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On the Cover

The Canadian aerospace landscape changed forever on Oct. 16, 2017, when Bombardier announced a partnership with Airbus to "unlock" the value of its C Series commercial jet family. The deal was widely seen as a lifeline for the critically acclaimed but beleaguered program, which was floundering in the face of soaring development costs and prohibitive U.S. import tariffs. **Airbus/Bombardier Image**



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Bombardier's regional aircraft options

BY RICHARD ABOULAFIA

Fix, fold or sell? These are the three options confronting any business that's in jeopardy. Thanks to 10 years of neglect due to the enormous resource drain of the C Series, Bombardier's regional airliner business is best described as "in jeopardy." The company's decisions will be driven by factors largely unrelated to the regional market, but here is how the options stack up:

"Fold" is the default outcome. This would not be an overnight result. In fact, this process has been underway for years. The Dash 8 Q400 turboprop and CRJ regional jet have not been upgraded in line with the competition, and the company hasn't been able to aggressively sell these planes to a cost-sensitive market. If Bombardier does nothing, CRJ production will sunset before 2024, while the Q400 might survive at two-per-month through the 2020s. But, lucrative aftermarket work would last for decades, and since the company wouldn't need to invest anything, profitability would be strong.

"Sell" is possible, but this is not Bombardier's decision. Rather, it presupposes the arrival of a buyer. Direct competitors (ATR, Embraer, Mitsubishi) can't buy these lines for antitrust reasons.

Private equity would find it hard to see the end game from an acquisition. It's unlikely that anyone else would be attracted by aging products that need significant cash for rejuvenation, particularly when the market top line has been stubbornly flat for several decades. The same is true for a long-rumored Learjet sale.

That leaves "fix," the most complicated option. There's a lot that can be done with these two product lines. Investments in additional sales resources and product support infrastructure would be a start, followed by product updates. Even modest cockpit and interiors enhancements would show that Bombardier was again committed to its regional products.

Most intriguingly, there's a lot that can be done with the long-running CRJ family. The type's General Electric CF34 powerplants are aging, a serious problem as Pratt & Whitney's Geared Turbofan comes online with Embraer's re-engined E2 series and the Mitsubishi Regional Jet (MRJ). Adapting lower-rated versions of the GE Passport engine used on Bombardier's Global 7000 business jet could be a solution. New wings could be another possibility, albeit an expensive one.

While the technical feasibility of this CRJ major derivative is far from certain, there's also the prospect that it could produce a jet powered by new generation engines that was also compliant with current regional airline scope clauses. The current scope agreements, which determine what regional affiliate airlines can fly, have remained stubbornly persistent, and are a serious impediment to the introduction of a new generation of regional jets. All of Embraer's E2 series and the baseline MRJ are above the weight limit.

In December 2016, Embraer decided to delay the E175-E2 by a year, for scope reasons. While the current E175 model is scope-compliant, it has the same GE CF34s found on today's CRJ family.

There are clear market reasons why Bombardier should consider product upgrades, and a more aggressive approach to regional airliner sales and marketing. While the Dash 8 Q400 has led a hand-to-mouth existence for years, its rival, the ATR series, has enjoyed very strong results. Over the last five years (2012 to 2016), Downsview built 151 Dash 8s, compared with 389 ATRs. In the same period, Bombardier delivered 189 CRJs, while Embraer delivered 497 E-Jets.

The big complication with the fix scenario, of course, is that it takes money. The decision to hand over majority control of the C Series to Airbus gives Bombardier some flexibility to devote resources to regional aircraft, but the company must first prioritize its business jet unit. That too has been neglected, although not as badly as Bombardier's regional business. Since the Global 7000 is over five years behind Gulfstream's highly successful G650, Bombardier ceded its number one position in the business jet market. Gulfstream took this prize in 2013, and Bombardier will need to do a lot of work to get it back.

Bombardier also has other obligations. It has \$700 million in additional exposure to possible C Series cost overruns over the next few years. It also has an investor base that will be eager for returns, or at the very least a break from years of costly product development. Bombardier's dual-class shareholder structure may provide a degree of insulation from this investor pressure.

Looking at Bombardier's regional airline options, it's clear that "fix" has the strongest attraction, if the company can make the numbers work. If not, "fold" will result in the gradual exit of what was once the regional market's biggest player.

Read more about Bombardier's regional aircraft families on page 24.

“If Bombardier does nothing, CRJ production will sunset before 2024, while the Q400 might survive at two-per-month through the 2020s.”

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Aviation showdown: The good, the bad and the ugly

BY KEN POLE

Any number of economists will tell you that free enterprise is a wonderful thing in that it promotes competition, ostensibly keeping costs down. That's arguably the "good" factor in the equation; but when applied to air transport (and many other sectors), the capitalist factor can include "bad" and downright "ugly" elements.

It's been a year since the government gave us Transportation 2030 for all federally-regulated sectors, an initiative Transport Minister Marc Garneau said "will move our transportation system forward and support the economic growth of our great country for the benefit of all."

The policy was based on six months of consultations which saw Garneau log more than 18,000 kilometres—significantly less than the distances the former naval officer with a doctorate in electrical engineering travelled during his stint as Canada's first astronaut.

That aside, the government promises "greater choice, better service, lower costs and new rights for travellers" as

part of building "a safer, more secure transportation system that Canadians trust."

A key element with profound consequences is a proposal to ease restrictions on foreign control of Canadian passenger and cargo operators by increasing the cap on "voting interests" to 49 per cent from 25.

Garneau noted that the control cap would not increase for specialty services such as heli-logging, aerial photography or firefighting. His rationale for "liberalized" control elsewhere ostensibly means access to more investment capital as well as more competition, which, in turn, would mean more consumer choice and more opportunities for airports and suppliers.

The wide-ranging policy also would have the Canadian Air Transport Security Authority (CATSA), a Crown corporation, ensure that passengers are processed faster without slacking standards.

Anecdotally, processing worldwide has slowed to a crawl despite the advent of new screening technologies. More staff

and/or better training are required—an added cost to be born, ultimately, by passengers who are already fee'd up, to coin a phrase.

Those two elements present opportunities for "bad" and "ugly," the latter especially when operational safety is affected by cost-cutting, which unfortunately has happened in the past.

But the devil, as they say, is in the details. That's where Bill C-49, the draft *Transportation Modernization Act*, comes into play. Designed to amend more than a dozen current statutes, it was introduced in the House of Commons by Garneau in May with absolutely no fanfare.

However, three weeks later, launching second-reading debate, he called it "truly transformative" and spent much of his time on passengers' rights and carriers' obligations.

When C-49 was sent to the Standing Committee on Transportation, Infrastructure and Communities, Garneau and government MPs understandably touted the "good" factors and downplayed any potential "bad" or "ugly" ones.

By the time the all-party committee, chaired by Liberal MP Judy Sgro, had finished with the bill, they'd heard from dozens of witnesses on just about everything you can imagine.

Garneau told reporters a short while later that he's "delighted to see it moving forward now" despite some proposed amendments, but he declined to speculate about how quickly. He said only, "I hope it's passed expeditiously."

As of mid-November, the House had just 20 sitting days left before adjourning until the end of January. Bill C-49 was first before the Senate on Nov. 2 for further review, and knowledgeable folk suggest (this is by no means absolute) it might not see the legislative light of day until late winter or early spring.

Cue actors Clint Eastwood, Lee Van Cleef, Eli Wallach and composer Ennio Morricone's music. This showdown is far from over. ■



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“ Knowledgeable folk suggest Bill C-49 might not see the legislative light of day until late winter or early spring.”



A welcome letter to new hires

BY TONY KERN

Dear new aviation professional, As you probably know by now, you are entering an industry on the rise, one filled with promise, sunny skies and tailwinds.

Airlines, business aviation, charters and the industries that support them are hiring thousands of new pilots, technicians and support personnel. Passenger loads are up. Fuel costs are down. New aircraft with advanced technologies only dreamed of a decade ago are hitting the line. Companies are making serious money. What could possibly go wrong?

What you may not know is that we have been here before ... many, many times. From 1975 to 1979, the airline industry was *the* place to be: rapid growth, rapid advancement, good pay and benefits, and even disco music!

Then came global economic factors that led to the industry decline of the early 1980s. But by the mid-80s, we were back in the big time. From 1984 to 1989, the aviation industry was booming again,

with new hires, seat changes and big profits. Once again, this was followed by a huge drop in profitability from 1990 through 1994.

But aviation is nothing if not resilient. By 1995, we were back again. That is, until Sept. 11, 2001.

The purpose of this short history lesson is not to be pessimistic, but to be realistic. The aviation industry sits at the end of a long tail, with global factors influencing its cyclical nature. Civic unrest, economics, pandemics, fuel prices, regulations and many more factors drive the engine of aviation.

So, what does this mean for you, Mr. and Ms. New Hire?

Put simply, you have entered a wonderfully unpredictable career. Those of us who have been on this roller coaster ride a few times can share some solid lessons:

1. The time to prepare is now. Get your mindset right. Don't overextend your finances based on future predicted

upgrade dates, getting on with a major airline, etc. If these things happen on schedule, that's great. But if they don't, you will be ready.

2. Expect whitewater. The big mergers seem to have settled down a bit, but change is inherent in our industry. If you know it is coming, you will be far more adaptable and flexible in responding to it.

3. Stay away from blame games and cynicism. I've followed the aviation pilot and maintenance blogs for a long time now, and it pains me to see the vitriol and mudslinging that happens when the unexpected downturn happens. Not just because it is often unjustified, but more because I can see the death of personal professionalism and passion for our industry in each post or tweet. There was a time when each of these professionals felt just as you do: excited, eager to do their best and prove themselves. Now, they don't. Don't let this happen to you.

4. Enjoy the ride. Aviation is a rewarding profession, full of challenge. You will meet great people and do some great things. Don't ever take this for granted. There are millions of people trapped in unfulfilling dead-end jobs who would die to have the opportunities you do.

Things change. The sky, and the industry that supports our use of it, is unpredictable. There will be turbulence, setbacks and unforeseen challenges. This is as much a part of our environment as the wind beneath our wings.

Get ready. Stay ready. Have fun. Welcome aboard!

“The aviation industry sits at the end of a long tail, with global factors influencing its cyclical nature.”



Porter Airlines Photo



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RED AIR



DA Defence will be using a fleet of modernized Dornier Alpha Jets (shown here) and Learjet aircraft to provide contracted airborne services to the Canadian Armed Forces. **Michael Durning Photo**

SUCCESS

AFTER A PROLONGED DECISION-MAKING PERIOD, DISCOVERY AIR DEFENCE HAS LANDED THE 10-YEAR CONTRACT TO PROVIDE THE CANADIAN ARMED FORCES WITH ADVERSARIAL AIR SERVICES.

BY CHRIS THATCHER

As the incumbent on the Contracted Airborne Training Services (CATS) program, Discovery Air Defence (DA Defence) had every reason to be confident.

Still, there were visible signs of relief in its Montreal office on Oct. 30 when the federal government delivered a 10-year, \$480-million contract with options that could extend the service to 2031 and the value to as much as \$1.4 billion.

“It was a really proud, happy moment,” said president Paul Bouchard. “There was relief in the sense that we originated the [CATS] program . . . and it’s what we’ve built the whole business around. It is the largest and longest program of its kind in the world, and it creates a lot of job security and [financial] certainty . . . [and] allows us to advance the business plan of securing the company’s future in Canada and [to] continue to grow the company internationally.”

Corporate anxiety wasn’t helped by repeated delays in the evaluation process. The request for proposals (RFP) closed in February 2016 and a winner was expected by the end of the year. Media reports, however, suggested the government lacked enough qualified staff to assess the bids, which pushed back the award until late October 2017.

The program will provide the Canadian Armed Forces (CAF) with adversarial air, also known as aggressor or red air, which simulates hostile threats for fighter pilots, naval crews and land forces. The project includes training for joint terminal attack controllers, electro-optical and infrared-guided weapons system operators, as well as electronic warfare training for aircrews, land forces, aerospace weapons controllers, and navy frigates.

The realistic combat readiness training has been beneficial to the Canadian Army and Royal Canadian Navy, but it’s been particularly important to the Royal Canadian Air Force, preserving flight hours for the CF-188 Hornet, which cost approximately \$30,000 per hour.

DA Defence edged out CAE Canada in what Carla Qualtrough, recently appointed minister of Public Services and Procurement, called “an open, transparent and competitive process.”

CAE had partnered in a joint venture with Draken International of Lakeland, Fla., operator of one of the largest combat aggressor air fleets. An official with CAE said the company was disappointed with the result and had “requested a debrief to learn more about the reasons for the decision.”

Canada has been a pioneer among NATO allies in the use of contracted airborne

“

Without [CATS], it would have been very difficult to continue to implement our strategic path. Winning at home is essential.”

services. Since the early 2000s, DA Defence has delivered aggressor air on an interim basis to national and international training exercises through a series of government standing offers, employing a combination of fighter jets and business jets stationed at four bases: Esquimalt, Cold Lake, Bagotville and Halifax.

The success of the Canadian program helped the company secure a similar training support contract with the German Armed Forces in 2014 and, more recently, a two-year trial with the Australian Defence Force. It has also helped position DA Defence to bid on large contracts with the U.S. Air Force (USAF) and U.S. Navy (USN) and, with partners Leonardo and Inzpire, on the U.K.’s Air Support to Defence Operational Training (ASDOT) program.

In interviews with *Skies*, company executives acknowledged that a loss of the CATS contract could have meant the end of the company as a Canadian entity.

“It would have made it tough in Canada, just because [CATS] is 100 per cent of our business,” said Bouchard, a former CF-188 fighter pilot who, like many of his employees, has decades of experience in the CAF. “The company would have continued, but obviously the Canadian piece is a big piece—that is where we started from, so it would have been a big blow.”

“This is our bread and butter. This is the foundation of DA Defence,” said Didier Toussaint, group president and operations manager. “Without [CATS], it would have been very difficult to continue to implement our strategic path. Winning at home is essential. It’s a long time coming,

but we really feel this is one of the key steps we needed to put in place.”

More than anything, the victory is validation of DA Defence’s capabilities. The adversarial air training services industry is relatively small, but the market is expected to skyrocket in the coming decades, from approximately 20,000 flight hours to over 100,000, as NATO allies seek training for new fleets of fifth and advanced fourth generation jets. The USAF program alone could exceed the combined current capacity of every player in the sector, while the advanced USN requirements could push the technological envelope.

“We think [CATS] is going to be a launching platform for us internationally,” said Bouchard. “We’re already active, but this is going to allow us to expand with confidence.”

The program has become a benchmark for many countries considering embedded aggressor air, he noted, and allies such as the U.K. and U.S. have become familiar with the aircrews, technicians and services of DA Defence through participation in Canadian exercises such as Maple Resolve and Maple Flag.

“[This] gives us the opportunity to compete in the rest of the world,” said Toussaint.



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



Andy Cline Photo

CTA ready to tackle air passenger rights regulations

BY BRENT JANG

The rights of air passengers in Canada are slated to be beefed up in 2018 under the federal government's vision for new regulations to protect consumers.

The timing of when those regulations might begin to be developed hinges on Bill C-49 passing through Parliament and receiving royal assent. Enhancing the rights of air travellers is a high-profile part of the broader transportation bill.

The Canadian Transportation Agency (CTA) has the task of overseeing the drafting and finalizing of new regulations, based on public consultations with groups representing a variety of interests.

"The CTA is putting all the pieces in place so that we're ready to move very quickly after the bill passes both houses and receives royal assent," said CTA chairman and CEO, Scott Streiner, in an interview. "We are going to make sure that we're ready to roll and that we're able to have the consultation process done in about two to three months after the bill has passed."

Transportation industry observers speculate that those consultations could be held in the spring of 2018, based on Bill C-49 receiving royal assent by then.

The CTA wants to hear from a wide range of groups, such as the aviation sector, consumer rights advocates, the travelling public and industry experts.

How much detail goes into the regulations will depend on the language in the portion of the legislation dealing with air passenger

rights. For consumer advocates, that raises the prospect of specific compensation levels to be spelled out for events such as denied boarding (bumping), delayed flights and cancellations.

The issue of passenger rights made headlines in the summer, notably when Air Transat flight TS157 from Brussels experienced a delay of nearly six hours on the tarmac at Ottawa International Airport after being diverted from Montreal due to severe weather on July 31.

"As a frequent traveller, I can imagine how difficult the situation must have been in those conditions after a long transatlantic flight," said Transport Minister Marc Garneau in a statement in August. "Our government's objective is to bring clear, transparent and enforceable rights for passengers in a more competitive and accountable market."

The CTA held hearings in late August into the tarmac delays in Ottawa involving Montreal-bound Air Transat flights TS157 (from Brussels) and TS507 (from Rome).

In September, the federal Standing Committee on Transport, Infrastructure and Communities heard submissions on Bill C-49, including a presentation by Marina Pavlovic, an assistant law professor at the University of Ottawa.

"The current regime of complicated tariffs and related individual carrier's contracts is overly complex and ineffective," Pavlovic said in her presentation notes. "Consumer rights regarding air travel are varied and fragmented. They depend on a number of factors and it is difficult, if not impossible, for consumers to know ahead of the time what rights they have and what are the appropriate redress mechanisms."

Pavlovic said Canada needs to go beyond what has been attempted in the past to establish minimum obligations for airlines to follow.

In 2008, the federal government announced an informal bill of rights, saying "Flight Rights Canada" would help promote a code of conduct for Canadian carriers.

Then in 2009, the National Airlines Council of Canada unveiled its own passenger bill of rights, though critics say that move was more about general principles rather than genuine enforcement. The council represents Air Canada, Jazz, Westjet Airlines Ltd., and Air Transat.

Pavlovic said she believes regulation is the appropriate mechanism for the new bill of rights, which consumer advocates hope will be in place by the end of 2018.

"A bill of rights and an effective redress mechanism are essential components of a robust consumer protection regime," she said.

The Ottawa-based Public Interest Advocacy Centre (PIAC) welcomes moves to strengthen the rights of air travellers. PIAC backs efforts to draft rules that would address concerns over issues such as flights delays, cancellations, delayed or lost luggage and overbooking. The group also wants to see the creation of an air passenger complaints commissioner.

Bruce Hood served as air travel complaints commissioner under the CTA from 2000 to 2002, followed by Liette Lacroix Kenniff from 2002 to 2004. The commissioner position wasn't renewed, but the air travel complaints program has remained in place at the CTA. The program, which saw a spike in gripes after the CTA raised consumer awareness in mid-2016 for filing complaints, aims to help resolve disputes through "facilitation, mediation and adjudication."

The CTA's Streiner said the Air Transat incidents underscore the importance of having air passenger rights that provide for fair and consistent levels of compensation.

"We want passengers to actually be able to find out what their rights are without having to dig through layers upon layers of websites," said Streiner.

The CTA plans to set up a website to encourage online discussions, assuming Bill C-49 receives royal assent. Consultation hearings are also in store for various locations across Canada.

Garneau said he expects "clear and fair standards" to emerge and that through regulations, "minimum compensation to be paid to passengers under certain circumstances would also be established."



Brent Jang, a business reporter at The Globe and Mail, is the winner of two National Newspaper Awards and has been a National Magazine Award nominee. He boarded test flights for the Airbus A380 in 2007 and Boeing 787 Dreamliner in 2012.



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AIRBUS, BOMBARDIER & THE C SERIES:

ANALYZING THE “ABCs” OF THE BLOCKBUSTER AEROSPACE DEAL

BY JAMES CARELESS

On Nov. 2, Bombardier announced the welcome sale of 31 C Series jets to an unidentified European customer, with an option for 30 additional aircraft. The company said the deal was bolstered by its recent partnership with Airbus SE, which has agreed to assume a 50.01 per cent stake in the C Series program.
Patrick Cardinal/Bombardier Photo

▶ Watch the video [here!](#)



Now that Airbus has agreed to secure a 50.01 per cent stake in the C Series Aircraft Limited Partnership (CSALP), the future of Bombardier’s innovative CS100 and CS300 passenger aircraft seems secure. (Under the proposed deal, which is expected to close by mid-2018, Bombardier and Investissement Québec [IQ] will own approximately 31 per cent and 19 per cent of the CSALP, respectively.)

Certainly, the market demand is there. Bombardier estimates potential global sales for 100 to 150 seat narrow-body airframes “to represent more than 6,000 new aircraft over the next 20 years,” said Nathalie Siphengphet, senior adviser for media relations and public affairs at Bombardier Commercial Aircraft.

The addition of Airbus to the CSALP “will ensure sustainability and growth of the C Series program,” she said. “It will also consolidate the entire aerospace cluster, resulting in a positive impact on this strategic sector of the economy for Quebec and Canada.”

The potential downside? The C Series program’s white knight could end up as its sole owner, cutting Bombardier out of the narrow-body aircraft niche it has pioneered at great expense to both the company and the Canadian taxpayer.

UNDERSTANDING THE DEAL

Usually, when one company obtains controlling interest of another company’s business venture, money changes hands.

But not in this case: Airbus is not putting up any cash for taking control of the CSALP.

Instead, “Under the agreement, Airbus will provide procurement, sales and marketing, and customer support expertise to

the CSALP, the entity that manufactures and sells the C Series,” said Siphengphet.

In exchange, Airbus gets a 50.01 per cent share. It gets to choose four of the seven appointments on the CSALP board of directors and will also name the chairman.

Despite Airbus scoring a ‘no money down’ deal in taking control of the CSALP, Bombardier has still achieved a serious business coup. It now has access to the larger aircraft manufacturer’s vast supply chain, international sales and service force, and customer base. To explain what Bombardier has done in hockey terms, it is as if a top-flight minor league hockey team has negotiated complete access to the front office, coaching staff and players from the Stanley Cup champion Pittsburgh Penguins.

At the same time, “The C Series Aircraft Limited Partnership headquarters and primary assembly line [will] remain in Quebec where Bombardier is based,” said Siphengphet. “The program will benefit from Airbus’s sales force and global reach, and we are confident that it will create value for our employees.”

Richard Aboulafia is vice-president of analysis at Teal Group, a respected aerospace and defence consultancy headquartered in Fairfax, Va. He thinks the Airbus/Bombardier deal remedies a problem that has always dogged this innovative aircraft; namely, that “when it came to the C Series, it always seemed as if Bombardier had bitten off more than it could chew.”

For Bombardier to truly grasp this aircraft family’s full potential, “they needed help from a much bigger aircraft manufacturer with the resources to build the C Series in line with Airbus and Boeing production and marketing costs,” said Aboulafia. “Joining with Airbus brings them this help.”

Announcing the blockbuster deal at a press conference on Oct. 16, 2017, were, from left to right, Quebec Deputy Premier Dominique Anglade, Bombardier president and CEO Alain Bellemare, and Airbus executive Romain Trapp. **WSJ Photo**





After the U.S. Commerce Department moved to impose an almost 300 per cent tariff on the C Series, Bombardier customer Delta Air Lines reaffirmed its plans to take delivery of 75 C Series aircraft. The original deal, signed in April 2016, was the catalyst which prompted Boeing to file a petition alleging unfair subsidization and dumping. **Bombardier Image**

“Under the agreement, Airbus will provide procurement, sales and marketing, and customer support expertise to the CSALP, the entity that manufactures and sells the C Series.”

That said, Airbus is not writing a blank cheque to Bombardier to build the C Series. “Bombardier will continue to fund the plane’s early production through the limited partnership as well as any cash shortfalls up to \$700 million over the first three years of the deal,” said *The Globe and Mail’s* Report on Business. As well, “No cash is changing hands in the deal and the C Series partnership assumes no debt as part of the transaction, the partners said.”

THE BUYOUT CLAUSE

In addition to getting 50.01 per cent of the C Series from Bombardier, Airbus has also won the right to buy out Bombardier’s 31 per cent and IQ’s 19 per cent of CSALP shares at a future date.

According to a Bombardier news release, “Airbus will benefit from call rights in respect of all of Bombardier’s interest in CSALP at fair market value...including a call right exercisable no earlier than 7.5 years following the closing, except in the event of certain changes in the control of Bombardier, in which case the right is accelerated.”

Assuming that the deal closes in mid-2018 as predicted, this means Airbus could make a pitch for Bombardier’s and IQ’s CSALP shares by 2025.

The good news is that this is a two-way

street, sort of: “Bombardier will benefit from a corresponding put right whereby it could require that Airbus acquire its interest at fair market value after the expiry of the same period,” said the Bombardier news release. However, there is no apparent provision to allow Bombardier to buy out Airbus and reclaim the C Series, should it ever want to.

In actual fact, this clause raises the possibility that the plane Bombardier—and Canadian taxpayers—spent billions to build could end up being owned outright by Airbus.

This said, Airbus is not planning to take sole control of the C Series program, said Airbus CEO Tom Enders. “We have no intention to buy out the others because we know they are great partners,” he told reporters after an appearance at the Montreal Board of Trade. “If they want to stay on the journey going forward they are very welcome to that.”

IMPACT ON BOMBARDIER

Before the Airbus/Bombardier deal was announced on Oct. 16, 2017, it seemed doubtful that Bombardier had the financial clout to reap the rewards from its significant C Series investment, despite there being no real alternative to the CS100 and CS300 on the market today.

The company just didn’t have the deep pockets to compete with Airbus or Boeing; both of whom wouldn’t stand idly by and lose market share to a smaller Canadian competitor.

Proof of this comes from the U.S. Department of Commerce’s decision to slap an almost 300 per cent tariff on the C Series, after Boeing complained that the Canadian CS100/CS300 program had benefitted from unfair government subsidies.

Although Bombardier customer Delta Air Lines publicly reaffirmed its purchase of 75 C Series aircraft after the U.S. duty was announced—adding that it expected to receive the planes but did not expect to pay the tariffs—the levy put a chill on future C Series sales to American carriers.

Now that Airbus is in the picture, everything seems to have changed; primarily because Airbus already operates an A320 assembly factory in Mobile, Ala., to serve the U.S. market. This is where the company intends to set up a second C Series assembly line, in addition to the one already in operation at Bombardier’s facility in Mirabel, Que.

“Thanks to Airbus’s plan to assemble the C Series at its Mobile plant, the new deal simply destroys Boeing’s trade case,” declared Teal Group’s Aboulafia. “Boeing and the Commerce Department could try to persist with their complaint, but having the

C Series built in Alabama makes this futile.”

According to Aboulafia, Boeing’s trade complaint against Bombardier was specifically couched to win support from the protectionist wing of the Republican Party. Unfortunately for Boeing, “The epicenter of that wing is in Alabama, which loves *factory jobs* [his emphasis], even from foreign companies,” he wrote in a Teal Group newsletter after the Airbus/Bombardier deal was announced.

With the C Series now set to bring new jobs to the protectionist wing’s heartland, Aboulafia expects “that Commerce will rule that it has no authority on jetliners exported from Alabama to Georgia [where Delta Air Lines is based], and that will be that.”

At press time, Boeing wasn’t giving up. “The announced deal has no impact or effect on the pending proceedings at all,” said an October tweet from Boeing, attributed to J. Michael Luttwig, the company’s executive vice-president and general counsel.

Boeing’s tough stance comes across merely as “pure spin,” said Aboulafia. In this case, “spin is defined as a hope, dressed up as an assertion. . . . Since the Commerce case was highly politicized, and since much of that support came from the nationalist wing of the Republican Party, and since the centre of that wing is in Alabama, I’d say Boeing has no hope with this at all.”

Bombardier is similarly unimpressed. “A final assembly line in Alabama will further underscore the fact that the C Series has a significant U.S footprint,” said Siphengphet.

She added that 50 per cent of the value of every single C Series jet is provided by U.S.-based companies; even those being built today in Mirabel. “This represents US\$30 billion of investment in the U.S. over the life of the program and 22,700 well-paid, highly skilled U.S. jobs.”

At the same time, Bombardier’s Mirabel assembly line is not under threat through the addition of the Alabama assembly facility, said Clay McConnell, who is head of communications for Airbus Americas Inc.

“By bringing Airbus into the process, Bombardier will be able to sell to many more carriers in the U.S. and global markets,” he said. “This means that the pie they are getting a slice of is much, much bigger than ever before; even when running two assembly lines instead of one!”

The message that Bombardier’s workforce is safe under the Airbus/Bombardier deal was hammered home in an open letter to the Canadian company’s employees from Airbus’s Enders.

Under the deal, “the headquarters of CSALP—along with most engineering services, research and development, as well



From left to right: Pierre Beaudoin, Bombardier board chair; Tom Enders, Airbus CEO; Alain Bellemare, Bombardier president and chief executive officer; Fabrice Bregier, Airbus chief operating officer and president of Airbus Commercial Aircraft. **Airbus Photo**

as manufacturing and assembly activities—will remain in Quebec,” he promised. At the same time, “The teaming of Airbus and Bombardier will bring to the C Series what it urgently needs: production cost savings by leveraging Airbus’s operational and supply chain expertise and Airbus’s global reach and scale to accelerate the C Series’ commercial success.”

Creating an Airbus/Bombardier team will reinforce the C Series program and its industrial operations in Canada, the U.K. and the U.S., added Enders. “It will also give the world’s airlines even greater confidence in the C Series. And, once all approval processes are behind us, the full power of Airbus’s worldwide brand and marketing forces will be harnessed to sell the C Series.”

Enders’ reassurances notwithstanding, the federal government has promised to require protection for Bombardier’s Canadian workforce before approving the Airbus/Bombardier CSALP deal.

“Proposed investments of this kind require the government to consider whether they are in the national interest,” said minister of Innovation, Science and Economic Development Navdeep Bains in an official statement. “The Airbus deal, like all significant proposed investments in Canada by non-Canadians, is subject to the *Investment Canada Act*, an act which I oversee. In my review, I’ll be looking to see how this deal will benefit Canadians, support our aerospace sector and create good jobs.”

In saying this, Bains noted that Airbus already employs a Canadian workforce of 1,900 people across seven provinces and generates \$1.2 billion of Canadian supply chain spending.

Airbus said it plans to keep C Series manufacturing and assembly in Montreal, but the Canadian government will be looking for guarantees before it approves the Airbus/Bombardier deal. **Patrick Cardinal/Bombardier Photo**



BENEFITS TO CANADIAN AEROSPACE

Airbus’s open letter to Bombardier employees extended Enders’ good news to the entire Canadian aerospace industry.

“Canada is now set to become the fifth ‘home country’ in the Airbus family—the first outside of Europe,” he said. “Facilitated by the break-through free trade agreement CETA between Canada and the EU, this marks an important milestone in Airbus’s commitment to invest in and expand its footprint across Canada for the long term, from coast to coast.”

This is no small deal, said Airbus’s McConnell. “Although Airbus operates in many countries worldwide, this marks the first time that we have established a ‘home country’ outside of the original four in Europe. This

speaks to how seriously we take establishing ourselves in Canada.”

Enders emphasized how important Airbus could be to the Canadian aerospace industry once the CSALP deal is finalized.

“Beyond the C Series, Canadian aerospace suppliers will have great access to the Airbus global supply chain—one worth \$82 billion in contracts annually, extending across all of Airbus’s business lines and products, in both civil and military aviation,” he said in the open letter.

With promises like this, Aero Montreal president Suzanne Benoit is understandably happy about the Airbus/Bombardier CSALP deal. (Aero Montreal is a strategic think tank that brings together all the major decision-makers in Quebec’s aerospace sector.)

“I think it’s great news for our industry, because Airbus is a global player,” said Benoit. “This will bring more opportunities to our supply chain. This is very good news, in that sense.”

From Aero Montreal’s perspective, Airbus’s arrival comes at a time when the Canadian aerospace sector has already become diverse, cutting edge and world class. This means that Airbus will have access to a range of Canadian aerospace talent when it is time to launch new projects.

“This is all good news to us,” said Benoit, “to have such a key player come in to develop our aerospace industry here in Canada.”

This said, one key element of the Airbus/Bombardier deal is the multinational’s extensive, volume-based supply chain that dwarfs Bombardier’s own. Could this fact result in Airbus sourcing C Series parts from non-Canadian suppliers? As well, should Canadian suppliers expect to be asked for lower unit prices, perhaps in exchange for larger volume purchases?



To get around the high import duties placed on the C Series, Airbus will open an additional assembly line serving U.S. customers at its existing A320 factory in Mobile, Ala. **Airbus Photo**

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In reply to both queries, Aboulafia said, "That sounds like a likely scenario."

For his part, Airbus's McConnell has soothing words for the C Series' Canadian suppliers. "The synergies in procurement are expected to be gained from an overall increased volume of C Series aircraft produced as a result of accelerating the aircraft's commercial success," he told *Skies*, rather than lower unit prices from suppliers.

"Plus, we anticipate our activity in Canada would result in a greater role in the future for Canadian suppliers in Airbus's overall global procurement," he continued. "It really is an important win for the Canadian aerospace community."

Over at Aero Montreal, Suzanne Benoit is more guardedly optimistic, but optimistic nevertheless. "It's difficult to provide a specific answer, because we don't know Airbus's strategy," she said. "However, the Canadian and Quebec suppliers working on the C Series have all been certified so it would be surprising, and cumbersome, if Airbus wants to work with new suppliers, because they would have to go through the certification process."

In addition, Airbus's supply chain in Europe is already working at full capacity,

Benoit noted, "so it is in the company's interest to continue working with established Canadian suppliers if they want to produce more aircraft."

WHAT LIES AHEAD

Now that the Airbus/Bombardier CSALP deal is out in the open, the clock is ticking. Until it is finalized, for instance, the C Series is still vulnerable to the 300 per cent U.S. import tariff.

As well, no one knows when the Alabama production line will actually be up and running—and it's a key element to Bombardier providing Delta with the promised C Series aircraft, while dodging tariffs. ("Once the partnership agreement is finalized between both parties, we will have better clarity on the timeframe," said Bombardier's Nathalie Siphengphet.)

So will Delta wait? *Skies* asked the airline for comment, but received no response by press time.

However, Teal Group's Richard Aboulafia has no doubts. After predicting that it will take "a year or so" to start producing C Series jets in Alabama, he added, "Yes, Delta will wait."

Still, the Airbus/Bombardier deal has yet to be finalized. Until it is, the sharks will

keep circling the C Series program. But then again, they were circling long before Airbus came to Bombardier's rescue.

At Bombardier itself, people are justifiably proud of what they've built, the storms they've weathered and how well they have played their hand.

"We have developed a product that is being recognized widely in the industry as being the most innovative in its class," said Siphengphet. "There is so much heart and soul in this aircraft program, and we believe that Airbus is the perfect partner to ensure that it has access to all key markets globally, because their global scale, strong customer relationships and operational expertise are key ingredients for unleashing the full value of the C Series."



James Careless writes on aerospace issues for *Skies* and *Vertical* magazines. He is a two-time winner of the PBI Media Award for Editorial Excellence.

At the Dubai Airshow in November, Bombardier announced it had signed a letter of intent for up to 24 CS300 aircraft with EgyptAir Holding Company of Cairo. The order included 12 CS300 aircraft with purchase rights for an additional 12 jets. Should EgyptAir exercise all of its purchase rights, the contract value would total nearly US\$2.2 billion. **Bombardier Image**



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Tipping Point?



BOMBARDIER HAS ACTED TO SECURE THE FUTURE OF ITS FLAGSHIP C SERIES, BUT THE CRJ AND Q400 FAMILIES NEED SOME ATTENTION, TOO.

BY KENNETH I. SWARTZ

The new alliance between Airbus and Bombardier has enhanced the credibility and viability of the C Series single-aisle commercial aircraft, but the jury is still out on how this deal will impact Bombardier Commercial Aircraft's (BCA's) other regional aircraft business.

The C Series stretched Bombardier's resources for many years, pulling management attention away from marketing, selling and improving the CRJ regional jet and Q400 turboprop.

Bombardier's latest commercial aircraft forecast says 5,750 new regional aircraft worth US\$240 billion will be delivered over the next 20 years in the 60- to 100-seat market.

That's a huge business opportunity, but Bombardier will face fierce competition

from Embraer, ATR and new competitors like Mitsubishi's regional jet.

To gain the upper hand, BCA needs to invest in product development (and perhaps sign on a new business partner) to reach a tipping point where it will capture a large market share.

PROGRAM MILESTONES

This year marks the silver anniversary of Bombardier's purchase of de Havilland Canada (DHC) from Boeing (with the Ontario government) and the delivery of the first 50-seat Canadair Regional Jet Series 100 (CRJ100) to Lufthansa CityLine in 1992.

In the first decade of the millennium, Bombardier expanded its portfolio with new derivative aircraft. The first high-speed, 70-seat Q400 turboprop entered ser-

vice in 2000; the 70-seat CRJ700 regional jet in 2001; the 86-seat CRJ900 in 2003; and the 100-seat CRJ1000 in late 2010.

High fuel prices and declining yields shifted airline demand to the larger aircraft, resulting in the last CRJ200 airline delivery in 2007 and Dash 8 Q200/Q300 delivery in 2009.

Since 2000, Bombardier has delivered 1,375 large regional aircraft, split 60/40 between CRJs and Q400s, but has been outsold by its competitors in recent years.

MARKET DYNAMICS

Bombardier champions "right sizing" aircraft capacity to passenger demand to achieve high yields and profitability.

The BCA 2017-2036 market forecast says the small regional aircraft (20 to 60 seats)

▶ Watch the video [here!](#)

Every five seconds, a CRJ lands or takes off somewhere in the world. The type is now in service with 120 different customers, including Jazz Aviation, which operates this Air Canada Express CRJ-705. **Michael Durning Photo**

across all major airlines, but Bombardier believes that current scope restrictions on seat count (maximum 76 seats, maximum aircraft weight 86,000 pounds and number of aircraft) will not change in the immediate future.

Nevertheless, BCA forecasts that the top five markets for large regional aircraft will be North America (1,400 deliveries), Europe (1,000), East Asia and Oceania (900), China (900) and Latin America (500).

In emerging travel markets like China, East Asia and Oceania, and India, more large turboprops and regional jets are needed to feed hubs, connect secondary and tertiary cities, and link important origin and destination markets.

CRJ NEXTGEN FAMILY

Every five seconds, a CRJ lands or takes off somewhere in the world, with the aircraft now in service with 120 different customers, including 25 added in the past five years.

The CRJ program directly employs more than 1,000 people. The CRJ NextGen family (CRJ700, CRJ900 and CRJ1000) is built on a single final assembly line at Mirabel Airport. Bombardier builds the wings and cockpit in Montreal, the mid-fuselage in Belfast and the rudder in Querétaro, Mexico. RUAG Aerostructures makes the aft fuselage in Switzerland and Germany, and Aernnova makes the elevators and horizontal and vertical stabilizers in Mexico.

The new Atmosphere interior for the CRJ will feature contemporary styling, larger business class overhead bins, new mood lighting, and a large optional passenger with reduced mobility (PRM) lavatory.

Recent CRJ900 NextGen deliveries went to American Airlines, China Express, Chorus Aviation (Air Canada Express) and CityJet (SAS), and new CRJ1000s found homes at Air Nostrum.

The CRJ NextGen family is built on a single final assembly line at Montreal's Mirabel Airport. A new "Atmosphere" interior features contemporary styling, larger overhead bins and other passenger conveniences. **Michael Durning Photo**



About 560 Q400 turboprops have been delivered from Bombardier's Toronto factory to 60 different customers. With its jet-like speed, the Q400 is capable of replacing older turboprops and jets. **Garret Rodgers Photo**



Now that Airbus will be backing the C Series program, Bombardier can concentrate on its other offerings. Those include the new Global 7000 business jet, shown here (bottom) on its first flight in November 2016. **Frederick K. Larkin Photo**



Q400 NEXTGEN

About 560 Q400 turboprops have been delivered from Bombardier's Toronto factory to 60 different customers, including 15 added in the last five years.

The Q400 program directly employs 800 people at the Bombardier plant in Toronto in engineering, program management, manufacturing and final assembly, and hundreds more in customer support.

Bombardier makes the Q400 cockpit and wings in Toronto. The fuselage and empennage are made by Shenyang Aircraft (SAC), a subsidiary of Aviation Industry Corporation of China (AVIC) and shipped to Toronto for final assembly.

In 2016, unionized workers approved Bombardier's plan to transfer Q400 wing production to Mexico and the cockpit to China, in order to save \$2 million and thereby make the Q400 price competitive with the ATR 72, reported *The Toronto Star*.

While that hasn't happened yet—the cockpit and wings are still made in Toronto—Bombardier remains committed to reducing manufacturing costs.

With its jet-like speed, the Q400 is capable of replacing older turboprops and jets. Recent deliveries went to Chorus Aviation (Air Canada Express), WestJet Encore and Porter Airlines in Canada, Island Air in Hawaii, Luxair in Europe, Ethiopian Airlines in Africa and Philippine Airlines, ANA Wings and Ryukyu Air Commuter in Asia, plus leasing companies.

In July, SpiceJet of India became the launch customer for the new 90-seat Q400, with a firm order for 25 aircraft and 25 options. The new aircraft has 14 more revenue seats than the ATR 72-600 (at 28-inch pitch).

The proposed 90- to 100-seat Q400X with a 10-foot longer cabin is on hold, but could be launched to block ATR's entry into the 90-seat market.

To compete with new generation turboprops, Pratt & Whitney Canada has been developing the fuel efficient Next-Generation Regional Turboprop (NGRT) engine with 5,000 to 7,000 horsepower for the 90-seat class.



Ken Swartz is an award-winning aviation industry journalist who has covered the market for 35 years. He has spent most of his career as an international marketing and media relations manager with airlines and a leading commercial aircraft manufacturer. He runs Aeromedia Communications, a marketing and PR agency, and can be reached at kennethswartz@me.com.

Bombardier said CRJ900 NextGen direct operating costs are seven per cent less than the Embraer E175, and the escalation of CRJ700/900/1000 "A" and "C" maintenance checks to 800 hours and 8,000 hours will reduce costs even further.

Other CRJ advantages include cockpit commonality across the 50- to 100-seat class (meaning lower pilot training costs) and the

lowest operating weight in the 60- to 100-seat class. However, the E175 began outselling the CRJ900 after Embraer extended the wingspan by nine feet to reduce the fuel burn.

New competitors include the Embraer E-Jet E2 and Mitsubishi MRJ, which are powered by the PW1000, the same engine as the C Series. Re-engining the CRJ with another engine might be a competitive response.

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LOCKHEED MARTIN CANADA'S CHARLES BOUCHARD DISCUSSES HOW INNOVATIVE, FORWARD-THINKING IDEAS WILL CHARACTERIZE THE COMPANY'S FUTURE CANADIAN FOOTPRINT.

BY CHRIS THATCHER

Lockheed Martin recently completed \$1.4 billion in industrial and technological benefits (ITB) commitments associated with Canada's purchase of the CC-130J Hercules. **Galen Burrows Photo**

 Watch the video [here!](#)

On the opening day of CANSEC 2017, Canada's largest defence and security tradeshow, standing before a collage of innovative technologies that had shaped the sector over the past century, Navdeep Bains, minister of Innovation, Science and Economic Development, applauded Lockheed Martin

for completing its \$1.4 billion industrial and technological benefit (ITB) commitments for the CC-130J Hercules.

"To remain competitive, Canada must be committed to innovation," said Bains as he described Lockheed's final investments in four small companies developing novel applications in artificial intelligence (AI),

sensing equipment, multi-functional materials for solar panels and wireless power transfer. "That means continuously finding new ways of doing things better."

Unexpected as the public acknowledgement was, the words rang true for Charles Bouchard. Looking for better ways of doing business is almost a mantra for the chief



The F-35 program proposes a new model for engaging with Canadian industry. Rather than ITBs, it is constructed around “best value,” a process by which companies from participating nations compete and are selected to provide components not just for their country’s aircraft, but for the global F-35 fleet. **USAF Photo**



A Sikorsky CH-148 Cyclone prepares to land on board HMCS Montreal in the Atlantic Ocean on Oct. 31, 2016. Through its Sikorsky division, Lockheed Martin is focusing on bringing the Cyclone into service. **MCpl Jennifer Kusche Photo**



Lockheed Martin Canada's Charles Bouchard, left, with Navdeep Bains, minister of Innovation, Science and Economic Development. **Lockheed Martin Photo**

executive of Lockheed Martin Canada. But perhaps not in places you might expect. “Innovation—that is the future of this company,” he told *SKIES* in a recent interview. Lockheed Martin is best known as a defence company, the largest weapons contractor in the United States, with military-related revenues of around US\$50 billion. And Bouchard makes no bones about that. But when he describes Lockheed’s future areas of innovation, it’s in space and deep-sea exploration; in energy management and conservation, perhaps in Canada’s northern communities; in quantum computing, cybersecurity, AI, robotics and other ground-breaking technologies like automation, directed energy and synthetic biology. “This is what excites me about this company. This is what the future looks like and we in Lockheed Martin get to see it,”

said the retired Royal Canadian Air Force (RCAF) lieutenant-general, who, over the course of a 37-year career, held senior positions in NORAD and NATO. “For us it’s always, what’s the next bound?” That corporate thinking has shaped Lockheed’s approach to the companies in which it chooses to invest. ITBs, making investments in Canadian companies and academic research equal to the value of a major defence contract, might be an obligation, a crucial box to be checked in any proposal—and the more regional representation, the better. But, they also present an opportunity to explore the cutting edge of technology, capture new ideas and capabilities, and secure long-term partnerships. All of which can be game-changing. “A successful ITB is when we have met our commitment, and, even better, when we

can do that on time or ahead of time like we did with CC-130J,” explained Bouchard. “But it’s also when we leave [a company] bigger and better than when we came in. If you look at our investments in quantum computing—D-Wave Systems and QRA—we not only met our commitments, we left them stronger. This is not a transactional deal, it’s a transformational deal.” Gabe Batstone understands the value of that deal well. A former CEO of NGrain, an early supplier to Lockheed Martin’s F-35 Joint Strike Fighter program, he said establishing a relationship with the defence and security giant was one of his first priorities after co-founding Ottawa-based Contextere. “It is a significant benefit to a small company,” he said of Lockheed’s \$1.1 million investment in his AI software. “The money is certainly part of it. But as much as anything, it’s being able to say that Lockheed Martin has invested and will be a user of your technology. That’s significant when you go to talk to other large manufacturers, whether in aerospace or other sectors. “And the association with a company that is transformational, that’s also big,” he added. “It gives you credibility that would be very hard to attain in other ways.” As part of an ITB investment for the CC-130J, Contextere is developing an AI-powered solution to deliver real-time notification to Lockheed maintenance workers on their phones.

“They [ITBs] present an opportunity to explore the cutting edge of technology, capture new ideas and capabilities, and secure long-term partnerships.”





Canada's fleet of updated Lockheed CP-140 Aurora aircraft has been recognized as one of the most capable platforms in the world for anti-submarine warfare and intelligence, surveillance and reconnaissance duties. **Stuart Sanders Photo**



The Sikorsky CH-148 Cyclone maritime helicopter (foreground) is currently undergoing operational test and evaluation before it officially replaces the CH-124 Sea King (background). **Mike Reyno Photo**

The technology is premised on the fact that, “close to 25 per cent of the time when people go to put warm hands on cold steel, they are unable to finish the procedure,” said Batstone. “Sometimes there’s an error, sometimes they don’t have the right tool. Other times the problem they originally identified isn’t the one they have now come to encounter. There’s some natural inefficiency as it relates to the maintenance of complex assets.”

In addition to increasing worker productivity, reducing errors and improving safety, the software offers a way to capture the knowledge and skills of an aging workforce and utilize wearable technology like Microsoft HoloLens or Samsung GearHub to share those insights with a new generation.

“We’ve got this huge blue collar workforce, not just in aerospace but in everything from elevator mechanics to power and utility workers, and they are retiring with all this tribal and enterprise knowledge,” said Batstone. “How do we capture that and disseminate it to Millennials, who learn and operate in a completely different way? Lockheed obviously has a huge skilled workforce and they are not immune from the realities of demographics.”

The initial investment is intended for Lockheed’s workforce, but the capability could be extended to third-party service providers like Cascade Aerospace of

Abbotsford, B.C., one of only two approved C-130 Hercules service and heavy maintenance centres, or frontline military maintainers.

“It will go down in the history of Contextere as one of the early highlights and seminal moments in our growth,” said Batstone about Lockheed’s ITB investment.

SEEING STABILITY

The value of the Lockheed brand can’t be understated, said Jim Andrews, general manager of Lockheed Martin Commercial Engine Solutions (LMCES). Andrews was part of Air Canada Technical Services in Montreal, the forerunner to Aveos Fleet Performance, whose assets and tools were acquired by Lockheed Martin Canada in 2013. From a start of just seven employees when the engine maintenance, repair and overhaul (MRO) facility re-opened in September 2013, LMCES Montreal has grown to over 250 people and doubled revenue year over year. It has a mandate to reach around 500 employees.

“The previous facility had a very good name around the world for quality and service,” said Andrews, “and we’ve hired back many of the same people, but the name Lockheed Martin does bring comfort to the airlines that we deal with. Everyone thinks military, but even the

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commercial airlines see stability; they see financial strength.”

LMCES provides MRO services to the Royal Saudi Air Force and recently closed a deal with the U.S. Air Force for work on the KC-10 aerial refuelling tanker. But in the past 18 months, the company has signed exclusive agreements with Frontier Airlines and Air Wisconsin for work on CFM56-5 and CFM34-3 engines, respectively, adding to a customer base that includes major North American and European airlines. Andrews said LMCES deliberately rebranded itself as a commercial entity to attract a global market and assure prospective customers the facility had a commercial focus.

The brand has helped attract talent in Montreal’s large aerospace cluster, where engine manufacturers like Pratt & Whitney Canada and GE Aviation are also seeking young technicians and engineers from the region’s numerous colleges, universities and business schools.

“We’re still in our infancy...[but] the world is open to us,” said Andrews. “We

have the Lockheed name, the Montreal location, an extremely skilled workforce and a very good reputation for doing what is right, committing to our customers and executing on what we say.”

CDL’s John Molberg would agree about the value of the Lockheed name. In 2012, Lockheed acquired CDL Systems, a Calgary-based firm of 60 employees founded in 1992 from technology developed by Defence Research and Development Canada-Suffield. Its software for unmanned aerial systems ground control stations was already well established—it had amassed over 1.5 million flight hours on more than 30 different platforms, and had as its primary customer the U.S. Army with the MQ-1C Gray Eagle, RQ-7 Shadow, and RQ-5 Hunter, among others.

Now, as part of Lockheed’s Rotary and Mission Systems business, CDL Systems is seeing opportunities beyond the military, said Molberg, its business development manager. The company recently released Hydra Fusion Tools, a suite of tools that allows users to fuse and create a 3D world from captured terrain data. More

 [Download the wallpaper here!](#)

At Sikorsky, a Lockheed Martin subsidiary, the immediate priority is to introduce the CH-148 Cyclone into military service as Canada’s next maritime helicopter. However, there are opportunities on the civilian side for aircraft like the S-76D, shown here. **Mike Reyno Photo**



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Sikorsky has had a firm footprint in Canada for years with corporate clients and offshore providers such as HNZ, which operates this S-92A. Mike Reyno Photo

Lockheed Martin teamed with Bombardier, Raytheon and Sierra Nevada Corp. to deliver an affordable solution for the U.S. Air Force Joint Surveillance Target Attack Radar System recapitalization (JSTARS recap) program. Lockheed Martin Image



impressive, the software can generate real-time, precise 3D models from multiple 2D images through what is known as simultaneous localization and mapping.

“Right now, as far as I’m aware, no one else has the capability to do a live 3D model,” said Molberg.

While military and police are logical customers for a tactical terrain picture that can be manipulated and measured and provide change analysis in real time, “You’d be surprised how many businesses are interested in this—pipelines, building roads, pouring concrete. It’s a new way of looking at the terrain [and] making the most of big data.”

OFFERING SOLUTIONS

The acquisition of Sikorsky Aircraft in November 2015 also provides Lockheed with another entry into the civil side of Canadian aviation. Sikorsky, of course, has had a firm footprint in Canada for years with corporate clients and offshore providers like Cougar Helicopters and HNZ.

Chief executive Bouchard said the immediate priority remains on the military side with the introduction of the CH-148 Cyclone into service with the Royal Canadian Air Force (RCAF) and Royal Canadian Navy (RCN). It may then shift to an eventual replacement for the CH-146 Griffon—Lockheed believes the Sikorsky UH-60 Black Hawk might fit the likely requirements.

But there is no question “Canada is helicopter country,” said Bouchard, and Lockheed will be looking beyond the oil and gas sector that tends to drive helicopter sales to other areas in natural resources management, support to Arctic operations, medevac, and augmenting search and rescue capability.

“We are looking not only at the more conventional helicopters, but also at the use of unmanned helicopters, whether it’s pipeline monitoring, fighting forest fires or resupply,” he said, noting the partnership with Kaman Aerospace that has transformed the K-Max helicopter into an unmanned platform capable of autonomous

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or remote-controlled operations. “Anything that is boring, dangerous or repetitive can be done without a pilot on board.”

He added, “Take it one step bigger and we are talking about airships.” Lockheed is expecting to launch its first commercial airship next year with Quest Rare Minerals, which plans to eventually operate a fleet of seven helium-filled aircraft from its Strange Lake rare earth mining

facility along the Quebec-Labrador border.

“I’m not limited by what we have today,” said Bouchard. “I can envision what we’ll have tomorrow. I don’t approach [problems] with the idea that, this is what we make, therefore this is where I want to go. It’s more, what are the challenges of the customer and how can we be the solution? That’s why we are always looking for new ideas.”

SERVICE AND SUPPORT

Among those new ideas is a change in approach to in-service support (ISS). One of the ongoing challenges for military aircraft is keeping pace with technology. In 2016, Cascade Aerospace, an operating unit of IMP Aerospace & Defence, completed a block upgrade on the RCAF’s 17 CC-130J Hercules aircraft, a fleet acquired in 2007 and introduced into service beginning in 2010.

Though the transport aircraft were barely five years old, changes across the global fleet and new Canadian requirements necessitated a sizeable upgrade package. Previously, with legacy CC-130 fleets, the RCAF would have likely managed an incremental program.

With the J-model, however, Lockheed Martin has retained all intellectual property and data. Together with its global customers and suppliers, it develops and tests each upgrade package before providing maintenance centres like Cascade with a single kit for each aircraft.

In this case, the upgrade from Block 6.0 to 7.0 involved three large modifications: a multinational block involving changes developed and available to all C-130J operators; a U.S. Air Force developed block; and a series of design requirements unique to Canada. To confirm new systems could be installed and integrated, the first RCAF aircraft was modified and tested by Lockheed Martin in Marietta, Ga., before complete kits for the remaining 16 were sent to Cascade.

“That is how most of our fleets will continue to be postured,” LGen Mike Hood, RCAF commander, said of the new ISS approach. “We will continue to upgrade them in blocks along with our allies that are flying those aircraft. It is certainly a change in our operating concept since I started flying in the late ‘80s.”

For Cascade, the block approach was a significant change from how it had long maintained legacy CC-130 fleets. But it represents “an easier way of conducting several modifications together,” Pierre Carignan, Cascade’s director of C-130 programs, said at the time. “It is more efficient because you only open up things in the airplane once. ...[H]istorically, Canada would perhaps ask the contractor to do a few modifications together, but not necessarily this many all at once.”

That early success has encouraged Lockheed

to consider a similar approach to the long-term maintenance for the CH-148 Cyclone.

The company maintains a dedicated CC-130J team in Ottawa to respond to Canadian ISS needs, but the office remains connected to the global program.

“I think it is a good balance between keeping our own proprietary information protected while at the same time providing the customer with service and teaming up with Canadian companies to make sure we share information,” said Bouchard, acknowledging that access to intellectual property can be a sticky and even contentious issue for ISS. “I’ve never worried about Canada receiving the information it requires to protect its sovereignty.”

Whether that approach is extended to the F-35 Joint Strike Fighter (JSF) is, of course, contingent on the next-generation jet being selected to replace Canada’s CF-188 Hornets. But already the F-35 is prompting a new model for engaging with Canadian industry.

Rather than ITBs, the JSF program is constructed around “best value,” a process by which companies from participating nations compete and are selected to provide components not just for their country’s aircraft, but for the entire F-35 fleet, which could exceed 3,500 airplanes.

But the ITB principle of helping small- and medium-sized companies reach global markets remains the same. Because of the exacting manufacturing techniques and requirements for the F-35, Lockheed and its partners, BAE Systems and Northrop Grumman, put a premium on finding innovative companies “that could learn.”

One example often cited is Ottawa-based Gastops, a recipient of CC-130J ITB-related investments that also supports the F-35, based in part on its earlier relationship with the F-22 Raptor.

Building components for the F-35 says a lot about your capabilities elsewhere, suggested Bouchard. “If you get the Lockheed seal of approval, that tells future customers that you have advanced manufacturing capability,” he said, pointing to companies like Mississauga-based Magellan Aerospace that provides the horizontal tail assemblies. “If you can meet F-35 standards, you can meet automotive or even satellite requirements.”

With or without the F-35, the Lockheed Martin footprint in Canada is large and growing. Whether in military, or, increasingly, in commercial aerospace, the company has found innovative ways to do business differently. And it is drawing on a lot of Canadian ingenuity to achieve it. ■

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AN INTERIM SUPER HORNET PURCHASE IS IN DOUBT AS CANADA CONSIDERS USED AUSTRALIAN JETS TO FILL THE SO-CALLED CAPABILITY GAP.

BY CHRIS THATCHER

In the ongoing saga that is the replacement of Canada's 30-year-old fighter jets, the latest plot twist has veered Down Under.

On Sept. 29, after a month of informal discussions, the Canadian government submitted a formal "expression of interest" to Australia for the potential purchase of an undisclosed number of legacy F/A-18A/B Hornet fighter aircraft and associated parts. A response detailing the "availability and cost" of the aircraft is expected from Canberra by the end of the year.

Canada's sudden interest in used Australian Hornets, to fill what the government has called a capability gap in the fighter fleet to simultaneously meet both NORAD and NATO requirements, was prompted by a commercial dispute between

U.S. giant Boeing and Montreal-based Bombardier over the C Series aircraft. It's a spat that has flared up against a backdrop of contentious North American Free Trade Agreement (NAFTA) renegotiations.

In November 2016, Canada announced a plan to acquire 18 new Boeing-built F/A-18E/F Super Hornets, an interim measure to close the capability gap before the government launches an open competition in 2019 to replace the entire CF-188 fleet of 76 modified A/B Hornet variants. That was followed in March 2017 by a letter to the United States government outlining our aircraft requirements for this potential foreign military sale.

Though the U.S. State Department has approved the possible foreign military sale, issuing a statement on Sept. 12 outlining a comprehensive aircraft and

weapons package, the deal appears to be grounded—at least for now.

Earlier this year, following the 2016 sale of 75 C Series CS100 aircraft to Delta Air Lines, Boeing accused Bombardier of receiving unfair subsidies from Canadian federal and provincial governments, allowing it to dump the struggling small passenger jet in the U.S. at below-market prices. In separate rulings on Sept. 26 and Oct. 6, the U.S. Department of Commerce agreed and slapped countervailing tariffs and anti-dumping duties of nearly 300 percent on the Bombardier plane.

As the trade dispute escalated, Canadian ministers repeatedly warned the government would not do business with a company potentially harming vital domestic aerospace jobs.

While the Canadian government has deferred "discussions with Boeing related to the interim purchase," it has not walked away from the Super Hornet as a possible replacement for the entire fighter fleet. **Joe Letourneau Photo**



The longer Canada waits to replace its fleet of CF-188 Hornets, the more attractive the F-35A may become as the stealth fighter continues to enter operational service with allied air forces around the world. **Dave Mills Photo**

However, all the posturing might be for naught. On Oct. 16, Airbus struck a blockbuster deal with Bombardier, assuming a 50.01 per cent stake in the C Series program. Airbus also indicated it could set up a second final assembly line at its plant in Mobile, Ala., theoretically avoiding import tariffs as the planes destined for U.S. customers would be manufactured on American soil.

While the Canadian government has deferred “discussions with Boeing related to the interim purchase,” it has not walked away from the Super Hornet altogether. Public Services and Procurement Canada said in a statement on Oct. 9 that it was still in negotiations with the U.S. government about the jet, even if talks with Boeing remain suspended.

Defence Minister Harjit Sajjan has confirmed the Department of National Defence’s continued interest in the Super Hornet, but he’s also sought to ensure the department has “various options,” according to *The Canadian Press*. That has included kicking the tires of Kuwait’s small fleet of gently used F/A-18C/D Hornets and the formal letter of interest in some Royal Australian Air Force (RAAF) F/A-18A/B aircraft, which are being replaced by Lockheed Martin F-35A Joint Strike Fighters, beginning in 2018.

Carla Qualtrough, the recently appointed minister of Public Services and Procurement, told the Canadian Aerospace Summit on Nov. 7 that the government expects a response from Australia “in the weeks ahead with details on the availability and cost of the aircraft and associated parts that Canada is considering.”

She also said the government had consulted

with allies such as the U.S., Sweden, France, Australia, Denmark, Finland and Belgium, many of them also F-18 operators, to gather lessons learned on the legacy fleets and “on the costs, delivery times, interoperability and operational availability” of new fleets being considered by Canada for the eventual replacement program.

“Preparatory work for the competition is underway and we will be engaging prospective suppliers and undertaking planning to initiate a bid solicitation in 2019,” she said.

CANADIAN OVERHAUL

Almost immediately, questions were raised about the viability of a Hornet fleet over three decades old. *CBC News* flagged a 2012 report that it said was produced by Australia’s defence materiel group claiming the F/A-18s were nearing the end of airframe life. The report stated, “The incidence of discovery of airframe corrosion in the Hornet fleet is increasing, and the annual cost of corrosion-related repairs has increased significantly.”

There were also suggestions that the Trump administration might obstruct an Australian deal. “You could easily foresee some kind of ‘America First’ agenda come out of the Commerce Department and the Trump administration, and that could certainly change the dynamics more broadly for U.S. firms and the U.K. and Canada,” Roman Schweizer of Cowen and Co. told *Defense News*.

Despite their age, Canadian maintainers may be more familiar with Australia’s former jets than most people realize.

Montreal-based L3 MAS, which has been responsible for maintaining Canada’s



In 2010, Canada’s L3 MAS completed the last of 10 centre barrel replacements on Australian legacy Hornets, a major engineering and overhaul program. Now, Canada is considering buying those Aussie Hornets to temporarily fill the country’s fighter jet capability gap. **Senior Airman Matthew Bruch Photo**



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Canada's fleet of 76 modified A/B Hornet variants is not sufficient to meet the country's NATO and NORAD responsibilities concurrently, according to the government. **Stuart Sanders Photo**



Industry competitors say an interim Boeing Super Hornet purchase would prevent a fair competition. **Boeing Photo**

CF-188s since they first entered service over 30 years ago, has also had a role in keeping the RAAF jets airborne. Under a Hornet structural refurbishment program, L3 MAS was contracted in 2002 by the Australian Defence Materiel Organisation to help extend the fuselage life of the F/A-18 fighters. In 2010, the company completed the last of 10 centre barrel replacements at its facility in Mirabel, Que., a major engineering and overhaul program.

L3 MAS was unable to talk publicly about the Australian program at this time, but an industry official, speaking on background, noted that the RAAF jets might “integrate into your fleet much more readily than any other airplanes in the world.”

QUESTIONS ABOUT COST

Boeing has tried to separate the military transaction from what it called “a commercial dispute with Bombardier... a classic case of dumping, made possible by a major injection of public funds.” But the clash over commercial practices might have knocked the company from the pole position on the longer-term CF-188 replacement project as well.

As of yet, the government has given no indication it might forego the interim mea-

sure and move straight to a replacement project. And to many competitors, Boeing would have been in an advantageous position in a future competition as the provider of the interim solution. Where others would have to bid 88 aircraft to meet Canada's requirements, Boeing, with 18 Super Hornets already under contract, would only have to offer 70, significantly affecting the structure of their bid.

“An interim buy of any new airplane actually prevents a fair competition,” said an executive with a rival company.

Aerospace analysts *Skies* spoke with after the U.S. State Department informed Congress of a possible sale of 18 Super Hornets to Canada noted that the complete package and estimated cost of US\$5.23 billion appeared to position Boeing for a more substantial deal.

The Letter of Offer and Acceptance (LOA) included 10 Super Hornets in the single-seat E variant and eight in the tandem-seat F configuration, as well as GE Aviation F414-400 engines. However, in addition to spares, training and logistical support, the package also offered a lengthy list of onboard capability—AESA (active electronically scanned array) radar, electronic warfare countermeasures systems, sniper targeting pods, joint tactical radio systems, joint helmet-mounted cueing systems, integrated countermeasures systems, and distributed targeting and processing systems—and a weapons suite that included guided missile launchers, tactical missiles and various training missiles.

Last November, the U.S. State Department approved the possible foreign military sale of 32 F/A-18E/F Super Hornets to Kuwait, with similar onboard systems but without the missile systems, for an estimated US\$10.1 billion.

In 2013, the U.S. approved the potential sale to South Korea of 60 F-35A Light-

ning fighter jets, as well as associated equipment, parts, training and logistical support, for around \$10.8 billion.

Richard Aboulafia, vice president of analysis at Teal Group, said the estimated price of proposed sales is usually determined by the package of training, spares, weapons and support, and by what he called “scope,” which is the likelihood that more aircraft will eventually be acquired beyond those covered in the initial deal.

“The Canadian price tag was a bit of an eye opener. It certainly didn't have anything to do with the price tag of the Super Hornet,” he said, noting that the unit recurring price of a Super Hornet is between \$60 and \$70 million, while an F-35A is now just under \$100 million. “It had everything to do with the scope of what was either requested or proposed. I don't think you'd pay that much even for a comprehensive package unless you were planning on getting more than 18 planes.”

Aboulafia observed that notifications to Congress can reflect more than was requested, an indication of what the U.S. might prefer to sell. Though Qatar, for example, sought approval for 36 F-15QA multi-role fighters, the State Department in November 2016 approved the potential sale of an estimated \$21.1 billion package for 72 aircraft.

“When you are submitting something for approval to Congress, you tend to gravitate toward the most,” he said. “The only other possible explanation is that a bunch of other Canadian Hornet spares and weapons were rolled in there. But I doubt it. That stuff is typically just routinely purchased off the shelf.”

Boeing would not comment on the details of the LOA, but emphasized that such proposed deals deliberately have a lot of flexibility written into them, and the price of each Super Hornet should not be calculated

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by dividing the estimate cost by 18.

There was some debate among analysts whether the package included components of the Block III Advanced Super Hornet, a proposed series of upgrades and new capabilities yet to be introduced into service.

The U.S. Navy (USN) is planning a service life modification (SLM) for the Block II Super Hornet fleet, beginning in April 2018, to extend the life of each aircraft from 6,000 to 9,000 flight hours. While most of the SLM project involves structural upgrades to the airframe and some subsystems, the USN has requested funding for a Block III conversion of some aircraft. Eventually, it would

like to see the entire Super Hornet fleet upgraded to the Block III standard.

In procurement justification documents submitted earlier this year, the USN is seeking to buy 14 Super Hornets in 2018, 23 in 2019, 14 in 2020, 14 in 2021 and 15 in 2022, all or some of which could be delivered in the Block III configuration.

That could include the ability to search and detect enemy tracks at greater distance, called long-range infrared search and track; conformal fuel tanks to extend combat range; low-observable coating and radar-absorbent material applied to certain areas of the aircraft; enhanced onboard computing known

as distributed targeting processor-networked (DTPN) and a larger pipe to move the data called Tactical Targeting Network Technology; an advanced cockpit system with large-area display; and upgraded integrated defensive electronic countermeasures.

In a briefing earlier this year, Dan Gillian, Boeing's vice-president of F/A-18 and EA-18G programs, could not disclose which capabilities Canada had requested. But, he said most of the upgrades proposed for the Block III could be available to any Canadian acquisition or could be retrofitted into the Block II at a later date.

RE-ENERGIZED PROGRAM

The Boeing/Bombardier dispute could also have a significant impact on the Super Hornet production line in St. Louis, Mo. According to *Defense News*, Boeing officials have said they need at least two aircraft a month to maintain a steady production rate. "Except for a 23-unit spike in procurement planned for fiscal year 2019, the [U.S.] Navy plans to procure only about 14 Super Hornets per year over the next five years—about half of the number needed to sustain the line," the publication reported.

The F/A-18 has found new life in recent years due to delays with the introduction of the F-35 into the U.S. Navy (USN). Older C-model Hornets, as well as E and F Super Hornet "Rhinos," have had to forego deep maintenance to keep squadrons resourced, prompting the USN to order more aircraft.

"[B]ecause the Charlies are running out of flight hours and their availability is not there, we are forced to put Es and Fs in there," said Capt. Chris Boyle, Commodore, Strike Fighter Wing Atlantic, in an interview with *Skies* earlier this year. "That's why we need more Rhinos—we have been using them up faster than we thought we would."

Boeing's Dan Gillian also acknowledged when the acquisition was first proposed that 18 Canadian aircraft would be significant for the production line and future global sales. "The international picture on the Super Hornet has re-energized," he said.

One key selling feature of the Super Hornet was the ease of integration with the current Canadian fleet. The Block II E and F aircraft might be far more capable and complex than Royal Canadian Air Force A/B models, but the transition would be straightforward, according to USN pilots and maintainers at Naval Air Station Oceana.

"In terms of survivability, lethality and the technology integration, the [Super Hornet] is easily two generations beyond the legacy Hornet," said Boyle, a former F-14 Tomcat pilot. "[But] the system architecture is such that it is not speaking a foreign language."

"Essentially, any deficiencies you might have found in a legacy airplane have been fixed in a Super Hornet," added Cmdr Scott Miller, the Strike Fighter



The F/A-18 (top) has found new life in recent years due to delays with the introduction of the F-35 (bottom) into the U.S. Navy. USN Photo

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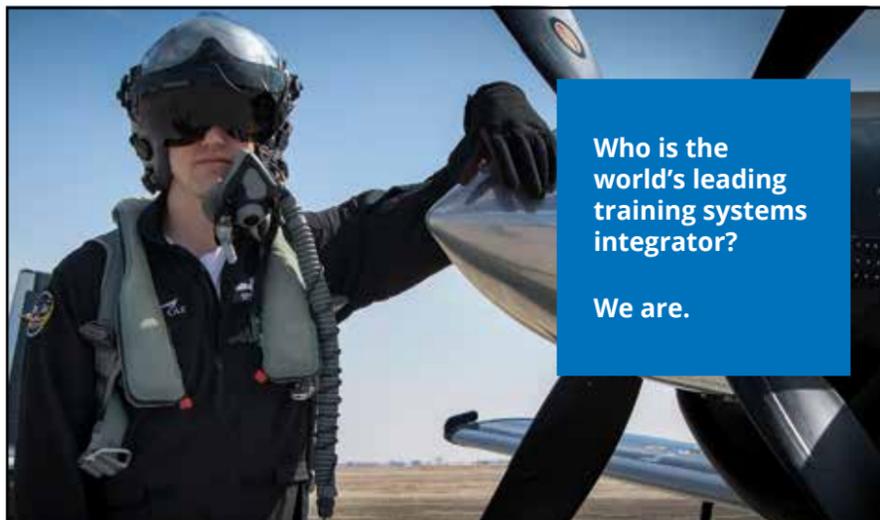
smarter aircraft management

Wing Atlantic's operations officer and a former F-14 pilot with experience in the Hornet C, E and F models. "I can jump in each one and the buttons are in the same place, the displays are identical, the integration is the same. In terms of operating procedures, emergency procedures, all are identical."

Maintainers face a steeper learning curve, but even then, most trades take between

four and six months, said Boyle. The advanced sensors and mission systems on the Rhino mean the "avionics guys [are] the long pole in the tent."

Said Gillian: "We have designed the Super Hornet to be a very maintainable airplane. Things we learned from the classics were implemented on the Supers. The Supers are decidedly lower cost to operate for the USN than the classics they still maintain."



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CONSIDERING THE CONTENDERS

With Boeing's clash with Bombardier and the Canadian government comes widespread speculation about the prospects for other contenders in the eventual CF-188 replacement program.

The Liberal government famously promised during the 2015 election campaign not to acquire the Lockheed Martin F-35 Joint Strike Fighter (JSF). But as that aircraft transitions later this year from a developmental to an operational fighter jet, it will be harder to deny its abilities. It has achieved initial operating capability with the U.S. Air Force and Marine Corps, and will begin entering service with more and more allies between now and 2019. In fact, over 240 JSFs are now flying, with over 100,000 hours under their wings.

An official with Lockheed Martin acknowledged that no formal meeting had been held with the government, only brief discussions at various airshows and other events over the summer.

The manufacturer is still struggling to change political thinking about offsets. The JSF program memorandum of understanding is based on "best value," by which companies from participating nations bid and are selected to provide components and services for the entire F-35 fleet, rather than for their country's aircraft. While the process does not return the types of regional and technological investments to industry that Canada requires of defence procurements, it does make selected companies attractive to the global marketplace.

"Because it is a partnership, any kind of cost put on the program for offsets would be shared by everybody. And that would just make the price of the jet go up," said the official.

With Airbus helping to save the fortunes of Bombardier, there is also speculation the move might fortify the prospects for the Eurofighter Typhoon, a fighter in wide use with NATO allies.

The deal with Bombardier has made Canada a fifth "home" country for Airbus. The company already has ties to over 550 suppliers in Canada, but Dirk Hoke, chief executive officer for Airbus Defence & Space, told the recent Aerospace Summit in Ottawa that Airbus would be "focused on developing our footprint further in Canada," including "putting a lot of effort" to position the Typhoon for a future fighter competition.

Simon Jacques, president of Airbus Defence & Space Canada, said the investment in the C Series had not generated any new discussions with the government about the Typhoon. He added that Airbus would wait to see the government's request for proposals before deciding whether to bid the aircraft.

That's likely the approach for all of the contenders, Boeing included. The less said the better until the government's next step is clear, even if it's a step Down Under.



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The Pursuit of Passion

STRETCHING OUTSIDE HIS COMFORT ZONE HAS PAID BIG DIVIDENDS FOR AIRSHOW PERFORMER BRENT HANDY.

BY LISA GORDON | PHOTOS BY MIKE LUEDEY

When Brent Handy was 11 years old, he saw a Royal Canadian Air Cadet glider in a mall near his hometown of Wyevale, Ont., about 40 minutes northwest of Barrie. A shy kid who had yet to find his passion in life, Handy was astounded to learn that it was possible for him to earn his glider pilot licence through the Air Cadets, an organization he'd never heard about.

"I thought being a pilot was the ultimate when I was a kid," he said. "I didn't know any pilots; nobody in our family was a pilot. I don't think I believed I'd be able to do it."

For Handy, the Air Cadets opened up a whole new world.

"It was tough for me. I was a very, very shy kid," he admitted. "I didn't know a single person there. I was so shy and it was such a foreign environment; kids in uniform, marching around, yelling."

Handy credits his parents for their patience and encouragement; he said they'd drop him off at meetings in nearby Midland, Ont., and wait for him in the parking lot. Sometimes, Handy would come out and sit in the car for a break.

Eventually, it got better. Then, the summer after his first year in cadets, Handy was named top junior cadet.

"That was the first time I felt like I had achieved something," he said. "That was a pivotal moment in my life. From there, I really started to believe in myself. I loved flying so much that studying 24/7 was no problem for me. It was like a fire that ignited and took over my life."

BALANCING ACT

Fast forward to the fall of 2017, and that shy kid is nowhere to be found in the present-day Brent Handy, who has racked up more than 4,700 hours in the air—

4,000 of them in jets or aerobatic aircraft.

At age 40, he is just coming off his fourth season on the airshow circuit, wowing thousands of fans under his own banner, Brent Handy Aerobatics. His eye-catching red and white Pitts Special S-2B carves up the sky at nine to 12 airshows a year, most of them in Western Canada and the Northwestern U.S.

What is so remarkable about Handy's dedication to his airshow business is that he balances it with a full-time military career and a young family.

Since joining the Royal Canadian Air Force (RCAF) in 1999, Handy has progressed steadily through the ranks, qualifying on the CF-188 Hornet fighter at age 30 and later performing as a member of the Canadian Forces Snowbirds aerobatic team for the 2012 and 2013 seasons.

Today, Handy is based in Moose Jaw, Sask., working as a standards and evaluation pilot for Winnipeg-based 2 Canadian Air Division. His job is to function as an independent observer of 15 Wing Moose Jaw's Snowbirds 431 Air Demonstration Squadron. He helps implement any regulatory changes, technical orders and pilot procedures, and performs team and pilot evaluations.

"In reality, when it comes to this time of year and the new pilots are around the squadron, I'm pretty intimately involved in getting them trained up," said Handy, who flies about 150 hours per year in the team's CT-114 Tutor aircraft.

So how does he balance his full-time job, his family life—with wife Rebecca and kids Evan, 9, and Grace, 6—and his passion for aerobatic flying? There's no doubt the man is busy.

"I'm up at the crack of dawn to get in a practice flight at the municipal airport



Brent Handy and his eye-catching red and white Pitts Special S-2B appear at nine to 12 airshows a year, most of them in Western Canada and the Northwestern U.S.

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Handy flies in formation with another Pitts S-2B owned by George Kirbyson. It is painted in the original team colours of the Ray-Ban Gold Aerobatic Team.



Handy is an unrestricted, surface-rated aerobatic performer.

“I loved flying so much that studying 24/7 was no problem for me. It was like a fire that ignited and took over my life.

”

[where he keeps the Pitts], then I race to the base for a training flight with the Snowbirds, followed by another aerobatics practice flight. Then I'll watch the flight video in the evening.”

Although the municipal airport is just 10 kilometres northeast of Moose Jaw, the military base is on the opposite side of the city. Luckily, Moose Jaw isn't known for its traffic jams.

“I'm out there three to five times a week to do practice flights. It takes a lot of hours to prepare for an airshow. The first year I got into flying aerobatics, I flew 100 hours on the Pitts each summer. Put into context, each flight is 12 minutes. That's a lot of flights.”

As his show routine has crystallized, Handy's schedule is not quite as hectic.

Yet every 12-minute flight is physically taxing for the unrestricted surface-rated aerobatic performer, despite the fact that his body has been conditioned by almost 20 years of military flying.

Flying in the Pitts is nothing like flying in the Tutor, however, and Handy said there's no danger of confusing one with the other.

“The planes are so different that the mental shift from one to the other isn't a factor. Every airplane has its pros and cons. You can't beat the Tutor for formation aerobatic flying, but if you really want to dig into aerobatic flying, well, flying the Pitts made me feel like

I was learning how to fly all over again. The controls are more sensitive and very powerful.”

But as anyone who has flown it knows, the Pitts is anything but a cross-country airplane. The most challenging aspect, said Handy, is simply transiting to and from airshows.

“For the last 20 years, I've flown a well-equipped, high-performance airplane that can get up above the weather. For me to shift into the Pitts, which is a VFR airplane, bumping around under the weather all the time—that was very challenging.

“The Pitts is built for 10 minutes at a time,” he noted. His has a ferry tank that extends its range to 400 nautical miles.

Still, “It's hard enough to put on the ground on the best of days, let alone after you've been flying it for hours,” Handy said, when describing the seemingly simple task of landing the airplane after a numbing three-hour transit.

A DREAM WITHIN REACH

Once he lands at an airshow, however, it's like old home week. Handy—who uses his personal leave time from the Air Force to perform—said the airshow community is tight-knit.



“The Pitts is built for 10 minutes at a time,” according to Handy, who said that transiting to and from airshows is taxing.

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“You get these intense friendships with people and then you don’t see them for a while, and then you get together at the next show,” he said. “It’s very akin to military friendships.”

“It’s a quirky community; you have military performers at an airshow and you have civilian performers. The military performers are sharp, professional; they fit the mould. Then, when you look at the civilians, what a crazy mix of people! There’s the full spectrum of personalities and airplanes there. Everyone flies for a slightly different reason.”

For Handy, the exposure to civilian aerobatics came during an airshow in Yarmouth, N.S., when American

performer Gary Ward took him for a spin in his MX-2. The memory of that flight is still crystal clear.

“The first flight blew my mind! The roll rate, the ability to tumble it, do all kinds of aerobatics I’d never even conceived of before. . . . It was like learning to fly all over again. I knew from that moment that if there was any way I could swing it, I would get into that kind of flying. Then, I realized there were people who were willing to pay for a pilot to do that kind of flying!”

And so, after his 2013 tour with the Snowbirds, Handy stepped “outside his comfort zone,” developed a business plan for Brent Handy Aerobatics, and presented it to the bank.

“Hanging around upside down just above the ground is another day at work for me, but going to the bank to get the loan was scary!”

His wife, Rebecca, knows how passionate he is about flying, but even she was surprised when Handy said he wanted to perform in airshows.

“It’s been a journey for all of us, and their support is so important,” he said. “It is tough to go away; my kids are at an age where it’s so amazing to watch their development day by day.”

But he also believes it’s important to show his children that hard work and perseverance can bring any dream within reach—and sometimes, a little sacrifice is necessary.

“It wasn’t a hard decision to get into airshow flying, because that was the only way,” he said. “I don’t come from a background with a lot of extra cash to just buy airplanes. But with a lot of work, it’s been a great way for me to pursue my passion.”

He’s also attempted to share that passion with both of his kids, taking them for flights in the Pitts.

“My daughter was the first one to fly with me. I had to find every cushion to prop her up so she could see. They’re still cautious about it. My son didn’t like the noise at first—the Pitts is a loud airplane.”

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A DIFFERENT PERSPECTIVE

The 2017 airshow season was a bit of a roller coaster ride for Handy. He participated in the ill-fated Canadian Arctic Aviation Tour, which ran out of funding before it could finish, leaving performers unpaid.

“I put a lot of mileage on the airplane during that tour. You have to invest your time and money to prepare for shows; but either way, when you fly an airplane 2,000 miles round trip it’s a big expense and a lot of time on the engine.”

However, the chance to fly in the North to places he’d only visited with the RCAF was “a real eye opener as to how big the country is.”

“When you’re down in the weeds at 1,000 feet in a small airplane, it’s a different perspective.”

He cherishes that outlook and has no plans to quit anytime soon.

“It’s allowing me to do what I love to do, and I use it to have fun and motivate kids and raise money for worthwhile causes. I didn’t see this coming five years ago; it’s opened up a whole world I didn’t even know about. I think it’s safe to say I’ll be doing it, if I can help it!”

Handy said the biggest rewards in his professional life have come from stepping outside his comfort zone to chase a dream—whether enrolling in Air Cadets, joining the RCAF, or approaching the bank for a loan to start his aerobatics business.

What’s next? Possibly a post-military career with a major airline—although after conquering the sky, Handy is also turning his thoughts to the water.

“I’ve been dreaming of a sailing expedition for a while now. I don’t know anyone who has done this, but I think of getting in a boat and moving it from one continent to another; that might be one of the next possibilities for me.”

“There are no excuses; it’s whatever you want to do,” he concluded. “Because we live in Canada, we have so many opportunities. Whatever you want to do, you can make it happen. The only excuses are in our minds.”



Lisa Gordon is editor-in-chief of Skies magazine. Prior to joining MHM Publishing in 2011, Lisa worked in association publishing for more than a decade, overseeing the production of custom-crafted trade magazines. Lisa is a graduate of the Ryerson University Journalism program.

“Hanging around upside down just above the ground is another day at work for me, but going to the bank to get the loan was scary!”

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**The Art and Science
of Aviation Photography**

Q&A
with
Mike
Reyno

BY KYLE DAVIS

EDITOR'S NOTE: This article was written by Kyle Davis of BDN Aerospace Marketing and first appeared on the BDN blog as a two-part series in September 2017. It is reprinted here with permission. We thought there was no better place than the annual Skies Photo Contest issue to take readers behind the lens with our publisher and expert aviation photographer, Mike Reyno.

Watch the video [here!](#)



Photographed from a CT-114 Tutor near Comox, B.C., 2017 CF-18 demo pilot, Capt Matthew 'Glib' Kutryk, shows off the vivid red paint scheme on the topside of the jet, which contrasts against the dark clouds below. Unfortunately, thick clouds obscured the snow-capped mountains on the ground. Air traffic control also prevented the two aircraft from flying above a thin layer of clouds at 16,000 feet, making this one of Reyno's most challenging photo shoots.

BDN partner Kyle Davis recently had the pleasure of speaking with Mike Reyno, group publisher of *Vertical*, *Vertical 911*, *Skies*, *RCAF Today* and *Insight* magazines about the art and science of aviation photography. Reyno is an accomplished photographer, who has been involved in the aviation publishing industry since the early 90s. His experience and in-depth knowledge of aviation is the foundation that MHM Publishing's successful portfolio of magazines has been built upon. He has flown in 80-plus aircraft types, and has accumulated more than 1,000 hours shooting air-to-air photography.

Kyle Davis: You've always been passionate about aviation and about great aviation photography. Can you tell us a little bit about how that started?

Mike Reyno: I grew up in London, Ont., about one and a half hours west of Toronto. I first got connected to aviation as a kid going to the London International Air Show. Every year, I noticed there was a group of guys taking photos. So, that was kind of where it all started. When I

was about 14, I started taking pictures, too, and my interest in aviation and then photography grew and intensified. And it's funny, because I always tell my dad, "You never took me skating and you never got me into sports," and he laughs and says, "But I took you to a bloody air show." I would go to these shows and shoot 25 to 30 rolls of film, and it wasn't long before I wanted to take everything to the next level. I was interested in photography as a career and started to notice that all of the photographers at these shows had other full-time jobs. They were police officers and sales reps—you name it—but photography was something they did as a sideline. Well, I wanted to make it a full-time gig, because I loved it. I basically looked at everything that the other photographers were doing and said I won't do any of that. So I just started shooting and building up my own reputation. I had a little print portfolio in my camera bag and I'd show it to people along the way. My very first air-to-air-photo shoot was in a Sea King helicopter and I took those photos to the guys who flew the jets and they invited me to fly with them, and from there it started to build and I began to really separate myself from all the other photographers.



The Snowbirds are used to flying dynamic formations for the camera. Nonetheless, a formation like this is only attempted after a well planned briefing so that everyone knows exactly where they need to be.



Many times it is the background that makes all the difference, which is the case here as the sun sets behind a Waterloo Wellington Flight Centre Piper Seminole.



A banked turn enables a truly captivating image of this 1952 Canadian Harvard Aircraft Association Harvard Mk. IV.

KD: Were you making money?

MR: I started to make money around that time, and I started to build a good reputation for myself within the Canadian Air Force community, because that's where it really all started for me and things kind of took off from there.

KD: What advice you would give to aspiring photographers today?

MR: My advice to the new generation of photographers is that you have to ignore everything around you. It's a very clique type of group with a lot of naysayers and critics and you can't be afraid to do things your own way. You need to have confidence in yourself and your vision for what you want to do and don't pay attention to what anyone else says or does. That's what I did in the beginning and those are the

guys I see doing phenomenal work today.

KD: Are you self-taught?

MR: When I started, I was just taking photos for fun. I never took a photography course, and I just learned by doing. I still have my first camera from my brother. He reminds me of that all the time.

KD: What made your photos stand out initially?

MR: I think understanding the aircraft and what it can do to get the shot, as well as the people behind the aircraft, is important. But most of all, the photo has to tell a story without a caption. And I think that's the key and a lot of people are still missing that, but I think that was the difference early on.

KD: There are many aspiring aviation photographers out there. I would guess it might even be harder today than it was when you were coming up?

MR: Well, I have mixed feelings on that, because the difference today is that we have digital. So, with digital you can see the shot instantly. And it's funny, if you go to an airshow and watch 30 photographers, within one second of a plane going by they're all looking down at their cameras to make sure they got the photo. In my early days we didn't have that luxury.

So, in some ways it's easier now because of the technology. You can take a shot that's marginal and you can make it look a lot better, and I'm not knocking that because I like seeing how people can take a photo to the next level—but there's a limit to that because at some point the photo itself gets lost.



Photographing helicopters provides for some unique opportunities that you cannot do with a fixed-wing aircraft. This photo is a good example, as a CH-147 Chinook demonstrates an aft-wheel pinnacle landing.

KD: *Who is doing work today that you admire?*

MR: There is a new generation of phenomenal photographers who are taking it to the next level—I'm talking about young guys like Anthony Pecchi. He came into a crowded space and established himself very, very quickly because he's different, and he has a great personality to go along with his talent. That gets him the access. There are other guys like Jan Jasinski, a Canadian who doesn't do air-to-air, but does a lot of work at the end of the runway. He does

very creative things with his images. He just kind of gives it a little push, but he still maintains the essence of the photo. Another great young photographer is Stuart Sanders. He shoots fighters from the ground and it looks like an air-to-air shoot. He'll take a photo of a fighter flying by at 400 knots and get a tack sharp image—that's very difficult. These are guys that are truly creative. On the other hand, you can go to airliners.net and see that probably 80-plus per cent of the images are basically the same. And it's that 20 per cent that I'm always looking for.



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KD: *So, what are your thoughts on the technical and the artistic aspects of great photography and what advice can you offer?*

MR: It can be difficult to have the two blend together and do justice to both aspects. But let's say you're a contract photographer who gets assigned to go shoot a Kaman K-Max helicopter. What do I know about a K-Max? What are its capabilities? What are its selling features? What types of photos can I take to really show off what that aircraft can do? The photographer has to connect the dots.

For some photographers—and I'm saying more on the enthusiast side than on the professional side—you've got to get past the wow factor of, 'Hey, I'm flying in an airplane shooting photos and there's another one flying right beside me!' As a photographer, you have to know what you want from the shoot and then push the limits to make it happen, and when I say push, I don't mean from a safety perspective, but to have the confidence to speak with the pilots or whomever. I want to see photographers stand up to orchestrate the photo shoot so they can get that image that's different, versus just shooting whatever is in front of them.

KD: *I'm hearing a common theme about confidence.*

MR: Yes. But there are also three fundamentals. So, you've got the passionate or artistic side, you've got the technical side of photography, but then you also have the technical side from what will these aircraft do. So, imagine I'm photographing an F-18 that likes to fly at 350 knots from an airplane that likes to fly at 250 knots. How can I orchestrate this so we're going to be safe? You've got different performance envelopes so you have to have that understanding as well as knowing not to ask a helicopter to hover into or out of wind, for example. You need to know what the aircraft is capable of and what the pilots are capable of.

KD: *People always ask photographers what kind of equipment they use—is that a question you get a lot?*

MR: Definitely. And it's interesting because for a lot of photographers it's their secret recipe. You know, what lens did you use? What camera did you use? I'm a Nikon guy. I was a Canon guy, but probably about six years ago I switched, and that's because Nikon at that time had the edge on low-light capability. Now they're pretty much like Ford to GM, and they both have their pluses and



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F/A-18E/F SUPER HORNET



RAYTHEON NORTHROP GRUMMAN GENERAL ELECTRIC BOEING



Use the sun to your advantage, especially with morning or evening light, as shown here with a Fig Air Sikorsky S-76D photographed over Muskoka, north of Toronto.



Reyno positioned the sun just right as a CF-18 Hornet flew a loop in formation with the photo ship over Bagotville, Que. Communication with the pilots is the key to any successful photo shoot.



Two SAR Techs from 442 Squadron are hoisted up to the CH-149 Cormorant. Fighting rotorwash for a photo like this has its challenges.



A 436 Squadron CC-130J Hercules flies a (very bumpy) low-level mission over Algonquin Park in Northern Ontario.



No photo flight is complete without the ultimate selfie. In this case it is in the cockpit of a CT-155 Hawk.

minuses. For me, I'm just so invested in Nikon now that I wouldn't go back. And I have four lenses that I go to most often: Nikkor 14-24mm F/2.8, Nikkor 70-200mm f/2.8, Nikkor 80-400mm F/4.5-5.6 and Nikkor 18-200mm f/3.5-5.6. I have eight more, but those four are the mainstays.

KD: *Your magazines are known for their exceptional photography. What do you look for in the photographers who shoot for you and in the photos you choose for the publication?*

MR: I always look for what's different or what's unique about the way a photographer takes images. Last year, our *Vertical* photo contest winner was a search-and-rescue technician with the U.S. Navy. He shot a photo while he was in an ice crevice near Whidbey Island in Washington—where he was looking up to a helicopter hovering overhead. We love to see different angles, different perspectives, different backgrounds—as long as it's done safely—it makes all the difference in what we choose.

KD: *Can you talk about shooting helicopters versus fixed-wing?*

MR: In some ways, shooting a helicopter is a lot easier, because if you're trying to get a specific background the aircraft can essentially stop. But then the challenges that come with a helicopter is that you've got spinning rotors and vibrations and wind coming into an open doorway. With fixed-wing, the challenge is that you know the background you want, but it's hard to make it happen when you're flying by at 300 knots. I did a photo shoot with the Breitling Jet Team two years ago and we had four quick fly-bys over Niagara Falls, and that was it. I got the shot, but it's tough because if you don't get it ... you know it's a lot of money, and that's the other thing. Doing air-to-air is a huge expense—from \$600 to \$7,000 an hour for an R44 or an S-92 to \$40,000 for a CF-18. So, you'd better come back with the shot.

KD: *What's the most you've ever seen someone spend on a photo shoot?*

MR: Around \$50,000, just for the aircraft time alone. It's big, big bucks, and you've got to make sure that the photographer you're using can do all those things we just spoke about.

KD: *You spoke about the new generation of young photographers who are doing great work. What about some of the more established people?*



The key to any successful and safe photo shoot is communication, especially when you are working with pilots that may not have formation flying experience.

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MR: Ted Carlson, Eric Dumigan, Dan Megna, Heath Moffatt and Skip Robinson come to mind. Also, Rich Cooper and Ned Dawson are really talented. Paul Bowen is in a class of his own on the business aviation side. And the ultimate photographer would be Katsuhiko Tokunaga, who just dominates with military stuff. Paul and Katsuhiko are the two biggest names in aviation photography. They both demonstrate the ultimate as far as professionalism and they are two of the nicest guys you'd ever hope to meet.

KD: So, you've been involved in a lot of photo shoots, including air-to-air as we've discussed. Have any of them been especially memorable or interesting, and have you had any close calls?

MR: Yes, but it wasn't a close call; we actually hit in mid-air. It was in 2001 and I was flying with the Snowbirds at the London air show. It was a media day and I was actually not even taking photos when we had the problem. The photo shoot went well, but there was miscommunication between two pilots

during a rejoin and we basically met head-to-head. We took off his tail with our wing and he took off a big chunk of our leading edge. So we're over Lake Erie, the crew in the other airplane had to punch out, and then for probably 10 minutes we weren't sure if we'd have to punch out as well. We didn't know if we could make it back, but ultimately we did and the guys who ejected were all OK, too. I think it took about a month and a half before I would get back in an aircraft but—knock on wood—that's the only time I've ever had an incident and I've never had a close call since. Safety is everything. At the end of the day, it's only a photo.

KD: Tell us about some of your other most memorable flights.

MR: Some of the more interesting ones I think have been where I get out into the bush. So, if I go to Airbus and I do a photograph of an H-125, that's one thing. But then I go out into the field and I see how they put that helicopter to work. The best part of what I do is bringing that to the reader. I can show them the utility of taking one helicopter type, like an AStar, and that helicopter probably does 20 different things. So, it's one thing to see it at the manufacturer, but to go out into the field to show what they're doing out there, every one of those is memorable because it's something that's always unique and often amazing.

KD: What about any parting shots or wisdom? Are there any topics you'd like to talk about that we haven't covered?

MR: Sure. Too many people in the industry don't understand the value of aviation photography, and, frankly, they don't want to pay for it. But a lot goes into every photo. First, I had to fly there to shoot it. I also had to have the knowledge base to brief it so we could do everything safely; but, you know, there is a risk element that comes with this work. There's the creative and technical talent. So you try to factor that into what you're asking for the photos. Still, I'd say 90 per cent of people just don't understand the value that goes with it. They think you just went up in the airplane and clicked. The other thing that I've talked about a couple of times is the safety element, so we're careful about what we show in our magazines. We don't want selfie sticks out the windows and things like that. We've seen a lot of videos and photos of accidents or aircraft doing some pretty stupid things, and that can create a perception outside of our industry that is not what we want. This isn't the Wild, Wild West. We've got to be safe.



In 2015, Reyno had the opportunity to fly with the Breitling Jet Team's seven L-39 Albatros aircraft over Niagara Falls. Three fly-bys were briefed. However, an experienced chase pilot got into position for the shot on the first take.

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Everywhere you look



A highlight of the London program was the U.S. Air Force F-35A Lightning II heritage flight, featuring the new fifth generation fighter alongside the legendary P-51 Mustang, "Bald Eagle." **Dave Mills Photo**

FIGHTERS in Forest City

THROUGH THE HARD WORK OF DEDICATED VOLUNTEERS, LONDON IS BACK IN THE AIRSHOW BUSINESS—BIG TIME.

BY LISA GORDON

For one unseasonably hot September weekend, Canada's so-called Forest City became its Fighter Town as the country's largest display of military airpower roared into London, Ont., from Sept. 22 to 24, 2017.

The unmistakable sound of screaming jet engines returned to London last year, when the show was resurrected for the first time since 2004.

It had been discontinued due to organizational difficulties and soaring insurance costs. But for airshow fans, London was legendary from the 1980s through to the early 2000s.

"We were always spoiled growing up with these great big airshows, so when you say the airshow's back, you've really got to bring it back," said Gerry Vanderhoek, director of flight operations for Airshow London and manager of commercial services and passenger experience for London International Airport. "Everybody's expectations are very high in London. When we brought it back [in 2016], everybody was excited."

Last year, about 25,000 people attended the show. One day got rained out, but Vanderhoek said 2017 attendance soared close to 40,000 over a sunny weekend with temperatures climbing to 32C.

"Our team put together a show that made history," said Dave De Kelder, executive director of Airshow London. "The most advanced aircraft in the world were on our runways and in the skies all weekend. It was amazing and awesome and people loved it—the performers and crews loved it."

The U.S. Navy's E-6 made a rare appearance outside the United States. **Joe Letourneau Photo**

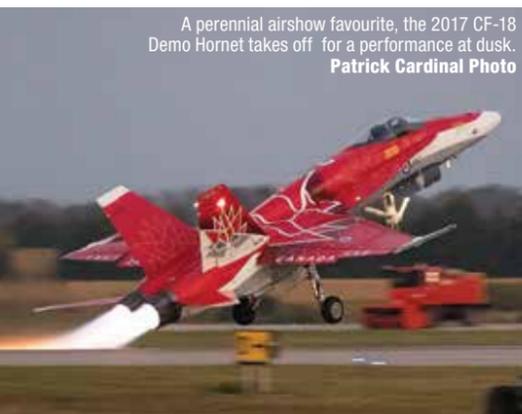


London's hometown hero, Red Bull Air Race pilot Pete McLeod, pulled out all the stops in his performance. **Joe Letourneau Photo**





Airshow announcer Ric Peterson shows his enthusiasm for the Canadian Forces Snowbirds. **Patrick Cardinal Photo**



A perennial airshow favourite, the 2017 CF-18 Demo Hornet takes off for a performance at dusk. **Patrick Cardinal Photo**



Three F-15 Eagles from the Louisiana Air National Guard did not disappoint during their series of fly-bys. **Patrick Cardinal Photo**

Jim Graham, Airshow London's chair of the board, said the event raised the bar for future shows, both in London and elsewhere.

"This was only year two of our comeback in a new format—as a not-for-profit—and our team rocked it," he said. "Visitors from around the globe made it their mission to be in London [that] weekend and they were glad they did."

Presented by Lockheed Martin, Airshow London 2017 honoured Canada's 150th birthday while claiming the title of Canada's largest military airshow.

"It was probably in the top five for military in North America," said Vanderhoek. "It would have to be just looking at everything. For the amount and variety of aircraft, I'd say we were in the top five for military power."

More than 350 international crews and 63 aircraft, including those on the static display, were on hand.

"I think from an airplane perspective we had almost the same international presence as in 2016, but we had more buy-in from the dedicated demo teams from the U.S. Navy and whatnot," he added. "I think from an approval perspective it was a lot easier, too. People know who we are now. We put on the first show and now they know we're going to be around."

One of the airshow organizers' biggest achievements was having representation from every branch of the military on the air-

field. Highlights in the lineup included both the Lockheed Martin F-22 Raptor and the F-35 Lightning II on the static display ramp.

"The F-35 from the U.S. Navy was on static display outside the United States for the first time, so that was pretty exciting," recalled Vanderhoek. "A nice feather in our cap is that we had every fighter in North America. I think we pretty much covered it."

Air boss Donna Flynn, who has overseen the safe flow of traffic at Airshow London in 2016 and 2017, said this year's event had an "incredible military presence."

Flynn, who has been an air boss since 1989, said the best part of this airshow was seeing lots of smiles and hearing the crowd's reaction to the acts.

"It was clear everyone was proud of what the organizers were able to put together," she told *Skies*. "I haven't seen a show with what they had here in London in quite some time. There was not only an abundance of Canadian and American military aircraft, but also aircraft from around the world gathered for this show."

Making their first appearances in Canada were an Australian KC-30A multi-role tanker transport and an HC-144 Ocean Sentry from the U.S. Coast Guard. The program also included airshow staples such as the Canadian Forces Snowbirds aerobatic team and the Royal Canadian Air Force (RCAF) CF-18 Demo Hornet, as well as more unusual acts that included a heritage



Canada's first fighter jet, the de Havilland Vampire, flies formation with the 2017 CF-18 Hornet Demo. **Patrick Cardinal Photo**



Gerry Vanderhoek, director of flight operations for Airshow London, is all smiles at show time. **Airshow London Photo**

flight featuring the U.S. Air Force F-35 and a P-51 Mustang and a demonstration by the U.S. Navy Super Hornet. A Vampire, a MiG-17PF, and London-based Red Bull Air Race pilot Pete McLeod were other notable acts in a jam-packed show program.

Extensive hurricane activity in the southern U.S. and the Caribbean just prior to the airshow resulted in several aircraft being cancelled from the show lineup due to re-tasking, including the C-5 Galaxy, the American C-17, the Canadian CC-177, a P-8, a P-3, and the C-130. Although the last minute changes were disappointing, Vanderhoek said everyone understood the aircraft were needed elsewhere to deliver aid.



Airshow London drew the largest display of military aircraft seen in Canada in the last 10 years. **Gary Molenkamp Photo**



“A nice feather in our cap is that we had every fighter in North America.”

Randy Ball put his MiG-17PF through its paces. During his spirited performance, he routinely pulls 8 Gs. **Michael Durning Photo**

INSPIRING VISION

The hardest part of bringing the airshow back to London was starting from scratch and trying to get people on board, Vanderhoek told *Skies*.

“There were a lot of ideas out there about insurance still being too high; but once we got the buy-in, you can see it’s been very successful both years as far as attendance and sponsorship,” he said.

A not-for-profit venture, proceeds from Airshow London benefit three local charities: Fanshawe College’s aviation program; Parkwood Institute’s Veterans Care Program; and the Children’s Health Foundation.

“A few years back, Fanshawe bought the

Air Ontario hangar, and they turned it into a maintenance and avionics school right on the airport,” explained Vanderhoek. “Talk about a great partner—they contribute about 150 volunteers to the show. We hope to make enough money that we can give scholarships and bursaries to the students.”

Giving back to veterans who have made sacrifices for Canada is important for show organizers, as is “Katie’s Corner,” named after Vanderhoek’s daughter, Kaitlin, who lost her battle with leukemia in May 2009. It’s a place where about 300 sick kids [100 per day] from all over Southern Ontario can escape the hard realities of daily life and just enjoy a day at the airshow.

Vanderhoek is also reaching out to area schools to inspire young people to consider aviation careers.

“We brought in 1,100 kids from all grades on Friday morning, five schools, and each came out and saw the static and some of our practice show,” he said. “I did an hour presentation at each of the schools and I’m hoping to open that up to every Grade 6 class in London when they have their aviation unit.”

Vanderhoek said he used to skip school and ride his bike to the airport to watch the planes arrive for the airshow, but nowadays aviation is in the curriculum and “that’s incredible.”



Three A-10C Thunderbolts, from the Michigan Air National Guard’s 107th Fighter Squadron, performed several fly-bys. **Joe Letourneau Photo**



The CC-177 made a brief appearance at Airshow London during the hour of power, but was tasked to fly humanitarian relief supplies, and had to leave the show. **Joe Letourneau Photo**



The U.S. Navy’s F-35C from VF-101 Grim Reapers made its Canadian debut in London. **Dave Mills Photo**

INTERNATIONAL ELEMENT

While Airshow London has returned to its legendary military roots, Vanderhoek said organizers are trying to build for the future. Plans include a tradeshow component featuring the latest military technology.

“We really want to push this to be Canada’s international airshow,” he said. “Abbotsford is considered to be Canada’s national airshow, but we really want to push this international element. You know, we’re pretty close to Europe on our side of the country, so hopefully that will help us in the future.”

So just how does Vanderhoek and his team manage to attract such a stellar show lineup?

Attendance at Airshow London 2017 soared close to 40,000 over the sunny weekend, with temperatures climbing to 32C. Joe Letourneau Photo



Photographers were out in full force at Airshow London. The F-35 was a star attraction. Joe Letourneau Photo

Two Royal Canadian Air Force CT-155 Hawks fly in formation with a CT-156 Harvard II. Both aircraft types are used for training in the NATO Flying Training in Canada (NFTC) program. Dave Mills Photo



He puts it down to simple hard work, enthusiasm and dedication. "It takes a lot of behind the scenes work to get these guys to come up," he admitted. "And if you say you're going to do something for these guys, then you've got to do it."

Vanderhoek previously helped organize the Great Lakes International Airshow in St. Thomas, Ont., and was able to mine some of his connections from that event, although he said the military has a high turnover and sometimes it can take 15 phone calls just to locate the right person.

No matter. Vanderhoek is tenacious, and he is a man on a mission. That mission is all about inspiring kids to aim high.

"For me, this whole thing is like a dream come true. We put a ton of extra hours into it; it's almost like a second

job over the course of a year. But to inspire young people about aviation is what I want to see. That's a real goal of mine. My whole life, aviation people have always been rock stars and now being part of it is really awesome."

Feedback on the 2017 show has been resoundingly positive, and plans are already underway for Airshow London 2018.

"People are asking how we're going to top it for next year," said Vanderhoek. "I have some good stuff for 2019 already! For 2018, I've already had two aircraft confirmed from the U.S. Air Force and they're not dedicated demo teams, which is pretty incredible."

Stay tuned to the @AirshowLondon Facebook page for more details, including show dates, as they become available. 

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Photo Contest

SHOW US **SKIES** THROUGH YOUR EYES

Welcome to the fourth annual *Skies* Photo Contest! If you love aviation photography, you've picked up the right magazine.

Every year, we invite readers to submit their best photos. And every year, they outdo themselves!

This year's contest netted some of the most jaw-dropping, gob-smacking, *incredible* aviation images we've ever seen. That's really saying something for a magazine that prides itself on publishing only the best aviation photography. It's what makes us different and keeps you, the reader, turning the page to see what's next!

We were particularly pleased to see that the submissions reflected the universal nature of aviation. The photos showcased aircraft of all sizes and stripes, including military, general aviation, airlines, warbirds, business jets and helicopters.

The *Skies* Photo Contest was open to both amateur and professional Canadian photographers over the age of 18. Photos were submitted in four categories: Airshows, Commercial, Military and General Aviation. Once the contest closed on Sept. 1, the *Skies* team had the difficult task of narrowing down the entries in each category.

Then, we called in our 11 contest sponsors. Representatives from Cascade

Aerospace, Columbia Aircraft Sales, Daher, FlightPath International, Innotech-Execaire Aviation Group, Keystone Aviation, Levaero Aviation, Lockheed Martin, Scott Builders, Universal Avionics Systems Corporation and Vector Aerospace voted for their favourite photos in each category, as did MHM Publishing staff. Ballots were cast by email address, to ensure each person had only one vote, and were tallied automatically.

As you'll see on page 3 and here on this spread, our 2017 Grand Prize goes to Jan Jasinski, who was on hand at Ottawa International Airport when then-U.S. President Barack Obama departed after a June 2016 state visit. As the sun began to set, Jan captured Air Force 1 in the perfect light to create this unforgettable photo. Congratulations on winning our grand prize, Jan!

The first, second and third place winners in each of the four categories appear on the following pages, as well as some honourable mentions. While it's impossible to print all of the stunning photos we received, we hope you enjoy the winning selections.

The *Skies* team thanks all photographers for their submissions. Of course, we also recognize and thank our contest sponsors for supporting the fourth annual *Skies* Photo Contest.



GRAND
prize

Former U.S. President Barack Obama's official state visit to Ottawa in June 2016 attracted a lot of people to the Ottawa International Airport to see the famous Boeing VC-25, designated Air Force 1 when the president is on board. The plane's departure time was delayed, meaning it took off as the sun was beginning to set. The conditions were perfect and Jan Jasinski immortalized the moment here, in our 2017 Skies Photo Contest Grand Prize-winning photo.

 Download the wallpaper [here!](#)

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Jan Jasinski is a 20-year-old Polish Canadian living in Gatineau, Que. He is a graphic design graduate and a private pilot who is currently studying aviation management to pursue his dream of becoming an airline pilot. During the winter months, he works as an aircraft de-icing technician and bay lead at the Ottawa International Airport. In his spare time, Jan also works part-time as a real estate photographer.



After the noon Canada Day flypast was scrubbed because of weather, a brief window of opportunity allowed the Canadian Forces Snowbirds to finally take to the skies over Ottawa during the late afternoon of July 1, 2017. With the cooperation of the assembled crowd at the centennial frame (unveiled 50 years earlier), this image by Patrick Cardinal captures all the elements of the incredible celebration of Canada's 150th birthday, highlighted by the team's iconic nine Canadian-built jets as they flew over Parliament Hill.

 [Download the wallpaper here!](#)

Patrick Cardinal is a corporate aviation event photographer based in Montreal, with a passion for capturing unique images of military and commercial aircraft.



SECOND.
place
AIRSHOWS

Greg "Wired" Colyer and his beautiful Ace Maker II T-33 Shooting Star heat things up during Aviation Nation 2017 at Nellis Air Force Base in Nevada. Colyer and his Rolls-Royce Nene-powered aircraft were one of the acts on hand to help celebrate the U.S. Air Force's 70th birthday during the event.

 Download the wallpaper [here!](#)



Photographer **Dave Mills** may be a paramedic by day in London, Ont., but his heart has always been in military aviation. His grandfather and father were both RCAF pilots, and Dave said this connection is undoubtedly part of the reason he was bitten by the "aviation bug!"

THIRD.
place
AIRSHOWS

The Canadian SkyHawks Parachute Team is Canada's only military parachute demonstration team. They have unique Canadian flag parachutes and put on a dramatic show by creating formations and expelling colourful smoke trails. Not only are the spectators amazed by the strength and precision of the jumpers, but also by the camaraderie once they are on the ground. After the show, team members delight the children by handing out souvenirs and signing autographs.

 Download the wallpaper [here!](#)



Angeline Haslett retired early from school teaching to pursue a new career in photography. She enjoys event shooting the most, whether water sports, equestrian events, festivals or airshows. She has been to the Abbotsford Airshow four years in a row to photograph the displays and events, saying, "It is usually hot, noisy and dusty, but I still get a thrill when the big jets fly overhead!"

FIRST
place
COMMERCIAL

Nestor Falls Fly-In Outposts operates these two Garrett-powered DHC-3 Otters to support their fly-in fishing operation in Nestor Falls, Ont. Mike Gate, flying C-FODK, leads the formation over Lake of the Woods, while Doug Zapfe, in C-FSOR, pulls in close in this Oct. 2, 2016 shot.

 Download the wallpaper [here!](#)



Rich Hulina has been a bush pilot and aviation photographer in Northwestern Ontario for more than 25 years. His passion is for travelling the North while trying to capture the hard-working bushplane in its natural element.



The winter weather brings out some incredible photo opportunities around airports. De-ice crews work around the clock at Toronto's Pearson Airport to ensure that flights like this Air Canada 767 go out safely and on time. The crew is giving the aircraft a full-body spray to remove surface contamination from the falling snow, which degrades the lifting ability of the aircraft's wings.

 [Download the wallpaper here!](#)

SECOND.
place
COMMERCIAL



Adam Tetzlaff is a student pilot and photographer from Toronto, Ont. Ever since he was young he has spent his days looking up at the sky, dreaming of being an airline pilot. Plane spotting was his way of getting closer to that dream, and now it is his passion alongside flying.

THIRD
place
COMMERCIAL

An Antonov An-124-100 is an imposing presence on the ramp at Toronto Pearson International Airport this past July.



Download the wallpaper [here!](#)



Rinat Haque has been an aviation enthusiast since childhood, spending countless hours at YYZ and YYC spotting planes. He is currently studying aviation operations and hopes to serve the industry very soon!

Shot from the 19 Wing CFB Comox control tower, 2017 CF-188 demonstration pilot Capt Matthew "Glib" Kutryk takes the Canada 150 Hornet to the edge of the speed of sound during a high-speed pass at an afternoon practice during spring training in April 2017.

 Download the wallpaper [here!](#)



An aviation lover for as long as he can remember, **Stuart Sanders** picked up his first camera 17 years ago. The result? His greatest passion, aviation photography. As a freelance aviation photojournalist residing on Canada's West Coast, Stuart enjoys the challenges his action-packed subjects present and always strives to produce images with a unique and dynamic style.

This picture was taken at the Gatineau-Ottawa Executive Airport just before the Canada 150 flight over Parliament Hill in July.



Download the wallpaper [here!](#)



Philippe Lacroix is an active 47-year-old, semi-professional photographer from Gatineau, Que. He loves everything that flies, including airplanes, jets, helicopters and even birds. Photography has been his favourite hobby since age 15.



Following an intense 50-centimetre snowstorm in February 2016 at the Ottawa International Airport, an RCAF CC-177 remained one of many aircraft overnighing on the ramp. Throughout his shift, photographer Jan Jasinski said he couldn't help but admire the beast's faded look in the midst of the storm. "I knew I couldn't leave the airport unless I had at least one decent shot of the CC-177."

 [Download the wallpaper here!](#)

THIRD
place
MILITARY

Jan Jasinski is a 20-year-old Polish Canadian living in Gatineau, Que. He is a graphic design graduate and a private pilot who is currently studying aviation management to pursue his dream of becoming an airline pilot. During the winter months, he works as an aircraft de-icing technician and bay lead at the Ottawa International Airport. In his spare time, Jan also works part-time as a real estate photographer.



This pair of Viking CL-415s was performing scoop training on the Bell River in Matagami, Que., in June 2017, right behind the helipad where pilot-photographer **Rémi Guillot** was parked.

 [Download the wallpaper here!](#)



Rémi Guillot is a commercial helicopter pilot from Quebec who always carries his camera with him, so he never misses the perfect shot.

The Canadian Warplane Heritage Museum's Avro Lancaster is seen over Southern Ontario. The vintage bomber is marked as the "Ruhr Express," in honour of the first Canadian-built Lancaster, KB700.

 [Download the wallpaper here!](#)



Eric Dumigan is an Ontario-based freelance aviation photographer who specializes in air-to-air imagery. He took his first aviation photos in 1974 and his first published photo depicted the inaugural flight of the Canadian Warplane Heritage Museum's Avro Lancaster in 1988.

Kyle Franklin flies his Waco "Dracula" into the sunset at the 2014 Battle Creek Field of Flight Air Show and Balloon Festival in Michigan.

 [Download the wallpaper here!](#)



Gary Molenkamp has been an aviation fanatic since he attended his first airshow with the Cub Scouts in the mid-1980s. When he started his photography hobby a decade ago, it gave him an outlet to share experiences through his own unique perspective.

Honourable

MENTIONS



Going vertical in the CT-155 Hawk. **Frederic Roy Photo**

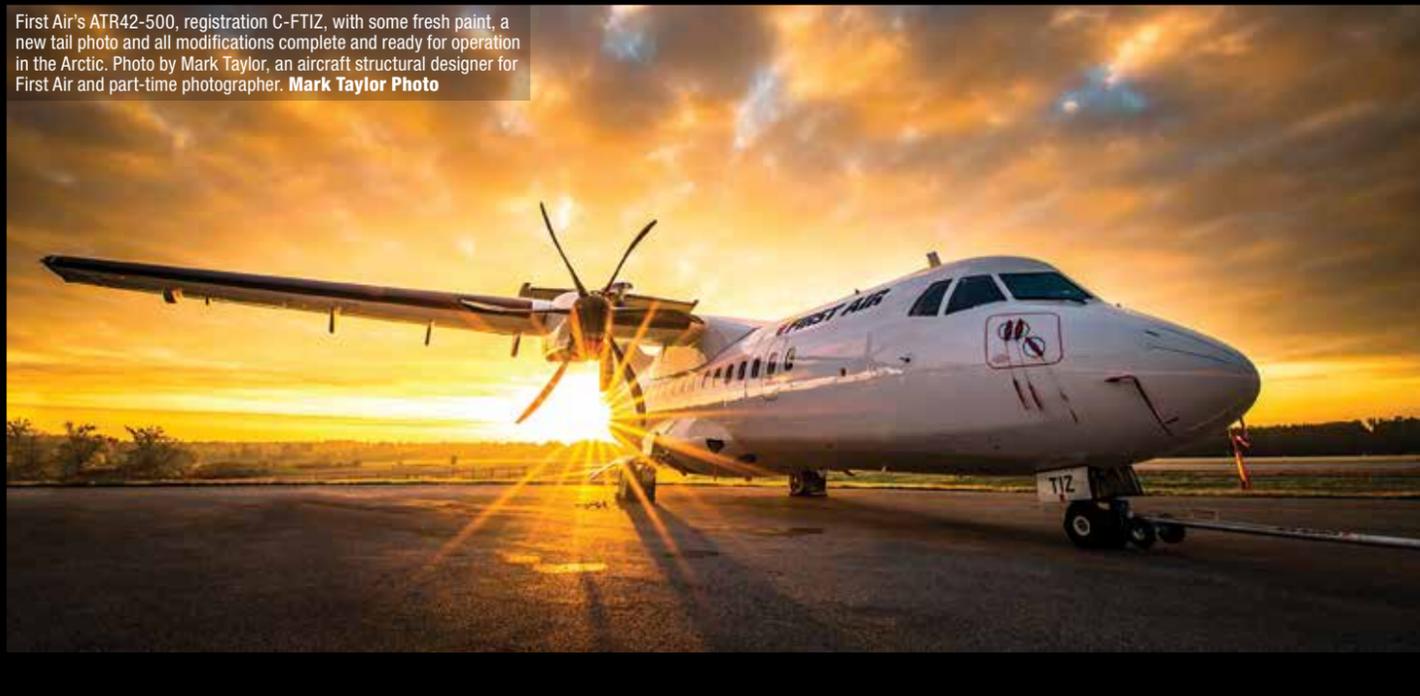


AreaShell Formation Team. **Angeline Haslett Photo**



Making a low and fast pass over Brantford Airport, Ontario. **John Chung Photo**

First Air's ATR42-500, registration C-FTIZ, with some fresh paint, a new tail photo and all modifications complete and ready for operation in the Arctic. Photo by Mark Taylor, an aircraft structural designer for First Air and part-time photographer. **Mark Taylor Photo**



Inspired. **Maciej Hatta Photo**



A CC-150 Polaris is accompanied by a CF-188 Hornet wingman. **Bruno Tucci Photo**



Cirque du Soleil in golden light. **Patrick Cardinal Photo**



Air Canada Boeing 787-9 Dreamliner over mountains.
Brian Losito Photo



1936 Beech Staggerwing. Mike Luedey Photo

Under the Milky Way, Baie-James Québec. Rémi Guillot Photo



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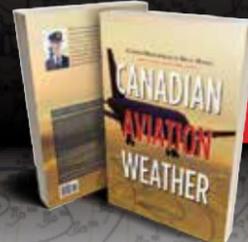
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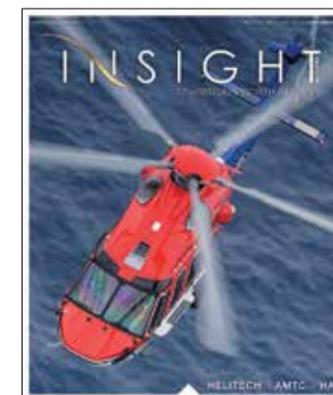
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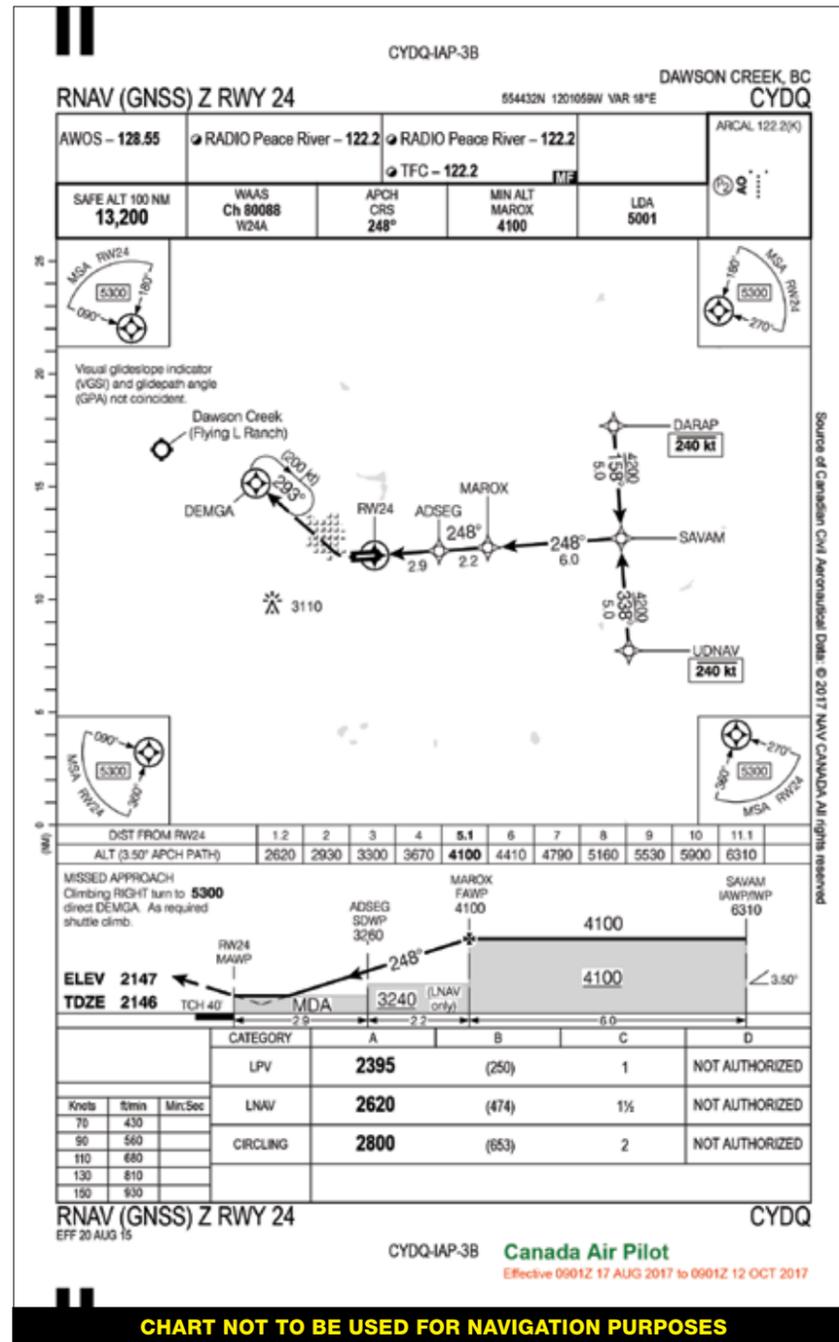
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Sharpen your IFR skills

BY JOHN MONTGOMERY



Test your instrument flight rules (IFR) proficiency and sharpen your piloting skills with this exclusive *Skies* feature!

Examine the following approach plate and take your best shot at the accompanying questions—answers can be found at www.skiesmag.com/iq.

DAWSON CREEK, B.C. (CYDQ) RNAV (GNSS) Z RWY 24 APPROACH

1. Identify the fly-over waypoints within this procedure: _____; _____.
2. You are cleared for the straight in RNAV RWY 24 approach and are cleared direct to the DARAP waypoint. What would be the correct lateral and vertical profile for this approach after crossing DARAP? It is daytime and +10 degrees C at the time of the approach.
3. What is the distance between the FAWP and the MAWP?
4. You are flying the LNAV approach via CDEFA technique. You are level at 4100 ASL. At what point do you initiate descent and what should be the optimum crossing altitude over ADSEG?
5. If your groundspeed on the approach was 110 knots, you would require a minimum descent rate of _____ FPM to meet this target.
6. What is the clearance limit of this approach and what action should be taken upon arrival if further clearance is not received?

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@proifr.com.

CHART NOT TO BE USED FOR NAVIGATION PURPOSES

Meet John Aitken, Chief Pilot, Vintage Wings of Canada

BY LISA GORDON

On a beautiful June morning this past summer, pilot John Aitken took off in a plane that had not flown since 1952.

With around 11,000 hours of flight time in his logbook and countless type ratings earned during a flying career that spans 56 years, Aitken has enjoyed many memorable flights. But this one was extra special, because flying alongside him in the cockpit of the lovingly restored Supermarine Spitfire Mk IX that day was the memory of Flight Lieutenant Arnold Walter “Rosey” Roseland, for whom the aircraft had been named.

The Roseland Spitfire was also lifted high that day on the hearts and minds of the countless dedicated volunteers who had literally brought it back from a South African scrap heap, where it was found in the 1990s.

The story of Vintage Wings of Canada’s Roseland Spitfire is one of determination, pride and a cross-country restoration effort that resulted in the completion of the first Spitfire ever built in this country.

As the chief pilot at Vintage Wings of Canada in Gatineau, Que., Aitken was in the right place when it came time to test fly the restored fighter. It’s a theme the 76-year-old pilot said has been prevalent throughout his career.

“I guess I can’t get around the fact that I’ve been in the right place at the right time and opportunities have fallen out when I was able to take advantage of them,” Aitken told *Skies*.

He credits his initial interest in aviation to an older cousin who flew F-86 Sabres in Germany and an uncle who was an aircraft design engineer. Growing up on a farm just east of Guelph, Ont., Aitken said just about every boy in those days dreamed of becoming a pilot.

“I grew up during the war years. Certainly after the war, I can remember as a kid maybe at six or seven years old, chasing my brother, and we had these little models of Spitfires and Hurricanes,” he recalled.

Aitken joined the Air Force right after finishing high school, going on to complete an engineering degree at the University of Western Ontario. During the summers, he’d do a bit of flight training but it wasn’t until July of 1965 that he earned his wings on the CT-133 Silver Star.

After a tour on the CF 101 Voodoo, Aitken completed advanced training at the U.S. Air Force Aerospace Research Pilot School. He subsequently did tours at the Aerospace Engineering Test Establishment (AETE) in Cold Lake and at the USAF 6512th Test Squadron in California. In his second tour at AETE he found himself in the right place at the right time, as a test pilot involved in Canada’s fighter procurement in the 1980s.

After completing Staff College in Toronto, he was posted to St. Louis, Mo., as part of the CF-18 procurement program. But he said he could see the writing on the wall. “Up until

then I had spent almost all of my career flying, and I knew from then on I was probably going to be posted to ground jobs.”

At that point a flying job came up at the National Research Council of Canada (NRC) in Ottawa, and he jumped at the chance, spending a rewarding 25 years with the renowned flight research laboratory before retiring in 2007.

Once again, the timing was in Aitken’s favour.

“It was just around that time when Mike Potter was expanding his fleet of [Vintage Wings of Canada] airplanes, and I guess he was looking for somebody to fly them, and I happened to be lucky enough to be in the position to say, ‘Yes, I can do that.’”

Of all the types of airplanes he has flown—and there are 35 to 40 of them varying from the Chipmunk to the C5A Galaxy—Aitken said the one that is most near and dear to his heart is the storied Spitfire.

“There are a lot of very interesting airplanes I’ve flown, but there is just something about the Spitfire that really tugs at you,” he said.

These days, Aitken isn’t up in the air as much as he’d like to be. He logs perhaps 40 hours per year on the Vintage Wings collection.

This is his third year as chief pilot at the organization, and though he said he tells people he’ll be done soon, “no one listens to me.”

On the other hand, flying the likes of this collection is a once-in-a-lifetime opportunity that Aitken said would otherwise be a very expensive hobby.

“People tend to think that the major cost of flying these airplanes is the gas, but it really isn’t. It’s the horrendous maintenance effort you have to put into them to have them serviceable enough to legally fly,” he said.

He added that there was a lot of paperwork to do before that June morning when the Roseland Spitfire took off into a picture perfect Gatineau sky.

“That airplane was basically built from a data plate; there are very few original parts on it,” he said. “It’s basically a completely rebuilt airplane. For example, the wings on the airplane were completely built in our hangar.”

But while the Spitfire may indeed be iconic, Aitken said it’s not terribly difficult to fly as long as it’s treated with respect.

“They can get you into trouble if you don’t really appreciate what they can do to you,” he said. “But basically, they don’t fly much different than a Cessna or whatever; they are a relatively simple airplane, with simpler systems on them, but they’ve got big engines and that’s the thing that can get people into trouble.”

As he looks back over his rich and incredibly varied pilot career, Aitken said it’s been very satisfying.

“The maddening thing now is that as I get older, it is tougher and tougher to climb up in some of those airplanes,” he lamented. “I know at some point in time I’ll have to, you know, hang up my spurs so to speak, and that will be it. It will be tough to give it up, but it’s certainly been a fun ride!”



John Aitken in the cockpit of Vintage Wings’ Roseland Spitfire.
Peter Handley Photo



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