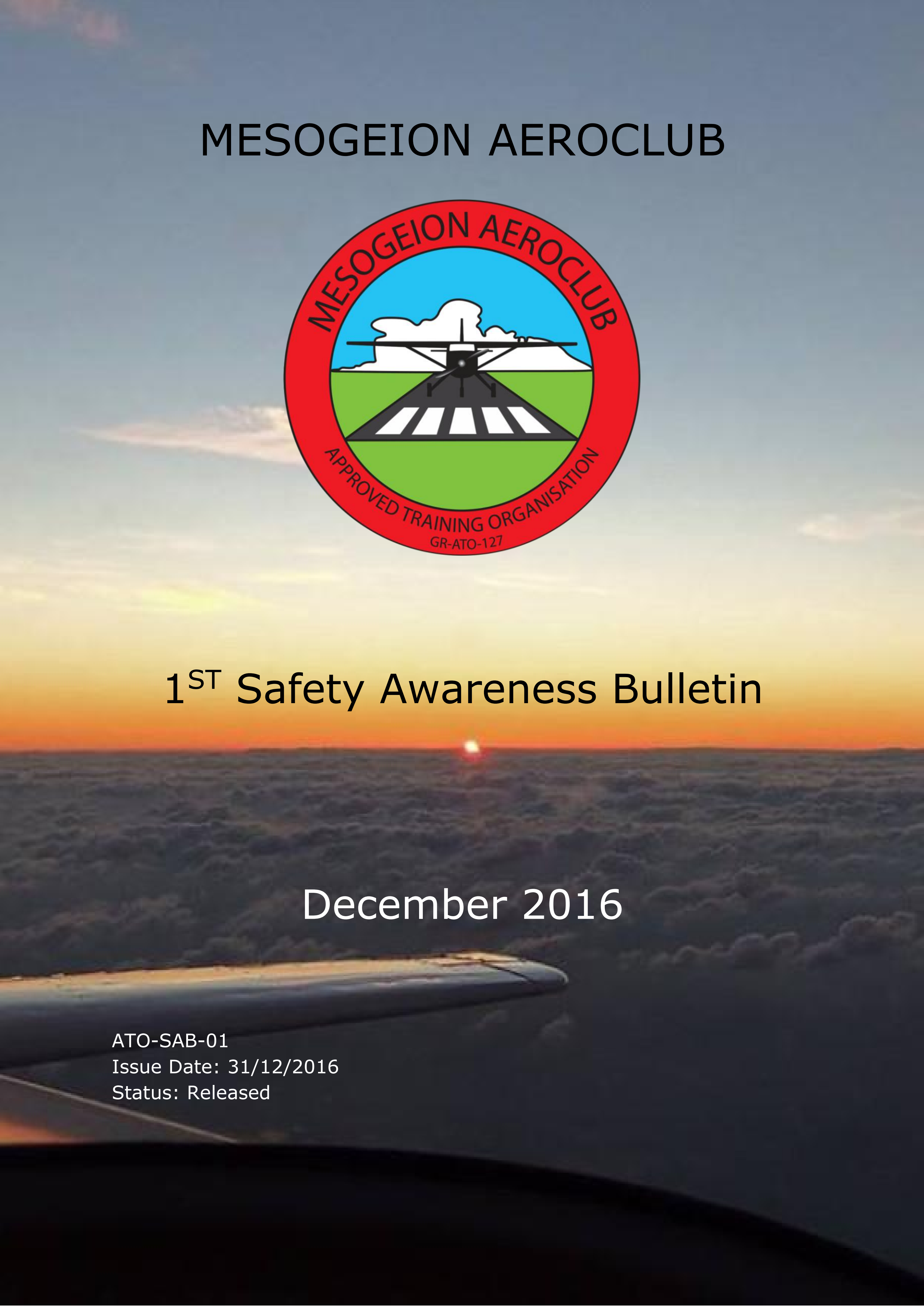

MESOGEION AEROCLUB

1ST Safety Awareness Bulletin

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Welcome on board!

Dear Friends and Colleagues,

It is my pleasure to welcome you to our first safety awareness bulletin. Having a long term interest in flight safety, we have always wanted to create a safety-related publication. For a long time we considered this task to be time-consuming and we faced several dilemmas; what should it look like? Who is our audience? How far should we go with disclosing details coming from reports or details related to our internal processes? We worked carefully through those questions and we decided that now more than ever, we have a duty to be open an honest about safety. We have established an SMS system which is now in a stage of maturity and we have sufficient data to openly discuss safety matters relevant to our organisation. As an organisation we have accumulated thousands of flying hours and our experience convinced us that our national safety level needs to be improved. Being critical about others is always easy. But safety starts at home. We can only improve by being critical about ourselves, transparent and honest. The basis for it means accepting criticism and being ready to expose ourselves to it.

For our organisation, the purpose of this publication is twofold; Firstly, it provides you with an overview of our Safety Management System and an update on safety developments. Secondly, it fosters and sustains a lively dialogue on safety matters aiming at improving our safety awareness and enhancing our safety culture. But safety culture is never a static idea - on the contrary - it is very dynamic and it requires continuous efforts in every single of its pillars. With this bulletin we are trying to transform our safety culture to an informed and a learning culture.

Our Safety Management System is a main pillar of our operational environment as well as a powerful tool to monitor and improve safety levels. For our SMS to be functional and effective, we need safety related data. The main sources of such raw data are safety related reports without which, charting our safety levels would have been impossible. Every single report, no matter how trivial it might seem, is yet another very important contribution. We are pleased to present in this issue aggregate flight safety results from April 2015 to November 2016. The growing number of reports suggests a strong interest in flight safety and an improving safety culture which in turn enables us to carry out informed decision making in safety related matters. By exchanging safety related data with our national authorities we are becoming a precious data source and in the long run we are actively contributing towards an improvement in our national safety standards.

Because we are primarily a training organisation, we consider ourselves to be activists in matters of flight safety. Flight safety starts with training and strongly depends on it. With that in mind, we have embarked on a tireless journey to improve flight safety.

I would like to once again thank you for your commitment and your active participation and I wish you all safe and enjoyable flights.

Iason Rigas
Safety Manager

Contents

1.0 Introduction

Before looking at safety related data we would like to turn the time back to share with you what we consider to be important milestones of our training system and consequently, our training culture.

Mesogeion Aeroclub was founded in December 1999 and obtained its first aircraft in December 2000. In February 2004 we obtained an approval for the JAR-PPL training course. In those past 12 years we have had the pleasure to work with a number of highly skilled and enthusiastic professionals who have changed the organisation for the better. Through their commitment, dedication and hard work they have transformed a simple air club to an EASA certified flight school providing top quality courses within a highly standardised and consistent environment. We are showing every day that one doesn't need a huge fleet, expensive installations and flawlessly ironed uniforms to provide a good training standard. But what one needs, and few have, is consistency, standardisation and highly skilled professionals who are passionate about their job. Through this publication we want to express our gratitude to Cpt. Serafeim Touliopoulos, a legendary professional and one of our former Heads of Training for his tireless efforts towards improving standardisation and safety within our organisation. This is not to say that we are not thankful to all of our past and current colleagues with whom we have cooperated all over the years. The list is very long and each of their individual contributions is very special. But owing to his vast experience in single engine flying and his persistent character routed in his passion for aviation, Serafeim achieved the greatest positive impact by implementing a unique training methodology. Ever since, we are meticulously safeguarding this fine tradition by sharing this passion with the world.

Knowing that an organisation needs time to adapt to changes, we initiated an experimental introduction of the EHEST SMS toolkit (an EASA proposed SMS tool) in January 2014.It quickly became apparent that the EHEST is not appropriate for our structure, size and complexity and that we need to develop and implement a different SMS solution. Subsequently we decided to shift responsibility for safety management away from our accountable manager to a dedicated Safety Manager. In the first quarter of 2015 the new Safety Manager attended an external SMS course in Germany and worked towards a custom made SMS solution based on the AARMS methodology. In April 2015 as part of the EASA application process the new SMS was submitted to the CAA and we became an EASA certified ATO while the new Safety Manager assumed his duties in July. During that time, there has been a parallel development of an electronic occurrence reporting system (developed by Ilias Tsopelas) as well as continuous improvements to the existing SMS.

Coincidently as we have been developing and improving our SMS system we received an invitation from the AAIASB to a general aviation meeting focused on flight safety. It was the first initiative of this kind and we attended it enthusiastically. We were relieved to realise that the responsible authorities are sharing our anxiety for a lack of safety management systems in Greece as well as for aspects of general aviation safety culture which seem to be highly problematic. A national safety culture survey was presented indicating a need for a more systematic approach to flight safety and an improvement of the safety culture. By the end of this meeting we had realised that although there is a lot to do internally, by having an already functional SMS system we can assist with our know-how national authorities as well as the rest of our community.

Figure 1 From the EHEST trial application to the establishment of a functional SMS

Our first priority was to develop our system further and ensure that our safety level is appropriate. We continued monitoring our safety levels and we realised that although we have concentrated on the technical aspect of our SMS, we should spent some more time to communicate the changes to our members.

Figure 2 A safety culture has to be an informed culture. The number of occurrence reports increased spectacularly following a live presentation a distribution of SMS material

A live presentation took place during the 2015 annual meeting while one bilingual offline presentation was created for members who were not able to attend. Since January 2016 and after two years of having some form of an SMS implemented, we can now argue that our SMS is mature.

This doesn't mean that the system should be left on its own. On the contrary – we continue monitoring its functionality and try to improve it further.

Between April 2015 and September 2016[1] we have received a total of 77 safety related reports submitted through our electronic occurrence report submission system. As required by law, a number of such reports have been forwarded to the relevant Civil Aviation Authority and Hellenic Air Force departments. Additionally, in an effort to increase the data pool of national safety related data we have forwarded a significant amount of data to the Greek Air Accident Investigation & Aviation Safety Board (AAIASB). We were very pleased with their enthusiastic and positive reactions to our inputs and we are looking forward towards developing a future close cooperation with them and other stakeholders.

[1] The sample of this bulleting covers safety data from April 2015 to September 2016 inclusive. The bulleting is published in December as there is an extensive data analysis, drafting and reviewing process causing a 'publication lag'. The next publication will most likely cover the period October 2016-September 2017.

2.0 Occurrence Reports Analysis

2.1 The process

Reports submitted to our SMS through the electronic occurrence reporting form undergo an initial processing by the Safety Manager personally. The initial processing consists of the following steps:

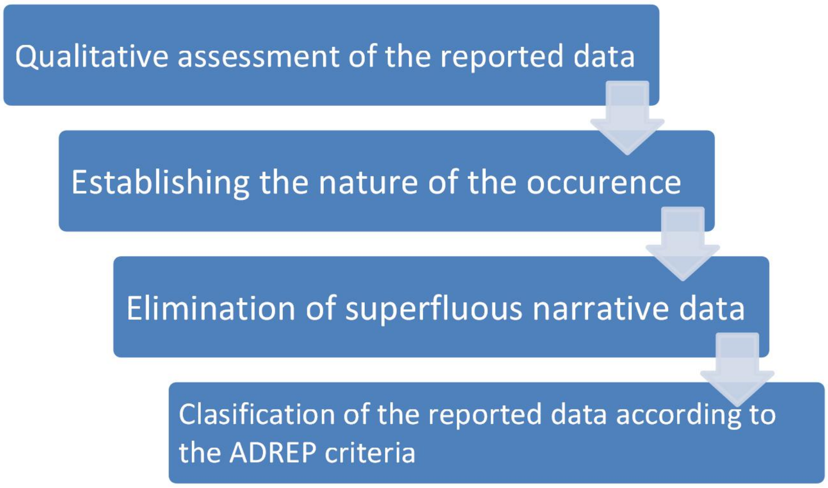


Figure 3 Electronic occurrence report initial processing

This quick process establishes the urgency with which the report is to be dealt with and whether there is a need to contact the reporter, persons named in the report, or other units or authorities. If no such need arises the report is anonymised by removing names and other data which might be used to directly identify individuals and it is stored in a dedicated database following partly the ADREP[2] format. After the report is stored, an extended event risk classification (EERC) is conducted on all reports and if required a safety review (SRE) is conducted according to the SMM Manual. Potential subsequent findings are recorded in a separate safety database.

[2] The Accident/Incident Data Reporting (ADREP) system is operated and maintained by ICAO. The ADREP system receives, stores and provides States with occurrence data that will assist them in validating safety. Mesogeion uses partly the ADREP 2000 classification for its systems to enable data analysis in the future and as a step to facilitate the electronic transfer of occurrence report data.

2.2 Reports by phase of flight

Due to the nature of our flight operations and the size of our fleet, the number of reports will not enable us to draw safe conclusions solely based on quantitative statistical analysis. Therefore qualitative assessments based on expert judgement have been carried out throughout this document in order to supplement our quantitative data and lead to more consistent conclusions[3]. Figure 4 shows how occurrences are split between different flight phases.

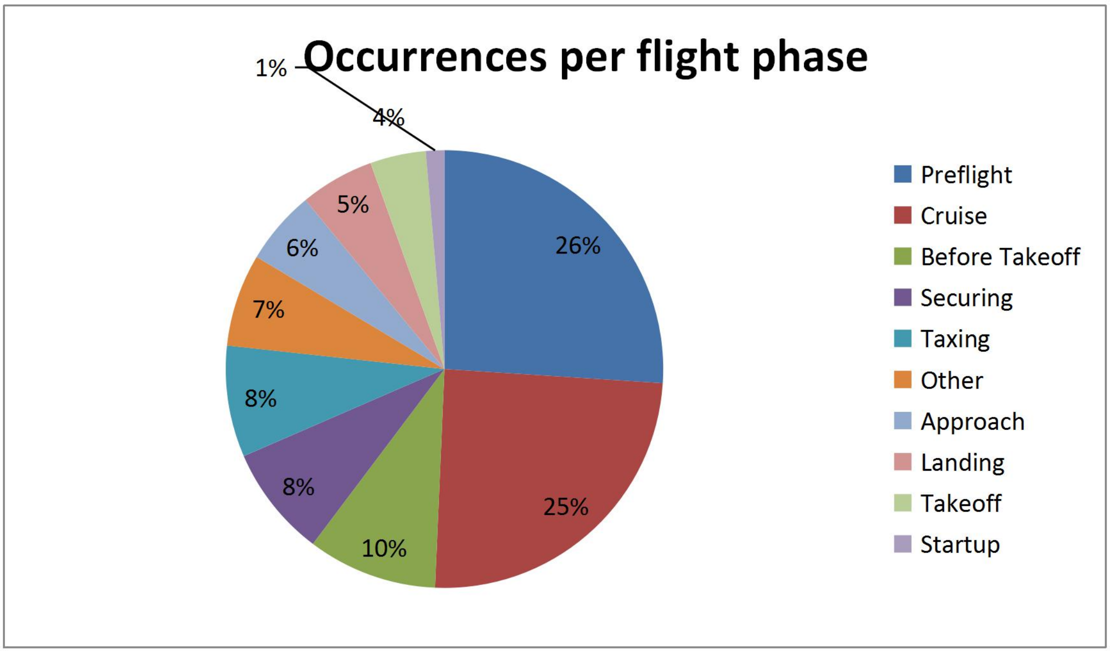


Figure 4 Share of reports per flight phase, pre-flight and cruise occurrences make up the biggest share

Despite the fact that most of our flight volume consists of training flights involving several take-offs and landings there is a relative small amount of occurrences related to these phases. Teaching a student how to take-off and land is a complex process which, if not handled well by the instructor on board, might lead to a range of undesirable situations. This was not the case. The very few reports concerning the approach and landing phases involve licence holders who fly either alone or with an instructor as part of a re-currency check. **For a number of years we have observed that some licensed pilots can face difficulties during the approach and landing phases especially if they have not flown recently**. To mitigate this risk we have implemented **stricter recency requirements**[4] which have empirically led to a reduction of such incidents.

Comparison of statistical figures is a complex process requiring caution. In aviation literature we very often find graphs and statistics concerning incidents and accidents. Their anatomy is bound to be very different from statistics describing simple occurrences especially when no severity threshold is applied. To put it very simply, an occurrence form can be filed for almost anything. For example, if a colleague detects during his pre-flight checks the beacon light switch forgotten in the

[3] A note of caution for readers: for some occurrences multiple reports have been submitted (by different individuals) and therefore it is impossible for the reader to determine the number of the reports in each category based on percentage figures.
[4] See Operations Manual paragraph 1.11 Recency Requirements Day and Night

“on” position, such a report will appear in the statistics above. However such an event cannot possibly become a cause of an incident/accident. Therefore statistical figures in this bulletin can only be potentially compared with figures coming from another organisation of similar operational complexity and in a similar operational context. Even then, factors such as the ratio of training/leisure flights would alter the results. The importance of this bulletin is not the inclusion of statistics and other numbers, but the insight the reader can gain, and application of that insight in flight operations.

2.3 Pre-flight phase reports

Most occurrence reports concern the pre-flight phase and this is a positive side as the pre-flight procedure is a flight safety process of a preventative character. It therefore suggests that this safety net is functional and that several issues are discovered early. On the other hand it also shows that pilots are not hesitant to report minor findings detected such as forgotten switches in wrong positions or failures at an organisational level. Although some might sound trivial, in fact they have greatly assisted us in improving our processes.

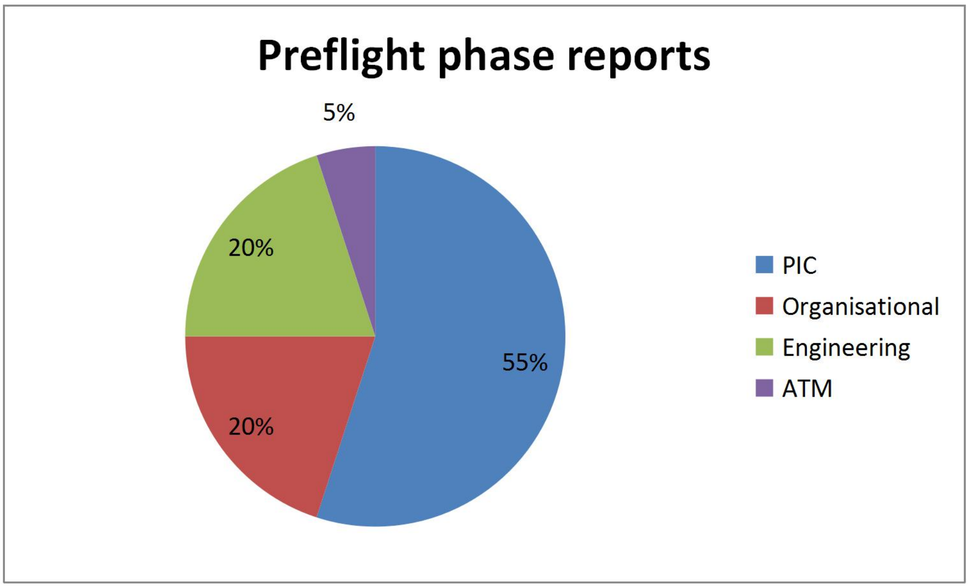


Figure 5 The primary causal factor is the PIC. Engineering issues are expected but organisational factors were unusually high. Actions were taken to mitigate risks related to organisational factors.

An unusually high share of reports concerned the refuelling process and fuel checks. Although the PIC is a contributing factor in most cases (eg. Mistakes in measuring fuel quantities, skipping the drain process etc), a good percentage **concerned organisational factors**. Let’s look at each of them in turn:

2.3.1 Organisational factors analysis

The following excerpt illustrates an example:

<u>Background:</u> The PIC refuelled the aircraft with a sufficient amount of fuel, flew to his destination, and then returned. After his returned he was asked how much fuel he had on board on his last departure and he was uncertain of the exact quantity.
*"The PIC had **only a rough estimate in mind**. I asked him if he used the dip stick to see the exact amount of fuel, and he stated that he didn't check it visually because:* *a) the leg first leg was short (less than 2 hours)* *b) he **has checked the fuel before starting** at LGTT* *c) the **fuel indicator** was almost full at his destination during his pre-flight check* *d) the PIC didn't want to climb on to the wing without ladder and didn't know that there is plastic stool in the baggage area to be used.* *f) he considered that there was **no-possibility that someone might remove fuel from the plane**"*

<u>Analysis:</u>

In this example it becomes apparent that although the PIC understood that he had to check the fuel before flight, he was confident that he had enough fuel as he refuelled the aircraft himself. At the same time he didn't want to climb on to the wing, knowing that the correct procedure would be to use a staircase.

<u>Contributing Factors:</u>

For a long time the pre-flight fuel check was conducted by stepping on the pylon and **assessing roughly the contents of the tank using a simple ruler**. After the aircraft was repainted there was an instruction to stop climbing on the pylon. Although a stool was placed on board the aircraft, it appears that this fact was not successfully communicated to all pilots.

<u>Additional Considerations:</u>

It is a known fact that fuel indicators on board C172s have to be considered unreliable in general as they tend to be inaccurate. A very basic parameter is that there is always a possibility that someone removed fuel from the plane or that there is a fuel leakage.

A safety review investigation was carried out regarding this and similar incidents were a second latent risk was discovered**. Fuel dip sticks were inaccurately graded, leading to uncertainty regarding the actual contents of the fuel tanks in litters. All aircraft are now equipped with graded dip sticks in litters enabling the PIC to accurately assess fuel quantities.**

Every mitigation action in place to control a hazard must be monitored for its effectiveness. This is especially important as our mitigation action might not be effective or it might become itself the source of another risk. As this occurrence report indicates, our mitigation action created a new risk:

Background: The PIC conducted a short local flight
"I conducted the pre-flight inspection. I calculated 70 lts on board using the graded dipstick. After the flight I realised that ***the dipstick inside ASG is the one belonging to ASV which has a smaller tank. Therefore, in reality the aircraft had more fuel than 70lt****."*

Analysis:

In this specific case the dip stick under-read the contents of the tanks, with the aircraft having in reality more fuel on board. The opposite would have been a dangerous situation.

Contributing Factors:

The graded dipsticks were marked with the aircraft's registration mark. However, this was not enough to prevent a pilot at some stage mixing them up.

The following table illustrates the organisational hazards detected in the examples above and their associated mitigation actions:

Hazard Identified	Severity	Mitigation Action
Existence of a stool to check fuel contents was not effectively communicated to all pilots, making them hesitant to check fuel contents	D	The existence of a stool was communicated to all pilots.
Fuel dip sticks are not properly graded making fuel calculation complex and error prone	D	New dip sticks are developed and they are accurately graded.
Fuel dip sticks accidentally swapped between two aircraft with different tanks, resulting to an underestimation of fuel quantity	E	Fuel dip sticks clearly marked for the two aircraft

Table 1 Organisational hazards detected and associated mitigation actions

The PIC factor is also predominant for another reason. During the initial stages of flight training and in order to shape their airmanship character, students are allowed to carry out pre-flight inspections alone. As in all stages of flight, students are more likely to make mistakes.

2.3.2 PIC and Engineering factors analysis

PIC

Regarding the PIC as a causal factor, the occurrences reported were mainly about mistakes and lapses during the pre-flight. The following table lists some representative examples during this period:

Occurrence report description:
Flaps down following pre-flight in windy conditions
Filler cap forgotten after refuelling but closed before flight
Fuel strainer stuck in drainer valve during pre-flight
Hand pushback causes minor damage to elevator
Dipstick dropped into fuel tank during pre-flight

Table 2 Typical pre-flight findings related to the PIC

However there are also examples of occurrences which concern the flight preparation (and thus listed here in the pre-flight section), and their nature is very different as they are about errors in decision making. The following excerpt illustrates such a case:

Background: The PIC carried out his pre-flight checks and made a decision to depart to his destination.
*"I talked to the PIC just before start-up who was **not properly prepared for the flight**. I informed him for the TAF at (destination aerodrome):* *VRB05KT 9999 SCT030 PROB30 TEMPO [XX]12/[XX][5]18 5000 SHRA FEW018CB SCT030* *The PIC **insisted to start-up**. Had he executed the flight, he would have most probably encountered adverse WX conditions while **he would have also violated the OPS Manual**."*

Analysis:

The OPS manual in section 1.21.1.3 lists the following restrictions:

1.21.1.3 THUNDERSTORMS AND TURBULENCE

An aircraft will not takeoff when before departure actual or forecasted conditions indicate that:

1. En-route or at the destination aerodrome at the time of arrival the weather conditions will be adverse due to thunderstorms.
2. Above or in the close vicinity of the departure aerodrome there are cumulonimbus clouds covering 1/8 or more of the sky.

According to the TAF there is a PROB30 indication for the time of arrival of the aircraft with a similar forecast of 1/8 cumulonimbus clouds. Although PROB30 indicates only a probability of the event occurring, taking such risk was unnecessary.

[5] Date removed in compliance with Regulation (EU) 376/2014, provisions for the protection of reporters.

Additional considerations:

It is important to familiarise yourselves with the operations manual in general and especially with all safety restrictions in this manual. These restrictions are an additional safety net.

Engineering

Engineering findings during pre-flight are very typical and they are a first line of defence. Typical findings during this period include some of the following:

Occurrence report description:
Brake INOP
Nose gear oleo strut flange failure
Magneto rough operation

Table 3 Engineering factors during pre-flight

These are considered ‘normal’ findings and therefore no mitigation actions were considered necessary. For the oleo strut flange failure, an aircrew safety notification was sent to all pilots and members. Additional discussion of this issue can be found at the end of the bulletin.

2.4 Cruise phase reports

2.4.1 PIC factors analysis

The second largest category is occurrences during the cruise phase. Figure 6 shows that in 35% of the occurrences reported, the PIC was the main contributing factor. Poor decision making and insufficient preparation before the flight were key characteristics of some of the reported occurrences. In some cases a better preparation would have prevented a number of occurrences reported. The occurrences reported vary and therefore it is difficult to reach a conclusion at this stage. In the next issue perhaps more useful conclusions can be reached. For now, we can go over a simple report:

Background: The PIC is flying en route and does not maintain the minimum vertical distance from the cloud above
"aproximatelly at [POSITION] without expecting it we penetrated a cloud and as a result we encountered IMC conditions. ***We decided to lose some altitude*** *in order to clear the cloud as we did. Carb HEAT was used and I immediately switched to the instruments."*

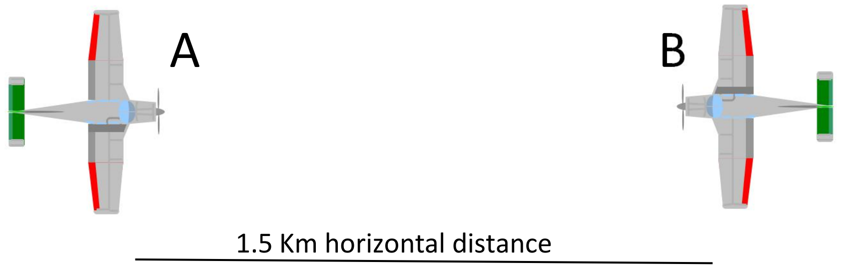
Analysis:

Entering IMC is one of the most dangerous situations a PPL licence holder can encounter. This is the first reason why a minimum horizontal distance of 1,5 km and a vertical distance of 1000ft away from clouds must be maintained (depending on altitude and airspace classification). Descending while in IMC is not an advisable action. From a theoretical point of view, if IMC is encountered a 180 turn should be performed. In this case however, the PIC knew that he penetrated the cloud from below and thus it was more sensible to descend (terrain permitting) a few feet to get out of the cloud rather than to stay at the same altitude and initiate a 180 turn in IMC conditions. You should avoid entering IMC conditions at all costs. A 180 avoidance manoeuvre when IMC is encountered is dangerous for those not flying in IMC regularly. And even then, you should maintain your altitude. It is not helpful to fly a 180 turn only to realise that you are now 500 ft above your initial altitude and well into the clouds.

Additional Considerations:

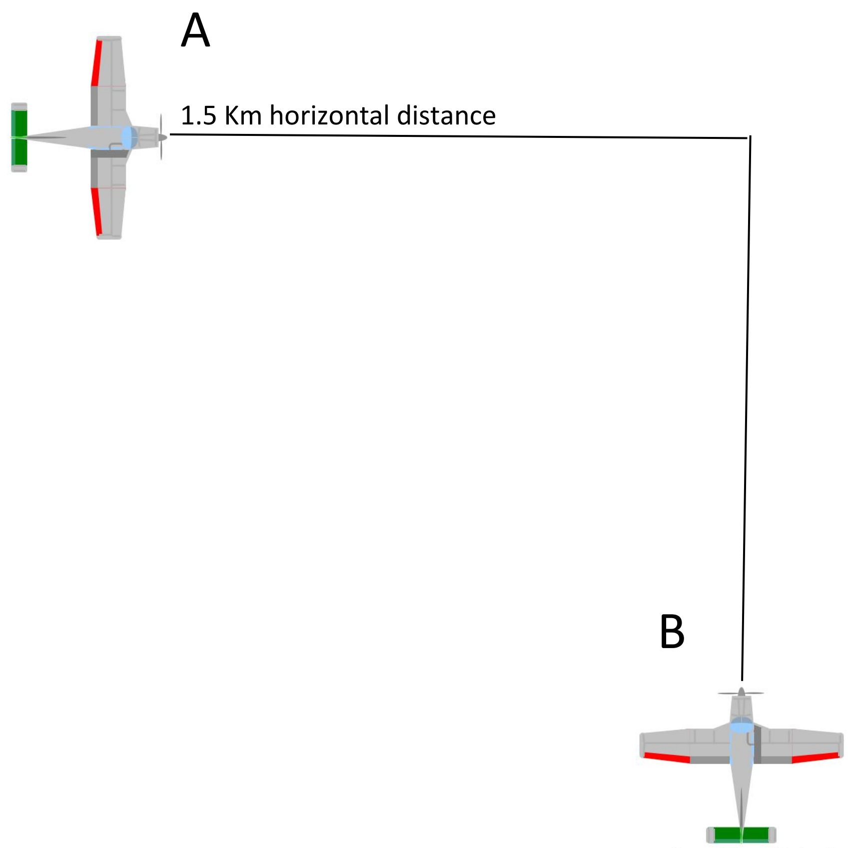
Very often we have to follow a number of rules and regulations but we might not understand why those are in place. Sometimes the horizontal and vertical distances from clouds are questioned for their necessity and the extent to which those numbers are arbitrary. These restrictions are in place on an ICAO level not only to make sure that you will not enter IMC conditions, but also to ensure that you will have enough time to avoid other aircraft depending on the airspace classification and the applicable rules of the air. We can illustrate this through a very generic example:

An aircraft flying below 10.000ft will most likely have a maximum speed of 250 kts. Therefore two such aircraft on a head on collision course will have a combined closing speed of 500kts, 926km/h. Under those conditions, their in-between distance of 1.5 km will be covered in 5.8 Seconds as the picture shows below. This is a worst case scenario with a very tight margin for reaction and it is hardly applicable in our general aviation context. The purpose is to illustrate the rationale of a minimum distance.



With a closing speed of 926 km/h (250 kts each) , the aircraft will collide in 5.8 Seconds

The following example is more relevant for us. Think of two aircraft converging on a 90 degree angle, each with a speed of 100 kts. Due to the 90 degree angle their closing speed is 100 kts (185km/h). The aircraft will collide in 29 seconds.



A closing speed of 100kts (185 km/h) means that the aircraft will collide in 29 seconds.

Assuming that you are flying plane B, and plane A was not visible before because it was flying in IMC conditions (for example it is flying IFR outside controlled airspace) you both have now 29 seconds to see and avoid each other. This is enough time if you are both scanning actively for traffic outside the aircraft. You should always remember that in our environment most procedures and rules are in place for a very good reason and a number of them were developed following fatal accidents.

2.4.2 ATM/CNS factors analysis

29% of the occurrences can be attributed to Air Traffic Management (ATM) and Communication/Air Navigation and Surveillance services (CNS) as a causal factor. We are well aware that in the domestic aviation industry national authorities experience strong difficulties in those two areas and as a result of deep budget cuts their financial ability to enhance and improve their operational systems and thus the services provided is very much limited.

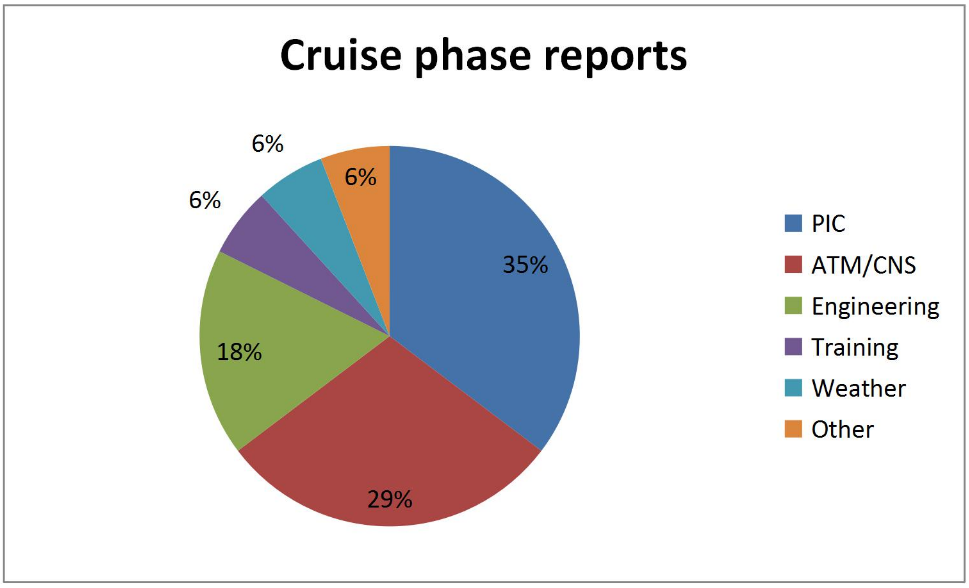


Figure 6 Cruise phase reports. PIC and ATM/CNS are the main causal factors. Engineering comes third with some interesting cases.

Through our SMS we are gathering data which enables us to carry out risk assessments and mitigate risks while at the same time we are constantly forwarding safety critical data to the responsible authorities. Within the scope of our SMS we are assessing every single such report to detect and manage risks. As we are not in a position to bring about changes in ATM and CNS infrastructures, we consider our operational environment to be fixed but at the same time we are implementing controls to mitigate any risks. Safety assessments have concluded that the most safety critical facet of the ATM-CNS issue concerns our IFR operations. A number of reports concerns lack of radio and radio navigational coverage at low levels under IFR.

Background: The PIC was flying IFR when noticing that an ils DME was unserviceable but no NOTAM has been issued.
*"Within the coverage area of [XXX] ILS i noticed that I-[XXX] DME was out of service (no-ident, no-indication). **No NOTAM has been issued**. Our receiver has been checked with another station on the same day. On the previous day within the same area, and with a different airplane I noticed the same (again **no NOTAM was issued**). Both days I reported this to the ATC. "*

CNS issues are not the only ones encountered. Although the air traffic control is used to work with IFR commercial traffic, the volume of IFR general aviation flights is low. Additionally, the volume of IFR training flight is much lower and therefore controllers are sometimes not used to our 'strange' requests, requests to facilitate training purposes. The following excerpt illustrates that point:

Background: The PIC was flying IFR. The first leg would be a practice approach followed by a missed approach and reclearance to a new destination. He is number 1 , followed by an airliner.
*"The controller at least 3 times requested me to execute **unpublished departure** procedures such as:* *1) climb 10DME straight ahead* *2) **climb 4DME at 6000feet (which would have been impossible to achieve with the C172)*** *3) left turn visual to XXXXX.* *Initially I accepted option 1, but as I approached the airport it was clear that we would enter into very unfavourable IMC, thus I insisted - requested (at least 2 times) to get a published SID (such as [XXXXX]).* *The controller finally cleared us for the published SID, but advised me next time to accept ATC instructions."*

Analysis:

In the excerpt above the controller had difficulties working with the two aircraft and although both flights were flying IFR and normally there are a number of tools to deal with such a situation, he was not used to work with that kind of traffic mix. On top, the controller was confused with the inability of the PIC to execute other instructions as he is very much used to different performance from the aircraft he is working with.

- Option 1 would have brought the aircraft in an area of heavy cloud formations;
- Option 2 would have been impossible for the aircraft type;
- Option 3 would have required a visual segment;

Finally, the ATC went with the PIC's proposal as there was no other alternative.

Additional Considerations:

No matter what kind of clearance we are given, we should always decide whether the clearance is safe and appropriate for the aircraft and the conditions. If not, we should request an amended clearance as **we have the final and full responsibility for the safe conduct of the flight.**

Mistakes and errors are not avoidable but especially under IMC conditions it is crucial that any situation developed can be safely recovered from. Besides proper training, maintaining a good situational awareness is a necessary condition for resolving any situation. Our IFR aircraft have the necessary approvals and comply with all legal requirements. However the equipment requirements are the minimum listed, and although they provide all the necessary information for flying under IFR we considered that it would be desirable to upgrade existing equipment.

Figure 7 Flying IFR at night or in IMC is always challenging as your situational awareness is based only on your interpretation of instruments on board.

In the first quarter of 2016 we decided to channel our efforts into maintaining only one IFR approved C172 (SX-ASG) and to upgrade its equipment by adding an approved Garmin GNS430 GPS by the end of 2016. The device has been bought and at this time its installation is pending.

Figure 8 The GNS430, selected COM1 frequency is shown on the left side while just below it a VOR is selected. Route with obstacle data is displayed.

The GNS430 is an RNAV capable GPS unit which also serves as an 8.33 khz capable radio transceiver. The main benefit is that the GNS430 adds a precious B-RNAV capability to our aircraft while at the same time it offers improved situational awareness to the flight crew through a moving map and a terrain display capability.

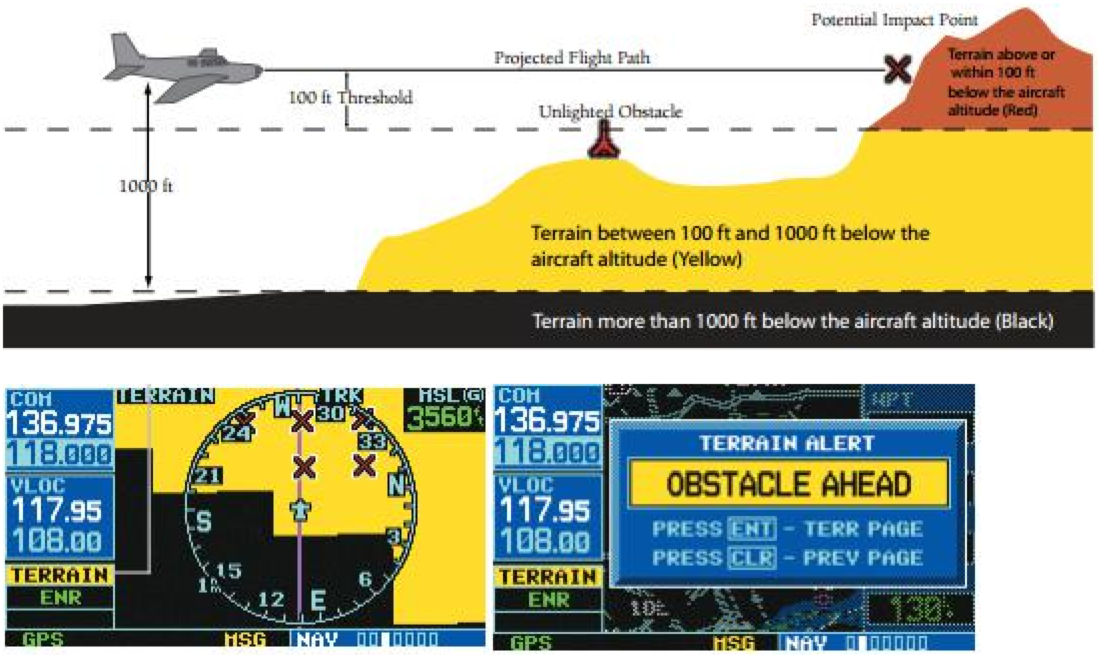


Figure 9 The GNS 430 includes a non-TSO-C151b-certified terrain awareness system. Terrain between 100ft and 1000ft below the aircraft is displayed in yellow while terrain above or within 100ft is displayed in red.

Additional features will also reduce complexity of IFR operations while keeping open our options for future avionics upgrades.

2.4.3 Engineering factors analysis

Few of the occurrence reports in the cruise phase concern engineering issues. Two of them are worth looking at. The first one shows how a mechanical failure can have a negative impact on a flight whose flight planning is already poor.

Background: The report concerns a VFR navigation flight from an island back to the base airport.
"Soon after departure the engine started running rough. Oil and temperature indications were normal and as I suspected carburator icing I put on the carb heat, but there was no sign of icing. CHT and EGT indications seemed to me to be higher than usual. I decided to divert to XXXX where the flight ended uneventfully"

Analysis:

The PIC was very late on his departure and his flight planning choice was not good. The restricting factor was the closing time of the destination aerodrome. Judging from his arrival time at the diversion aerodrome he would not have made it in time and it is quite certain that he would have diverted due to that. He found himself now under pressure related to the closing times of his destination aerodrome but also due to an unexpected engineering issue.

Contributing Factors:

The first sensible choice would have been to **return back to his departure aerodrome**. Although according to the published times via NOTAM the aerodrome would close at that time, due to an operational flight, the aerodrome's schedule was prolonged by one hour. The PIC was aware of that, but as he said later on, he forgot about it. Bad planning resulted in additional stress since he was not certain that he can reach his destination aerodrome in time. The engine's roughness resulted to even more stress and a poor decision. That is, **to fly a long leg over the sea with engine roughness and taking a ditching risk in case of engine failure**. His decision however to divert instead of pushing for his destination was an appropriate one.

Additionally the PIC carried out all necessary troubleshooting checks in his attempt to detect the problem and resolve it. Investigation after the flight revealed that there was indeed a mechanical failure. The cowling was not properly secured and it came in contact with part of the spinner producing an unusual sound which was mistaken for engine roughness. The PIC could not recall anything being wrong with the cowling before flight, but also admitted of rushing through the pre-flight checks to get airborne as soon as possible due to time pressure.

Additional Considerations:

When it comes to occurrence reports it is easy to point out mistakes. But we have to remember that all of us are error prone and that the system contains inherent hazards. Sticking to the procedures, our knowledge, and good airmanship increases our chances of resolving any situation successfully. In this case poor flight planning contributed to poor decision making and it increased the workload of the PIC who was now acting under increased time pressure and stress.

The second occurrence is spectacular as it concerns a very rare electrical failure which we had never seen before in all of our years in operations.

Background: The report concerns a short VFR flight with passengers
*“I departed from XXXX with X passengers for a NAV flight to XXXX. Until 5 nm outbound everything was normal. At that time I changed the frequency to [Next ATC Unit] and the C**OM 2 radio didn’t transmit properly**. I switched to COM 1 with the same results. I started orbiting overhead [NAV POINT] at 3000ft while troubleshooting. I assessed the situation as radio failure, **squawked 7600 transmitted blindly to 121.5 and diverted back to XXXX**.* *In the meantime I discovered that **all avionics had no power**. I orbited ½ nm E of the aerodrome at 2500 ft trying to make my situation clear to the tower and being on the look for visual signals which I wasn’t able to detect. After about 10 minutes and having made sure that no traffic was in the circuit I performed a low pass. During the approach the flaps were also found inoperable. I completed a full circuit pattern and landed* *Remark: The tower did not use signalling flares as last time such usage caused a local forest fire. **“***

Analysis:

Post flight investigation by the engineer revealed that there was a fault in the alternator’s field cabling. The only indication to the crew in this case would have been an ammeter discharge. The PIC was right in that there was a communication failure, since he was running out of electric power, but he did not realise that there will be a total electrical failure. There was no action from the PIC that could restore the alternator failure. The only option would be to land to the nearest aerodrome as he did, following all applicable com failure procedures.

Additional Considerations:

This occurrence shows that **we should always be very thorough with our checks and we should familiarise ourselves with our procedures**. It is not clear when this failure occurred but most likely the alternator failed in flight as according to the PIC ammeter indications were normal before departure. **Frequent scanning of our instruments is important to confirm that there are no abnormal indications**. If the same occurrence would have occurred under IFR and IMC conditions, it would have been a much more difficult situation. An engine failure is not the only critical situation which might be encountered, a number of other failures can contribute to a difficult situation. Most situations are preventable when all procedures are followed. For those situations which are not preventable there is a much higher chance for an uneventful outcome when you know your airplane and its applicable procedures.

2.5 Before Take-off Phase

The main causal factors in this category are the PIC and mechanical failures detected during the run-up procedure. The high percentage of engineering factors is positive in terms of flight safety as it shows that the **run up check is carried out in a faithful manner**. It also shows that **the run up check is a crucial procedure which occasionally leads to an aborted flight, for a good reason**. Although the PIC is the primary causal factor, all such occurrences concern accidentally skipping items during the execution of the checklist during the before take-off phase. Eventually, the item is discovered at a later stage in flight.

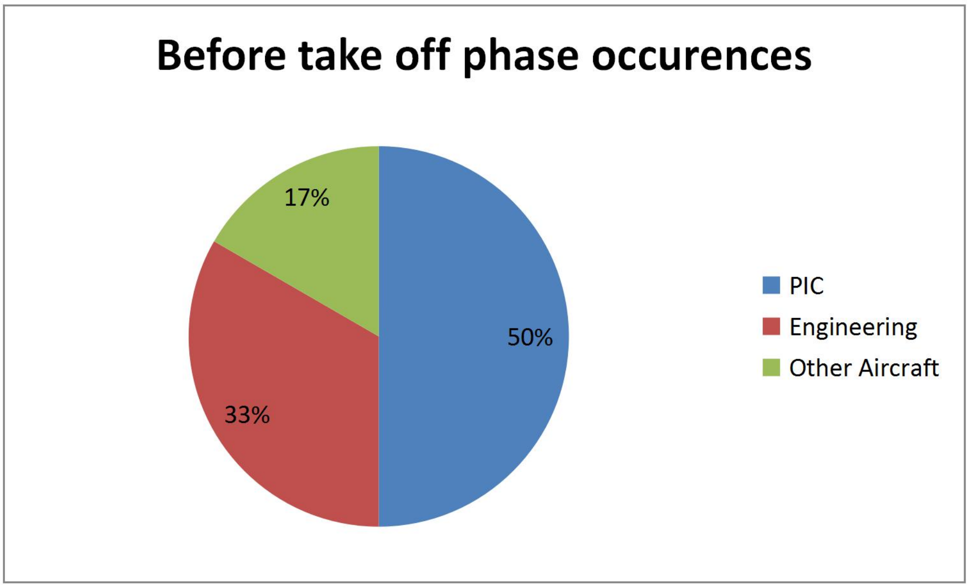


Figure 10 PIC and Engineering are the main causal factors

In terms of engineering factors the situation is much more specific. The most popular failure is that of the carb heat lever. This mechanical failure occurs when the carb heat lever is operated violently especially when set from the carb heat on to the carb heat off position (lever pushed towards the panel).

Figure 11 The carb heat control with its cabling is one of the most often replaced parts in C172s globally

In the long run, fatigue caused by abrupt operation of the lever causes the carb heat cabling to fail. If the carb heat is stuck in the hot position, it will prevent icing build up but it will incur a performance penalty due to lower RPM and additional engine wear due to a very rich mixture. On the other hand, when stuck in the cold position there is a possibility for carburetor icing. As both situations are problematic **it is important to operate smoothly and gently all controls and levers**. With the exception of the primer lever (which is harder to operate), no control or lever requires excessive strength.

The last category concerns other aircrafts or vehicles. It is about the movement of other aircraft or vehicles in the vicinity of the run-up area. It is therefore of paramount importance to lookout for traffic, people, animals and obstacles before performing the run-up check. Additionally you should leave enough space

2.6 Securing Phase

Occurrences reported during the securing phase are straight forward as the PIC is the main causal factor. **Misexecution of the shutdown and airplane securing procedures** is the main factor responsible.

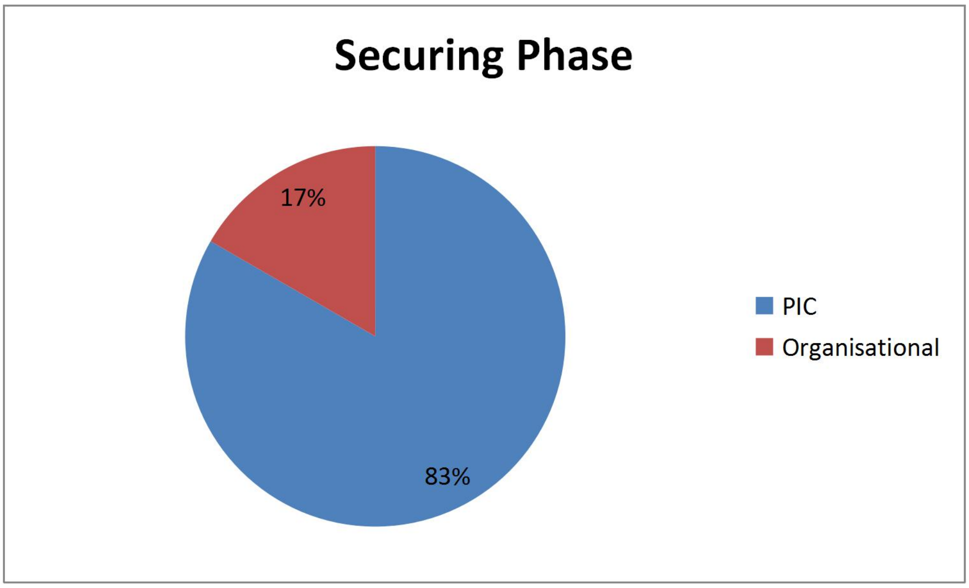


Figure 12 During the securing phase the PIC is the main causal factor with some organisational elements identified as well.

Although the securing phase is not critical for the flight already conducted, **it can be critical for the safety of ground personnel and for the safety of subsequent flights**. Not performing the magneto cut-off check and thus checking that the magnetos are grounded creates a risk of people walking close to the aircraft. Additionally, a master switch forgotten "on" will deplete the battery with consequences for the next flight. Over the years we have changed a number of batteries in this way and some of them **had to be changed in aircraft parked very far away from our home aerodrome…**

2.7 Taxing Phase

The number of occurrence reports during the taxiing phase is small and the contributing factors are of equal percentages. However the occurrences reported have some very interesting elements which are worth sharing.

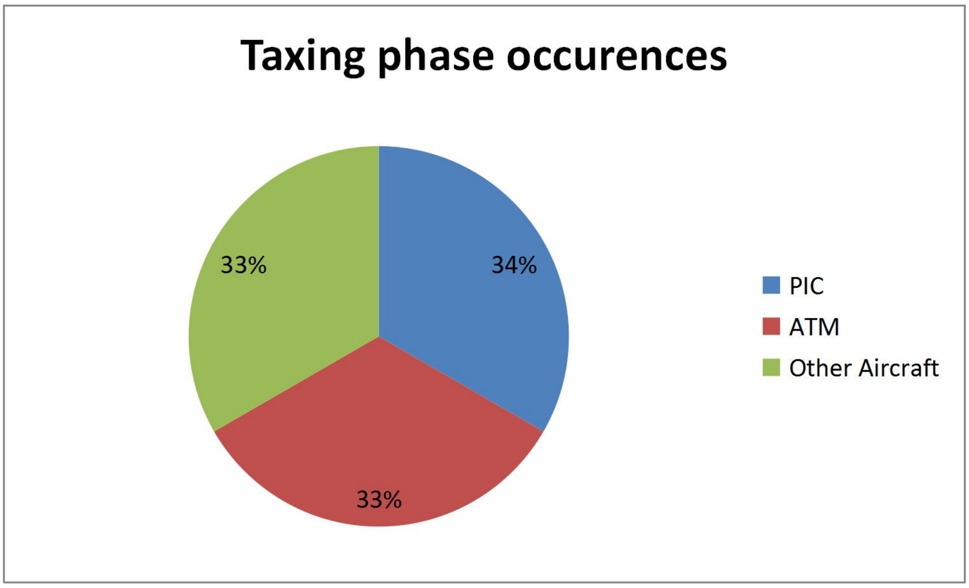


Figure 13 Taxing phase reports. Although causal factors are equal, qualitative assessment of the reports suggest that we operate in a challenging operational environment

2.7.1 PIC factors analysis

A number of occurrences suggest that flight crew distraction was a key factor. In every occurrence there will be a number of different factors at play and it is challenging to isolate a single causal factor responsible. The following excerpt is a representative example:

Background: The VFR training flight has landed and is taxiing to the apron

"During manoeuvring at XXXX apron under the guidance of an airport official the left wing came into contact with the wire perimeter fence. We immediately stopped the engine and inspected the wing to find minor scratch at the wing tip and a dent along the leading 10cm away from the wing tip.

*At the time of the occurrence we were requested by the fire department officer, **against our initial agreement with the tower**, not to shut down and manoeuvre the aircraft manually.*

*At the same time the tower asked us to park **at the space occupied by the only two other aircraft** at the moment at the airport which were preparing for departure. The reason stated over the radio that we could not park elsewhere at a more suitable place was that it was reserved for a private helicopter expected later on.*

*We were **guided around the two departing foreign aircraft**. At the time of the occurrence I was **asked by the tower our departure details**. The firemen and the handler who supervised/guided our parking following the two departing aircraft were preoccupied with a retractable doorstep forgotten extended by one of the aircraft.*

*At the moment of the incident apart of the tower conversation both **ground staff were pointing towards the direction of the departing ac** and even after we stopped and walked toward the wing in the fence they were still **insisting that we inform the other crew about the doorstep**.*

*Although I was well aware of the airports chaos and ground staff recklessness I didn't get control of the aircraft and continued supervising an experienced student with gestures **while on the radio with the tower**. Main reason of this occurrence was **allowing division of attention** towards external influence and lack of total control of the situation. **"***

Analysis:

The last two sentences summarise the PIC's experience of the occurrence and point in the right direction. What would have normally been a routine taxiing manoeuvre led to a situation involving a number of people, increased workload, and minor damage to the aircraft. The PIC did not manage to control the situation. Although taxiing is thought to be a routine and easy part of our flight, it is one which requires that we are in control of the aircraft at all times. When the aircraft is moving we should not allow ourselves to be distracted by issues inside or outside the aircraft itself.

Figure 14 The left wing hit the fence and obtained minor damage

Contributing Factors:

The report suggests a chaotic situation in the cockpit, on the radio and on the apron. A number of personnel who were not qualified to guide the aircraft were involved while they were prompting the crew to advise the crew of another aircraft about a retractable door step. Instructions from the ground personnel and the tower were conflicting. Although the apron was relative empty, the aircraft was guided to a small and busy area where two other aircraft were departing. We can point out several other factors at play here but the main conclusion is **that the PIC should have taken control of the aircraft from the student, should have exercised his authority in relation to ground personnel if required, and should have concentrated on the safety of the aircraft.**

2.7.2 ATM and other aircraft as causal factors

It is often easy to cite the PIC as the main causal factor but this unavoidable as his actions determine the uneventful –or not- execution of a flight. Assessment of the reports however suggests however that "ATM" and "Other Aircraft" are also a strong causal factor. We should always carefully assess instructions and clearances issued by the ATC. The following excerpt illustrates such a case:

Background: A VFR departure from our base airport
"I received a taxi clearance for runway 21 despite the wind being obviously northerly. Before reaching the holding point, I requested wind information. The tower replied: *'on runway 03 no wind information available. On runway 21 wind 100 degrees at 7 knots. The windsock on runway 21 indicated 050-070 6-10 knots.'* *I requested runway 03. The take off was carried out in a definite headwind.* **"**

Analysis:

This is a clear case of challenging a clearance received, and for a good reason. Tailwind take-offs are prohibited in our aircraft and taking off with a 7 knots tailwind would have been a dangerous condition. We are all prone to errors and air traffic controllers are not an exception to this rule. At some point you might receive an instruction or a clearance which might not be suitable or which might compromise the safety of your aircraft. It is your responsibility to remain vigilant and to assess whether clearances and instructions received make sense.

Additional Considerations:

Several reports suggest that our ground operating environment is challenging and that many users are not aware of the safety risks involved. This seems to be the case not only at LGTT but also at other airports. A common factor in all such occurrences was that the aircraft was taxing slowly and thus the crew had sufficient time to react and brake. We should always remember that a reasonable taxi speed is very crucial as every such aircraft is a tricycle with a limited manoeuvrability and breaking capabilities, as opposed to a car.

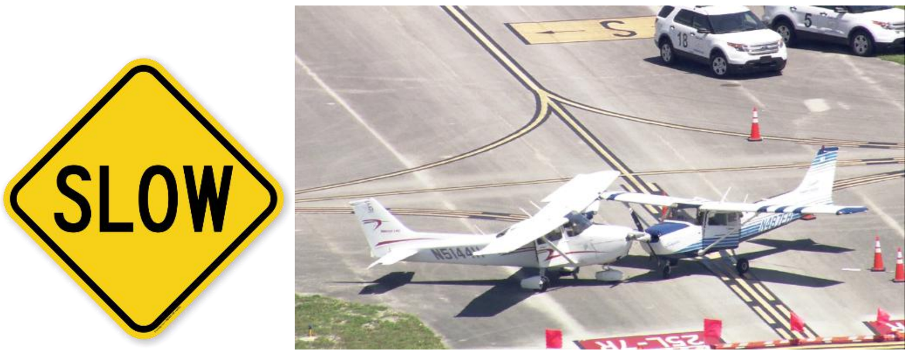


Figure 15 Taxing might sometimes offer a false sense of security because we are on the ground. Planes unlike cars are designed for slow speed taxiing and they being tricycles their manoeuvrability is limited. Their braking capability is also limited.

We should always exercise a good lookout while taxiing and concentrate inside the aircraft as less as possible. Working heads-down while taxiing is inherently dangerous as it can lead to loss of directional control. There are several points at which pre-departure checks can be carried out such as just after starting up or when at the holding position.

Background: A training flight landed and vacated the runway. While taxiing to the apron with the student at the controls the following happened:

"I cleared the area left and right, started taxing, at a low speed, and transferred the control (only rudders) to the student. While I was instructing him on how to taxi, I cleared the area on my right approx. 20-30m before reaching the link on my right which connects the RWY with the TWY. Approaching this link, I noticed that our plane was displaced to the left and I instructed the person who had the control of rudders to correct to the right and come towards the centre line of the TWY, while I simultaneously **forgot to make a final clearing check on the right**.
The plane had reached 5-10m from the link when the student told me "I can go right - where is he going?!". I immediately lowered my head and checked on my right: there was another plane from the link coming with **a high taxing speed in front of us to enter the TWY**.

I took the controls of the rudders and stopped the plane quickly as we were slowly taxing uphill.
I looked at the other pilot and realized that **he was looking towards the opposite direction** as he was turning onto the TWY without looking at me at all. Our wingtips came in **close proximity (around 3-5m)** when I stopped. The other aircraft had **never received a taxi clearance to the apron and I was never instructed to give way to the other aircraft**."

Analysis:

Remaining vigilant and checking for traffic while taxiing is a crucial and systematic process. When exercised continuously, it becomes a strong airmanship habit. Chances are that if all airspace users are systematically checking for traffic, one of them will spot the other. In that case the PIC did not check his right side and the collision was avoided only after the student spotted the traffic. The other pilot also failed to spot the traffic while he did not receive a taxi clearance. A good lookout is a very basic safety net which can prove to be life-saving both on the ground and in the air.

2.8 Remaining Phases

The number of occurrence reports in other phases is small to reliably quantify any findings. However they concern critical flight phases we would like to share some of them with you as they contain interesting facts.

Background: A normal approach for a full stop landing
*"On sort final I realized that **my rate of descend was higher than desirable**. Immediately after a **heavier than usual** touch down I decided to "go-around" in order to prevent bouncing. During the go around the front passenger (and licence holder) warned me that the **airspeed was low** (55kt), immediately I lowered the nose of the aircraft and continued with the go around procedure. **The stall warning bell did not trigger but the controls felt rough and quaky**. This situation I believe resulted from the fact that I informed the TWR for my go around intentions **before I had set the proper attitude**, additionally I was surprised because of the heavy touchdown. The second approach and landing was uneventful**"***

Analysis:

This is a typical scenario of an unstabilised approach on final. If you feel uncomfortable on final or you realise that you are flying beyond usual flight parameters, chances are higher that you are heading for an adventurous landing. A go around is always advisable in such cases. Experience shows that although the go-around is a relatively simple manoeuvre, it has to be practiced regularly. Many licence holders are rusty on the first go-around manoeuvre performed in revalidation flights. Establishing the proper attitude and ensuring that the aircraft is flying on a stable flight path and in the correct configuration is much more important than informing ATC about your actions. As you are executing a go-around in front of the tower, the ATC will most likely be aware that you are executing a go-around.

Additional Considerations:

As go-arounds are most likely a result of a problematic approach, there is usually a sensation of urgency during their execution. The stress resulting from having to execute a go-around should not lead us to rush our actions. Even during the most critical situations there is enough time for a calm but decisive and firm reaction by the pilot. This holds true for other situations such as for example during touch and goes. During touch and go a sense of urgency develops as we are getting closer to the runway end. However we forget that the aircraft is already almost at flying speed and by adding power we will be very soon airborne again. There are always a few seconds available to check the configuration before taking off again.

Background: A normal approach for a touch and go
"During approach I made my flow check everything was fine. I turned the airplane on base leg with flaps 20,I landed very smoothly on the runway but I forgot to retracted my flaps...I saw the flaps down from the window and I dropped my nose down to gain some speed and after 400 feet I started to retract my flaps gradually and that's it I made it...I did another 2 touch and goes and 1 full stop landing without any problem cause I took a big lesson from this incident...it was completely my mistake to forgot to retract my flaps. "

Analysis:

Forgetting to retract the flaps or forgetting to set the carb heat to cold, are common mistakes in go-arounds. In most cases they are uneventful, as they only incur a performance penalty. However under different conditions they might develop differently. For example forgetting flaps 40 on a short runway with obstacles at the end or forgetting carb heat in the hot position during summer with a heavily loaded aircraft and obstacles at the end of the runway might be more critical.

2.9 Aircrew Safety Notifications

Aircrew safety notifications are notifications published by the safety manager concerning critical safety related information and guidance to flight crews. As all pilots and members are registered in mailing lists with their personal e-mail addresses, aircrew safety notifications are promulgated through e-mail. The following two Aircrew Safety Notifications were published and they are in force:

2.9.1 C172 oleo strut

Issue: An incident took place recently at which the oleo strut seal failed, causing a flat oleo strut during a landing executed within normal flight parameters
Investigation: Subsequent investigation suggests that the oleo strut seal failed occurred as a result of a series of very tight turns on the ground, while parking under guidance in confined space. This has been a known issue affecting C172s in general. In the following picture you can see the failed oleo strut: http://mesogeion-aeroclub.gr/images/ground-to-ground/oleo_strut_seal.jpg The failure is not because of fatigue or a heavy landing, but simply as a result of very tight parking turns.
Guidance to flight crews: Flight crews should exercise caution while executing parking manoeuvers, avoiding prolonged and very tight turns as much as possible. Obviously there will be situations when tight turns will have to be carried out and this notification is not to suggest that this is an issue of limited controllability of the plane on the ground or that such turns cannot be executed at all.
Current Status: Applicable

The oleo strut oil manufacturer had been changed recently. We have now switched back to the previous strut oil manufacturer. This failure is thought to be complicated and it depends on a number of factors. At this stage we are monitoring the situation and there have been no other occurrences. Guidance to flight crews is still applicable. We will re-evaluate the situation in the future to decide whether this Aircrew Safety Notification will be cancelled

2.9.2 Military area reservations

Issue:
An incident took place recently in which the ATC notified one of our colleagues that area 15A is activated, and thus, that he should re-plan his route in flight to avoid this area. As the area was not published in the AIP, the PIC was unable to locate it, however he managed to avoid it with the help of the ATC and his navigational skills.

Investigation:
Subsequent investigation revealed that there are several areas which are not published but which are activated on short notice by military air traffic units. It is not clear why these areas are not properly published, but we are in the process of clarifying the issue with military authorities.

Some of these areas, which we will refer to as the Alphas, correspond ONLY ROUGHLY (meaning lateral and vertical limits do not coincide) with the existing published PRD airspaces. According to unofficial information, the following areas are activated more often than others:

Area 9A (activated by NOTAM) from LGR27 to south FIR border
Area 5A LGD76 LGD83 LGD88
Area 4A LGD68 (Andros)
Area 7A LGD72B (Andravida)
Area 15A LGD65 (Psathoura)
Area 6A West of Crete, no corresponding area
Area 13A south of Crete, no corresponding area
Area "PELAGOS" south of 15A, no corresponding area

Guidance to flight crews:
It is a legal requirement to familiarise yourself with the aeronautical information publications relevant to your flight path before departure. It is vital to remember that you should familiarise yourself not only with the NOTAMs in questions, but also the AIP. Some areas (like LGD 65 Psathoura), are activated at standard days and times published in the AIP. It follows that the activation of an area like LGD65 will NOT be promulgated via NOTAM. It is your responsibility to make sure that you will not violate such an area when it is active according to the published AIP schedule.

Should you at any time receive information from the ATC that one of the "Alpha" areas is activated, request immediately details about the lateral and vertical extend of the area in question. Then, determine your position and deviate accordingly to avoid that area. If needed, request ATC assistance. Remember that your first priority is to fly the plane and once established on a new route, recalculate subsequent segments of your route.

We will endeavour to resolve this situation as soon as possible. Until then, please be aware of this issue and pay particular attention to your flight planning.

Current status:
Applicable

Our ATO managed to get in touch with the responsible military authority. The Hellenic Air Force has no intention to publish those areas. However we were informed that the air traffic control in cooperation with military authorities will ensure that no aircraft will enter any such area, by providing appropriate guidance to the aircraft potentially affected. We invite all pilots to remain vigilant about this issue and in case they observe any abnormality we kindly ask them to report it to us as soon as possible.

3.0 Conclusion

Writing such a bulletin was a task requiring a lot of effort and motivation. It is a task which would have been absolutely impossible without having a reliable resource, that is, safety reports from our colleagues. It is however equally important to have the organisational commitment towards being open about safety matters within the organisation and towards the public.

Being both an aeroclub and an EASA approved training organisation at the same time endows us with a responsibility to comply with the regulatory framework but also with a responsibility to fulfil a social role. As an organisational structure our social role is to promote aviation in general and also in particular sport aviation. As a training organisation we have a social responsibility to deliver to the society trained pilots capable of operating their aircraft in a safe manner irrespective of whether they will be flying as hobbyists or they will pursue a career within the aviation industry. Some of our students have pursued careers as pilots and flight instructors or within a wide range of positions in the aviation industry. Many of them came in touch with aviation for the first time by flying on board one of our aircraft. We have always felt that we have a responsibility and an active duty to promote the best practices of our industry and at the same time to inspire more people to be actively involved in aviation. Owing to this philosophy we have agreed to work towards the materialisation of this bulletin. Our intention is to develop such a bulletin on a yearly basis and we hope that with this publication we are setting an example for other organisations to follow. This is an open invitation for all stakeholders to join us in a single cause, the improvement of national safety levels in general aviation by promoting the best safety practices and sharing our experience and expertise.

We would like to thank once again our members and our pilots for all their feedback provided during this year through their safety reports. We know that they might feel slightly awkward reading their reports, sometimes slightly embarrassed or sometimes slightly proud for their actions. Safety is not about pointing fingers. For that reason we have ensured that all reports in this bulletin are anonymous and no individuals can be identified through the reports quoted. Our signal is very clear: safety is about all of us. Under the right (or wrong) conditions, any of the occurrences in this document could have happened to any of us. We hope that with this in mind, we will receive more reports in the future and we will be able to improve our organisation and develop further while mitigating risks and thus preventing potential accidents.

The golden rule when it comes to safety reporting is:

To share is to protect

With best regards,

Mesogeion Aeroclub