

THE CONTROLLER

JULY 2017

JOURNAL OF AIR TRAFFIC CONTROL



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THE CONTROLLER

JULY 2017
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PUBLISHER

IFATCA, International Federation of
Air Traffic Controllers' Associations
360, St Jacques - Suite 2002
Montreal, Quebec - H2Y 1P5 - CANADA

Phone: +1514 866 7040
Fax: +1514 866 7612
Email: office@ifatca.org

EDITOR-IN-CHIEF

Philip Marien
Van Dijklaan 31
B-3500 Hasselt, Belgium
email: editor@ifatca.org

DEPUTY EDITOR & CORPORATE MEMBERS COORDINATOR

Philippe Domogala
email: dp@the-controller.net

REGIONAL EDITORS

Phil Parker, Asia Pacific
Serge Tchanda, Africa & Middle East
Ignacio Baca, Technical

COPY EDITORS

Paul Robinson, Jez Pigden, Brent Cash,
David Guerin Alasdair Shaw & Helena Sjöström

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PROMISE OR THREAT?

➤ BY PATRIK PETERS, IFATCA PRESIDENT & CEO

IFATCA is the global voice of air traffic control – the voice of safety professionals. Our aim is to promote and safeguard the interest of the air traffic control community and to protect and evolve the profession we all love to execute – in a safe and efficient professional manner. Our work contributes to the incremental changes at many air navigation service providers – serving the air traffic controller and – therefore – the flying public and aviation in general. Aviation as the backbone of every modern society demands the input of our highly trained professionals.

Reading the headlines of recent press announcements, we see several disturbing trends. Probably the biggest undertaking is the announcement of the President of the United States to overhaul the Federal Aviation Administration (FAA). This affects our largest member association and it proposes to privatise the US air traffic control system. Moving the FAA, with its 30,000 employees, from a government body to a private entity bears many risks such as the possibility of increasing user fees or the abuse of control over the America's skies by a private company. An increased focus on economising might also stop investment in modern technology and more critically in the human – the air traffic controller.

Too often do we hear about automation serving as the Holy Grail salvaging the flying public from being exploited by controllers.

Airlines for Europe (A4E) has been campaigning to reduce the impact of air traffic controllers strikes. The European Commission has been pressured to take action in order to minimize air traffic disruptions – contemplating to have air traffic services provided by neighbouring service providers. Whilst I believe that sovereignty aspects will forbid such provision – recent terrorist threats have made politicians think more conservatively than in the past years – these "thought experiments" remain an attack on workers' rights and may well adversely affect safety.

Higher degrees of automation are proposed as the ultimate solution to eliminate these annoying humans from the equation. Is that actually true? Are we able to significantly reduce staffing requirements through automation?

Perhaps it's time for a reality check: What do we see happening with regards to technology in our ATC environment? Isn't it more like that we witness a lot of failing initiatives? There is little gain when we first have to train all controllers to be able to cope with higher degrees of complex technical systems to then be able to mitigate for the failures of those. We can all agree that air traffic control will over time transform from a nowadays reactive and tactical service provision to a more proactive and strategic one.

But there's little doubt that it will always require a human to intervene and correct

when things turn sour. The belief in automation has cost many peoples' lives - have a look at 'Children of Magenta' on YouTube. In 1997, American Airlines captain Warren Van Der Burgh said that the industry has turned pilots into 'Children of the Magenta': too dependent on the guiding magenta-colored lines on their screens and demonstrated that safety clearly suffered as a result.

ICAO estimates that more than 40,000 air traffic controllers are needed worldwide over the coming years to cope with the expansion of air traffic and the enormous growth we see in several parts of the world. Validation and education of controllers as well as the involvement of staff organizations in the process of modernization are absolutely essential to the success of the system. In fact, several large European service providers are experiencing the effects of their overambitious staff cutting plans.

Air traffic controllers are professionals! We want to be in the loop, we desire to evolve together and we need to be listened to. That's why we are active in our global community IFATCA.

We're all in this together!

Professionally yours

Patrik Peters

patrik.peters@ifatca.org



THINK TANK

 BY PHILIP MARIEN, EDITOR

Rejoice, because the aviation world has a new think-tank! "What are they thinking about?", I hear you ask. Well, according to the [website](#) of the ATM Policy Institute, the think-tank will provide research on ATM policy issues and make the case for the benefits of enabling ATM service providers to compete with each other for the provision of ATM services. Quite who was asking for this, or who they will provide their advice to, is not entirely clear...

But, in other words: they are going to think about having air traffic control providers competing against each other, in order to make things better cheaper...

As the tank's chairman David McMillan (former Head of the UK CAA and former Director General of EUROCONTROL) put it: "Liberalisation revolutionised the airline industry and has been a global success story, driving growth across the world. Unfortunately, air traffic management remains largely a national monopoly, without the incentives necessary to drive up performance. We believe that by opening up parts of the ATM industry to greater liberalisation significant benefits could be achieved, including reducing costs and minimising the environmental impact of aviation, all while maintaining or improving on today's safety levels."

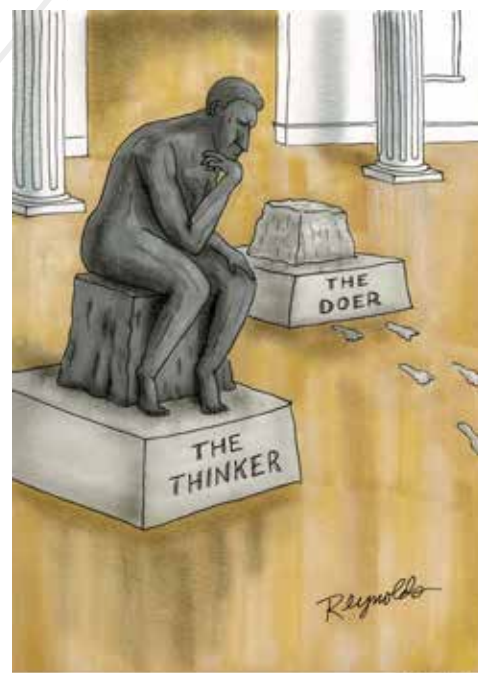
There's a number of flaws in this statement, at least from my perspective. I am not at all sure that the liberalisation of the airline industry is a global success story. Certainly, flying has opened to a much wider public, but at the same time, we're seeing larger airline alliances absorbing smaller companies and monopolies re-appearing. If this continues, about 10 mega-airlines will soon dominate the global industry – which can't actually be that good for the customer... Apart from that, I don't think anyone's prepared to call today's airport and on-board experience a great success story...

The second flaw is subtler, but very important: they want to open up **parts** of the ATM industry. An accompanying document lists possible areas where this would be possible. Again in my humble

opinion, doing it for only parts of ATM has been detrimental in all attempts made so far of moving away from monopolies: if you want to have service providers behave like commercial companies and introduce competition, then for heaven's sake: go all the way. Introduce supply and demand mechanisms: you want to fly at a busy time, a slot is going to cost you more than one at quiet times. Do away with 'first come, first serve': ANSPs should get to decide what certain routes costs and whether to serve an airport, or whether it's not actually worth the effort. Priority treatment, like a fast lane at airport security? Sure, but it's going to cost you. You want a last-minute change in your flight plan? No problem, let us add that to your route charge... FL370 is your optimum level? Let me check in the computer what that's going to cost you. But I guarantee you that this is not what the think-tank (read the airlines behind it) will want to be discussing.

The [document introducing the think-tank](#) has some contradicting statements. For example, it says that "the unit route charges in French airspace are just under €68 but increase to almost €83 in neighbouring German airspace, despite the two sharing many common characteristics". Oddly enough, the French ATM system is one of the very state monopolies they criticize, while Germany is run by a commercial company that's keen on competing (as long as it's not in Germany it seems). As a side note: working in between the two mentioned countries, I can also assure you that they do not have many common characteristics...

Or how about this statement from the same document: "in many industries where a firm has a monopoly, it is subject to economic regulation". I would submit that, at least in Europe, this already exists for ATC. The influence of the unit route charge drives the traffic flows much more than anyone seems to realise or wants to admit. And route charges are regulated, as they are supposed to be based on cost-recovery. What is more, there are strict limits on what can happen with additional income (in case the business runs better than foreseen). Unlike



a real company, this income cannot be used to invest or hire additional staff – it has to be largely refunded to the customers! If one State drops the route charges, it suddenly becomes more attractive. Airlines exploit this, filing detours which are cheaper as the cost of additional fuel is offset by the lower route charges. So how is this not liberal?

They propose a franchise system for ATS would be particularly attractive in regions where skills and experience in ATM are lacking, or where the scope to exploit economies of scale is limited. Oddly enough, these are not the areas where most of today's problems (delays) are or where the cost of such a system is the highest.

Rather than liberalising, perhaps we need to consider that for a safety-critical system like air traffic control that enables fair competition between airlines, a level playing field is absolutely essential. A system that doesn't favour one customer over another. This means cross-border service providers, which are not solely motivated by income or how cheap they can be, but that can reliably provide a long-term service. The idea on how to do this has been around for more than 50 years but very few have had the guts to implement it... And even fewer have dared to admit that it is the only viable solution! ◀

editor@ifatca.org

IFATCA ANNUAL CONFERENCE

TORONTO, CANADA - MAY 2017

➤ BY PHILIP MARIEN, EDITOR

For the 56th time in IFATCA's history, delegates gathered for its annual conference. The meeting was held from 15 to 19 May 2017, at the Chelsea hotel in downtown Toronto, Canada. Host for the conference was IFATCA's Canadian Member Association, CATCA. Despite having had just under one year to prepare the event – after a decision at the 2016 annual conference to re-locate the conference from Tunisia to Canada – the organising committee nevertheless managed to put together an excellent event.

Opening Plenary

On the first day, IFATCA President and Chief Executive Patrik Peters and his Executive Board welcomed the delegates at the Opening Plenary. In his opening address, Mr Peters highlighted the importance of these gatherings as they gave attendees a unique opportunity to discuss professional issues with colleagues from all over the world. He continued to say that, while they are proud professionals, controllers' professionalism is increasingly challenged

by staff shortages, austerity measures and ever-growing pressure to be more productive. He warned this professionalism cannot indefinitely make up for bad management decisions, such as the lack of proper staff planning.

An emotional moment for many was the moment of remembrance for Willem Zuidveld, who passed away a few weeks before conference. His involvement, spirit and passion for the profession and the Federation will be sorely missed by all who had the privilege of ever meeting him.

With NAV CANADA as the title sponsor of the Conference, its President and CEO, Mr. Neil R. Wilson, then addressed the meeting. He welcomed the delegates to Canada and highlighted the strength of having system development within his company: it allows for early involvement as well as quick and relevant feedback from the controllers, which NAV CANADA clearly believes is a strong asset. Fittingly, it culminated in the 2017 IFATCA Tech Award being presented to NAV CANADA for their Controller Suite. The system integrates all information that a controller needs onto one screen, allowing them to stay focussed rather than looking around to gather that information from different screens/sources.

After the formal presentation of the 2017 Tech Award to Mr. Rob Cook of NAV CANADA, the roll call showed that nearly 70 Member Associations were present, with nearly 450 delegates registered to attend. The plenary meeting was then adjourned to allow three committees to discuss reports and working papers.

Obituary - Willem Zuidveld

A few weeks before conference, our Federation got the devastating news that Willem Zuidveld had passed away. Many thought he had won his courageous battle against cancer, but sadly that was not the case.



Not only was he an inspiration and a mentor to many, he was also a joker and the life of many a party. He was a good man, always with a smile on his face, a heart of gold and a willingness to help anyone he could, and with a proud dedication to his profession.

Willem was very active within his own association, The Netherlands Guild of Air Traffic Controllers, and within IFATCA. He proudly and ably represented the Federation on many occasions, and will be known to many who have attended our conferences. He was part of our IFATCA family and will be sadly missed. ◀

Committee A Administration

The Committee was chaired by Mr Dale Wright (USA), who had stepped in at the last minute for Mr Jules Ogilvie (UK). Mr Wright was assisted by Mr Mark Taylor (UK) as Committee Secretary. Mr Scott Shallies, Deputy President, completed the head table.

Dealing with administrative issues of the Federation, Committee A reviewed the past year by hearing the reports from different elected and appointed officials. These included reports of the Deputy President and the EVP Finance, who also presented an overview of the Federation's finances. Also discussed was the budget for the upcoming fiscal year (2017-2018). The Federation's financial situation is strong, with substantial reserves. The work programme for the Finance Committee for this coming year includes the inflation factor for the membership dues and a review of IFATCA's financial records to comply with IFATCA policies. The committee will also monitor and assist the Executive Board with assigning funds to assist members.



➤ Renee Pauptit presents the IFATCA Technical Award to Rob Cook of NAV CANADA
Photo: Ricardo Boreka



➤ **Imtradex stand in the technical exhibition**
Photo: Ricardo Boreka

The affiliation of two Member Associations was terminated, while three new member associations were accepted: CENAMER (Honduras), Mozambique and Kosovo. This brings the total number of Member Associations to 128. The Constitution and Administration Committee (CAC) addressed issues such as the liability of IFATCA for its staff in an area of adverse travel advisories; setting guidelines for the FIC/CAC review of the Federation's financial records; a more flexible process for installing a standing committee; a review of the rules pertaining to the structure of working papers; compensation for Member Association if an event is not able to be held due to external reasons; and the applicability of the term "Chairman" with respect to a female "Chair" as referenced in the IFATCA Manual. Mr Rob Mason, (Australia) completed his first year as CAC Chair and will for the coming year be assisted by New

Zealand, the UK and the USA. Cameroon and Kenya will also serve as corresponding members of CAC.

Katie Mason (UK), Chair of the Communication Steering Committee provided the Directors with information concerning a Media Review, the IFATCA visual identity, the Federation's Circular, newsletters and other Federation communication items. The structure of the CSC includes the Controller Magazine Editor, the Office Manager and three other members. This relatively new committee has a bright future in assisting the Federation under the leadership of Ms. Mason.

Mr Scott Shallies (Australia) was elected to serve for one year as Executive Vice President Finance. Mr Duncan Auld (Australia) will continue to serve on the Executive Board trading his function as EVP Technical for that of Deputy President. Mr Ignacio Baca (Spain) was appointed the new EVP Technical. EVP Africa & Middle East, Ms Keziah Ogutu (Kenya), having served 6 years in the Executive Board, did not stand for re-election. A successor was found in the person of Mr Fath Bekhti (Algeria). Finally, Mike O'Neil (Hong Kong) was re-appointed as EVP for the Asia/Pacific region.

The committee also considered the venues for forthcoming conferences: Ac-

cra, Ghana will be the venue of the next Annual Conference, from March 19th until 23rd 2018. Three member associations presented their bid to host the event in 2019: Turkey, Serbia and Costa Rica. The latter won the relatively close vote and will host the conference for the second time – the first time was in 1986.

Finally, the committee proposed to award the Federation's highest recognition – the scroll of honour – to Ms Keziah Ogutu (Kenya) and to Mr Christoph Gilgen (Switzerland) for their long dedication to the Federation, its members and the air traffic control profession.

Committee B Technical

The Committee was chaired by Mr Alasdair Shaw (New Zealand). Assisting him was Mr James Robinson (UK) as Committee Secretary. Mr Duncan Auld, IFATCA's EVP Technical completed the head table.

The presentation from Raimund Weidemann, our outgoing representative at the ICAO Flight Operations Panel was of particular interest. Having been the IFATCA representative to this panel since 2003, Raimund took one last opportunity to address the committee and

➤ **View from the head table during the Opening Plenary**
Photo: Duncan Auld





was thanked for his long-lasting commitment as a representative of the Federation.

The Technical and Operations Committee produced 10 work-studies this year, of which 7 were presented in committee B. The general theme of all but one of the papers considered by the committee was new developments in aviation or Air Traffic Management. All proposed policy was adopted, generally with little difficulty.

A presentation on cybersecurity provided much food for thought for the committee members. Provisional policy was adopted to classify cyber-attacks as unlawful interference. As a result, it was recommended that a study into the federation's policies on unlawful interference be put into the coming year's work programme.

Review of existing policy was the subject of two papers: one covering 4D trajectory concepts and the other re-categorization of aircraft wake turbulence. These papers resulted in the Federation's policies being either amended or deleted. As the 4D and RECAT concepts are still in

development, further reviews will probably be required in coming years.

Further policy was adopted as a result of the work-study into low level remotely piloted aircraft systems (RPAS), another rapidly expanding aspect of aviation. It was also recommended that the use and liability of RPAS surveillance information when provided to controllers be studied in this year's work programme.

The papers on the use of aircraft based weather reporting systems and on investigating the potential complexity introduced by delay absorption programmes from multiple sources also resulted in new policies.

Finally, policy was adopted covering the potential use of conditional clearances to Rescue and Fire Fighting vehicles. This policy was only adopted after robust debate within the committee. During the debate, we heard a wide range of views from a consider-

able number of Member Associations. The fact that this was debated at all shows that it is not only advancements in aviation and new technologies that are of concern to us as controllers.

The Technical and Operations Committee (TOC) is funded to comprise a minimum of 6 and maximum of 10 elected MAs. This year, it was decided to elect 7 associations. Nine MAs ran for election and Australia, Georgia, Germany, Romania, Sudan, USA and Zambia were elected members of the Committee. As in the past year, the committee will be chaired by Renée Pauptit (NL).



➤ CATCA's Tania Calverley and her staff worked tirelessly to accommodate delegates.

Photo: Ricardo Boreka / CATCA

ICAO WORKSHOP

On Wednesday, ICAO organised a well-attended workshop/discussion. Mr Chris Dalton, Chief of the Airspace Management and Optimisation (AMO) Section, formerly known as the ATM Section of the Air Navigation Bureau, at ICAO Headquarters introduced the workshop by explaining that controllers need to become leaders in change. He recognised that, often with good reason, controllers often appear to resist change. A lack of good change management is at the source of this. But with the predicted demand – IATA says that by 2030, we will need to move 7 billion people per year – controllers will need to be involved in the changes needed to accommodate this. As he put it, while controllers need to be cautious about it, they will have to deal with it as eventually, it will make life easier. Mr Dalton also touched upon the Fatigue Management System, which ICAO has mandated by 2020. States have been given 5 years to implement, so we're actually half-way and a lot of work is still needed.

Mr Vincent Hwa then introduced proposed changes to standard phraseology. The aim is to make the pronunciation of numbers more intuitive: "flight level one zero zero" will become "flight level one hundred"; "QNH one thousand" will replace "QNH 1.0.0.0" and so on. A state letter has gone out for comments and the actual change is therefore a few months away. Mr Hwa also touched on some required changes for PANS/ATM (DOC4444) to accommodate/enable remote/virtual towers. As the provisions of aerodrome control service remain

largely the same, he foresaw small and incremental changes that facilitate the use of technology to enable remote towers rather than a big bang change. First of all, definitions will need to be added for visual surveillance systems as well as performance/quality requirements for such systems.

Mr Nicholas Hinchliffe discussed Air Traffic Flow Management (ATFM). He explained that it's an aspect of air traffic management that will keep gaining importance, as more predictability is needed by all stakeholders. Problem is that the current network doesn't interact very well with each other. We need to evolve towards interconnected nodes, have global ATFM standards, supplemented with regional initiatives. ATFM is wider than controllers and flow control and he pointed to ICAO DOC 9971 - which details what ATFM is all about. It's also



➤ (L to R): Vincent Hwa, Chris Dalton and Nicholas Hinchliffe.

Photo: Ricardo Boreka / CATCA



➤ **IFATCA's new EVP Technical, Ignacio Baca**
Photo: Ricardo Boreka / CATCA

Joined Committee B & C Technical and Professional

The combined Committee B and C was again very well attended. It was co-chaired by Chairman Committee B, Alasdair Shaw and Chairman Committee C, Peter van Rooyen. The agenda consisted of reports from global representatives, reports from the Regional Vice Presidents, 4 work-studies and a presentation from NAV CANADA.

The report from the Federation's representative to the IFALPA ATS Committee demonstrated the excellent relationship with our sister Federation representing the pilot community. Mr. Rip Torn, Chairman of the IFALPA ATS Committee, also acknowledged this and the importance of the close cooperation between IFATCA and IFALPA cannot be overstated.



Jean-François Lepage, the IFATCA representative to the ICAO Air Navigation Commission (ANC), in presenting his report, demonstrated once again the value of having representation at the ANC. Many of the subjects he regularly works on at ICAO are subjects that have been discussed in committee B or C at recent conferences. He stressed the point that IFATCA receives a lot of exposure in ICAO and that our contributions are valued. Jean-François along with Carole



➤ **The NAVCAN Suite, winner of the 2017 IFATCA Technical award**
Photo: Ricardo Boreka / CATCA

something that needs to be looked at early on, before the traffic variations become impossible to cope with. He also warned that ATFM is not a fix for bad design. Lastly, it's vital that the entire chain is considered, from airline operators to controllers, pilots and military authorities for example.

Mr Hinchliffe also discussed the changes to the SID/STAR procedures and phraseology. He noted that a number of countries had made the transition seemingly without problems while others were having more difficulties. He attributed it to problems in training both controllers and pilots and to the 'rolling' implementation: some places have transitioned already early on, while others (e.g. limited by training capacity) had yet to make the change. This 'mixed' environment leads to confusion on the flight deck. Mr Hinchliffe urged controllers to pay very close attention to the level readback of the pilot on a SID/STAR, as the controller being on the lookout for this is the only mitigation for a level bust because the pilot follows the profile rather than the actual clearance. Detailed information and different scenarios can be found on the ICAO website (https://www.icao.int/air-navigation/sidstar/Pages/CHANGES-TO-SID_STAR-PHRASEOLOGIES.aspx)

The bulk of the discussion following the presentations focussed on these changes to the SID/STAR procedures. The very open and, at times, frank exchanges demonstrated the maturity and value of the relation between IFATCA and ICAO. It's clearly benefiting both sides to engage like this. ◀

ITF PANEL

The International Transport Workers' Federation (ITF), represented by its ATC Committee board members Gabriel Mocho Rodriguez, Patricia Gilbert, Paul Winstanley and Joe McGee, explained what ITF does, what the relation between IFATCA and ITF consists off and how both federations can complement each other. As a union partner organisation (IFATCA signed an MoU several years ago with ITF), ITF in labour related aspects cooperates with IFATCA to complement our professional safety related efforts. Often IFATCA members call upon our assistance whereas the nature of the problem relates to labour issues within a certain country - this is where we the affiliation to ITF can be useful and should be considered. ◀



➤ (L to R): Gabriel Mocho Rodriguez, Patricia Gilbert, Paul Winstanley and Joe McGee
Photo: Ricardo Boreka / CATCA

Couchman from IFALPA also presented a paper that highlighted the importance of using ICAO Standard Phraseology and that urged the Federation's Member Associations to foster good practices concerning radiotelephony.

The Technical and Operations Committee and the Professional and Legal Committee produced three combined work-studies this year. The subjects for these were Ambient Workplace Recording; Virtual Centres and Functional Airspace Blocks; and Moving to a New Facility.

A large body of policy changes was adopted as a result of the paper investigating Ambient Workplace Recording.

The joint committee is to be congratulated on the rigour with which it approached the debate on this policy. The policy is all the better following this debate.

The joint committee also considered an information paper produced by the Professional and Legal Committee that outlined a number of broad principles air traffic control officers can apply that may be useful to ensure the requisite 'duty of care' has been met.

Committee C Professional

Mr Peter Van Rooyen (South Africa) chaired the committee. He was assisted by Ms Maria Serrano Mulet as Committee Secretary. Eric Risdon (Switzerland), IFATCA's Executive Vice President Professional, completed the head table. Following a number of reports from representatives, who represented IFATCA in numerous meetings around the world, the Committee discussed the work-studies carried out by the Professional & Legal Committee (PLC). IFATCA in general and also Committee C, enjoy a close collaboration with organizations such as IFALPA, ITF, IATA and ICAO. This

is essential as positions and policies can be heard, compared and worked upon together contributing to improve our overall safety and performance.

Amongst received information papers, one that stood out highlighted the importance of Mental Fitness and tips for an optimal mental health state was given.

The working paper and debate on the Critical Incident Stress Management Programme Throughout IFATCA showed that this subject remains a challenge throughout the Air Traffic Controller environment. The debate clearly demonstrated this will remain a subject that should stay high on the agenda of the Federation in the future.

Relation between the ATC trainee and the instructor was also an interesting subject, which again highlighted the importance of understanding human factors and behaviour.



IFATCA PANEL: DUTY OF CARE

Philippe Domogala introduced this year's IFATCA panel as the first non-technical one. It was moderated by David Perks (AU), a member of the Federation's Professional and Legal Committee, who specialises in Just Culture and Duty of Care.

He introduced the theme and the speakers: Mr. Roderick van Dam, formerly of the Dutch CAA, ICAO and EUROCONTROL. He is the chairman of the EUROCONTROL Just Culture Task Force; and Mr. Peter Ettler, a Swiss lawyer specialising in air law amongst other things. He was involved in several air accident court cases, including the Ueberlingen accident.

Both Mr Van Dam and Mr Ettler gave a short interpretation of their perspective on Duty of Care. It may not always be enough for the controller to just apply the correct standards and rules to the letter. If there's a known condition for example or if there's more that an ATCO could have reasonably have done to prevent an accident, a judge could rule that the controller in question had an obligation to try and prevent it happening.

It is Important to realise that this assessment cannot be captured in procedures or flowcharts. It's not black and white and, in our legal system, it requires a judge to determine if someone acted with the necessary duty of care, as can be expected from him. Professionals need to accept the authority a court/judge has to make that call. This is because the general public has an expectation to see someone who commits a crime punished. But they also expect safety. This needs to be

balanced and it means that there are no immunities from the law: in our legal systems, judges are expected to make that judgement. Unfortunately, there have been a few high-profile cases where prosecutors abused their powers, leading to long and protracted legal battles. A better insight from both sides into each other's world can help to limit this, which is why the Just Culture workshops with the judicial authorities are so important.

While there can never be a guarantee that a judge will be asked to evaluate whether you acted with sufficient care, acting in a professional way can help tip the balance of justice in your favour, should that actually ever be needed. As with Duty of Care, there's no explicit list or hard standard for what constitutes professionalism but most people can grasp the concept of professionalism easier than that of Duty of Care.



(L to R): Peter Ettler, David Perks and Roderick van Dam.
Photo: Ricardo Boreka / CATCA

Other information papers of interest debated the Incident Reporting responsibilities throughout the whole ATC domain; Civil and Military Integration in the Same Workplace; ATCO and Colour Vision; and global harmonisation in the field of ATM Training.

Closing Plenary Session

After the various regions had their informal regional meetings on Friday morning, IFATCA PCX Patrik Peters reconvened the plenary assembly of the Federation in the afternoon. This assembly formalised the decisions taken in the different committees, by accepting the reports of the Committee Chairmen and voting on the various recommendations from the committees.

For attendees, it was again clear that

besides the working sessions, an important part of any conference remains the informal contacts that are made outside the official meetings. As such, meeting face to face with colleagues from around the world is of incredible value and contributes immeasurably to creating one sky and one voice. ◀

editor@ifatca.org



New Policy was also introduced highlighting the importance of a holistic approach to remotely operated towers.



NEW CORPORATE MEMBER



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Platinum Aerospace is a new corporate member and voice in IFATCA. The shortage of ATS personnel, an essential lubricant to the rapidly expanding business of aviation, is costing the global aviation sector billions in lost revenue annually. And the trend is worsening. Typical ATM training organizations are not designed to meet the surge in demand.

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CYBERSECURITY IN AVIATION

SECURITY THROUGH OBSCURITY?



BY IGNACIO BACA, IFATCA EVP TECHNICAL AND PHILIP MARIEN, IFATCA EDITOR

Our world increasingly relies on digital information technology. Big amounts of data are processed by computerized systems, stored as numerical files and sent and transmitted through communication networks. Essentially, the security problems affecting this digital environment are comparable to those that affect their physical equivalents: only authorized people should have access to sensitive data, can modify them and unauthorized people should be denied access. When referring to such security issues in the digital world, the term cybersecurity is used.

Vulnerabilities in digital systems

Cybersecurity is essentially not different from 'conventional' security. In both cases, the threats involve unauthorized access to sensitive information, an attacker taking control of a critical system and/or denying access to legitimate users. Cyber-threats do however have some peculiarities to consider:

- **Automation:** Computers excel at performing dull, repetitive tasks. A human attacker would be discouraged if a lock protected by a password resisted thousands of attempts but a computer will go on trying again and

again for as long as it takes.

- **Distance:** Communication networks have made it possible for a cyber attacker to be thousands of kilometres away from its target. This also makes tracing and locating the attacker very complicated. Physical access to a computer or its location is not needed in many cases.
- **Propagation:** Once a vulnerability is discovered, it may be quickly disseminated via the internet. This can rapidly multiply the number of attackers that make use of it, even if they do not have the skills to understand the actual functioning of the attack.

In a number of cases, criminals are after the data that is stored on computerized systems. One such example was the hack of the Sony Playstation network in 2011: they obtained data from 77 million users. An even bigger leak was when the details of 500 million Yahoo! accounts were stolen in 2014. That type of data is sold in shadier parts of the internet to other criminals who use it for credit card or other identity fraud.

Even systems that are theoretically well protected may be vulnerable due to oversights in their implementation. An example is the system of control and dis-

tribution of drinking water of Oslo, Norway. It has extensive protections against intrusion but in September 2009 it was discovered that it could be accessed via Bluetooth because nobody had thought about changing the default settings and passcode.

Even if properly implemented, a password protected system can be attacked by brute-force: trying one password after another until eventually finding the correct one. This tends to be time-consuming, even for powerful computers. Unfortunately, humans are not very good at remembering "strong" passwords and users often choose simple passwords. These are easy to remember, but they are inherently weaker. Some of the most commonly used passwords are as easy to guess as 12345 or even the word password. Studies show that a person finding a lost credit card has more than 18% chance of getting money from an ATM by trying the pincodes 1234, 1111 and 0000.

Users are easily the weakest link in the security chain. Even a well-protected system may be weakened if the users don't follow the security procedures. Too often, people consider these security measures cumbersome. Encrypting a file takes an additional step and password to remember, so it's easier to save it unencrypted.



In other instances, users write down their passwords – immediately invalidating most security layers.

So-called social engineering is therefore another and very powerful way to obtain access to a system. A hacker will use social skills to obtain seemingly trivial information from a user. Often in combination with information found on social networks, they piece together those apparently harmless details, to forge access to a system. Many systems allow users to recover their password using 'security questions' such as the maiden name of your mother or the name of the first pet you had. Through seemingly innocent conversation or looking on Facebook, a hacker can try to collect all the information he needs to answer these questions...

Many experts believe there is no technology that can prevent a social engineering attack. It is much easier to trick someone into giving a password than to spend the effort to crack into the system. Too often, time and money will be spent on an elaborate security policy, only to find someone simply gave up his password to someone who said he was from "the IT department".

Taking control of a system or stealing data are not the only threats. An increasingly common problem is the so-called ransomware: the attacker manages to install an application that encrypts all data stored on the computer and to which it is connected. The only way to decrypt it again is to pay a ransom to the hacker. A large-scale attack – dubbed WannaCry – compromised computers worldwide in May 2017, affecting thousands of government agencies, companies and users.

In some cases, an attack can simply be used to disrupt access to a system or a service. In such cases, a server is overloaded with requests. It's not able to reply or will crash under the load of thousands of requests made per second from outside. To organize such an attack, a hacker uses compromised systems – often thousands of them – on which a small piece of software was placed that allows the hacker to control it remotely. This creates a so-called botnet that with a single order, can simultaneously connect to the target server. This referred to as a Distributed Denial of Service (DDoS) attack. The biggest DDoS so far took place in October 2016. It was directed against some central points on the internet that route traffic to the proper destination. It is es-

timated that the attack involved a botnet of around 100,000 infected devices – not only computers, other devices connected to the internet: printers, web cameras, baby monitors, etc. The routers collapsed under the amount of requests they had to process – estimated to be some 1.2 terabytes network data per second. As a result, popular websites such as the BBC, CNN, Amazon, Paypal, Twitter and Visa could no longer be reached.

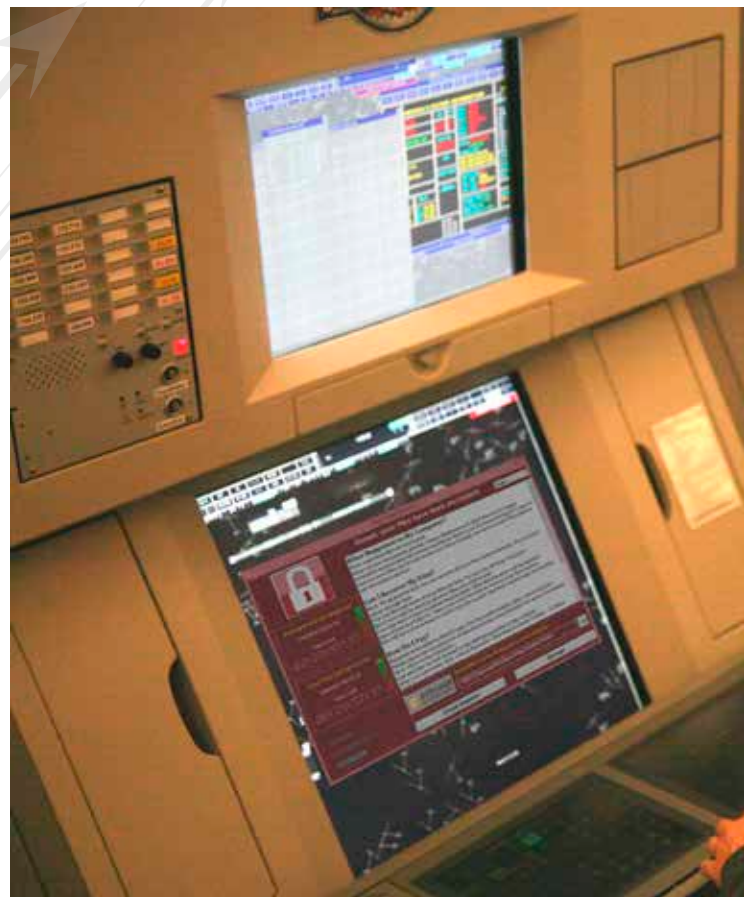
Besides humans, complexity is also a large concern from a security point of view. A theoretically secure concept must be implemented through lines of code to form an application, which runs on an operating system installed in computers connected to networks depending on system administrators and operated by users. Every step has its own vulnerabilities. It is estimated that commercial software has 5 to 15 errors or "bugs" per every thousand lines of code, after all tests and quality control, with each bug being a potential vulnerability. An operating system like Windows or MacOS has around 50 million lines of code. It is just impossible to patch all the vulnerabilities but even if possible, the system would still be vulnerable to social engineering.

Aviation and cybersecurity

At present, aviation appears to be largely absent from the long list of industries affected by cybercrime. EASA estimates there are some 1,000 attacks per month targeting the aviation sector, which seems to be a low number considering the relative size of the industry. In comparison, a country like Spain alone, there are an estimated 4,000 attacks per day, though details of what these entail are not readily available.

Media sometimes link technical failures like radar outages or automation crashes to possible cyberattacks. So far, no real evidence of this has ever been confirmed by any service provider.

Even if no cyberattack has been con-



firmed, the aviation community has started to address the potential problem. Cyber threats were mentioned in a 2011 update to ICAO Annex 17, Security. More recently ICAO mentioned cybersecurity as a high-level impediment to the implementation of the Global Air Navigation Plan.

At the ICAO 39th Assembly, held in 2016, cybersecurity was also the subject of several papers and a resolution recognized the multifaceted and multidisciplinary nature of cybersecurity challenges and solutions. It called upon the States, industry and stakeholders to counter cyber threats to civil aviation.

Both the USA and Europe are taking steps to protect their ATM systems against cyber threats but their efforts have started relatively late compared to other industries. We make mobile phone calls without thinking about the complex authentication and encryption protocols and algorithms that keep the conversation private and bill the cost to the correct customer. The same is true for concepts like e-commerce. If these actions are common today it is because the industry managed to implement cybersecurity to such an extent that it is largely transparent to the average customer, yet it can be trusted to provide sufficient protection. It



is a long process that started many years ago when internet and the mobile phone industry were in their infancy. Why has aviation not gone the same way?

For the most part, the answer appears to be in the largely obsolete architecture used by aviation systems. It implies that the lack of issues currently comes from obscurity rather than from a solid security architecture. We still use amplitude modulation for VHF communications, navigation relies on systems designed in the early 20th century and surveillance is mainly based on (analogue) radar. These systems were developed in a world not yet digitally interconnected and when information is transmitted, it is mostly via dedicated land lines. With the transition to technologically advanced systems comes the need to address technologically advanced threats. As the system evolves from a point-to-point connected structure to a networked one where the elements are nodes linked through digital connections using IP (Internet Protocol). A network structure similar of the internet requires a security comparable to critical internet services.

Potential threats specific to aviation

So far, we have discussed much information about attacks to networks in general. Now we turn our attention to potential attackers. Who may be interested in tak-

ing down any element of the civil aviation system? There are at least four kinds of menaces:

- Amateur hackers: this is the first group that comes to mind when thinking about computer generated attacks. The challenge to find a way to penetrate a protected system may be a reason for a computer nerd with high skills and motivation but most of them are not willing to cause damage nor to face the legal consequences of intruding in a critical system. Nonetheless they cannot be ignored.
- Criminals: a single person behind a computer may attack thousands of potential targets often thousands of kilometres away, in another country with a different legal system. This explains the reason why scams, like *phishing* through fake e-mails or ransomware, are on the rise. This group is potentially more dangerous than the previous one because they have an economic motivation. On the other hand, criminals try to maximize the benefits by attacking targets with a minimum costs and effort so measures of defence must be taken but no extraordinary means are needed because they will move to less protected and most profitable targets if they find proper resistance.
- Terrorists: while a common cybercriminal tends to have financial motivations and has no reason to create unnecessary damage, a terrorist's goal is generally to cause as much

damage as possible. The high visibility of aviation events makes an attractive target for such purposes. Individual aeroplanes have been targeted before but computerized networks may allow attacking several planes at once or causing wide disrupting of the ATM system. The will to maximize the damage makes terrorists a dangerous and fearsome threat and creates the need to use the strongest forms of cyberdefence for air traffic control, as for any other highly automated, safety-critical system.

- Cyberwar: when hostilities break out, critical infrastructures of the enemy become a target: electricity, communication, food supplies... and of course air traffic control. Automated systems are therefore targets and their infection with malware has sometimes been credited to foreign agencies. It has been acknowledged that malware may be already in place to attack critical infrastructure and that such attacks could be launched as a retaliation against other cyberattacks. This kind of rhetoric is reminiscent of the Cold War and its Mutual Assured Destruction (MAD) doctrine in such a way that the term MAC (Mutual Assured Crashes) has been suggested to describe the approach. It is almost impossible to protect a system against such adversaries because they have huge resources at their disposal as well as the necessary skills.

What kind of attacks can aviation expect?

This is not an easy question to answer. The ways to harm and disrupt a system are only limited by human imagination. Any of the components of the CNS-ATM system would have its own vulnerabilities.

Currently, the controller-pilot voice communication appears vulnerable and indeed fake messages from someone pretending to be a pilot using a simple radio transmitter have been occasionally reported.

Controller-pilot datalink (CPDLC) would require a higher technical level for an attacker to succeed. But because it lacks the "party line" effect, a successful attack would be more difficult to detect. A fake controller or a successful man-in-the-middle attack modifying proper clearances could have a serious impact.

It is theoretically possible to spoof navigation systems, including conventional ground based systems as well as satellite-based ones. But as the spoofer would need to be close to the target, it would seem more difficult to affect commercial aviation – unless the attacker is inside the plane or the attack takes place in the vicinity of an airport. Simply jamming voice, datalink or navigation, including satellite, signals is also a threat.

For surveillance, radar is still the preferred system par excellence but ADS-B is swiftly catching up. It appears to be a lot easier to spoof or jam ADS-B, also because they are not encrypted. To prevent 'ghost aircraft' being propagated in the system, providers like the FAA do not rely solely on signals from a single antenna. Moreover, the ADS-B position is verified by calculating the TDOA (Time difference of arrival) of the signal to different ADS-B receivers. This way the ADS-B signal is used in two ways: to extract a position from the information it contains and to calculate the position using multilateration (MLAT). Both positions must concur to consider the signal as valid.

Newer ATM concepts, some of which rely on (encrypted) networks could be even more vulnerable. Traffic in a remotely controlled airport could be disrupted through the injection of corrupt data in the communication between the airport sensors and cameras and the remote tower. Much easier may be the simple interruption of communications by a DDoS attack which would make the controllers blind, deaf and mute. The worst scenario is a DDoS attack against a single facility controlling several remote towers that would disrupt the traffic of several airports with a single action.

A concept such as SWIM (System Wide Information Management) is perhaps the most appealing target for hackers to target. Best described as an ATM-only internet, imagine a network where all kinds of data are available for the appropriate (read: authorized) users: meteorological data flight plans, trajectories, surveillance data, etc shared by all authorised users connected to the system, up to and including individual aircraft. But using IP (Internet Protocol) means that the same kind of attacks used in the internet may be possible against such a SWIM network, includes DDoS, injection of corrupt data, stealing of sensitive data or ransomware. The extension of the system to all kinds of users, from ATC to small General Aviation facilities and from airlines to meteorological services, means there may be a lot of vulnerable entry points that could be used to compromise such a system.

A holistic approach to security

Security does not exclusively rely on the algorithms and keys of programming. According to cryptography consultant Bruce Schneier: "I found that the weak points had nothing to do with the mathematics. They were in the hardware, the software, the networks and the people. Beautiful pieces of mathematics were made irrelevant through bad programming, a lousy operating system or someone's bad password choice." The consensus is that security is more a process than a product and can therefore not be bought. When a system is being put

in place, care must be taken in every implementation step. And it does not stop when a system goes online: it must remain a point of focus during its entire life cycle, every operational day at every level.

Considering this view, the user is an essential component to maintain and improve security. Strong algorithms are the domain of engineers as well as secure implementation, robust hardware and software and solid networks but the choice of a good password and the refusal to give any relevant piece of information to someone who can be an attacker using social engineering techniques must be done by the user. As a consequence, end users must understand the basics of security and the appropriate protocols and behaviour to avoid the weakening of the system, meaning that training on the subject must be provided.

Conclusions

While aviation has been relatively free of incidents related to cybersecurity, the increasing use of modern technology and network connectivity makes this kind of event more probable. ICAO has declared cybersecurity a high-priority subject and has urged States through a resolution to address the issue.

Steps have been taken to enhance cybersecurity by organizations like the FAA or EUROCONTROL but there is still a long way to go, seeing that aviation is behind other industries in adopting interconnected systems.

IFATCA currently does not have a specific policy on cybersecurity. The existing policy about unlawful interference may be applicable to the subject and during the 2017 IFATCA Annual Conference, provisional policy was accepted to reflect this. IFATCA's Technical and Professional Committees were tasked to review this policy and its relevance to cybersecurity for their 2017/18 work program. ◀

ignacio.baca@ifatca.org

EN-ROUTE WAKE TURBULENCE

AN ACCEPTABLE RISK?



BY PHILIP MARIEN, EDITOR

The effects of and mitigations for low-level wake turbulence are well known and documented. It led to classifying aircraft in different weight categories, which determine the spacing on take-off and landing that needs to be applied to avoid aerodynamic upsets for the trailing aircraft. These standards have had to be revisited over the years, with the introduction of new aircraft types.

More recently, a collaborative research project between EUROCONTROL, the FAA, their research facilities and the aviation industry, concluded that the required separation between certain aircraft could be safely decreased in the terminal area. Aircraft were re-assigned to one of six new categories (A through F) which were derived by redefining the transition weight between the old categories, adding a Super category and splitting each of the Medium and Heavy categories into two new ones. The resulting categorisation is as follows:

- CAT A - "Super Heavy"
- CAT B - "Upper Heavy"
- CAT C - "Lower Heavy"
- CAT D - "Upper Medium"
- CAT E - "Lower Medium"
- CAT F - "Light"

A matrix determines the required separation minima for arriving and departing traffic. The aim is to optimize airport capacity. The system has been

implemented at a number of airports in the USA and Europe.

In the en-route environment, wake turbulence was generally considered more of a nuisance than a real safety concern. ICAO determined that for a light aircraft 'operating directly behind a heavy airplane', increased separation was needed. The main concern in the upper airspace remained clear air turbulence or sudden up/down drafts associated with weather systems. High level wake turbulence upsets were occasionally reported, but rarely if ever as an event with safety implications.

However, as wing design/efficiency continue to improve, it appears that wake vortex generation and its effects have also evolved: reports suggest that wake propagates longer and stronger behind aircraft than before. In addition, air traffic is getting denser every year, which increases the risks of encountering a turbulent spot left by another aircraft. But it wasn't until the Airbus 380 was introduced that there was some real concern that its wake vortices could pose a risk for other aircraft at higher levels. After a trial period, ICAO advised its member states in 2006 on additional separation for aircraft arriving and departing behind an A380, but no additional measures were specified for the en-route phase. And while there was a slight increase in reported wake encounter at higher

levels involving newer and larger aircraft types – not only the A380, but B747-800, B777 and B787 – the issue was simply monitored. The occasional encounter would result in sudden bumps, autopilot disconnects, engine warnings and the aircraft suddenly banking. But compared to weather related phenomena, these were considered much less safety critical.

In January 2017 however, the crew of a Canadair Challenger 604 business jet at FL340 lost control of the aircraft about 1-2 minutes after passing an A380, which passed opposite 1000 ft above them. The crew was able to regain control of the aircraft only after losing about 10,000 feet. A number of occupants were injured, one of them was seriously hurt. The airframe experienced very high G-Loads during the upset and the airframe manufacturer decided it had to be written off as a result.

The [investigation](#) showed that the Challenger had passed through a pocket of wake turbulence generated by the A380. The aircraft entered an uncontrolled roll, turning the aircraft around at least 3 times (possibly even 5 times) and both engines flamed out.

To explain the event, we need to look at what causes wake turbulence and how it propagates behind an aircraft. When a wing generates lift, vortices are generated from the tip of that wing. Air





➤ *The Challenger involved in the January wake turbulence encounter*
Photo: BFU



from below the wing is drawn around the wingtip into the region above the wing by the lower pressure above the wing, causing a vortex to trail from each wingtip. This rotating pocket of air is best described as a horizontal "tornado" behind the wing.

The strength of wingtip vortices is determined primarily by the weight and airspeed of the aircraft. Though there are other components to consider, wingtip vortices make up the primary and most dangerous component of wake turbulence.

Atmospheric conditions are also a factor: below the tropopause, the likelihood of wake encounter increases. The altitude at which the tropopause begins varies from day to day and with latitude.

Crucially, the turbulent air mass created by these vortices doesn't remain where it was created: it 'descends' at a rate of

300-500 feet per minute and it is laterally displaced by wind. Depending on the stability of the surrounding air, it can take several minutes before the wake's energy is absorbed by the air mass around it.

All this makes predicting if and where a pocket of wake turbulence will affect another aircraft extremely difficult. Controllers tend to look ahead – where will an aircraft be in the next few minutes – rather than remember where it has been. Especially when aircraft are climbing or descending, trying to anticipate whether another aeroplane will be affected by a moving pocket of turbulence is impractical at best, if not as good as impossible.

The European Aviation Safety Agency (EASA) has recently published a [Safety Information Bulletin](#) on the subject. It recommends that when an En-route Air Traffic Controller identifies a traffic proximity situation with risk of a potentially hazardous wake encounter, providing traffic information to the trailing aircraft, including a caution for potential wake turbulence and when possible, proposing a change of lateral or vertical flight path, as appropriate.

While only suggestions, there's a clear issue in that a court might not accept them as such if another accident occurs. A judge may well consider any advice, even if it is formulated as a

suggestion, to fall within the duty of care of a controller, and hold him/her (partially) accountable for the outcome of such an accident. This clearly creates a dilemma, as we have separation standards which we're told are safe, yet which in certain cases might be wholly insufficient. At the same time, reverting to larger separation (e.g. non-RVSM separation) for certain aircraft types would have immediate consequences for capacity. Especially on trans-Atlantic routes for example, in dense continental airspace and on in and outbound routes from large airports, it would create havoc. Increased vertical separation would also not solve the problem for aircraft climbing behind a larger colleague...

Another suggestion is to use upwind lateral offset if the risk of a wake encounter is suspected. Again, this sounds logical, but in reality, it could be complicated as military airspace, national boundaries and other restrictions could interfere. If controllers get frequent requests for lateral offsets, it could also increase workload.

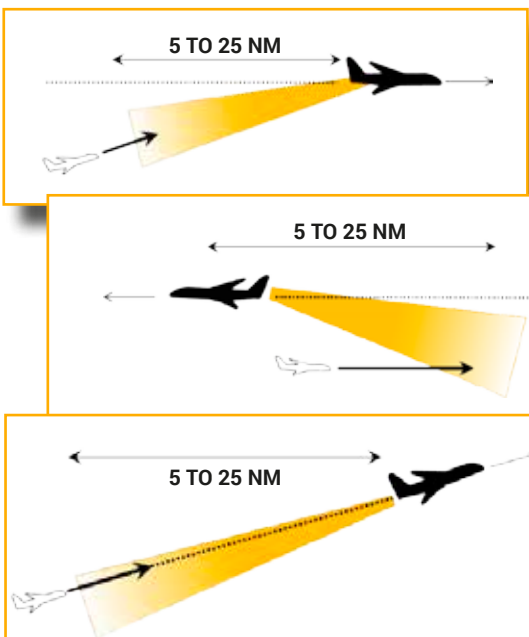
While it may be possible to develop tools that predict wake for controllers, it would undoubtedly make ATC much more complex. Whether the risk associated with high level wake is such that this warrants additional workload and potential capacity losses will be up to regulators and authorities to determine.



editor@ifatca.org

➤ *Some of the possible encounter geometries*

Photo: EASA



FLIGHT OPERATIONAL FORUM

NORWAY, APRIL 2017

 **Flyoperativt Forum**

BY PHILIPPE DOMOGALA, DEPUTY EDITOR

As everyone has grown accustomed to, the presentations during the Norwegian Flight Operational Forum were again of exceptional quality this year. The main topic was cooperation between controllers and cockpit crew during go-around, fuel minima and other unusual events. Loss of control was reviewed with an excellent presentation from Nathalie de Ziegler from the French accident investigation board (BEA). She focused on the crew performance and training during loss of control events, using the Air Asia A320, Air France 447, but also a Falcon 50 recovery as an example.

My two presentations were on communications between ATC and cockpit crew during emergencies (correct use of MAYDAY, PAN-PAN-PAN, A7700, etc.); and on the application of Just Culture – prosecution of controllers, punishing/rewarding, etc. – that hopefully cleared up some of the confusion that appears to exist. It was amazing to see how many pilots and controllers have a completely different understanding of what PAN-PAN-PAN really means and when to use it.

Another main discussion topic was the airline's creative financial contraptions with wet, dry and now "damp" leases. The latter has aircraft and crew from various countries and backgrounds, working for companies located in other

countries, but operating for main line aircraft in another different country. All of this of course with much lower salary and different social conditions. Norway is directly affected with Norwegian Airlines, but the model is rapidly spreading. It seems to be only a matter of time before someone proposes this as a model for ATC – definitely something to watch out for.

Another topic worth mentioning was a very interesting presentation made jointly by Johan Bergstrom, of the Lund University, and Captain Gaute Bere, of Wideroe airlines. They discussed the decisions leading to "go-around". The presentation concentrated on how human factors and the notion of "failure" in the mind of some pilots often delayed or even avoided initiating a go-around. Whether and how air traffic control could help making the decision was discussed as one of the potential mitigations.

Besides the forum itself, tradition has it that the organisers get everyone together for a dinner. This was the perfect opportunity for some networking but also a chance to have a chat with the speakers, including this year's guest of honour: Jeff Skiles, the co-pilot in the 2009 Hudson ditching of US Airways 1549. He made a very good speech on the event, which focussed on the lessons to be learned from the event.

As every time (it was in fact the 31st edition), the forum was again a very good opportunity for both pilots and controllers to debate and exchange ideas on safety related topics. Despite running the event as volunteers, Morten Kjellesvig and Knut Backer managed to pull together a very professional setup and managed to attract some 160 participants from across the aviation industry. ◀

dp@the-controller.net

DITCHING AN AIRBUS 320

While the story is well known – up to the point that a major motion picture was made about it (Sully, starring Tom Hanks as Captain Sullenberger) – Jeff Skiles disclosed a few lesser known points about the event in his presentation during the forum.

It was actually Jeff's first commercial flight on the Airbus 320. He had just completed his conversion training from the Boeing 737. He said: "The good point is that I had done this exercise in the simulator 2 weeks before, though it was at 30.000 ft, not at 3000!"

He was the pilot flying and he vividly recollects it all went extremely fast: take off, gear up, turning heading north, Captain 'Sully' Sullenberger shouting "BIRDS", a few impacts, and then both engines stopped. We were nose up, speed decaying rapidly. He pushed the nose down, knowing they were at 3000 ft, 200 knots and now descending at 1000 ft/minute. Sully called "my aircraft", took over and made a mayday call.

He called it three times, but a crossed transmission blocked it out to ATC. Despite trying everything to help



➤ Above: Dinner with Jeff Skiles (3rd from left), David Learmount from Flight Global (middle), Morten and Knut, the Forum's Organisers.

Photos: Flyoperavit Forum

Below: The well-attended forum



us, the suggestions of the controller would have put us over a densely-populated area. There were houses and buildings everywhere and the Hudson was their only choice.

There were lots of warnings and bells in the cockpit: the ground proximity warning system shouting "Pull up-Pull up" which is less than useful without any engines! TCAS was shouting "Traffic-Traffic" because of helicopters below us and lots of ECAM warning messages and lights. Jeff recalled the dead stick landing speeds from memory and called them: "Flaps 2 135 Kts!" As luck would have it, the river was calm and there were no boats. They hit the water hard, tail first and wings level. As soon as the aircraft came to rest, they lost all electric power. Whatever backup system that should have activated, it didn't work. The cabin crew did not know they were on the water as the intercom didn't work. Sully got up from his seat and opened the cockpit door to tell them. As First Officer, Jeff was left to go down the Emergency Check list: "The first item was 'parking brake on', the second one 'engines 1 and 2 OFF'. Totally useless..."

The water was 1 degree above freezing but miraculously everyone survived. Ferries and other vessels had been warned and immediately converged towards us. A number of these had participated in a similar rescue exercise a few months before – another piece of luck. Everything went very fast and relatively smoothly given the circumstances. Another piece of sheer luck was that we mostly had "professional passengers" on board. There was only one family and one elderly passenger. The rest were business people, who were very used to flying. In fact, eight of them, after being rescued from the water, took a taxi back to the airport to catch the next flight to Charlotte or Seattle! <



➤ The wreck of US Airways Flight 1549 being lifted out of the Hudson river
Photos: Spyropk via wikimedia

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FLYING THE BOEING 787-900

➤ BY PHILIPPE DOMOGALA, DEPUTY EDITOR

On the way to the World ATM Conference in Madrid, I had a chance of going on a brand-new LATAM (Chile) Boeing 787-9. I managed to arrange a visit to the cockpit and took the opportunity to talk to the crew about this new aircraft, its new technology and how it interacts with air traffic control.

Cockpit

The cockpit is totally different from all previous Boeing aircraft. As some people have remarked: it looks like it was designed by Apple. Others have said that it's an Airbus cockpit, built by Boeing.

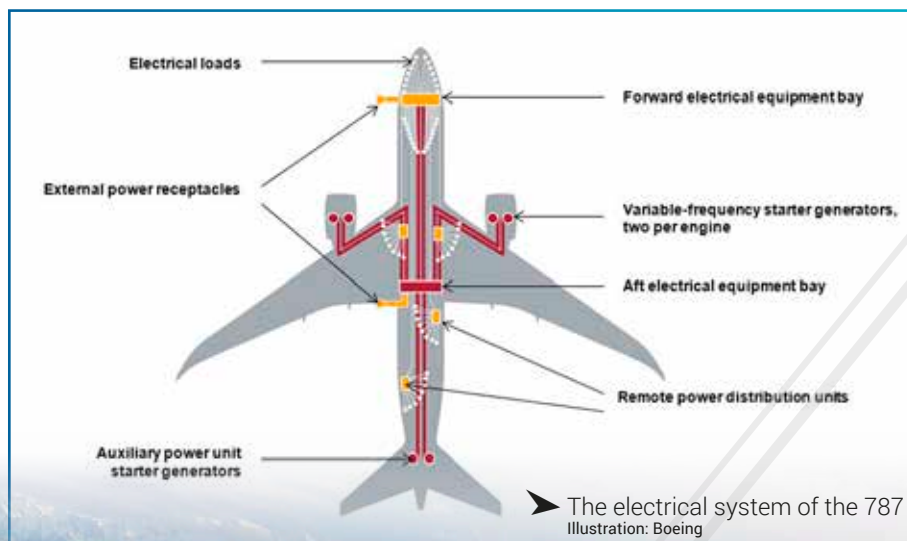
The large, colourful computer screens take up most of the space. They've not gone as far as making them touch sensitive. One thing that is immediately obvious is that there's not a single analogue instrument, not even as back up. The actual back up is a small, independent system with its own display that can be configured in various modes. There are very few buttons on the overhead panel, about half of what you have on a Boeing 777. Even more striking it the complete absence of physical circuit breakers. Even these are now 'virtual', arranged on a computer screen...

Automation

Many functions are fully automated. In case of an APU fire warning for example, the extinguisher bottles are discharged automatically without any pilot intervention. While still keeping the traditional look, the control columns are fly-by-wire, but synchronized, unlike the Airbus joysticks.

Every aircraft system is electric or electronic, right up to the pressurization systems. With the engines running, the total available on-board electrical power is 1.45 megawatts, which is five times the power available on conventional pneumatic airliners. Even the blinds on the passenger windows have been

replaced by "dimnable windows": at the press of a button, they can be set to let more, or less, light through! Passenger comfort is also improved, thanks to a humidifier and a lower cabin altitude: the cabin is pressured to 6000ft which makes a world of difference to the human body. On long flights, you should



feel less tired and less stressed because of this.

Backup systems

As indicated earlier: all the controls are fly-by-wire, so electric power is needed to fly the plane. The backup systems are interesting: batteries only provide power for 10 to 15 minutes. A ram air turbine is available to provide for a very limited amount of systems: flight controls a few essential instruments. Worth noting for ATC is that in this configuration, only 1 VHF radio is available and there's no transponder and no TCAS. With 6 generators on board, Boeing however is quite confident that it would be extremely exceptional to have to fall back on such a minimalistic system.

must have been very small. If you are tall, you have to adjust your seat nearly fully forward, which is not very comfortable. But the HUD is also a big help to recover from unusual attitudes, where no outside reference is available. Lastly, while the system is very useful to fly SIDs and STARs, it can be tricky to use at night when flying overhead a city: too many lights outside make it harder to see the information on the display.

Flight control systems

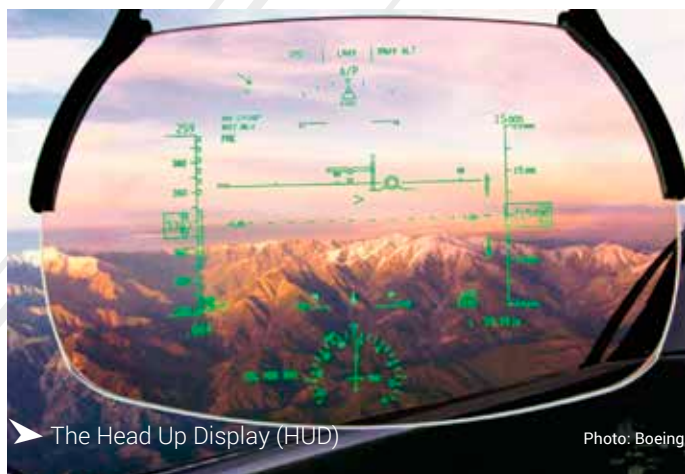
The aircraft has several advanced flight control systems. If the aeroplane is high on approach and landing flaps have been selected, it extends the ailerons and two most outboard spoilers, while maintaining airspeed, to assist in glidepath capture from above. The feature removes itself below 500 feet. When level at cruise,

the aircraft symmetrically moves the flaps, ailerons, flaperons, and spoilers based on weight, airspeed and altitude to optimise cruise performance by varying the wing camber, thus reducing drag. It also has a system that helps to suppress vertical gusts. This improves ride quality when in vertical gusts and turbulence. It uses symmetric deflection of flaperons and elevators to smooth the bumps. Lateral gust suppression on approach makes yaw commands in response to lateral gusts and turbulence, resulting in a smoother ride on approach.

All in all, it's a very nice-looking aircraft, both from the outside and from the inside. It's clearly showing us a glimpse of what the future will look like: technology taking over more and more tasks and an increasing dependence on automation.

A big thank you to Captain Christian Staiger and Captain Cristian Casanova for accommodating me on this flight. ◀

dp@the-controller.net



► The Head Up Display (HUD)

Photo: Boeing

Composite

The fact that the aircraft is mostly made of composite material, rather metal, has lots of operational advantages: the aircraft is of course much lighter and therefore uses less fuel than its metal predecessors. Extreme cold also doesn't affect the fuel as quickly, as the tanks are less heat conductive. This can be an important advantage on certain routes via polar regions.

Head Up Display

Like most modern aircraft with very efficient wings, controllers might notice it's more difficult to slow down quickly. From the pilot's point of view, navigation is made easy: it comes standard with Head Up Displays (HUD) like those found on jet fighters. This makes it easier to fly the parameters. A remark by one of the pilots was that the Boeing test pilots who calibrated this



► The LATAM crew, with Captain Casanova on the left, in the cockpit of their Boeing 787-900

Photo: DP

RADIO DIRECTION FINDING RE-INVENTED

➤ BY PATRICK BARDET, EUROCONTROL MAASTRICHT UAC

Air traffic controllers at EUROCONTROL's Maastricht Upper Area Control Centre (MUAC) can now rely on additional technology to further improve their situational awareness. Using triangulation software, the Radio Direction Finder (RDF) system recently deployed throughout MUAC's international airspace - the upper airspace of Belgium, the Netherlands, Luxembourg and northwest Germany - accurately calculates the position from which a transmission is made.

While radio direction finding is far from a new concept, the way that it has been implemented matches the highly integrated working environment of controllers in MUAC. In densely occupied airspace, which has up to 25 aircraft being controlled at any one time in one sector, RDF helps controllers to quickly locate which aircraft is transmitting on the frequency. A circle on the controller's screen indicates the area from which a transmission originates.

Deployment

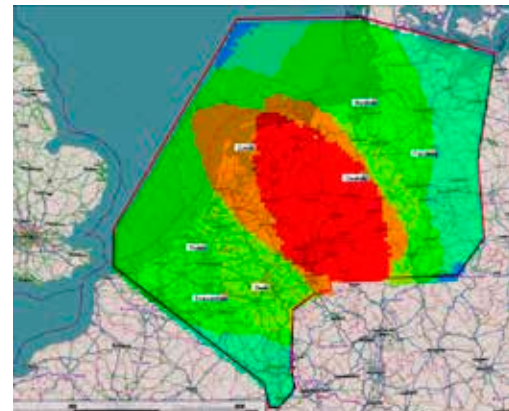
To ensure reliable coverage, a total of seven RDF units have been deployed throughout the geographic

region controlled by MUAC. This ensures at least two RDF units cover for each aircraft in MUAC airspace.

The receivers are located in:

- Belgium: Beauvechain
- Netherlands: Beek, Tholen and Zurich
- Germany: Diepholz, Nordholz and Fassberg.

The tool was made available for operational evaluation in October 2016. From February 2017, the RDF function has been in operational use, first with limited coverage using four RDF receivers (Beek, Beauvechain, Fassberg and Diepholz) and since June 2017 with all seven RDF receivers.



➤ Coverage maps, showing the receiver stations
Photo: EUROCONTROL

Expected benefits

The tool helps reduce call sign confusion, read-back errors and crossed transmissions. It also increases the controllers' situational awareness and makes it less likely that aircraft are misidentified: if an aircraft which is not meant for a controller's sector calls, it is easier for him/her to locate it and transfer it to the adequate frequency.

As one of the centre's controllers explained during the evaluation phase: "After two days of working with the RDF function, I must say that it is even working better than we expected. Coverage in the Dutch airspace is already very good. The system easily picked up transmissions from aircraft which usually have trouble just receiving our transmissions. As a radar controller, it is considerably easier to work with in busy traffic, because RDF gives a visual clue as to which aircraft is calling, saving precious time, especially when there are aircraft with similar callsigns. For a coordinator, it is considerably easier to follow what his executive controller is doing, being able to see who is calling/answering while simultaneously doing telephone coordination."

The RDF is financed by the Innovation and Networks Executive Agency (INEA).

➤ muac.info@eurocontrol.int



➤ Detail of the controller's screen, with the frequency selection window and a circle indicating a transmission
Photo: EUROCONTROL

Controller display

On his/her working position, a MUAC air traffic controller can see the triangulated position from where a transmission is made. The area is marked by a white circle while the transmission is ongoing. The controller can also recall the position of the last transmission via a mouse click. It's not limited to one frequency: the controller can select the ones assigned to his/her sector, as well as emergency frequencies.



➤ The RDF antennas in Fassberg, Germany (L) and Beauvechain, Belgium (R)
Photo: EUROCONTROL

INTERNATIONAL WOMEN'S DAY

SPECIAL TRIBUTE IN ISRAEL

BY THE AIR TRAFFIC CONTROLLERS ASSOCIATION OF ISRAEL

On March 8th 2017, the Air Traffic Controllers Association of Israel (ATCAI) organised a special event in order to celebrate the international women's day. They arranged to have all air traffic control positions in Israel 'manned' with female controllers for two hours - from 08:00 until 10:00 UTC.

In preparing the project, the ATCAI board had to get the approval from all Israeli Airport Authority (IAA) unit managers to tweak the rosters accordingly, so all units would be able to support the project. Coordination for this started several months before, to ensure that the roster plans aligned.

The ATCAI board published a short film with impressions of the day and the it was also covered by one of Israel's television channels with the assistance of the Israeli Airports Authority's public relations office.

The information that was presented started from a general background regarding the history of that day: "International Women's Day is celebrated on March 8 every year. The focus of the celebrations is the acknowledgment of respect to the economic, political and social achievements of women throughout the world. The day was predominantly celebrated by the socialist movement and communist countries until it was adopted in 1975 by the United Nations. In 1977, the United Nations General Assembly invited member states to proclaim March 8 as the UN Day for women's rights and world peace."

The text also detailed women's presence in Air Traffic Control in Israel: there are nearly 200 Air traffic controllers working at the Israeli Airports Authority. Around one quarter of them are women. Fifteen percent of them are also shift managers and some twenty percent have different managerial roles and positions within the units. Around 40% of them have an OJTI rating.

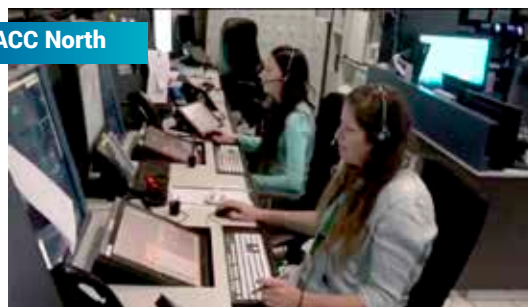
At the forefront of female presence in Israeli ATC is Haifa Tower, in the north of the country. Here, 55% of the air traffic controllers are women. Of all the OJTI coaches, three quarters are female, as are all shift managers.

We would like to thank all those who took part in the project and donated their time. From here one can only look forward and strive for even more equality in numbers and opportunities.

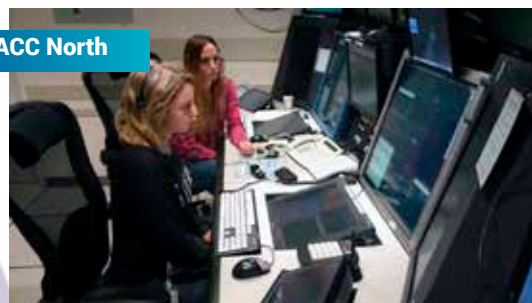
Make sure to check the ATCAI Facebook page (<https://facebook.com/ATCISRAEL>), where you can find a short video showing how all stations were staffed by women. ➤

israel@atc.org.il

ACC North



ACC North



LLIB - Rosh Pina



LLHA - Haifa



LLBG - Tel-Aviv



WORLD ATM CONGRESS

MADRID, MARCH 2017



➤ **BY PHILIPPE DOMOGALA, CORPORATE MEMBER COORDINATOR**

The World ATM Congress in Madrid had an excellent edition this year, with many exhibitors and dozens of forums with interesting topics. The combination again drew a lot of attendees to this year's edition. IFATCA was represented by our President and CEO, Patrik Peters; Tom Laursen as our EVP Europe; and Philippe Domogala as Corporate Member Coordinator. We shared a booth with our American colleagues from NATCA, as has been done in previous years.

Patrik was kept busy promoting our profession in many of the forums, as well as in the main conference discussions. He was quoted every day in the event's magazine, greatly enhancing IFATCA's profile. His main message was that technology alone will not solve the problems ATM encounters: "You can implement all the technology you want, if you do not invest in humans to operate it, it will not deliver the promises manufacturers claim". This holds true globally, but it's even more acute in areas like Africa, South America or Asia. There was also some focus on recruitment: as young people adapt better to new technologies, they should be recruited in large numbers to deal with the coming automation. As all predic-

tions still show a tremendous traffic increase over the next decade, it will be difficult for an ageing controller workforce to cope with. During one of the debates, we learnt that in Australia, implementation of new technologies did not enable a reduction of the number of controllers. This contradicted some of the press releases and media reports, and experiences of other countries appear to verify this.

On the automation itself, we were reminded that ATC is a safety critical profession that does not function in a linear, predictable manner. Full automation of all ATM tasks is therefore still a long way off. In addition, it was clearly stated that any automation is only as good as its back up system(s). Contingency systems must allow safe recovery of very complex situations. This is certainly not a trivial matter and therefore tends to be rather expensive.



All photos: DP





➤ The IFATCA delegation (L to R): Philippe Domogala (Corporate Member Coordinator), Patrik Peters (IFATCA PCX & CEO) and Tom Laursen (IFATCA EVP Europe)

Talking about not easy and expensive, brings us to the concept of remote towers. As was the case last year, it was "the" hot topic in many of the debates. Many service providers consider it the Holy Grail, and almost all booths in the exhibition area had something to show on the subject. But at the same time, people closely involved tell us that it remains a relatively expensive option compared to a traditional tower. To get a real cost benefit, it would require operating multiple airports from a single remote tower location. And this is what many fear will not be that easy. IFATCA and others have serious concerns about this but are willing to enter the debate, as we fear this will be pushed ahead anyhow.

One very interesting debate was on unmanned aircraft (UAVs, RPAs, drones or whatever they are called this week). Sean Cassidy, Director of Amazon Prime Air was a speaker at one of the panels. He shook the traditional way of thinking about regulations a bit! If you do not know about the Amazon Prime Air concept, go to their web site and see for yourself: they aim to deliver within 30 minutes of an order! Quoting Sean Cassidy's: "We went to lots of meetings: JAR, FAA, Eurocontrol, EASA, ICAO etc. Different meetings all around the world to discuss the same, standardization and global guidelines. Nothing came

to date. There is a huge duplication of work and nothing is coming. We cannot wait for you. There is competition out there and we need and will go ahead. As far as we understand ICAO is working far too slowly and drone regulation does not seem to be a priority item for them". He concluded: "We are operational already right now, with live trials. Full deployment is in the next 2 years and we will go ahead!"

Teri Bristol, COO of the FAA replied: "The drone discussion is like a baby being born while air traffic management are parents still discussing if they are ready for a baby". By now, industry is defining the rules at



they go along, and we should focus less on technology and more on requirements.

Michael Baldwin of the European Commission said: "There is immense pressure to get drone regulation right in order to get consumer acceptance of drone technology". He also added later: "We could kill this industry ourselves".

Kevin Shum, the Director General of the Singapore CAA replied: "We need to respond immediately. Of course, we will make mistakes but we have to accommodate them otherwise Industry will by-pass us. ICAO is also not really the right place to discuss this because none of those drones are likely to cross international boundaries. Do we want ICAO regulating domestic operations?"

It seems that while everyone is still busy discussing, the baby is being born today and we better find ways to take care of it! ◀

dp@the-controller.net



FLYING VFR IN CANADA

PART ONE: FLOAT PLANES

▶ BY PHILIPPE DOMOGALA, DEPUTY EDITOR

Aviation in Canada is very particular: the demanding environment made Canadians design and build wonderful and specialised aircraft that still are legendary today: Beavers, Twin Otters, the Dash 7 and the (original) Dash 8, etc.... But it is foremost the vast fleet of float planes that are very special to this huge country full of lakes. Nearly every aircraft type has been modified to be able to use floats.

Of course, I was eager to experience this first hand and thankfully Peter Duffey, President of IFATCA's Canadian member association CATCA, was able

to put me in touch with one of his friends, Stephen Wilcox. Stephen is currently the manager of Oshawa executive airport (CYOO) and he is also the proud owner of his very own floatplane. We arranged to meet up and Stephen kindly offered me an introduction flight.

His aircraft is a beautiful Cessna 185, that he has modified with extended wingtips, wing vortex generators. These modifications increase manoeuvrability at very low speeds. The stock engine was replaced with a more powerful 300 HP engine and even a methanol injection, like those found in World War 2 airplanes or top end race cars. This extra power allows the aircraft to accelerate faster to get out of the water. And then of course there

are the floats themselves which feature retractable landing gear in them, giving you the best of both worlds. Stephen made all these modifications himself. He uses it mostly to go fishing all around the area, as far as the Hudson Bay.

In Canada, by law, every water surface – be it a lake or a river – is freely usable for float planes, even if the land all around is privately owned. And with the amount of water around, it opens up a very big playground.



All photos: DP

After a short briefing on the particularities of this type of aircraft, Stephen invited me for a flight towards a few lakes just 15 NM north of Oshawa. Taking off from the concrete was easy: you just need to remember you are higher up and to make a very flat rotation until the floats are high enough above the concrete.

There was no wind at all, so the lakes were completely flat, like a mirror. I thought that would be ideal conditions for a novice like me, but in fact it is exactly the opposite! During landing, you need a reliable visual height reference, such as waves, drift wood or ducks. Anything that will tell you when to flare. And of course, a flat, mirror-like surface is the worst.

Flaring too early will cause you to overfly your landing spot. Flare too late, and the top of the floats will hit the water first. This will cause the plane will loop and you end up upside down... So, when we couldn't find a reliable reference on the flat lake, we decided to try and go as close as possible to the shore, in an area long enough and deep enough for us to land. The shore would then provide a height reference. Stephen demonstrated the first landing and take-off himself to show me the techniques. Then, it was up to me for the following three landings and three take offs.

The techniques are totally different to those used for a conventional aircraft. First, as soon as you touch the water, you must keep the control column firmly full aft till you get to a full stop. Releasing it too early will result almost certainly into a loop nose down in the water. The same applies during take-off. The slightest movement forward can cause you to end up with the nose down in the water. This is against your land-plane reflexes. Similarly, on water you need to land with the gear up. Putting the gear down on the floats and you will immediately capsize when touching the water.

Stephen made me practice a short take-off technique, where you put full power with methanol injection, control column full aft and bull deflected right throughout. That causes the left float out of water first, reducing water drag by half. When that happens, you need to immediately lower the left wing, just a bit, to fly straight. You then wait for the second float to clear the water, level the wings and off you go.

Landing on a concrete runway is more conventional as long as you remember it needs the gear down this time! But again, one has to remember that you're much higher up and you must make a slightly flatter and faster approach to compensate for additional drag of the floats.

Could I do this again? Well, all-in-all it sounds relatively straightforward. Full conversion from land to float can be done with only 7 hours dual instruction, but the younger you start the better. Older pilots, like me, tend to use more instinctive reactions based on years of experience. Especially when under stressful conditions, these can take the upper hand, which can be deadly or at least very expensive in a floatplane.

While I loved the experience, and would love to do it again (and I probably will), it will always be with a real float plane pilot beside me. Similar to airports in the mountains, nothing beats local knowledge and experience.

Many thanks to Stephen for the opportunity to discover this wonderful part of Canadian Aviation. I owe him big time! ◀

dp@the-controller.net



FLYING VFR IN CANADA

PART TWO: NIAGARA FALLS

The main tourist attraction near Toronto is of course Niagara Falls. They are about 100 km away, on the other side of Lake Ontario. I had planned to fly there as soon as I got to Canada, but the weather – more specifically the extremely strong winds – prevented the trip until the very last day!

With the winds finally easing up, just before returning home, I managed to secure a good old (and I mean really old!) but reliable Cessna 172 from Toronto's City Airport, on Toronto island. Together with Richard and Alex from Austria, we went to overfly this magnificent water spectacle.

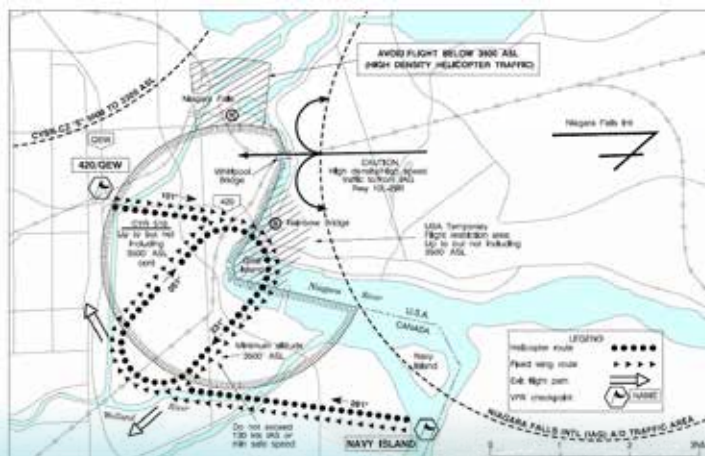
Getting there was dead easy: we just followed the coastline of Lake Ontario until we spotted the outfall of the Niagara river. Looking upstream, the high-rise structures (hotels and watchtowers) and the water spray, it was impossible to miss where we had to go next.

There are special VFR procedures to follow, as the area is crowded by dozens of helicopters showing tourists the same thing. In addition, the falls are on the border between the USA and Canada, so there is a special circuit to follow. This brings you into US airspace while

remaining on a Toronto ATC frequency.

Helicopters circle at 2500 ft, VFR stays at 3500 ft and IFR airspace begins above that. Everyone turns clockwise, with predefined entry and exit points. While it certainly looks complicated on paper, it is surprisingly easy and efficient. The biggest problem I found was to strictly remain at 3500 ft during the turns while watching the helicopters below you. And of course, it's very easy to get distracted by the majestic view of both falls below! It's good to have a copilot for that! ◀

dp@the-controller.net



FLYING VFR IN CANADA

PART THREE: TORONTO CITY AIRPORT

Toronto's City Airport offers a challenging approach in high winds, but allowing to overfly the city centre and turn around (and below) the CN tower.

The airport name has changed many times over the last years. It's now officially called the Billy Bishop Toronto City Airport or BBTCA. Billy Bishop was a Canadian Ace from the first world war with 70 victories to his name.

The airport is located on a small island in Lake Ontario, which is why locals prefer calling it the "island airport". It's also just below the iconic 315m high CN Tower, which dominates the Toronto skyline.

The airport is mainly used by two airlines, which both operate Dash 8s. The largest of the two, Porter, flies to some twenty destinations on Canada's east coast and some in the USA. The other airline is Air Canada Express, who operate a shuttle service between Toronto and Montreal.

In addition to the scheduled flights, the airport is used by Ornge, a helicopter and air ambulance service for the province of Ontario. There's also a small flying school (Island Air) operating mostly Cessna 172s and there are around 30

private aircraft based there. This all adds up to some 300 movements per day.

Due to the proximity of the city, all arrivals and departures are routed across the lake. Additionally, the presence of high obstacles (the CN tower is half a mile from the runway) obstacle clearance is an issue and all traffic, including IFR, must fly visual during arrival and departure. If you are friendly with the local controller, he or she can allow you to overfly the city centre and circle the CN tower before landing, which I did of course!

The airport is relatively close to the Toronto Pearson international airport (CYYZ). When runway 23 is used for landing, it requires extensive coordination with Toronto approach to make it work.

Finally, their main problem, especially in the summer, is the US pilots calling in when they are just 5 miles out. They arrive without a flight plan or any other prior notice. The proximity of the US border and the fact that most US GA pilots believe Canada is part of the US are the main reasons, I was told. ◀



CHARLIE'S COLUMN

BY CHARLIE@THE-CONTROLLER.NET



MY COPILOT IS A ROBOT

You might have seen this already but the press release that followed is interesting, some extracts: a robot co-pilot has managed to fly and land a Boeing 737 in a flight simulator. It is part of a research project to add more automation on existing aircraft. Even more automation than already exists today? Here at the Charlie offices, we were under the impression that, besides taxiing and taking off, all the rest was pretty much already fully automated.

But the researches have other motives: civil and military aircraft are expensive to operate and require intense and skilled human labour to react properly in unexpected situations. The robot can help a pilot fly and even land a Boeing 737. The thing can process visual input (i.e. it can see), just as a human would. Besides being able to manipulate the flight controls, it is capable of speech recognition and speech synthesis, formulating responses to communicate with the pilot. Presumably telling him: "Don't touch that" and "Let me do it" ... ◀



DRONES AND ANIMALS

Apparently, during one of the tests by Amazon to use drones in London, one of their experimental drones did not come back to his station after a delivery. The investigation showed that it had landed in a garden, where the house's dog attacked it and ripped it to tiny little pieces. This photo was recovered from the wreck... Yet another thing for the EASA's and the FAA's of this world to take into account when drafting drone regulations... ◀

Good luck with that!

What's as annoying as people applauding after a landing? It's people throwing coins into fountains and water features for good luck (or whatever they hope to achieve by throwing away perfectly good money). What if you combine the two? You get an elderly lady who, just before getting on a flight from Shanghai to Guangzhou, China and without a fountain in sight, thought it would be a good idea to chuck a handful of coins into the engine of the Airbus 320 she was about to board... You know, for luck. It resulted in a five-hour delay while engineers dismantled the engine looking for the 'lucky' coins. While we understand that with today's airline experience, you need all the luck you can get, you probably need a lot more than the 1.7 yuan (around US \$0.25) the woman threw at the engine... ◀



BRINDISI RADAR CLUB

presents



LAROUGE PROJECT FREE

September 2018 - SALENTO - Italy

The first Controllers Music Festival will be held in September 2018. Venue for the event will be Salento, in "The Heel of Italy". It is the South-eastern portion of Region Puglia, famous for its amazing September weather, stunning beaches, seafood and typical Southern Italian cuisine. It is also one of the most important red wine producer regions of the country.

The current plan is to hold a four-day event. It's being organised by the "Brindisi Radar Club", which is a nonprofit association of controllers and employees of the Brindisi Area Control Centre.

The only condition for participating is that one of the band members has to be involved in air traffic control or air traffic management somehow. Interested bands can pre-register at the following link:
www.brindisiradarclub.it

After pre-registration, we will get in touch to let you know what the booking options are for bands and for guests. Accommodation and transfers will also be proposed at attractive fares so you can enjoy your stay in Salento.

For updates on the events, please check on Facebook and Instagram (@controllersmusicfestival) or via our association's website.

At the time of writing, there were already 16 bands pre-registered, from around the world.

brindisiradarclub@gmail.com

