, but last year pilot shortages forced the airline to cancel numerous Q400 fleets and it is now outsourcing some flying to Skywest Embraer E175s.

Bombardier has tried hard to place Q400s with other U.S. airlines, but the merger of United and Continental, Delta and Northwest, and American and U.S. Airways left the major carriers and their regional affiliates awash with regional jets, which have squeezed out turboprops, including the United Express Q400 fleet.

Canada is now one of the largest Q400 markets with 118 in service, including Hydro Quebec (two for crew change flights); Porter Airlines (29); WestJet Encore (43); and Chorus Aviation/Jazz (44).

Porter began taking a serious interest in the Q400 almost four years before it launched its premium regional airline from Billy Bishop Toronto City Airport in the fall of 2006. Today, the airline's 29 Q400s can easily operate from the downtown airport's 3,988-foot paved runway to numerous destinations in Canada and the U.S.

Sky Regional introduced Air Canada Express' first Q400s on the Montreal-Billy Bishop Toronto route and Jazz later introduced the aircraft as a 50-seat CRJ100/200 replacement. (Jazz acquired Sky Regional's Q400s in 2017.)

WestJet Encore has used the Q400 to serve

markets too small for the Boeing 737, and also supplemented 737 jet service at off-peak times of the day.

Flybe is the largest independent regional airline in Europe and the world's largest Q400 operator. The growth of low-cost carriers (LCCs) has seen some Q400 operators fail (EuroLOT and Air Berlin), but the fleets have been quickly absorbed by successor companies.

Africa is now home to more than 60 Q400s, with Ethiopian operating the largest fleet from its hub in Addis Ababa.

India is a very promising market, with government policies now supporting the developing of regional air services. Newer Asian customers like Nok Airlines in Thailand and Philippine Airlines have also introduced Q400s with high-density seating on low fare and high density routes.

### Q400 ON A MISSION

Earlier this year, the Conair Group in Abbotsford, B.C., purchased six Q400MR aircraft from Bombardier, which it will convert into multi-role firefighting air tankers for France's Sécurité Civile.

This is a follow-on order to the two former SAS Commuter Q400s converted by Conair (and Cascade Aerospace) into 10,000-litre (2,600 US gal) air tankers delivered in 2005-2006. The unique external retardant tank allows the quick-change cabin to be used year-round in passenger, cargo, combi transport, medevac, emergency response, surveillance and patrol without compromising the aircraft's firefighting capabilities.

This time, Conair has contracted Flying Colours Corp. to modify the interiors of the new Q400 air tankers for France.

For its part, Cascade Aerospace (owned by IMP) has teamed with L3 to develop a Q400 Multi-Mission Aircraft featuring long-range external fuel tanks, which frees the cabin for a wide range of mission systems. The prototype flew in late 2016 and features a compartment under the belly that can accommodate a search radar, torpedos, or other mission systems.

### MANUFACTURING SITE

Step inside the cavernous Bombardier factory in Toronto, and the floor space is dominated by assembly work for the Global 5000, Global 6000 and new Global 7000 business jets. The factory sits on 1.5 square kilometres (375 acres) with an adjacent private 7,000-foot runway.

De Havilland Aircraft of Canada Limited opened its first aircraft assembly hangar in the Toronto suburb of Mount Dennis in March 1928—80 years ago—and then moved to a larger site at Downsview in 1929.

A new aircraft factory was opened off Wilson Avenue in 1954 after the wartime factory was purchased to expand RCAF Station Downsview (now part of Downsview Park). Then, in the late 1980s, Boeing expanded the plant to support Dash 8 production by adding four new production bays.

The Q400 program directly employs 800 people in Toronto in engineering, program management, manufacturing and final assembly, plus a couple hundred more in Dash 8 Q Series customer support.

The Downsview plant was once a noisy place where rivet guns pounded constantly as Dash 8 components and sub-assemblies were fabricated onsite, as well as earlier STOL aircraft. Today, business aircraft assembly dominates the site.

Bombardier has always fabricated the Q400 cockpit and wing in Toronto, but all other parts are made elsewhere and arrive as large components for final assembly with wiring or ducting already installed.

The Q400 fuselage and empennage were originally built by Mitsubishi Heavy Industries (MHI) in Japan. In 2006, production of the forward and aft fuselages and tail was reassigned to Shenyang Aircraft (SAC), a subsidiary of Aviation Industry Corporation of China (AVIC). During the transition from Japanese to Chinese suppliers, Bombardier's Belfast factory stepped forward to provide critical components.

The Q400 fuselage is assembled in a portion of Downsview's Bay 2 and is then

Bombardier has always fabricated the Q400 cockpit and wing in Toronto, but all other parts are made elsewhere and arrive as large components for final assembly with wiring or ducting already installed.

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transferred to the final assembly line located in Bay 5, where Bombardier fabricates the Q400 cockpit and wing. Almost everything else incorporated into the Q400 and the Global business jet is made elsewhere.

The workstations in Bay 2 at Downsview are where the Q400's nose and empennage are mated to the central fuselage. Since the production line was first established, the assembly process has changed to improve efficiency. It now includes ergonomically designed platforms to improve workflow and safety harnesses to reduce workplace injuries.

The assembled fuselage is then towed in a special cradle to the final assembly line in Bay 5, where wings and fuselage are mated, landing gear and engines installed, and control surfaces and cabin interior completed.

### Q400 AT A CROSSROADS?

The Q400 was launched with a lot of promise and it remains an impressive regional aircraft.

As the largest and most expensive turboprop on the market, the Q400 is an easy target when competing turboprops built by ATR (as well as in Russia and China) are smaller and sell for less.

In August 2013, Bombardier announced a preliminary agreement with Rostec and leasing firm Ilyushin Finance Co. of Russia for the sale of at least 100 Q400s, valued at \$3.4-billion at list prices, that would be assembled by Rostec at a plant 900 kilometres southeast of Moscow.

This order and the opportunity to open a second production line were seen as a huge endorsement for the Q400, but the political crisis triggered when Russia annexed Crimea in 2014 killed the deal after international economic sanctions were imposed.

In 2016, unionized workers gave Bombardier their approval to transfer production of the Q400 wing to Mexico and the cockpit to China. This would reportedly save \$2 million and make the Q400 price competitive with

the ATR 72, according to the *Toronto Star*.

The cockpit and wing are still made in Toronto. While Bombardier remains committed to reducing manufacturing costs, it has yet to announce an outsourcing plan for those components.

Some analysts say the sale of the Bombardier C Series program to Airbus will reduce Bombardier's commitment to the commercial aircraft market, especially since business aircraft sales have historically had higher margins.

Others say that with 5,750 new large regional aircraft in the 60- to 100-seat class required in the next 20 years, Bombardier is well positioned to capture a reasonable share of this US\$240 billion aircraft market.

The Q400 (and the CRJ) have both suffered from a lack of investment in the last few years as the C Series program absorbed all of Bombardier's cash.

Speaking to investment analysts during Bombardier's Fourth Quarter and Full Year 2017 results conference call on Feb. 15, 2018, Bombardier CEO Alain Bellemare said the company's research and development focus "was or has been on the C Series. Now that we are completing the partnership with Airbus, it gives us the ability to think about the other platforms that we have.

"We were successful last year in rebuilding the backlog on the Q. We got the largest ever order on the Q400. And now we're spending time on the CRJ .... But for the time being, focus is on completing the C Series deal with Airbus. And then looking at

how we make our other commercial aircraft stronger and better to be able to compete successfully in the marketplace."

As fuel prices increase, the increase in direct operating costs "drives out" the cross-over point between turboprop and regional jet economic efficiency, making the turboprop more efficient over longer stage lengths than it was previously.

When fuel prices increased to record highs between approximately 2003 and 2010, turboprop sales increased by 700 per cent.

However, the market entry of new regional jets equipped with the fuel efficient Pratt & Whitney PW1000 geared turbofan that burns 20 per cent less fuel—such as the Embraer E175-E2 and Mitsubishi MRJ—will further close the gap between turboprop and regional jet direct operating costs.

That's one of the reasons why Pratt & Whitney Canada has been developing a Next-Generation Regional Turboprop (NGRT) engine with 5,000 to 7,000 horsepower and significantly lower fuel burn for new 90-seat-class turboprops.

Just where Bombardier might find the funds required to develop a new generation Q400 (and CRJ) was unclear until mid-January 2018, when news broke that the company was actively soliciting bids for its entire Downsview factory and airport site from at least a dozen major land developers.

The value of the site has been reported to be in the neighbourhood of \$500 million-plus.

Thirty years ago, Bombardier announced plans to redevelop Canadair's Cartierville Airport site a few years after it bought Canadair from the Canadian government. In that case, Bombardier maintained a large fabrication plant at Cartierville, but moved the final assembly line for the Canadair Challenger and CL-215 waterbomber to Dorval Airport, where a new production line for the CRJ was also established.



The first 50-seat Dash 8 Series 300 entered service with Time Air in 1989. Here, an Air Canada Express aircraft soars over the Canadian flag.

**Nick Chute/Threshold Images Photo**



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Proceeds from the sale of Cartierville were used to finance new Bombardier aircraft programs.

It's an open question as to whether Bombardier would use the proceeds of the sale of the de Havilland factory site (originally acquired in 1992 with the Ontario government as a 49 per cent partner) and the runways at Downsview (acquired from the federal government) to pay down debt, retain a share of the C Series program, or finance the development of new aircraft programs, such as a successor to the Q400.

But selling the Downsview site may not be an easy solution for Bombardier.

In mid-March, the *Toronto Star* reported that Unifor, the union representing about 2,000 Bombardier Downsview staff, is petitioning government to deny the rezoning of the site for residential development. Currently, the land is reserved for industrial use, but rezoning it for residential purposes would open the gates to more potential buyers.

Scott McIlmoyle, president of Unifor Local 112, told the newspaper that the union doesn't want to move the facility.

"Our position is that we're going to do everything we can to keep our members and our work right there."

One longtime Toronto aerospace executive believes the land should not be sold.

"The governments of Ontario and Canada helped Bombardier acquire the Downsview site to expand the aircraft manufacturing industry in the City of Toronto," said the executive. "They didn't give them taxpayer land and money so Bombardier could enrich itself by selling the land and closing the factory."

While it evaluates options for the sale of the Downsview lands, Bombardier is reportedly considering other scenarios, including relocating production to Toronto Pearson International Airport.

During a February conference call, Alain Bellemare, Bombardier president and CEO, said the company has been considering the future of the Downsview property for quite a while.

In mid-March, Bloomberg reported that Bombardier had hired Toronto-Dominion Bank to find a buyer for the land. Multiple bids have apparently been received, including from residential developers.

Calling the property an "underutilized asset," Bellemare said he hoped a deal could be closed "relatively quickly in 2018." ❏



**▶ KENNETH I. SWARTZ**

Kenneth I. Swartz has spent most of his career working in international marketing and PR with commercial aircraft manufacturers, airlines and helicopter charter operators. An award-winning aviation and rotorcraft journalist, he runs Aeromedia Communications.

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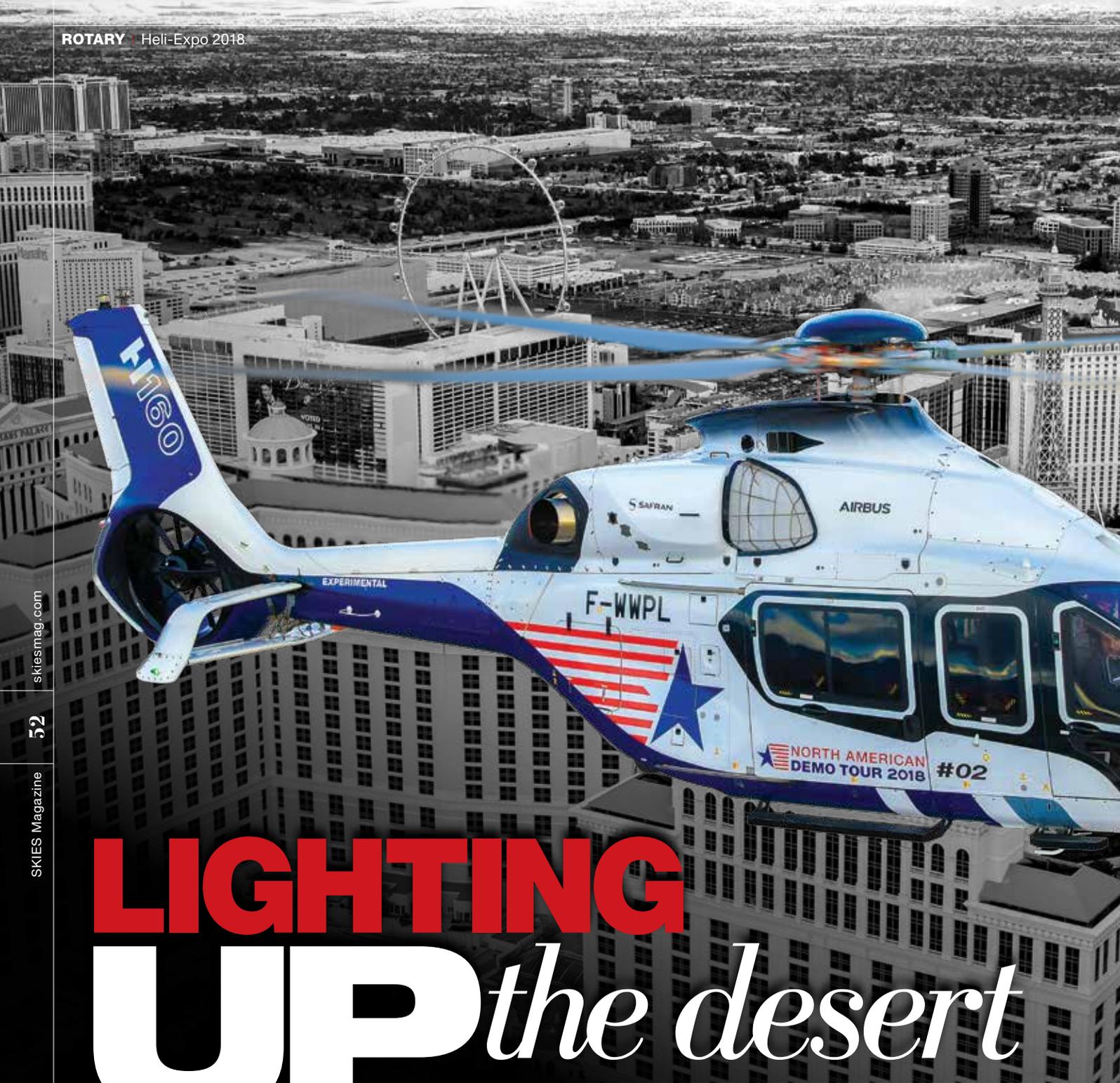
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# LIGHTING UP the desert

When the helicopter industry's biggest players gathered in Las Vegas for Heli-Expo 2018, Canadian companies made their mark.

BY BEN FORREST

**I**nside the Las Vegas Convention Center, a sprawling 3.2-million-square-foot building near the Las Vegas Strip, more than 17,000 people strode, stopped, mixed, mingled, and admired the latest innovations in rotary flight.

They were part of Helicopter Association International's (HAI's) annual Heli-Expo, the helicopter industry's premier North American trade show, where major manufacturers and smaller suppliers gather to display their latest products, share news, and connect with their industry peers. Held from Feb. 26 to March 1, this year's show featured 705 exhibitors and 51 aircraft on the show floor.

Canada was well represented, generating more than its share of buzz in a space where the biggest names in the industry were clamouring for attention. Here's a roundup of the biggest Canadian developments.



An Airbus H160 prototype visited Heli-Expo 2018 and *Skies*' sister magazine, *Vertical*, was the only media outlet invited to fly it. Here, *Vertical* test pilot Jon Bourke flies over downtown Las Vegas while publisher/photographer Mike Reyno rides alongside in a photo ship. **Mike Reyno Photo**



Eagle Copters flew a newly refurbished Bell 212 from its Calgary, Alta., location to Las Vegas, to show off the company's overhaul capabilities. **Skip Robinson Photo**



Showgoers crowd around the Vertical booth at this year's Heli-Expo, which featured 705 exhibitors and 51 aircraft. **Skip Robinson Photo**

April/May 2018



Bell unveiled the latest derivative of the Bell 407, the 407GX1, at Heli-Expo 2018. **Skip Robinson Photo**

53

SKIES Magazine



An Airbus H145 and H130 wait to be towed into the Las Vegas Convention Center to be put on display. **Skip Robinson Photo**



Bell's Air Taxi mock-up was a popular attraction at the show. It allowed "passengers" to get a taste of the future of air mobility. **Skip Robinson Photo**

skiesmag.com

**BELL 407GX1**

Bell president and CEO Mitch Snyder officially unveiled the 407GX1, a converted 407GXP featuring new avionics and an upgraded engine. The aircraft will be manufactured by Bell's Canadian division in Mirabel, Que.

The 407GX1 was certified by Transport Canada on Jan. 19, 2018, and was expected to be in full production by early April.

"It will have the 407 Garmin integrated flight deck, with the G1000H NXi with Wi-Fi and optional Bluetooth capability," said Snyder at the show. "[It will also have] new avionics and an upgraded engine with dual channel FADEC [full authority digital engine control], and an updated interior. We expect deliveries later this spring."

The engine is upgraded from the Rolls-Royce M250-C47B/8 to the M250-C47E/4, retaining the high and hot performance introduced with the GXP in 2015. But the engine control system is now a dual channel FADEC with three layers of redundancy.

"If you have a failure, you go from your primary channel of FADEC 1 to your primary channel on FADEC 2," said Michael Nault, Bell Helicopter Textron Canada's program director for light helicopters.

"If that fails, you go to your secondary channels."

The new engine also offers a four per cent improvement in range and fuel consumption, he said, while providing the aircraft with a cruising speed of 246 kilometres per hour.



Bell continues to see interest in its 429 model, which is manufactured in Mirabel, Que. **Skip Robinson Photo**

**HELI-EXPO 2018 AT A GLANCE**

Rotorheads came together at Heli-Expo 2018 in Las Vegas. Along with the tradeshow component, the event also featured educational sessions and industry speakers.

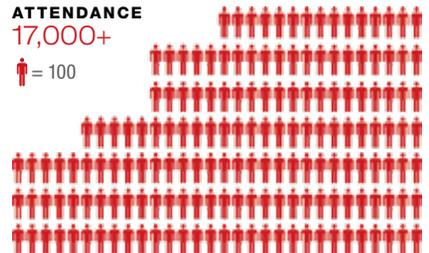
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Sikorsky's booth featured a matte black S-76D helicopter on loan from Canadian operator Fig Air. **Anthony Pecchi Photo**

April/May 2018



Leonardo showed off its brand new AW169. **Anthony Pecchi Photo**

The GXi features Garmin's G1000H NXi integrated flight deck and the Garmin FlightStream 510, a Wi-Fi and Bluetooth-enabled multimedia card that allows pilots to upload flight plans from a smart device.

Another feature is the Garmin SurfaceWatch, an enhanced runway monitoring technology. Finally, the aircraft will be fully automatic dependent surveillance—broadcast (ADS—B) in and out compliant.

Bell made significant wiring and structural changes to accommodate the new engine and avionics boxes, and as a result the company is not planning to retrofit the GXP with the new features found in the GXi.

**ENGINES IN A NEW ERA**

Pratt & Whitney Canada (P&WC) made several announcements at Heli-Expo 2018.

The company secured an exclusive 10-year maintenance and repair agreement with Era Group Inc., one of the largest helicopter operators in the world.

The agreement covers 180 P&WC engines across Era's global fleet, including Leonardo AW139s, AW119 Koalas and AW109 Power helicopters; Airbus H135s; and Bell 212s.

P&WC also announced a comprehensive engine services agreement with Dallas-based Air Medical Group Holdings (AMGH) that will cover approximately 240 P&WC engines.

AMGH flies the engines through its subsidiaries Med-Trans Corporation, REACH Air Medical Services, AirMed International and Guardian Flight.

In addition to a fleet management program (FMP) that covers AMGH's fleet of 100 PW206B engines, the new 10-year engine services agreement will provide fixed overhaul and hot section inspection costs for the company's fleet of 140 PT6A engines and several P&WCSMART programs that also offer guaranteed prices and genuine P&WC parts and labour.

The engine manufacturer announced it has also signed a 13-year FMP agreement with Weststar Aviation Services, a Kuala Lumpur, Malaysia-based company that specializes in offshore missions.

The agreement covers a fleet of 44 PT6C-67C engines that power 22 Leonardo AW139 helicopters.

With costs becoming an increasingly important parameter for helicopter operators, P&WC also announced six new aftermarket services aimed at delivering more value over "the total life cycle of engine utilization," according to Nicolas Chabee, the company's vice-president of marketing and sales.

P&WC is launching a Small Fleet Pay-per-Hour (PpH) solution that will provide customers who operate fewer than five helicopters with many of the customized benefits associated with P&WC's FMP.

The Small Fleet PpH program also aims to "make it easy" for operators, with a streamlined contract and transferability of benefits.

"There was a niche that we felt needed a program," said Chabee in an interview, noting small operators represent the

majority of the commercial helicopter fleet. The PW206, PW207, and PT6C engine families will be the first to be covered under the program.

P&WC is also expanding its Eagle Service Plan (ESP) program for PW206/207 operators. The program will now include a Platinum level that encompasses routine periodic inspections of fuel nozzles, environmental repair at overhaul, and P&WC technical publications.

Another development is P&WC's new certified pre-owned engine program for three of its most popular helicopter engines: the PT6C-67C, PW206C and PW207C, with plans to roll out to other turboshaft engines in the future.

Similar to certified pre-owned programs for high-end used cars, the program is initially being launched in collaboration with the global helicopter dealer Rotortrade.

Once aircraft dealers certify a pre-owned engine through P&WC, the manufacturer will offer a 500-hour/one-year engine warranty for that engine, as well as six months of complimentary tech pubs, plus a credit that can be applied to an ESP program.

P&WC is also offering comprehensive service packages to customers in VVIP and head of state transport. These customized packages of spare parts and engineering services will include deployment of P&WC Mobile Repair Team (MRT) technicians for routine onsite maintenance.

Onsite visits from the MRT will also help



Pratt & Whitney Canada secured an exclusive 10-year maintenance and repair agreement with Era Group Inc., one of the largest helicopter operators in the world. Dan Megna Photo

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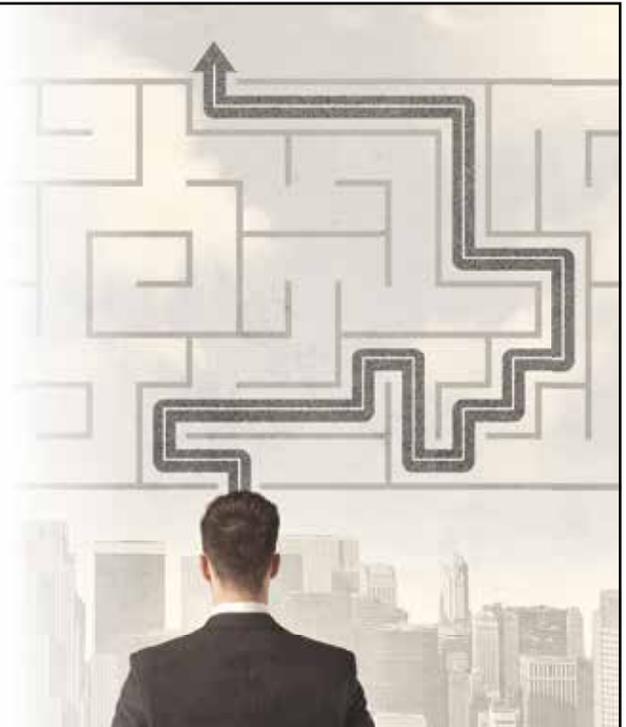
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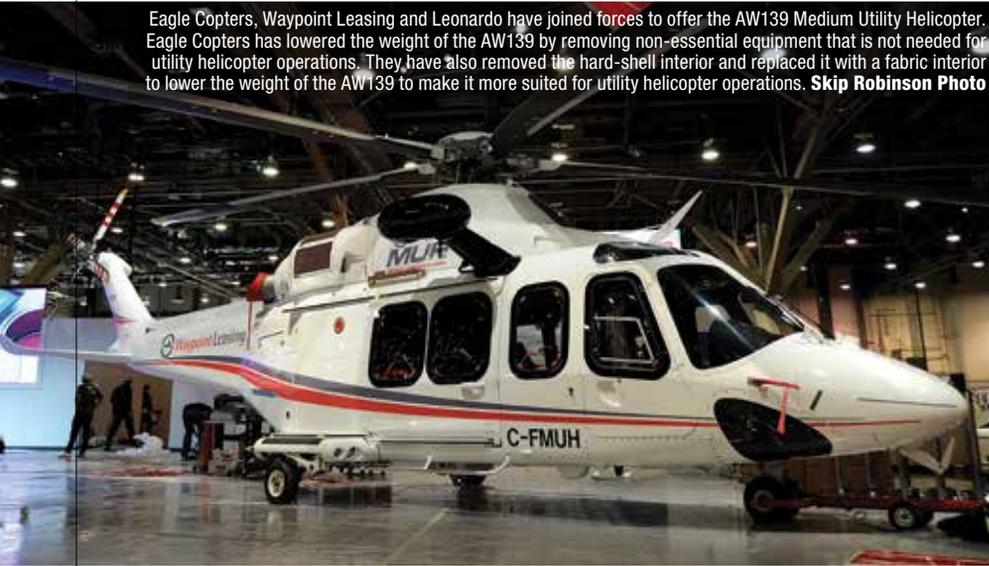
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Eagle Copters, Waypoint Leasing and Leonardo have joined forces to offer the AW139 Medium Utility Helicopter. Eagle Copters has lowered the weight of the AW139 by removing non-essential equipment that is not needed for utility helicopter operations. They have also removed the hard-shell interior and replaced it with a fabric interior to lower the weight of the AW139 to make it more suited for utility helicopter operations. **Skip Robinson Photo**



DART Aerospace said operators have been asking it to design a firefighting bucket for some time. The new product complements DART baskets, long lines and remote hooks. **Skip Robinson Photo**

familiarize customers' technicians with maintenance procedures.

Finally, P&WC is piloting an enhanced line replaceable unit (LRU) availability program, which will supply customers with assets and establish asset pools in key geographic locations for the shared benefit of operators.

**TRAXALL**

Montreal-based Traxxall Technologies, provider of an aircraft maintenance tracking and inventory management system, announced a landmark agreement with Airbus Helicopters.

Under the agreement, all Airbus helicopters delivered in Canada and the United States will be provided with the Traxxall system for one year. The companies will also offer a special promotion for in-service helicopters.

"The Traxxall team has developed an excellent maintenance tracking and inventory management system," said Thierry Meouchi, head of connected services, North America, at Airbus Helicopters.

"We are confident that our decision to include Traxxall with all new deliveries in the U.S. and Canada will be greatly beneficial to our clients."

**DART**

DART Aerospace of Hawkesbury, Ont., made a splash at Heli-Expo with several product announcements, including its first firefighting bucket.

Operators had been asking DART for a firefighting bucket, the company said in a statement. The new product complements DART baskets, long lines and remote hooks.

DART and Airbus Helicopters also announced delivery of the first Airbus H145 Quick Release Heli-Utility basket to Airbus customer San Diego Gas & Electric (SDG&E).

The basket can transport up to 200 pounds



Aero Design purchased the FAA and Transport Canada supplemental type certificates for the Helitowcart line of bear paws. **Aero Design Photo**

(90.7 kilograms) of cargo, and has an enhanced-safety, self-locking lid mechanism to secure cargo during flight.

"The DART team appreciates the collaboration of Airbus Helicopters and SDG&E to optimize the design of this quick release basket, which can be attached or removed from its supporting brackets by a single person in just under one minute," said Alain Madore, president and CEO of DART Aerospace.

The U.S. Federal Aviation Administration (FAA) has approved the basket, with European Aviation Safety Agency (EASA) validation expected by the second quarter of 2018.

Another major development was Transport Canada Civil Aviation's (TCCA's) approval of the Bell 505 Emergency Flotation System.

Bell and DART announced a partnership at Heli-Expo 2017, with the ambitious goal of having the flotation system certified by the first quarter of 2018.

They were successful, marking a milestone for both companies.

The float design incorporates DART's patented Tri-Bag Float technology, which is said to deliver greater stability during water landings while also allowing unimpeded egress during emergencies.

This is the first and only such system available on the market, DART said in a news release.

**AERO DESIGN**

Heli-Expo marked two major milestones for Aero Design Ltd. of Powell River, B.C., a company best known for its cargo baskets and helicopter bike racks.

Aero Design announced at Heli-Expo it has purchased the FAA and Transport Canada supplemental type certificates (STCs) for the Helitowcart line of bear paws for Airbus AS350/AS355, Airbus EC130 and Robinson R44/R66 helicopters.

"The Helitowcart bear paws are well known for their quality and design," said Jason Rekve, president of Aero Design.

"Bear paws are an obvious fit with our existing cargo baskets and bike racks, so it was an easy choice when the option to purchase the line arose."

Aero Design also revealed details about a prototype for its new "Mega" profile cargo basket for the Airbus AS350 and AS355.

Developed with support from the industry, fire bucket manufacturers and Environment Canada, the basket promises safe loading, unloading and transportation of large valve fire buckets, as well as water survey equipment and other oversized items.

The Mega profile basket will utilize Aero Design's hallmark quick release system, and allows for the installation of the company's complete line of quick release fixtures.



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Las Vegas-based Papillon Airways signed an MOU with StandardAero for 40 retrofitable crash-resistant fuel tanks in support of Papillon Grand Canyon Helicopters' fleet of Airbus AS350 B3 and EC130 B4 tour aircraft. **Mike Reyno Photo**



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SKIES Magazine

**RAISING THE BAR**

Phoenix Heli-Flight, a charter company based in Fort McMurray, Alta., announced it is raising the bar on safety by upgrading its older, analog audio, video and flight data recording devices with the next-generation Outerlink IRIS system.

IRIS provides digital voice, video and flight data recording, with the added benefit of dual satcom network connectivity and next-generation push-to-talk (PTT) voice over Internet protocol (VoIP) technology.

Phoenix Heli-Flight will also be working with Outerlink and Maxcraft Avionics to develop Transport Canada and U.S. Federal Aviation Administration (FAA) supplemental type certificates for the Airbus EC130 T2 (H130), EC120, and both the analog and VEMD-equipped AS350 B2 airframes.

The system is already certified by Transport Canada and the FAA for the Airbus EC135, and has FAA certifications for the Sikorsky S-92, Leonardo AW139, EC145 AS350, Bell 206 and Bell 407.

**STANDARDAERO**

StandardAero and Papillon Airways announced they have signed a memorandum of understanding (MOU) for 40 retrofitable

crash-resistant fuel tanks (CRFT) in support of Papillon Grand Canyon Helicopters' fleet of Airbus AS350 B3 and EC130 B4 tour aircraft.

Installation of the first CRFT is scheduled for April 2018.

StandardAero (formerly Vector Aerospace) and Robertson Fuel Systems developed the CRFT as a direct replacement for all AS350 models, as well as for the EC130 B4.

The tank's unique design features a robust crash-resistant fuel bladder, with the same capacity as the legacy fuel cell, and uses innovative elements like magnetic field sensor fuel gauging technology and vent system roll-over protection.

**SKYTRAC**

After successful trials with CHC Helicopter in 2017, Leonardo is working with Kelowna, B.C.-based SkyTrac to implement a next-stage, real-time health and usage monitoring system (HUMS) onboard the Leonardo AW139.

CHC continues to lead system implementation and testing for the project.

This system installs key data sets from Leonardo's Heliwise HUMS analytics software on SkyTrac's ISAT-200A data acquisition unit and transceiver. Paired with

real-time monitoring and a globally-reliable satellite connection, operators are notified about issues as they arise during flight.

A wireless file download process also sends complete HUMS data straight into the Heliwise software as soon as the aircraft arrives back at home base.

**MOVING FORWARD**

As Canada's helicopter companies leave behind the glitz and glamour of Las Vegas, the real work begins. They return to the shops and hangars that birthed innovations that make them some of the best in the world.

The goal is to refine those products, make new ones, and make an even bigger splash in years to come.

Heli-Expo 2019 is set for March 4 to 7, in Atlanta, Ga. **✚**

*- with files from Chris Thatcher and Elan Head*



**BEN FORREST**

Ben Forrest is assistant editor of *Skies* magazine. Before joining *Skies* in 2015, he spent the better part of 10 years in the newspaper industry, where he worked as an editor, sports editor and general assignment reporter.

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CITATION TEAM CANADA



Big airplane systems and capabilities complement the Legacy 500's ramp appeal.



# BIRD

# ON A

# Wire

Embraer's Legacy 500 pushes the boundaries with fly-by-wire technology

BY ROBERT ERDOS  
PHOTOS COURTESY OF EMBRAER

“Well, boys, where shall we go today?” With my entourage in tow, I strode from my limousine onto the waiting airplane. A gleaming new Embraer Legacy 500 business jet beckoned, and I was enjoying the delusion that I had somehow been elevated to the jet-set.

OK, you caught me. There was no limo and no jet-set, but the enquiry was real.

Embraer Executive Jets touts state-of-the-art technology when describing its new Legacy 450 and Legacy 500 bizjets, but fancy equipment aside, performance and capability define an airplane's merits. It was natural to wonder, “What could we do with this thing?”

The answer, in short, is plenty. With up to 12 passenger seats, a maximum published range of 3,125 nautical miles, and respectable field performance, Embraer's Legacy 500 is a proper trans-continental midsize jet with exceptional utility. As we'll see, impressive technology adds to the value proposition.

## CREATING A LEGACY

Brazil-based Embraer made a name for itself in North America with regional jets for the airline market, before decisively entering business aviation about a decade ago. Having successfully repurposed its ERJ145 airliner as the Legacy 600 bizjet, Embraer took on the very-light and light jet segments with its popular Phenom 100 and 300 models. The Lineage 1000E, based on the E190 airliner, serves the I-Need-a-Really-Big-Jet customer.

That left a hole in the market, at least as Embraer saw it. The Legacy 450 and 500 were both clean-sheet designs, intended to bridge the market gap between Embraer's Phenom light jets and their large airliner-derived Legacy/Lineage models. Embraer designed the Legacy 500 for the midsize market, while its sibling, the Legacy 450, is described as a “mid-light” jet. The Legacy 500 was certified in August 2014, with certification of the Legacy 450 following a year later.

**MEET THE JET**

It seems that the Legacy 450 and Legacy 500 were designed as fraternal twins of a sort, sharing many similarities yet with distinctly different characters. The salient difference is simply that the Legacy 500 is longer in the centre fuselage by 3.5 feet, allowing for an additional row of seats. Embraer touts a 95 per cent commonality in parts and systems, allowing both airplanes to share a common cockpit layout, operational procedures and handling qualities.

Much thought was evidently put into the layout and finishing of the cabin. A flat cabin floor provides 1.83 metres (six feet) of headroom. Big windows and contrasting materials make for a bright and spacious interior. A well-equipped wet galley is standard on the Legacy 500.

Interior flexibility is a strong suit of both Legacy models. The Legacy 500, for example, may be fitted with double club seating for eight, plus an optional belted lavatory seat for the firm's junior partner. If one packs pajamas, the two adjacent club seats can be converted into flat berths. Alternatively, left and/or right side-facing three-seat foldout divans can replace the aft set of club seats. An optional side- or forward-facing observer's seat may be installed adjacent to the entry door, bringing the maximum passenger complement to 12.

The Honeywell HTF7500E turbofan engines are featured on both models, although slightly de-rated on the lighter Legacy 450. Featuring dual-channel digital control (FADEC) and on-condition maintenance, variations of the engine have proven reliable and popular on other designs such as the Gulfstream G280 and the Bombardier Challenger 300/350.

The pre-flight inspection revealed a generous 110-cubic-foot unpressurized,



Sidestick controllers in lieu of traditional control yokes make the cockpit feel especially spacious.



From well-equipped galley to fresh-water vanity, much thought was put into the layout and finishing of the interior.



Passengers will appreciate both the capacious external and in-flight accessible internal luggage compartments.

“IT SEEMS THAT THE LEGACY 450 AND LEGACY 500 WERE DESIGNED AS FRATERNAL TWINS OF A SORT, SHARING MANY SIMILARITIES YET WITH DISTINCTLY DIFFERENT CHARACTERS.”



With a maximum published range of 3,125 nautical miles, the Legacy 500 is a proper trans-continental midsize jet.



The cabin boasts a flat floor with a six-foot cabin height.

## LEGACY 500 AT A GLANCE

Technology has fully permeated Embraer's newest midsize design. From digital flight controls and side sticks to optional heads-up enhanced vision systems, the Legacy 500 seeks to demonstrate that leading edge systems deliver a competitive advantage.

### TECHNOLOGY HIGHLIGHTS

- Clean-sheet design
- Full fly-by-wire controls with sidestick
- Enhanced vision system (optional)
- Head-up display (optional)
- Auto-throttle
- Synthetic vision system
- Low operating cost
- Steep-approach operation

### ENGINES HONEYWELL HTF7500E



### AVIONICS ROCKWELL COLLINS PRO LINE FUSION



Options include a Collins heads-up guidance system with enhanced and synthetic imagery on.



An overhead colour touch screen controls the cabin management system.

Auto-throttle and full-authority digital engine control (FADEC) make power management easy.





ENGINE THRUST/FLAT RATING: 7,036<sup>hp</sup>/ISA+18°C



MMO: M 0.83



MAX. OPERATING ALTITUDE: 45,000<sup>ft</sup>/13,716<sup>m</sup>

HIGH-SPEED CRUISE: 466<sup>KT</sup> / 863<sup>km/h</sup>



RANGE: 3,125<sup>nm</sup>/5,788<sup>km</sup>



TAKEOFF FIELD LENGTH:  
4,084<sup>ft</sup>/1,245<sup>m</sup>



CREW+STANDARD CAPACITY:



2,800<sup>lb</sup>  
1,270<sup>kg</sup> MAX PAYLOAD

UNFACTORED LANDING DISTANCE:  
2,122<sup>ft</sup>/647<sup>m</sup>

optionally-heated external baggage compartment. Co-pilots will appreciate the integral folding ladder to facilitate access to its far corners. Alternatively, there is a 35-cubic-foot, in-flight accessible baggage compartment aft of the lavatory.

A comparison of the two Legacy models is interesting. Their performance numbers—runway requirements, climb, cruise speed—are almost identical, with the exception of range and payload. Leveraging their extensive commonality affords a simple choice between the Legacy 450 and Legacy 500: buying more jet allows one to carry more people further.

Daniel Bachmann, Embraer's manager of communications, summarized the difference well, saying, "The Legacy 500 can do with nine people what the 450 can

do with four." For a tidy price difference of \$US3.5 million for an additional 3.5 feet of jet, the Legacy twins nicely cover the mid-light and midsize markets.

### SEEING IS BELIEVING

Our demonstration flight would take a brand new Legacy 500, registration N561EE, for a round-robin flight off the central Florida coast, returning to Embraer's sprawling facility at the Melbourne airport.

Owing to paperwork issues, I was relegated to riding the jump seat, in lieu of my usual annoying tendency to leap into any empty left cockpit seat. The crew included Brad McKeage, vice-president of flight operations, in the left seat, and demonstration pilot Joaquim Paula in the right seat. My bruised

ego was soothed by the opportunity to watch a trained crew in operation, instead of the more entertaining option of making a mess of things for myself.

In lieu of the optional datalink, Paula entered flight plan data manually into the flight management computer, which displayed graphical weight and balance, continuously updated with fuel burn, and related field-performance calculations. Loaded with two cockpit crew, one simulated chairman of the board in the cabin, and the author riding the jump seat, plus 6,970 pounds of fuel (about half capacity), our gross takeoff weight was 31,600 pounds, or 6,760 pounds below the maximum takeoff weight of 38,360 pounds (17,400 kg). The published payload with maximum fuel is 1,779 pounds, but

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of course that depends upon the owner's appetite for options.

The cockpit seemed very spacious upon first impression, a perception enhanced by replacing the typical floor-mounted control yokes with compact side-mounted sticks. Among the advantages of a side-stick is that it affords an unobstructed view of the displays at any seating position. The pilots even get a sliding table that can be pulled from beneath the instrument panel.

The cockpit features the Rockwell Collins Pro Line Fusion avionics system; the panel predominated by four bright 15.1-inch diagonal landscape-oriented flight displays. Each display may be split into two, three or four panes, providing truly pilot-reconfigurable instruments.

The interface consists of either a conventional alpha-numeric keyboard or a mechanical trackball conveniently located outboard of each throttle, and provides for truly graphical flight planning.

Synthetic vision is standard equipment, while the optional compact Collins HGS-3500 heads-up guidance system premieres on the new Legacy models, which includes the capability to integrate both synthetic and enhanced imagery from an optional

Rockwell Collins EVS-3000 visual/infrared sensor. Embraer claims that the HGS-3500 lightens pilot workload and reduces touchdown point dispersion, and is truly a capability multiplier on a jet in this class.

The brake- and steer-by-wire systems seemed smooth during taxiing. Cleared for takeoff from Runway 09R, McKeage pushed the autothrottles to the Takeoff detent and we were off. What appeared as a single aft input rotated us to about 20 degrees pitch, which the Legacy 500 held perfectly as the jet cleaned up and accelerated. The published takeoff distance is 4,084 feet at maximum takeoff weight under standard sea level conditions.

The Legacy 500 is capable of climbing to FL430 at maximum takeoff weight and standard conditions.

Level at FL410, McKeage set the throttles at the maximum continuous thrust (MCT) detent, and was rewarded with a high speed cruise of 470 KIAS (0.82 Mach) under standard conditions. Fuel flow was 1,840 pounds per hour, which was indeed slightly better than the published consumption.

If maximum range is the mission, then a long range cruise power setting will be preferred. Still at FL410, McKeage set the

throttles, yielding 425 KIAS (0.74 Mach) and burning 1,430 pounds per hour of fuel.

The Legacy's 9.7-pound-per-square-inch cabin pressure yields a comfortable cabin altitude of 6,000 feet at its published ceiling of FL450.

Enroute back to Melbourne, McKeage responded to my enquiry about the Legacy 500's stall characteristics by retarding the throttles to idle and extending the speedbrakes from the clean configuration. He held altitude with progressive aft stick as the jet slowed. The autothrottles tried to save the day, so McKeage disabled them. Ultimately we were flying with full aft stick displacement, nicely stabilized at the maximum angle of attack, indicating 108 KIAS, but the jet would not stall. McKeage was grinning.

Similarly, he demonstrated how Embraer implemented bank angle protection. Lateral stick input commanded a roll rate, with the jet holding a precise bank angle upon stick release. In lieu of hard limits to constrain the pilot, the fly-by-wire (FBW) system demands the pilot to "override" it with additional stick force required in proportion to bank angle. When the force is released, the bank returns to the limit. FBW also provides pitch compensation in turns,

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obviating the need for back pressure. In terms of speed, load factor, bank angle and angle of attack, FBW enables the airplane to participate in its own limit protection. Such are the merits of FBW.

As a glassy, smooth twilight settled on the Florida coast, Paula set up the avionics for an instrument approach. Synthetic vision, standard on the Legacy, was particularly beneficial from my perch in the jump seat, as I could see topographical data, air traffic and even a perspective rendering of the runway with primary flight instrument data overlay on top. Coupled with the autothrottles engaged, the crew's workload appeared to be zero.

Upon landing, the FBW induces a programmed de-rotation, so McKeage's landing consisted largely of "flare and wait." Nosewheel touchdown activated the automatic feature of the carbon brakes, which in conjunction with the hydraulically-actuated thrust reversers, provided for impressive deceleration. What could be easier?

The published minimum landing distance is 2,534 feet, at maximum landing weight and standard conditions.

**HOW DO THEY DO IT?**

Among its myriad technology innovations, if I were able to associate a

single "Wow!" with the Legacy 450/500 jets, it would be this: Fly-by-wire in a midsize jet! Embraer uses a big font in its promotional material to proclaim that the Legacy models have "the most advanced flight controls system in any business jet priced below \$52 million." Absolutely.

It is often difficult to explain the merits of FBW, even to other pilots. The typical explanation is that it reduces pilot workload and improves ride quality for passengers, but FBW is more than that. Software tailors the entire flying experience, shaping the control response, enhancing stability, and providing for various means of flight envelope protection, including thrust asymmetry compensation. Instead of simply using the stick to position the control surfaces in the wind, FBW enables a control mode where the pilot directly selects flight path. The result is far simplified handling, and few pilots fail to appreciate its merits once "converted."

The maintenance department will appreciate FBW in terms of reduced parts count, labour and downtime. An example perhaps? The Legacy's integrated Aircraft Information Manager coordinates updates of databases and charts, which can be performed wirelessly by the crew in minutes from anywhere in the world.

**TAKING STOCK OF THE TECH**

The fundamental measures of an aircraft haven't changed since Orville and Wilbur downloaded their first software update: safety, reliability, performance and handling. Embraer has invested heavily in technology with its Legacy 450 and Legacy 500 models. Approaching the jet skeptically, I mused about whether all the technology delivers a commensurate utility. My time in the Legacy 500 convinced me.

The Legacy 500 may well shake things up a bit. A midsize jet with full-authority fly-by-wire, synthetic and enhanced vision, sidesticks, heads-up display and auto-brakes—to name a few gee whiz features—makes the Legacy unique. In terms of technology, it stepped to the front of the line as the state-of-the-art in this bizjet segment.

The merits of the Legacy 450 and Legacy 500 jets will no doubt prove themselves to the market. Their time has come. 🚀

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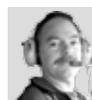
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**▶ ROBERT ERDOS**

Robert Erdos is a contributing editor for *Skies* magazine. He is a graduate of the U.S. Naval Test Pilot School and a professional test pilot. Also an aviation enthusiast, his spare time activities include displaying vintage airplanes and flying his RV-6 kitplane.

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Photo: Tourism Calgary

# 2018

# READY TO RESPOND

The Canadian Armed Forces is preparing its response plan for a major air disaster in a remote, inaccessible location.

► BY CHRIS THATCHER | PHOTOS BY ALLAN JOYNER

**O**n the afternoon of Aug. 20, 2011, amid a thick blanket of fog and drizzling rain, First Air flight 6560 crashed into a ridgeline about one nautical mile east of the landing strip in Resolute Bay, Nunavut. The pilot and co-pilot of the 737-200 combi aircraft had struggled with misaligned navigational sensors on approach and failed to realize they

were 17 degrees off the plane's actual heading. Remarkably, just a few hundred metres away from the point of impact, members of the Canadian Armed Forces (CAF) were conducting an annual Arctic training exercise. Three of the 15 people on the jet survived and were evacuated to Iqaluit and then Ottawa on a CC-177 Globemaster that had landed only moments later, carrying search

and rescue technicians, medical personnel, and Transportation Safety Board of Canada investigators preparing to participate in a Forces simulation of a major air disaster (MAJAID). The intrusion of reality on a training event was a stark reminder of how difficult it could be to respond to a downed airliner had the circumstances been different. As air and marine traffic intensifies across

A member of the Canadian Army Advanced Warfare Centre waits to direct the landing of the second of three CH-146 Griffons. The helicopters were used to evacuate the simulated injured during SAREX17 last September.





SAREX17 afforded the Canadian Armed Forces with valuable experience in responding to a major air disaster.



Volunteers played the roles of casualties from the simulated mid-air collision.



SAR Techs performed triage and delivered care to victims.



SAR Techs typically deploy with enough resources to sustain themselves and their casualties for up to seven days.



The Canadian Armed Forces is preparing to respond to a major air disaster on land or at sea. DND/David Blais Photo

“AS AIR AND MARINE TRAFFIC INTENSIFIES ACROSS THE NORTH, THE CANADIAN ARMED FORCES IS BRACING FOR THE NIGHTMARE SCENARIO: A MAJOR ACCIDENT IN A REMOTE OR INACCESSIBLE AREA.”

the Canadian north, the CAF is bracing for the nightmare scenario: a major accident in a remote or inaccessible area that strains—and perhaps overwhelms—its emergency response capabilities.

“I do think it is going to happen and we have to be ready for it,” LCol Kevin Toone told *Skies* during a recent training exercise.

Toone heads the Canadian Joint Operations Command (CJOC) search and rescue (SAR) program and believes that while the CAF is well positioned to respond to a major air disaster-level scenario, a lot of work still needs to be done on the interaction between the military, other government agencies and civilian services to ensure the response and casualty management is seamless.

He noted over the past 15 years there have been a number of significant aircraft-related accidents in Canada, mostly at airports and managed by local responders. Even the recent crash in December 2017 of West Wind Aviation Flight 282 near Fond-du-Lac, Sask., occurred only a kilometre from the runway and Canadian Rangers and other members of the local community were on the scene within 20 minutes.

The downing of an airliner or even the grounding of an expeditionary cruise ship with several hundred passengers on board in an isolated part of the Arctic, however, would quickly exceed local response capacity.

And while the Royal Canadian Air Force (RCAF) would have a search and rescue aircraft airborne within 30 minutes of one of its three Joint Rescue Coordination Centres receiving a request for help, its initial response capability would also be overwhelmed.

Though supporting forces are on 12 hours’ notice to move, because of geography it could be anywhere from 12 to 18 hours, and even 24 hours “before you are going to get [additional] help on scene,” Toone observed.

The CAF has had a contingency plan (CONPLAN) for a mass casualty and rescue

operation on standby for 20 years. But when Toone, a former CH-149 Cormorant pilot, assumed responsibility for SAR, he was asked by the commander of CJOC what kept him awake at night. It wasn’t a hard question to answer: an Arctic MAJAJD.

Since then, a team at CJOC has been rewriting the CONPLAN, incorporating supplemental plans from the Air Force, Army, Navy, and health services to solidify the necessary actions of more than just the SAR community.

Whether it is air mobility forces, tactical aviation forces or resources from other departments and agencies, all need well developed and rehearsed plans to not only deploy to the casualty scene, but also to sustain themselves for an extended period.

In the past, most viewed the “chances of an A380 going down in the North as so slim,” they were not willing to invest valuable resources planning for it, said Toone. “Now, we are saying, ‘Wait a minute, this is for any [mass casualty event].’ The First Air crash would be that scenario—we just happened to be there at the time.”

What concerned him with the CONPLAN was that, after the initial deployment of SAR and follow-on CAF resources, there were “spaces where something magically happened” and co-ordination with civilian or other government departments naturally occurred.

“I said, no, we need to have an actionable plan that somebody new can pick up and see, this is what I’m supposed to do now,” he added. “So we’ve made [the CONPLAN] thinner, more condensed and to the point.”

### SIMULATING REALITY

In the sweltering heat this past September, members of the Forces’ SAR community and the Canadian Army Advanced Warfare Centre (CAAWC) put elements of that CONPLAN to the test as part of SAREX17, an annual national SAR training event.

Conducted at Canadian Forces Detachment Mountain View south of Trenton, Ont., the

A CC-130 Hercules drops search and rescue supplies at the simulated accident scene, including triage tents and food.



exercise simulated the mid-air collision of two aircraft carrying 40 passengers over a remote and thickly wooded area in northern Canada.

In a scene reminiscent of any horror movie, volunteers with torn clothing, severe burns and deep lacerations (all painted on) realistically role-played badly injured and dead passengers scattered among the trees and what remained of two fuselages.

The challenge for the arriving SAR techs, airborne soldiers and medical personnel was to triage and deliver care to the casualties, manage the incident scene, and expedite an evacuation.

SAR techs typically deploy with enough resources to sustain themselves and their casualties for up to seven days. For the purposes of the exercise, the deployment of some equipment was simulated to accomplish everything in an intense six hours.

The first CC-130H Hercules on the scene dropped four SAR techs and then took up an over-watch position as a communications platform, managing and deconflicting air traffic and passing information among the ground team, incoming aircraft and higher headquarters. The first SAR tech to land assumed the role of on-scene team leader, conducting an initial evaluation of the site and then liaising with the circling Herc.

The arrival of additional SAR techs might normally take several hours, but for the exercise a CC-115 Buffalo reached the drop zone just a few minutes later, inserting 14 more jumpers. As the Buffalo backed off to circle the area, a second Hercules then simulated the delivery of a container with medical and survival gear and a chalk of airborne jumpers from the CAAWC, which

keeps two six-member teams on four hours' notice to move in support of such operations.

Once on the ground, the SAR techs immediately began a coordinated triage of the casualties, using a colour-coded system to sort and determine the level of care required. At the same time, the CAAWC soldiers quickly retrieved their equipment and set up tent shelters for on-site treatment.

Last to arrive was a three-ship of CH-146 Griffon helicopters containing command post elements and aero-medical technicians, critical pieces to the transition from SAR to medical evacuation and the hand-off to civilian agencies.

Prior to the exercise, LCol Leighton James, the commanding officer of 424 Transport and Rescue Squadron and the host of SAREX17, emphasized the importance of communications in any SAR incident—on scene, between ground and air, in the air, with military and civilian agencies, and with supporting headquarters.

So it was hardly surprising that during a post-exercise debrief, communications emerged as the predominant theme. From the first pilot on the scene, to the first SAR tech on the ground, the SAR tech medical leader (med boss), and the Griffon aircrew, all had high praise for the response and execution but found room for improvement with communication at key moments: brevity of messages; more patient information when handing off between triage and initial treatment and between SAR techs and later arriving medical personnel; and between the ground team and the approaching Griffons.

"Communication is the key. If you can't communicate, often you are working against each other. And there is no time for that," MWO Aaron Bygrove, the exercise facilitator, observed.

Missing from the exercise, however, was the critical role of other government agencies, civilian responders and medical services. So, in September 2018, as part of the annual Operation Nanook exercise, the CAF will host a larger mass casualty event in Yellowknife for a much bigger training audience.

Exercise Ready Soteria, its name taken from the Greek goddess of safety and preservation from harm, will see approximately 270 CAF members respond to the suspected crash of a Boeing B777-200 carrying 250 passengers and 15 aircrew from Dubai to Los Angeles. In the scenario, the pilot will report loss of power and electrical system problems and then attempt a controlled landing on a short runway on remote Banks Island, 250 kilometres northeast of Yellowknife. When no response is received following anticipated touchdown, and no settlement is within 150 kilometres, the Joint Rescue Coordination Centre will launch SAR resources.

Although the RCAF will drop a full MAJAID kit and deploy all of its



A maintenance technician inspects a CC-130 Hercules in the early hours before the SAREX17 MAJAID exercise, which simulated a mid-air collision between two aircraft.

SAR resources, the primary focus will be integration with other agencies, said Toone. Participants could include the Canada Border Services Agency, Transport Canada, Transportation Safety Board, local first responders, hospitals, the local coroner and territorial and provincial medevac capabilities. The event could even include representatives from a large airline to understand their communications and local resource requirements in the wake of a crash of one of their jets.

"We want to start that integration now before something does happen," he explained. "A MAJAID task force commander

needs to understand how the machinery of government works, see who [they] can tap into. You can't do that until you have exercises and somebody shows up and says, 'Who are you and what do you do?'"

"This is our nightmare scenario," added James. "But it gives us the opportunity to figure out what is working and what is not. This is a huge first step for dealing with all the different agencies." ❏



➤ **CHRIS THATCHER**

Chris Thatcher is an aerospace, defence and technology writer and a regular contributor to *Skies*.

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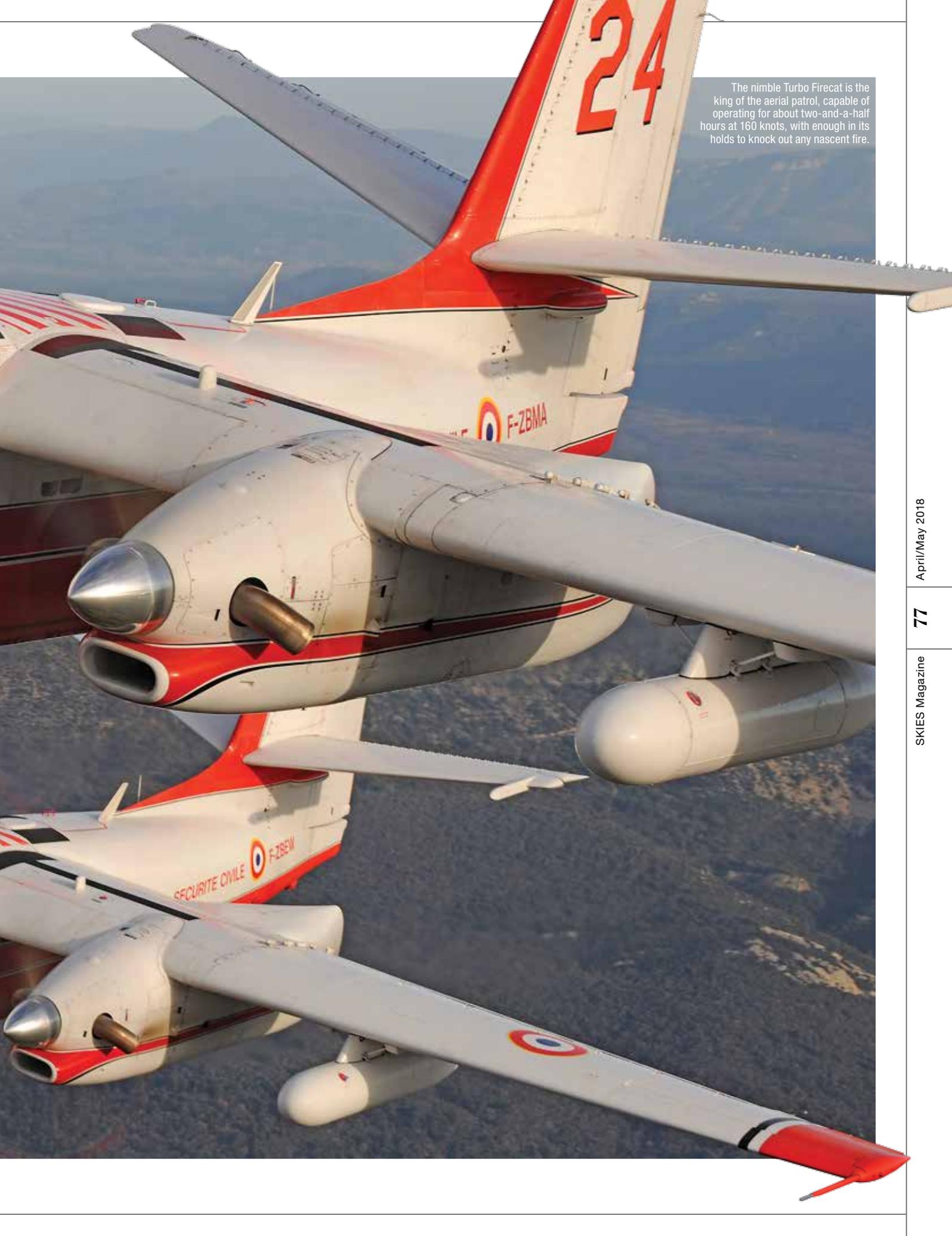
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# *Farewell* TO THE **FIRECAT**

France will retire its last Conair Turbo Firecats by 2022. While a replacement fleet of Bombardier Q400MR aircraft is in progress, the Firecat will leave behind a group of loyal pilots who find no fault with its solid and dependable firefighting performance.

BY FRÉDÉRIC LERT | PHOTOS BY ANTHONY PECCHI





The nimble Turbo Firecat is the king of the aerial patrol, capable of operating for about two-and-a-half hours at 160 knots, with enough in its holds to knock out any nascent fire.



### CONAIR: A STRONG RELATIONSHIP WITH FRANCE

As the Turbo Firecat type certificate holder, Conair is in essence the OEM for the aircraft. The company is responsible for its continued airworthiness, which includes parts support, technical support, modifications as required, airworthiness concerns, etc.

Jeff Berry, Conair's director of business development, shared a bit of history about the French Firecats:

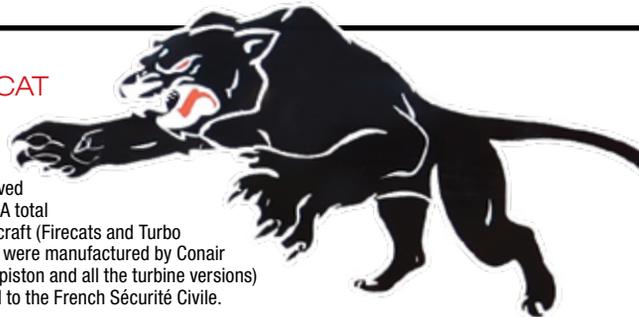
### A FIRST FOR FRANCE

T01 was the first aircraft (Firecat) to be built for France in 1982.



### TURBO FIRECAT

The first Turbo Firecat, T16, arrived in 1988. A total of 27 aircraft (Firecats and Turbo Firecats) were manufactured by Conair with 19 piston and all the turbine versions delivered to the French Sécurité Civile.





Most of the French Sécurité Civile pilots are former air force pilots who are not afraid of flying close to the ground. The Turbo Firecat provides them with enough power to evade obstacles once the water is released.

**I**n the minds of the general public, all aerial firefighting waterbombers are Canadairs. But in the shadow of the king of the scoop, the Conair Firecat, alias “Turbo Tracker,” does its job with efficiency under the colours of the French Sécurité Civile.

France is the last country to use the airplane on a large scale, currently operating a fleet of nine aircraft which are scheduled for retirement by 2022. While the country has ordered a fleet of six multi-role Bombardier Q400MR air tankers as replacements, it remains business as usual in the nine-aircraft Turbo Firecat department of the Sécurité Civile, led by pilot Philippe Prioult.

Like the other pilots in his department, Prioult is a former military aviator. He spent 15 years with the French Air Force, flying SEPECAT Jaguars and Dassault Mirage 2000Ns. From the strike-fighting Jaguar, he acquired the taste for low-level bombing missions, a skill that transfers nicely to aerial firefighting.

When asked if he has encountered any flaws with the twin-engine Turbo Firecat, Prioult answers “no” without hesitation. Then he changes his mind, well aware that no plane is perfect. “His only fault is his age.”

Indeed, the Firecat’s origins date back to 1952. That’s when Grumman first flew its S-2 Tracker, a twin-engine, carrier-based anti-submarine aircraft that was originally produced for the U.S. Navy.

Grumman built more than 1,200 S-2 aircraft, many of which were designated as military surplus by the 1970s. That’s when a Canadian company, B.C.-based Conair Group, raided the surplus fleet with the idea of developing a firefighting air tanker.

Dubbed the Firecat, Conair achieved its objectives by raising the cabin floor 20 centimetres to accommodate four water tanks in the old bomb bay. At the same time, the removal of all the military equipment translated into a 1,500-kilogram weight savings, allowing for the addition of a 3,296-litre retardant tank.

The French Sécurité Civile opted for the plane in 1981, and the first two aircraft landed in Marignane (Marseille’s international airport in southern France) the following year, after a nine-stop journey from Conair in British Columbia.

Fourteen aircraft were purchased by France, with the last one delivered in 1987. While receiving its last Firecat, the Sécurité Civile engaged in an engine upgrade program that gave birth to the Turbo Firecat, with the old piston engines being replaced with a pair of modern Pratt & Whitney Canada PT6A-67AF turboprops and new five-blade propellers.

Upgraded airplanes were also easily recognizable thanks to the additional fuel tanks permanently suspended under the wings. The Turbo Firecat was also lighter, with a 6,800 kilogram empty weight, since the PT6 turbines were much lighter than the original Wright piston engines.

The upgraded aircraft were further complemented by a handful of Turbo Firecats bought directly from Conair. At the end of the day, the French Sécurité Civile purchased a total of 19 aircraft from the Canadian company. Of this total, eight were subsequently destroyed in operation, one has been retroceded, another has been placed on display, and there are now nine operational aircraft.

## OF DIALS AND IPAD

The days of those last nine aircraft are numbered. The first will be retired by the end of 2018, and four more by 2020. All aircraft will stop flying by 2022.

However, for the French pilots, the Turbo Firecat is irreplaceable. When asked to quote the shortcomings of the plane, they do not find any.

The original Tracker was already pretty good, and with the turbines it became nearly perfect—even more flexible and faster while remaining very agile. Admittedly, the available power is relatively limited and the release of the payload (a mixture of water and chemical to suppress a fire) is imperative in the

### CONAIR CONVERSION

Of the 19 aircraft sold to France, 14 were piston Firecats with eight of those returning to Conair for turbine conversion. Five Grumman Trackers were directly modified to Turbo Firecats without being Firecats first.

### AVRO RJ85s

Today, Conair has no plans to convert any more Firecats. However, the company is busy converting Avro RJ85s into air tankers and now has eight in its fleet.



### BOMBARDIER Q400MR

Conair is now working with Flying Colours to convert six Bombardier Q400MR air tankers into multi-role aircraft for the French government. These aircraft will be configured with four different interiors: passenger, cargo, combi and medevac/special missions.



The Firecat can carry 7,500 pounds of water and retardant. That's not a bad performance for its diminutive size!



Philippe Prioult is head of the Turbo Firecat department of the Sécurité Civile.



Left hand on the column, right hand on the power setting: coming in to land after a day of work.

event of engine failure.

Still, it is necessary to push Philippe Prioult to admit to the discomforts of the plane.

“OK, the cockpit is not air conditioned and it’s hot in the summer,” he said. “The cockpit is clamped between the two engines and the lack of soundproofing also makes it a noisy airplane. One flies with earplugs and helmet, but it remains very noisy . . .”

Another unique feature of the plane is the cockpit access via a hatch located on top of the fuselage. The pilot must be fit!

The dashboard is classic, based on dials and without screens. But the Sécurité Civile pilots now fly with an iPad on their lap to assist with navigation. Turbo Firecats, however, only operate in daylight, in specific sectors.

### KING OF THE AERIAL PATROL

The aircraft is compact, drawing its lines from its original mission (the hunt for submarines) and the constraints arising from its embarkation on aircraft carriers. Its dimensions allowed it to sit on an elevator and enter an aircraft carrier hangar, while having at the same time a well-sized tail to counter an engine failure.

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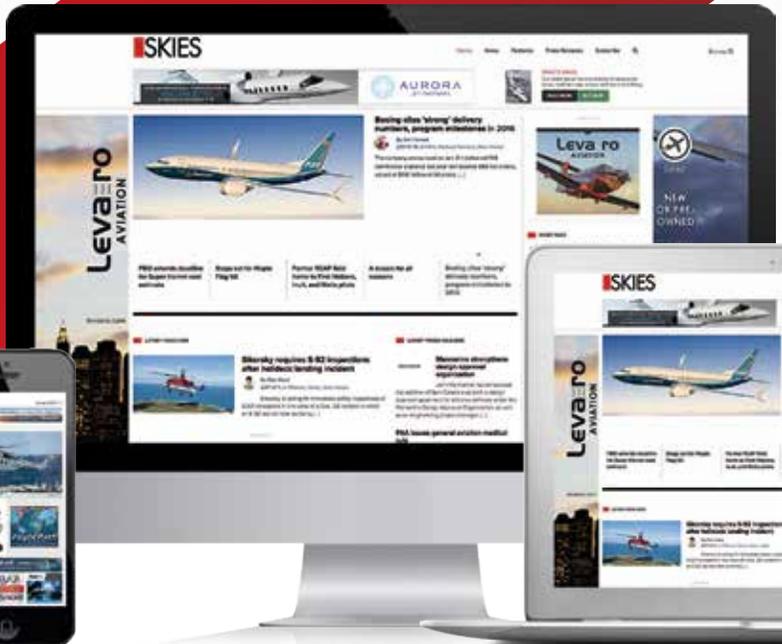
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Aviation is  
our passion.



Thanks to bubble windows on each side of the cockpit, the Firecat provides pilots with excellent visibility.



The former U.S. Navy aircraft are still going strong. When a fire is located, the “bombing” is generally done in two stages, two tanks at a time.

It also had to be sufficiently manoeuvrable at low speeds for carrier operations, which resulted in the use of very large flaps—these occupy 80 per cent of the trailing edge of the wing. The remaining 20 per cent is occupied by the ailerons, whose action is combined with that of the spoilers (1.5 metres on each wing). This provides excellent manoeuvrability to the aircraft, and a stall speed of only 70 knots.

The Turbo Firecat weighs 20,000 pounds including 4,000 pounds of fuel (two main tanks of 1,700 pounds each plus 300 pounds per underwing tank). With the 7,500 pounds of water and fire retardant mixture carried in its four payload tanks, the aircraft reaches the maximum takeoff weight of 27,500 pounds. The payload tanks are filled on the ground under pressure in less than two minutes. The “bombing” is generally done in two stages, two tanks at a time.

Thus equipped, the Turbo Firecat is the king of the aerial patrol, capable of operating for about two-and-a-half hours at 160 knots, with enough in its holds to knock out any nascent fire.

“The Sécurité Civile’s GAAR mission [Guet Aérien Armé – Armed aerial patrol] is unique to France, while other countries only focus on firefighting,” noted Prioult. “The territory on which we intervene, southern France and Corsica island, lends itself well to the mission.”

The establishment of summer detachments on remote airstrips allows the force to effectively cover its territory with the possibility of intervening very quickly at the scene of a brewing fire.

“When the risks are high, days of great drought with wind, we maintain patrols in the air for two-and-a-half or three hours, with the autonomy necessary to ensure a hand over between a patrol and its backup,” said Prioult. “This organization makes it possible to intervene at any point in the surveillance zone in less than 10 minutes.”

### DANGER AND COMPLEXITY

Some days, patrolling an empty sky for hours is a bit boring. The Turbo Firecat pilots do not hide it. But the GAAR mission is like fighting in a war: the passage from the deepest torpor to the most hectic activity can be traversed in the blink of an eye.

“The principle of the GAAR is to allow us to intervene very quickly; the time factor is essential in the prevention of risks,” said Prioult. “It is necessary to analyze very quickly the fire we face and its environment, so that we can quickly kill it with a drop or two. With a two-aircraft patrol and [a combined six tons] of fire retardant on board, we have the

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Pilots enter the Turbo Firecat through the hatch located on top of the fuselage. Situated between the two engines, the cockpit is noisy.

“THE TURBO FIRECAT WEIGHS 20,000 POUNDS INCLUDING 4,000 POUNDS OF FUEL. AN ADDITIONAL 7,500 POUNDS OF WATER AND FIRE RETARDANT ARE CARRIED IN ITS FOUR PAYLOAD TANKS.”

perfect tool to deal with this type of emergency. It is this mission that excites me and which justified my choice of the Turbo Tracker [Firecat].”

When the GAAR is engaged, more than 80 per cent of incipient fires starts are killed by the Turbo Firecat, with the support of ground firefighters. If the initial attack did not succeed in controlling the fire, the airplanes are then used to set retardant barriers to limit its spread or to protect sensitive areas. These things are easily stated, but the reality is often complex and the craft is always dangerous, as evidenced by the eight aircraft lost in flight between 1985 and 2005.

However, the pilots benefit from their previous careers as combat pilots in the air force or the navy. Recruitment is also open to civilians, but a first career within the armed forces is always a major asset. It brings with it a solid knowledge of low-level flight, the sense of relative flying and the ability to think quickly and well in the face of the unexpected.

With nine planes available, France's Turbo Firecat department now has 18 pilots on staff. Recruitment is based on retirements and transfers to the other

sectors of the Sécurité Civile, to either the Canadair CL-415s or Bombardier Q400MR multi-role aircraft. A newcomer's qualification on the Turbo Firecat is made internally, by the department.

Since 2000, new pilots joining the community must acquire two to three years of prior experience as a Canadair CL-415 co-pilot, where they learn their craft of waterbombing and attacking the fires.

### STAY TUNED

In 2022, the oldest Turbo Firecat will log 40 years of service under the French colours. Taking into account their past lives, this figure will actually be closer to nearly 70 years of service!

Meanwhile, France prepares to welcome six more Q400MR aircraft to its firefighting fleet.

They will have a tough act to follow. 🇫🇷



#### FRÉDÉRIC LERT

Frédéric Lert has been a professional journalist and photographer for over 20 years, during which he has authored 20 books on aviation. He lives in Bordeaux, France.



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# N O R T H E R N *light*

Iqaluit International Airport has been instrumental in the growth of Nunavut's capital city.

BY BEN FORREST | PHOTOS BY BRIAN TATTUINEE

**A**s the ambient air temperature at Iqaluit International Airport dipped to -34 C on a frigid day in early February, a bright white Gulfstream G500 business jet touched down on the frozen runway and taxied onto a ramp coated with snow.

Days earlier, Gulfstream had announced the aircraft had entered the final stage of its flight test and certification program, which included cold weather testing in the capital city of Nunavut, near the shores of the North Atlantic.

"This has been the premier cold weather testing location—one of them in the world, for sure," said John Hawkins, director of the Iqaluit airport (CYFB), in an interview with *Skies*.

"Airbus tests most of their new airframes and engine variants here. Boeing's tested engine variants," he said. "Every year, we can expect at least one or two campaigns to come through."

Hours after the G500 touched down, a green test vehicle of the slightly larger Gulfstream G600, also expecting certification in 2018, was scheduled to arrive. It was the latest in a long line of new aircraft that have been put through their paces at

Iqaluit, including the Bombardier Global 7000 and Airbus A320neo.

"We have great weather for that," said Hawkins. "We can pretty much count on -30 [temperatures] for a month or six weeks of the year, and not a terrible amount of wind."

The fact that Iqaluit is a preferred OEM testing spot is a point of pride for the airport, which underwent a \$300 million refurbishment last year that included a new terminal building, runway reconstruction, new taxiways, expanded apron structures, a new fuelling system, and a new combined services building.

But CYFB is much more than a cold-weather proving ground. It's also a vital connection between Iqaluit and other Nunavut communities, and an essential link between Canada's newest territory and southern Canada.

"Our only year-round mode of transportation here is air," said Hawkins. "That means our groceries come here by air, and our medical travel is done by air. All of our administrative functions, all our travel for visiting—everybody here travels by air."

"There are no two communities in the whole territory that are linked by road, so you can't get from one place to another

without getting on an airplane."

Iqaluit International Airport traces its origins to 1942, when the United States Air Force (USAF) built a major airbase at Koojessie Inlet, near the southern tip of Baffin Island. The airbase was planned as a link to Europe during the Second World War, but it was under-used, and later acquired by Canada's federal government.

During the Cold War, present-day Iqaluit (then known as Frobisher Bay) became a centre for Distant Early Warning (DEW) Line construction operations, contributing to the chain of 63 radar and communications facilities that stretched from Western Alaska to Greenland.

Frobisher Bay officially became Iqaluit in 1987, reverting to its original Inuktitut name. Today, the city is a government, cultural and commercial centre, with a population of about 7,800 people.

The airport has played a crucial role in Iqaluit's growth, and its refurbished facilities are a way of keeping pace with the rapid, ongoing development of Nunavut's various communities.

"They all have young populations and they're all growing," said Hawkins. "So all of this commercial growth and all of the population growth, that sort of increasing standard of living—that all feeds into the need for growth at this airport."

Iqaluit saw about 18,000 aircraft movements in 2017, a number that has been stable since the late 1990s, although the types of aircraft have changed, and more cargo is travelling on dedicated freighters.

An estimated 140,000 passengers came through the terminal building last year, up from 83,355 in 1999. The new 10,000-square-metre (107,639-square-foot) structure can process 650 passengers at peak hours.

Iqaluit's 2,629-metre (8,626-foot) runway is one of the longest in the country, and one of only two paved runways in Nunavut, with the other located at Rankin Inlet.

The airport continues to be a technical stop for transatlantic commercial aircraft, and a fuelling stop for aircraft travelling to and from Europe, the United States, and Asia.

First Air and Canadian North both offer daily scheduled service to Ottawa from Iqaluit, as well as routes to Yellowknife, N.W.T., and several smaller Northern communities. First Air also serves routes to Edmonton and Winnipeg from Iqaluit.

"This is the connection to the South," said Hawkins. "This is the hub that everything comes through."

As the communities around it grow, the Iqaluit airport is expected to grow with them, playing the essential role it always has—as a cold-weather testing site, a community hub, and a link to the rest of the country.

"The role it plays in the community is akin to the old-style train station," said Hawkins.

"It's quite a bit elevated over what it does in [a larger] city, where everyone kind of avoids the airport if they can." ■

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# Column

## INSTRUMENT IQ BY JOHN MONTGOMERY

John Montgomery is the founder and president of Professional Flight Centre in Delta, B.C., which was established in 1986. A 12,000-hour ATPL pilot and multi IFR instructor, he also specializes in ground school and seminar instruction. John can be reached at john@proifc.com.



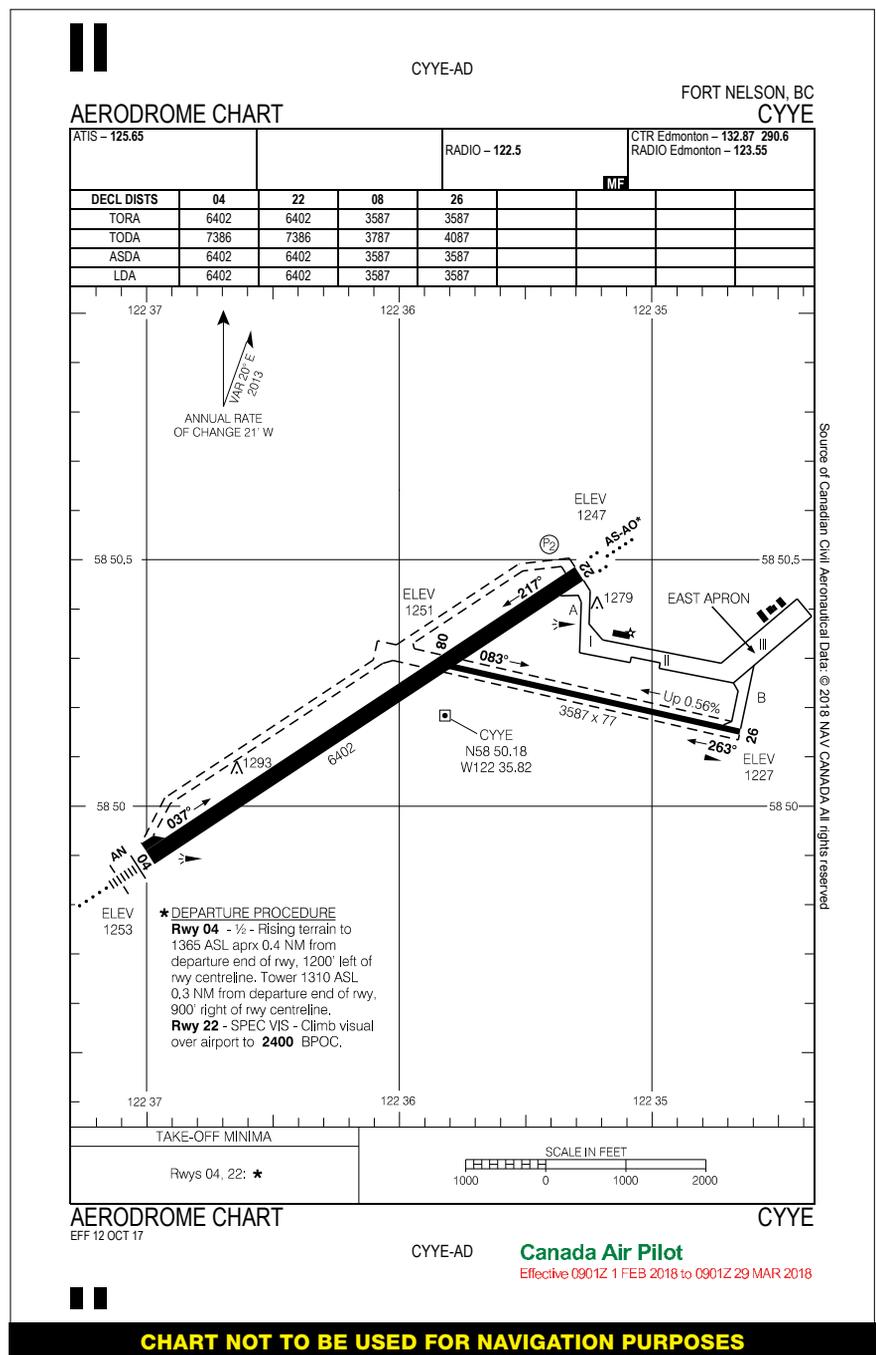
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1. Would you expect RWY 22 to be equipped with a clearway?
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3. You are planning to depart RWY 04. FSS is reporting 3/8 SM but you can count 13 sets of runway lights in the touch down zone (TDZ). Are you legal to depart? Answer for both fixed-wing and rotorcraft.
4. What must the pilot in command do to confirm obstacle clearance when departing RWY 04?
5. What is the precise magnetic track of RWY 22?
6. Your planned climb speed on a SPEC VIS Departure off RWY 22 is 125 KIAS. What minimum ceiling and visibility will allow this departure given the above information?
7. You would expect the ATIS to operate (limited hours/24-7), please choose.



## Meet Steve Hankirk President, Canadian North & ATAC Chair



Rob Mejia Photo

In 1979, Steve Hankirk's first flying job landed him in the remote settlement of Pikangikum, approximately 100 kilometres northwest of Red Lake, Ont.

In this isolated location, inaccessible by road or rail, the young Hankirk earned his stripes flying charters in a Cessna 185 on floats, wheels and skis. The experience emphasized how vital air service is to northern communities, a realization that was reinforced by a series of progressive flying jobs in northern Ontario and Alberta.

In 1985, Hankirk joined the world of corporate aviation, piloting a Learjet out of Edmonton. Three years later, he became a first officer with Time Air in Calgary on a brand new de Havilland Canada Dash 8.

"I flew the Dash 8 and became chief pilot in late 1989," he recalled. "I liked the schedule that came with the airline business."

But big changes were brewing in the Canadian airline landscape. Time Air morphed into Canadian Regional Airlines, an amalgamation of several carriers across Canada.

"We became the feeder for Canadian Airlines. I had many jobs at Canadian Regional, but ended up as director of flight operations, with 32 Dash 8s and 32 Fokker F-28s. Through that whole period, I managed and flew at Canadian Regional until 2001. That's when Air Canada and Canadian merged."

Around the same time, Canadian North was structured into a separate, independent

airline owned by Air NofTerra. Opportunity knocked for Hankirk, who was hired on as operations manager.

In those days, the small carrier was flying scheduled passenger and cargo service to destinations in northern Canada, from hubs in Edmonton and Ottawa.

"As the airline matured in 2005, we diversified into charter work, starting with charters to diamond mines with [Boeing] 737s and then the oil sands of northern Alberta," recounted Hankirk.

He progressed through a number of positions at the airline, finally becoming president in 2012.

From an initial fleet of three 737s, Canadian North now operates 12 of that type, along with three Dash 8 combi aircraft, and boasts about 700 full-time employees.

In 2017, the Inuvialuit Development Corporation, representing the Inuvialuit of the Western Arctic, assumed full ownership of the airline. Today, it incorporates three business units: scheduled passenger service, cargo and charters.

Hankirk said the scheduled airline currently services 16 destinations in the Northwest Territories and Nunavut, still from bases in Edmonton and Ottawa. Canadian North also does charter work for most of the big oil sands companies, and leisure flying on behalf of Air Transat and Celebrity Cruises. Players in the Canadian Football League also fly on a custom-painted Boeing 737-300.

Last fall, Canadian North unveiled plans to open its own manufacturing, maintenance, repair and overhaul (MMRO) facility in its Edmonton hangar.

Hankirk said 45 new employees started on Feb. 12, 2018, with the first aircraft scheduled to enter the new shop on April 2.

"We had to recruit 30 engineers," he said, adding that he had expected that to be a difficult task, given the staff shortages currently plaguing the industry. "However, avionics engineers presented the only place we fell short. We were able to fill the need with some contractors and apprentices."

Hankirk expects the new facility will help the airline lower costs while managing its maintenance schedules.

Along the same lines, Canadian North pur-

chased its own CAE 737 Level D flight simulator in 2015, enabling in-house pilot training in Edmonton and external leasing revenue.

Another exciting development is the launch of Fetchable, a new consumer delivery service powered jointly by Canadian North and BBE Expediting Ltd.

"It allows a [northern] customer to phone up almost any Canadian retailer, buy at normal retail prices, and then go online to Fetchable and input their package information. We'll pick it up and next thing you know, it's at your doorstep," explained Hankirk. "We are offering same-day service from the south to the north and soon international shipping, too."

As Fetchable matures, it will also showcase goods on its website.

While all of this is happening at Canadian North, Hankirk is also busy in his role as chair of the Air Transport Association of Canada (ATAC).

He has identified some big priorities for his three-year term.

First, he wants to work with Transport Canada and ATAC members to implement a fair fatigue management system.

"The rules need to change from what they are today, but Transport needs to be measured in how they approach it," said Hankirk. "We need to work with them so members can live with the new rules, and have an appropriate implementation period."

He added that if the regulations (as written) went into effect right now, most operators would need to hire 15 to 20 per cent more pilots.

Coupled with the current pilot shortage, "it's the most serious issue to face the industry for 20 years."

Hankirk believes the solution is a "whole of industry" approach that involves the regulator and all types of operators, from flying schools to smaller carriers to large airlines.

"The communication with Transport Canada is pretty constant right now, to try to pin down what the final regs will be," concluded Hankirk. "ATAC can do a number of things. It's probably the best vehicle to get a message to Transport Canada and [Transport] Minister Garneau."

To foster industry co-operation, he is aiming to establish a partnership between ATAC and the National Airlines Council.

Hankirk added that if the fatigue regulations were implemented as they currently stand, Canadian North would immediately need 15 per cent more pilots. Service schedules would have to be adjusted for shorter duty days.

But northern operators aren't the only ones who would feel the pinch under the regulations as they now stand.

"No more Mexico and back in a day—that would be impacted. It goes from top to bottom in terms of the problems it will cause." ■

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