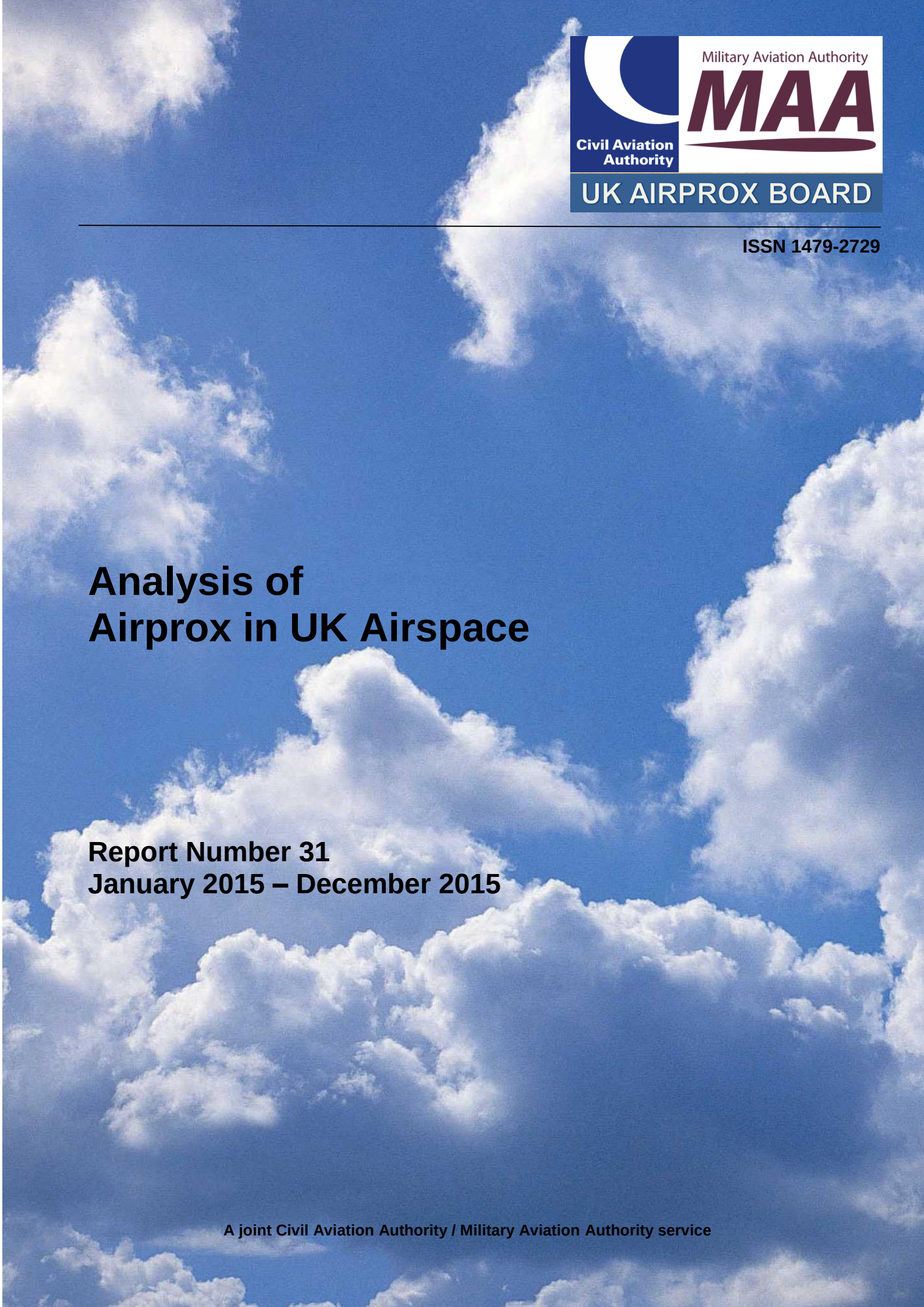

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Analysis of Airprox in UK Airspace

Report Number 31
January 2015 – December 2015

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Thirty-first Report by the UK Airprox Board

Analysis of Airprox in UK Airspace

(January 2015 to December 2015)

Compiled by Director UK Airprox Board for

The Chief Executive Officer
UK Civil Aviation Authority

and

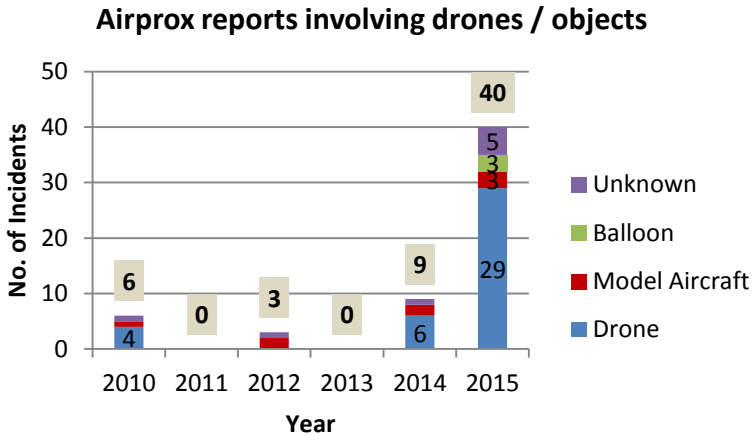
The Director
UK Military Aviation Authority

CONTENTS

OVERVIEW

Executive Summary

The UK Airprox Board (UKAB) assessed 217 Airprox in 2015, of which 107 (49%) were assessed as risk-bearing events (Risk Categories A & B).[1] This represents a slight decrease in overall notifications compared to 2014 (when there were 224 notifications) but an approximate 10% increase in risk-bearing events. In other words, there were slightly fewer Airprox in 2015, but a greater percentage of those that were reported involved risk of collision. However, without doubt, the defining feature of 2015 was the dramatic increase in drone/objects that were encountered by aircraft. In 2014, there were only 9 such incidents (of which 6 were positively identified as drones) whereas, in 2015, there were 40 incidents (of which 29 were positively identified as drones – see sidebar graph). This increase in drone encounters presents something of a dilemma for Airprox reporting; although rightly considered as incidents in their own right, there is a danger of skewing underlying aircraft-to-aircraft trends and analysis as a result of the new phenomenon. Table 1 and Figures 1 & 2 show Airprox statistics and associated risk trends for all Airprox over the last 10 years, wherein the headline figures above are readily apparent. Table 2 and Figures 3 & 4 show the same data with drones/objects stripped out. In this latter case, it can be seen that the underlying aircraft-to-aircraft trends show a healthy decrease in overall numbers, although, worryingly, the risk-bearing trend for these occurrences remains upwards in percentage terms.



With or without drone/object Airprox being included, the risk-bearing percentage figures are the highest they have been for the last 10 years; indeed, they have only been at these levels twice in the last 20 years (in 1996 and 1997) as shown in Figures 5 & 6 which show the long-term trends with drone/object Airprox removed. The fact that, percentage-wise, Airprox are getting riskier is cause for concern. Anecdotally, there are concerns about pilots focussing more on internal avionics and navigation displays (including iPads etc) at the expense of lookout. I have no specific evidence to back this up other than we have seen a number of incidents where pilots have reported Airprox as they have turned their attention again to lookout having conducted in-cockpit tasks; but these tasks are generally described as radio frequency changes, map-checking or SSR re-coding, all of which are nothing new.

[1] Risk categories are defined within the Glossary of definitions and abbreviations at the end of this annual report. Note that Category E was only introduced in 2011, and similar events would probably have previously been classified as Category C: the seeming reduction in Category C occurrences since then should be viewed in this light.

On the other hand, I still see a number of risk-bearing Airprox in the visual circuit which seem to result from poor adherence to procedures or a lack of appreciation and situational awareness of others in the circuit. There appears to be a recurring problem with the conduct of overhead joins, with many pilots either appearing not to understand them or able to perform them correctly. Based on a growing impression that some pilots seem not to fly defensively in this environment, are prone to pressing on without proper situational awareness, or think that they have priority when they do not, conduct in the visual circuit is certainly something that could be usefully emphasised in training and education activities. In this respect, I still eagerly await the production of the much-heralded CAA Skyway Code which will provide a 'Dummy's Guide to Flying' that will emphasise the basic rules and procedures in an accessible and readable manner, it is hoped. Until then, confusion for example over such things as 'joining crosswind' vs 'conducting a crosswind join' remain a real source of potential conflicts.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	**2015**	10-year Average
Category A	15	9	13	11	12	23	18	22	28	**41**	19
Category B	40	39	38	36	33	36	27	43	68	**66**	43
Category C	103	106	100	97	116	88	97	72	86	**78**	94
Category D	1	0	4	3	6	2	5	9	9	**12**	6
Category E						12	14	26	33	**20**	21
Annual Totals	159	154	155	147	167	161	161	172	224	**217**	172
Risk Bearing	35%	31%	33%	32%	27%	37%	28%	38%	43%	**49%**	36%

Table 1. Total Airprox Notifications and Risk Assessment Statistics

	2006	2007	2008	2009	2010	2011	2012	2013	2014	**2015**	10-year Average
Category A	15	9	13	11	12	23	18	22	26	**27**	18
Category B	40	39	38	36	33	36	27	43	65	**52**	41
Category C	103	106	100	97	116	88	97	72	85	**75**	94
Category D	1	0	4	3	6	2	5	9	6	**5**	5
Category E						12	14	26	33	**18**	21
Annual Totals	159	154	155	147	167	161	161	172	215	**177**	167
Risk Bearing	35%	31%	33%	32%	27%	37%	28%	38%	42%	**45%**	35%

Table 2. Total Airprox Notifications and Risk Assessment Statistics – Minus Drones / Objects

In common with every other Airprox report, I stress that caution should be exercised when trying to identify trends and lessons from what is a statistically small sample size compared to the many thousands of flights that are conducted without incident within the UK's airspace every year. Nevertheless, in purely numeric terms, 217 incidents still represents, on average, an Airprox occurring in UK at least every other day; of these, 107 risk-bearing events reflects that, on average, in 2015, two aircraft almost collided in UK airspace (or safety margins were at least much reduced) about twice a week.

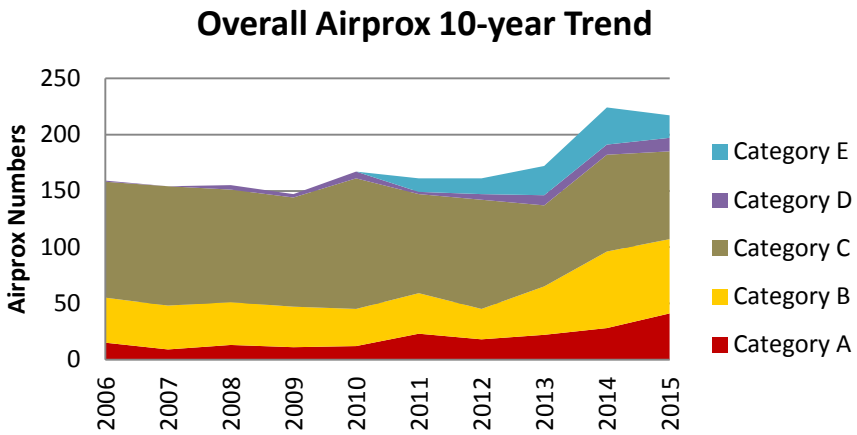


Figure 1. Total Airprox Numbers

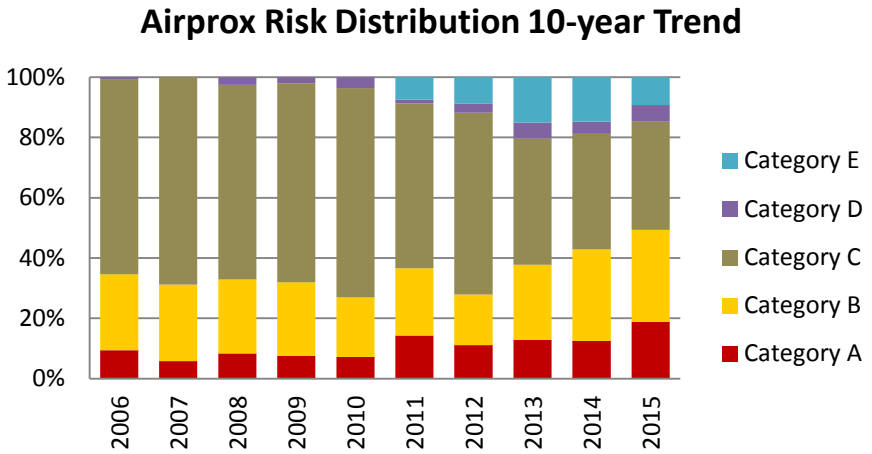


Figure 2. Total Airprox Risk Distribution

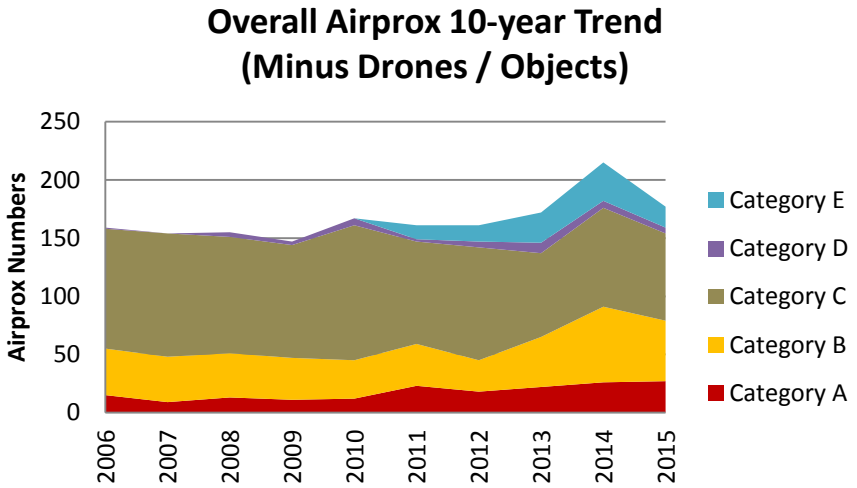


Figure 3. Non-Drone/Object Total Airprox Numbers

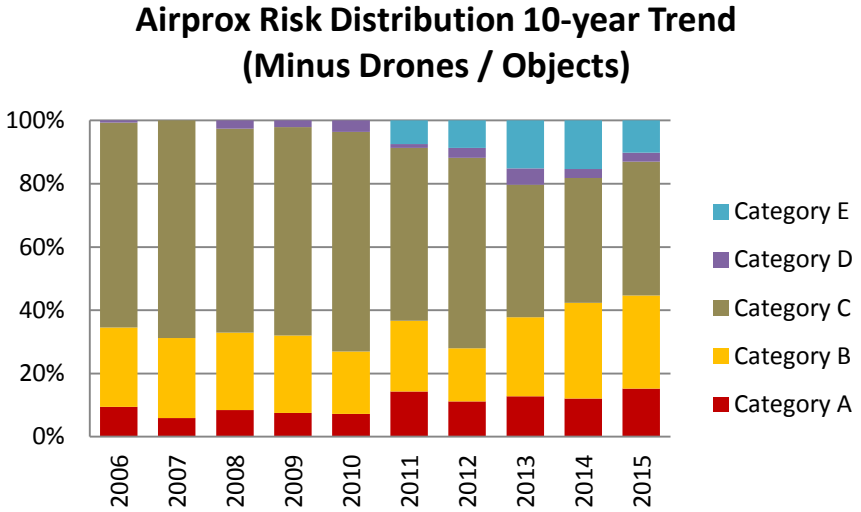


Figure 4. Non-Drone/Object Total Airprox Risk Distribution

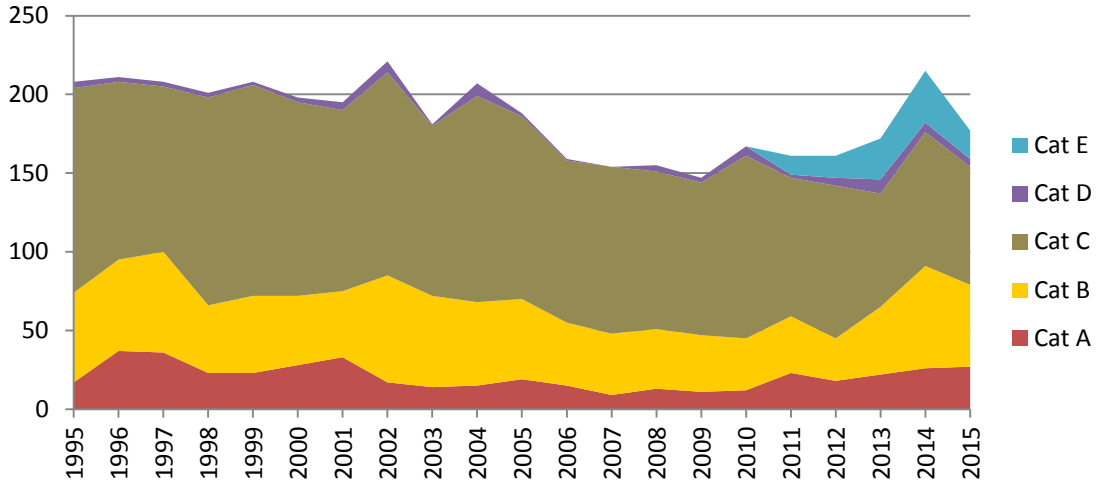


Figure 5. Airprox Numbers - 20-year Trend (without drones/objects)

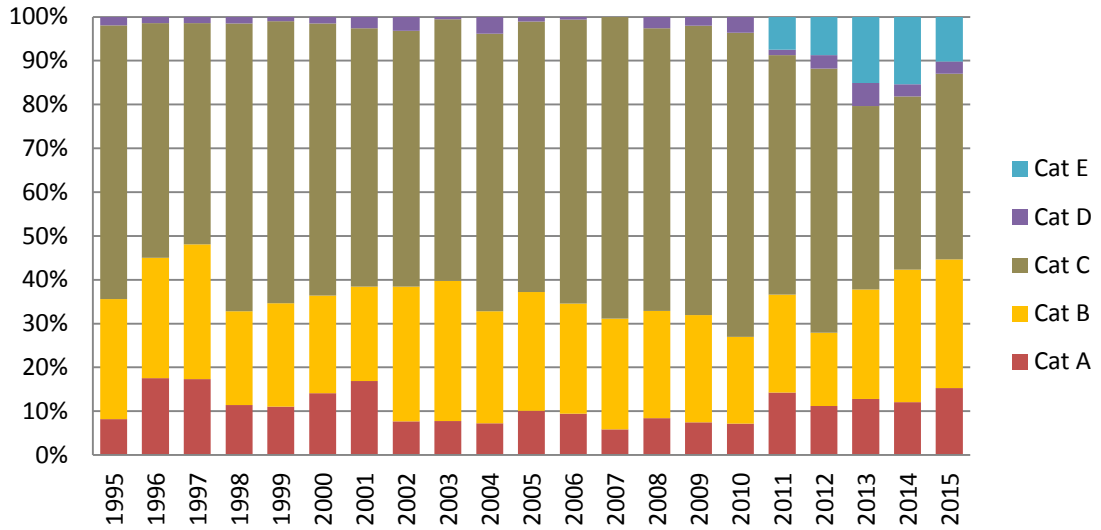


Figure 6. Airprox Risk Distribution - 20-year Trend (without drones/objects)

In common with normal Airprox annual trends and monthly reporting statistics, 2015 saw proportionally more incidents in the summer months (when GA are more active), than the rest of the year. However, reported GA total flying hours were similar to 2014 and so, with that in mind, there appear to be no obvious explanations for why the proportion of Airprox risk-bearing events should have risen again compared to 2014. That being said, collation of reliable flying hour statistics is notoriously difficult due to the fact that much of sports aviation activity is not logged. With this in mind, Table 3 shows the best flying hours figures I can obtain from CAA and MOD sources. These indicate that, overall, UK flying hours have been pretty stable for the last 6 years or so (average ~2.86M per year since 2009/2010).[2] Overlain on the 10-year trend graph (Figure 7), it is clear that although there was a slight increase in hours flown in 2015, the trends in Airprox reporting do not particularly correlate to hours flown.

[2] UK recession running up to 2010 saw reduced GA/CAT flying, and this coincided with reductions in military aircraft numbers following re-profiling of UK defence expenditure.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CAT Hours x 10K	160.3	162.0	163.5	149.4	141.6	147.1	145.4	149.0	151.5	154.8
GA Hours x 10K	130.5	134.6	135.1	131.2	113.0	112.7	109.8	107.0	108.3	108.5
Mil hrs x10K	43.1	43.4	40.1	43.2	31.8	31.1	25.6	24.2	25.0	24.9
Total Hrs x10K	333.9	340.0	338.7	323.7	286.4	291.0	280.8	280.2	284.8	288.2

Table 3. UK Flying Hours 10-year Statistics

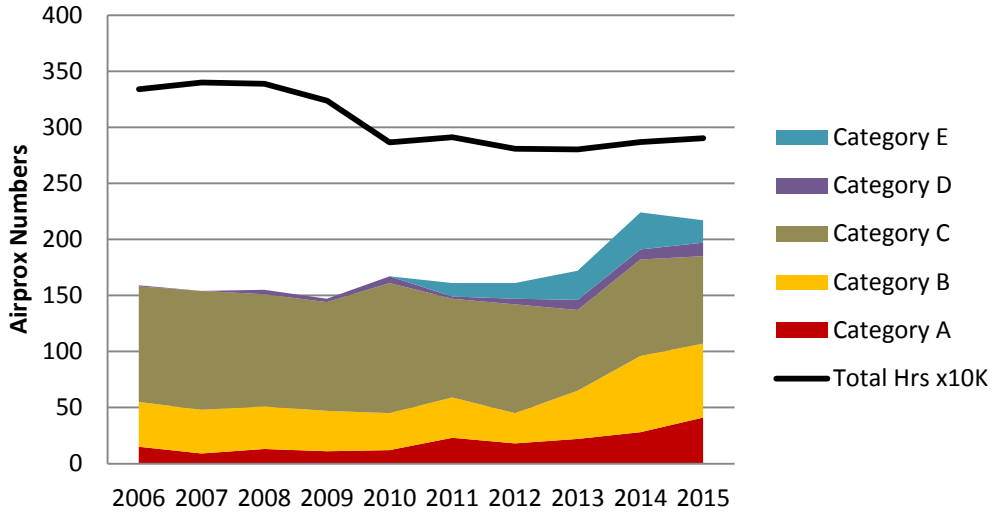


Figure 7. Overall 10-year Trend compared with Flying Hours

Turning specifically to the military, 2014 saw the MOD Tutor training fleet return to full flying after previous propeller safety issues, so their historic contribution to military Airprox re-emerged in 2015 with 14 Airprox for Tutors (on average, Tutors account for 20-25% of military Airprox, circa 20 per year on average). For their part, military glider flying largely remained paused in 2015 due to engineering assurance concerns, and this will have reduced military figures by about 6 or so based on historical norms. Military rotary-wing Airprox numbers were broadly stable compared to 2014 (20 incidents in 2015 compared to 26 incidents in 2014) but there was a marked reduction in military fixed-wing powered Airprox (49 incidents in 2015 compared to 69 incidents in 2014). Overall, there were only 70 military Airprox in 2015 compared to 97 in 2014, a welcome reduction of 28%. That being said, military risk-bearing absolute numbers remained roughly the same (32 in 2015 compared to 33 in 2014), which means that the proportion of incidents that were risk-bearing increased from 34% in 2014 to 46% in 2015; this is the highest percentage of military risk-bearing incidents that we have seen in the last 10 years.

Looking specifically at the risk-bearing percentages for overall occurrences for all aircraft classes in the last 10 years, there is a clear upwards trend in the last 4-5 years which, as is reflected in Figure 8, shows the 2015 rate at 49%. This is the highest it has been in the last 10 years (the 10-year average risk-bearing percentage is 36%). Even discounting drone/object incidents, Figure 9 shows an unhealthy increased rate of 45%, although it might be argued that the roll-over on the second chart indicates that the underlying aircraft-to-aircraft risk-bearing rate of increase may be reducing.

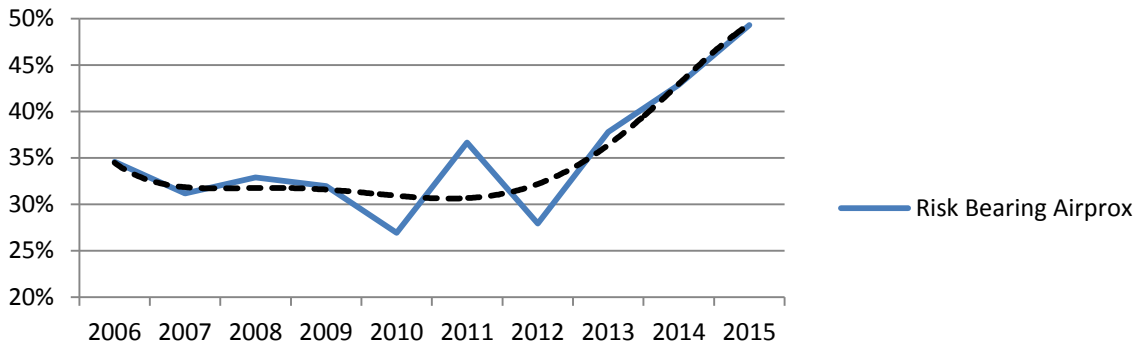


Figure 8. Overall Risk-Bearing Airprox - 10-year Trend

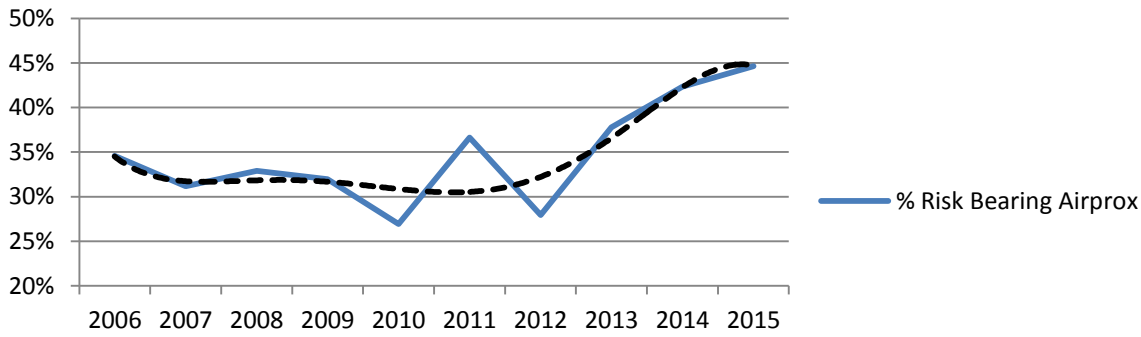


Figure 9. Overall Risk-Bearing Airprox - 10-year Trend (without drones/objects)

Although some vagaries in the classification of risk must be expected because of the subjective nature of both the ICAO Airprox definition and the Board's assessment process (both of which are qualitative in nature rather than quantitative), sub-categorising the increasing overall risk-bearing trend by respective classes indicates an increasing trend across the board for all aircraft categories. That being said, care must be applied when reviewing Commercial Air Transport (CAT) rates given that most drone incidents applied to this sector; if these are discounted, then the trend was shallower, although still upwards as shown in Table 4 and Figures 10 & 11. However, the small numbers of CAT non-drone Airprox overall, and the very small numbers of CAT non-drone risk-bearing Airprox, mean that trends can easily be skewed in this sector[3]; the section on CAT statistics will cover this in more detail. Notwithstanding that the removal of drone data allows for year-on-year comparisons to be made with the time before drones became commercially available, drone Airprox should not be discounted as unimportant - they still represent a situation where a collision could conceivably cause problems for an airliner; especially if such an encounter occurs at a critical stage of flight (such as the final approach or departure from an airfield) where CAT aircraft may have few options to manoeuvre and avoid. That being said, the issue of whether a drone-strike would in fact cause any significant damage to an aircraft is under investigation

[3] Non-drone: 2015 - 3 risk-bearing out of 31 events; 2014 - 4 risk-bearing out of 27 events; 2013 - 4 risk-bearing out of 33 events; 2012 - 1 risk-bearing out of 35 events; 2011 - 1 risk-bearing out of 22 events).

by others; it is not for the Board to make any statements regarding the outcome of collisions, we simply report the risk of collision itself such that operators can use this information in their own risk assessments.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GA Risk-Bearing	46%	38%	44%	30%	29%	38%	38%	42%	47%	46%
Mil Risk-Bearing	40%	33%	39%	44%	26%	36%	30%	34%	33%	46%
CAT Risk-Bearing	8%	8%	3%	3%	0%	5%	3%	12%	19% (15%)	45% (14%)

(CAT data in brackets show non-drone/object figures)

Table 4. Percentage Risk-Bearing Airprox by Class of Aircraft

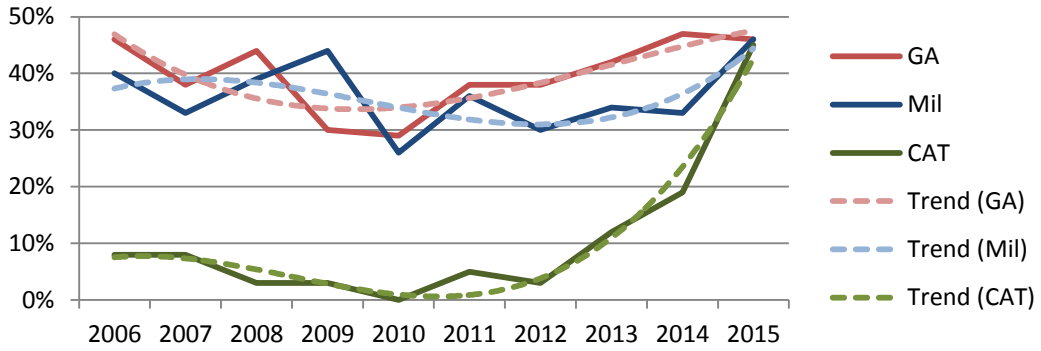


Figure 10. Risk-Bearing Percentage Trends by Class of Aircraft

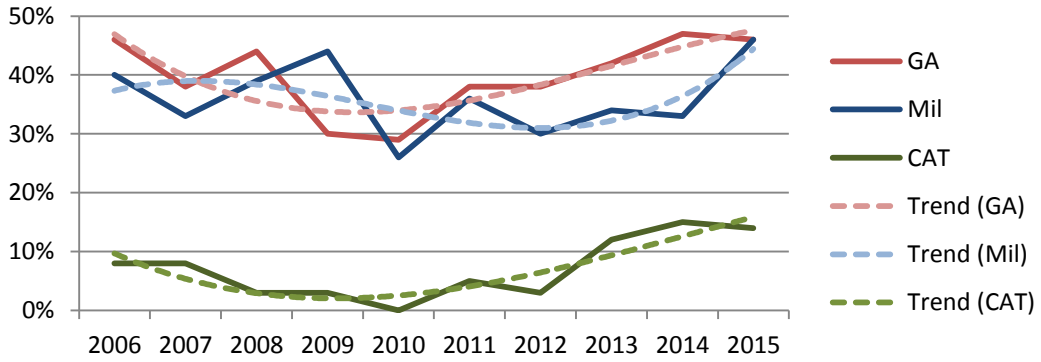


Figure 11. Risk-Bearing Percentage Trends by Class of Aircraft (CAT with drones/object data removed)

Normalising these statistics for hours flown (per million flying hours (mfh)), the last 10 years confirms the underlying trends above as shown in Table 5 and Figure 12 (detailed data is included in the relevant sections of this report).

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total CAT Airprox per mfh	46	40	37	23	25	15	24	22	20	32
CAT Risk Bearing Airprox per mfh	4	3	1	1	0	1	1	3	4	14
Total GA Airprox per mfh	79	77	73	72	90	106	99	117	158	142
GA Risk Bearing Airprox per mfh	35	28	29	21	27	41	31	49	75	65
Total Mil Airprox per mfh	139	120	140	162	308	266	278	339	388	281
Mil Risk Bearing Airprox per mfh	56	39	55	72	78	96	82	116	132	129

Table 5. Airprox per mfh by Class of Aircraft - last 10 years

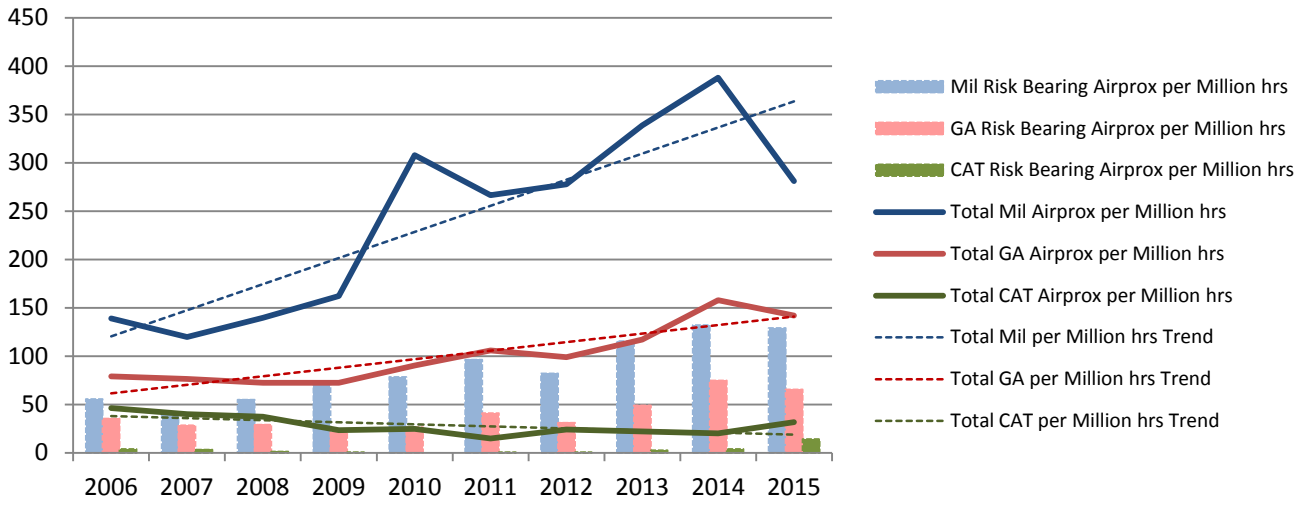


Figure 12. Airprox per mfh by Class of Aircraft – last 10 years

Statistics and trends can sometimes mask the overall meaning of the analysis. Bluntly, Airprox are near accidents, and risk-bearing Airprox reflect incidents where aircraft very nearly collided, or safety was much reduced below the norm. Headline statements for UK airspace in 2015 are:

- **217** Airprox represents, on average, an Airprox at least every other day.
  - **107** risk-bearing Airprox means that, on average, there was either a risk of collision, or safety was much reduced below norms, about twice a week.
- **21** non-drone/object CAT Airprox represents about two per month.
  - **3** risk-bearing non-drone/object CAT Airprox means that, on average, there was either a risk of an aircraft colliding with CAT, or safety was much reduced below norms, about once every 4 months.
- **28** drone/object CAT Airprox represents about one per fortnight.
  - **19** risk-bearing drone/object CAT Airprox means that, on average, there was either a risk of a collision, or safety was much reduced below norms, between a drone/object and a CAT aircraft about 1.5 times per month.
- **154** GA Airprox represents about three per week.
  - **71** risk-bearing GA Airprox means that, on average, there was a risk of GA collision, or safety was much reduced below norms, nearly six times a month.
- **70** Mil Airprox represents about six per month.
  - **33** risk-bearing Mil Airprox means that, on average, there was a risk of Mil aircraft collision, or safety was much reduced below norms, about 2.75 times a month.

Figure 13 illustrates graphically the 2015 Airprox breakdown. The large central pie chart shows the division of all Airprox by class involvement, whilst the smaller satellite pie charts show the sub-division of involvements within each of the classes (i.e. the 154 Airprox involving GA meant that they were involved in

71% of all assessed Airprox: 58% of these GA Airprox were GA-GA, 25% were GA-Mil, 9% were GA-CAT, and 8% were GA-Other). Note that the term 'Other' refers to aircraft such as Air Ambulances, Police Helicopters, unknown aircraft, model aircraft, drones/UAV/RPAS etc.

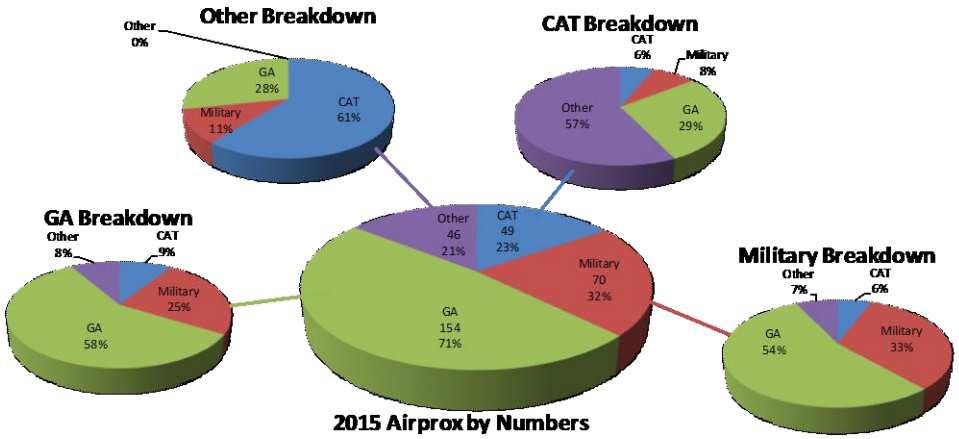


Figure 13. 2015 Airprox by Class Involvement

In headline terms, the greatest collision risk for GA is other GA; for military it is GA; and for CAT it is drones/objects. Almost all of the drone/object incidents occurred in airspace within which they were not entitled to fly; unfortunately, we have yet to trace any drone operators given the difficulty in pinpointing their location in a timely manner.

Most Airprox stem from multiple causes and contributory factors which each have a greater or lesser bearing on the outcome depending on the circumstances. A formal breakdown of causes is included in the forthcoming sections but, to give a flavour of what lies behind these technical causes, the following themes were specifically commented upon over the year in my monthly reports. Although such an analysis of comments would not bear detailed statistical scrutiny, it gives a sense of what concerned the Board most over the year (ranked in order of times the comment was made):

- Poor, or at least questionable, airmanship decisions were commented upon 71 times.
- Ineffective integration in the visual circuit was discussed 55 times.
- Late- or non-sighting was mentioned as a factor 50 times.
- Sub-optimal or ineffective ATC coordination or Traffic Information was mentioned 35 times.
- Lack of pilot Situational Awareness was remarked upon 33 times.

Although some of the Airprox associated with poor integration in the visual circuit are a subset of poor airmanship, it is disappointing that there were so many incidents at airfields or within ATZs. These environments represent one of the most regimented and controlled flight regimes for exactly the reason that they are where aircraft naturally come together in order to take-off or land. It seems that much of the problem is caused by pilots who do not follow standard

procedures; do not properly listen-out on the radio for others; are unaware of the nuances and limitations of the various levels of control at airfields (ATC vs AFISO vs AGCS); or who do not fly defensively and with due concern or consideration for others in the visual (or IFR) pattern. Visual circuit aside, and recognising that 'airmanship' is a somewhat loose definition covering 'common-sense, good practice and experience in the air', other airmanship issues included: deviating from the plan and not informing the ATC unit that was providing a service; not deviating from the plan when conditions had changed (aka 'pressing on regardless'); unclear communication of intentions; inaction on detecting an impending conflict (either by not acting on ATC Traffic Information, or relying on the fact that the geometry of the situation dictated that the other aircraft should give way (the latter of course being reliant on the other aircraft's pilot having seen them, which may not be the case)); flying too close to another aircraft (on the assumption that if they themselves were comfortable with the separation then so would be the other pilot); and not complying with procedures (such as overflying glider sites or not applying the rules of the air effectively).

The following sections provide an overview of Airprox statistics and trends, which is intended to provide some idea of how things are progressing year-on-year. The subjective nature of Airprox reporting and assessment, and the small number of incidents compared to the overwhelming number of flights where Airprox were not encountered, means that care should be taken in drawing too many definitive conclusions. Many Airprox themes are recurring over the years, and probably intrinsic in aviation as a human endeavour: the best that can be done in many circumstances is to try to keep these threats in the minds of those who fly; learn from the experiences of others; and attempt to provide as safe an environment as practically possible.

Finally, as of 2013, these 'Blue Book' reports are no longer published in hard-copy due to distribution costs. This report and associated individual Airprox reports are now only available online (at www.airproxboard.org.uk) or by email on request. In previous years, an annual Airprox magazine has been published each August which focuses on GA Airprox incidents and issues in a more digestible and relevant format for the wider aviation community. Unfortunately, due to funding constraints, the CAA was unable to commit to a 2016 edition. Previous versions are available at the link[4] at footnote, and on the UKAB website above. It is hoped that next year will see the return of the magazine.

Steve Forward
Director UK Airprox Board

[4] http://edition.pagesuite-professional.co.uk//launch.aspx?eid=60b7eab6-10a1-41e3-b6c2-c0ddb0ff0284.

Airprox Reporting Statistics

The UKAB assessed 217 Airprox in 2015, 7 less than in 2014 but 45 more than the 10-year average of 172. Although slightly reduced compared to 2014, the overall reporting trend remains sharply upwards, especially in the last 3 years. Figure 14 displays the overall 10-year trend, whilst Figure 15 shows the breakdown of 2015's flow of occurrences overlain on bars representing the 5-year rolling average for each of the months. As can be seen, there were consistently high levels of reporting throughout most of 2015, with Spring and Autumn significantly exceeding expectations.

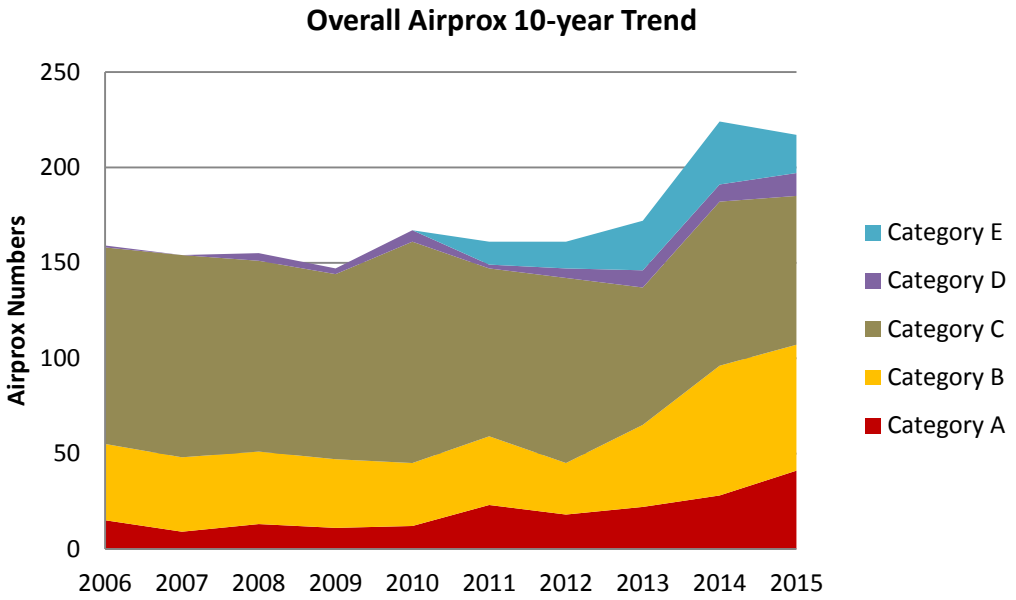


Figure 14. Overall Airprox 10-year Trend

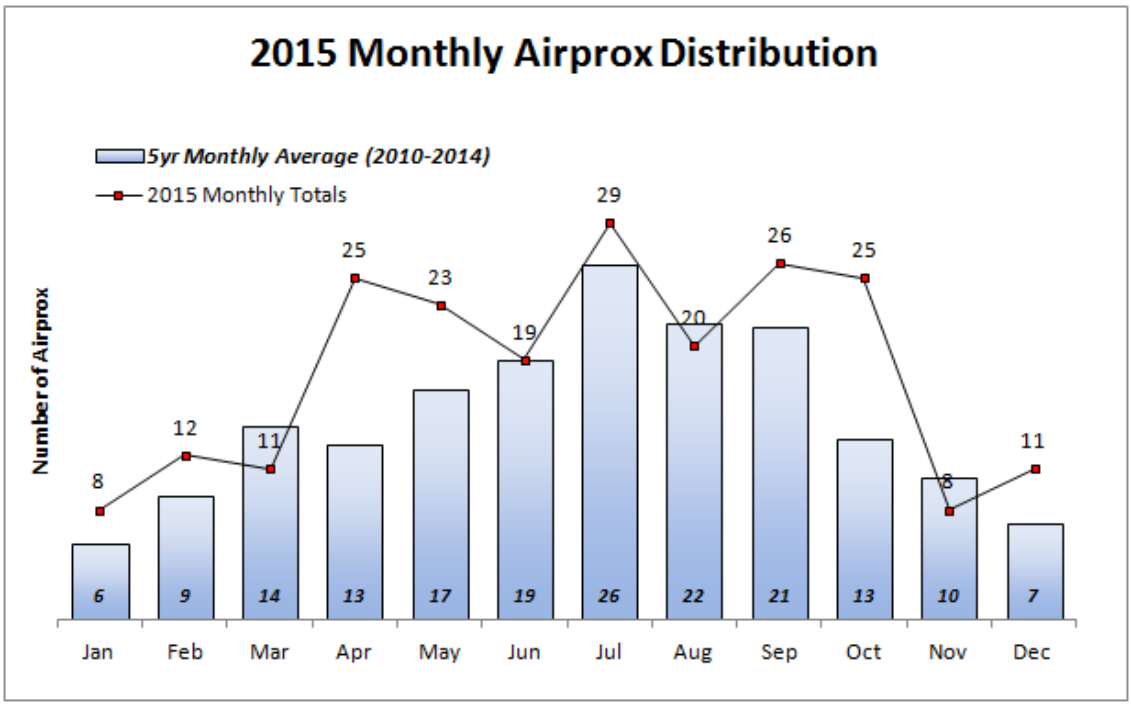


Figure 15. 2015 Airprox Monthly Distribution

Airprox Analysis and Trends

Overview

Although the reasons for the peaks and troughs above will be many and various, they are often associated with weather conditions, which naturally affect GA flying rates. Although only one aspect of aviation weather considerations, Figure 16 shows the Met Office seasonal rainfall anomaly charts[5] for 2015, which show that Spring and Autumn were indeed much dryer than previous 30-year averages (brown shading) and therefore conducive to increased flying rates (and hence increased Airprox exposure). Not immediately obvious from the charts, but April, September and October were particularly dry; hence the likely spikes in Airprox in these months.

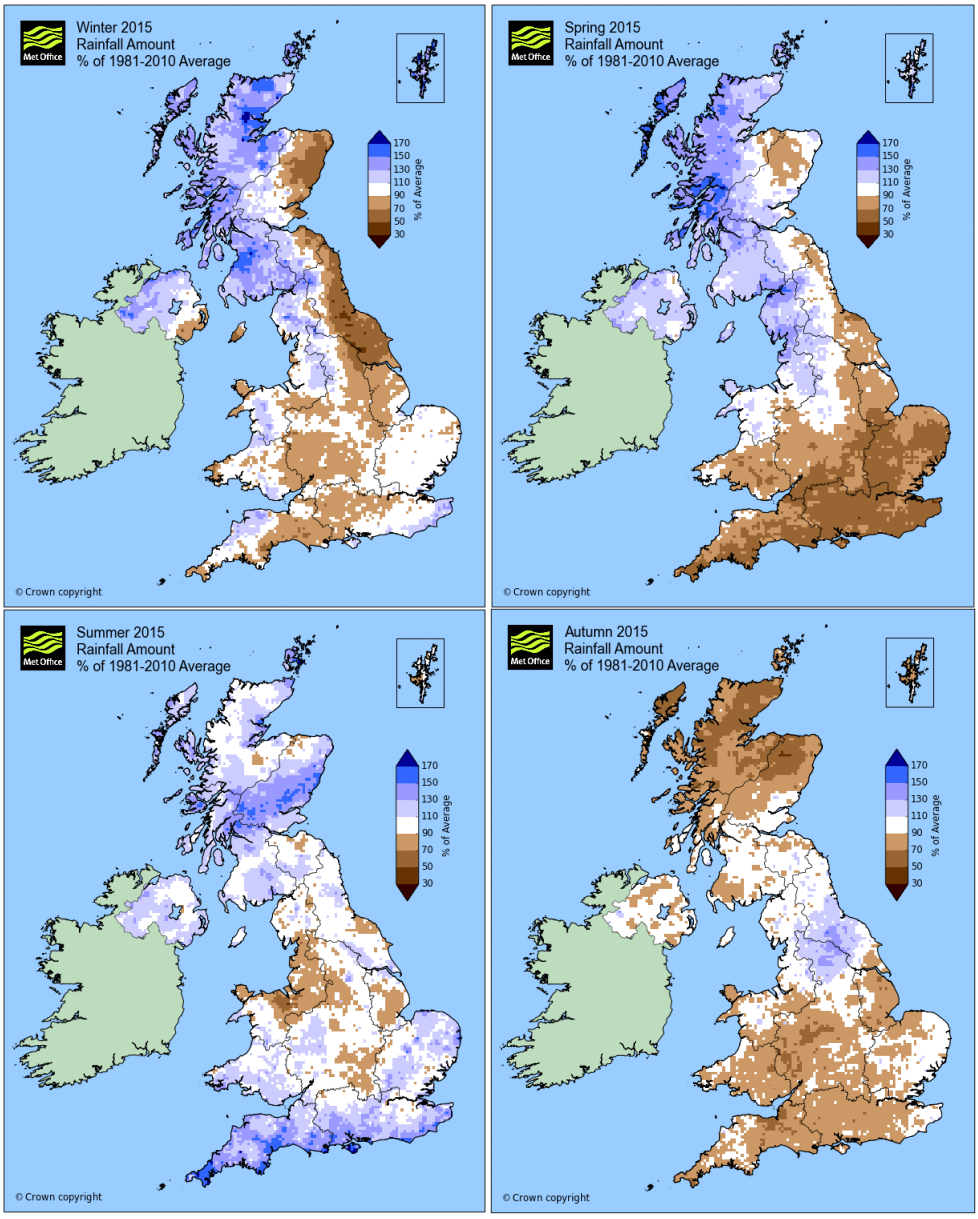


Figure 16. 2015 Seasonal Rainfall Anomaly Charts

[5] Available at: http://www.metoffice.gov.uk/climate/uk/summaries/anomacts.

Figure 17 shows the monthly breakdown of Airprox incidents by risk, whilst Figure 18 shows the same data but overlain with risk-bearing incidents as a percentage of the overall number. As can be seen, June and September were notable for their very high rates of risk-bearing Airprox (Category A & B) both in percentage terms and in pure numbers. It is also of interest that, following a 'risky' January, the trend of risk-bearing Airprox (brown line) spiked in Spring and then gradually declined in trend-terms as the year progressed. We saw the same pattern in 2014, where I speculated that this may be down to the GA flying community coming out of 'hibernation' in Spring as the weather improved, being perhaps a little rusty, and prioritising their focus on refreshing pure flying skills at the expense of lookout and situational awareness. It seems that as the year progresses, the risk-bearing trend gradually decreases, perhaps as flying proficiency and lookout improve. That the numbers of Cat A Airprox spike in the summer months is usual: this probably primarily reflects the increased flying rates overall (and hence increased exposure since there are more aircraft airborne and therefore more chances of an encounter). There is also a tendency for those who do not fly regularly, or who are *ab initio* pilots, to focus on the good weather seasons: because they may be less practiced in lookout, or may have less-honed flying skills that are absorbing their capacity, they may not see other aircraft either at all, or until the latter stages of an occurrence.

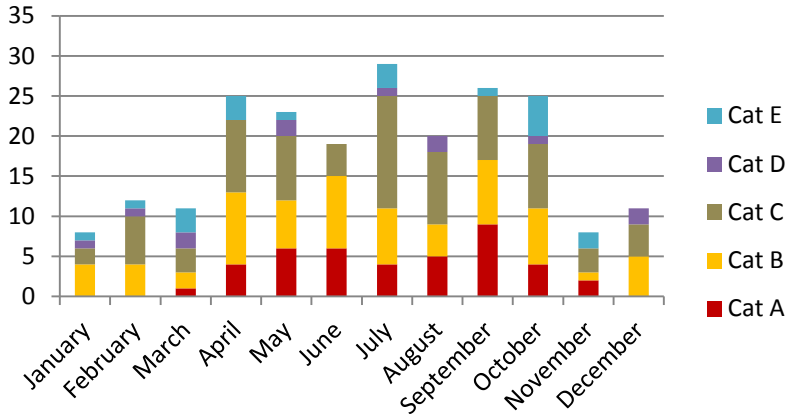


Figure 17. 2015 Airprox Risk Distribution by Month.

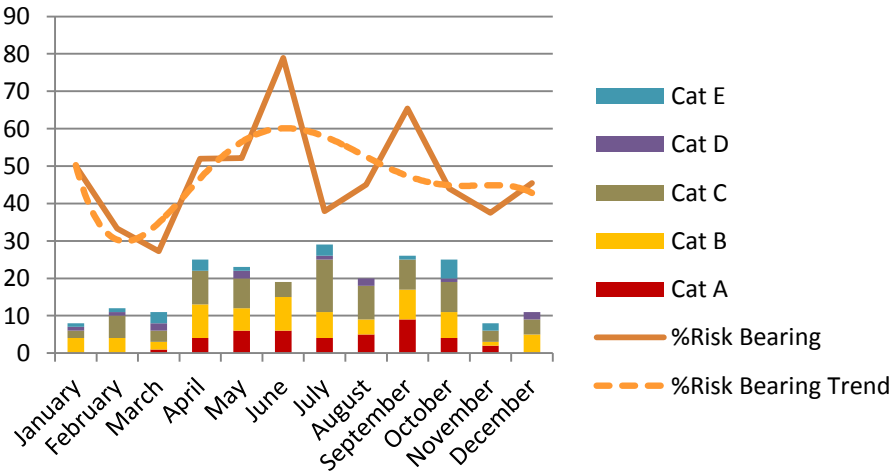


Figure 18. 2015 Airprox Risk-Bearing Trend by Month.

Analysis by User Groups

Table 6 and Figure 19 show the overall total Airprox trends by user group interactions over the last 10 years, (this year's analysis has a new user group of drones/objects added to reflect their increasing influence on the statistics). As can be seen, the numbers of Military-to-Military incidents have been broadly level in recent years (although a gradually decreasing trend overall from 2009/2010); Civil-to-Military showed a healthy decrease in 2015 (although the underlying linear trend is gradually increasing over the 10-year period); and Civil-to-Civil decreased markedly in 2015 compared to 2014 but this masks a greatly increasing trend overall since 2009/2010. 'Other' refers to aircraft such as Air Ambulances, Police Helicopters and unknown aircraft; numbers are small, but there appears to be a healthy decrease in the latter years, perhaps correlating with the formation of NPAS as a unified operating authority for police helicopters that is proactive in promoting safety themes and procedures. As previously reported, massively increased numbers of drone/object Airprox are the stand-out item due to their soaring popularity in the last few years – in 2013 there were no Airprox referring to drones/objects; in 2014 there were 9; and in 2015 there were 40.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Civil~Civil	95	93	93	74	63	73	84	80	120	106
Civil~Mil	46	38	38	36	54	50	39	54	58	42
Mil~Mil	12	12	17	30	34	26	28	19	26	23
Obj/UAS					6	0	3	0	9	40
Other	6	11	7	7	10	12	7	19	11	6
Totals:	159	154	155	147	167	161	161	172	224	217

Table 6. 10-year Total Airprox Statistics by User Group

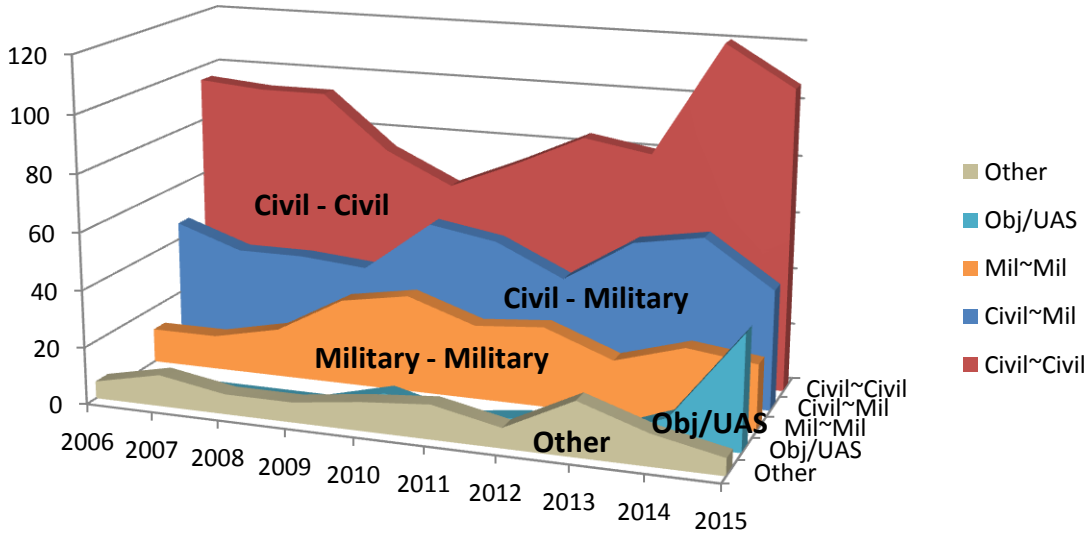


Figure 19. 10-year Total Airprox Trends by User Groups

Analysis by Flight Classification

In order to gain greater granularity of civil Airprox trends, Table 7 and Figure 20 below further break down the above civil user group statistics into classes that distinguish CAT from GA.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GA~Mil	25	25	24	29	40	46	33	48	53	38
GA~GA	44	46	47	46	44	55	59	57	97	89
CAT~CAT	19	19	24	11	5	4	11	9	5	3
CAT~GA	32	28	22	17	14	14	14	14	18	14
CAT~Mil	21	13	14	7	14	4	6	6	5	4
Mil~Mil	12	12	17	30	34	26	28	19	26	23
Obj/UAS	0	0	0	0	6	0	3	0	9	40
Other	6	11	7	7	10	12	7	19	11	6
Total	159	154	155	147	167	161	161	172	224	217

Table 7. 10-year Total Airprox Statistics by Flight Classification

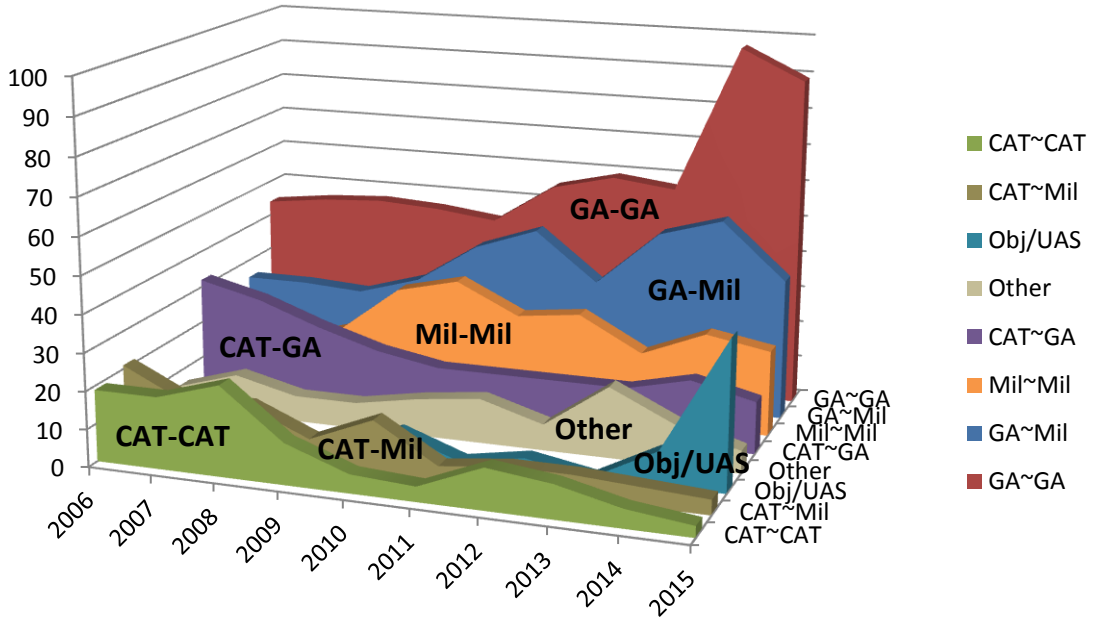


Figure 20. 10-year Total Airprox Trends by Flight Classification

The following observations are pertinent:

- **CAT**: After a marked increase in 2012, CAT-CAT incidents have continued their shallow decline; CAT-Mil incidents remain in a steady decline; and CAT-GA incidents also remain broadly steady, but at about 4 times the level of CAT-CAT and CAT-Mil.

- **Mil**: Mil-Mil incidents continue to show an overall gradual decreasing trend over the last 6 years, possibly reflecting reduced military aircraft numbers overall, the high overseas operational tempo, and the introduction of CADS[6] (a flight notification and conflict awareness tool used by the military and selected others). In contrast, although Mil-GA incidents showed a healthy decrease in 2015 compared to 2014, there is a noticeable increasing underlying trend in recent years (we saw a dip similar to 2015 in 2012 that was reversed in subsequent years). It is worthy of note that this increasing trend might have been even higher but for the greatly reduced Tutor[7] and VGS glider flying in recent years due to their respective pauses in flying. For both Mil-Mil and Mil-GA, the step increase and continued high reporting rates since 2009 can probably be attributed to the introduction of mandatory military Airprox reporting following the adoption of ASIMS[8] and an associated strong reporting culture within their safety management system.

- **GA**: GA-GA incidents nearly doubled in 2014 compared to 2013, and only abated slightly in 2015. Depending on one's perspective, this overall step-increase in GA-GA incidents over the last 2 years is either cause for concern in that GA are having more Airprox or, on the other hand, may be cause to rejoice in the fact that our engagement strategy over the last couple of years is bearing fruit through a greater awareness and willingness to report Airprox. However, notwithstanding the latter perspective, such a marked increase seems intuitively to indicate an underlying issue.

Analysis by Airspace

Figure 21 shows the spread of 2015's Airprox occurrences by Airspace involvement. The 2 most prevalent airspace types have not changed since 2014: Class G airspace/low-level below 3000ft; and ATZ/MATZ. Reflecting the fact that the majority of Airprox involve GA and Mil aircraft, it is no surprise that Airprox occurred most often in the former, where see-and-avoid provides the main mitigation (100 incidents, 46%). However, it is again disappointing (but in line with historical trends), that the second largest group again occurred within ATZ/MATZ (37 incidents, 17%). It might be expected that aircraft would be at their most predictable (and therefore avoidable) within ATZ/MATZ given that there are well-defined rules and procedures within these zones aimed at reducing the risk. However, as ever, rules and procedures are only effective if they are complied with: that this is evidently not the case bears further thought. A rising concern this year is that Airprox in Class D airspace have greatly increased in number (31 in 2015 compared to 9 in 2014); however, this is largely explained by the increased number of drone/object Airprox that have been reported in the airspace surrounding major airports.

[6] CADS – Centralised Aviation Data Service.
[7] Historically, Tutors account for 20-25% of military Airprox – much of the 'wedge' reduction in 2012 incidents can probably be accounted for by the limited amount of Tutor flying during the last 4 months of 2012 due to propeller issues, and their phased return to flying in the latter part of 2013.
[8] ASIMS – Air Safety Information Management System.

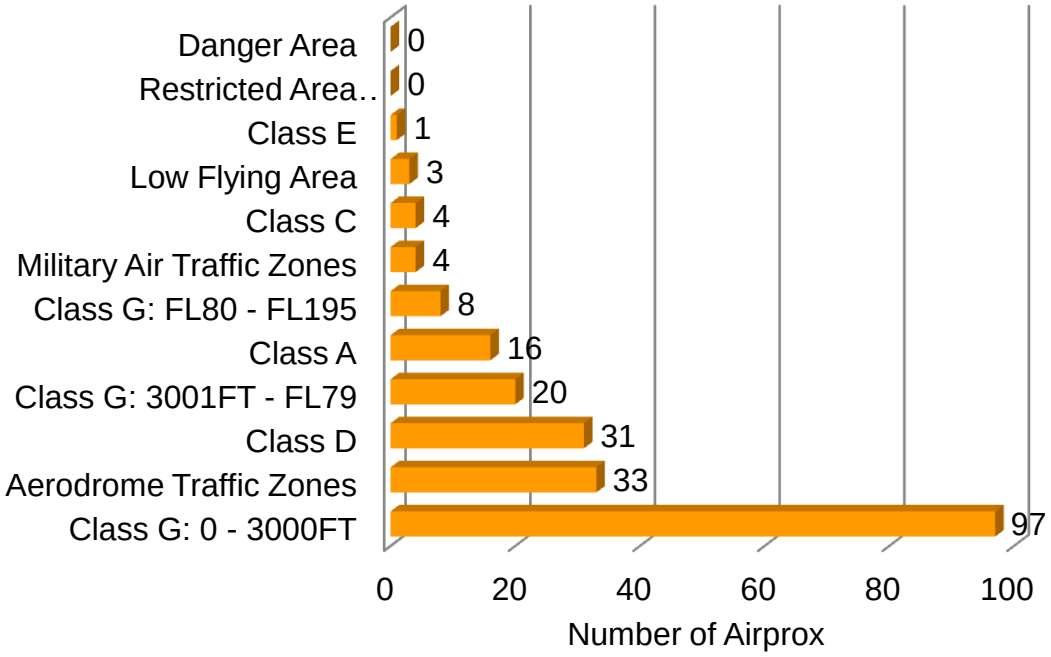


Figure 21. 2015 Airprox by Airspace Involvement

Top Ten Airprox Causes

Figure 22 shows the overall top-10 Airprox causes for 2015, along with the associated risk distributions and number of incidents for each. Other than some minor jockeying for position in the 3 least-frequent causes, the order of ranking has not changed since 2014.

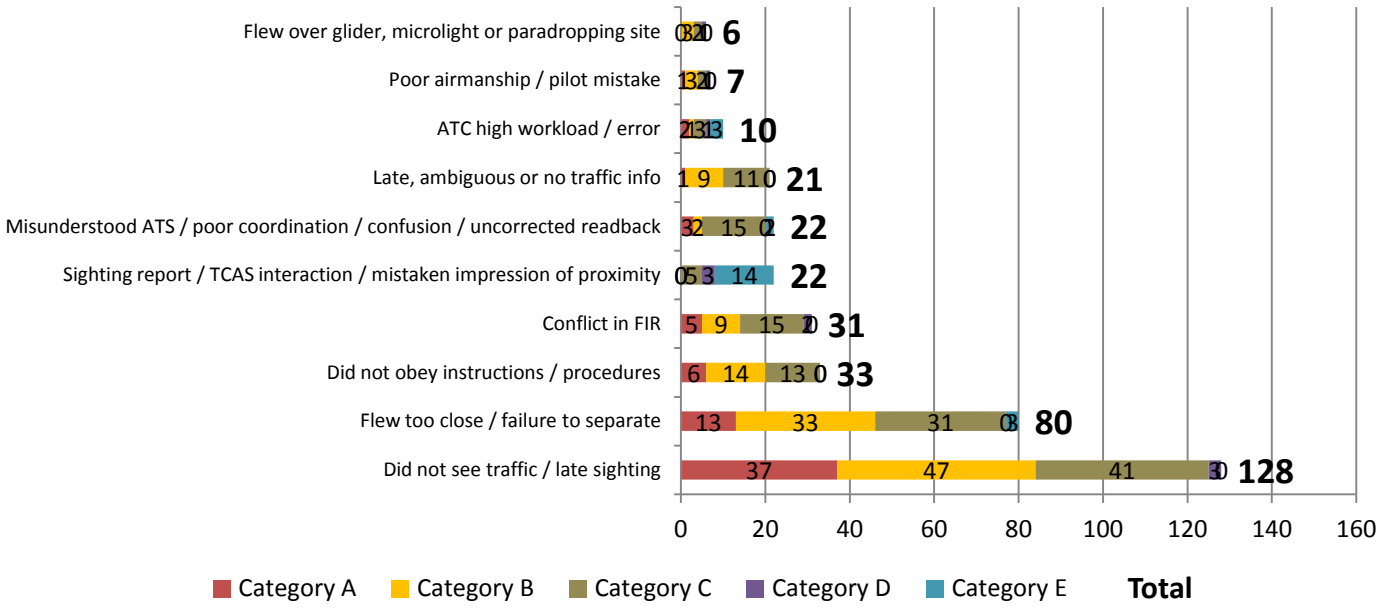


Figure 22. 2015 Top-10 Airprox Causes with Associated Risk Breakdowns

It is worthy of note that 65% of incidents in the top cause ('Did not see / late sighting') were graded as risk-bearing; this is a similar percentage to 2014, and highlights the limitations of see-and-avoid as a practical barrier to MAC if the other aircraft is not observed at an early juncture. These limitations lend weight to arguments for aids to pilot lookout and traffic awareness as a primary means of avoiding MAC: be they enhanced electronic or visual conspicuity; proper lookout training; availability of ATC Traffic Information; or simply ensuring that someone in the cockpit is energetically looking out at all times.

The second- and third-most common causes ('Flew to close / failure to separate' and 'Did not obey instructions / procedures'), showed similarly high percentages of risk-bearing Airprox. It is disappointing to note that these two causes are almost entirely avoidable given that they are largely down to pilot and controller adherence to procedures and protocols. Both of these cause groups could largely be eliminated by better pilot and controller performance; there is perhaps a case to be made for applying some thought to how we can either introduce formal education or at least achieve better awareness of 'airmanship' and 'controllership' issues.

In summary, the 3 most common cause groups for Airprox in 2015 were, 'Did not see traffic / late sighting', 'Flew too close / failure to separate' and 'Did not obey instructions / procedures'. Not only were these 3 cause groups the most common causes of Airprox, they were also the most risky.

Airprox Themes

Reflecting the causes above, the themes below represent a distillation of the Board's discussions and are based on a qualitative, subjective review of the underlying incidents. Many of these are recurring issues that have also been identified in previous reports. Only the main themes are included, and, recognising that most Airprox involve multiple causal factors, these are presented broadly in order of frequency of their occurrence during the Board's discussions (there were 251 mentions of causal factors overall during the year's reporting). The list gives some idea of the relative importance of each theme but does not bear analytical scrutiny because many Airprox involved multiple discussion themes. Encompassing all of these themes, Board debates consistently returned to the need for pilots to fly defensively and with consideration for others; prioritise lookout above in-cockpit tasks (lookout being a prime component in the 'Aviate' part of the 'Aviate, Navigate, Communicate' good-airmanship trio); and to properly understand the applicability and limitations of each of the air traffic services that are available under UK FIS.

- **Airmanship.** The Board considered that poor, or at least questionable, airmanship decisions were contributory 71 times. Although much proclaimed as underpinning everything about aviation, 'airmanship' remains a somewhat elusive quality intended to convey the notion of aviation wisdom, experience and 'common-sense' gained from: learning from the experiences and sage advice of other aviators; thinking ahead and understanding the application of rules, procedures and airspace; courtesy to other aviators; and applying a huge dose of self-preservation

through defensive flying at all times. Anecdotally at least, there are complaints that 'airmanship' is on the decrease, whatever that might mean. Particular issues were: deviating from the plan and not informing the ATC unit that was providing a service; not deviating from the plan when conditions had changed (aka 'pressing on regardless'); unclear communication of intentions; flying too close to another aircraft (on the assumption that if they themselves were comfortable with the separation then so would be the other pilot); and not complying with procedures (such as overflying glider sites or not applying the rules of the air effectively).

- **Visual Circuit.** Poor or ineffective integration in the visual circuit (or when near to ATZs, airfields, DZs and glider sites) was discussed as a factor 55 times. Flying in the circuit should be one of the most regimented and predictable of activities that a pilot conducts, yet we saw all sorts of *ad hoc* profiles and much 'pressing-on' when situational awareness had not been achieved. There is a recurring problem with the conduct of overhead joins, with many pilots either appearing not to understand them or being unable to perform them correctly. Particular problems were: poor situational awareness when joining, operating within, or departing the visual circuit; failing to follow standard joining procedures; joining the circuit downwind, crosswind or base leg rather than from an overhead join when the circuit was busy; failing to clearly pass intentions; poor integration, sequencing or separation with other aircraft already in the circuit; a general lack of consideration/awareness of those already within the visual and instrument patterns; becoming task-focussed to the detriment of lookout; assumption of 'protection' when within an ATZ; and lack of awareness of the nuances/limitations of the various levels of control at airfields (ATC vs AFISO vs AGCS).

- **Lookout**. Late- or non-sighting was mentioned in discussions 50 times. The well-known failings of the human eye have to be compensated for by pro-active lookout (especially in detecting objects with little relative movement), and this again highlighted the point that, even in good VMC, great attention and appropriate prioritisation needs to be given to visual lookout over other in-cockpit tasks. Anecdotally, there are concerns about pilots focussing more on internal avionics and navigation displays (including iPads etc) at the expense of lookout; I have no specific evidence of this.

- **ATS Provision.** Sub-optimal or ineffective ATC coordination, provision of TI, or simple controller errors were discussed 35 times. In mitigation, there were numerous instances where pilots had flawed expectations of ATC, and some where they simply did not communicate their intentions effectively or early enough to allow ATC enough time to fully assimilate the situation. That being said, there are hot-spots of uncertain LARS coverage where pilots complain that they are unlikely to gain access to their ATS of choice due to controller workload, the very time an ATS is of most use. There were also a disappointing number of Airprox demonstrating poor pilot understanding of UK FIS (especially foreign

pilots). Particular issues were: selecting an inappropriate ATS for the flight conditions or activity; assumed protection from other aircraft whilst in receipt of an ATS; and pilots' lack of appreciation for their continued collision avoidance responsibilities when in receipt of an ATS (even when IMC). Anecdotally, much of the confusion surrounding UK FIS comes from its nomenclature; the word 'Service' within Basic Service, Traffic Service, Deconfliction Service and Procedural Service all lend the impression that ATC will be 'looking after' the pilot through a 'service' that includes radar surveillance. That this is not so is fundamental within their definitions, but often not appreciated by many inexperienced pilots. Other problems that recurred in Board discussions included: insufficient or incomplete Traffic Information; poor adherence to procedures (see the visual circuit theme in particular); conducting IFR training outside ATS coverage but in intermittent IMC; and poor awareness by VFR pilots about IFR procedures and associated holds/routing.

- **Situational Awareness / Inaction.** Lack of pilot Situational Awareness was remarked upon 33 times. This theme encompasses those situations when either ATC provided Traffic Information but the pilot did not act upon it, or when a pilot sighted another aircraft that was required to give way to him and assumed that its pilot had also seen him and would avoid. Assumption of right of way, or that the other pilot has seen you, is a flawed mind-set: even if not technically required to give way, positively responding at an early stage to developing conflict situations as soon as they are detected (for self-preservation reasons if nothing else) might easily have resolved many conflicts where pilots' inaction or acceptance of a close miss-distance meant that aircraft came into proximity when they didn't need to. Interestingly, studies have shown that pilots tend to prefer avoiding other aircraft in the horizontal plane, whilst ATC tend to separate aircraft by applying a vertical avoiding manoeuvre.

- **Understanding and Knowledge.** Poor knowledge/appreciation of others (specifically, gliders, parachuting, microlights, hang-gliders etc) was evident in a number of incidents. In particular, the number of incidents where aircraft have flown through glider/microlight/parachuting sites indicates either poor GA awareness, or a lack of consideration for winch-launching, glider towing and other associated sport-aviation activities. On the other hand, gliders and microlights soaring or transiting across airfield approach lanes or in IFR holds indicates similar lack of knowledge and appreciation of GA procedures.

- **Courtesy and Consideration.** The perception of 'how close is close?' varies with aircraft classes and individual pilots; however, all aviators should be considerate of other airspace users and not assume that others have the same risk appetite as they. Moreover, it is clearly not possible to know the mindset or experience of other aviators when one encounters them in the air, and so a healthy dose of caution is required to keep out of others' way. Particular problems were: assumption of right of way; poor judgement of separation with other aircraft (especially in the circuit); failure to follow procedures; sub-optimal ATC control or

coordination; overtaking too close; indecision, uncertainty, poor anticipation or inaction in busy airspace; poor cooperation or information flow; *laissez faire*, self-interest and pressing-on without knowing (or sometimes seemingly caring) where other aircraft might be flying; poor adherence to procedures and Rules of the Air; failure to avoid known glider sites and paradropping locations; not considering the consequences of their actions on other aviators; and generally unthinking or casual operations (especially within or around ATZ).

- **Flight Planning.** Inadequate (or lack of) flight planning featured in a number of Airprox, and, as mentioned earlier, this was notably exacerbated by a lack of familiarity amongst VFR-only operators about IFR procedures and their implications. Pilots soaring in approach lanes or the 'feathers' of airfields, or transiting (VFR) through the overhead of busy commercial airport IFR holds and approach paths, were all demonstrations of an apparent lack of knowledge within the GA, glider and microlight communities of where these approach paths, holds and reporting/navigation points might be located. This is not helped by the fact that there is no consolidated source of such information other than by examining individual approach plates for the airfields concerned; UKAB made a recommendation in this respect to the CAA to seek a consolidated chart showing these locations; however, this was rejected. Other issues included: poor airspace understanding; poor NOTAM awareness/understanding; poor choice of ATC agency, operating area, routing and waypoints; routing too close to, or through, ATZs, minor strips and glider/microlight/parachuting sites; lack of thoroughness of pre-flight self-briefing; and lack of contingency planning for actions on becoming lost or experiencing other eventualities.

- **R/T.** Poor radio frequency management and ineffective (or lack of) passage of information to ATC meant that some Airprox could have been directly avoided if at least one pilot had passed information to ATC such that they could have provided Traffic Information to the other pilot involved. In this respect, specific issues were: lack of communication of intentions to ATC (and/or other aircraft involved); reluctance for pilots to talk to airfields as they pass close by (a simple information call would help immensely but it seems that pilots are fearful that once in contact they will be 'harassed' by ATC into altering their route or activities); not using the radio to confirm theirs or others' intentions; failure to communicate a change of intentions; poor or casual R/T discipline and failure to use pro-words; undetected incorrect read-backs, or failure to read back instructions; imprecise routing or reporting instructions; interpretation of unclear transmissions based on assumptions or standard routines rather than request a retransmission; clipped, garbled, blocked or simultaneous 'double' transmissions; and failure to clearly and simply articulate intentions or instructions.

- **Technical.** There is no doubt about the value of electronic conspicuity in assisting lookout. However, although knowledge of electronic systems and traffic avoidance equipment is slowly increasing amongst the GA/Mil

communities, we still saw many incidents of poor understanding of TCAS/TAS mechanisation; lack of awareness of own flight vector on other TCAS equipped aircraft; problems with the use of TCAS in mixed VFR/IFR traffic conditions; inappropriately responding to TCAS TAs; and poor understanding of TCAS azimuth unreliability. There were also examples of false expectations or over-reliance on TCAS/TAS; the positive value of FLARM/P-FLARM in preventing Airprox; the value of SSR Mode S in helping ATC detect anomalies between cleared altitudes and those selected by pilots; and examples of pilots not selecting SSR transponder Mode C/Alt (therefore hampering ATC's ability to separate aircraft by altitude, and negating TCAS/TAS equipment in other aircraft from reacting). Although FLARM has gained much acceptance in the gliding community, the use of SSR still seems to be resisted due to cost and power requirements, despite the fact that many modern kits have overcome this; that being said, there would likely be issues with wholesale adoption of SSR by the gliding community given potential saturation of ATC displays as a result.

- **Supervision.** Lapses in, or absent, supervision played a part in a number of Airprox. These included sub-optimal monitoring, information flow and coordination within and between ATC units; lack of effective supervision (both within ATC and by flying instructors of solo students); reduced capacity of instructors whilst mentoring trainees meaning that they overlooked other priorities; and flying instructors allowing their students to undertake solo training sorties either when conditions might not be wholly suitable, or when they were not fully briefed on possible contingencies and eventualities.

COMMERCIAL AIR TRANSPORT

As mentioned elsewhere, 2015 saw a large increase in drone/object Airprox incidents, and the majority of these involved CAT aircraft. As a result, year-on-year comparisons with historic data need to be careful to compare like with like. As a result, I have included graphs and statistics both with, and without, drone/objects included. That being said, drone/object Airprox still represent significant risk and should not be lightly discounted merely because they represent a new, as yet not fully quantified, threat.

CAT Airprox by Airspace

Figure 23 shows the breakdown of all CAT Airprox by airspace type. Of the 49 Airprox involving CAT: 15 occurred in Class A, IFR-only controlled airspace; 27 occurred in Class C/D, mixed IFR/VFR controlled airspace; and 7 occurred in Class G uncontrolled airspace. Equivalent figures for 2014 were: 6 in Class A; 7 in Class C/D; and 15 in Class G. The large increase in Class A/C/D incidents in 2015 is largely down to drone/object events (there were 28 CAT Airprox involving drones/objects in 2015). In contrast, there was a welcome decrease in Class G CAT events, perhaps due to increased awareness of TCAS envelopes given that we also saw a reduction in Airprox classified as 'TCAS sighting reports' in 2015.

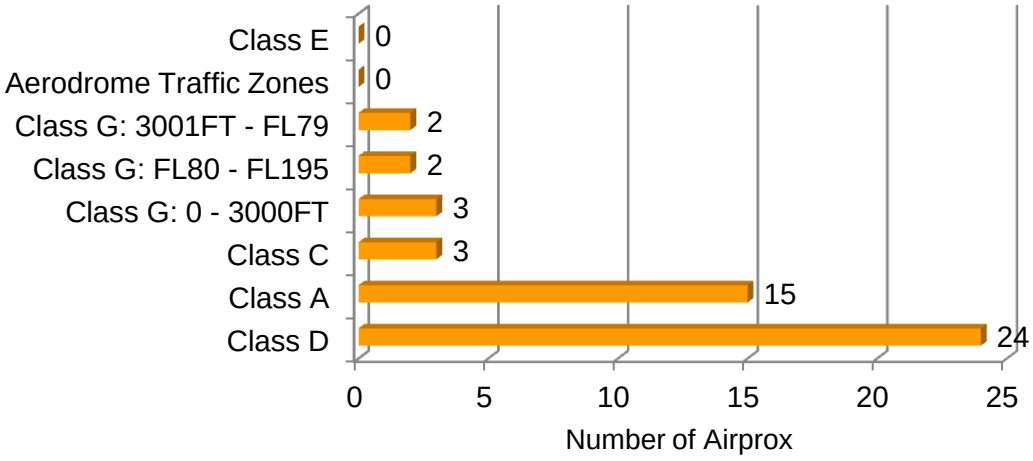


Figure 23. 2015 CAT Airprox by Airspace Involvement

CAT Risk Distribution

Table 8 and Figures 24/25 show the 10-year CAT Airprox totals and associated risk distributions. Discounting the drone/object data, the underlying aircraft-to-aircraft CAT Airprox trend shown in Figure 24 shows a steady decline since 2012, albeit the risk-bearing percentage remains constant in the low- to mid-teens. The picture is very much different if drone/object Airprox are included in the statistics as shown in Figure 25 where increasing trends are evident in both overall numbers of incidents and the proportion that are risk-bearing. The latter trend being particularly skewed by the fact that most drone/object incidents are reported at close quarters due to the difficulty in seeing drones at range; as a result, most drone/object Airprox are classified as risk-bearing.

Other than drone/object incidents, those CAT Airprox that were classified as risk-bearing in 2015 were:

- 2015066 – Category B: L410 vs BE20 near Gloucester in Class G.
- 2015111 – Category B: B737 vs USAF C5 at 'BARMI' in Class C.
- 2015164 – Category B: SF340 vs PA30 at Kirkwall in Class G.

Details of these Airprox can be found in the 2015 Airprox catalogue at the end of this report, and on the UKAB website at www.airproxboard.org.uk.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CAT Risk A	0	0	0	0	0	0	1	1	2(1)	9(0)
CAT Risk B	6	5	2	1	0	1	0	3	4(3)	13(3)
CAT Risk C	68	60	58	33	33	18	23	14	15(14)	13(11)
CAT Risk D	0	0	1	1	2	0	4	3	2(1)	7(1)
CAT Risk E	0	0	0	0	0	3	7	12	8(8)	7(6)
CAT Total	74	65	61	35	35	22	35	33	31(27)	49(21)

Table 8. 10-year CAT Airprox Statistics by Risk Classification (figures in brackets are minus the drone/object Airprox)

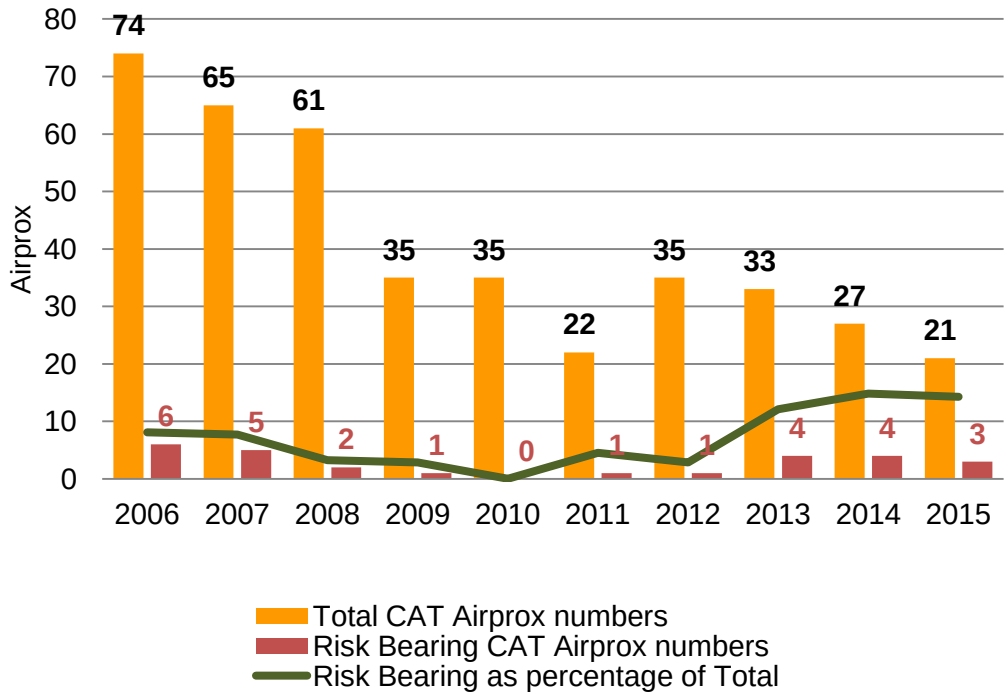


Figure 24. 2015 CAT Airprox Risk Bearing Distribution (without drones/objects)

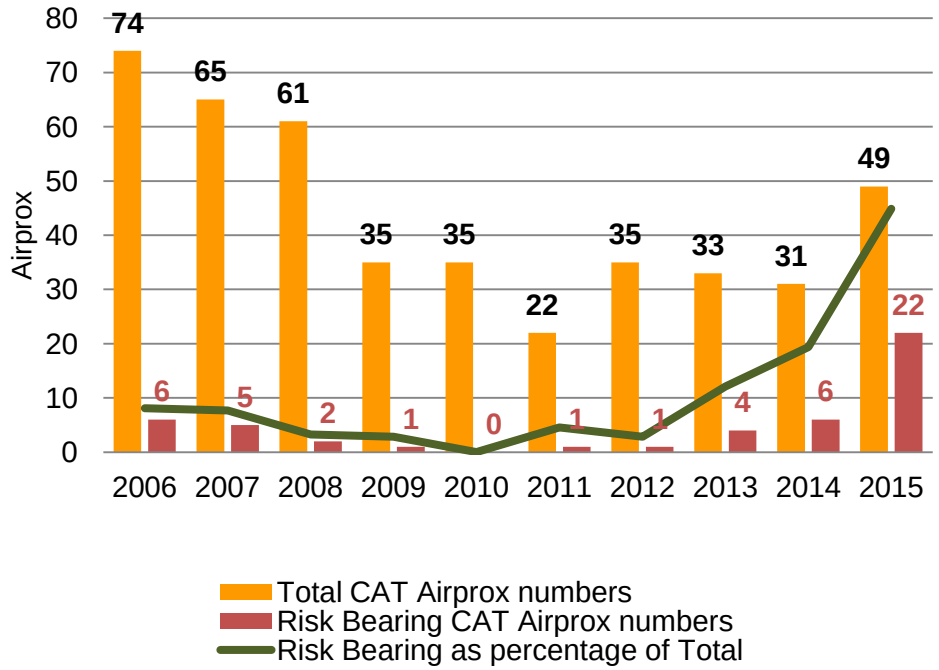


Figure 25. Overall 2015 CAT Airprox Risk Bearing Distribution (including drones/objects)

CAT Airprox Rates

Table 9, along with Figures 26-29, further illustrate the CAT Airprox risk distributions and rates normalised for hours flown (both with, and without, drone/object incidents) over the last 10 years. The underlying trend without drone/object incidents shows a steadily reducing overall rate of CAT Airprox per million flying hours (mfh) in the last few years, albeit with a fairly steady risk-bearing rate of 2-3/mfh in recent times; prior to 2013, this rate had decreased to a steady ~1/mfh. However, similar to other Airprox analysis, it should be noted that, statistically, the numbers for CAT Airprox are especially small, and so care must be taken in attempting to identify risk-bearing trends. If drone/object incidents are retained in the statistics then, as before, the picture is very different with commensurately sharply increasing trends for both overall and risk-bearing incidents per mfh.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total CAT Airprox	74	65	61	35	35	22	35	33	31(27)	49(21)
Risk Bearing CAT Airprox	6	5	2	1	0	1	1	4	6(4)	22(3)
CAT Hours x 10K	160.3	162.0	163.5	149.4	141.6	147.1	145.4	149.0	151.5	154.8
Total per Million hrs	46	40	37	23	25	15	24	22	20(18)	32(14)
Risk Bearing per Million hrs	4	3	1	1	0	1	1	3	4(3)	14(2)

Table 9. 10-year CAT Airprox Statistics versus CAT hours flown (figures in brackets are data minus drone/object Airprox)

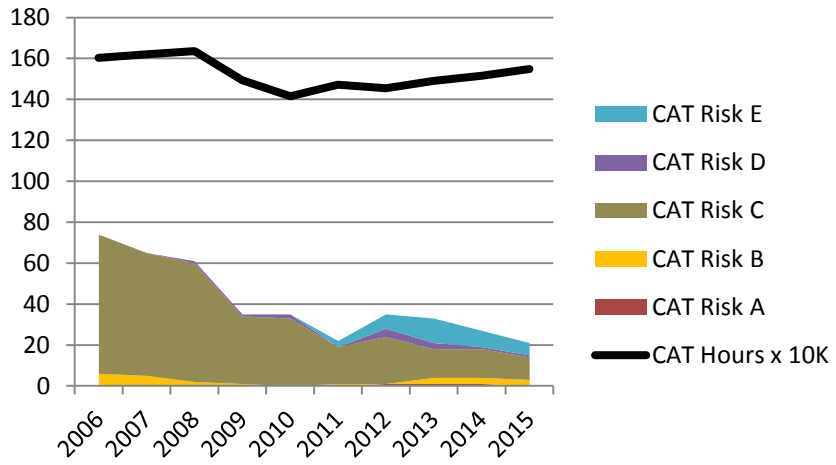


Figure 26. 10-year CAT Airprox Risk Distribution vs CAT hrs (without drones/objects)

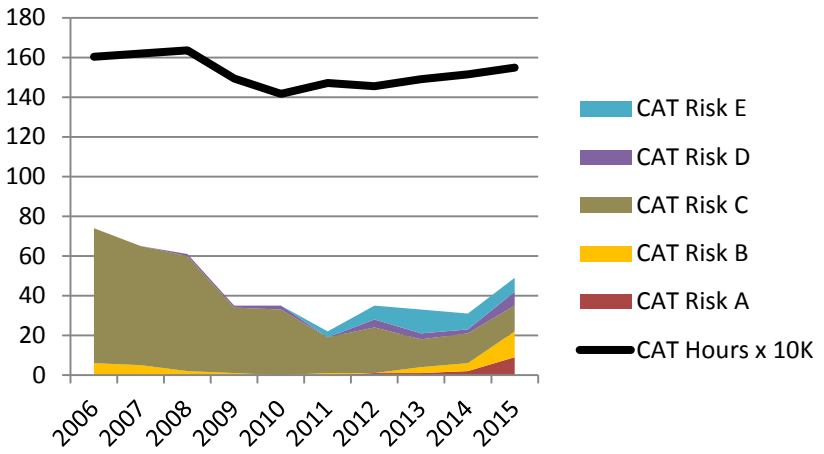


Figure 27. 10-year CAT Airprox Risk Distribution vs CAT hrs (including drones/objects)

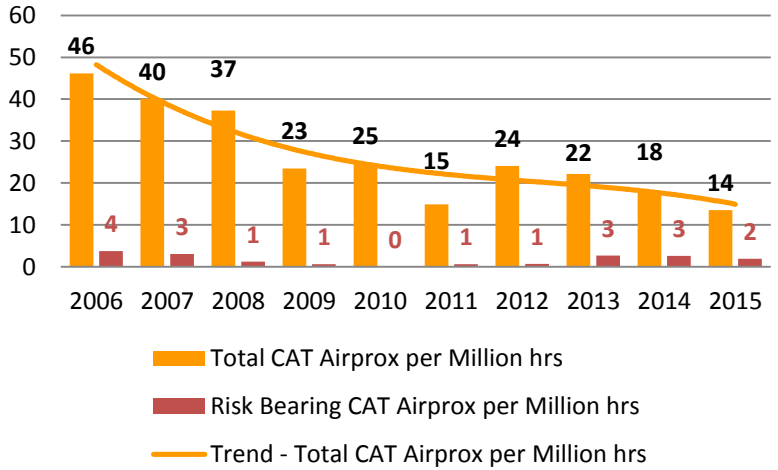


Figure 28. 10-year CAT Airprox Rates per Million Flying hrs (without drones/objects)

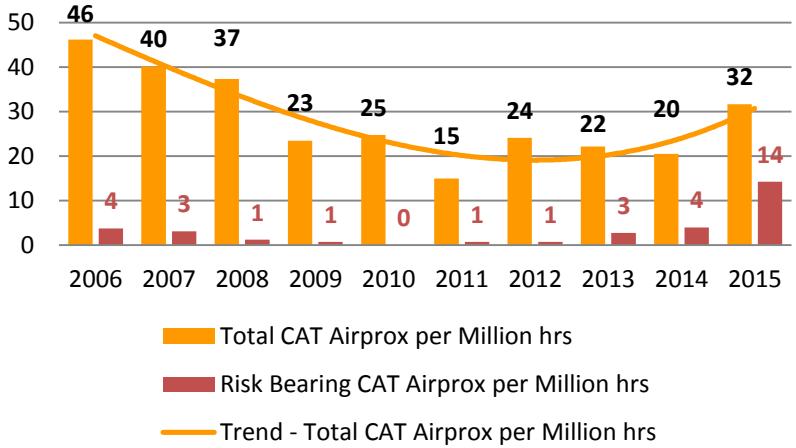


Figure 29. 10-year CAT Airprox Rates per Million Flying hrs (including drones/objects)

CAT Causal Factors

Airprox rarely occur for a single reason; there are often several contributory causal factors relevant to each. Nevertheless, within the Airprox assessment process, a single 'cause' statement can often be useful in focusing attention on what was the top-level reason that the Airprox occurred. The list at Table 10 and Figure 30 represent the most commonly assigned causes for CAT in 2015.

Rank	Cause	Totals
1(1)	Not obeying ATC / flew too close / poor airmanship / pilot mistake	29
2(5)	Sighting report / TCAS / FIR conflict	11
3(2)	ATC did not adequately separate traffic, or late / no TI	10
4(10)	Other cause / unknown	9
5(7)	Ambiguous / misunderstood ATC instructions or degraded comms	7
6(9)	Mistaken impression of loss of separation	4
7(8)	Failure to see conflicting traffic / late sighting	3
8(4)	High Controller workload / distraction / inadequate supervision	2
9(3)	Lack of / breach of ATC coordination	1

Table 10. 2015 Top CAT Airprox Causal Factors (2014 ranking in brackets)

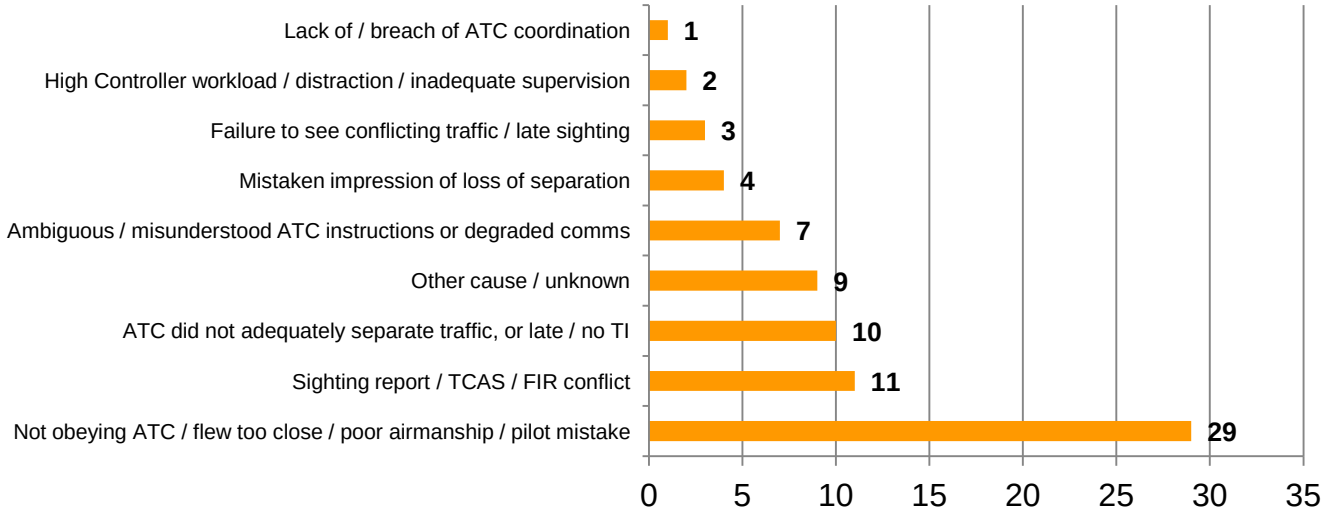


Figure 30. 2015 Top CAT Airprox Causal Factors

'Not obeying ATC / poor airmanship / pilot mistake' is a catch-all for a number of factors including *inter alia* inadequate avoiding action, flying too close to other aircraft, faulty/incorrect transponder operations, penetration of CAS/ATZ without clearance, poor airmanship, and 'flight causing ATC concern'. That is not to say that the CAT pilots were necessarily the perpetrators of the causes, often it was the other pilot concerned who had the cause attributed to them rather than the CAT pilot. In 2015, this cause category showed a disproportionate increase compared to 2014 (which saw only 16 instances) because the Board ascribes this cause to drone incidents where the drone was being operated in airspace that it should not have been and was thus effectively an incident caused by 'penetration of CAS without clearance' / 'poor airmanship'.

In a similar vein, this year saw a doubling of incidents attributed to 'Sighting Report / TCAS / FIR conflict' categorizations. Some of these were drone sighting reports and some were encounters where CAT crews were either concerned by the TCAS-reported Traffic Alert (TA) proximity of other aircraft, or responded to a TCAS RA. Although the Board acknowledges that CAT crews must always obey the commands generated under a TCAS RA, there are lessons for both CAT crews and other aviators flying in non-Class A airspace in recognising that TCAS is mechanised for IFR separation criteria and so will generate alerts and avoidance instructions in circumstances where VFR pilots are at liberty to fly much closer in mixed IFR/VFR airspace. VFR pilots should be aware that CAT crews have specific mandatory actions that require them to manoeuvre on receipt of TCAS RAs, and they should therefore try to give CAT aircraft as wide a berth as possible to avoid triggering 'emergency' manoeuvres caused by flying close to, or pointing their flight vector at, CAT aircraft.

Drones / Unknown Objects / Model Aircraft / Balloons

As previously mentioned, drone Airprox have increased markedly in 2015 as a result of their growing popularity across all sectors of consumer, hobbyist and commercial drone operator communities. Table 11 and Figure 31 give the associated figures since 2010, when UAV/drone incidents first began to be consistently reported. It can be seen that 2015 saw an unprecedented rise in drone incidents, most of which involved CAT aircraft.

Year	Drone	Model Aircraft	Balloon	Unknown	Totals
2010	4	1	0	1	6
2011	0	0	0	0	0
2012	0	2	0	1	3
2013	0	0	0	0	0
2014	6	2	0	1	9
2015	29	3	3	5	40

Table 11. Airprox involving drones / objects since 2010

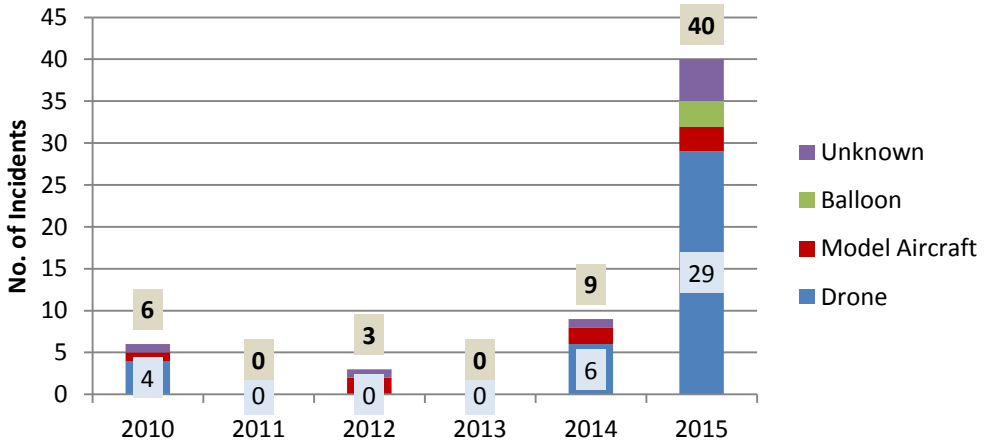


Figure 31. Airprox involving drones / objects since 2010

GENERAL AVIATION

GA Airprox by Airspace

There were 154 Airprox in 2015 in which at least one aircraft was GA (71% of the total 217). Although this is a welcome reduction since 2014 where there were 171 incidents, it still represents a markedly high absolute number of incidents compared to the last 10-year period. That being said, the percentage share of Airprox involving GA has historically remained fairly consistent at between 61% and 76% over the last 10 years; 2015 remains within this band. This reflects that GA represents the majority of flying activity in Class G see-and-avoid airspace, which is where most incidents occur. Of the 2015 incidents, the clear majority occur below 3000ft in Class G airspace as shown in Figure 32. However, of concern, the second most common airspace for Airprox is within Aerodrome Traffic Zones which should provide a highly structured and known environment, but still accounts for a significant number of events largely resulting from poor airmanship, poor situational awareness or lack of consideration for other airspace users.

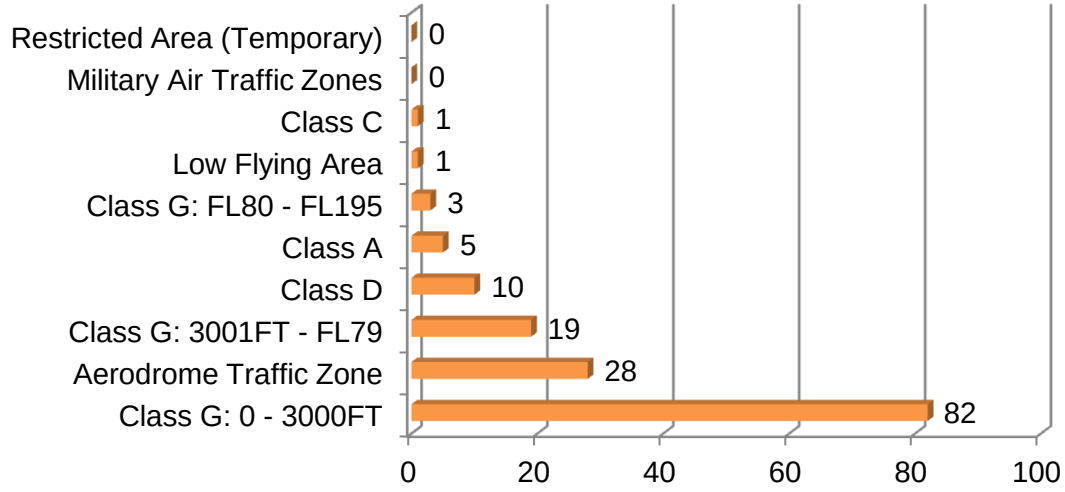


Figure 32. 2015 GA Airprox by Airspace Involvement

GA Risk Distribution

The 2015 GA Airprox risk distribution figures at Table 12 reflect that, although there was an overall decrease in GA Airprox numbers, absolute numbers of risk-bearing incidents remain high, with a similar percentage to 2014's figures being risk-bearing (in 2015, 46% of GA incidents were risk-bearing compared with 47% in 2014); Figures 33 & 34 illustrate this graphically. The underlying trend is that risk-bearing percentages and absolute numbers have been edging up over the last few years; in other words, GA Airprox are trending towards more serious encounters. Without extensive Human Factors information, it is hard to explain this increase other than to speculate about reduced lookout performance/prioritisation (perhaps emphasising the effects of introducing more electronic cockpit displays), poorer situational awareness/airmanship, or simply more Airprox reporting as the GA community embraces safety reporting.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GA Risk A	10	8	8	8	5	19	13	18	23	26
GA Risk B	36	30	31	20	25	27	21	34	58	45
GA Risk C	57	65	55	66	70	63	62	53	62	62
GA Risk D	0	0	4	1	2	2	1	2	3	5
GA Risk E	0	0	0	0	0	8	11	18	25	16
GA Totals	**103**	**103**	**98**	**95**	**102**	**119**	**108**	**125**	**171**	**154**

Table 12. 10-year GA Airprox Statistics by Risk Classification

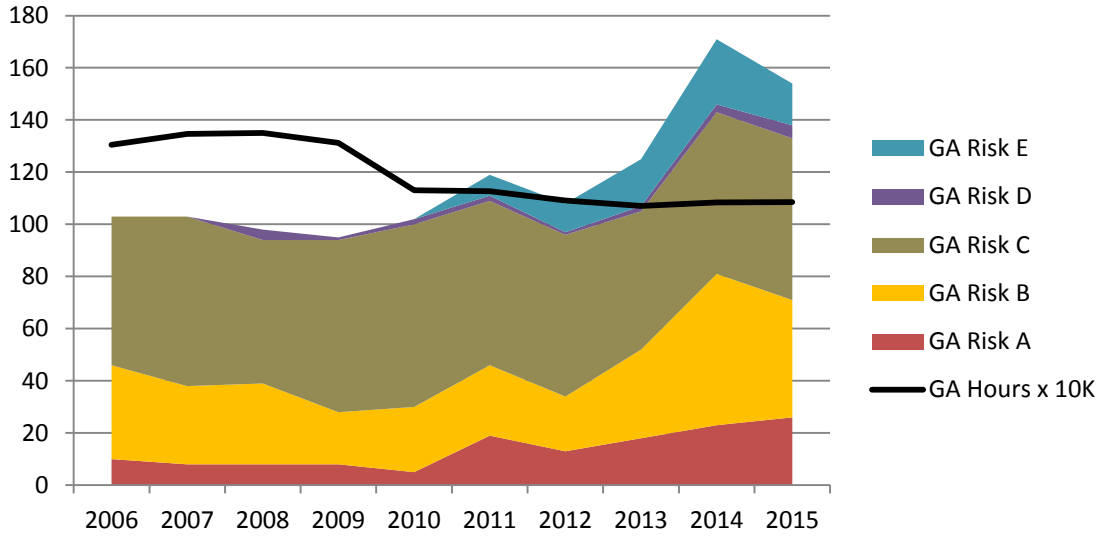


Figure 33. 10-year GA Airprox Risk Distribution and GA hours

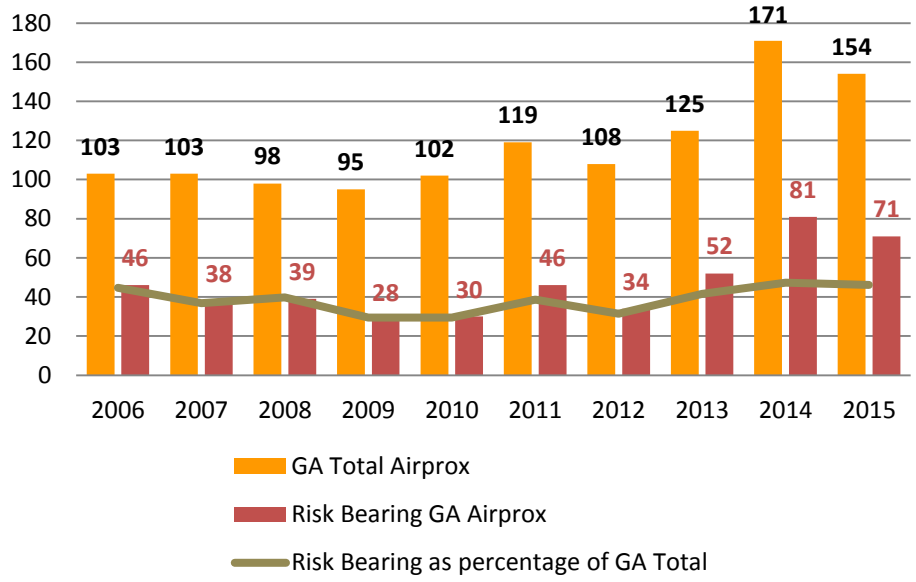


Figure 34. 10-year GA Airprox Risk Bearing Distribution

GA Airprox Rates

Normalising GA Airprox statistics for hours flown shows a moderate decrease for both the overall rate and the risk-bearing rate: Table 13 and Figure 35 show Airprox numbers in relation to GA hours flown. Notwithstanding that this slight decrease in 2015 might hopefully presage a return to historic norms, the underlying linear trend remains increasing for both overall and risk-bearing measures over the past 6 years. It is stressed that statistics for GA flying hours are notoriously hard to estimate given that a significant portion of sports aviation hours are not formally recorded (especially hang-glider, paraglider, paramotor hours etc). Notwithstanding, light-aircraft and glider hours have been reported fairly consistently over the years and, given that these represent the majority of Airprox candidates, headline rates can be used as an indicative measure.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GA Total Airprox	103	103	98	95	102	119	108	125	171	154
Risk Bearing GA Airprox	46	38	39	28	30	46	34	52	81	71
Risk Bearing % of GA Total	45	37	40	29	29	39	31	42	47	46
GA Hours x 10K	130.5	134.6	135.1	131.2	113.0	112.7	109.2	107.0	108.4	108.5
GA Total per Million hrs	79	77	73	72	90	106	99	117	158	142
GA Risk Bearing per Million hrs	35	28	29	21	27	41	31	49	75	65

Table 13. 10-year GA Airprox Statistics versus GA hours flown

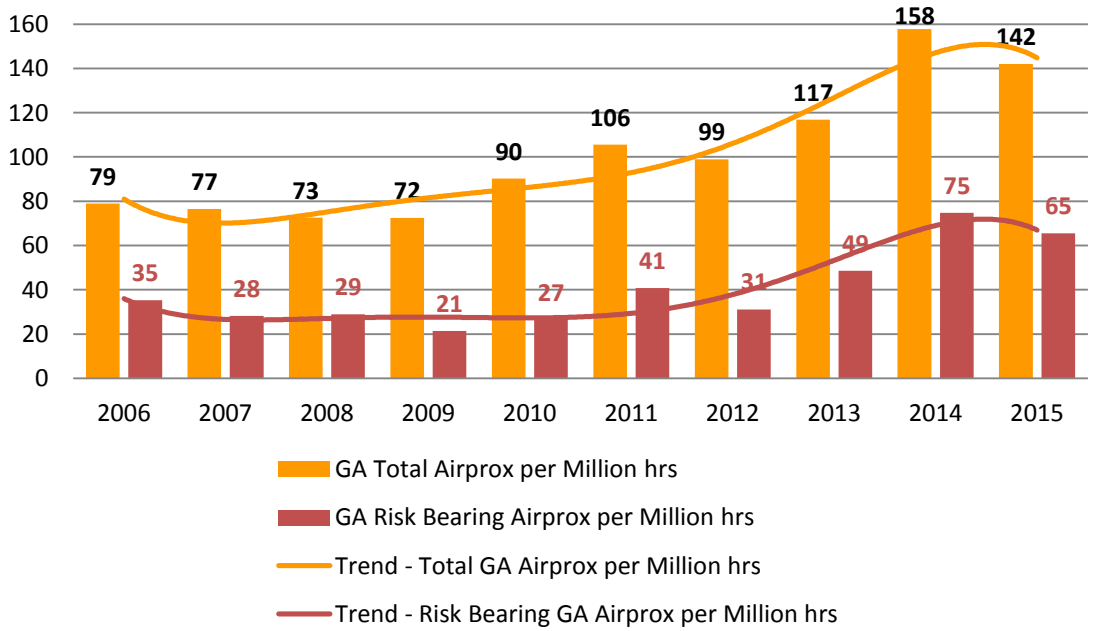


Figure 35. 10-year GA Airprox Rates per Million Flying Hours

GA Causal Factors

Table 14 and Figure 36 show the top-ten rankings for the 277 formal causal assignments given to GA Airprox incidents in 2015 (an Airprox often has more than one causal factor). As for previous years, the most common cause was 'Did not see traffic/late sighting', which featured in 118 incidents. This is largely to be expected in an environment where see-and-avoid is the primary barrier to Airprox incidents – if the other aircraft is not seen then it cannot be avoided. The 2nd most common cause of 'Flew too close/failure to separate' remains the same as for 2014 and reflects a general concern about poor airmanship, situational awareness or lack of consideration for other airspace users who have been sighted or detected but not properly avoided. The 3rd most common cause 'Conflict in FIR' represents situations where one, or both, of the pilots saw each other as early as prevailing circumstances permitted: in other words, the available barriers of see-and-avoid etc could not have functioned any better than they did, but the aircraft still came into conflict. 'Did not obey instructions / procedures' remains a concern; although there were fewer incidents this year (21 incidents in 2015 compared to 35 in 2014), these Airprox are wholly avoidable and often accounted for many of the Airprox within ATZ.

Rank	Cause	Totals
1(1)	Did not see traffic / late sighting	118
2(2)	Flew too close / failure to separate	42
3(4)	Conflict in FIR	23
4(3)	Did not obey instructions / procedures	21
5(5)	Sighting report / TCAS interaction / mistaken impression of proximity	16
6(6)	Late, ambiguous or no traffic info	15
6(8)	Misunderstood ATS / poor coordination / confusion / uncorrected readback	15
8(10)	ATC high workload	6
9(7)	Flew over glider, microlight or paradropping site	5
9(9)	Poor airmanship / pilot mistake	5

Table 14. 2015 GA Top-10 Airprox Causal Factors (2014 ranking in brackets)

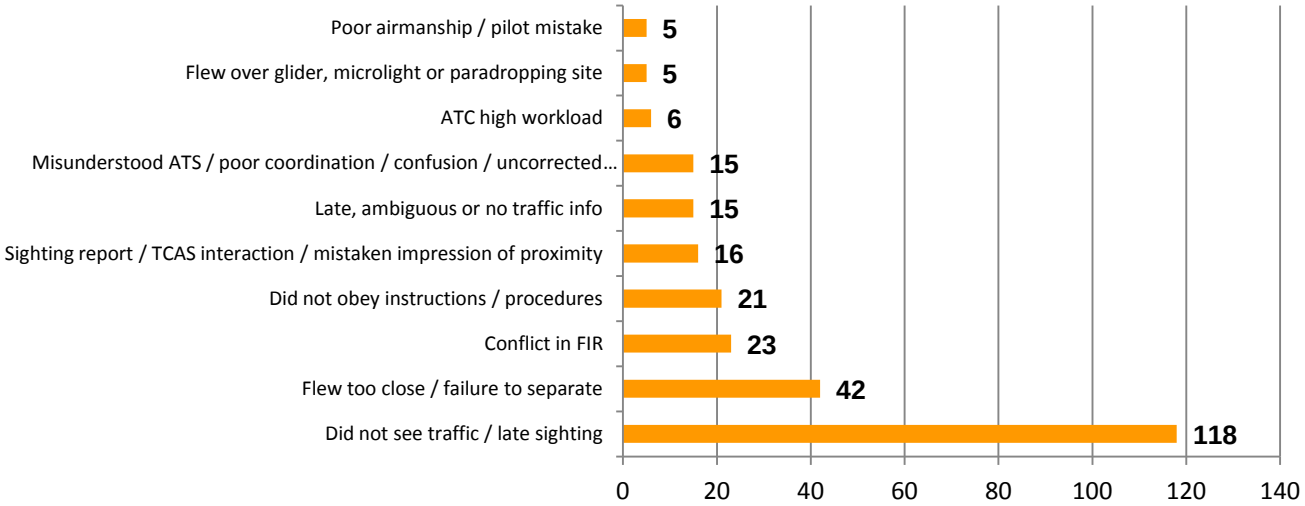


Figure 36. 2015 GA Top-10 Airprox Causal Factors

MILITARY AVIATION

Military Airprox by Airspace

There were 70 Airprox involving the military in 2015 (compared to 97 in 2014). In airspace terms, the majority of military Airprox again occurred in Class G airspace below 3000ft (including the low-flying areas), where numbers remained broadly constant since last year (41 incidents in 2015 compared to 46 in 2014). Of these 2015 encounters, 9 were Mil-Mil whilst 29 were Mil-Civ (the remaining 3 being 2 x drone incidents and 1 x model aircraft incident). This re-emphasises that civil aircraft remain the key MAC risk to military aircraft below 3000ft. Compared to 2014, the biggest reductions in military incidents occurred in Class G airspace above 3000ft: both of the 2 airspace bands 3000ft-FL80 and FL80-FL195 saw incidents reduce by an identical amount from 13 to 6. Equally encouraging was the halving of military incidents in MATZ/ATZ; from 21 Airprox in 2014, to 10 Airprox in 2015. Figure 37 shows the distribution of military Airprox in 2015 by airspace type.

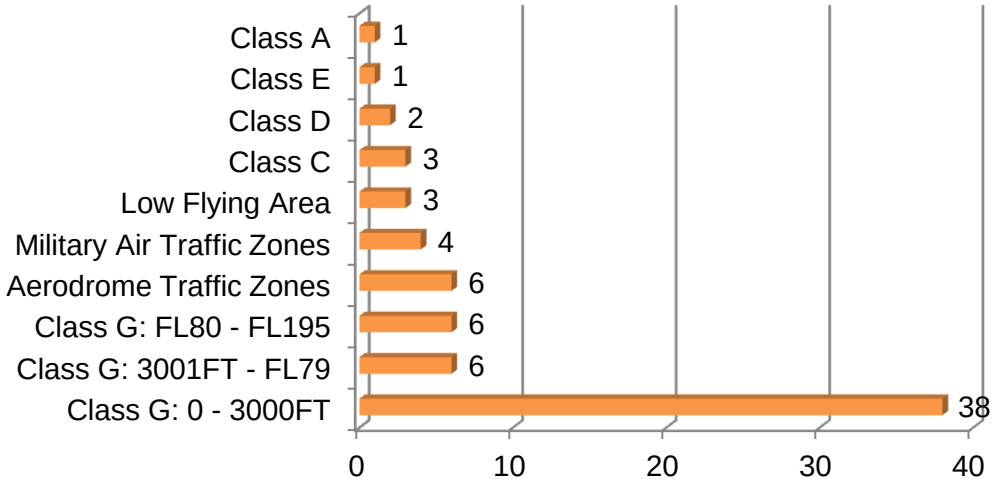


Figure 37. 2014 Military Airprox by Airspace Involvement

Military Risk Distribution

Table 15, Figure 38 & Figure 39 illustrate the military Airprox statistics and risk distribution for the last 10 years, wherein the recent peaks and troughs merit some explanation. The step increase in Airprox reporting rates in 2010 is likely to be accounted for by the introduction of formalised Air Safety Management processes and mandatory Airprox reporting when the MAA was formed. The trough in 2012/2013 was likely attributable to reduced flying by the Tutor and Glider fleets as a result of their respective groundings due to maintenance issues: the return to flying of the Tutor fleet[9] saw 21 incidents involving these

[9] After a second propeller failure on 9 Jan 2013, flying was paused for resolution of propeller security issues and subsequent replacement. Following an extended period of non-flying whilst compatibility issues were addressed, a staged return to flight preceded a formal declaration on 20 Dec 13 that full Tutor capability had been regained.

aircraft in 2014, and 14 in 2015 – this was undoubtedly a factor in the return to previous Airprox levels in 2014 (Tutors have historically accounted for 20-25% of military Airprox). Similarly, the military gliding fleet was also temporarily suspended from flying in 2013-2014 and, at the time of writing, has still to fully resume operations; I expect further increases in Airprox numbers once they do. It would be tempting to correlate 2015's welcome reduction in military Airprox with a high tempo of overseas operations that were conducted in the context of reducing numbers of front-line fast-jet aircraft. However, the number of fast-jet Airprox in 2014 and 2015 were broadly comparable (32 and 29 respectively), although Typhoon incidents did reduce from 9 to 4.

Overall, UK military flying hours have remained fairly static in recent years and so there is cause for optimism in the reduction of military Airprox in 2015. What is less encouraging is that the number of risk-bearing incidents remained similar to 2014, and both at higher levels than historically experienced. In the context of decreasing overall Airprox numbers, this equates to a quite marked increase in terms of risk-bearing percentage; moreover, the overall trend is gradually increasing over recent years. In other words, although the overall Airprox rate decreased in 2015, they were, in percentage terms, more risky.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mil Risk A	7	2	7	8	7	9	8	8	7	11
Mil Risk B	17	15	15	23	18	21	13	20	26	21
Mil Risk C	35	35	34	38	70	44	43	38	41	27
Mil Risk D	1	0	0	1	3	1	0	4	6	2
Mil Risk E	0	0	0	0	0	8	7	12	17	9
Total	60	52	56	70	98	83	71	82	97	70

Table 15. 10-year Military Airprox Statistics by Risk Classification

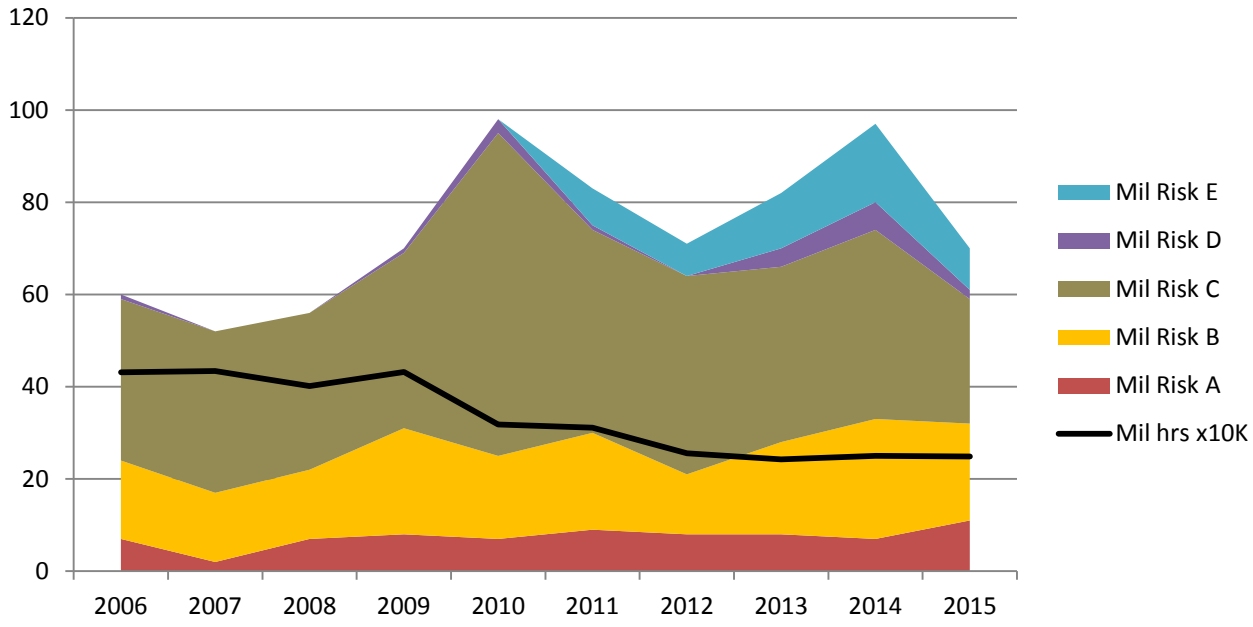


Figure 38. 10-year Military Airprox Risk Distribution and Military hours

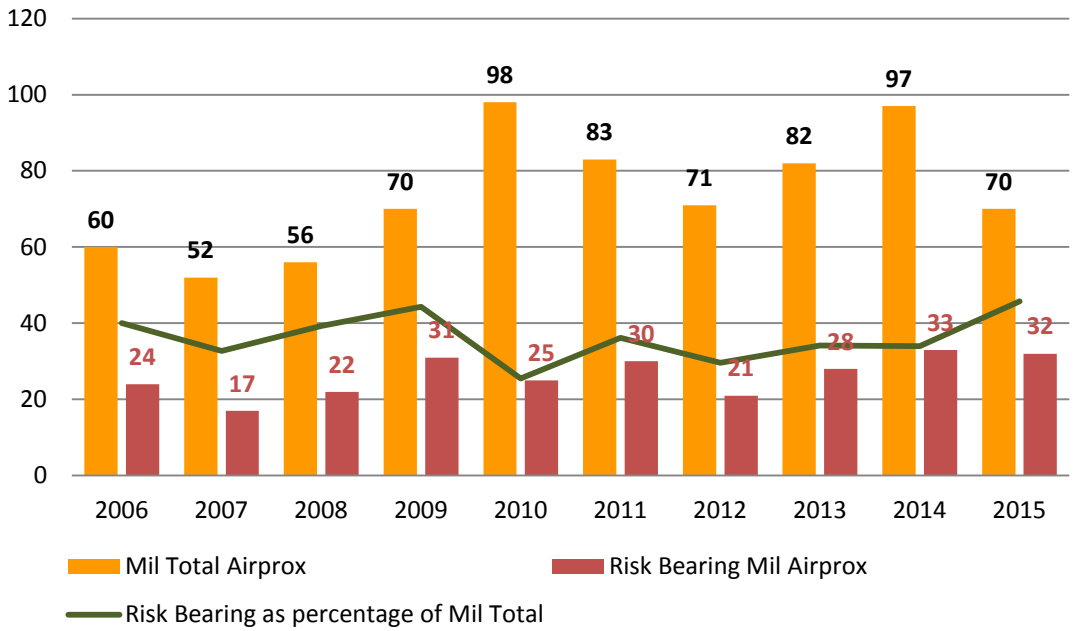


Figure 39. 10-year Military Airprox Risk Bearing Distribution

Military Airprox Rates

Table 16 and Figure 40 show the normalised military Airprox rate per mfh. With hours flown being largely the same as 2014, the reduced number of overall military Airprox in 2015 therefore translates into a reduced overall rate per mfh that has returned to recent historic norms compared to the record high 2014 figure. Overall, in 2015, there were 281 Airprox per mfh, down from 388 in 2014, and below the annual average of 310 per mfh over the last 6 years. However, although the 2015 risk-bearing rate also showed a decrease to 129 per mfh (from 132 in 2014), this remains well above the annual average (which is about 105 per mfh in the last 6 years), with an overall increasing underlying trend of risk-bearing military Airprox per mfh as shown.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Mil Airprox	60	52	56	70	98	83	71	82	97	70
Risk Bearing Mil Airprox	24	17	22	31	25	30	21	28	33	32
Risk Bearing as % of Total	40	33	39	44	26	36	30	34	34	46
Mil hrs x 10K	43.1	43.4	40.1	43.2	31.8	31.1	25.6	24.2	25.0	24.9
Total Mil per Million hrs	139	120	140	162	308	266	278	339	388	281
Risk Bearing Mil per Million hrs	56	39	55	72	78	96	82	116	132	129

Table 16. 10-year Military Airprox Statistics versus Military hours flown

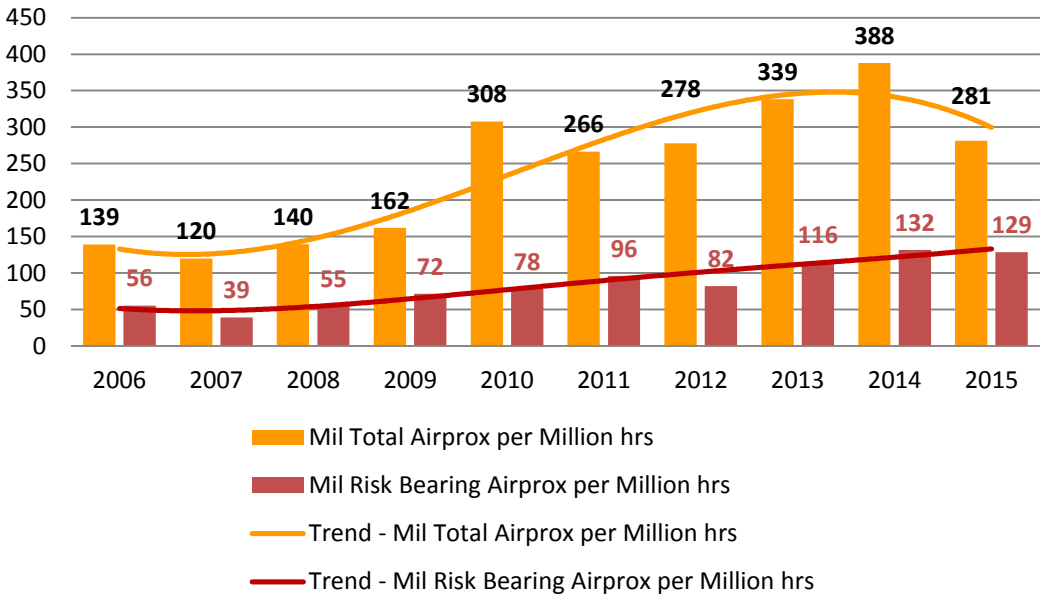


Figure 40. 10-year Military Airprox Rates per Million Flying Hours

In 2015, the military experienced about twice the GA Airprox rate per mfh. Superficially, it might be tempting to conclude that, hour for hour, military flying is therefore twice as risky as GA flying. However, care should be exercised when making direct comparisons of Airprox rates between classes of aircraft given that military crews have a mandatory requirement to report incidents, whereas the GA community reports on a voluntary basis so there are likely to be a significant number of unreported GA events as a result. Also, paradoxically, the military's focus on lookout training techniques may well also mean that they simply see and report more aircraft than their hobbyist GA counterparts who probably have relatively less proficiency in pro-active scanning techniques. That being said, the routinely higher speeds at which some elements of the military fly may well also pre-dispose them to encounters brought on by reduced time to react in a see-and-avoid environment, as may the effects of terrain screening at low-level.

A welcome initiative in 2014 was the trial introduction of a VHF low-level common frequency in Scotland.[10] This initiative was extended to 2015 and there have been some anecdotal reports of its benefit. There were also a number of comments made in Mil-GA Airprox in England and Wales where the GA pilot commented that they wished the frequency was available for use outside Scotland because they could have communicated with the military aircraft to prevent the reported incident. As shown in Figure 41, historically, most Mil-GA low-level (below 3000ft) Airprox occur in England and Wales, and so it may be that we have yet to see the potential benefits of this scheme realised; its extension to cover the whole of the UK is wholeheartedly supported by the Airprox Board.

[10] Previously, military aircraft used UHF at low-level so that they could communicate with other military aircraft; unfortunately, these UHF frequencies were not accessible to civilian VHF-only equipped aircraft. The intention was to provide a common VHF means for civil aircraft to gain situational awareness as military aircraft broadcast their intentions, and also to enable direct communications, if time permits, to resolve conflictions.

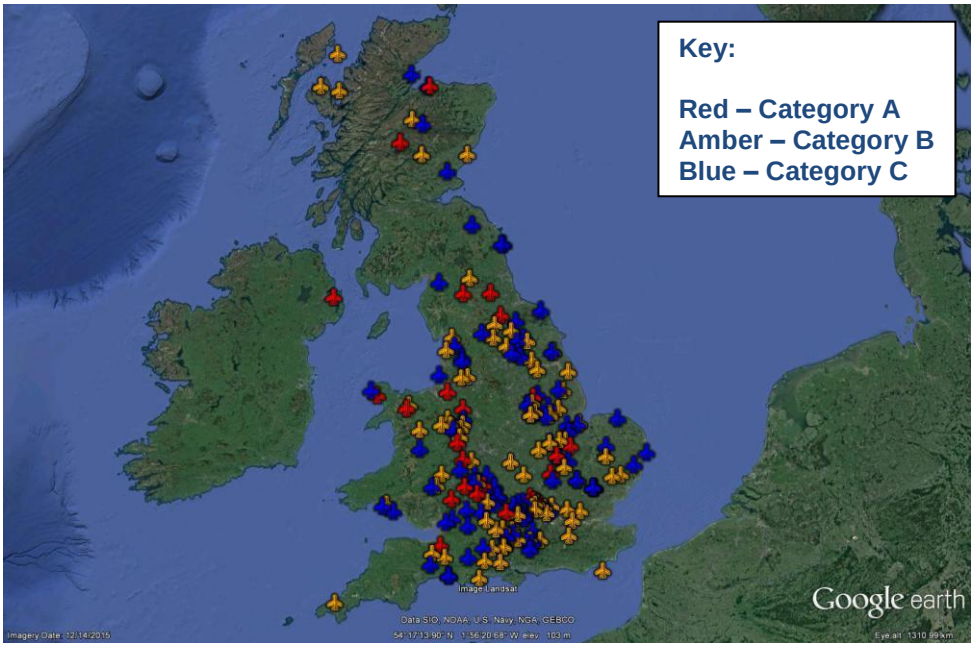


Figure 41. Mil-GA Airprox Distribution at or below 3000ft (2006 to 2015)

Military Causal Factors

150 cause factors were collectively assigned to the 70 Airprox that had military involvement in 2015 (individual Airprox often have more than one causal factor); Table 17 and Figure 41 show the top-10 causes assigned. Similar to GA, and unsurprising in what is primarily a see-and-avoid operating environment in Class G / Low-level, 'Did not see traffic/late sighting/poor lookout' was the most frequent cause. As discussed previously, the routinely higher speeds at which some elements of the military fly may well pre-dispose them to encounters in this environment because of reduced detection and reaction times; the effects of terrain screening at low-level (electronic and visual) will also undoubtedly be a factor.

Rank	Cause	Totals
1(1)	Did not see traffic / late sighting / poor lookout	47
2(2)	Flew too close / failure to separate	28
3(3)	Did not adhere to procedures / follow instructions	10
3(6)	Late, ambiguous or no traffic info	10
3(7)	Conflict in FIR	10
6(4)	Sighting report / TCAS interaction / mistaken perception of separation	8
7(5)	Misunderstood ATS / poor coordination / confusion	7
8(8)	Distraction / high workload / kit interpretation or operation error	4
9(9)	Poor airmanship	4
10(10)	Poor U/T supervision or pilot error	2

Table 17. 2015 Military Top-10 Airprox Causal Factors (2014 ranking in brackets)

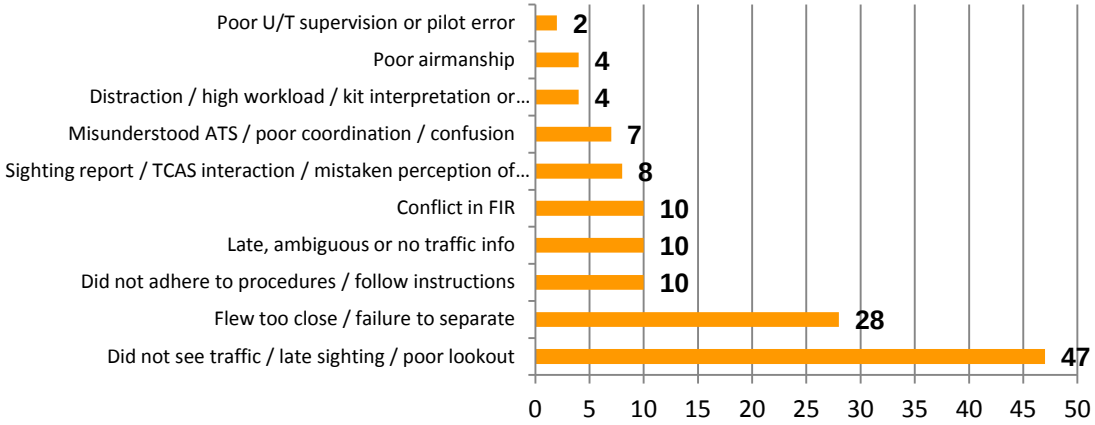


Figure 41. 2015 Military Top-10 Airprox Causal Factors

The 2nd most frequent cause was 'Flew too close/failure to separate'. Incidents of this nature involve inadequate avoiding action by pilots, or controllers failing to separate aircraft. For example, in avoiding another aircraft, a fast-jet military crew may ensure that sufficient VFR separation has been achieved, but a commercial crew or GA pilot operating in Class G airspace may be used to greater separation, or more leisurely closure rates, and may file an Airprox as a result of being startled by the unexpected closure or proximity of the fast-jet.

Finally, 2015 saw the phased introduction of TCAS to the Tornado fleet over the year; we saw 6 associated Tornado Airprox in which TCAS was mentioned: 4 were TAs (1 x Cat B and 3 x Cat C) and 2 were RAs (1 x Cat C and 1 x Cat E). That being said, it is yet too early to come to any judgement as to its efficacy in reducing Tornado Airprox rates given that we do not yet have a full year's data to review. Although Figure 42 shows a reduction in overall Tornado Airprox numbers by one in 2015, this may be due to numerous other factors and may simply be within normal reporting variances. Hopefully, 2016 will provide a fuller picture of TCAS efficacy in reducing Tornado Airprox rates.

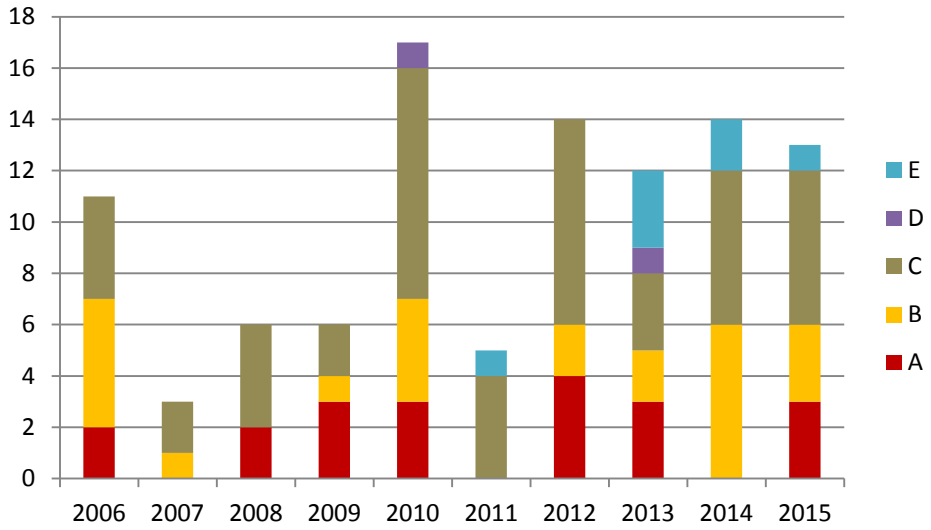


Figure 42. Tornado Airprox Distribution over the last 10 years

UKAB 2015 SAFETY RECOMMENDATIONS

Accepted Recommendations

Airprox	Recommendation	Comments
2015028	HQ Air Cmd and the CAA review the effectiveness of the promulgation of the ongoing VHF Low-Level Common frequency trial to the civil aviation community.	The RAF Safety Centre has widely promulgated the LL VHF common frequency trial to both military users and to its civil contacts. However, it appears that that the civil aviation community is not as well informed of this trial as we had hoped. DCom Ops is in the process of writing to Mr Mark Swan at the CAA to reinvigorate the civil processes for publicising this trial; Safety Centre staff stands by to assist in the provision of briefing materials and leaflets if required. The CAA endorsed the extension of the frequency trial and assisted the RAF in setting up a Survey Monkey feedback survey. The CAA also publicised the trial on the 'Flyer' magazine website.
2015049	The CAA liaise with NPCC to clarify Police response to ATC reports of Airprox involving Drones.	Liaison is in place with the CAA and NPCC and a guidance document for police officers outlining actions to be taken on receipt of a drone report has been issued to all police governors, this also includes a prioritisation list for the police deployment of resources. This will be monitored and updated as necessary. Of note, the same person has the police lead for laser attacks, therefore safety relevance is understood.
2015055	The CAA and NATS plc review the process of the introduction of the Southend CTR.	The CAA undertook a review of correspondence and meeting notes between sponsor and stakeholders which determined that information pertaining to the change had perhaps not been disseminated as widely as could be expected inside the stakeholder's organisation. Therefore, the CAA appended the Airspace Change Process to include a requirement for case officers to prompt a check of the preparedness of critical stakeholders. NATS also undertook an internal review of the implementation of the Southend Airspace Change; a number of improvements were identified, tracked and have subsequently been absorbed into the change process. Nevertheless, it was determined that all affected controllers had been briefed appropriately to be able to discharge their duties, and any controller who did not feel suitably prepared was afforded the opportunity to seek and obtain additional advice or support. More importantly, and with the support of the CAA, NATS is reviewing its process for assessing controllers preparedness for operational duties following change or an extended absence from operational duty (as this was considered to be a contributory causal factor to the occurrence).

Airprox	Recommendation	Comments
2015057	The BHPA consider measures to educate para-motor pilots on best practice for crossing airfield approach lanes.	BHPA agreed to consider an article for their SkyWings magazine.
2015072	Marham and Lakenheath review their coordination procedures with regard to simultaneous aircraft recovery and departure.	RAF Marham engaged with Lakenheath in order to update the working practices between the two units. A new LoA was approved by USAFE legal advisors and was signed by both units on 22 Feb 2016.
2015093	1. HQ Air considers the value of having a Supervisor in both the VCR and the ACR.	A SQEP panel was convened to conduct a review into Supervisory requirements in both ACR and VCR environs; it concluded that current policy, regulations and guidance allow Unit commanders the flexibility to determine the appropriate level of supervision required. Consequently, a number of Unit Commanders have introduced additional levels of management support within the VCR during periods of high intensity workloads.
	2. HQ Air reviews the use of using both runways simultaneously [at Boscombe Down] with inexperienced pilots.	Boscombe Down has now amended its procedure to allow only one solo student (Tutor pilot) in the circuit at any one time; 'warn-out' procedures now also require the pilot to annotate whether he/she is restricted to operations from the main runway only. The Duty Instructor is also required to monitor frequencies and become an additional look-out.
2015170	Oxford reviews their VFR/IFR procedures with regard to traffic deconfliction.	Oxford are consulting with flying clubs to implement a departure RP. LoA received from Oxford to endeavour to resolve the recommendation through a change in procedures.

Partially Accepted Recommendations

Airprox	Recommendation	Comments
Nil		.

Rejected Recommendations

Airprox	Recommendation	Comments
Nil		

Recommendations Remaining Unresolved

Airprox	Recommendation	Comments
2015085	1. Gloucester review suitability of O/H join with mixed IFR and VFR traffic.	Acknowledgment received from Gloucester who are undertaking a comprehensive review of all procedures and will report back when complete. Formal response still awaited; see also 2015090.
	2. CAA considers providing additional advice with regard to O/H joins.	Initial response from CAA is that they do not consider that additional advice is required. Awaiting further review following further justification for the recommendation by UKAB Secretariat.
2015090	Gloucester considers reviewing their mixed runway procedures.	Acknowledgment received from Gloucester who are undertaking a comprehensive review of all procedures and will report back when complete. Formal response still awaited; see also 2015085.

AIRPROX CATALOGUE 2015

The table below is an abbreviated form of the full 2015 catalogue that is available on the UKAB Website at 2015 Airprox Catalogue: individual reports can also be accessed through the website. Note that report numbers do not always run consecutively because Airprox that were initially reported and then subsequently withdrawn (either because the reporter had second thoughts or the event did not meet investigation criteria), are not listed.

Airprox No	Date	Risk Category	Aircraft 1 Type	Aircraft 2 Type
2015001	02/01/2015	D	DHC-8 (DASH 8)	GLIDER (UNSPECIFIED)
2015002	16/01/2015	B	CHEROKEE / WARRIOR / ARROW	EV97 EUROSTAR
2015003	20/01/2015	B	GROB 115, TUTOR	SUPER KING AIR 200/300/350
2015004	22/01/2015	C	HAWK	EUROFIGHTER TYPHOON
2015005	21/01/2015	E	SAAB 2000	WEATHER BALLOON
2015006	23/01/2015	B	LYNX AH MK I	CESSNA 152
2015007	24/01/2015	B	CHEROKEE / WARRIOR / ARROW	CHEROKEE SIX
2015008	08/02/2015	C	S6/S7/S9/S10/S11/S12/S14/S16	EC135
2015009	04/02/2015	B	TORNADO GR, IDS	F15 EAGLE
2015010	12/02/2015	E	ECUREUIL SA 350	CHINOOK CH47
2015011	24/01/2015	C	CHEROKEE / WARRIOR / ARROW	CHEROKEE / WARRIOR / ARROW
2015012	17/02/2015	B	DR 400/2+2	CESSNA 172
2015013	20/02/2015	C	DG300	TUCANO
2015015	23/02/2015	C	DO 328	F15 EAGLE
2015016	21/02/2015	C	MILES M3A FALCON	206L LONGRANGER
2015017	21/02/2015	D	CHEROKEE / WARRIOR / ARROW	MODEL AIRCRAFT
2015018	06/03/2015	B	TORNADO GR, IDS	HAWK
2015019	27/02/2015	C	HAWK	JETSTREAM 41
2015020	17/02/2015	B	GROB 115, TUTOR	CHEROKEE / WARRIOR / ARROW
2015021	12/03/2015	A	TUCANO	EUROFIGHTER TYPHOON
2015022	27/02/2015	C	AGUSTA A109	BO209 MONSUN
2015023	11/03/2015	E	FALCON 20FJF/20C/20D/20E/20F/2	HAWK
2015024	15/03/2015	D	AIRBUS A320, A321	UAV UNSPECIFIED
2015025	21/03/2015	C	CESSNA 404	R-21/00 /12 /60, ALPHA
2015026	20/03/2015	C	DISCUS GLIDER	MD520N, MD600N, MD902 EXPLORER
2015027	05/02/2015	B	TUCANO	TORNADO GR, IDS
2015028	27/03/2015	E	CESSNA 172	HAWK
2015029	26/03/2015	C	DA42 TWIN STAR	AGUSTA A109
2015030	27/03/2015	D	HAWK	UNTRACED LIGHT AC
2015031	04/04/2015	B	EC135	CESSNA 172
2015032	20/03/2015	B	THRUSTER T600N SPRINT M/LIGHT	CHEROKEE / WARRIOR / ARROW
2015033	30/03/2015	E	FOKKER 50	CENTURION 210
2015034	10/04/2015	C	A319	CESSNA 182 SKYLANE
2015035	11/04/2015	B	ROBINSON R22	JETRANGER 206
2015036	07/04/2015	A	PARAGLIDER - UNSPECIFIED	CESSNA 152
2015037	10/04/2015	C	MD-90	DA42 TWIN STAR
2015038	10/04/2015	C	TUCANO	GROB 115, TUTOR
2015039	09/04/2015	B	CHEROKEE / WARRIOR / ARROW	CIRRUS SR22/SR20
2015040	13/04/2015	E	EMBRAER 170/175	JETRANGER 206
2015041	04/04/2015	C	CHEROKEE / WARRIOR / ARROW	CHEROKEE / WARRIOR / ARROW
2015042	16/04/2015	B	PARTENAVIA P68, VICTOR	CHEROKEE / WARRIOR / ARROW
2015043	16/04/2015	A	PARTENAVIA P68, VICTOR	QUIK GT450 M/LIGHT
2015044	14/04/2015	C	DA42 TWIN STAR	CESSNA 404
2015045	17/04/2015	C	TWIN ECUREUIL	BELL 412 (MOD - GRIFFIN)

Airprox No	Date	Risk Category	Aircraft 1 Type	Aircraft 2 Type
2015046	11/04/2015	C	EC135	UAV UNSPECIFIED
2015047	20/04/2015	B	TUCANO	TUCANO
2015048	21/04/2015	E	HUGHES/SCHWEIZER 269/300/369	DA42 TWIN STAR
2015049	19/04/2015	B	DHC-8 (DASH 8)	UAV UNSPECIFIED
2015050	20/04/2015	C	TORNADO GR, IDS	STRATOTANKER KC135
2015051	24/04/2015	B	APACHE HELICOPTER	MODEL AIRCRAFT
2015052	20/04/2015	B	BOEING B757	UAV UNSPECIFIED
2015053	09/04/2015	E	DAUPHIN SA 365	GLIDER (UNSPECIFIED)
2015054	25/04/2015	A	LYNX HAS/HMA MK8	UAV UNSPECIFIED
2015055	23/04/2015	C	ATR42, -72	EMBRAER 190/195
2015056	01/05/2015	B	DR 100,105,1050,1051	PARACHUTIST
2015057	01/05/2015	C	AGUSTA 139	PARA-MOTOR/POWERED HANGLIDER
2015058	02/05/2015	C	EMBRAER 170/175	CHEROKEE / WARRIOR / ARROW
2015059	04/05/2015	C	CHEROKEE / WARRIOR / ARROW	SPITFIRE
2015060	03/05/2015	D	REGIONAL JET (RJ)-70,-85,-100	WEATHER BALLOON
2015061	04/05/2015	C	CHEROKEE / WARRIOR / ARROW	CHEROKEE / WARRIOR / ARROW
2015063	02/05/2015	A	ROTORWAY EXEC 90/162	RV7
2015064	13/05/2015	B	EC155	EUROFIGHTER TYPHOON
2015065	13/05/2015	A	CHEROKEE / WARRIOR / ARROW	MICROLIGHT (UNSPECIFIED TYPE)
2015066	11/05/2015	B	LET410 TURBOLET	SUPER KING AIR 200/300/350
2015067	21/05/2015	A	GLIDER (UNSPECIFIED)	CHEROKEE / WARRIOR / ARROW
2015068	27/04/2015	B	ROLLADEN SCHNEIDER LS4 GLIDER	CORSAIR (WWII)
2015069	21/05/2015	C	CHINOOK CH47	EUROCOPTER EC145
2015070	17/05/2015	B	C-208 CARAVAN	CESSNA 182 SKYLANE
2015071	15/05/2015	C	525 CITATION JET	DR 400/2+2
2015072	26/05/2015	C	TORNADO GR, IDS	F15 EAGLE
2015073	28/05/2015	D	AIRBUS A320, A321	UNKNOWN
2015074	30/05/2015	A	CIRRUS SAILPLANE	LIGHT AIRCRAFT CIVIL
2015075	21/05/2015	E	CESSNA 182 SKYLANE	AGUSTA A109
2015076	29/05/2015	C	TUCANO	TUCANO
2015077	03/06/2015	C	TUCANO	ASW20 GLIDER
2015078	03/06/2015	B	LS8 GLIDER	EC135
2015079	23/05/2015	A	PC-12 EAGLE	CESSNA 152
2015080	03/06/2015	A	ECUREUIL SA 350	GLIDER (UNSPECIFIED)
2015081	05/06/2015	A	LYNX AH MK7	S6/S7/S9/S10/S11/S12/S14/S16
2015082	08/05/2015	B	BOEING B757	UAV UNSPECIFIED
2015083	08/06/2015	B	IKARUS C42 MICROLIGHT	CESSNA 152
2015084	30/05/2015	B	RV4, RV6, RV6A, RV8 HOMEBUILT	UAV UNSPECIFIED
2015085	18/06/2015	C	EUROCOPTER EC145	CHEROKEE / WARRIOR / ARROW
2015086	17/06/2015	A	MTO SPORT GYROPLANE	UAV UNSPECIFIED
2015087	26/04/2015	A	GLASAIR	CHEROKEE / WARRIOR / ARROW
2015088	10/06/2015	C	CESSNA 182 SKYLANE	CHEROKEE / WARRIOR / ARROW
2015089	28/05/2015	A	SEA KING, S-61 (MIL MODELS)	DA42 TWIN STAR
2015090	04/06/2015	A	AGUSTA A109	TB20 / TB21 TRINIDAD
2015091	21/06/2015	B	GRUMMAN AA5	CHEROKEE / WARRIOR / ARROW
2015092	23/06/2015	B	CESSNA 182 SKYLANE	LIGHT AIRCRAFT CIVIL
2015093	25/06/2015	A	GAZELLE SA 341	GROB 115, TUTOR
2015094	24/06/2015	B	CESSNA 182 SKYLANE	CHEROKEE / WARRIOR / ARROW
2015095	27/06/2015	B	ASW19 GLIDER	SPITFIRE
2015096	11/06/2015	B	EV97 EUROSTAR	UAV UNSPECIFIED
2015097	27/06/2015	C	SAAB 2000	EC135
2015098	25/06/2015	A	TORNADO GR, IDS	PARA-MOTOR/POWERED HANGLIDER
2015099	29/06/2015	B	CABRI G2	DR 400/140,400/140B

Airprox No	Date	Risk Category	Aircraft 1 Type	Aircraft 2 Type
2015100	02/07/2015	C	TORNADO GR, IDS	BD-700 GLOBAL EXPRESS-SENTINEL
2015101	02/07/2015	E	GROB 115, TUTOR	GROB 115, TUTOR
2015102	05/07/2015	E	RV8	CESSNA 172
2015103	03/07/2015	C	MOONEY M20	FOURNIER RF3,4,5 PWRD GLIDER
2015104	08/07/2015	C	CHINOOK CH47	AGUSTA A109
2015105	10/07/2015	C	EC135	CESSNA 172
2015106	09/07/2015	A	RJ REGIONAL JET	UAV UNSPECIFIED
2015107	09/07/2015	B	GROB 115, TUTOR	KING AIR 90/100
2015108	10/07/2015	C	HAWK	EV97 EUROSTAR
2015109	09/07/2015	B	BOEING B737	UAV UNSPECIFIED
2015110	14/07/2015	A	TORNADO GR, IDS	TORNADO GR, IDS
2015111	14/07/2015	B	BOEING B737	GALAXY
2015112	15/07/2015	C	HAWK	HAWK
2015113	16/07/2015	B	HAWK	SCHLEICHER ASG 29
2015114	09/07/2015	E	DHC-8 (DASH 8)	NAVAJO, CHIEFTAIN
2015115	20/07/2015	D	CESSNA 150	CESSNA 172
2015116	23/07/2015	C	EUROCOPTER EC225 (NEW AS332L)	BAE 146-100
2015117	26/07/2015	A	SUPER KING AIR 200/300/350	UAV UNSPECIFIED
2015118	26/07/2015	C	DC-8	UAV UNSPECIFIED
2015119	18/07/2015	B	GROB 115, TUTOR	GLIDER (UNSPECIFIED)
2015120	30/07/2015	C	EC135	UNTRACED LIGHT AC
2015121	03/08/2015	C	SIKORSKY S92 HELIBUS	F15 EAGLE
2015122	31/07/2015	C	DA42 TWIN STAR	ASW20 GLIDER
2015123	30/07/2015	B	SHK1 GLIDER	F15 EAGLE
2015124	03/08/2015	C	EUROFIGHTER TYPHOON	UNTRACED LIGHT AC
2015125	23/07/2015	B	CHEROKEE / WARRIOR / ARROW	DA40,DA40D DIAMOND STAR
2015126	05/08/2015	C	VIGILANT MOTOR GLIDER	R44 ASTRO (ROBINSON)
2015127	06/08/2015	A	CHEROKEE / WARRIOR / ARROW	AIRLINER
2015128	10/08/2015	B	ECUREUIL SA 350	CHEROKEE / WARRIOR / ARROW
2015129	11/08/2015	A	CHINOOK CH47	UAV UNSPECIFIED
2015130	06/08/2015	A	CESSNA 152	CESSNA 152
2015131	31/07/2015	C	DA42 TWIN STAR	ASW24 GLIDER
2015132	31/07/2015	C	DA42 TWIN STAR	GLIDER (UNSPECIFIED)
2015133	18/07/2015	A	EUROPA	SUPER DIMONA
2015134	29/07/2015	C	BOEING B737	"JUMBO" JET B747
2015135	12/08/2015	C	TORNADO GR, IDS	LS8 GLIDER
2015136	13/08/2015	C	EC135	GROB 115, TUTOR
2015137	05/08/2015	C	CESSNA 172	CHEROKEE / WARRIOR / ARROW
2015138	15/08/2015	B	CESSNA 172	CHEROKEE / WARRIOR / ARROW
2015139	17/08/2015	D	A319	UNKNOWN
2015140	15/08/2015	C	CESSNA 152	CESSNA 206
2015141	27/08/2015	A	DO 328	UAV UNSPECIFIED
2015142	05/08/2015	A	ASK21 GLIDER	RV4, RV6, RV6A, RV8 HOMEBUILT
2015143	18/08/2015	B	AIRBUS A320, A321	UNKNOWN
2015144	06/09/2015	A	CESSNA 152	CESSNA 152
2015145	07/09/2015	C	QUIK GT450 M/LIGHT	EC135
2015146	04/09/2015	A	EC135	CHEROKEE / WARRIOR / ARROW
2015147	20/08/2015	B	CHINOOK CH47	GRUMMAN AA5
2015148	06/09/2015	C	CHEROKEE / WARRIOR / ARROW	LIGHT AIRCRAFT CIVIL
2015149	29/08/2015	C	CESSNA 172	CESSNA 152
2015150	11/09/2015	B	CHEROKEE / WARRIOR / ARROW	CESSNA 150
2015151	05/09/2015	A	EUROPA	GROB G109 MOTOR GLIDER
2015152	05/09/2015	B	PEGASUS QUANTUM FLEXWING M/LGT	EV97 EUROSTAR

Airprox No	Date	Risk Category	Aircraft 1 Type	Aircraft 2 Type
2015153	09/09/2015	C	CHEROKEE / WARRIOR / ARROW	ROBIN R3000/3100/3120/3140
2015154	09/09/2015	B	SUPER KING AIR 200/300/350	SILENT 2
2015155	13/09/2015	A	BOEING B737	UAV UNSPECIFIED
2015156	30/08/2015	C	CESSNA 152	206L LONGRANGER
2015157	13/09/2015	A	EMBRAER 170/175	UAV UNSPECIFIED
2015158	17/09/2015	B	TUCANO	PARAGLIDER - UNSPECIFIED
2015159	14/09/2015	C	LYNX HAS/HMA MK8	CHEROKEE / WARRIOR / ARROW
2015160	17/09/2015	C	EC135	CESSNA 172
2015161	22/09/2015	C	TORNADO GR, IDS	CHEROKEE / WARRIOR / ARROW
2015162	22/09/2015	A	B777	UAV UNSPECIFIED
2015163	25/09/2015	B	A319	UAV UNSPECIFIED
2015164	17/09/2015	B	SF340, 340A (SAAB)	TWIN COMANCHE
2015165	27/09/2015	C	CHEROKEE / WARRIOR / ARROW	CHEROKEE / WARRIOR / ARROW
2015166	27/09/2015	B	DR 200/220/221 DAUPHIN	CHEROKEE / WARRIOR / ARROW
2015167	27/09/2015	A	SUPER CUB	CHEROKEE / WARRIOR / ARROW
2015168	23/09/2015	B	EMBRAER 190/195	UAV UNSPECIFIED
2015169	17/09/2015	A	SUPER CUB	CHEROKEE / WARRIOR / ARROW
2015170	22/09/2015	E	DA42 TWIN STAR	CESSNA 182 SKYLANE
2015171	06/09/2015	C	CESSNA 404	PIPER SENECA
2015172	30/09/2015	A	A319	UAV UNSPECIFIED
2015173	01/10/2015	E	DAUPHIN SA 365	HAWK
2015174	15/07/2015	C	SKYRANGER	P-149
2015175	02/10/2015	A	MICROLIGHT (UNSPECIFIED TYPE)	TORNADO GR, IDS
2015176	02/10/2015	A	DO 328	UAV UNSPECIFIED
2015177	04/10/2015	A	CHEROKEE / WARRIOR / ARROW	UAV UNSPECIFIED
2015178	01/10/2015	C	EMBRAER 190/195	EMBRAER 190/195
2015179	03/10/2015	C	IKARUS C42 MICROLIGHT	CESSNA 182 SKYLANE
2015180	09/10/2015	B	206L LONGRANGER	CHEROKEE / WARRIOR / ARROW
2015181	08/10/2015	E	ATR42, -72	525 CITATION JET
2015182	12/10/2015	C	SKYRANGER	ECUREUIL SA 350
2015183	04/10/2015	D	B777	UAV UNSPECIFIED
2015184	14/10/2015	B	GROB 115, TUTOR	LYNX HAS/HMA MK8
2015185	16/10/2015	B	NAVAJO, CHIEFTAIN	R-21/00 /12 /60, ALPHA
2015186	14/10/2015	E	SEA KING, S-61 (MIL MODELS)	HAWK
2015187	10/10/2015	C	EV97 EUROSTAR	JETRANGER 206
2015188	14/10/2015	B	CHEROKEE / WARRIOR / ARROW	CHIPMUNK DHC-1
2015189	09/10/2015	C	AIRBUS A330	PARTENAVIA P68, VICTOR
2015190	17/06/2015	B	CITATION 550, 551,560 (II - V)	UAV UNSPECIFIED
2015191	06/10/2015	E	HELICOPTER (TYPE UNKNOWN)	MODEL AIRCRAFT
2015192	18/10/2015	C	CHEROKEE / WARRIOR / ARROW	RV10
2015193	19/10/2015	E	GROB 115, TUTOR	CESSNA 182 SKYLANE
2015194	28/10/2015	B	CHEROKEE / WARRIOR / ARROW	CIRRUS SR22/SR20
2015195	13/10/2015	B	AIRBUS 380	UAV UNSPECIFIED
2015196	29/10/2015	C	BOEING B767	"JUMBO" JET B747
2015197	27/10/2015	C	JETSTREAM 41	CESSNA 172
2015198	12/08/2015	D	AIRBUS A320, A321	UNKNOWN
2015199	31/10/2015	A	PIPER SENECA	EC135
2015201	04/11/2015	E	GLOBAL 6000	BOEING B737
2015202	08/11/2015	A	B777	UNKNOWN
2015203	11/11/2015	B	CESSNA 152	KITFOX
2015204	18/11/2015	E	AIRBUS A320, A321	TORNADO GR, IDS
2015205	23/11/2015	C	BELL 430	PIPER PA12 SUPER CRUISER
2015206	19/11/2015	C	TORNADO GR, IDS	PC-12 EAGLE

Airprox No	Date	Risk Category	Aircraft 1 Type	Aircraft 2 Type
2015207	28/11/2015	C	A319	UAV UNSPECIFIED
2015209	01/12/2015	B	GROB 115, TUTOR	LIGHT AIRCRAFT CIVIL
2015210	01/12/2015	D	GROB 115, TUTOR	LIGHT AIRCRAFT CIVIL
2015211	06/12/2015	B	EMBRAER 170/175	UAV UNSPECIFIED
2015212	28/11/2015	A	AIRBUS A320, A321	UAV UNSPECIFIED
2015213	07/12/2015	B	AIRBUS A320, A321	WEATHER BALLOON
2015214	09/12/2015	C	FALCON 20FJF/20C/20D/20E/20F/2	F15 EAGLE
2015215	31/10/2015	B	CIRRUS SR22/SR20	EV97 EUROSTAR
2015216	13/12/2015	D	HERON 114	UNTRACED LIGHT AC
2015217	14/12/2015	C	DUCHESS 76	MERLIN, EH-101
2015218	04/12/2015	C	A319	EC155
2015219	16/12/2015	B	GROB 115, TUTOR	GROB 115, TUTOR
2015220	29/12/2015	B	EV97 EUROSTAR	TOMAHAWK
2015221	04/12/2015	C	ECUREUIL SA 350	GROB 115, TUTOR

GLOSSARY OF DEFINITIONS AND ABBREVIATIONS

Risk Categories

Risk Category	ICAO 4444 PANS-ATM AIRPROX risk classification	Eurocontrol severity classification scheme (ESARR 2)[11]	Current UKAB Board Guidelines word picture	UKAB collision risk descriptor and word picture
A	Risk of Collision: ...aircraft proximity in which serious risk of collision has existed.	Serious incident.	Situations that stop short of an actual collision, where separation is reduced to the minimum and / or where chance played a major part in events and nothing more could have been done to improve matters. Late sightings frequently attach to these cases.	**Providence – serious risk of collision**. Situations where separation was reduced to the bare minimum and/or which only stopped short of an actual collision because chance played a major part in events: the pilots were either unaware of the other aircraft or did not/could not make any inputs in time to materially improve matters.
B	Safety not assured: ...aircraft proximity in which the safety of the aircraft may have been compromised.	Major incident.	Those cases, often involving late sightings, where avoiding action may have been taken to prevent a collision, but still resulted in safety margins much reduced below the normal.	**Safety much reduced/not assured**. Situations where aircraft proximity resulted in safety margins being much reduced below the norm either due to serendipity, misjudgement, inaction, or where emergency avoiding action was taken at the last minute that materially increased separation and averted a likely collision.
C	No risk of collision: ...aircraft proximity in which no risk of collision has existed.	Significant incident	By far the most common outcome where effective and timely actions were taken to prevent aircraft colliding.	**Safety degraded – no risk of collision**. Situations where safety was degraded but either fortuitous circumstances or early enough sighting, information or action allowed one or both of the pilots to either simply monitor the situation or take timely and effective avoiding action to prevent the aircraft from coming into close proximity.
D	Risk not determined: aircraft proximity in which insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination.	Not determined.	Reserved for those cases where a dearth of information renders impossible any meaningful finding.	**Non-assessable – insufficient, inconclusive or irresolvable information**. Situations where insufficient information was available to determine the risk involved, or inconclusive/conflicting evidence precluded such determination.
E	No ICAO risk classification	No safety effect: occurrences which have no safety significance.	Met the criteria for reporting but, by analysis, it was determined that the occurrence was so benign that it would be misleading to consider it an Airprox event. Normal procedures, safety standards and parameters pertained.	**Non-proximate - benign**. Situations that met the criteria for reporting but where the occurrence was in fact benign and normal procedures, safety standards and parameters were considered to have pertained.

[11] ESARR - **E**UROCONTROL **Sa**fety **R**egulatory **R**equirement.

Abbreviations

aal	**above aerodrome level**
ac	aircraft
ACAS	Airborne Collision Avoidance System
ACC	Area Control Centre
ACN	Airspace Co-ordination Notice
ACR	Approach Control Room
A/D	aerodrome
ADC	Aerodrome Control(ler)
ADR	Advisory Route
AEF	Air Experience Flight
AEW	Airborne Early Warning
AFIS(O)	Aerodrome Flight Information Service (Officer)
A/F	Airfield
agl	above ground level
AIAA	Area of Intense Aerial Activity
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
alt	altitude
amsl	above mean sea level
ANSP	Air Navigation Service Provider
AOB	Angle of Bank
A/P	Autopilot
APP	Approach Control(ler)
APR	Approach Radar Control(ler)
ARP	Aerodrome Reference Point
ASR	Airfield Surveillance Radar
ATC	Air Traffic Control
ATCC	Air Traffic Control Centre
ATCO	Air Traffic Control Officer
ATCRU	Air Traffic Control Radar Unit
ATIS	Automatic Terminal Information Service
ATM	Aerodrome Traffic Monitor
ATS	Air Traffic Service
ATSA	Air Traffic Service Assistant
ATSOCAS	ATS Outside Controlled Airspace
ATSI	Air Traffic Services Investigations
ATSU	Air Traffic Service Unit
ATZ	Aerodrome Traffic Zone
AWACS	Airborne Warning and Control System
AWR	Air Weapons Range
AWY	Airway
BGA	**British Gliding Association**
BHPA	British Hang Gliding and Paragliding Association
BMAA	British Microlight Aircraft Association
BMFA	British Model Flying Association
BS	Basic Service
CANP	**Civil Air Notification Procedure**
CAS	Controlled Airspace
CAT	Commercial Air Transport
CAVOK	Visibility and cloud above prescribed values
CC	Colour Code - Aerodrome Weather State
cct	Circuit
CFI	Chief Flying Instructor
CLAC	Clear Above Cloud
CLAH	Clear Above Haze
CLBC	Clear Below Cloud
CLBL	Clear Between Layers
CLNC	Clear No Cloud
CLOC	Clear of Cloud
CMATZ	Combined MATZ
CPA	Closest Point of Approach
C/S	Callsign
CTA	Control Area
CTR/CTZ	Control Zone
CWS	Collision Warning System
DA	**Decision Altitude**
DAP	Directorate of Airspace Policy CAA
DF	Direction Finding (Finder)
DH	Decision Height
DME	Distance Measuring Equipment
DS	Deconfliction Service
DW	Downwind
E	**East**
EAT	Expected Approach Time
elev	elevation
ERS	En Route Supplement
est	estimated
FAT	**Final Approach Track**
FIR	Flight Information Region
FIS	Flight Information Service
FISO	Flight Information Service Officer
FMS	Flight Management System
FO	First Officer
FOB	Flying Order Book
FPL	Filed Flight Plan
fpm	Feet per Minute
FPS	Flight Progress Strip
FW	Fixed Wing
GAT	**General Air Traffic**
GCA	Ground Controlled Approach
GH	General Handling
GMC	Ground Movement Controller
GP	Glide Path
GS	Groundspeed
G/S	Glider Site
H	**Horizontal**
hdg	Heading
HISL	High Intensity Strobe Light
HLS	Helicopter Landing Site
HMR	Helicopter Main Route
hPa	Hectopascals (previously millibars)
HPZ	Helicopter Protected Zone
HQ Air	HQ Air Command
HUD	Head-Up Display
IAS	**Indicated Air Speed**
iaw	In accordance with
ICF	Initial Contact Frequency
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
ivo	In the vicinity of
JSP	**Joint Services Publication**
KHz	**Kilohertz**
km	Kilometres
kt	Knots
L	**Left**
LACC	London Area Control Centre (Swanwick)
LARS	Lower Airspace Radar Service
LATCC(Mil)	London Air Traffic Control Centre (Military)
LFA	Low Flying Area

LFC	Low Flying Chart
LH	Left Hand
LJAO	London Joint Area Organisation
LoA	Letter of Agreement
LOC	Localizer
LTMA	London TMA
MATS	**Manual of Air Traffic Services**
MATZ	Military Aerodrome Traffic Zone
METAR	Aviation routine weather report
MHz	Megahertz
M/L	Microlight
MOD	Ministry of Defence
MRP	Military Regulatory Publication
MSD	Minimum Separation Distance
N	**North**
NATS	National Air Traffic Services
NDB	Non-Directional Beacon
NK	Not Known
nm	Nautical Miles
NMC	No Mode C
NR	Not Recorded
NVD	Night Vision Devices
NVG	Night Vision Goggles
OACC	**Oceanic Area Control Centre**
OAT	Operational Air Traffic
O/H	Overhead
OJTI	On-the-Job Training Instructor
Oo	Out of
OOS	Out of Service
PAR	**Precision Approach Radar**
PCAS	Portable Collision Avoidance System
PD	Practice Diversion
PF	Pilot Flying
PFL	Practice Forced Landing
PI	Practice Interception
PIC	Pilot-in-Command
PINS	Pipeline Inspection Notification System
PNF	Pilot Non-flying
PS	Procedural Service
QFE	**Atmospheric pressure at aerodrome elevation**
QFI	Qualified Flying Instructor
QHI	Qualified Helicopter Instructor
QNH	Atmospheric pressure altimeter setting to obtain elevation when on the ground
R	**Right**
RA	Resolution Advisory (TCAS)
RAT	Restricted Area (Temporary)
RCO	Range Control Officer
RCS	Radar Control Service
RH	Right Hand
ROC	Rate of Climb
ROD	Rate of Descent
RMZ	Radio Mandatory Zone
RP	Reporting Point
RPAR	Replacement PAR
RPAS	Remotely Piloted Air Vehicle
RPS	Regional Pressure Setting
RT	Radio Telephony
RTB	Return to base
RTF	Radio Telephony Frequency
RVR	Runway Visual Range
RVSM	Reduced Vertical Separation Minimum
RW	Rotary Wing
RWxx	Runway xx, e.g. RW09
S	**South**
SA	Situational Awareness
SAP	Simulated Attack Profile
SAS	Standard Altimeter Setting
ScACC	Scottish Area Control Centre (Prestwick)
ScATCC(Mil)	Scottish Air Traffic Control Centre (Military)
SERA	Standardised European Rules of the Air
SFL	Selected Flight Level [Mode S]
SID	Standard Instrument Departure
SMF	Separation Monitoring Function
SOPs	Standard Operating Procedures
SRA	Surveillance Radar Approach
SSR	Secondary Surveillance Radar
STAR	Standard Instrument Arrival Route
STCA	Short Term Conflict Alert
SUP	Supervisor
SVFR	Special VFR
TA	**Traffic Advisory (TCAS)**
TAS	True Air Speed
TC	Terminal Control
TCAS	Traffic Alert & Collision Avoidance System
TDN	Talkdown Control(ler)
TFR	Terrain Following Radar
TI	Traffic Information
TMA	Terminal Control Area
TMZ	Transponder Mandatory Zone
TP	Turn Point
TRA	Temporary Restricted Area
TRUCE	Training in Unusual Circumstances and Emergencies
TS	Traffic Service
TWR	ATC Tower
UAR	**Upper Air Route**
UAS	Unmanned Air System
UAV	Unmanned Air Vehicle
UHF	Ultra High Frequency
UIR	Upper Flight Information Region
UKDLFS	United Kingdom Day Low Flying System
UK FIS	UK Flight Information Services
UKNLFS	United Kingdom Night Low Flying System
unk	unknown
unltd	unlimited
USAF(E)	United States Air Force (Europe)
U/S	Unserviceable
UT	Under Training
UTC	Co-ordinated Universal Time
UW	Upwind
V	**Vertical**
VCR	Visual Control Room
VDF	Very High Frequency Direction Finder
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VOR	Very High Frequency Omni Range
VRP	Visual Reporting Point
W	**West**
Wx	Weather
XXXX	**Unknown or deliberately dis-identified**