# CONVERSATION AVIATION

#01 2023

STARTING POSITIVE CONVERSATIONS ABOUT SAFETY


EASA
European Union Aviation Safety Agency

together 4safety

#01
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# Contents



# Contributors

## Collaborative Partners

Conversation Aviation is a collaborative safety promotion initiative that involves organisations from across Europe and beyond.

We would like to thank all of those airports, airlines, manufacturers and other organisations who worked with us to develop the material.

John Franklin and Ross Inwood (EASA), EASA's SIB Teams for GNSS outages and Incorrect barometric altimeter setting, Ana-Maria Anghel, Claudio Marturano, Gemma Aiuto-Turner, Mark Van Vogt, Miguel Mendez, Ronald Macintyre (T-C Alliance), Stuart Beech and Claire Durston (Resilient Pilot), Airbus, easyJet.

## Image credits

Airbus, Ana Anghel, Dassault, John Franklin, Resilient Pilot, Stephen van Houwelingen, iStock.

# Introduction and Welcome from Luc Tytgat

*EASA Director of Strategy and Safety Management*

On behalf of the European Union Aviation Safety Agency (EASA), welcome you to this first edition of the Agency's "Conversation Aviation" collaborative safety magazine.

Conversation Aviation serves two purposes. The main one is to share interesting information on different safety topics with leaders and safety managers from across the commercial, fixed wing, air ops community. We want to help you keep your operation moving safely by providing you with useful information that you can really use to manage safety. Knowing how time consuming it can be to create safety promotion material in your own organisation, we also offer the magazine in an editable format for you to use as foundation material for your own safety promotion. The Agency's safety promotion team is happy to support you in using Conversation Aviation with your own staff.

It would not have been possible to put this magazine together without the support of our many collaborative partners. Thanks goes to ACI Europe, the European Regional Airlines Association, IATA, manufacturers including Airbus, ATR and Boeing, along with air operators such as easyJet, Emerald Airlines and Luxair. I would like to thank all the organisations involved for their valuable support.

I would like to talk about some of the key safety challenges that, from EASA's perspective, industry is facing, both now and in the coming years. Aviation is a complicated system comprising many parts so, I will focus only on three specific areas out of many. The full list of safety issues may be found in in Volume III of the European Plan for Aviation Safety.

- ***Having enough competent staff who are operationally ready and fit for duty.*** It is likely no surprise that after the COVID-19 pandemic, industry is facing difficulties finding enough staff to fill all the different jobs and roles required by the increase in activity. EASA has a number of initiatives to promote aviation as a career for the next generation. It is also important that aviation organisations are seen as attractive places to work and especially employers that support staff development and care for their mental health. We also need to work more to understand the competencies that our staff need, in all job roles, and how we can support them so that they perform to the best of their abilities. If the job market perceives that aviation organisations view their employees as just another commodity to be used, then these challenges will continue for a long time to come. This negative culture needs to be challenged.
- ***Ensuring the safe integration of future technology.*** It is commonly understood that the cumulative level of technological change increases over time. In aviation, we know things are evolving quickly. For regulators like EASA, we need to ensure that technological advancement happens in a controlled manner and that it is driven by safety. Certainly, there will be difficult conversations to be had and a lot of work to do, but I can assure you that EASA will be leading this work and always with an eye to the level of safety within the aviation system.
- ***Improving our environmental credentials.*** The long-term future of the aviation industry requires us to focus on its long-term sustainability. It is important that we understand what this means in terms of practical actions within our organisations. The necessary improvements can then be built into the system, and we can communicate those improvements to our passengers. It is vital that the public be kept in the loop.
- ***External threats to the aviation system.*** In an ever-changing world, we know that aviation will continue to face many external risks. From cyber and physical security to new health risks, we need to be sensitive to these threats and, together, we need to mitigate them at the system level. EASA is leading such developments though the introduction of Part-IS on Information Security and the Conflict Zone Information Platform.

What I have outlined highlights the importance of moving from a purely operationally-focussed Safety Management System to a far more Integrated Management System approach that looks at the wider system. This is work that must be done together, cooperatively and sensitively and I would like to invite you to join the Agency in this very important and major work stream. ■

# Welcome from together 4safety

Finally, it's here. After many months of planning, a lot of meetings, and many hours with our different collaborative partners in online meetings - here is the first edition of Conversation Aviation "The Magazine".

Together4Safety was launched as EASA's safety promotion brand 3 years ago. The aviation system is complicated enough so we aimed to create something that provides easy-to-read, practical safety information. We aim to be straight talking, informative and interesting.

Our main goal is to get the whole industry to have positive conversations about how to operate safely and effectively.

Our material is mostly aimed at safety leaders, managers, and safety teams in operational organisations. The last thing any airline or airport needs is EASA sending information directly to their frontline staff. It is important that your organisation sets our articles, videos, or other safety information in the right context for your day-to-day work and in accordance with your organisational mindset.

To help reach as many people as possible and save you time in your own organisation, we will also make the magazine and its article available in editable, Adobe format. This way you can use the magazine as the basis for your own safety promotion material and company magazines. You will be able to change the logos and publish it as your own with minimal effort. You can edit or remove the articles to add your own context and you could also add your own as well. It's up to you.

Until now we have mostly published articles on the Air Ops Community Site and then we shared them on LinkedIn in the hope that we could reach as many people as possible. Whether you work in an airline, airport, maintenance organisation, ground handler, or anywhere else, creating interesting and engaging safety promotion is not easy. We know, we face the same challenges every day ourselves here in the EASA Safety Promotion Team.

This is where Conversation Aviation "The Magazine" comes on. It will be published every quarter as an EASA publication, created in a collaborative way with organisations from across the aviation community. The publication dates will be 31 March, 30 June, 30 September and then the final issue of the year will be just before Christmas.

During the course of each quarter, we will publish the articles over time on the Air Ops Community so you can read them as individual articles and not just as part of the magazine. We will also include some videos, posters, and even some podcasts on the different topics.

Finally, we would love your contribution to "Conversation Aviation". If you would like to provide an article or join the editorial team, please send us an email to safetypromotion@easa.europa.eu ■

# **Who** Does **What** at EASA

## Learn more about the European Regulator

Just as we might like to think EASA is the centre of the European aviation universe, we realise that the Agency is a long way from the operational reality that many of you work in. We thought it might be useful to provide a quick and simple overview of who does what at EASA; how the Agency is organised and the different tasks it performs.

EASA is headed by its Executive Director, Patrick Ky. The Agency has 5 Directorates.

1. **Executive Directorate**
2. **Certification.**
3. **Flight Standards.**
4. **Resources and Support.**
5. **Strategy and Safety Management.**

Across the organisation there are more than 800 people, the majority of whom are based in Cologne, Germany. The vast majority of the EASA team are aviation experts. There are engineers, flight crew, controllers, cabin crew, safety experts and many more. The experts are supported by many other professionals in IT, administration and HR etc – just like any other organisation.

Here is a little more about the main roles of the different Directorates of EASA. The diversity of the aviation industry makes it impossible to cover everything we do but this should give you a better understanding of who does what.

- ***Executive Directorate:*** This Directorate carries out many important functions. It contains our Communications and Legal Departments. From an operational perspective it is also the home of the Air Traffic Dept and also the EASA Drones Team.
- ***Certification Directorate:*** The team here look after the airworthiness of aircraft and products. A key part of their role is to support the safe integration of new technology into future designs. The Directorate is split into departments covering Design Organisations; Environment and Propulsion Systems; General Aviation and VTOL; Large Aeroplanes and Policy; Innovation and Knowledge.
- ***Flight Standards:*** These are the people who make the operational rules that you will know and love so well! They also deal with the oversight and standardisation of the National Aviation Authorities (NAAs). Another of their functions you will likely be aware of is the Third Country Operators programme and Safety Assessment of Foreign Aircraft (SAFA). This directorate is made up of departments covering Aircrew and Medical; Air Operations and Aerodromes; Maintenance and Production.
- ***Strategy and Safety Management:*** This directorate is perhaps the most diverse in the Agency. It includes the Safety Intelligence and Performance department which does work like safety analysis, accident investigation and safety promotion. The Strategy and Programmes Department do all the planning of the different activities the Agency does, including driving the European Plan for Aviation Safety (EPAS). Finally, the International Cooperation department collaborates and supports improving safety across the world. The directorate also has the lead for the environmental aspects of aviation including the ECO-Label and Sustainable Aviation Fuels (SAF) and also Cyber Security.
- ***Resource and Support:*** The last part of EASA are the people who keep the organisation running and make sure the experts have everything they need to support the industry. This team includes IT; Human Resources; Finance and Corporate Services.

One of the amazing things about EASA is that it brings together people from across all disciplines of the industry and from every single country in the EASA system. We have staff from almost every single country in the 31 EASA Member States. ■

# Safewings

## You name it, We fly it, Safely of course.

The group shot below includes the following Safewings team members:

Milena, our CEO.

Nuno, Head of Safety (That's me).

Rachel, one of our Captain's and fleet training managers.

Claudio, a First Officer who is also a fleet safety officer.

Sven, our Cabin Crew Manager.

Helena, an Engineer in our Part 145 organisation.

Val, who works on the Ramp in all weathers.

A warm hello from all of us at Safewings. We are a legacy low-cost airline with a diverse route structure from our base at Rheinufer Airport. Not only do we fly long-haul but we also do short-haul and event regional operations. We also have business jets, some air taxi aircraft and even some helicopters. Who knows, we may be doing some Urban Air Mobility (UAM) filghts very soon as well. We also have our own CAMO, Part 145 and even in house handling company.

Hopefully the diversity of our operation mean that we can relate to any safety challenge that you will be facing in your own operation. We thought it would be useful to team up with EASA to help share our safety experiences, topics and challenges with the whole industry. By doing it this way, its you can learn from us. Also, when you see how we use the Conversation Aviation magazine here in Safewings, it might give you some inspiration on what you could do with it yourself.

First its probably useful to introduce the key team members here at Safewings. They will be adding their own comments and thoughts on the different articles in the magazine so that they are relevant to our staff members. Maybe you could do the same with the Adobe file that EASA will be providing everyone, then you can use the magazine for yourselves.

We also have Cate, one of the friendly Air Traffic Controllers that we have Rheinufer Airport, she works for Alphabet Soup Air Traffic Service (ASATS). Finally, we have our regulator – John. He likes to think of himself as the helpful man from the regulator but we don't always see it that way. Still, he will have lots of interesting things to share with you. You might not understand everything he says, because he's from the regulator and makes everything too complicated – but he is learning.

Talking of learning, this is the first time we exposed the workings of our operation to the external world so please bear with us. We will do our best for this first edition of Conversation Aviation and hopefully we learn as we go. In future episodes, I'll share some of the challenges and risks we've had to deal with recently and also what we see coming. Look forward to exchanging lots of ideas with other safety managers out there in the "real" world.

Until next time, go safely. ■

## What is Safety?

# The Safety Map of the World


Effective implementation of safety management is difficult. It can be very easy to get sucked into the "processes" involved in safety. Then forget really the purpose of what you are trying to do – keep your operation safe. The Safety Map of the World helps to simplify things and really help focus your Management System in the right places. Remember, safety is not something you do *to* others, its something you do *with* others.

Has everything become too complicated? We do lots of 'things' in the name of 'Safety' but, ultimately, do we really understand the real purpose of the 'things' we do in the name of safety. Most importantly do we really understand how they contribute to safe and effective operations?

### What does safety mean to you?

Is it an outcome, something to be achieved? Are you a "target zero" person where is safety is something that means driving towards having no bad events at all?

Let's start with the ICAO definition:

*The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.*

### A new way to think about Safety?

For the purposes of the Safety Map of the World, let's consider safety as the things that are needed to minimise the chance of causing harm. This means that you need to know what is the "Stuff that might kill you (STMKY)", whether you are


controlling the risks of the STMKY and whether those controls are working. Oh, and whether or not there is anything else that you might have missed.

Together4Safety exists as a collaborative approach to help us all understand safety more easily and then to help us all have positive conversations about the things we need to achieve safe outcomes in operations every day. Rather than just talk about specific safety issues we thought it might help to show how everything is connected. This is what the Safety Map of the World was created for.

There are lots of stakeholders in aviation and they are quite diverse. As we get further into the various subjects, topics and themes, the connections between these components become more obvious. These connections then make it easier to really focus our safety efforts in the right places.

## The importance of understanding your purpose

The first element of our map is the anchor for the others. The "purpose" is your purpose, or rather that of your organisation and its operations. That purpose is not just what the organisation/operation does, but also how and where it does it. Most importantly, your purpose defines what safety means to you and the things your organisation needs to contribute to safe outcomes and, at the end of the day, aircraft that land safely while doing what they need to do.

You might be an airline focused on flying passengers from A to B. You might be a cargo operator, business jet operator or even flying ad-hoc air taxi. You might be a maintenance organisation, airport, ground handling company or even an ANSP. You might even do a combination of some of these activities.

The main thing is you never forget your purpose and how it connects with the wider aviation system that your purpose contributes to. If the goal is safe and effective operations - your safety efforts must focus on this purpose. If you are an operator, that goal is clear; the further you get from the flying part of aviation, the easier it can be to forget that you contribute to something bigger than yourself.

Your purpose, therefore, drives every other aspect of the map. As you heard before, everything in the map is connected and it must connect to your purpose.

## The Safety Landscape

*"The recent challenges in aviation have impacted safety and changed the landscape in which we all operate."*

The reality is that the landscape is not great. Due to the impacts of the Covid pandemic, combined now with financial challenges and the conflict in Ukraine, the aviation community is stretched, under tension, meaning that the probability of having an 'unsafe' environment is increased. At the same time, we have new challenges as covid has sped up the process of understanding things that are not going well that we need to tackle.

Our approach to safety must be a continuous activity and a collective endeavour, across all aviation disciplines, to analyse, manage and mitigate risks. To do this, and to improve our mindset on the current safety landscape, we must start looking at the future and become proactive rather than just reactive.

The 2022 EASA SAFE360 Conference highlighted that experience levels have dropped and there is a need to attract new talent to the industry. If we are to survive, we need to invest in young talent and train them accordingly. At the same time, we should respect and encourage the more experiences personnel to become safety ambassadors by sharing their skills and knowledge.

## Join us on a journey across the world

Rather than just promote specific topics in isolation The Safety Map of the World will help you to learn about how all your different safety activities connect to each other. Over time this will build up into a comprehensive resource aimed to simplify the way you think about safety in your organisation. ■

# Seasonal Risks:
## Stop Playing Risk Whack-a-Mole

Managing operational risks in your organisation is a constant challenge. Particularly when the aviation system is so dynamic. Thankfully, while some risks are hard to predict, there are many seasonal risks that come around year after year. When you augment your normal safety management activity with a seasonal risks mindset you stop playing "Risk Whack-a-Mole" and focus a key part of your safety efforts in an area you can control, mitigate and collaborate on.


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A key part of the Safety Map of the World is the "Risk" part. When it comes to safety, the goal is to "know your risks and mitigate them effectively as part of a resilient management system." In a continually changing aviation system, doing that is easier said than done. If we define risk at its simplest level as "any situation involving exposure to danger". The key question for you and your organisation is then what are you exposed to in your organisation that causes you danger and how will you manage and mitigate those risks? Focussing the greatest effort on the things that might kill people and working back from there.

Given that this part of the magazine is focussed on "Mindset", we thought it might be useful to introduce you to the concept of having a seasonal approach that underpins your routine risk management activity. If you feel like you are playing risk Whack-a-mole as new things continually pop up from occurrence reports, FDM and other sources, having this type of approach will help you understand and manage many risks that will likely always happen, year after year.

What type of seasonal risks you face will of course depend on your operation, but many of these are system-wide and could apply to any organisation. One of the benefits of this is that when we sync our seasonal risks schedule, it makes cross-domain and cross-organisational collaboration even easier.

Some seasonal risks centre around traditional leisure tourism seasonality and the pace of business travel. Other factors could include the geographical location of your operation, the weather or even religion (Easter, Christmas or the Hajj) or other cultural factors such as sporting events. Regardless, these kinds of things can be predicted, and the additional risks identified and managed ahead of time. It is much better to be in this mindset than wait for events to happen and deal with the operational challenges as they happen.

## What might a seasonal risks calendar look like?

- The year starts in the middle of the Winter Operations season, this means your people will likely be working outside in cold weather and staffing levels might be impacted by seasonal flu. This can be combatted by wearing the correct clothing, such as thermals and thick material clothing. Of course, this makes it harder to perform some tasks so beware also of risk transfer. Winter also brings skiing (and the skis that cause extra challenges on the ramp for loading, for which you might need extra training or equipment).
- As we head towards Easter, leisure travel picks up and flying volumes increase. This means seasonal workers arriving who might not be totally up to speed with the latest processes and procedures. Then the Bird migration season begins, and you might also find challenges with seasonal storms.
- Into May the wildlife season really gets going, the summer flying volumes really start to ramp-up so you need to be ready. Warmer weather means more Passengers of Reduced Mobility (PRMs) are likely to be traveling. More people start getting married, meaning more stag and hen parties and an increase in disruptive passengers. As temperatures increase, our staff are now dealing with high temperatures and exposure to the sun for prolonged periods. Exhaustion and dehydration can quickly impact staff performance if they are wearing too many layers or not hydrating often enough. Wearing loose clothing, with your high-vis of course, will help you keep cool in hot temperatures.
- Then, the school holidays really get going. You have unaccompanied minors, lots of families and all the challenges of an increase in people who don't travel so often. As September starts, people without children travel more, bringing more Mobility Scooters and an increase in the Lithium Battery fire risk.
- As the reserve bird migration starts in October, winter starts to arrive. This brings the need for de-icing, snow clearance and new weather challenges for flight crew. Then, the craziness of Christmas arrives and you get ready to start the whole cycle all over again.
- Just to add to the complication, throw in an Olympics, a European World Cup or just a Champions League final and things get more complicated.

The main thing is to create your own "Seasonal Readiness Map" for your operation <you can make a download and amend – or even a print, laminate and wipe clean>. In each month you should identify what seasonal risks you face and also what activities you are doing to look again at what is coming. Forward planning is vital. It might seem silly to be having a winter readiness check in the heat of July but when that first October snowflake falls you'll be glad you did. Each operator is encouraged to carry out a complete and competent risk assessment based on their operational needs.

## Sounds simple right? But what else should you consider?

Many of your risks will be predictable depending on the time of the year. This means that you can prepare actions in advance. EASA publishes safety promotion material, guides and SIBs to help you so check their resources on the Air Ops Community Site.

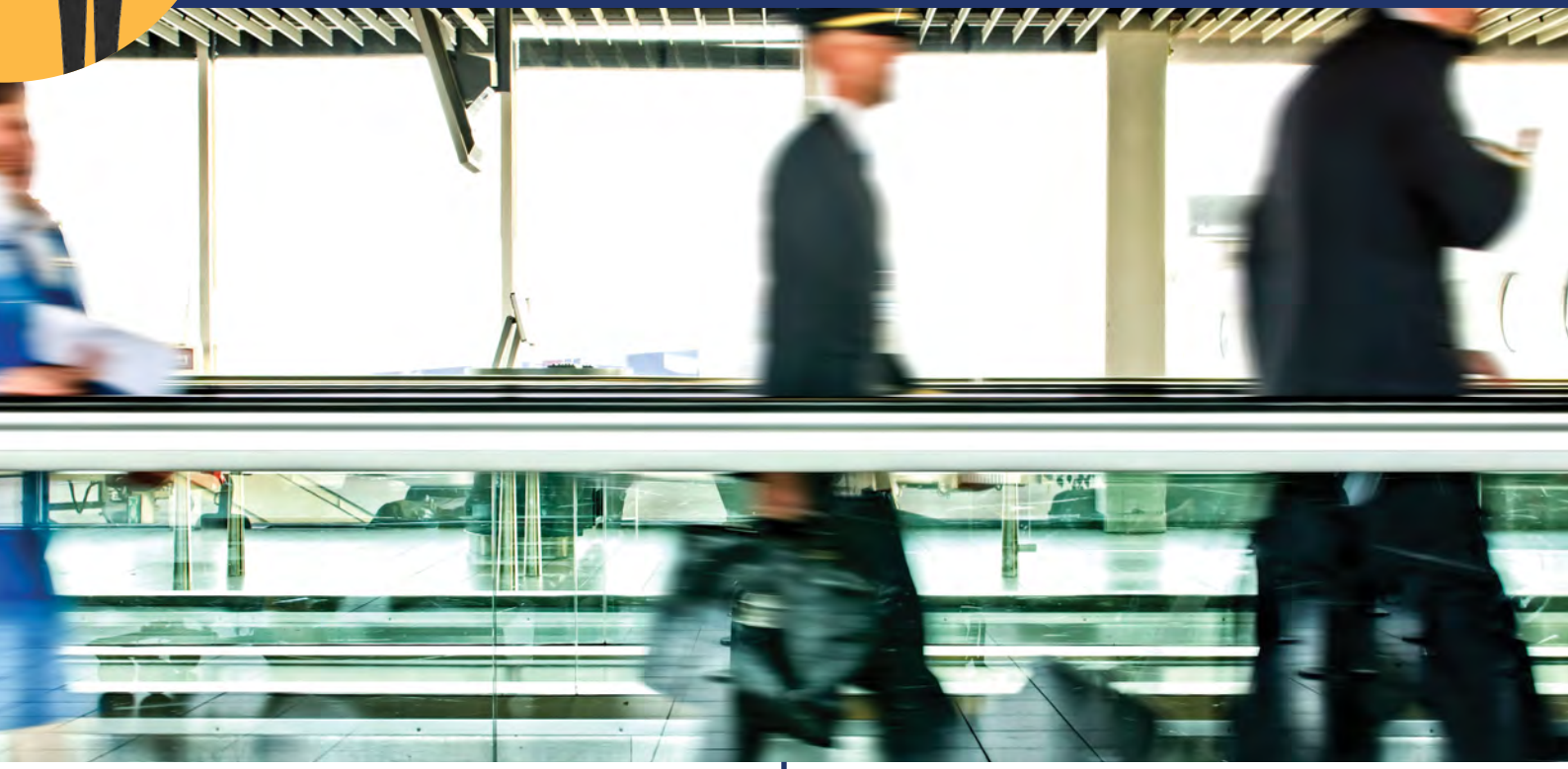
Let's take the example of bird migration. This is a seasonal activity and predictable. How does this affect your operations? In many ways is the basic answer, but let us take it further:

- Airport operations have to be made aware of bird migration in order to have adequate staffing and facilities to deal with birds in the airspace;
- -TC, Flight planning, and Scheduling may have to change routing and practices accordingly to avoid in-air bird strikes.
- Flight crew have to be mindful that there is a potential for bird strikes and be extra vigilant;
- Maintenance personnel may have to carry out additional maintenance, either in the form of unscheduled sheet metal repairs and or boroscope inspections on engines;
- Cleaning and ground personnel have to be made aware that there may be the possibility of change to schedules at the last minute to accommodate repairs and or change in aircraft for continued operations.

These are just a few examples of how one seasonal risk can affect all the departments of both airport and airline operations. It highlights the importance of having a seasonal mindset and an adequate and flexible "Seasonal Readiness Plan" in place you reduce the amount of "Risk Whack-a-Mole" you have to play. Be proactive and have the right resources in place at the right time (another key box on our Safety Map of the World). Finally, make sure that your staff are aware of the plan and everyone knows who is responsible for what actions. By doing so, we can be ready for changes and risks and help avert the worst-case scenarios that greatly affect our safety and the safety of those around us. ■

# Managing Staff Competencies

The people box of the Safety Map starts with "Having enough competent people...". Helping all your staff have the competencies they need to deal with the wide range of operational situations they face is a real challenge. In this article we explore the role of both the organisation and the individual in helping maintain competencies throughout the year. It also links to the EASA Safety Issue (SI) – 3011 on Training Effectiveness and Competence. Many thanks to Stuart Beech and Claire Durston from Resilient Pilot for the development of this article.



As organisations, we ask a lot of our staff. Often in very challenging circumstances, all types of weather and at strange times of the day. Aviation certainly isn't a cosy 9 to 5 job. In the recently published European Plan for Aviation Safety (EPAS) (12th Edition: 2023-2025) the overall strategic theme is to foster a **safe, secure, sustainable, and resilient aviation system, capable of coping with disruptive events of any type**.

Within this latest EPAS, "Competence of personnel' has been elevated to become a stand-alone strategic priority. It is a vital enabler of systemic safety & resilience. We aim to implement competency-based training assessments (CBTAs) across all the operational domains and promote a more evidence-based, data-driven approach to training and examination.

One of the few positives that the Pandemic afforded our industry was the evolution of cost-effective and more reliable virtual methods for the learning and development of aviation professionals. This means that there are many more options available to help establish and maintain people's competencies. It also highlights the partnership role between staff and their organisations so that competency development is a continual process for everyone. Hopefully, this approach help staff to feel more valued and your organisation to be more resilient.

During the pandemic, EASA produced a document: Guidance for allowing virtual classroom instruction and distance learning. This enabled organisations to deliver online learning and instruction, such as distance learning

and virtual classroom instruction; to help staff maintain their competencies when they were not flying, operating or working at normal levels.

Various organisations such as Resilient Pilot were founded during the pandemic to support displaced pilots and crew. They adopted a suite of alternative learning and development methodologies for its members and pioneered a virtual evidenced-based blended mentoring, coaching and CBTA approach. The programme involved continuously developing confidence by mentoring and coaching and competence through immersive scenario-based training SBT simulation. This was facilitated by virtual instructors. This work during the pandemic highlighted the value of such virtual experiences to introduce CBTA methodologies, enhance continuous development, self-evaluation skills, resilience and - ultimately - operational performance and safety as highlighted below.

The learning from the pandemic has shown the benefits of a combined approach to training, facilitation, coaching and mentoring. Especially when this is part of a continuous development activity that takes place on an ongoing basis. As more pilots have returned to full employment, the work is evolving to combine this approach with traditional flight crew training and the continuing evolution of Evidence-Base Training (EBT).

## Understanding more about the specific benefits

In competency-based training, competencies in aviation personnel (so far this applies to ATC, Flight Crew and Cabin Crew and the new EASA Ground Handling Regulation will also have a competency based approach) are developed by exposing staff to an array of realistic, changing scenarios. Which scenarios and situations people are trained to handle in competency-based training is then the foundation of EBT. The strategies people use whilst coping with different situations and actions create opportunities for competence development.

Scenarios can be used to train Task Prioritisation, Workload Management Threat Assessment, Threat Management Processes and Option Generation, helping to optimize the decision-making processes of individuals. When designed training programs, as in real life, one 'correct answer' should be avoided. This type of EBT program offers the crews a number of less-than-ideal courses of action; some with unfavorable conditions attached (GM1 ORO.FC.231(a)(2)EBT).

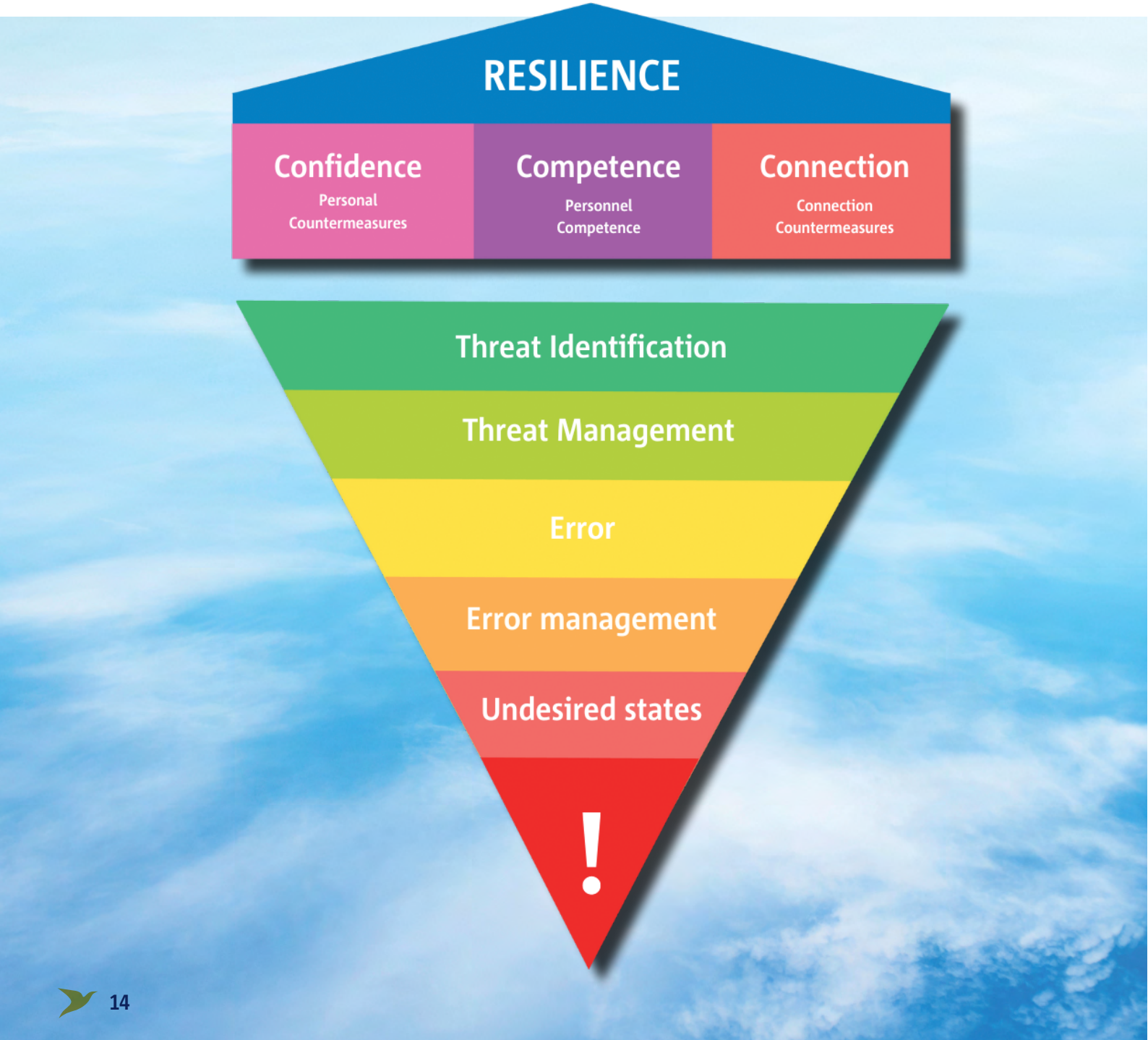
A recent program from Resilient Pilot found that the 6-month results of an inactive pilot carrying out virtual CBTA show an average increase in overall competency grade by 0.7 points, representing an overall 15% increase in performance.

The crew is exposed to unexpected events demonstrating behaviours to develop their competence, resilience and decision-making skills when encountering dilemmas or surprise situations.

As expected, the competencies Flight Path Management Automatic FPA and Manual FPM were rarely observed during the virtual scenarios, however, the alternative and more reliable training environment proved to be effective in allowing the crews to demonstrate the development of non-technical competencies such as Workload Management (WLM); Problem-Solving and Decision Making (PSD); Situation Awareness and Management of Information (SAW); Communication (COM); Leadership/Teamwork (LTW).

## Highlighting the role of coaching, mentoring and peer support as part of wider wellbeing

The Resilience Development Model helps to understanding the link between day-to-day coaching, mentoring and CBTA that help to build personal resilience and improved wellbeing with the more targeted supported needed to support staff through difficult situations. While many of these activities should be led and supported by the organisation, there are also many things that the individual can do as well. Together this will not only help with the "competent" part of the People box of the Safety Map of the World but also the "operationally ready and fit for duty" element as well.



## The key lessons learned so far

It is still early days for this type of blended CBTA models. So far they have mostly been applied to flight crew in larger airlines and ATCOs in support of maintaining non-technical competencies in ANSPs. Over time they will also help to reduce the training footprint and cost for smaller operators. They will also have great benefits for other types of staff and other organisations in the future.

Experience has shown that the programmes require a certain amount of customisation to accommodate the operational environment and different capacities of training providers. Some of these key learning to bear in mind in your own organisation are:

1. The need to foster a virtual blended learning and development approach, encouraging trainers to deliver learning and development by maneuvering between mentoring, coaching, facilitation, and learning;
2. Implement virtual scenario-based training as an alternative means to continuously develop competency. Why wait for the recurring training cycle to expose areas of development for individual crew and organisational populations?
3. Deliver virtual workshops to encourage social learning at the global level;
4. Encourage harmonized data-driven sharing system between smaller operators to identify future risks, threats, and errors within the European regional aviation system;
5. Empower personnel to take ownership of their personal and professional behavioural development, and incorporate EASA CPD credits alongside recurrent training. This will foster a culture of continuous development enhancing the resilience, performance, competency, and safety of the European Training System.

## EASA Safety Issue Report – Safety Issue 3011

The EASA Human Factors Collaborative Analysis Group (HF CAG) has recently completed a Safety Issue Assessment on Training Effectiveness and Competence. The assessment methodology included analysis of occurrences, review of all available data and a summarized bow-tie model. The risk assessment of the scenarios included training for emergent risks, improvement of standardisation, and monitoring of compliance.

The full report outlines the full assessment and is available on the EASA Air Ops Community Site companion article for this topic. The report proposes that EASA considers a number of future actions in the European Plan for Aviation Safety (EPAS). These include:

- Reviewing rules and regulations connected to training to create a common training and competence vocabulary.
- Developing material to support the implementation of normal operations surveys and monitoring to maintain/improve the quality of the training process.
- Ensuring safety information is fed back into competence development systems.
- Regularly reviewing and disseminating scientific advances in prediction and identification of future functional system changes.
- Promoting and educating senior managers in the impact of safety culture.

The next step in the Safety Risk Management process is to perform the impact analysis and definite the Best Intervention Strategies (BIS) that will then lead to specific EPAS actions in Volume 2.

Huge thanks to all the members of the CAGs for their continued support and great work. ■

# Language Proficiency

Safe and successful operations involve many different people. Pilots, controllers, ramp staff and others communicate continually both on the ground and in the air. Particularly when there are many people from different countries, situational awareness is greatly improved when everyone uses English as the common language using standard phraseology and plain language.

Within aviation, you are often required to talk to many different people from all over the world. As we talk to all these different people, what is said also provides important situational awareness for others. Using a language, you do not use regularly takes a lot of effort, especially if you don't use it very often. But in a sudden, non-standard situation, being able to communicate effectively could really save your life.

Hence, it is vitally important for safety that personnel be proficient in 'Aviation English'. Also for English speakers, it is also important to use plain language that can be understood by non-native speakers who also rely on your English to get a good picture of situational awareness.

### As a pilot:

Your first thought might be "I only fly domestically, why would I have to care about any language proficiency?" Indeed, in certain countries, a local language is officially used in the air. However, even if this is the case, it is important to know the specifics of standard aviation phraseology, it is a language on its own. With many people flying across borders if you report your position using a very regional or local phrase it could cause other pilots to lose situational awareness. When you can use standard phraseology, it becomes safer for everyone.

As soon as you start flying to other countries or to even places with more and more visitors from other countries – it can become very important. More and more airfields are turning into 'Radio Mandatory Zones' nowadays. This is done for the safety of everyone up in the air and on the ground which means that speaking the same language will become a necessity rather than simply a requirement.

### As airport personnel:

We live in a changing world. Whether it's because of new technology, the increase in air traffic, what we learn from accidents or to help further mitigate safety risks, the aviation system adapts to continually ensure safe and effective operations.

At the airport, it is important that everyone operating on the aerodrome are able to understand each other and can have good situational awareness. Is it really safe to drive a car on the runway when there are pilots who do not know what the vehicle is doing, or even when there is a truck somewhere out there? Most of us have heard about incidents or even accidents caused by communication problems, like the maintenance van that was hit by the wheels of a 747 or when an electrician had to run away and dive into the grass because of a landing A330.

This is why the use of English at the airport is important. So that everyone is able to contribute to the safety of operations – particularly where there are international flights.

### As a controller:

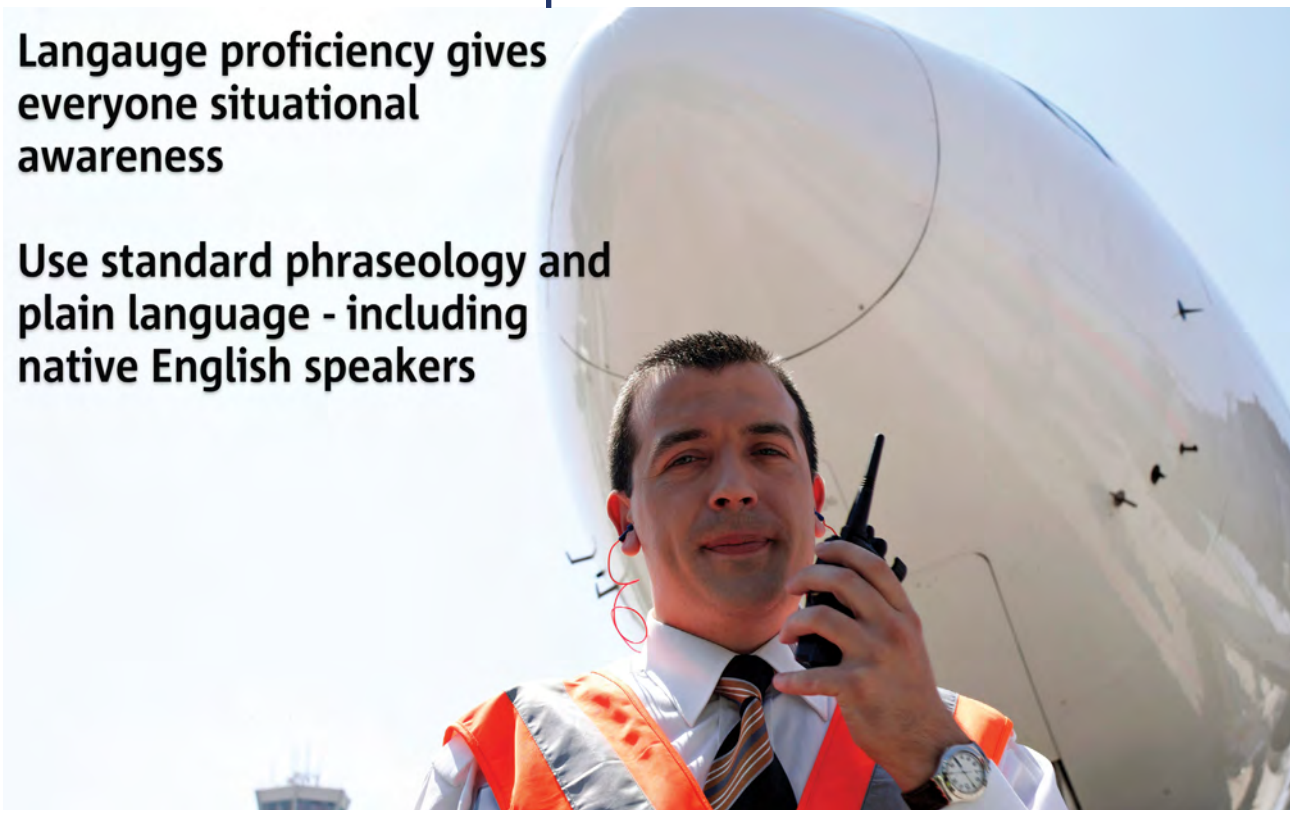
The main task for controllers is to manage and coordinate the flow of air traffic in a safe and controlled way. Controllers use verbal instructions to pass on messages to the receivers (pilots, ground crew, and neighboring controllers). During their day-to-day tasks, controllers can talk to many different people from all over the world. As they talk to all these different people, what is said also provides important situational awareness for others. This means it makes perfect sense that pilots and controllers speak the same language throughout the world, and I am sure that, as an ATCO, you are very aware of the huge weight of the responsibilities that come with the job.

English is a complex language, and very easy to misinterpret. This is much less likely when we use standard phraseology and this applies to native English speakers as well. Using plain language reduces the risk of misunderstandings that could lead to an incident. As a controller, it also reduces your workload by avoiding repetitions and corrections, which in turn allows you to focus on your tactical tasks.

***Ok, I get it, I need to be able to communicate efficiently at work, why is my general language proficiency not sufficient? Especially if my training is in English.***

There are two equally important parts of aviation language proficiency – standard phraseology and plain language in an aviation context. Because aviation English is a specialized type of English, let's focus on its challenges and requirements. Keep in mind all this applies to any language chosen by the local authorities as the main means of communication in their respective airspace and not necessarily just English.

As we live and work in a diverse world with different mother tongues and cultural backgrounds, it is important to standardize the language we use in flight to minimise misunderstandings and ensure everyone has the same level of situational awareness to the minimum. Therefore, a standard radio-communication phraseology was developed to allow everyone to convey and receive easily comprehensible messages. If you ever fly overseas, keep in mind that this set of phrases and expressions varies slightly by region, according to EASA regulations we are sometimes all on the same page.



***I took courses, I practice aviation language, why do I still need to be assessed?***

The assessment not only validates your knowledge but also serves as proof of your actual skills. It sets a standard level of proficiency for all the users of radio communication.

To make it fair for everybody, but also to be safe, ICAO has defined specific criteria to test all the members of the aviation community to promote mutual understanding and reduce the risk that people have "gaps" in their knowledge of aviation English.

For example, air traffic controllers and pilots have developed a standard radiocommunication phraseology to make their message exchanges shorter and more understandable.

For ground personnel, these types of conversations may be totally unfamiliar. Therefore, aviation English proficiency needs to be more focused than just general language proficiency.

While working at the airport, you have probably already heard phrases like:

"Speedbird 52 Heavy, hold short runway 27 left, traffic is a company 321 on short final."

"Scandinavan 221, behind the landing Citation, line up and wait behind, expect immediate left turn after departure."

"KLM 801, vacate left, taxi via Echo, follow the marshaller waiting at intersection Echo 2, stand 143. Monitor Ground on 121,630."

You will have noticed that the vocabulary is very unambiguous while keeping the grammar very basic, hence being comprehensible even to slightly less proficient English speakers. Not at all difficult, is it? With a few lessons, some practice and you should be good to go. Well, almost. It´s all fun and games until you come across a non-standard situation. Obviously, standard phraseology was neither meant nor has the capability to cover literally every single thing that may happen. This is when people have to revert to plain language to describe their situation and request assistance.

Of course, for ground personnel, the main challenge is to understand that an emergency situation is in progress and to assess how to participate in the effort to make things as easy as possible for everybody. Yes, there are also code words for emergencies, like "Mayday" or "Pan Pan", but because they are used in situations where stress is running high, not everybody thinks of using them. And this is where it can get tricky to understand a situation efficiently and assess correctly what the best course of action is to facilitate the job for ATC and pilots.

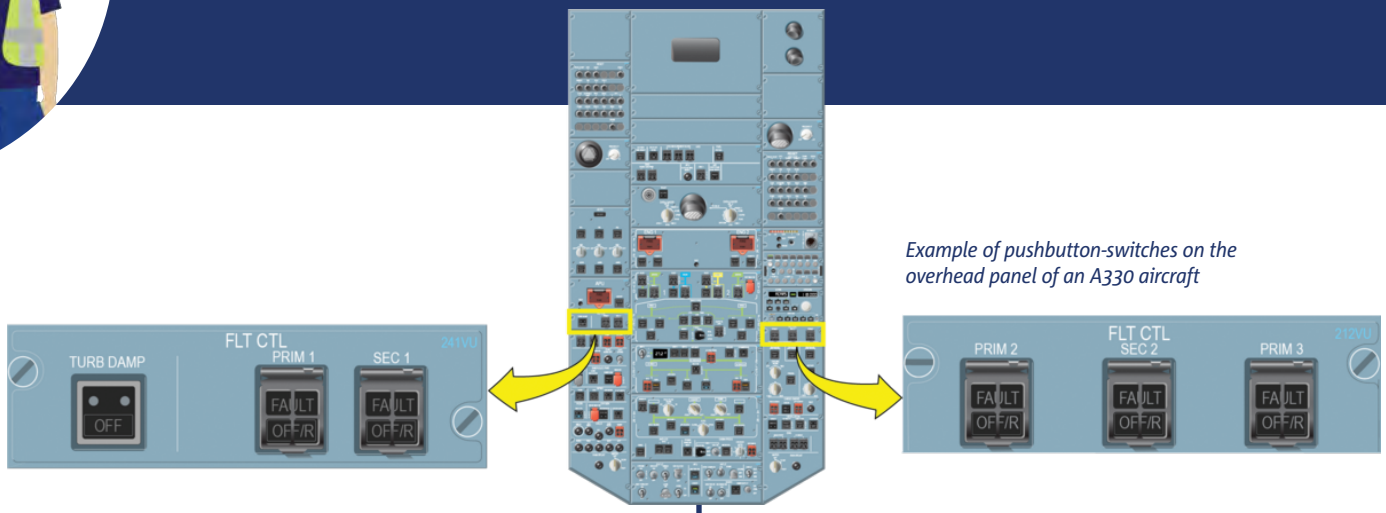
When hearing that a pilot had a bird strike, a flap disagree warning or an uncontained engine failure, it is also important to understand that these are emergency situations, and these are not really the typical things you would learn in a general English course, are they?

Another good example of this is an electrician who, in the middle of an intervention on the runway, reports that they need extra equipment and have to leave a centreline light open in the asphalt. By explaining it in English, they can be certain that both ATC and all other users know that the runway is temporarily unavailable.

Look at it as if you were taking your driver's license skill test – whether you had just completed your road theory training, manoeuvres, or road driving, you feel more or less comfortable in your car, your instructor trusts you do already have what it takes, yet to be as unbiased, fair and safe as possible, another set of eyes – those of your examiner – is needed to check once and for all that indeed you are a safe driver. And this is what language proficiency assessment is as well – it´s not a search for a perfect native-like linguist, it's a check or validation of your being a safe airport user. ■

# System reset: Use with caution

A system reset is not always the quick fix that it may seem. Performing an inappropriate manual system reset in flight can seriously impair the safety of the flight. Multiple system resets on the ground without performing the necessary troubleshooting actions can also have serious consequences. This article, developed by Airbus, addresses when system resets are applicable and how to perform them correctly.




*Example of pushbutton-switches on the overhead panel of an A330 aircraft*

## What is a system reset?

A system reset is the action of switching off a system and then switching it back on again with the objective to retrieve normal system behavior or recover a previously lost function. It is different from re-engaging a tripped Circuit Breaker (C/B).

## Triped circuit breaker

A C/B will trip when there is an overload of electrical current detected in the circuit. This is to protect from overheating or a short-circuit condition in the wiring that could lead to further damage or fire. Management of tripped C/Bs is not covered by this article. In this article, the term “reset” describes the action of switching off a system and switching it back on again. This action can also be called a “cycle”.

## Automatic reset vs. manual reset

Certain avionic systems, such as the Flight Management System (FMS), have an automatic reset function. The reset action is completely managed by the system that has an automatic failure detection mode. Maintenance or flight crews perform a manual reset by using the cockpit control for the system, a circuit breaker, or a dedicated reset button (also called a reset switch). This article focuses only on these types of manual resets.

## Manual reset using system controls

For specific systems, such as the flight control system, the maintenance or flight crews can perform a system reset from the cockpit using pushbutton-switches available on the overhead panel.

## Manual reset using a circuit breaker

Pulling a system C/B and then pushing it back in will trigger a system reset because this will isolate and then restore the power supply to all parts of the system. It will also cause the software of the system to reload. This is considered as a “hard system reset”.

There are two types of C/Bs: traditional C/Bs and electronic C/Bs. The traditional C/B is manually opened and closed. The electronic C/B, also called Solid State Power Controller (SSPC), is controlled by a remote interface (on A220/A380/A350). Various system C/Bs are located in the cockpit of Airbus A220/A300/A310/A320 aircraft, the avionics bay, the cabin, and the cargo compartments. There are no C/Bs in the cockpit of Airbus A330/A340/A350/A380 aircraft. They are replaced by system reset buttons on the overhead panel.


## Manual reset using a reset button

Pulling a system reset button (fig.3) then pushing it back in the cockpit will only reset the system software part (only available on Airbus A330/A340/A350/A380 aircraft). This is known as a “soft reset” because the system will remain powered.

## Inappropriate system resets can have serious consequences

Past events have highlighted how some system resets can have irreversible consequences. One example is where a system cannot be recovered after an inappropriate system reset in flight. Another example is where a reset of flight control computers is unduly performed. Depending on the system malfunction encountered, this can cause unexpected movements of the flight control surfaces, which may lead to serious consequences if performed in flight.

Avionics systems are interconnected systems, therefore, a system reset of one system can have significant consequences for the other systems that rely on its data. Inappropriate system resets can have unexpected side effects and hide deteriorating conditions of the system. In combination with a failure of another system, the safety of the flight can be impaired. Therefore, it is important that maintenance personnel and flight crews only perform system resets in accordance with the guidance in the relevant procedures, as for the cases described in this article.

## System resets by flight crew and maintenance personnel.

There are only some very specific situations where flight crew or maintenance personnel can perform system resets, for full information refer to the original Airbus Safety First article or the full article on the EASA Air Ops Community Site.

## Summary

Unauthorized resets of an aircraft system can hide a deteriorating condition of the system. What may seem to be a "quick-fix" on the ground to dispatch the aircraft can lead to a system fault reappearing in flight that may even affect the safety of the flight.

If not specifically requested in an ECAM/OEB/FCOM/QRH procedure, the flight crew can only consider attempting a reset to recover the operation of an affected system if it is listed in the System Reset table of the FCOM/QRH. If there is no reset procedure available in the System Reset table of the FCOM/QRH, which is associated with the malfunction or ECAM alert encountered, then the flight crew must NOT attempt to reset the system. Any system reset performed by the flight crew needs to be reported to maintenance personnel and must be recorded in the aircraft technical logbook, including the number of attempts and outcomes.

For A320 aircraft only, in some circumstances, due to possible electrical transients, the flight crew cannot perform on-ground resets that are not listed in the reset table.

Maintenance system resets are only performed in accordance with specific TSM/AFI tasks. Troubleshooting can start with resets but should not end there. The appropriate troubleshooting actions or at least recording actions should always follow.

For A320 aircraft only, the same on-ground resets from the System Reset table of the QRH are available in the A320 TSM and can be used to manage intermittent faults and ease the aircraft dispatch. In this case, it is possible to perform system resets that are not specifically listed in the TSM.

Manual system resets performed by flight crew or maintenance personnel are not a way to fix repetitive faults. Multiple and unreported resets can hide degraded system conditions. The fault could reappear later and have significant consequences during a flight. An efficient system for reporting and managing system resets is crucial for monitoring the health of all aircraft systems, which is key to maintaining safe aircraft operations. ■

# Occurrence Reporting

Occurrence reporting is the fuel that drives organisational learning. Your staff should be reporting because they feel part of your management system and they embrace the goal of continuous improvement. Make sure that the process of reporting in your organisation is as easy as possible and understood by your staff. The hard part is creating the trust needed for staff to tell you the things your organisation need to know.

## Who wants to be a safety millionaire?

Imagine you're at the final question of Who Wants to be a Flight Safety Millionaire (or whatever it might be called in your home country). You've used all your lifelines. You ask the audience a question about FOD. And your CEO helped you at the 250,000 point by actually getting a question right on Just Culture.

Now you have a shot at the big money. You used your 50/50 and you're left with two options for the question, "Why do you report safety occurrences and hazards in your organisation?

**Because Regulation (EU) 376/2014 says you have to?**

**So that your management system is fed with the information you need to identify and manage your risk?**

## So what's the right answer?

Of course, in the world of aviation, both are kind of right. But if you only report to meet a legal requirement then you really are missing the point. Firstly, the main reason for the "occurrence reporting regulation" is to feed the wider European aviation system with meaningful information.

The reports your organisation sends to your National Aviation Authority are then analysed at national level. This information then drives all sorts of safety activities. From safety action teams to promotion and focus oversight.

At EU level all the reports end up in a database called the European Central Repository (the ECR). The data is used to drive the European Safety Risk Management process that determines the actions to improve safety. Without your data, EASA and the Member States would be blind. So the system needs the best information possible, ideally from effective organisational investigations.

If your reports don't have any meaningful data on the real hazards and risks you face, we won't be able to take the right actions. In our Safety Map of the World, reporting is vital fuel for system level learning.

## Reporting to other organisations

There are many situations where other organisations need to know that something happened so they can do their own learning. This is particularly true for technical issues. It is vital that your organisation informs the Original Equipment Manufacturer (OEM) so that they can identify and solve any potential airworthiness issues. Because aviation requires so many people from different organisations to work together, informing others about a hazard is really important. A great example is with birdstrikes. If the airport isn't aware an airline had a problem, they won't know they have a hazard to manage.

## Reporting inside your organisation

Coming back to our Safety Map again, the main purpose of reporting is to help your organisation to learn and ultimately manage risks effectively. We have defined the learning part as "Inspire organisations and teams to talk about safety and then have a positive approach to learning and solving problems". Everything is connected in the Safety Map. Without reporting you won't know what your risks are, where you have resource challenges that need to be addressed, or where your staff might need more training or support, or where you have compliance challenges such as a procedure that wasn't updated when a new piece of equipment was introduced.

There are 3 key things to focus on:

- What went wrong (the traditional occurrences).
- What went right and why (so you can focus on consciously replicating success).
- The gap between work as imagined and work as done (so you know where staff are working in sub-optimal situations).

## How can you do that?

### *Have the right mindset and a simple process*

If you want your staff to report and support organisational learning, not just because they had no other choice or the ability to hide what went wrong, then you need to create the right culture and mindset. This means that you have to embrace every report you receive in a positive way. Staff will only report the really important things if they trust the organisation won't punish them for an honest mistake, made under pressure and if they actually believe you care enough to do something with every report.

Use your risk classification effectively to identify the occurrences with the greatest risk and then focus your investigation effort where it is needed the most. This leads to another interesting concept. Stop thinking of it as an "investigation" and more as an "organisational learning opportunity". Change this mindset and you'll be amazed at how much your staff will tell you. Every report gives you the chance to improve the effectiveness of your operation.

## Finally, make it easy?

The final thing about occurrence reporting is that the process has to be as simple and easy as possible. If staff are faced with 20 different forms that all look very complicated, the chances of them completing a useful report at the end of a busy day where something bad happened is pretty small. Make the process simple and train your staff how to use it and you will be amazed at what happens. Of course make sure to thank your staff for their reports as well. ■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# Enhanced Flight Vision Systems

Safe operations in poor weather and low visibility continues to be a major safety challenge in fixed wing, commercial operations. You hopefully have already seen the article and the implementation guide to support the new EASA rules on All Weather Operations that were implemented as part of RMT.0379. EFVS operation with operational credit has been by European Airworthiness and Air Operations regulations since 2008 and then with this further update in 2020

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One of the key parts of these rules are operations with Enhanced Flight Vision Systems (EFVS). This is currently particularly relevant for business or smaller commercial aircraft and should come into the wider airline market in the coming years. Many business jets are now equipped with this technology and certified for this kind of operation. This article will provide more information on what an EFVS operation is, what is required to ensure compliance with the rules and then how the risks can be managed effectively.

## What is an EFVS operation?

EFVS operation combines the use of specific aircraft vision-based technology and Instrument approach procedure such as LPV with appropriate flight crew training to enable approaches in reduced visibility conditions, such as with a Runway Visual Range (RVR) less than 550m. EFVS operations enable safe approaches to be made in reduced visibility that greatly increases the situational awareness of the flight crew through the use of on-board technology. Through additional training they can then manage an EFVS approach effectively.

Within the new All Weather Ops Rules, operators can either operate using EFVS 200 or they can apply to their National Aviation Authority (NAA) for a EFVS-A or EFVS-L operation to take full advantage on this new technology and operate in Low Visibility Conditions, i.e. below 550m but at many more aerodromes than just a few CATII/III.

EFVS family of operations enable safe approaches to be made in reduced visibility that greatly increases the situational awareness of the flight crew through the use of technology (The aircraft/ technology part). Managing a safe approach requires the pilot to have both appropriate training and the relevant currency needed to ensure they are proficient to use the HUD as well as EFVS (The people element in the Safety Map of the World).

### Three specific types of EFVS approach with Ops credit:

There are 3 specific EFVS operations with Ops credit with different levels of privileges/ requirements:

- ***EFVS 200 Approach:*** An operation in which the approach continues without reliance on the pilot's natural vision to a height not lower than 200 ft above threshold elevation and in visibility conditions equivalent to RVR not lower than 550 m. This is the option described on Page 25 of the EASA All Weather Operations Implementation Manual where no specific Ops approval is needed.

If EFVS operations are to be conducted in visibilities below 550 m, this also requires appropriate Low Visibility Procedures (LVPs) to be established at the aerodrome where the aircraft intends to land.

- ***EFVS Approach (EFVS-A):*** An operation in which the approach continues without reliance on the pilot's natural vision to a height above the threshold elevation not lower than 100 ft above and in visibility conditions equivalent to RVR less than 550 m but not lower than 350 m.

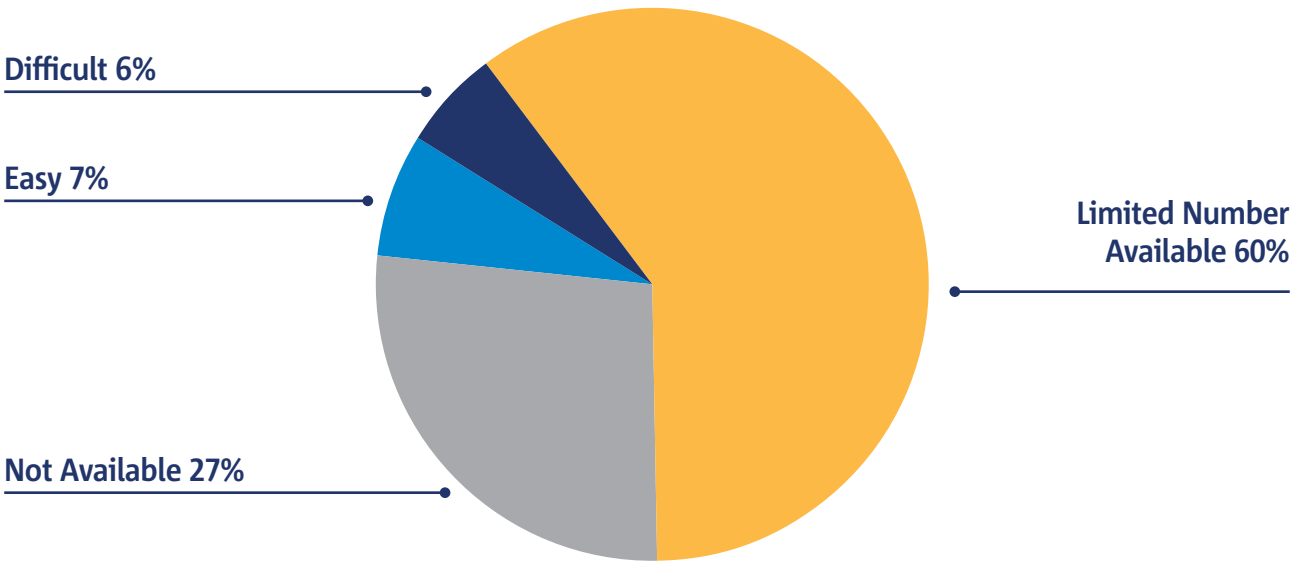
- ***EFVS Landing (EFVS-L):*** An operation in which the approach continues without reliance on the pilot's natural vision and any restriction to a height above the threshold elevation and in visibility conditions equivalent to RVR less than 550 m.

### The key challenges to the use of EFVS

The use of EFVS using the operational credit is not yet an easy task in Europe. A survey amongst business aircraft operators revealed some major challenges. Although currently EFVS is mainly used for situational awareness all respondents expect future low visibility operations and show a distinct desire for EFVS-L and EFVS-A operations.

There are some particular challenges for aircraft operators who seek specific approval for EFVS from their national aviation authorities. Almost 60% of the respondents encountered considerable difficulties, with some remarkable differences between the various European NAA's. There is somewhat a "Catch 22 situation" in many cases. Authorities require operators to provide certain aerodrome information, but this information is not published in their AIP's. Almost 90% of the respondents encountered great or unsurmountable difficulties in acquiring the required aerodrome data. Operators showed a great desire to have EFVS ready aerodromes published.

## Gathering information for EFVS



There are therefore two major challenges that need to be addressed by NAAs and aerodromes respectively.

- For NAAs, we know there are still difficulties in knowing how to approve the operational credits. While EASA is working on further support material for NAAs it is important that you consider two things. Firstly, whether you have a clear process to support operators through their application and also what additional training your staff might need to help making effective decisions during the application process.
- Operators have to carry out a "runway suitability verification". The greatest challenge they have is doing this without the available information in AIP. Therefore, it is important that aerodrome operators provide information as required by AMC3 SPA.LVO.100 (c) for EFVS-A or EFVS-L and in AMC2 CAT.OP.MPA.312 (a)(2)/ AMC2 NCC.OP.235 (a)(2)/ AMC2 SPO.OP.235 (a)(2) for EFVS 200. This includes LED on Approach Light Systems (ALS) and runway and runway Visual Segment Surface (VSS) and for operations with RVR below 550 m, appropriate LVP for approach and the switch over time less than 1 second. For EFVS-L, Precision Approach Terrain Chart (PATC) and ICAO Type A shall be provided.

Useful regulatory information for aerodromes can be found in Part ADR:

- AMC1 ADR.OPS.B.045(a)(3) Low-visibility procedures

**AMC1 ADR.OPS.B.045(a)(3) Low-visibility procedures**

**SUITABILITY OF RUNWAYS FOR EFVS APPROACH AND LANDING OPERATIONS**

(a) An EFVS-A operation may be conducted on a runway if:
  (1) it is served by a straight-in instrument approach procedure in accordance with Part-FPD of Regulation (EU) 2017/373;
  (2) an OFZ is established or a VSS is not penetrated by obstacles, and an instrument departure procedure is established;
  (3) the touchdown zone (TDZ) RVR is available;
  (4) low-visibility procedures are in effect;
  (5) the switch-over time for runway edge, threshold and end lights meets the specifications in CS ADR-DSN.S.880 for CAT II/III runways.

(b) An EFVS-L operation may be conducted on a runway when, in addition to point (a):
  (1) an aerodrome obstacle chart – ICAO Type A is published in the AIP; and
  (2) a precision approach terrain chart – ICAO is published in the AIP.

LVP for landing is new for most aerodromes that are candidates for allowing EFVS operations. You can find out more about the work done by Le Bourget (LFPB) and Antwerp (EBAA) that are CATI aerodromes that paved the way and received experimental approval for EFVS operations in the frame of SESAR AAL2 at this link here.

- ADR.OPS.A.070 Information on the aerodrome lighting system

**ADR.OPS.A.070 Information on the aerodrome lighting system**

*Commission Delegated Regulation (EU) 2022/208*

The aerodrome operator shall report to the aeronautical information services the information on the parts of the aerodrome lighting system where light units are light emitting diode (LED) lights.

**GM1 ADR.OPS.A.070 Information on the aerodrome lighting system**

*ED Decision 2022/013/R*

**GENERAL**

EFVS technology relies on the infrared heat signature provided by incandescent lights. The replacement of incandescent lights with LED lights may render the use of EFVS not possible. This information is important to aircraft operators to assess the suitability of the runway in order to conduct EFVS operations.

- ADR.OPS.A.085 Information on Visual Segment Surface (VSS) penetration

**ADR.OPS.A.085 Information on visual segment surface (VSS) penetration**

*Commission Delegated Regulation (EU) 2022/208*

The aerodrome operator shall ensure, either directly or through arrangements with third parties, that information on visual segment surface penetration is provided to the aeronautical information services, including procedure and procedure minima affected.

**AMC1 ADR.OPS.A.085 Information on visual segment surface (VSS) penetration**

*ED Decision 2022/013/R*

**INFORMATION ON OBSTACLES FOR VISUAL SEGMENT SURFACE (VSS) PENETRATION**

If the VSS is penetrated, the information to be provided to the AIS provider, to publish it under AD 2.25, should clearly indicate the name of the affected procedure and the procedure minima affected. Apart from this, information about the obstacles that penetrate the VSS should be provided to the responsible AIS provider to publish it under 'AD 2.10 Aerodrome obstacles'.

**GM1 ADR.OPS.A.085 Information on visual segment surface (VSS) penetration**

*ED Decision 2022/013/R*

**GENERAL**

Criteria related to the VSS are contained in PANS-OPS Volume II, paragraph 5.4.6, Part I – Section 4, Chapter 5.

- For EFVS 200, the runway suitability check is limited to OFZ or VSS clear of obstacle and LED status.

**GM2 ADR.AR.C.035(e) Issuance of certificates**

*ED Decision 2022/013/R*

**EFVS 200 OPERATION**

A runway is suitable for EFVS 200 operation when:

(a) an instrument approach procedure providing at least lateral guidance in which the final approach track is offset by a maximum of 3 degrees from the extended centre line of the runway is established; and

(b) either an obstacle free zone (OFZ) is established or the visual segment surface (VSS) is not penetrated by obstacles, and an instrument departure procedure is established.

Summary of aerodrome and Instrument Procedure information required for EFVS 200, EFVS-A or EFVS-L:

## SUITABILITY OF RUNWAYS: POINTS TO BE CHECKED FOR EFVS OPERATIONS

| | EFVS 200 | EFVS A | EFVS L | Requirements to be satisfied<br>*EFVS 200: AMC1 & AMC2 of CAT.OP.MPA.312(a)(2) / NCC.OP.235(a)(2)*<br>*EFVS-A: & -L: AMC1 & AMC2 of SPA.LVO.110 and GM12.SPA.LVO.110* | Where to get the information<br>See Here below<br>*or contact aerodrome* |
|---|---|---|---|---|---|
| EFVS 200 | ✓ | ✓ | ✓ | Impact of **LED** lighting (ALS) on visual advantage according to AFM | AIP AD2.14 |
| | ✓ | ✓ | ✓ | **IAP straight in design**ed in accordance with PANS OPS vol. II (ICAO 8168) or TERPS | AIP AD2.24 (charts) |
| | ✓ | ✓ | ✓ | IAP **vertical path** in accordance with AFM limitations and vertical guidance available[2] (AFM) | AIP AD2.24 |
| | ✓ | ✓ | ✓ | IAP final segment lateral **Offset** <3° for EFVS 200 or more EFVS-A & -L (AFM) | AIP AD2.24 |
| | ✓ | ✓ | ✓ | **Obstacles:** | |
| | ✓ | ✓ | ✓ | - Presence of OFZ[1] , or VSS of intended published minima not penetrated | AIP AD2.12 & AD2.25 (VSS) |
| | ✓ | ✓ | ✓ | - No obstacles requiring visual identification | AIP AD2.10 |
| | ✓ | ✓ | ✓ | - Balked landing: Presence of OFZ or climb gradient consistent with Instrument departure procedure[3] | AIP AD2.12 |
| EFVS A | | ✓ | ✓ | TDZ **RVR sensor** available | AIP/ aerodrome chart |
| | | ✓ | ✓ | appropriate **LVP** for landing and associated min RVR *(including switch over time 1sec for runway lights)* | AIP AD2.22 *(AIP AD2.15)* |
| EFVS L | | | ✓ | **terrain profile** prior to threshold, consistent with Flare domain (AFM) | AIP PATC |
| | | | ✓ | **runway profiles** consistent with Flare domain (AFM) | AIP ICAO obstacle type A |

**If a runway has been promulgated as suitable for EFVS by the state of the aerodrome (e.g AIP), then red items here above do not need to be verified by the air operator**
**A CATII/ III runway is considered as suitable for EFVS 200, EFVS-A and EFVS-L operations**




*1: for DA/H < 250ft. OFZ protects up to 960m from threshold 2: i.e 3D operation 3: or alternate procedure*

DASSAULT AVIATION

For NAAs – please encourage your Aerodromes to provide this additional information to the AIP.

# A reminder of Hand Signals for engine start without a headset

As the aviation system gets busier as we head towards Easter, its good to remember some of our basic knowledge. A great subject to think about is using hand signals for pushback and/or engine start. It might have been a while since you used them so its always good to review. Thanks to easyJet and T-C Alliance for this collaborative article.

Using hand signals for pushback and/or engine start can introduce operational risks that have resulted in safety events. Following recent safety reports, this article aims to review the use of hand signals by using an actual event, and the subsequent investigation highlight, the importance of standard hand signals. This shows how important occurrence reports are as they allow us to be proactive and maintain a safe operation.

### An example occurrence report:

"During the walk around, the aircraft anti-collision lights came on. At the time, I was next to engine number 1, looking underneath to check if all latches were closed. As I walked to the nose of the aircraft about to stand in position to confirm that the walk around was complete and the aircraft was clear to start, engine 1 was started. The engine was clear for the start so rather than stopping the engine I allowed it to continue. After engine 1 had started, engine 2 started. Again, with no communication or clearance from the ground. After both engines had started, I was given all clear to remove the chocks."

### What the investigation identified:

This engine start was carried out without a headset, thereby using hand signals. The investigation highlighted that once clearance from ATC was obtained, visual contact with the ground crew was sought to obtain approval for starting engine 1. As one of the ground crew members was observed to be nodding in response, engine 1 was started. This was followed by starting engine 2 after having received a 'thumbs up' from another ground crew member. Although the ground crew reported the aircraft not being cleared to start, the flight crew was under the impression that two uneventful engine starts had been completed. The root cause was determined to be a misunderstanding to which usage of non-standard hand signals contributed. Nonverbal communication between other ground crew members (not the assigned person) and the flight crew furthermore contributed to this misunderstanding. The report and investigation highlighted the importance of ensuring that all ground personnel are briefed and agree on pushing back and/or starting engines without headsets.

This is a key first message from this article: Make sure everyone involved in the operation agrees that this is going to take place.

### It's important to know what the right hand signals are:

Here is a brief overview of the standard marshaling signals used during pushback and engine start.

The following hand signals are taken directly from the ICAO manual and the Standardised European Rules of the Air (SERA); https://www.easa.europa.eu/en/document-library/easy-access-rules/easy-access-rules-standardised-european-rules-air-sera

#### Set brakes

Raise hand just above shoulder height with open palm. Ensuring eye contact with flight crew, close hand into a fist. **Do not** move until receipt of "thumbs up" acknowledgement from flight crew.

#### Release brakes

Raise hand just above shoulder height with hand closed in a fist. Ensuring eye contact with flight crew, open palm. **Do not** move until receipt of "thumbs up" acknowledgement from flight crew.

#### Chocks inserted

With arms and wands fully extended above head, move wands inward in a "jabbing" motion until wands touch. **Ensure** acknowledgement is received from flight crew.

#### Chocks removed

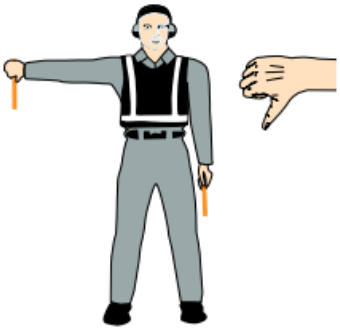
With arms and wands fully extended above head, move wands outward in a "jabbing" motion. **Do not** remove chocks until authorized by flight crew.

### Start engine(s)

Raise right arm to head level with wand pointing up and start a circular motion with hand; at the same time, with left arm raised above head level, point to engine to be started.

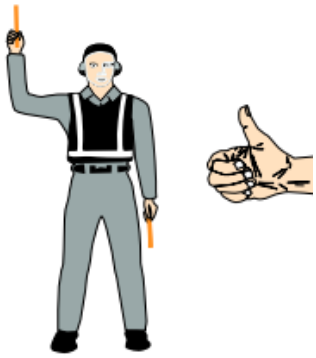
### Cut engines

Extend arm with wand forward of body at shoulder level; move hand and wand to top of left shoulder and draw wand to top of right shoulder in a slicing motion across throat.



### Negative (technical/servicing communication signal)

Hold right arm straight out at 90 degrees from shoulder and point wand down to ground or display hand with “thumbs down”; left hand remains at side by knee.



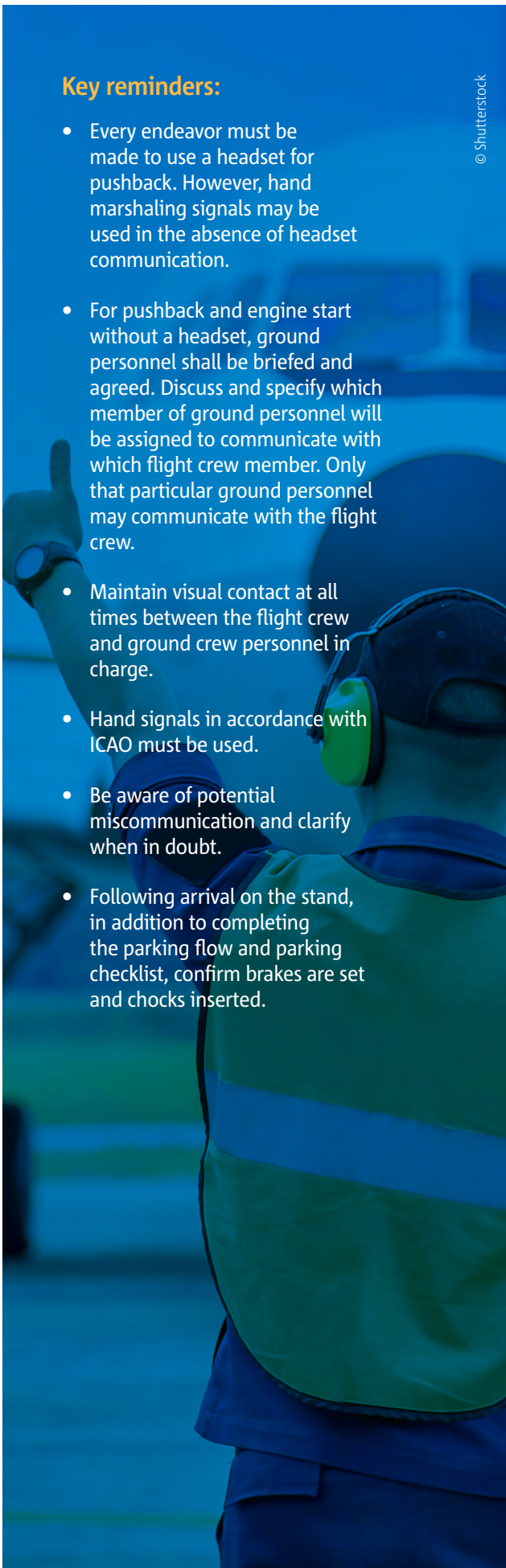
### Affirmative/all clear

Raise right arm to head level with wand pointing up or display hand with “thumbs up”; left arm remains at side by knee.

*Note.— This signal is also used as a technical/ servicing communication signal.*

### Dispatch aircraft

Perform a standard salute with right hand and/or wand to dispatch the aircraft. Maintain eye contact with flight crew until aircraft has begun to taxi.



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### Key reminders:

- Every endeavor must be made to use a headset for pushback. However, hand marshaling signals may be used in the absence of headset communication.
- For pushback and engine start without a headset, ground personnel shall be briefed and agreed. Discuss and specify which member of ground personnel will be assigned to communicate with which flight crew member. Only that particular ground personnel may communicate with the flight crew.
- Maintain visual contact at all times between the flight crew and ground crew personnel in charge.
- Hand signals in accordance with ICAO must be used.
- Be aware of potential miscommunication and clarify when in doubt.
- Following arrival on the stand, in addition to completing the parking flow and parking checklist, confirm brakes are set and chocks inserted.

# GNSS Outages

In a challenging world there are many external risks that we face from people outside the aviation system. With our aircraft systems so reliant on Global Navigation Satellite Systems, jamming and/or spoofing can pose a real threat in some parts of the world. This is particularly the case around conflict zones. In February 2023 EASA issued an SIB on this topic – this article highlights the key points from this document.


Modern aircraft are reliant on the signals from Global Navigation Satellite Systems (GNSS) to feed their different systems. Since February 2022, there has been an increase in jamming or possible spoofing of these GNSS systems that may have an impact on aviation safety. On 17 February, EASA issued a Safety Information Bulletin (SIB 2022-02) on GNSS outage leading to degradation in aircraft navigation or surveillance.

## The impacted areas

The issue of GNSS jamming is particularly a problem in places near conflict zones where you may be routinely operating. Following an EASA collaborative analysis, the main affected regions are:

- The Black Sea area:
  - FIR Istanbul LTBB, FIR Ankara LTAA
  - Eastern part of FIR Bucuresti LRBB, FIR Sofia LBSR
  - FIR Tbilisi UGGG, FIR Yerevan UDDD, FIR Baku UBBA
- The southeastern Mediterranean area, Middle East:
  - FIR Nicosia LCCC, FIR Beirut OLBB, FIR Damascus OSTT, FIR Telaviv LLLL, FIR Amman OJAC, northeastern part of FIR Cairo HECC
  - Northern part of FIR Baghdad ORBB, northwestern part of FIR Tehran OIIX
  - Northern part of FIR Tripoli HLLL
- The Baltic Sea area (FIRs surrounding FIR Kaliningrad UMKK):
  - Western part of FIR Vilnius EYVL, northeastern part of FIR Warszawa EPWW, southwestern part of FIR Riga EVRR
- Arctic area:
  - Northern part of FIR Helsinki EFIN, northern part of FIR Polaris ENOR

## The issues that GNSS jamming and/or spoofing could lead to

The analysis showed that the problem occurred in all phases of flight. In some cases, they lead to re-routing or diversions. It isn't possible to predict GNSS interference or its effects. Also, the magnitude of any impact depends on the location, duration of the jamming and the phase of flight. The main thing is to be aware of where jamming is most likely, what could happen to the aircraft and what crews can do in that type of situation.

### *Here are the main issues that jamming could generate in your operation:*

- Inability to use GNSS for waypoint navigation;
- Loss of area navigation (RNAV) approach capability;
- Inability to conduct or maintain Required Navigation Performance (RNP) operations, including RNP and RNP (Authorization Required) approaches;
- Triggering of terrain warnings, possibly with pull up commands;
- Inconsistent aircraft position on the navigation display;
- Loss of automatic dependent surveillance-broadcast (ADS-B), wind shear, terrain and surface functionalities;
- Failure or degradation of ATM/ANS/CNS and aircraft systems which use GNSS as a time reference;
- Potential airspace infringements and/or route deviations due to GNSS degradation.

## The recommended actions

EASA recommends a number of mitigation measures for operators, ANSPs and National Aviation Authorities (NAAs). These measures should be considered for operations in the areas mentioned earlier in the article and extended to any other areas identified. A new version of the SIB will be published if the situation changes.

### *Air operators, including helicopter operators, should consider the following actions:*

- **Reporting:**
  - **Immediate reporting:** Ensure that flight crews promptly report any observed interruption, degradation or anomalous performance of GNSS equipment or related avionics by means of a special air-report (AIREP) to air traffic control.
  - **Follow-up reporting:** Ensure that flight crews report full details of what happened through your organisations management system. As an operator, ensure the report is shared with your NAA – this will help to keep EASA updated.
- **Risk assessment and mitigations:**
  - **Operational risk assessment:** Assess if GNSS jamming and/or spoofing poses a risk to your organisation based on where you operate and your level of reliance on on-board systems requiring inputs from a reliable GNSS signal;
  - **Determine mitigations:** If required, in the flight planning and execution phase you should consider the availability of alternative, conventional arrival and approach procedures (i.e. an aerodrome in the affected area with only GNSS approach procedure should not be considered as destination or alternate).

**Dispatch limitations:** Ensure that operational limitations introduced by the dispatch of aircraft with inoperative radio navigation systems in accordance with the Minimum Equipment List, are considered before operating an aircraft in the affected areas.

- **Flight crew awareness:**
  - Make sure your flight crews are aware of possible GNSS jamming and/or spoofing, particularly if they are flying in the areas referenced at the start of the article.
  - Remind them to verify the aircraft position by means of conventional navigation aids when flights are operated in proximity to the affected areas.
  - Check that the navigation aids critical to the operation for the intended route and approach are available and;
  - Remain prepared to revert to a conventional arrival procedure where appropriate and inform air traffic controllers if such a situation arises.

### *Actions for NAAs:*

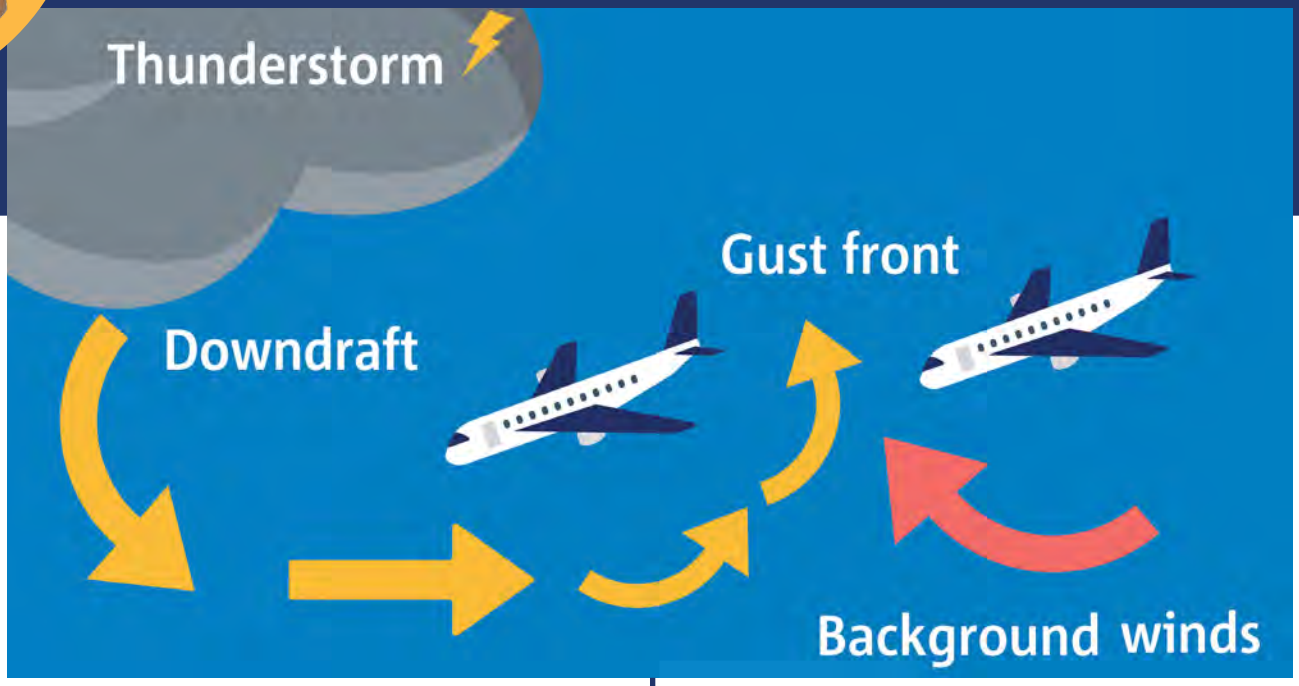
- Ensure that contingency procedures are established in coordination with ANSPs and airspace users, and that essential conventional navigation infrastructure, particularly Instrument Landing Systems, are retained and fully operational.
- Implement appropriate and proactive mitigating measures as a matter of high priority, including the issuance of NOTAMs e.g. describing affected areas and related limitations (as appropriate and determined at State level).

### *Finally, NAAs and ANSPs should also do the following:*

- Establish a process to collect information on GNSS degradations, in coordination with the relevant National Communications Authorities, and promptly notify the related outcomes to air operators and to other airspace users.
- Confirm ANSPs' readiness to provide reliable surveillance coverage that is resilient to GNSS interference, such as ground NAV aids for conventional non-satellite based navigation (Distance Measuring Equipment (DME), Very High Frequency omnidirectional range (VOR)).
- Ensure that ANSPs' contingency plans include alternative procedures to be followed in case of large-scale GNSS jamming and/or possible spoofing events. ■

# Windshear

It's almost impossible to have missed the fact that changes in our weather is leading to more challenging situations for pilots. One of those is windshear. This article from easyJet provides an overview of some of the key risks and mitigations you should consider in your organisation. If you are interested to learn more about windshear in general, check out these articles from Airbus Safety First and ANAC – Brazilian Civil Aviation Authority.




## The annual european storm season

It's not something that happens just at a specific time of year, it can be continual throughout the year. Most importantly it creates some major risks for the aviation community. The European Storm Season is an annual process that is run by the National Mereological Offices of Europe and runs from 1 September to 31 August each year. So far there have been 27 major storms this season with innocent sounding names like Claudio or Philomena.

A number of these storms had very high wind speeds with gusts in excess of 100 kts. Landing in bad weather conditions poses numerous threats, some of the more common ones include windshear or an overspeed while configuring for landing or during a go-around.

This article from easyJet identifies some of the risks associated with windshear escape manouevres based on internal safety reports and summarises key messages for when encountering these conditions. Occurrence reporting is important to help us all learn how to handle challenging environmental conditions.

## Windshear

Weather has often been a key contributor to loss of control in-flight accidents, in most of the cases involving thunderstorms or icing, while windshear is also one of the most significant threats. It is generally defined as a sharp change of wind direction and/or speed.

There are several causes of windshear:

- Thunderstorms and associated microbursts; this is the most severe phenomenon and may affect the aircraft at a critically low altitude.
- Obstacles (e.g, mountains or buildings); disrupting the airflow.
- Wake vortices; which can create severe turbulence or severe up and down drafts
- See breezes or strong temperature inversions; which can cause a sharp IAS variation resulting in an instant loss or gain of energy
- Wind change caused by a frontal system.

While windshear may be encountered at any time of the year, higher risk events are typically observed when associated with low pressure systems and sustained high winds.

## Preventing identified risks

- **Not applying the reactive windshear memory items if the warning triggers.**
  When trained in the simulator, windshear events are commonly associated with turbulence. However, events on the line can occur under perceived calm conditions, leaving little opportunity for anticipation. Even under such conditions, the warning should be trusted, as the AoA has usually changed considerably, undetected by the crew. Therefore, it is not the time to diagnose the situation. The memory items should be applied promptly. If the PF does not respond (perhaps through cognitive incapacitation or startle), PM is expected to prompt, direct or intervene to ensure the windshear escape manoeuvre is actioned. A key factor is knowledge of how the system operates and this is obviously different for each aircraft types. On the easyjet Airbus', once a reactive windshear alert triggers, windshear conditions are latched by the flight computers for 15 seconds. The end of the audio warning "WINDSHEAR" (repeated 3 times) does not mean that windshear has ceased. The message "WINDSHEAR" on PFD is latched for 15 sec. At the end of the 15 sec period, the audio warning will repeat if windshear is still detected. However, we cannot delay reaction to see if the warning repeats, due to the risk of inaction.
- **Reactive W/S memory items applied incorrectly**
  This can relate to configuration changes (such as Gear and/or Flaps) being performed during the windshear encounter. The Pilot Monitoring plays a significant role to ensure that the correct memory items and call outs are performed, monitoring the application of TOGA thrust and pitch flown to SRS or target as stated in FCOM. If asked by Pilot Flying for a configuration change while in windshear, the request should be challenged. Therefore, good communication is essential to keep a common mental model. Once the flight crew agrees that windshear has ceased, configuration can be changed. Do not change aircraft configuration during a windshear encounter! Retracting flaps results in an instant loss of lift and, on some aircraft types, raising the gear will initially add drag due the gear doors operation.
- **Confusion on crew actions and callouts following the activation of a predictive windshear warning**
  In a few cases, memory items relating to a reactive warning have observed to be performed following a predictive warning or caution. This results in the configuration being maintained (e.g. Gear Down, CONF FULL), while a clean-up in anticipation of an actual windshear encounter would have been beneficial.
- **Transition from a W/S escape manoeuvre to a normal climb or Go-Around**
  It is worth highlighting that there are effectively two phases: first the windshear escape manoeuvre and then the transition to a climb or Go-Around. This transition can be very challenging as the gain of energy when the aircraft exits the windshear conditions can easily be confused with an effect of windshear or turbulence, bringing risks of overspeed, altitude busts or Go-Arounds flown not iaw. SOPs. Keep the FMAs in the scan – when out of windshear and above acceleration altitude the mode will change from SRS. The aircraft pitch demand will result in acceleration which can be misinterpreted as persisting windshear. Because time to act is limited, briefing beforehand with an emphasis on the PM's role and actions will help to successfully manage the transition. What flight parameters will the PM monitor? Which callout will be used to indicate that windshear conditions have been escaped from? Which callout will the PF use to initiate a Go-Around or normal climb? How will the PM prompt or intervene if PF's response is not correct? As a reminder, windshear and associated procedures are described in our Airbus manuals (FCOM and FCTM). The FCOM describes the memory items to perform in case of a windshear encounter and the associated callout "Windshear TOGA". The FCTM contains guidance and techniques.

## The key messages for handling Windshear

### Avoidance

- Assess the conditions for a safe take-off or approach-and-landing based on all the available meteorological data, visual observations and on-board equipment.
- As far as possible, delay the take-off or the approach, or divert to a more suitable airport.
- Be "go-around minded" when flying an approach under reported wind shear conditions.
- Be prepared and committed to respond immediately to a predictive wind shear caution or warning.

### Recognition

- Be alert to recognize a potential or existing wind shear condition based on all available weather data, on-board equipment indications and on the monitoring of the aircraft flight parameters and flight path.
- Scan instruments for evidence of impending wind shear.

### Recovery

- If a wind shear warning occurs, apply the recommended FCOM recovery / escape procedure i.e. set maximum thrust and follow the FD wind shear recovery / escape pitch guidance.
- Make maximum use of aircraft equipment, such as the flight-path vector (as available). ■

# Incorrect Barometric Altimeter Settings

Vertical navigation that is based on barometric altimetry and vertical references on navigation charts rely on the use of local barometric pressure, i.e., QNH (or QFE). This means that operating with an incorrect altimeter setting could lead to flying closer to terrain or obstacles than expected. This article is based on an EASA SIB that provides recommendations for operators and ANSPs on ways to mitigate the risks.

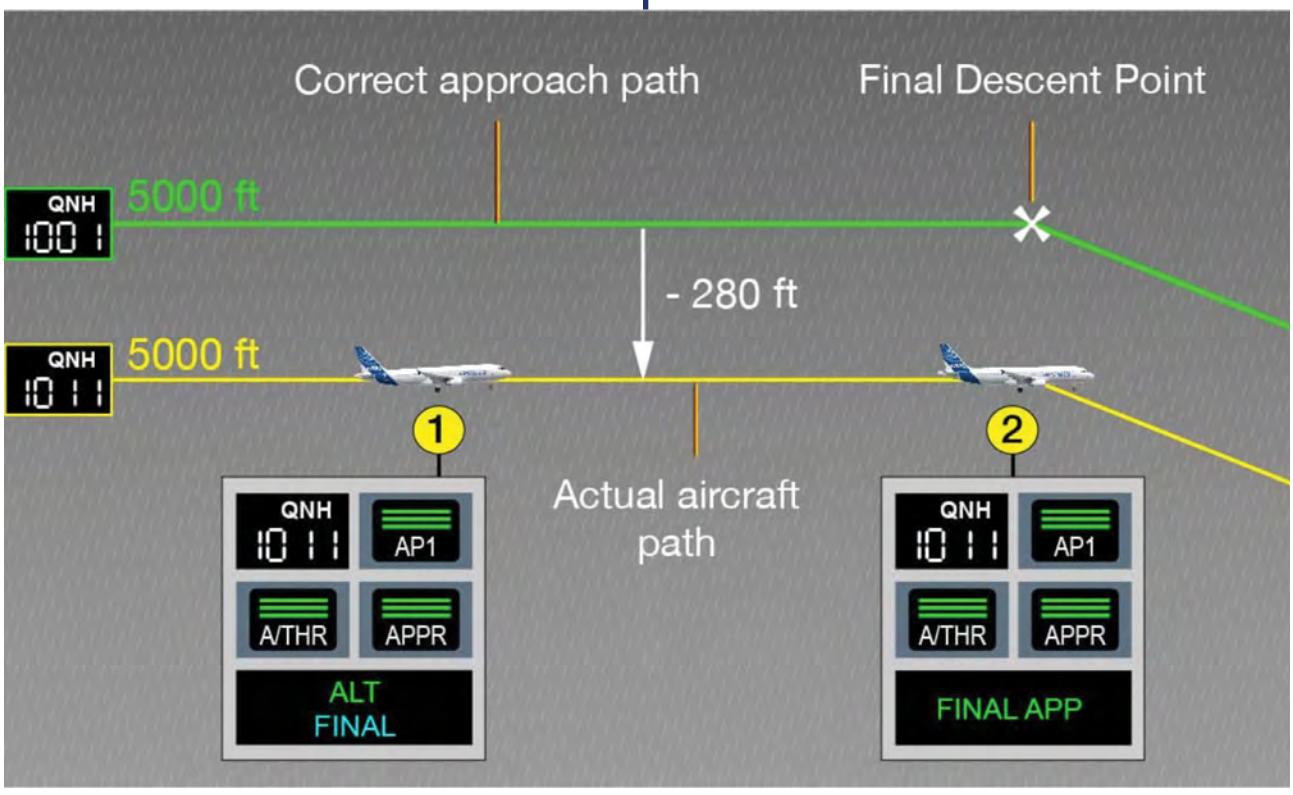
## Understanding more about the risk

Operating with a reduced altimeter setting could lead to flying closer to terrain or obstacles than expected. It may also lead to a loss of separation with another aircraft. These situations could lead to a CFIT or mid-air collision.

Barometric altimetry has been used for a long time and has helped to improve safety by offering vertical approach guidance to runways that were previously restricted to 2D instrument approach procedures or even visual approaches.

Incorrect barometric altimeter setting however, could severely affect the safety margins protecting a variety of approach procedures that are based on the use of barometric altimetry for vertical navigation (e.g., RNP APCH to LNAV/VNAV minima, RNP AR APCH) or that are flown using the CDFA technique that rely on a BARO-VNAV equipment onboard to compute the vertical profile and to provide vertical guidance along the descent (e.g., NDB, VOR, LOC). The diagram below helps to highlight what the situation might look like from a practical perspective.

Vertical guidance provided by ILS, SBAS or GBAS is not vulnerable to an incorrect barometric setting.




## The possible errors that could be introduced

Setting the correct barometric values in the cockpit requires a number of different people to do the right things. This is where the possibility for error comes in, these include:

- The determination of the local barometric pressure by the meteorological service provider.
- The broadcasting of the local QNH/QFE through ATIS (where available) or the radio transmission of the local QNH/QFE by air traffic control.
- Finally, the altimeter setting by the flight crew.

## The recommended actions from the EASA SIB

In addition to the barriers already in place, to prevent the risk of incorrect barometric setting and mitigate its potential consequences, the following practices are recommended:

- **To aircraft operators:**
  - Develop procedures to check the consistency of the QNH/QFE with previous settings and other available sources (e.g., ATIS). Whenever there are differences between the QNH/QFE provided by a controller and the QNH/QFE known from other sources (e.g., broadcast via ATIS), pilots may require confirmation of the QNH/QFE.
  - Ensure that the latest available software version and the latest terrain and obstacle database are loaded in the Terrain Awareness and Warning System (TAWS). This ensures that warnings will be provided for any new obstacles that may have been put up near the approach path.
  - Introduce methods into the FDM program to identify wrong altimeter setting problems, and analysis of data to determine and prevent possible patterns. More information on this is provided later in the article.
- **To air traffic service providers:**
  - Consider introducing procedures to provide aircraft with the QNH (or QFE) when clearing an aircraft for the approach or at first contact with the tower.
  - Subject to the peculiarities of the environment, the repetition of the QNH (or QFE) may be assessed as appropriate, even it is known that the aircraft has already received the information in a previous radio transmission.
  - Consider using the barometric pressure settings that Mode S EHS equipped aircraft downlink to quickly identify whether an aircraft is operating with incorrect barometric altimeter settings. Although Mode S EHS transponders are not mandatory for all aircraft, a vast majority of commercial air transport aircraft are compulsorily to be equipped to operate in the single European sky. Therefore, the actual setting onboard could be used by the ground surveillance system to detect an inconsistency with the local barometric reference, identify the aircraft and alert the ATCO.

## Finally - keep reporting:

To help your organisation and also the wider aviation system have the best picture of safety risks, it's important to keep reporting occurrences and hazards, when they are identified. There is an article on that as well earlier in the magazine. ■

# Managing Turbulence

Turbulence injuries are the most common cause of injury in aviation. This article from the Safety Team at easyJet highlights the main weather phenomena that lead to turbulence as well as some of the best practices that you can use to manage the risks to both cabin crew and passengers.



Turbulence encounters may cause injuries to passengers and cabin crew. However, by using best practices, applying the recommended techniques, and following procedures will help to reduce the risk of injuries.

This co-written article from cabin safety and flight ops safety aims to review some of the different types of turbulence, highlight the associated risks, and provide links to useful references that are available to avoid- and mitigate these risks.

## Some potential causes of turbulence

There are various sources of turbulence that you might encounter:

### Convective weather

*"During descent, crew is aware of a convective cloud ahead. The convective cloud is not displayed on the WXR Radar despite a range of tilt settings. With the lack of return showing on the WXR Radar (WXR Radar was operating and displaying normally) coupled with the appearance of the cloud, a weather deviation is not considered to be necessary. At around FL120 approx. two or three mins after the crew were requested to begin preparing the cabin for landing and were moving through the cabin, the aircraft entered the cloud and encountered moderate turbulence for approximately 25 to 45 seconds whilst the cabin crew was walking through the cabin."*

Convective weather remains an major cause of turbulence. Always consider that a convective cloud may be dangerous, even if the weather echo is weak (the weather radar mainly detects water droplets).

The flight crew should use the weather reports and charts to determine the location and altitude of possible convective weather and Cumulonimbus clouds (CBs). For us at easyJet,

our Connected Portal Pilot iPad app checks for new NOTAMS and weather "real time" when the briefing pack is refreshed. Regularly updating weather information throughout a duty is important because meteorological conditions can be very dynamic. Another potential source of information on convective weather may be an online weather radar. Sharing information about the weather conditions with the cabin crew during the interactive brief helps to create a shared mental model on the expected meteorological conditions and what this means for managing the flight.

Knowing the capabilities, limitations and operational procedures of the on-board weather radar helps ensure correct tilt management (if applicable) and a correct assessment of any storm cells you may encounter.

Once assessed and when deemed required, perform a lateral avoidance instead of a vertical avoidance. Vertical avoidance is not recommended, particularly at high altitude, due to the reduction of buffet and performance margins as well as the potential for strong turbulence (turbulence and a significant concentration of ice crystals can extend well above the visible top of a CB). In addition, some convective clouds may have a significant and unpredictable build up speed. It is therefore preferred to deviate around the "area of greatest threat" by at least 20NM upwind. Avoid flying underneath CBs even in visual conditions and if it is decided to overfly, apply a vertical margin of at least 5000' from the "area of greatest threat". You should provide your crews with further operational guidance on handling Convective Weather and Ice Crystals.

Different aircraft have different types of weather radars, even within a single fleet. So make sure crews know how their weather radar operates. Manufacturers provide various articles and videos that give guidance on the operation of the different types of installed weather radars.

## Clear air turbulence

*"During the cruise the crew were out with the trolleys when we had severe turbulence. The trolleys lifted off the floor at which point we had "cabin crew and passengers be seated immediately".*

Clear Air Turbulence is caused by the speed difference of air masses at high altitude. Regularly updating weather information during a duty and using significant weather charts to determine potential locations of Clear Air Turbulence is considered the main method in identifying areas where it may be present.

The Shear Rate (SR) value on the Operational Flight Plan (OFP) provides an additional source of information to crew. SR signifies a vertical windshear value in meters per second per thousand feet. The SR value is determined by quantifying the difference in wind speed and direction for the wind 2000 feet above and 2000 feet below the planned altitude using a pre-determined algorithm. The higher the SR value, the greater the difference in wind speed and direction between the two altitudes. This information is to be used as guidance only and should be correlated with other available information such as SIGMETS and SIG WX Charts. Actively monitoring the radio frequency for pilot reports of encountered turbulence is also helpful in identifying these areas.

If you encounter Clear Air Turbulence, consider avoiding it vertically, keeping in mind that the buffet margin reduces as the altitude increases (and vice versa).

## Wake turbulence

Wake turbulence rolls-up into a pair of coherent, counter rotating vortices that can persist for some minutes behind an aircraft's flight path. This wake turbulence usually moves downward and laterally with the wind. The intensity of the

vortex and the dissipation time depends upon factors as weight, size, speed of the aircraft and atmospheric conditions (calm weather creates the most critical situation).

Complying with separation minima is the main method to reduce encounters of wake turbulence. If it is suspected that the aircraft is encountering or may encounter wake turbulence, an upwind lateral offset can be used to avoid the wake turbulence (this however provides no guarantee of avoiding wake turbulence). During final approach, the crew should remain on the standard approach slope as a deviation does not guarantee avoidance of the wake turbulence and may introduce other risks.

Airlines should have clear guidance and training material for crew on handling significant wake turbulence encounters. For us, our Flight Crew Training Manual advises, do not use the rudder, keep the AP ON and if the AP is off: release the controls and wait for stabilization of the aircraft prior to rolling wings level and re-establishing the desired trajectory.

## Operational considerations for flight crew

If turbulence is expected, the crew must set the SEAT BELTS switch to ON to prepare passengers and prevent injuries in the cabin. All loose equipment must be secured in both the cockpit and the cabin.

When taking off in high turbulence, our training manual section on Weather Turbulence recommends waiting until target speed + 20kts (limited to VFE-5) before retracting the slats/flaps (e.g. the flight crew must wait for F+20 kt before setting Flaps 1).

In flight, as the flight controls are designed to cope with turbulence, it is recommended to maintain AP/ATHR ON (for severe turbulence refer to the QRH). This also applies for the approach, though if during the approach it is considered that A/THR is operating unsatisfactory: disconnect A/THR and use manual thrust (balance against the increased workload).

Severe turbulence as characterized by large, abrupt changes in altitude and/ or attitude with large variations in airspeed should be avoided. If these conditions are encountered, action the QRH Severe Turbulence procedure and request a maintenance inspection (turbulence check).

## Management of turbulence as a crew

It is essential for the cabin and flight crew to work together as one team to effectively manage the risks associated with turbulence. Practice shows that turbulence in the rear galley is likely to be perceived as worse than in the front of the cabin.

Having reviewed the relevant charts and weather information, the flight crew should use the interactive briefing to inform the cabin crew about the potential for turbulence and provide further information on the type, severity, duration- and location of any expected turbulence.

When expecting turbulence in the descent to destination, consider asking the cabin crew to prepare the cabin for landing at such a time so that the cabin is secure when the turbulence is expected to start (contrary to asking the crew to prepare the cabin for landing when the turbulence starts). Cabin crew are instructed to sit down and protect themselves when it is considered unsafe to move through the cabin. This may mean that the cabin is otherwise not secured on time.

When severe turbulence is either encountered or expected and insufficient time is available for normal procedures, make a PA to instruct the cabin crew and passengers to be seated immediately. When it is subsequently safe to move again in the cabin, make a further PA to return to normal cabin crew operations. Making a PA both in advance and during turbulence is considered a great way to keep your customers informed and reassured. It also really supports the cabin crew and will make a difference to any nervous passenger.

## The key points:

- Turbulence encounters may cause injuries to passengers and cabin crew. Using best practices, applying recommended techniques, and following procedures will help to reduce the risk of injuries.
- Turbulence in the rear galley is likely to be perceived as worse than in the front of the cabin. Cabin- and flight crew working together as one team is essential in effectively managing the risks associated with turbulence.
- If turbulence is expected, the crew must set the Seat Belts switch to ON, to prepare passengers and prevent injuries in the cabin. All loose equipment must be secured in both the cockpit and in the cabin.
- Always consider that a convective cloud may be dangerous, even if the weather echo is weak (the weather radar only detects water droplets).
- Making a PA both in advance and during turbulence really helps to reassure passengers and also supports the cabin crew in their duties. ■


EASA
European Union Aviation Safety Agency

together 4safety