UK AIRPROX BOARD

ISSN 1479-2729

Analysis of Airprox in UK Airspace

Report Number 32

January 2016 – December 2016

A joint Civil Aviation Authority / Military Aviation Authority service

Intentionally Blank

Thirty-second Report by the UK Airprox Board

Analysis of Airprox in UK Airspace

(January 2016 to December 2016)

Compiled by Director UK Airprox Board for

The Chief Executive Officer
UK Civil Aviation Authority

and

The Director
UK Military Aviation Authority

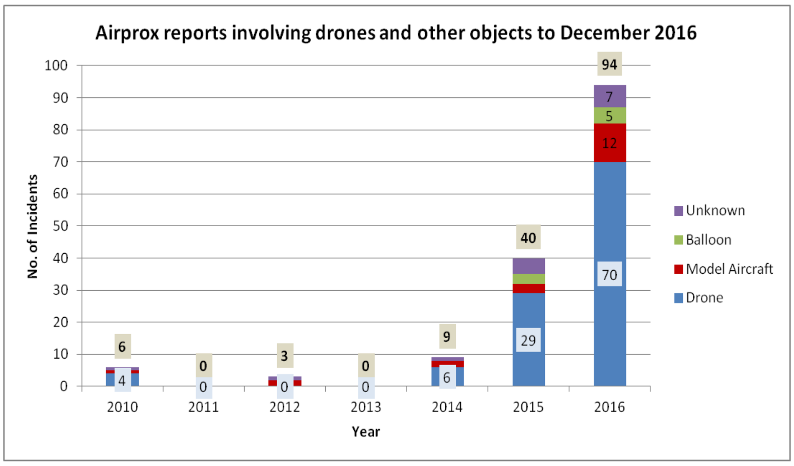
CONTENTS

	Page
Overview	
Overall Summary and Trends	1
Airprox Reporting Statistics Analysis & Trends	15
by User Groups	18
by Flight Classification	19
by Airspace	20
Top Ten Airprox Causes	22
Airprox Themes	23
Commercial Air Transport (CAT)	
CAT Airspace & Risk Distribution	26
CAT Airprox Rates	28
CAT Causal Factors	30
Drones / Unknown Objects / Model Aircraft / Balloons	31
General Aviation (GA)	
GA Airspace & Risk Distribution	32
GA Airprox Rates	34
GA Causal Factors	35
Military Aviation (Mil)	
Military Airspace & Risk Distribution	36
Military Airprox Rates	38
Military Causal Factors	40
Emergency Services (Emerg Servs)	
Emergency Services Airspace & Risk Distribution	42
Emergency Services Airprox Rates	44
Emergency Services Causal Factors	44
UKAB Safety Recommendations	
Accepted	46
Partially Accepted	47
Rejected	47
Unresolved	47
Airprox Catalogue 2016	48
Glossary of Definitions and Abbreviations	
Airprox Risk Categories	54
Airprox Barrier Definitions	55
Abbreviations	56

OVERVIEW

Overall Summary and Trends

The UK Airprox Board (UKAB) assessed 265 Airprox in 2016, of which 171 were aircraft-to-aircraft encounters and 94 involved drones/small unmanned air systems (SUAS). The number of aircraft-to-aircraft encounters was similar to 2015 (when 177 incidents were reported) but the number of drone/SUAS encounters more than doubled compared to 2015 (there were 40 drone/SUAS incidents in 2015), which no doubt reflects their increasing availability and popularity in the last few years. The sidebar graph below illustrates the rapidly increasing reporting trend of drone/SUAS incidents over recent years. Although rightly considered as Airprox incidents in their own right, this dramatic increase could skew statistical trends in the affected years, and so I have provided data for Airprox with and without SUAS involvement for each aircraft category in this year's report to ensure that only like-for-like comparisons and trend deductions are made over the years. Although this has increased the size of this report and altered some of the statistics and graphs that were quoted in previous annual reports, this now gives a more comprehensive and accurate description of trends and themes.



I have also introduced a new category of air systems to the report – Emergency Services – to include Air Ambulance, Police and Coastguard/SAR operations. Previously these had been included in the GA figures because, historically, there were relatively few of these aircraft. However, now that they are more abundant, there are valuable lessons to be learnt from tracking their Airprox involvement and highlighting the impact of such incidents on their operations.

Focussing on the non-SUAS incidents only, Table 1 and Figures 1 & 2 indicate that the 2014 peak in reporting seems to have been a blip, and 2016 reflects the more expected levels of reporting of recent years. Of the 171 aircraft-to-aircraft incidents, 58 (34%) were assessed as risk-bearing events where safety was not assured (Risk Categories A & B).[1] This represents a welcome decrease compared to 2015 (when there were 177 overall aircraft-to-aircraft notifications with 79 (45%) risk-bearing outcomes). This reversal of the previously increasing risk-bearing trend since 2012 is heartening; hopefully our education efforts are bearing fruit, and the importance of recent campaigns highlighting the need in particular for robust lookout, listen-out, and electronic conspicuity are reaching the right audiences.

[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.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	10-year Average
Category A	9	13	11	12	23	18	22	26	27	**17**	18
Category B	39	38	36	33	36	27	43	65	52	**41**	41
Category C	106	100	97	116	88	97	72	85	75	**79**	92
Category D	0	4	3	6	2	5	9	6	5	**8**	5
Category E	-	-	-	-	12	14	26	33	18	**26**	22
Annual Totals	154	155	147	167	161	161	172	215	177	**171**	168
Risk Bearing %	31%	33%	32%	27%	37%	28%	38%	42%	45%	**34%**	35%

Table 1. Non-SUAS Airprox Notifications and Risk Assessment Statistics

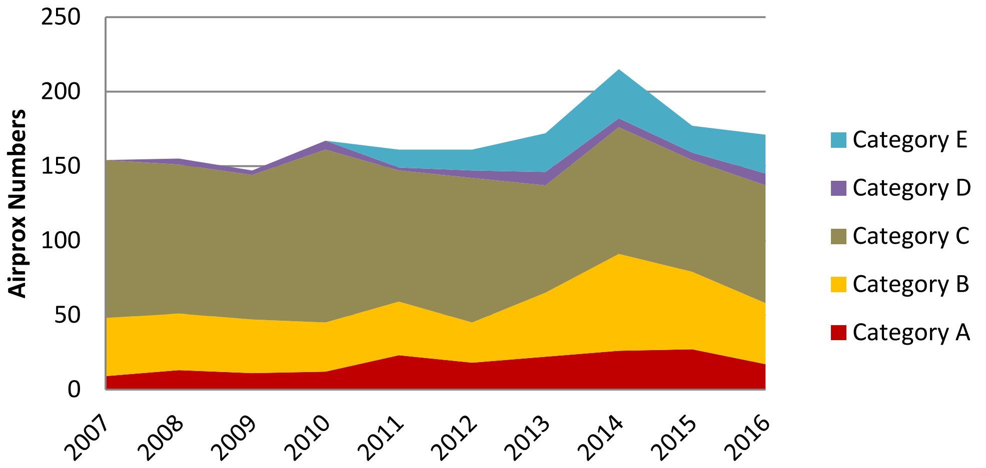


Figure 1. Non-SUAS 10-year Airprox Trend

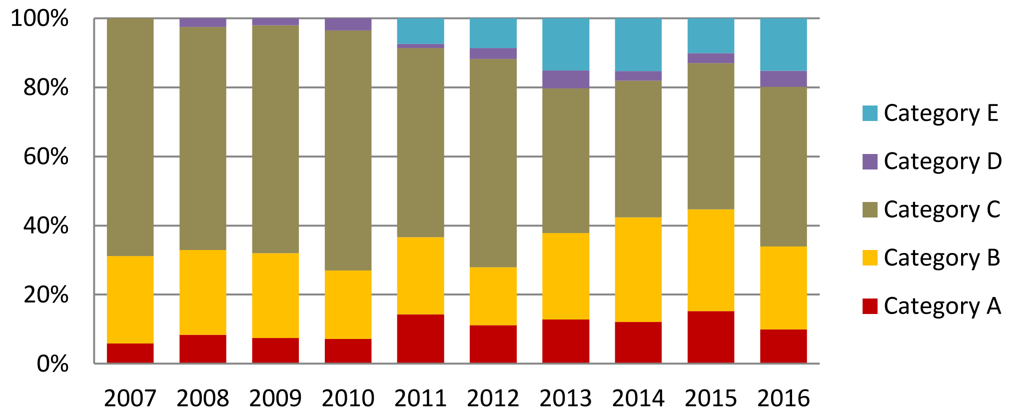


Figure 2. Non-SUAS 10-year Airprox Risk Distribution

In contrast, when the drone/SUAS figures are included the picture is very different. Not only are overall reported incident numbers rising rapidly, but the proportion that is risk-bearing also remains high. Table 2 and Figures 3 & 4 illustrate the effect that drone/SUAS incidents have on the statistics. Whilst it may be tempting to discount these Airprox as an aberration, the fact that they are mostly associated with CAT aircraft raises societal concerns about their perceived level of threat, and their impact hazard to unprotected aircraft surfaces remains an as yet unquantified factor. It is not for the Board to comment on the risk <u>from</u> collision, but simply to address the risk <u>of</u> collision. We will continue to report drone incidents whilst other agencies consider the reality of the collision hazard in the various flight regimes to the different aircraft types. With respect to drone/SUAS collision risk, it is notable that, of the 94 incidents reported for 2016, 65 (69%) were categorised as being risk-bearing. That so many of the drone/SUAS incidents are risk-bearing compared with aircraft-to-aircraft incidents is attributed to the fact that drones, by their small nature, are difficult to see and so it is probably mostly only the closer events that are reported. If we were to assume the same risk-bearing rate as for aircraft-to-aircraft incidents (34%) then this would indicate that there were perhaps in the order of about 100 drone/SUAS incidents not observed in 2016.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	10-year Average
Category A	9	13	11	12	23	18	22	28	41	**51**	23
Category B	39	38	36	33	36	27	43	68	66	**72**	46
Category C	106	100	97	116	88	97	72	86	78	**104**	94
Category D	0	4	3	6	2	5	9	9	12	**11**	7
Category E	-	-	-	-	12	14	26	33	20	**27**	22
Annual Totals	154	155	147	167	161	161	172	224	217	**265**	173
Risk Bearing %	31%	33%	32%	27%	37%	28%	38%	43%	49%	**46%**	40%

Table 2. Total Airprox Notifications and Risk Assessment Statistics

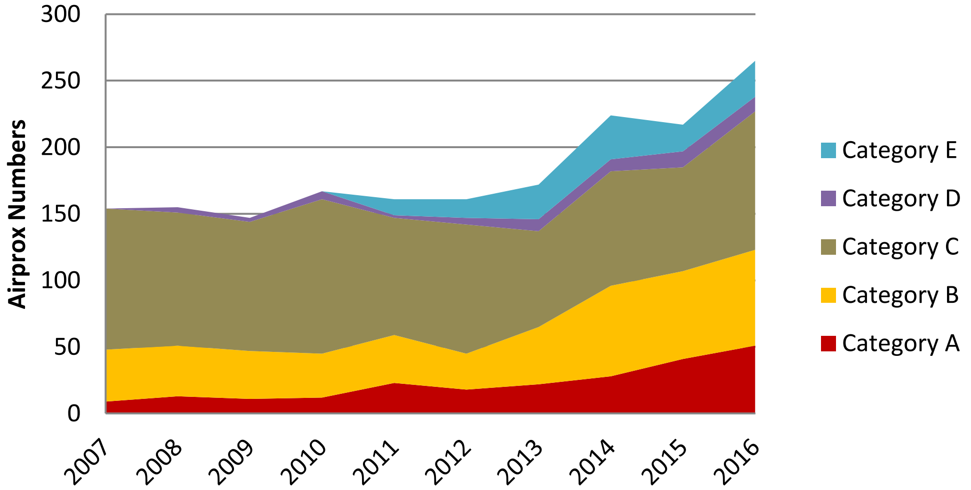


Figure 3. Total 10-year Airprox Trend

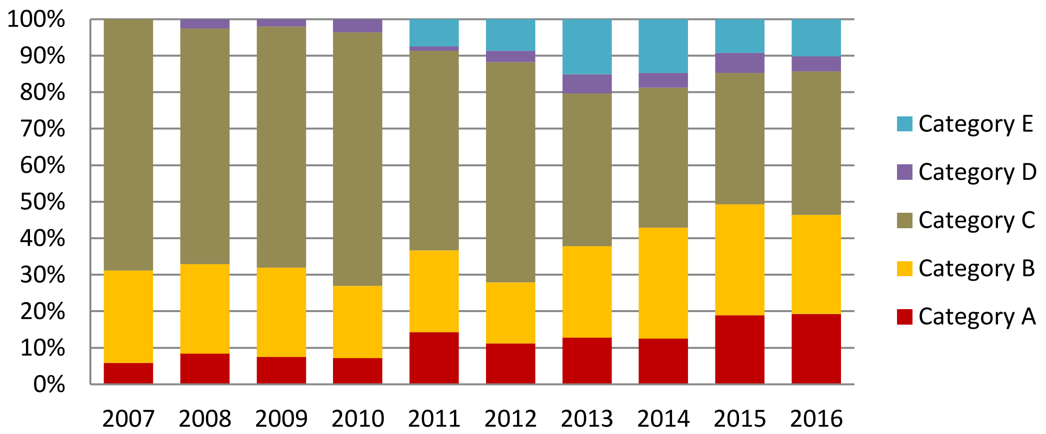


Figure 4. Total 10-year Airprox Risk Distribution

Looking at the longer-term trends since the UKAB was formed, Figures 5 & 6 show the aircraft-to-aircraft incidents from 1995 to 2016. Apart from the spike in 2014, it can be seen that overall reporting trends have largely returned to post-2005 norms although the headline number of risk-bearing Airprox remains higher than ideal. From 2006 to 2012, the baseline risk-bearing trend was about 50 incidents; although 2016's non-drone/SUAS risk-bearing number continues to decline from the 2014 high of 91 events, at 58 incidents it is still slightly above usual levels.

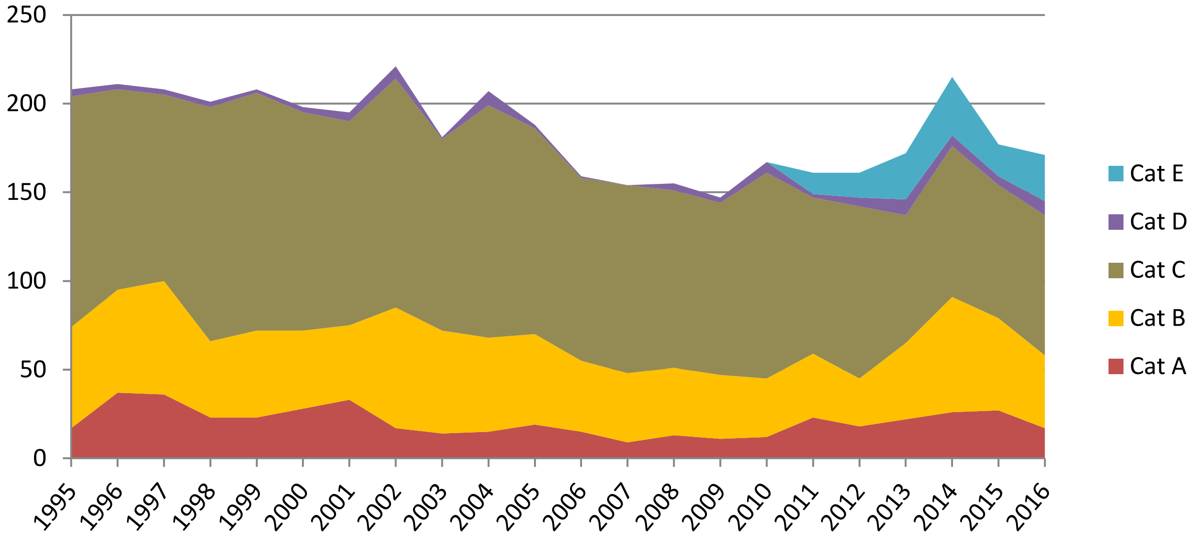


Figure 5. Airprox Numbers – non-SUAS 20-year Trend

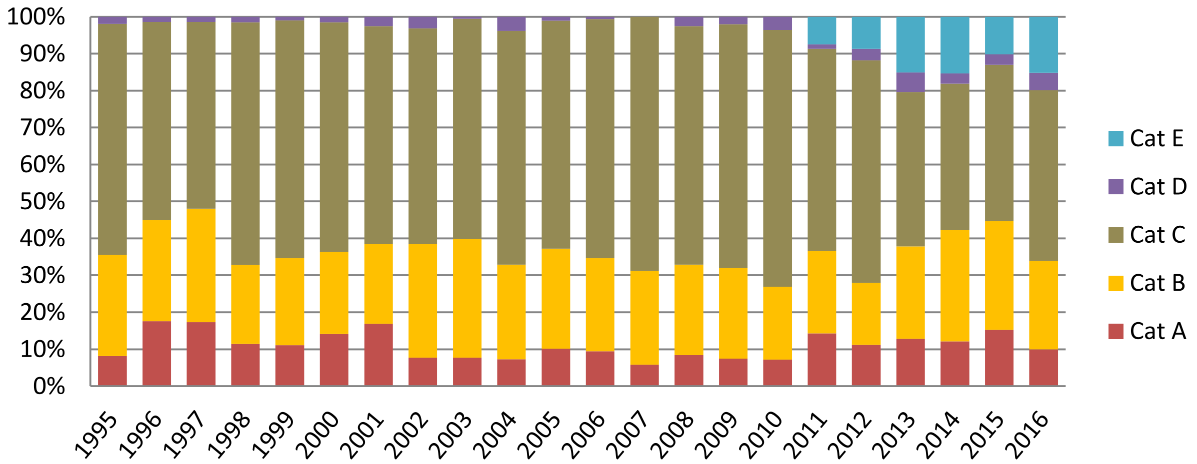


Figure 6. Airprox Risk Distribution – non-SUAS 20-year Trend

Risk-Bearing Trends

Looking specifically at risk-bearing percentages for all occurrences (including drones/SUAS) for all aircraft classes over the last 10 years, there is a clear upwards trend which, as is reflected in Figure 7, overshadows the slightly reduced 2016 rate of 46%. Even discounting drone/SUAS incidents, Figure 8 shows that there remains an unhealthily increasing risk-bearing trend although it might be argued that the 2016 roll-over on the second chart indicates that the underlying aircraft-to-aircraft risk-bearing rate may now be reducing.

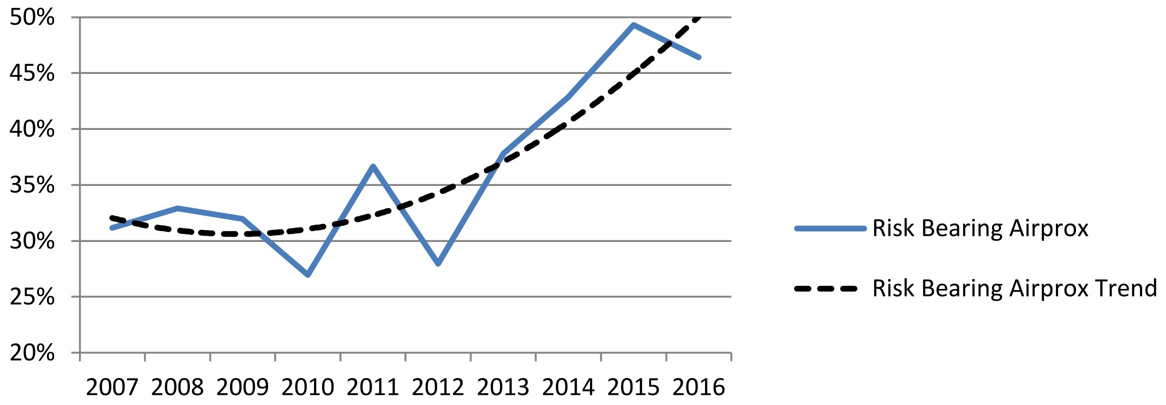


Figure 7. Overall Risk-Bearing Airprox - 10-year Trend

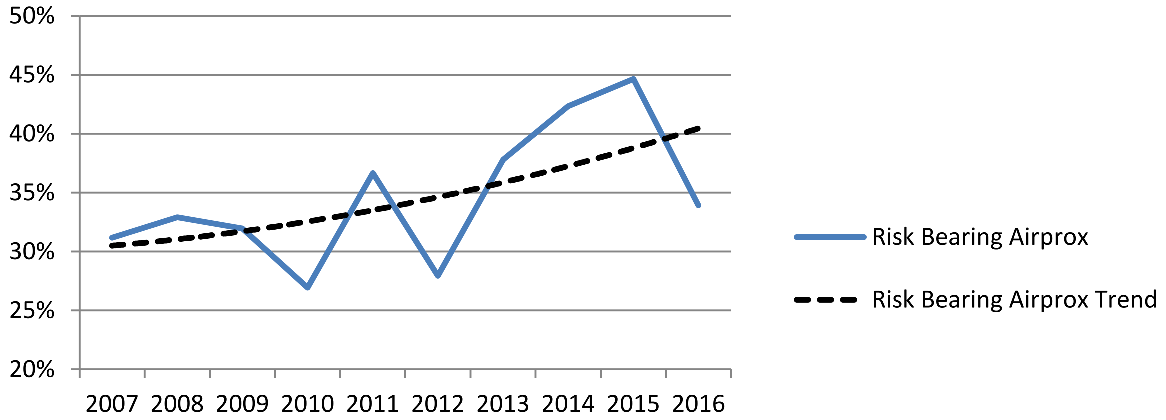


Figure 8. Non-SUAS Risk-Bearing Airprox - 10-year Trend

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 overall risk-bearing trend by respective classes indicates an increasing trend across the board for all aircraft categories as shown in Table 3 and Figure 9. That being said, care must be applied in particular when analysing the CAT rates given that most drone/SUAS incidents applied to this sector. If drone/SUAS incidents are discounted, then Figure 10 indicates that it is still the GA sector that is experiencing the most noticeable increase in risk-bearing events.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GA	38	39	27	29	46	33	51	79 (78)	70 (64)	56 (46)
Emerg Servs	1	1	1	1	3	2	3	5 (5)	2 (2)	2 (2)
Mil	17	22	31	25	30	21	28	33 (31)	32 (29)	28 (22)
CAT	5	2	1	0	1	1	4	6 (4)	22 (3)	49 (1)

Table 3. Overall Risk-Bearing Airprox by Class of Aircraft (non-SUAS figures in brackets)

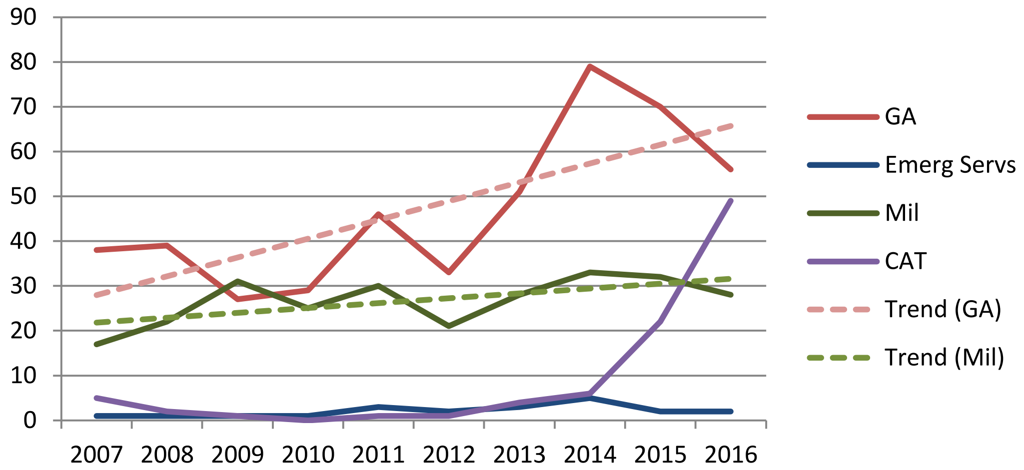


Figure 9. Overall Risk-Bearing Trends by Class of Aircraft

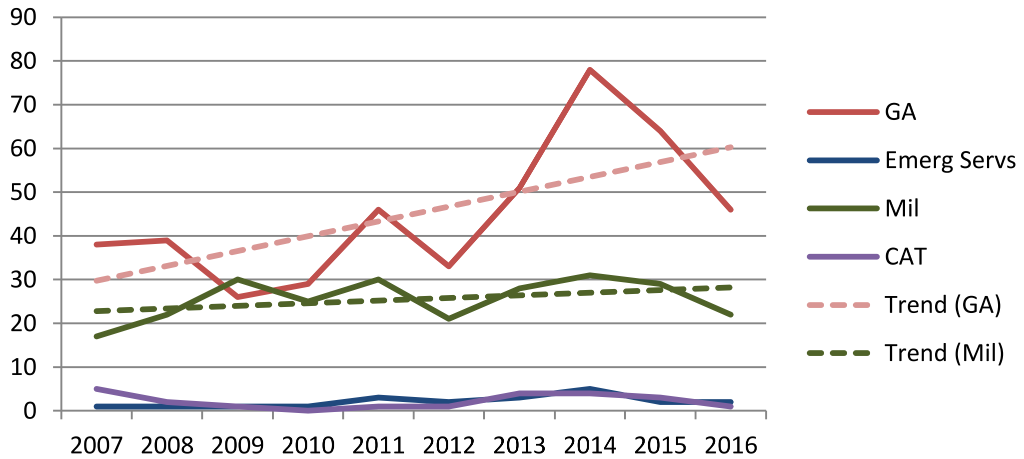


Figure 10. Non-SUAS Risk-Bearing Trends by Class of Aircraft

Collation of reliable flying hour statistics is notoriously difficult due to the fact that much of sports aviation activity is not logged, and obtaining accurate military flying hours for UK flying seems to be beyond the capability of military systems other than as an estimate. With this in mind, Table 4 shows the best figures I can obtain from CAA and military sources. These indicate that, overall, UK flying hours have been pretty stable for the last 7 years or so (average ~2.7M per year since 2009/2010).[2] Overlain on the 10-year trend graph (Figure 11), it is clear that although there was a slight increase in hours flown in 2016, the trends in Airprox reporting do not particularly correlate to hours flown.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CAT Hours x 10K	162.0	163.5	149.4	141.6	147.1	145.4	149.0	151.5	154.8	161.5
GA Hours x 10K	134.6	135.1	131.2	113.0	104.0	96.2	92.3	93.2	88.0	83.9
Mil hrs x10K	43.4	40.1	43.2	31.8	31.1	25.6	24.2	25.0	24.2	25.6
Total Hrs x10K	340.0	338.7	323.7	286.4	282.3	267.2	265.6	269.7	267.1	270.9

Table 4. UK Flying Hours 10-year Statistics

[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.

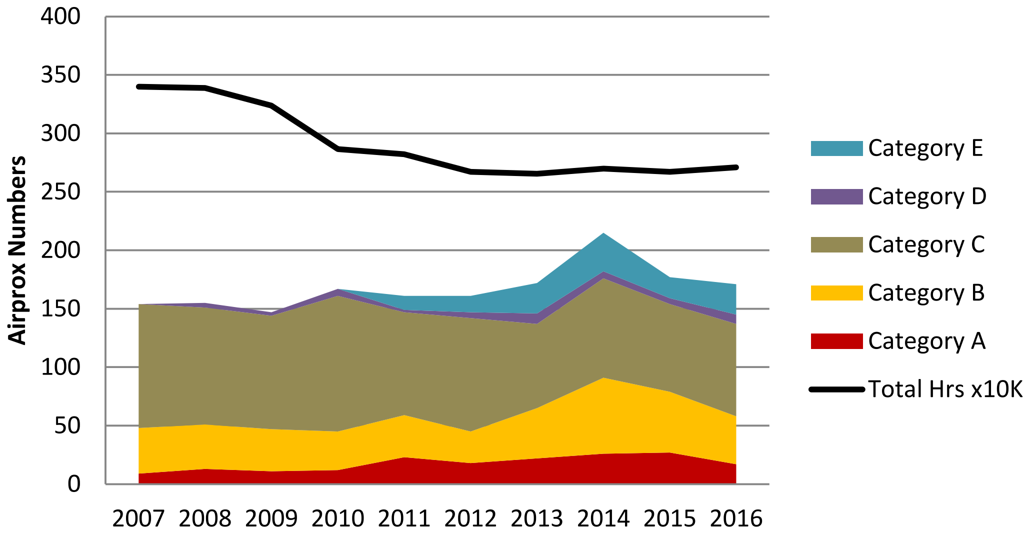


Figure 11. Overall non-SUAS 10-year Trend compared with Flying Hours

Trends per Million Flying Hours

Normalising the non-SUAS statistics for each sector per million flying hours (mfh), the underlying 10-year trends in Table 5 and Figure 12 show that overall military Airprox per mfh are increasing at the highest rate (double the rate of GA), and that military risk-bearing Airprox per mfh are consistently about 1½ times the GA rate. On the face of it, the conclusion is that, hour-for-hour, military pilots are about twice as likely to experience an Airprox than GA pilots. Moreover, the level of under-reporting of GA hours (unknown microlight, paraglider, paramotor etc hours) is likely to be much more than any errors in the estimate of military flying and so the GA rates may be even lower. Currently, I do not have specific data for Emergency Services hours and so they are not shown within the table or graph; this is something I will address next year.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total GA Airprox per mfh	75	70	69	89	113	106	133	175	159	156
GA Risk Bearing Airprox per mfh	28	29	20	26	44	34	55	84	73	55
Total Mil Airprox per mfh	120	140	160	308	270	278	339	380	277	270
Mil Risk Bearing Airprox per mfh	39	55	69	78	96	82	116	124	120	86
Total CAT Airprox per mfh	40	37	23	23	14	22	21	18	14	12
CAT Risk Bearing Airprox per mfh	3	1	1	0	1	1	3	3	2	1

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

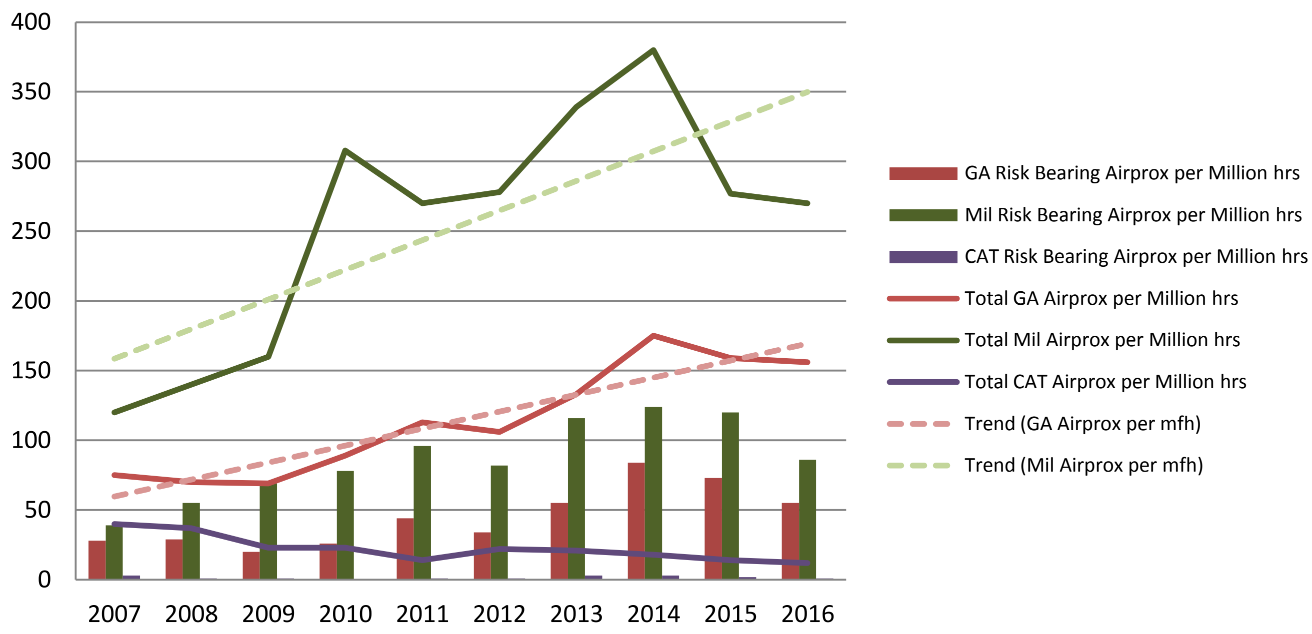


Figure 12. Airprox per mfh by Class of Aircraft – last 10 years

Airprox by Class Involvement

Table 6 and Figure 13 illustrate the 2016 Airprox-by-numbers breakdown by involvement. Note that the figures do not add up to the total number of Airprox in the year (265) because each Airprox may involve 2 classes of aircraft. Thus, a GA-GA Airprox will count as one GA involvement, whilst a GA-Mil Airprox would count as both a GA and a Mil involvement. Similarly, the total percentages do not add up to 100 for the same reason. The headline figures are that 55% of Airprox in 2016 involved GA, 31% involved military, 31% involved CAT (mostly SUAS), and 35% involved SUAS (mostly CAT).

	CAT	Military	GA	Emerg Servs	SUAS	Total	Total as % of all Airprox
CAT	5	3	11	0	64	83	31%
Military	(3)	15	48	3	12	81	31%
GA	(11)	(48)	65	6	17	147	55%
Emerg Servs	(0)	(3)	(6)	0	1	10	4%
SUAS	(64)	(12)	(17)	(1)	0	94	35%

Table 6. 2016 Total Airprox by Class Involvement

In Figure 13, the large central pie chart shows the division of all Airprox by class involvement, and the smaller satellite pie charts show the sub-division of involvements within each of the classes (i.e. for the 147 Airprox involving GA: 44% were with other GA aircraft; 33% were with military aircraft; 7% were with CAT; 12% were with SUAS; and 4% were with Emergency Services aircraft.

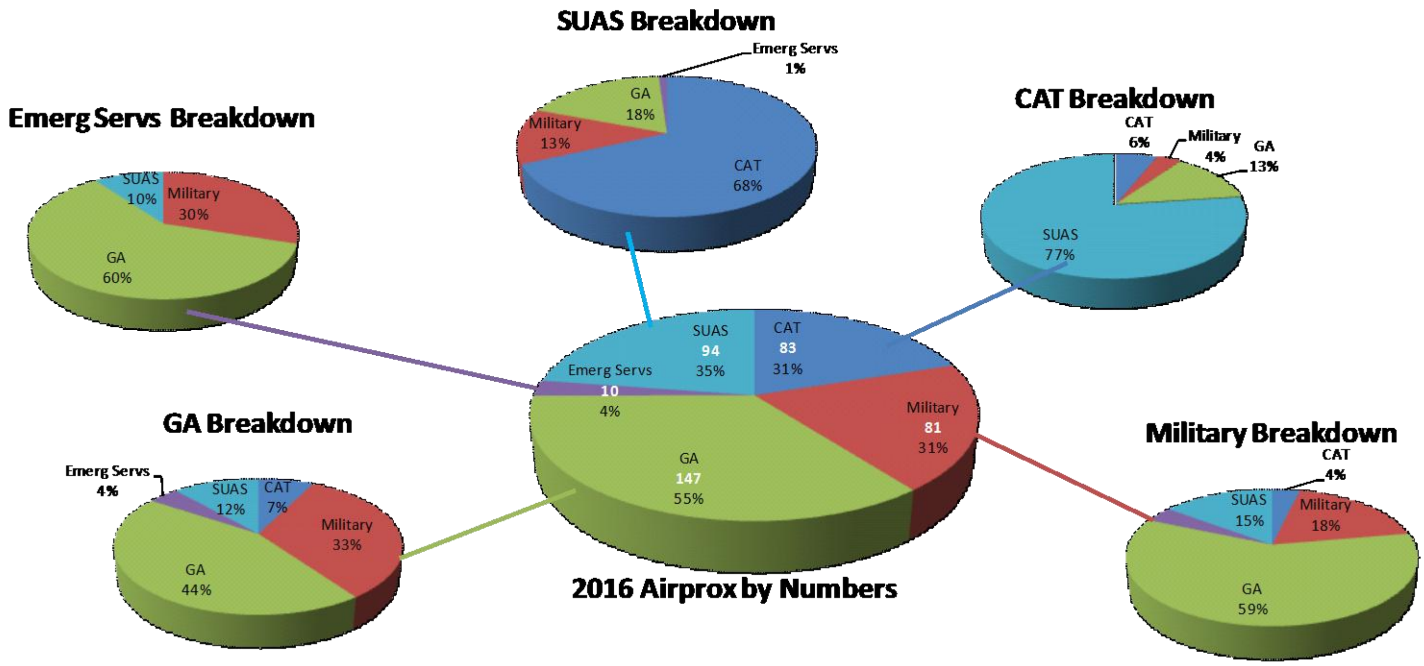
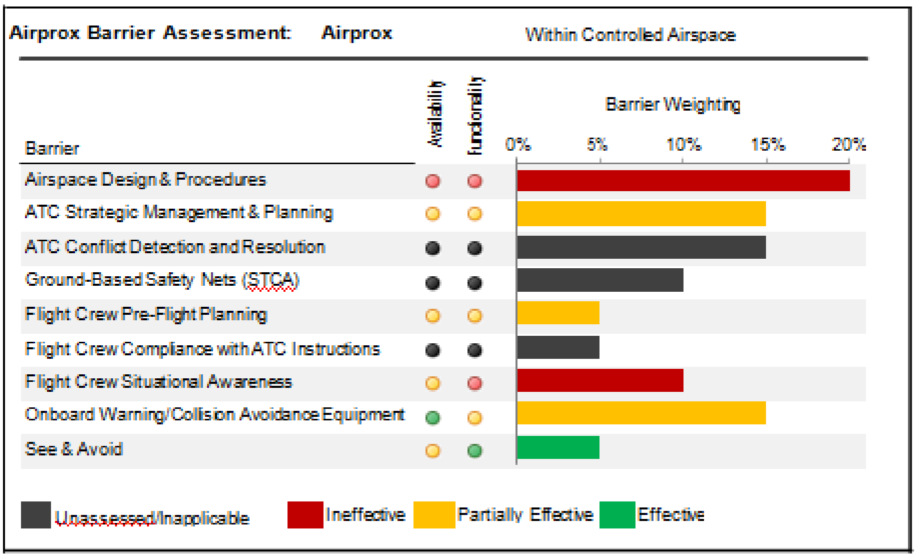


Figure 13. 2016 Total Airprox by Class Involvement

In headline terms, the greatest collision risk for GA is other GA; for military it is GA; for CAT it is drones/SUAS; for Emergency Services it is GA; and for drones/SUAS it is CAT. With regard to the latter, almost all of the drone/SUAS incidents occurred in airspace within which they were not entitled to fly; unfortunately, we have yet to trace any of these drone operators given the difficulty in pinpointing their location in a timely manner. That being said, 2016 saw the first Airprox being reported by a commercial drone operator; this was a refreshing outcome in that CAA drone operator licensing requirements are clearly highlighting their need to operate responsibly and participate in aviation safety processes. In the incident reported, the drone operator was taken by surprise when a helicopter flew over a ridge and managed to avoid it by descending his drone; an open and honest report that highlighted the difficulties in detecting other aircraft from the ground in hilly terrain.

Safety Barriers

We introduced the concept of Airprox analysis by safety barriers in the latter part of 2016. Intended to develop a more systematic approach to incident analysis, the barriers were based on those in common use within mid-air collision (MAC) bow-tie analysis. Although modified slightly in name and meaning during 2017, the 2016 barrier analysis provided some useful insights regarding their effectiveness and employment. Each barrier was attributed a weighting depending on the airspace type (i.e. in controlled airspace see-and-avoid attracts reduced importance as a safety barrier compared to Class G airspace), and were then graded for each incident for their effectiveness in terms of their availability and functionality. The 9 barriers were: Airspace design and procedures; ATM strategic management and planning; ATS conflict detection and resolution; Ground-based safety nets; Flight-crew pre-flight planning; Flight-crew compliance with instructions; Flight-crew situational awareness; Onboard warning / collision avoidance equipment; and See & avoid. Airprox assessments were presented on a chart that showed the weighting as the length of each barrier and the effectiveness as the colour. An example of the outcome for hypothetical incidents is shown at Figure 14 for each case (one showing within and one showing outside controlled airspace).



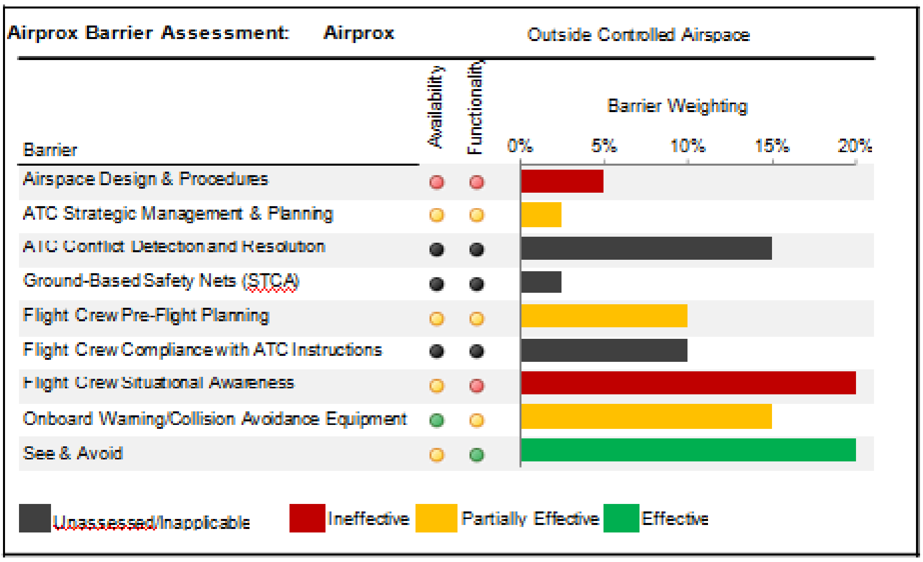


Figure 14. Examples of 2016 Airprox Barrier Assessment Outcomes

A word-picture chart was then developed for each barrier in order to ensure consistency in assessment (see the glossary of definitions and abbreviations at the end of this report). Even so, not every incident fitted into these word-pictures and so individual assessments required a degree of subjective judgement. Taken in aggregate though, an appreciation of each barrier's overall effectiveness can be developed that provides useful insights. For 2016, Table 7 and Figure 15 show the combined outcomes as a percentage of the 71 Airprox assessed in this manner.

Barrier Assessment:	Effectiveness Percentage Count				Effectiveness Numerical Count				Check Sum Total Incidents
	Absent N/A	Ineff	Partly Eff	Fully Eff	Absent N/A	Ineff	Partly Eff	Fully Eff	
Airspace design/procedures	0%	7%	17%	76%	0	5	12	54	71
ATC management/planning	39%	0%	10%	51%	28		7	36	71
ATC conflict detection/resolution	52%	13%	13%	23%	37	9	9	16	71
ATC electronic safety nets	89%	4%	1%	6%	63	3	1	4	71
Pilot pre-flight planning	11%	6%	17%	66%	8	4	12	47	71
Pilot compliance with ATC instructions	52%	4%	6%	38%	37	3	4	27	71
Pilot situational awareness	1%	35%	45%	18%	1	25	32	13	71
Onboard warning/collision avoid equipment	30%	34%	11%	25%	21	24	8	18	71
See & avoid	0%	15%	49%	35%	0	11	35	25	71

Table 7. 2016 Airprox Barrier Performance (71 Assessed Incidents)

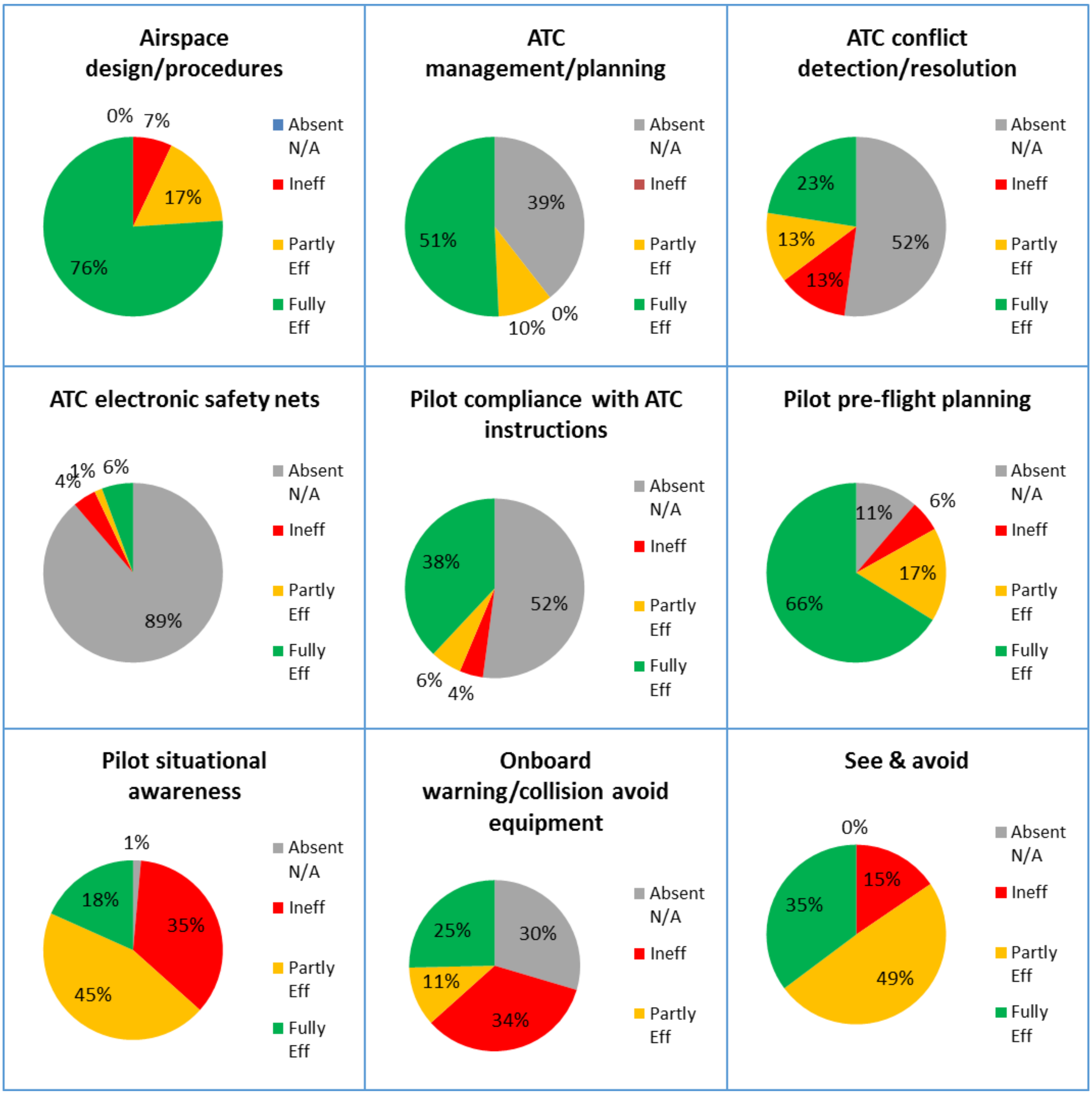


Figure 15. 2016 Airprox Barrier Dashboard (71 Assessed Incidents)

Some pertinent deductions from the raw figures are:

- See-and-avoid was only fully effective in 35% of incidents.
- Onboard collision warning/collision avoidance equipment was absent or ineffective (mostly due to incompatibilities between aircraft) in 64% of incidents.
- Pilot situational awareness was either ineffective or only partially effective in 80% of incidents.
- When ATC was available and involved, pilot compliance with ATC instructions was fully effective nearly 80% of the time.
- When ATC was available and involved, ATC conflict detection and resolution was fully or partially effective about 75% of the time.

As the use of these barriers matures more in 2017, more confidence will be gained in their indications; however, the deductions above provide some statistical basis for previous anecdotal comments regarding the effectiveness of visual lookout (and the need for robust lookout techniques); the desirability of installing onboard collision warning equipment (not just for its primary purpose of alerting about other aircraft but also for improving pilot situational awareness); the value of seeking a suitable Air Traffic Service (ATS); and the effectiveness of ATC conflict resolution.

Airprox Education Themes

Based on the above barrier analysis and overall causal outcomes, educational messages were developed in late 2016 along 6 easily understood themes as indicated in Figure 16. This messaging was deployed to the GA community in Spring 2017.

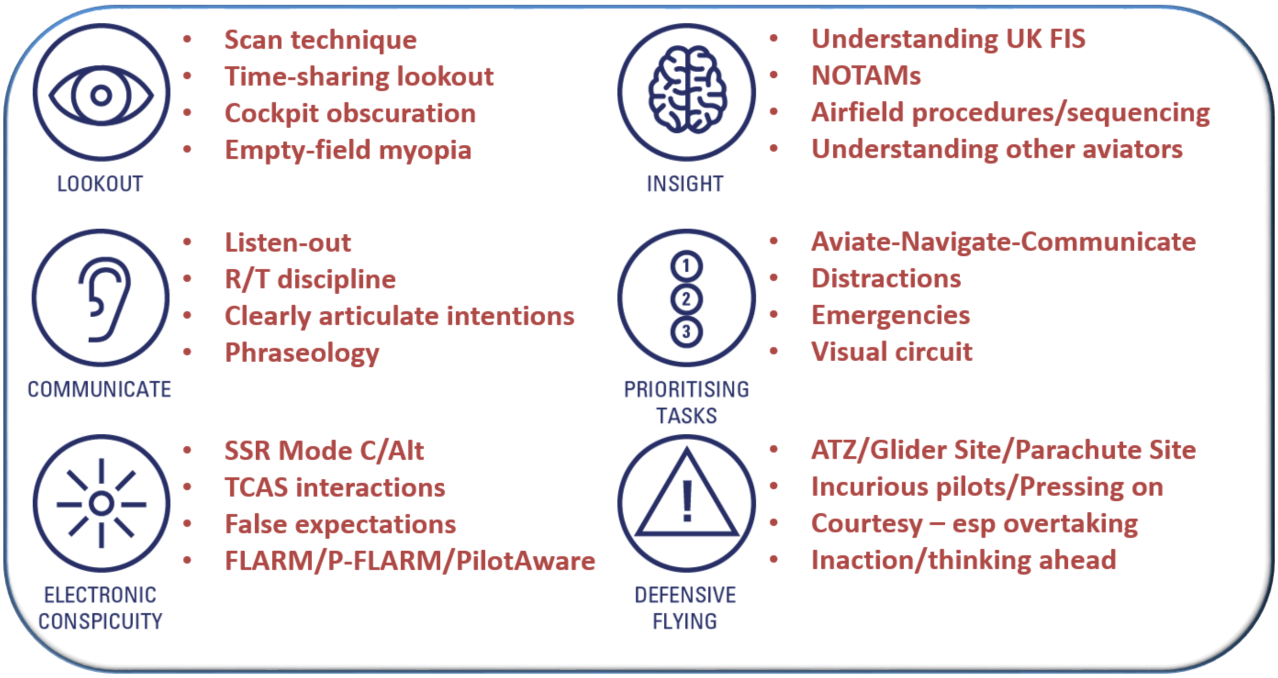


Figure 16. 2016 Airprox Education Themes

The following report sections provide more detailed overviews of Airprox statistics and trends by sector, intended to provide analysis on 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.

Anecdotally, there are still 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 described as radio frequency changes, map/system-checking or SSR re-coding, all of which are nothing new. I also 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 still appears to be a recurring problem with the conduct of overhead joins, with some pilots either appearing not to understand them or be 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, I have emphasised again that conduct in the visual circuit is certainly something that could be usefully underlined in flying training, testing and education activities.

Statistics and trends can sometimes mask the overall meaning of the analysis. In short, Airprox are near accidents, and risk-bearing Airprox reflect incidents where aircraft very nearly collided, or safety was much reduced below the norm. That being said, as for every other Airprox annual 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, 265 overall incidents in 2016 represents, on average, an Airprox occurring in UK about every working day. Of these, 123 risk-bearing incidents indicates that, on average, a collision nearly occurred in UK airspace (or safety margins were at least much reduced) over twice a week. Even when looking at only the aircraft-to-aircraft Airprox, 171 incidents represents about 3 Airprox a week on average, and with 58 risk-bearing aircraft-to-aircraft incidents in 2016, aircraft nearly collided every week.

To summarise, and to aid in educating the various communities to the MAC threat, headline statements for UK airspace in 2016 are as below. In assessing the relevance of these statements it is worth noting that, although annual correlations vary over the last 20 years, on average, there is a MAC event in UK airspace per 20 risk-bearing Airprox (and one per 60 Airprox overall).

- **265** Airprox overall represents, on average, about five incidents per week.
  - **123** risk-bearing Airprox overall means that, on average, there was either a risk of collision in UK airspace, or safety was much reduced below norms, at least twice a week.
- **171** aircraft-to-aircraft Airprox represents, on average, about three aircraft-to-aircraft incidents per week.
  - **58** risk-bearing aircraft-to-aircraft Airprox means that, on average, there was either a risk of collision between two aircraft, or safety was much reduced below norms, at least once a week.
- **20** aircraft-to-aircraft CAT Airprox represents about two per month, but only one of these was risk-bearing in 2016.
- **63** drone/SUAS CAT Airprox represents more than one a week.
  - **48** risk-bearing drone/SUAS CAT Airprox means that, on average, there was either a risk of a collision between a drone/object and a CAT aircraft, or safety was much reduced below norms, almost every week.
- **147** GA Airprox represents about three per week on average.
  - **56** risk-bearing GA Airprox means that, on average, there was a risk of GA collision, or safety was much reduced below norms, about once a week.
- **81** Mil Airprox represents about three per fortnight.
  - **28** risk-bearing Mil Airprox means that, on average, there was a risk of Mil aircraft collision, or safety was much reduced below norms, about once every fortnight.
- **10** Emergency Services Airprox represents almost one per month, but only three of these were risk-bearing in 2016.

This report and associated individual Airprox reports are available online at www.airproxboard.org.uk (or by email on request). An annual Airprox magazine is also published online which focuses on GA Airprox incidents and issues in a more digestible and relevant format for the wider aviation community, along with other relevant information and collision avoidance educative material.

Steve Forward
Director UK Airprox Board

Airprox Reporting Statistics

In common with normal Airprox annual trends, 2016 saw proportionally more incidents in the summer months (when GA are more active), than the rest of the year. Figure 17 shows the breakdown of 2016's flow of occurrences overlain on bars representing the 5-year rolling average for each of the months. The blue bars and blue line represent the aircraft-to-aircraft incidents, whilst the black line shows the total number of Airprox each month (the difference between the blue and black lines being the drone/SUAS incidents). As can be seen, aircraft-to-aircraft incidents were consistent with predictions, other than in June and September when there were far fewer reports than expected. We have yet to establish any pattern for the drone/SUAS incidents although, being also weather dependent, they appear to follow the overall increases in Spring, Summer and Autumn. The SUAS '5-year' predictions are shown as green bars but are as yet unreliable given that we have only really seen SUAS incidents over the previous 2 years, and so numbers have yet to stabilise.

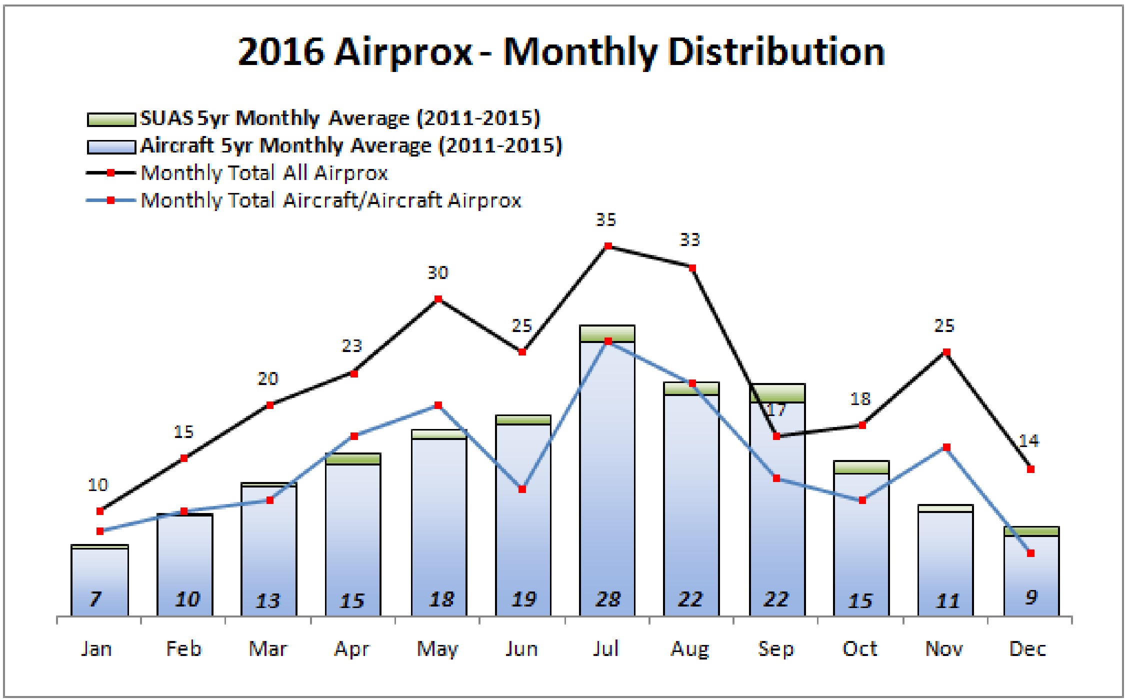


Figure 17. 2016 Airprox Monthly Distribution

Airprox Analysis and Trends

Overview

Although the reasons for the peaks and troughs above will be many and varied, they are often associated with weather conditions, which naturally affect GA flying rates. Although only one aspect of aviation weather considerations, Figure 18 shows the Met Office seasonal rainfall anomaly charts[3] for 2016 compared to the 30-year averages. These reveal a wetter than average Winter

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

(blue shading), especially in the Borders and Scotland, a mixed Spring and Summer, and a much dryer Autumn than average (brown shading). That being said, similar charts showing numbers of days of rain show that June and September had relatively high numbers of rainy days (more than 10-20 over most of UK), which may account for a reduction in flying and hence Airprox numbers in those months.

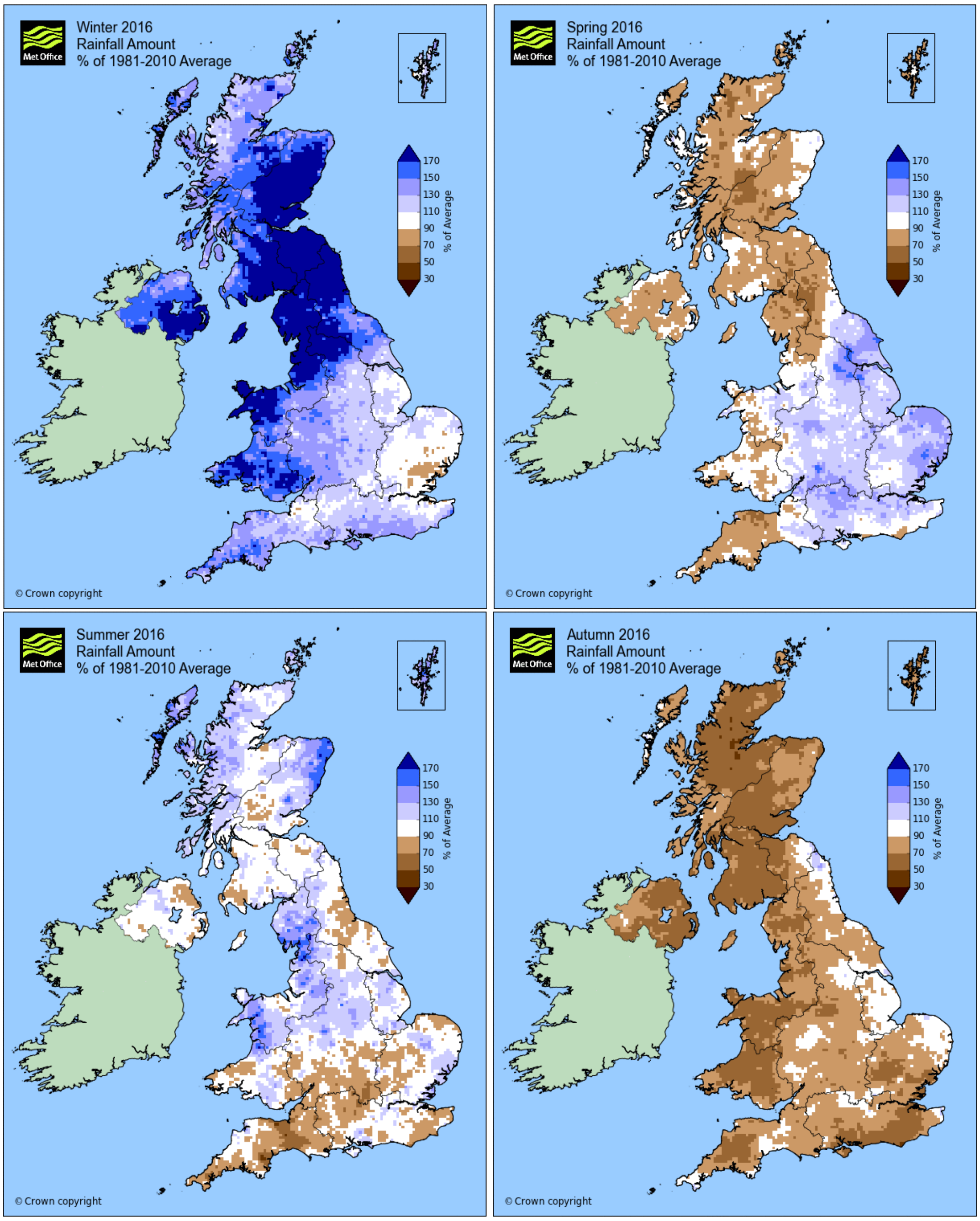


Figure 18. 2016 Seasonal Rainfall Anomaly Charts

Figure 19 shows the monthly breakdown of aircraft-to-aircraft Airprox incidents by risk, whilst Figure 20 shows the same data but overlain with risk-bearing incidents (Category A & B) as a percentage of the overall number. As with previous years, the trend is for Airprox to be 'riskier' than average at the start of the year, decline in risk towards Spring, and then steadily rise in risk again in

Summer before tailing off again towards the end of the year. This is a repeatable pattern over the years and gives credence to the hypothesis that, as the GA flying community come out of 'hibernation' as the weather improves after Winter, pilots are perhaps a little rusty and inadvertently prioritise 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, until the Summer surge in flying increases Airprox exposure overall, with more aircraft airborne and therefore more chances of a 'riskier' 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 summer season: because they may be less practiced in lookout, or may have less well-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.

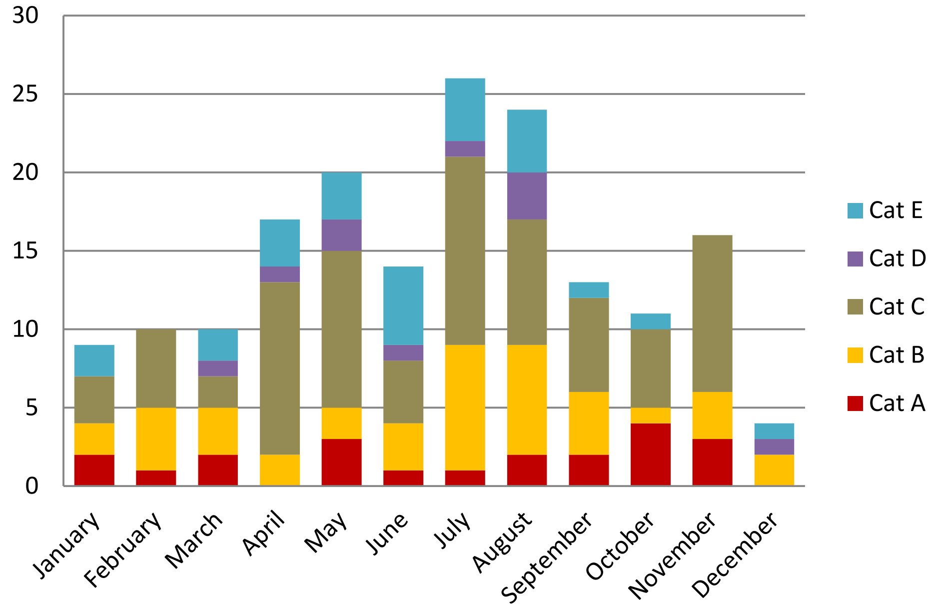


Figure 19. 2016 Airprox Risk Distribution by Month (non-SUAS).

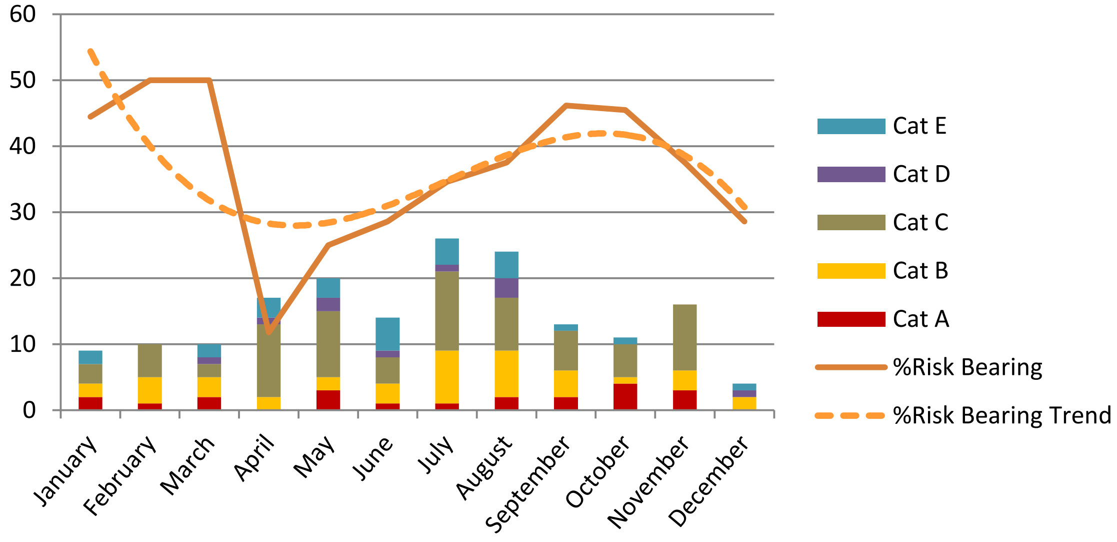


Figure 20. 2016 Airprox Risk-Bearing Trend by Month (non-SUAS).

Analysis by User Groups

Table 8 and Figure 21 show the overall total Airprox trends by user group interactions over the last 10 years. As can be seen, the numbers of Military-to-Military incidents have shown a broadly reducing trend in recent years; Civil-to-Military incidents seem to fluctuate around a fairly level mean of about 45 incidents per year (although the underlying linear trend is gradually decreasing over the last few years); and Civil-to-Civil decreased again compared to 2014 and 2015 but the underlying trend over the last few years remains markedly upward since 2009/2010. 'Other' refers to unknown aircraft, which can also probably be assumed to be civil.

As previously reported, massively increased numbers of drone/SUAS Airprox remain the stand-out item due to their soaring popularity in the last few years – in 2013 there were no Airprox referring to drones/SUAS; in 2014 there were 9; in 2015 there were 40; and in 2016 there were 94.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Civil~Civil	95	97	71	67	75	85	90	120	111	105
Civil~Mil	38	38	35	54	50	39	54	57	41	41
Mil~Mil	12	17	30	31	26	28	19	25	23	15
SUAS				6	0	3	0	9	40	94
Other/Unknown	9	3	11	9	10	6	9	13	2	10
Totals:	154	155	147	167	161	161	172	224	217	265

Table 8. 10-year Total Airprox Statistics by User Group

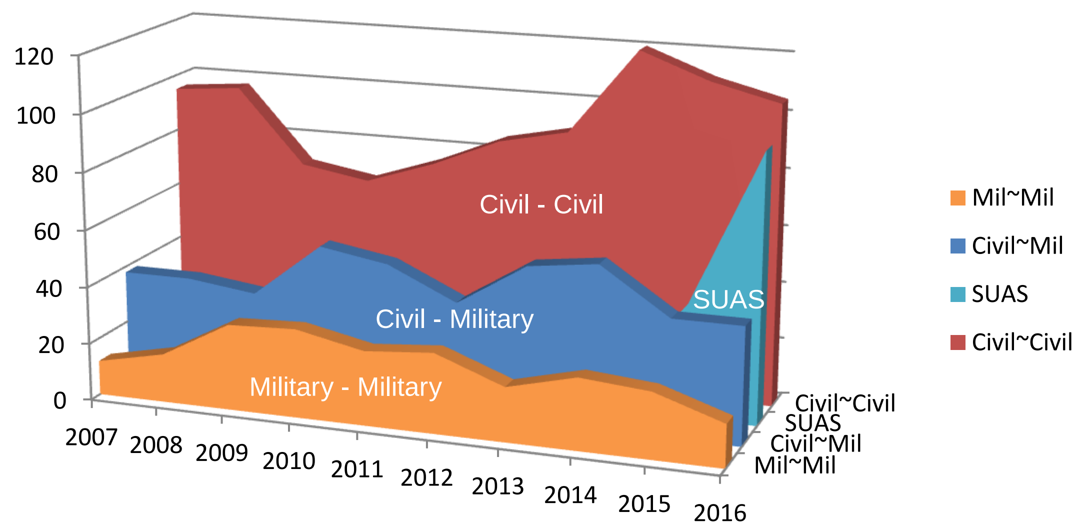


Figure 21. 10-year Total Airprox Trends by User Groups

Analysis by Flight Classification

In order to gain greater granularity of civil Airprox trends, Table 9 and Figure 22 below further break down the above civil user group statistics into classes that distinguish CAT from GA and Emergency Services.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GA~Mil	25	24	29	50	52	35	55	54	35	46
GA~GA	45	46	42	44	50	54	59	89	82	75
CAT~CAT	19	24	11	5	4	11	9	5	3	5
CAT~GA	30	22	15	15	12	14	17	17	18	18
CAT~Mil	14	14	7	13	4	6	6	5	4	3
Mil~Mil	12	17	30	31	26	28	19	25	23	15
SUAS				6		3	0	9	40	94
Emerg Servs	1	6	5	3	10	8	6	14	11	9
Unknown Ac	8	2	8	0	3	2	1	6	1	0
Total	154	155	147	167	161	161	172	224	217	265

Table 9. 10-year Total Airprox Statistics by Flight Classification

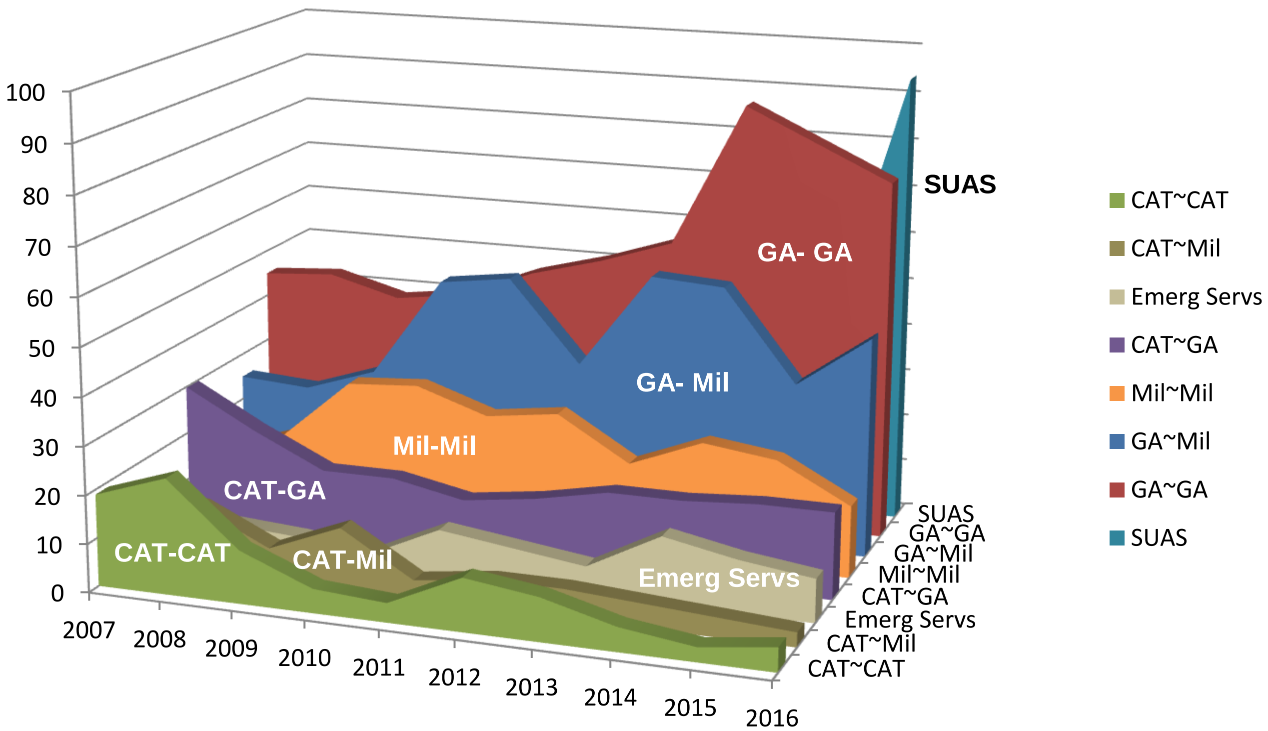


Figure 22. 10-year Total Airprox Trends by Flight Classification

The following observations are pertinent:

- **CAT**: Although showing a slight increase in 2016, CAT-CAT incidents are few and, allowing for the effect of small numbers, have shown a general shallow decline since 2012. CAT-Mil incidents also remain in a steady decline, whilst CAT-GA incidents have shown a steady increase, and at about 4-5 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, the introduction of CADS[4] (a flight notification and conflict awareness tool used by the military and selected others) and latterly the introduction of TCAS to the Tornado fleet. In contrast, although Mil-GA incidents showed a healthy decrease in 2015 compared to 2014, they rose again in 2016 although the underlying trend since 2010 remains gradually decreasing. The step increase and high reporting rates for military Airprox since 2009 can probably be attributed to the introduction at that time of mandatory military Airprox reporting, the adoption of ASIMS[5], and an associated strong reporting culture within their safety management system.

- **GA**: GA-GA incidents have continued their welcome downward trend since their high point in 2014. However, this needs to be tempered by the knowledge that the overall reporting trend over the last 10 years remains noticeably upward. With 75 GA-GA incidents reported in 2016, this represents about 44% of the overall 171 aircraft-to-aircraft Airprox total, which is significantly more than any other sector (GA-Mil being the next largest sector with 46 incidents in 2016). Whichever way the statistics are represented, GA has the largest involvement in Airprox overall, hence why our educational material is targeted at this sector.

- **Emergency Services**: Newly broken out as a sector in its own right this year, the increased numbers of Police, Ambulance and SAR aircraft merits them being considered separately. That being said, Emerg Servs Airprox have been fairly stable over the last 5 years or so, averaging at about 10 Airprox per year over that period. With the SAR role now being taken over by the Coastguard vice the military, I would expect a moderate increase in this sector's incidents in the coming years that were previously reported under the military sector.

Analysis by Airspace

Figure 23 shows the spread of 2016's Airprox occurrences by airspace involvement. The standout change for 2016 is the rise in Class A airspace Airprox (52 in 2016 compared to 16 in 2015). However, this rise is almost exclusively the result of the increased numbers of drone/SUAS Airprox which have mostly been reported against CAT aircraft either on the approach to major

[4] CADS – Centralised Aviation Data Service.
[5] ASIMS – Air Safety Information Management System.

airports or within controlled airspace. The most prevalent airspace for Airprox remains, as ever, Class G airspace/low-level below 3000ft (126 incidents). This reflects the fact that the majority of Airprox involve GA and Mil aircraft in that flight regime, but also that drone/SUAS Airprox outside controlled airspace are also most likely in that altitude range (Figure 24 shows the distribution of drone/SUAS Airprox in 2016).

Airprox in ATZ/MATZ remain disappointingly high despite efforts to educate pilots on 'lookout, listenout and follow procedures'. 2016 saw too many Airprox caused by pilots either not understanding or not conducting overhead joins properly, and similarly frustrating numbers of incidents where pilots failed to integrate with others already established in the visual circuit. There is a clear case for more education on circuit procedures, which the recently released CAA Skyway Code will hopefully assist, and perhaps for circuit joins to become a specific topic in periodic pilot competency checks when flying with instructors.

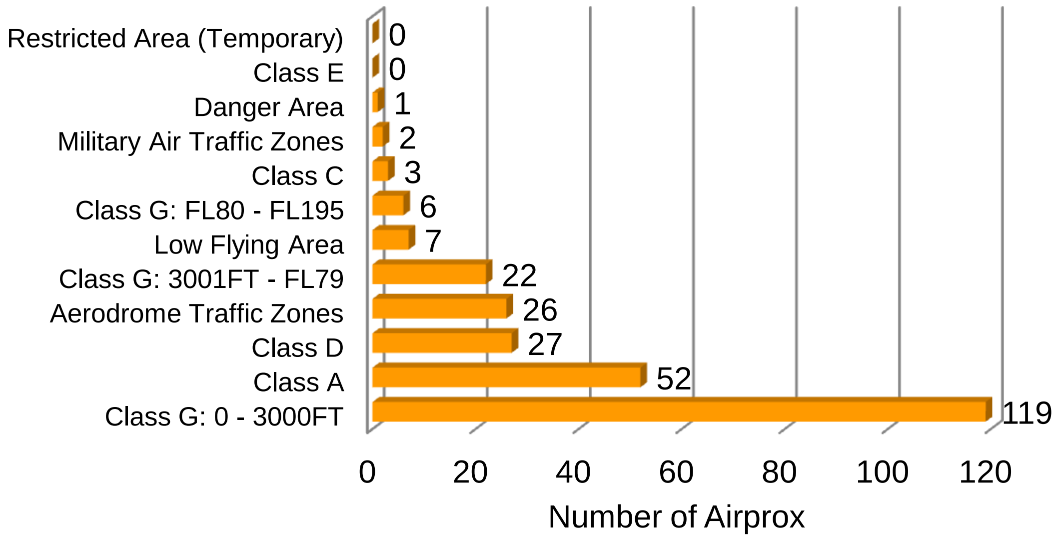


Figure 23. 2016 All Airprox by Airspace Involvement

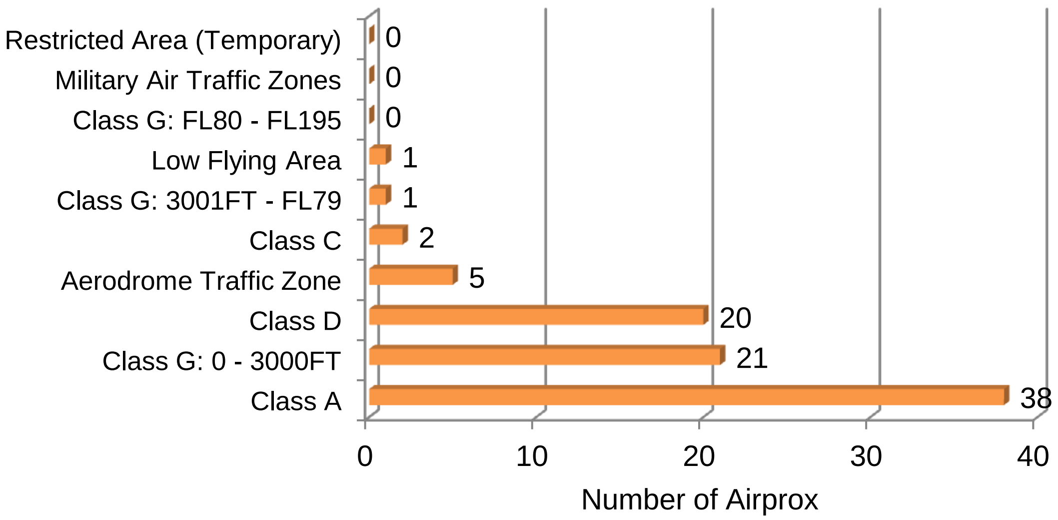


Figure 24. 2016 SUAS Airprox by Airspace Involvement

Top Ten Airprox Causes

Figure 25 shows the overall top-10 Airprox causes for 2016, along with the associated risk distributions and number of incidents for each. As ever, 'Did not see/late sighting' was the most prevalent cause which reflects the nature of see-and-avoid Class G airspace (if one doesn't see then one cannot avoid). 'Flew too close' (99) and 'Conflict in FIR' (53) have seemingly increased markedly in 2016 (80 and 31 incidents respectively in 2015). However, this can largely be attributed to the increased drone/SUAS reporting whereby if a drone is flown inside controlled airspace then it is recorded as 'Flew into conflict with', and if an unknown object is inside controlled airspace then it is recorded as 'A conflict in Class…'.

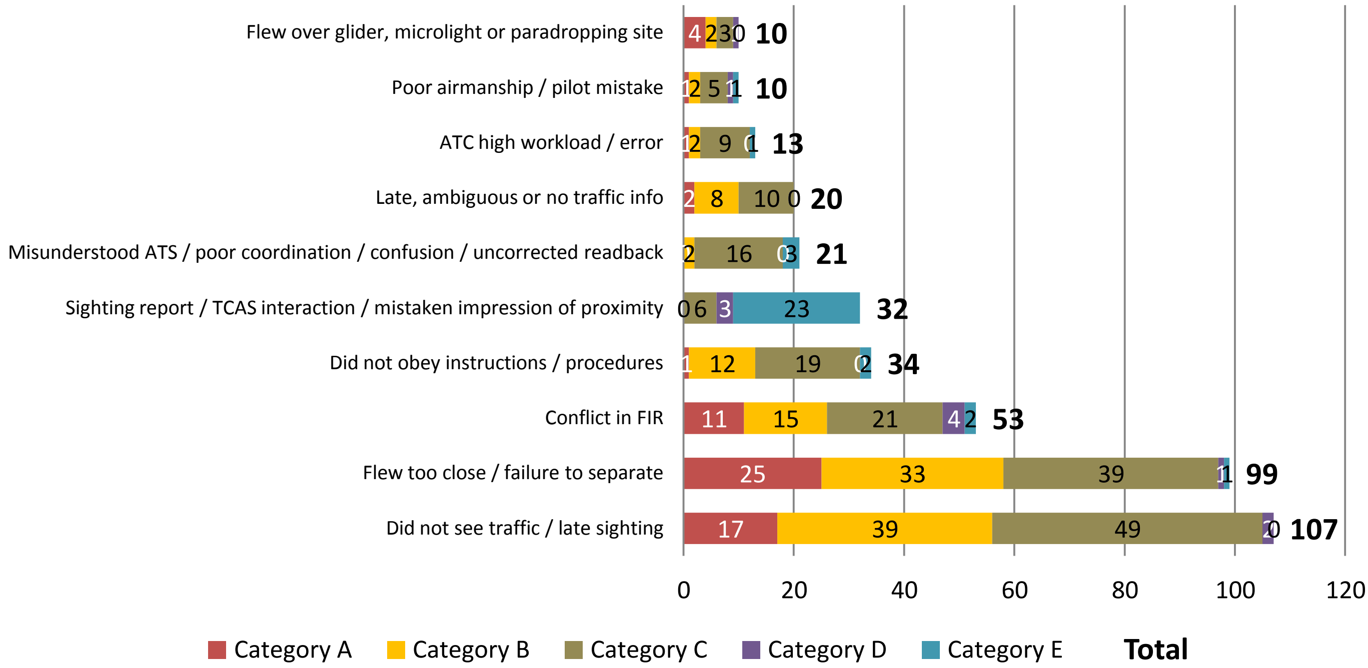


Figure 25. 2015 Top-10 Airprox Causes with Associated Risk Breakdowns

It is again worthy of note that 52% of incidents in the top cause 'Did not see / late sighting' were graded as risk-bearing; this 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 as a means of enhancing situational awareness and thereby 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 robustly looking out at all times.

'Sighting report / TCAS interaction / mistaken impression of proximity' is another cause set that has increased in 2016 compared to 2015 (22 incidents in 2015). As can be seen, the majority of these incidents are classified as Category E risk (normal safety standards) and these reflect a growing number of 'benign' TCAS incidents, especially in Class D airspace. Interactions between VFR and TCAS-equipped IFR traffic can cause unwanted TCAS RAs, to which IFR traffic is mandated to respond (and an Airprox is often then raised). Education of GA pilots in particular in making them aware of TCAS envelopes would be helpful.

Airprox Themes

Most Airprox stem from multiple causes and contributory factors with each having a greater or lesser bearing on the outcome depending on the circumstances. A formal breakdown of causes is included in the parts for each aircraft sector 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). In future reports, our emerging barrier methodology will provide better granularity regarding themes, but in the meantime I provide the information below for consistency as we develop the barrier processes.

- Poor, or at least questionable, airmanship decisions were commented upon 84 times.
- Late- or non-sighting was mentioned as a factor 76 times.
- Ineffective integration in the visual circuit was discussed 40 times.
- Sub-optimal controller decisions and ineffective ATC coordination or Traffic Information was mentioned 33 times.

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 268 mentions of causal factors overall during the year's reporting, and some will refer to the same incident). 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' mantra); 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 at least 84 times. In this context, 'Airmanship' as a quality is 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 were complaints that 'airmanship' was on the decrease, but I have no hard evidence to underpin that belief. Particular issues were: not thinking ahead, not deviating from the plan when conditions had changed (aka 'pressing on regardless'); unclear communication of intentions; flying too close to other aircraft (on the assumption that if they themselves were comfortable with the separation then so would be the other pilot); and flying too close to, or overhead glider or parachuting sites.

- **Lookout**. Late- or non-sighting was mentioned in discussions 76 times. The well-known failings of the human eye have to be compensated for by pro-active and robust 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 but there are ever increasing aids to navigation that are welcome in their own right but need to be used with foresight.

- **Visual Circuit.** Poor or ineffective integration in the visual circuit (or when near to ATZs, airfields, parachuting and glider sites) was discussed as a factor 40 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).

- **ATS Provision.** Sub-optimal or ineffective ATC coordination, provision of TI, or simple controller errors were discussed 33 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). 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.

More generally, 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.

In order to counter some of these elements, towards the end of 2016 we produced educational material within a '5 Seconds to Impact' headline message based on 6 themes below. This material was deployed in Spring 2017 and I will review its effectiveness in next year's report.

- **Lookout.** The limitations of the human eye; developing a scan technique; the problems of cockpit obscurations; and the need to spend at least 80% of the time looking out compared to 20% looking in.

- **Communicate.** The need to listen carefully to other pilots and controllers; RT discipline and the use of correct phraseology; and the need to clearly articulate intentions.

- **Electronic Conspicuity.** The requirement to use a transponder when fitted; the value of collision warning systems, but also the need to avoid false expectations of their performance; and awareness of TCAS envelopes when flying near other aircraft.

- **Insight.** The need to understand UK FIS and select an appropriate ATS for an activity; awareness of NOTAMs; the need to understand and follow airfield procedures (especially joining and integrating); and the need to understand other aviators, what they are trying to achieve, and what their aircraft are capable of or limited to.

- **Prioritising Tasks.** The need to maintain lookout even when distracted by emergencies or other flying tasks; focusing on the visual circuit when in or around airfields; and the old Aviate-Navigate-Communicate mantra for ensuring proper prioritisation of capacity.

- **Defensive Flying.** Thinking ahead; assuming that everyone is 'out to kill you'; not pressing on when things change from the plan; flying with courtesy for others; and avoiding glider sites and parachuting sites by as much separation as possible.

COMMERCIAL AIR TRANSPORT

As previously mentioned in this report, 2016 saw the sharp rise in drone/SUAS Airprox continue, with most of these being recorded against CAT aircraft. On the face of it, CAT Airprox numbers therefore rose significantly but, in order to compare like with like, I have separated out the drone/SUAS incidents so that year-on-year comparisons with historic data can be made. That being said, drone/SUAS Airprox are still incidents in their own right, and should not be discounted merely because the risk from collision is as yet unquantified.

CAT Airprox by Airspace

Figure 26 shows the breakdown of all CAT Airprox by airspace type. Of the 83 Airprox involving CAT: 47 occurred in Class A, (15 in 2015); 27 in Class C/D, (27 in 2015); and 9 in Class G (7 in 2015). The large increase in Class A incidents in 2016 is predominantly down to drone/SUAS events (there were 63 CAT Airprox involving drones/SUAS in 2016, of which 38 were in Class A).

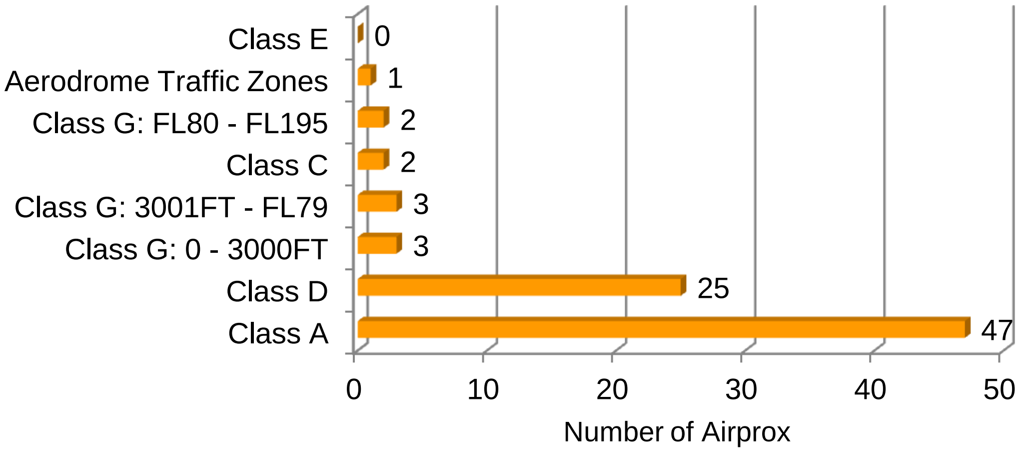


Figure 26. 2016 CAT Airprox by Airspace Involvement

CAT Risk Distribution

Table 10 and Figures 27 & 28 show the 10-year CAT Airprox totals and associated risk distributions. Discounting the drone/SUAS data, the underlying aircraft-to-aircraft CAT Airprox trend shows a steady decline since 2012, stabilising at about 20 Airprox per year in 2015 and 2016 (Figure 27). The number of risk-bearing aircraft-to-aircraft incidents also declined in 2016 to only a single incident. The picture is very much different if drone/object Airprox are included in the statistics where increasing trends are evident in both overall numbers of incidents and the proportion that are risk-bearing (Figure 28). The drone/SUAS risk-bearing trend is 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, the CAT Airprox classified as risk-bearing in 2016 was **Airprox 2016030 – Category B: RJ85 vs RJ1H at London City Airport.** Details can be found in the 2016 Airprox catalogue at the end of this report, and on the UKAB website at www.airproxboard.org.uk.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CAT Risk A	0	0	0	0	0	1	1	1(2)	0(9)	0(29)
CAT Risk B	5	2	1	0	1	0	3	3(4)	3(13)	1(20)
CAT Risk C	61	58	33	32	17	23	14	14(15)	11(13)	11(24)
CAT Risk D	0	1	1	2	0	4	3	1(2)	1(7)	1(3)
CAT Risk E	0	0	0	0	3	7	12	8(8)	6(7)	7(7)
CAT Total	**66**	**61**	**35**	**34**	**21**	**35**	**33**	**27(31)**	**21(49)**	**20(83)**

Table 10. 10-year CAT Airprox Statistics by Risk Classification (figures in brackets include drone/SUAS Airprox)

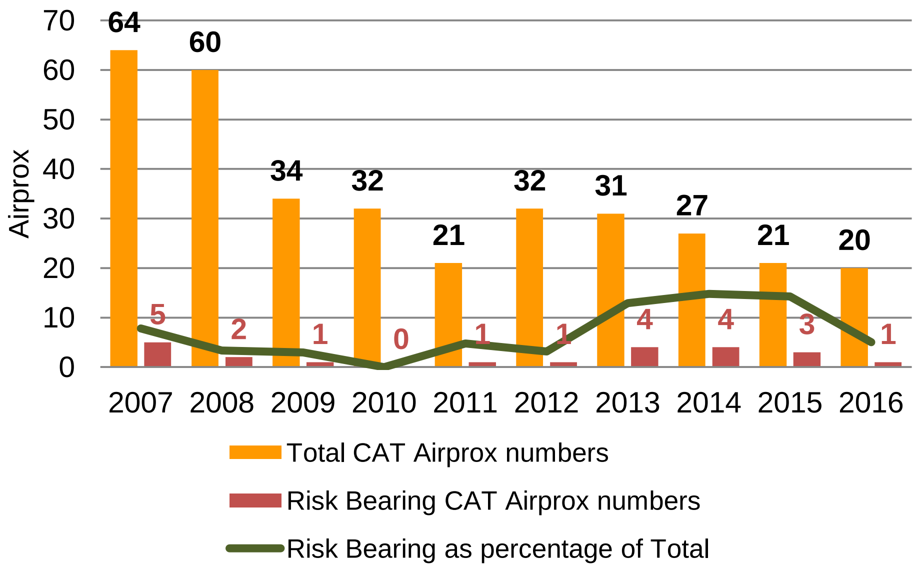


Figure 27. 2016 CAT Airprox Risk Bearing Distribution (no drones/SUAS)

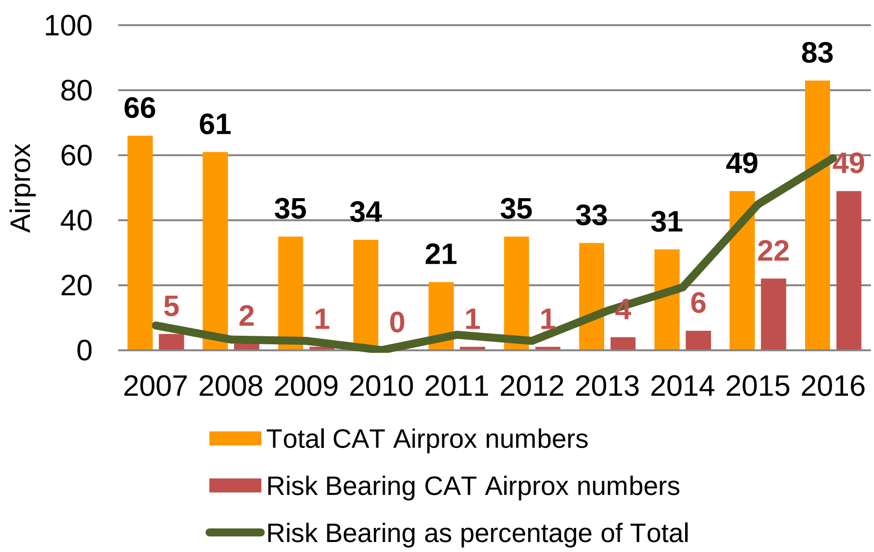


Figure 28. Overall 2016 CAT Airprox Risk Bearing Distribution (including drones/SUAS)

CAT Airprox Rates

Table 11, along with Figures 29-32, further illustrate the CAT Airprox risk distributions and rates normalised for hours flown (both with, and without, drone/SUAS incidents) over the last 10 years. The underlying aircraft-to-aircraft trend shows a steadily reducing overall rate of CAT Airprox per million flying hours (mfh) in the last few years. If drone/SUAS incidents are included 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.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total CAT Airprox	64	60	34	32	21	32	31	27(31)	21(49)	20(83)
Risk Bearing CAT Airprox	5	2	1	0	1	1	4	4(6)	3(22)	1(49)
CAT Hours x 10K	162.0	163.5	149.4	141.6	147.1	145.4	149.0	151.5	154.8	161.5
Total per Million hrs	40	37	23	23	14	22	21	18(20)	14(32)	12(51)
Risk Bearing per Million hrs	3	1	1	0	1	1	3	3(4)	2(14)	1(30)

Table 11. 10-year CAT Airprox Statistics versus CAT hours flown (figures in brackets include drone/SUAS Airprox)

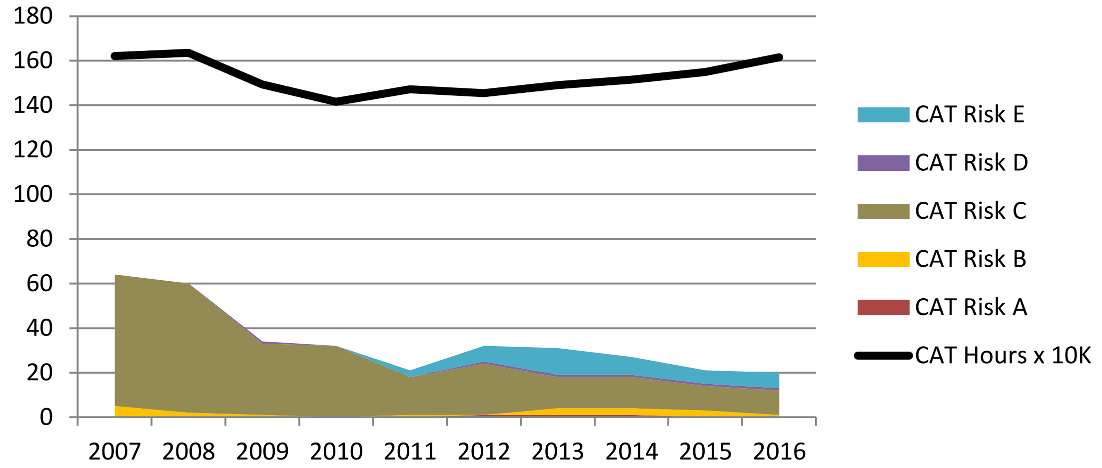


Figure 29. 10-year CAT Airprox Risk Distribution vs CAT hrs (without drones/SUAS)

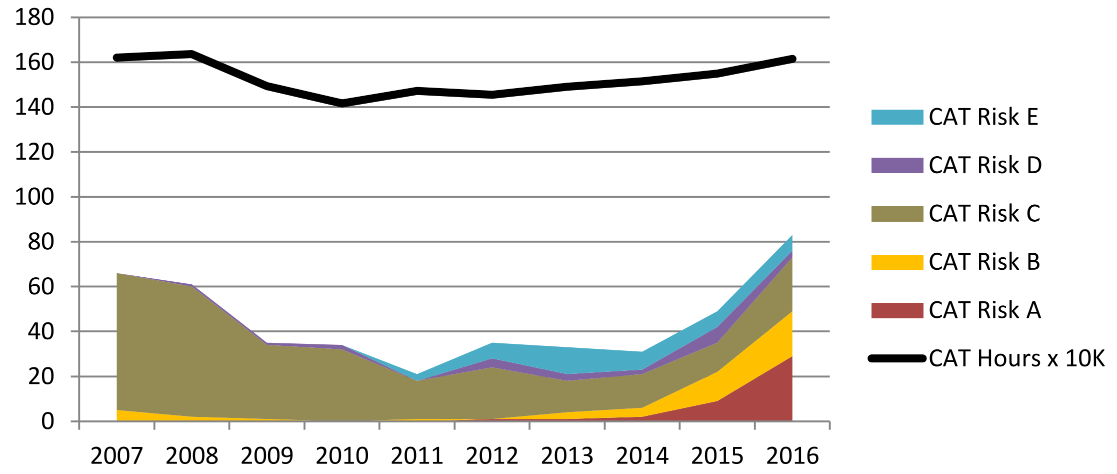


Figure 30. 10-year CAT Airprox Risk Distribution vs CAT hrs (including drones/SUAS)

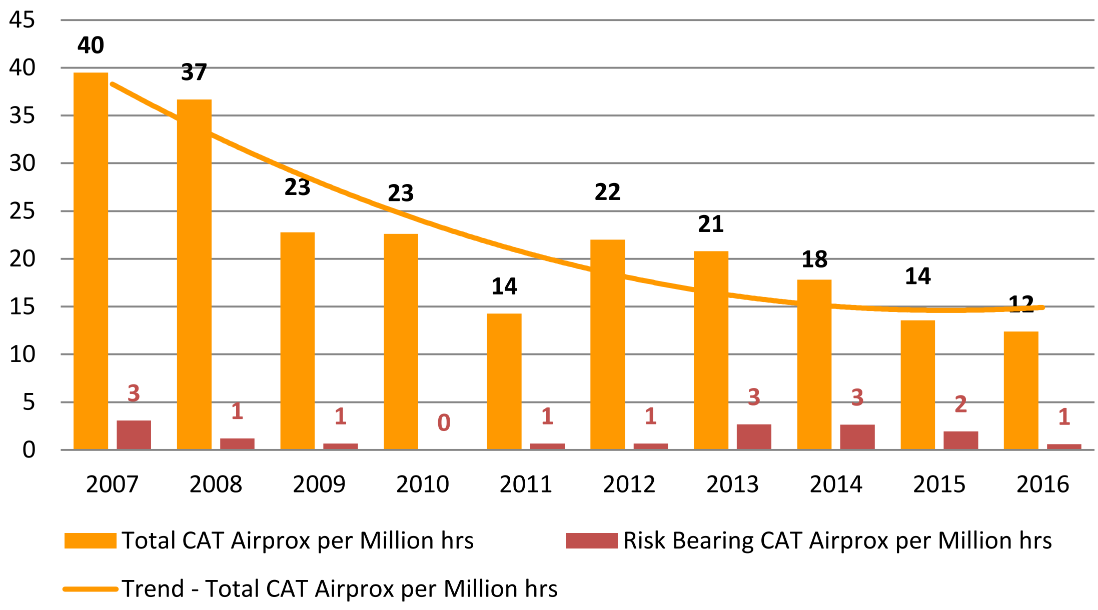


Figure 31. 10-year CAT Airprox Rates per Million Flying hrs (without drones/SUAS)

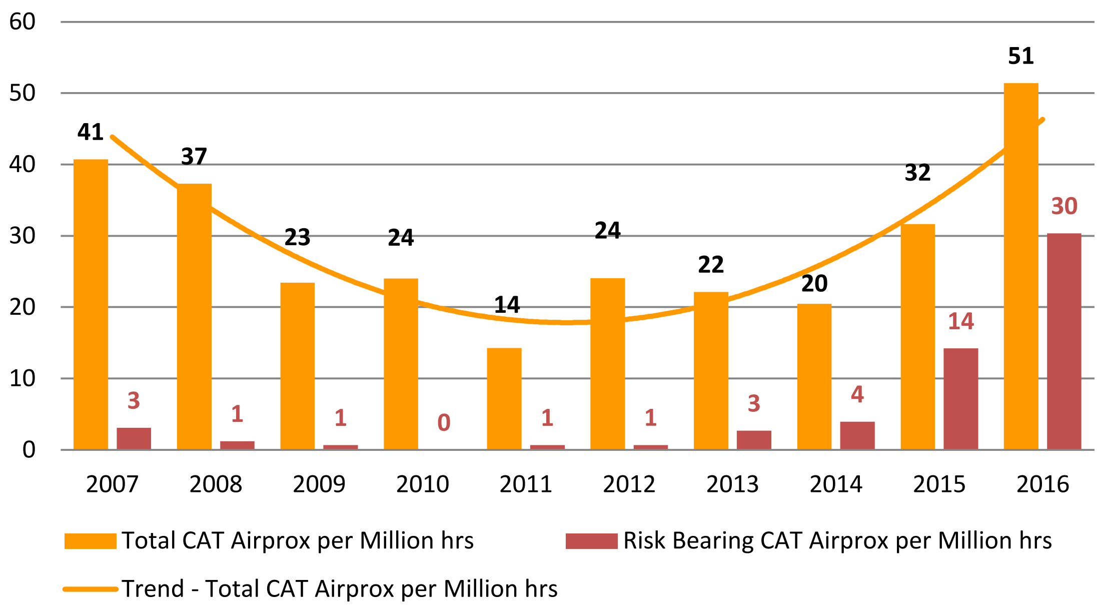


Figure 32. 10-year CAT Airprox Rates per Million Flying hrs (including drones/SUAS)

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 12 and Figure 33 represent the most commonly assigned causes for CAT Airprox in 2016. The ranking remains the same with or without drones/SUAS, the only difference being the totals, as indicated in brackets. Most drone/SUAS Airprox are attributed as 'Flew too close' to acknowledge that they are assigned the overarching cause group 'flew into conflict' to reflect the fact that they are considered to have endangered the other aircraft if they are operated beyond visual line of sight or in controlled airspace. If the drone/SUAS was entitled to fly in the airspace, or in the cases of uncontrolled balloons or unknown objects, the cause is usually attributed as 'conflict in Class A/C/D/E/F/G airspace'.

Rank	Cause	Totals
1	Not obeying ATC / flew too close / poor airmanship / pilot mistake	13(67)
2	Sighting report / TCAS / FIR/UIR conflict	11(16)
3	ATC did not adequately separate traffic, or late / no TI	5(5)
4	Ambiguous / misunderstood ATC instructions or degraded comms	5(5)
5	Mistaken impression of loss of separation	5(5)
6	Other cause / unknown	3(5)
7	High Controller workload / distraction / inadequate supervision	3(3)
8	Lack of / breach of ATC coordination	2(2)
9	Failure to see conflicting traffic / late sighting	1(1)

Table 12. 2016 Top CAT Airprox Causal Factors (totals including drones/SUAS in brackets)

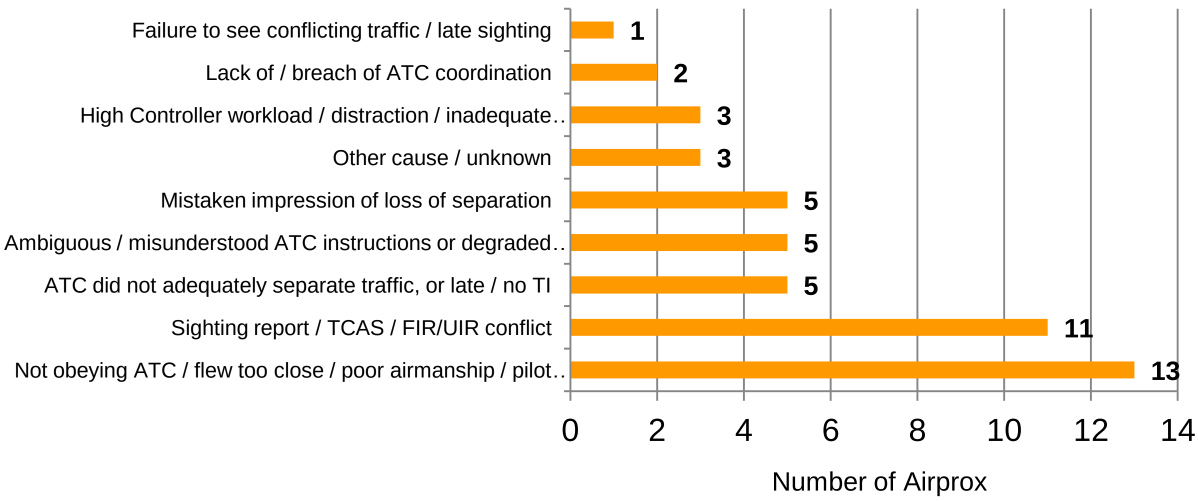


Figure 33. 2016 Top CAT Airprox Causal Factors (without drones/SUAS)

'Not obeying ATC / poor airmanship / pilot mistake' is a catch-all for a number of factors including *inter alia* inadequate avoiding action, late/poor position reporting, penetration of CAS/ATZ without clearance, not obeying ATC instructions, poor airmanship, and inadequate airborne procedures. 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. The number of ‘Sighting Report / TCAS / FIR conflict’ categorizations remained the same as 2015, with many of these being encounters where CAT pilots were either concerned by a TCAS-reported Traffic Alert (TA) on 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 all aviators in recognising that TCAS is mechanised for IFR separation criteria and so alerts and avoidance instructions in mixed IFR/VFR airspace will be generated where VFR pilots are at liberty to fly much closer to IFR traffic. VFR pilots should be aware that CAT crews are mandated to respond to TCAS RAs, and should therefore try to give CAT aircraft as wide a berth as possible to avoid their flight-vector triggering TCAS manoeuvres. Finally, the number of cause attributions for ‘ATC did not adequately separate traffic, or late or no TI’ was half the 2015 value (10 attributions in 2015). This is a welcome reduction.

Drones / Unknown Objects / Model Aircraft / Balloons

Drone/SUAS Airprox have again increased markedly in 2016 as a result of their growing popularity across all sectors of consumer, hobbyist and commercial operator communities. Table 13 and Figure 34 illustrate the figures since 2010, when drone/SUAS incidents first began to be consistently reported.

Year	Drone	Model Aircraft	Balloon	Unknown	Total
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
2016	70	12	5	7	94

Table 13. Airprox involving drones/SUAS since 2010

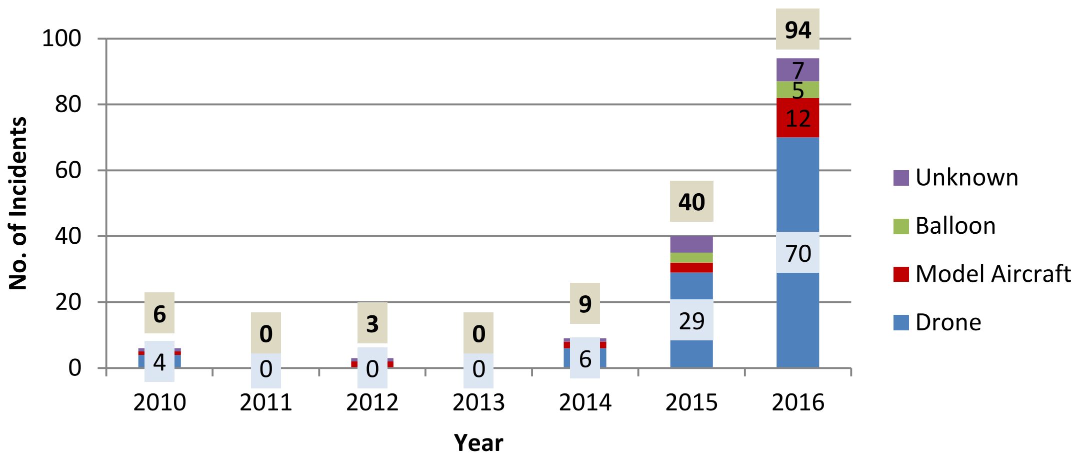


Figure 34. Airprox involving drones/SUAS since 2010

GENERAL AVIATION

GA Airprox by Airspace

There were 147 Airprox in 2016 where at least one aircraft was GA; of these, 16 involved drones/SUAS. Given the relatively low percentage of drone/SUAS incidents I have not separately reported these in detail; the graphs and tables below mostly show only the aircraft-to-aircraft Airprox. The 131 GA aircraft-to-aircraft Airprox represent 77% of the overall 171 aircraft-to-aircraft incidents in 2016, which is about the normal rate (79% in 2015). Although the GA Airprox trend is downwards in recent years since the 2014 high, the absolute numbers still remain significantly higher than before 2014. There are two ways of looking at this, either there is much more that can be done to raise awareness within the GA community to reduce incidents, or that our education efforts in the last few years are bearing fruit through more reporting of incidents that were previously not raised. That 77% of Airprox involve GA, reflects the fact that GA represents the majority of flying activity in Class G see-and-avoid airspace, which is where most incidents occur. As in previous years, of the 2016 incidents the clear majority (about 69%) occur below 3000ft in Class G/Low-Flying Area airspace as shown in Figure 35. However, the second most common airspace for Airprox is within Aerodrome Traffic Zones (13%) which should provide a highly structured and known environment, but still accounts for a significant number of events largely resulting from poor procedures, poor situational awareness or lack of consideration for other airspace users.

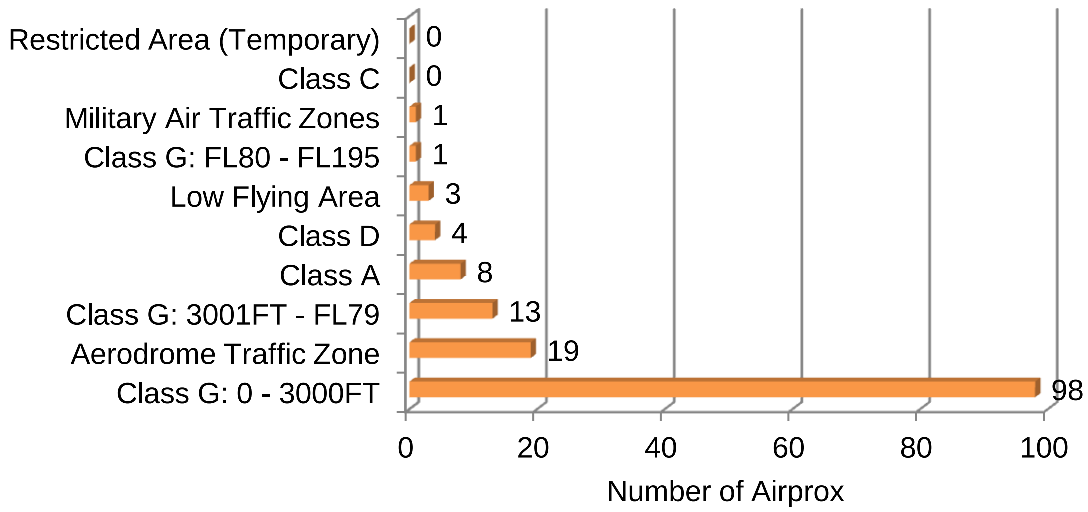


Figure 35. 2016 GA Airprox by Airspace Involvement

GA Risk Distribution

The 2016 GA Airprox risk distribution figures at Table 14 reflect the overall decrease in GA Airprox numbers and an associated welcome decrease in absolute numbers of risk-bearing incidents. Also welcome is the reduction in percentage terms of risk-bearing compared to all GA incidents (in 2016, 35% of GA incidents were risk-bearing compared with 46% in 2015). This indicates that GA incidents were overall less ‘risky’ in 2016. That being said, the percentage risk-bearing figure is now at historically average levels of about 35% over the last 10 years. Figures 36 & 37 illustrate these figures graphically. Without extensive Human Factors information, it is hard to explain these trends other than to speculate about lookout performance/prioritisation; the levels of situational awareness/airmanship; or simply more Airprox reporting as the GA community embraces safety processes.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GA Risk A	8	8	8	5	19	12	18	23	23	16
GA Risk B	30	31	18	24	27	21	33	55	41	30
GA Risk C	63	54	64	70	61	60	53	59	57	64
GA Risk D	0	2	1	1	2	1	2	3	4	6
GA Risk E	0	0	0	0	8	8	17	23	15	15
GA Totals	**101**	**95**	**91**	**100**	**117**	**102**	**123**	**163**	**140**	**131**

Table 14. 10-year GA Airprox Statistics by Risk Classification (without drone/SUAS)

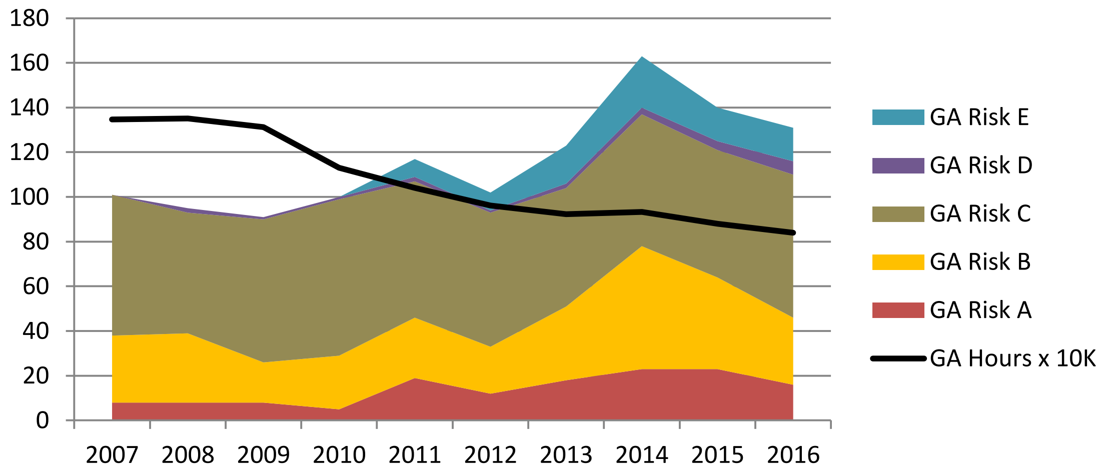


Figure 36. 10-year GA Airprox Risk Distribution and GA hours (without drones/SUAS)

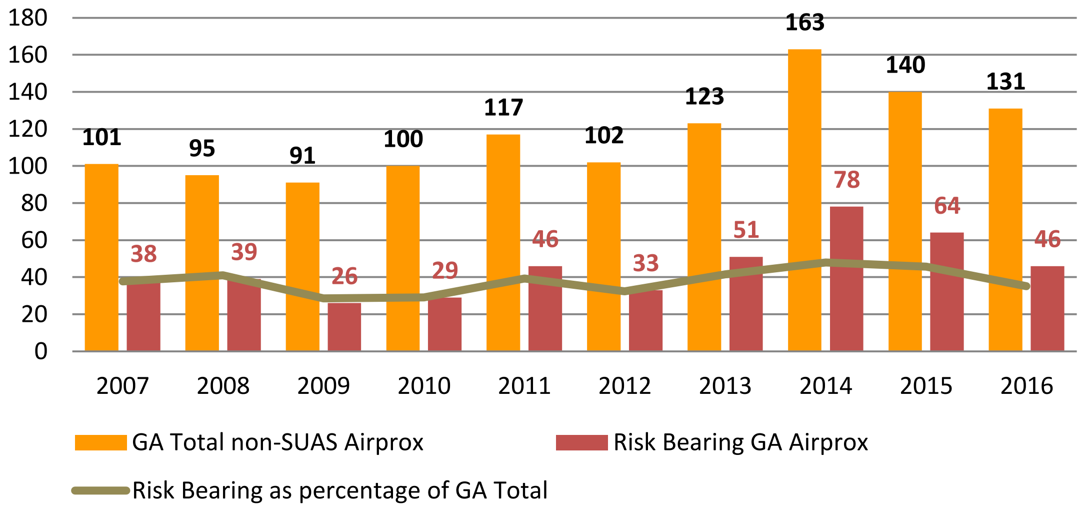


Figure 37. 10-year GA Airprox Risk Bearing Distribution (without drone/SUAS)

GA Airprox Rates

Normalising GA Airprox statistics for hours flown shows that the overall rate per mfh remains similar to 2015 but there is a welcome reduction for the risk-bearing rate per mfh: Table 15 and Figure 38 illustrate these figures and trends. Notwithstanding, both figures are higher than historic norms over the last 10 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 (hang-glider, paraglider, paramotor hours). Notwithstanding, light-aircraft and glider hours have been reported fairly consistently over the years and, given that these represent the majority of Airprox participants, headline rates can be used as an indicative measure.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total non-SUAS Airprox	154	155	147	161	161	158	172	215	177	171
GA non-SUAS Airprox	101	95	91	100	117	102	123	163	140	131
Risk Bearing GA Airprox	38	39	26	29	46	33	51	78	64	46
Risk Bearing as % of GA Total	38	41	29	29	39	32	41	48	46	35
GA Hours x 10K	134.6	135.1	131.2	113.0	104.0	96.2	92.3	93.2	88.0	83.9
GA non-SUAS per Million hrs	75	70	69	89	113	106	133	175	159	156
GA Risk Bearing per Million hrs	28	29	20	26	44	34	55	84	73	55

Table 15. 10-year GA Airprox Statistics versus GA hours flown (without drone/SUAS)

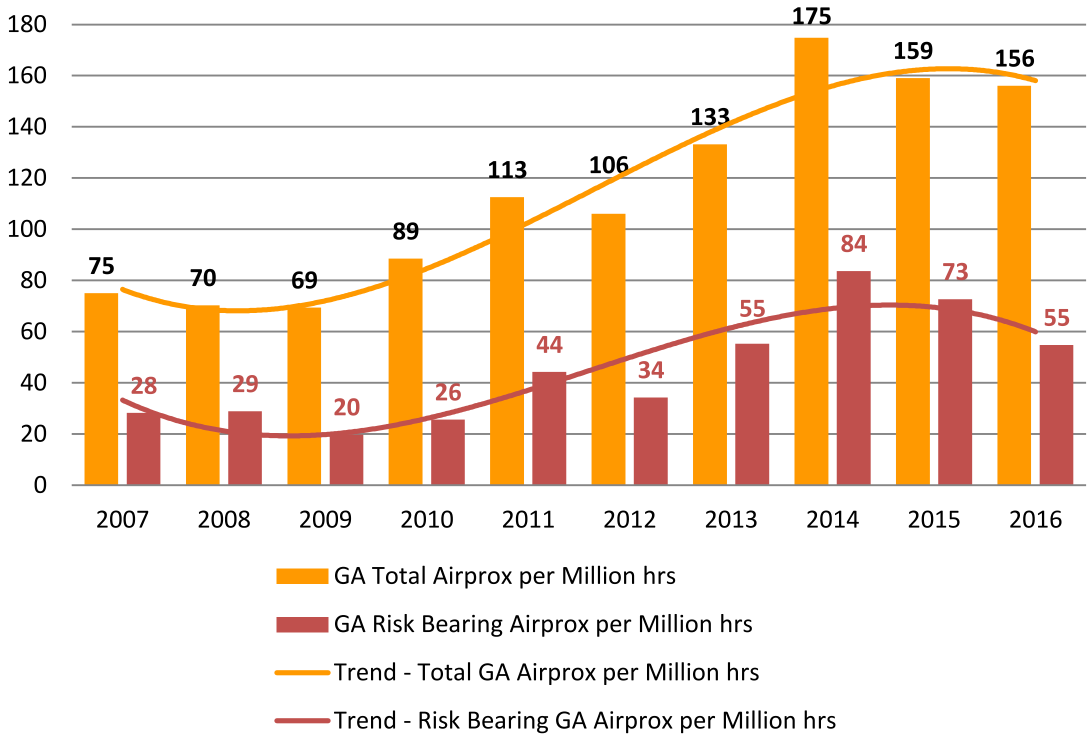


Figure 38. 10-year GA Airprox Rates per Million Flying Hours (without drone/SUAS)

GA Causal Factors

Table 16 and Figure 39 show the top-ten rankings for the 278 formal causal assignments given to GA Airprox incidents in 2016 (an Airprox often has more than one causal factor). As in previous years, by far the most common cause was 'Did not see traffic/late sighting', which featured in 98 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 2015 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 (there were 26 incidents this year compared to 21 in 2015), 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	98
2(2)	Flew too close / failure to separate	36
3(3)	Conflict in FIR	28
4(4)	Did not obey instructions / procedures	26
5(5)	Sighting report / TCAS interaction / mistaken impression of proximity	25
6(6)	Misunderstood ATS / poor coordination / confusion / uncorrected readback	20
7(8)	ATC high workload	12
8(9)	Flew over glider, microlight or paradropping site	10
9(6)	Late, ambiguous or no traffic info	8
9(9)	Poor airmanship / pilot mistake	8

Table 16. 2016 GA Top-10 Airprox Causal Factors (2015 ranking in brackets)

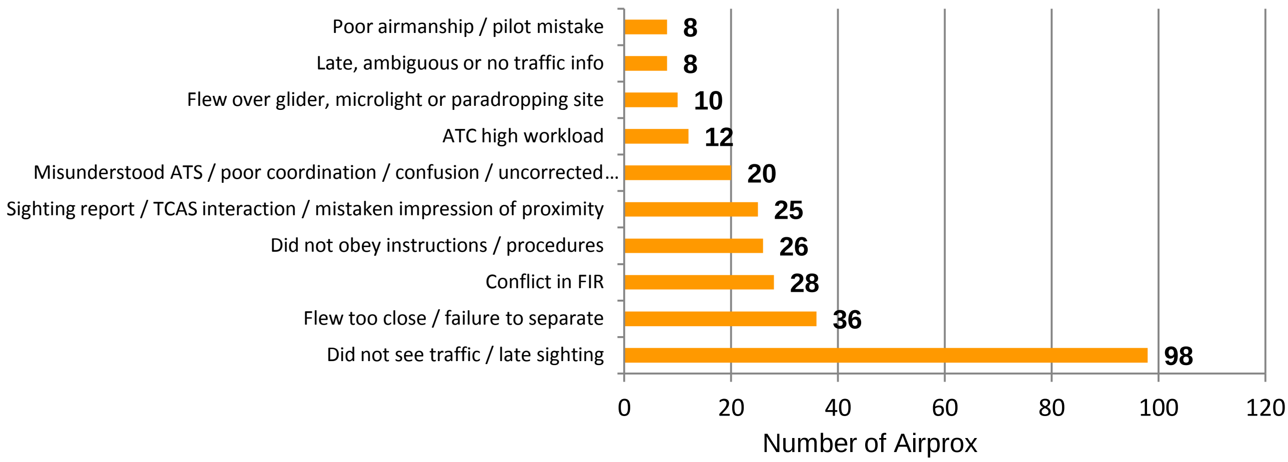


Figure 39. 2016 GA Top-10 Airprox Causal Factors

MILITARY AVIATION

Military Airprox by Airspace

There were 81 Airprox overall involving Mil in 2016; of these, 12 involved drones/SUAS. As for GA, given the relatively low percentage of drone/SUAS incidents I have not separately reported these in detail; the graphs and tables below mostly show only the aircraft-to-aircraft Airprox. The 69 aircraft-to-aircraft Mil Airprox represents 40% of the overall 171 aircraft-to-aircraft incidents in 2016, which is about the normal rate (38% in 2015). In airspace terms, the majority of Mil Airprox again occurred in Class G/Low-Flying Area airspace below 3000ft, where numbers were slightly up on last year (50 incidents in 2016 compared to 41 in 2015). Of these encounters below 3000ft, only 2 were Mil-Mil (compared with 9 in 2015); 38 were Mil-Civ; and the remaining 10 were drone/SUAS incidents (compared with only 3 Mil-drone/SUAS incidents overall in 2015, all below 3000ft). The increase in drone/SUAS incidents in 2016 also accounted for the overall increase in incidents below 3000ft. The figures not only re-emphasise that civil aircraft remain the key MAC risk to military aircraft below 3000ft, but that the success of CADS (and to a lesser extent TCAS in GR4) is evident in reducing Mil-Mil Airprox in this airspace regime. Notwithstanding, compared to 2015, incidents in the block 3000ft-FL80 increased markedly (14 in 2016 compared to only 6 in 2015). Of these, 3 were Mil-Mil; 10 were Mil-Civ and 1 involved a drone/SUAS. One encouraging aspect was that incidents within MATZ reduced from 4 in 2015 to just 1 in 2016; hopefully GA are more aware of MATZ and are talking to ATC. Figure 40 shows the distribution of Mil Airprox in 2015 by airspace type.

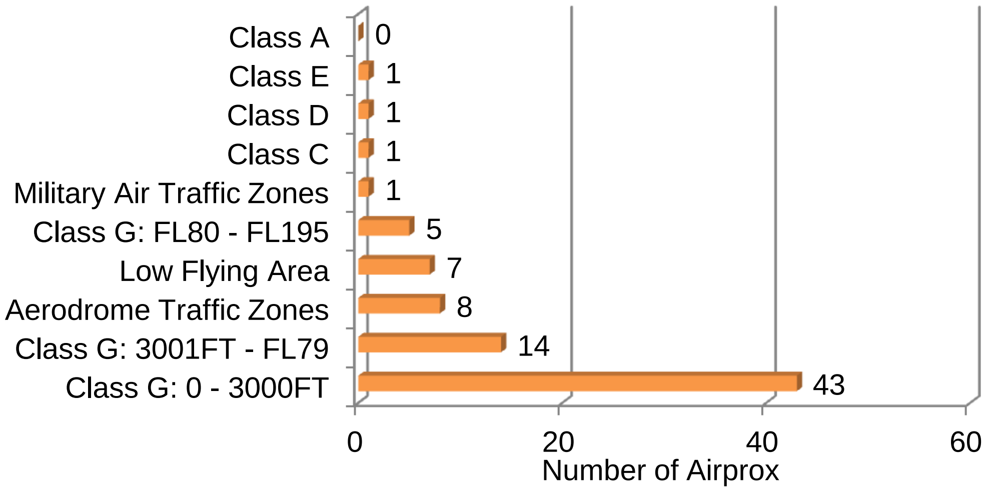


Figure 40. 2016 Military Airprox by Airspace Involvement

Military Risk Distribution

Table 17, Figure 41 & Figure 42 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[6] saw 21 incidents involving these aircraft in 2014, and 14 in 2015 – this was undoubtedly a factor in the spike of Airprox levels in 2014. Conversely, the Mil gliding fleet was also temporarily suspended from flying in 2013-2014, and are still yet to return to full operations; and SAR duties are now not carried out by military aircraft thereby transferring these Airprox to the new Emergency Services section at the end of this report.

Overall, UK military flying hours appeared to have remained fairly static in recent years, although my confidence in these figures is not high. There is no single source for military hours (the MAA do not have the information) and so the figures are a collation from the Front-Line Commands with varying levels of confidence and granularity about which hours were flown in UK, which were contractor flown, and who logs test & evaluation flying. Nevertheless, there is cause for optimism that the overall number of Mil aircraft-to-aircraft Airprox remained broadly similar to last year and, acknowledging the increases of 2013 and 2014, the overall trend is reducing since 2010. Equally encouraging is that the absolute number (22) and percentage rate (32%) of risk-bearing Airprox has returned to historical levels from the highs of recent years.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Mil Risk A	2	7	8	7	9	8	8	7	9	5
Mil Risk B	15	15	22	18	21	13	20	24	20	17
Mil Risk C	35	34	38	70	45	43	38	41	27	33
Mil Risk D	0	0	1	3	1	0	4	6	2	2
Mil Risk E	0	0	0	0	8	7	12	17	9	12
Non-SUAS Totals	**52**	**56**	**69**	**98**	**84**	**71**	**82**	**95**	**67**	**69**

Table 17. 10-year Military Airprox Statistics by Risk Classification (without drone/SUAS)

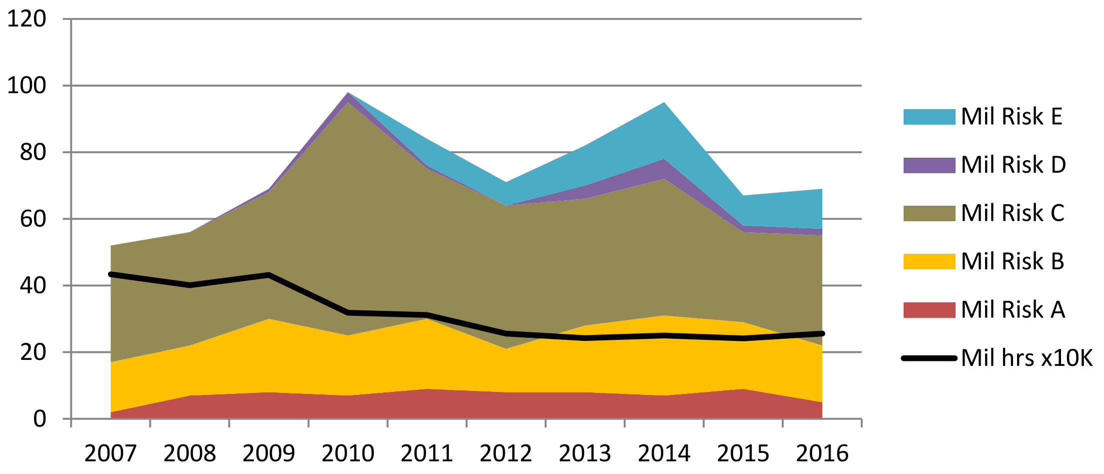


Figure 41. 10-year Military Airprox Risk Distribution and Military hours

[6] 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.

(without drone/SUAS)

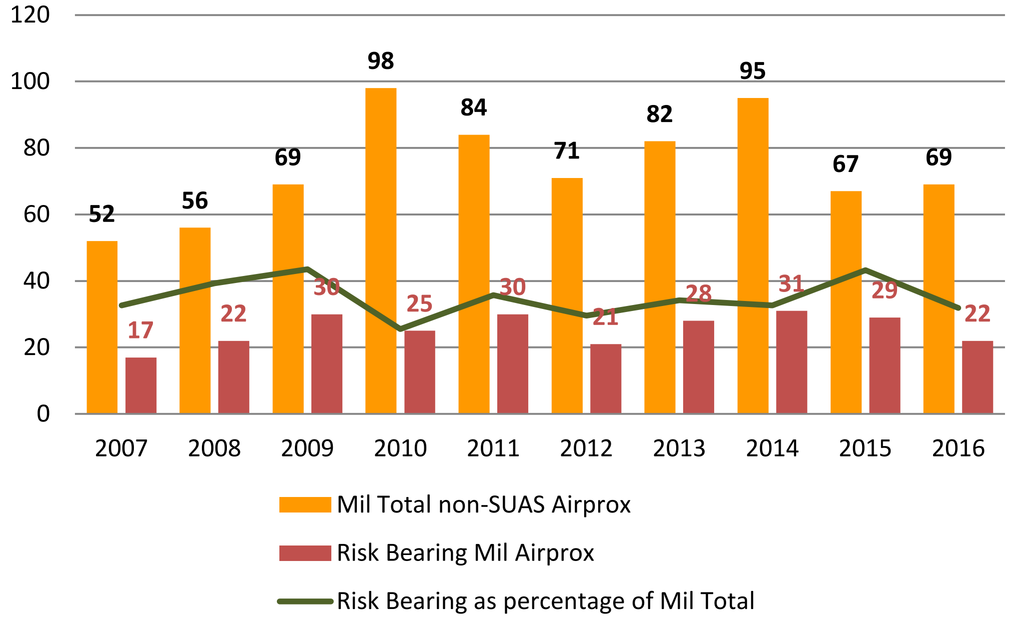


Figure 42. 10-year Military Airprox Risk Bearing Distribution (without drone/SUAS)

Military Airprox Rates

Table 18 and Figure 43 show the normalised military Airprox rate per mfh. With hours flown being largely the same in recent years, the reduced number of overall military Airprox in 2016 therefore translates into a reduced overall rate per mfh that has now returned to pre-2103 levels compared to the record-high 2014 figure. Overall, in 2016, there were 270 Airprox per mfh, slightly down from 277 in 2015, and below the annual average of about 300 per mfh since 2010. Similarly, the 2016 risk-bearing rate per mfh also showed a decrease to 86 per mfh (from 120 in 2015), also below the annual average of about 100 per mfh since 2010.

Although these reduced rates per mfh are cause for celebration in isolation, compared to GA the military experienced over 1½ times the GA rates per mfh in 2016 (GA: 156/mfh overall and 55/mfh risk-bearing; Mil: 270/mfh overall and 86/mfh risk-bearing). Superficially, it might be tempting to conclude that, hour for hour, military flying is therefore almost 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.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total non-SUAS Airprox	154	155	147	161	161	158	172	215	177	171
Total Mil non-SUAS Airprox	52	56	69	98	84	71	82	95	67	69
Risk Bearing Mil Airprox	17	22	30	25	30	21	28	31	29	22
Risk Bearing as % of Mil Total	33	39	43	26	36	30	34	33	43	32
Mil hrs x 10K	43.4	40.1	43.2	31.8	31.1	25.6	24.2	25.0	24.2	25.6
Total Mil per Million hrs	120	140	160	308	270	278	339	380	277	270
Risk Bearing Mil per Million hrs	39	55	69	78	96	82	116	124	120	86

Table 18. 10-year Military Airprox Statistics versus Military hours flown (without drone/SUAS)

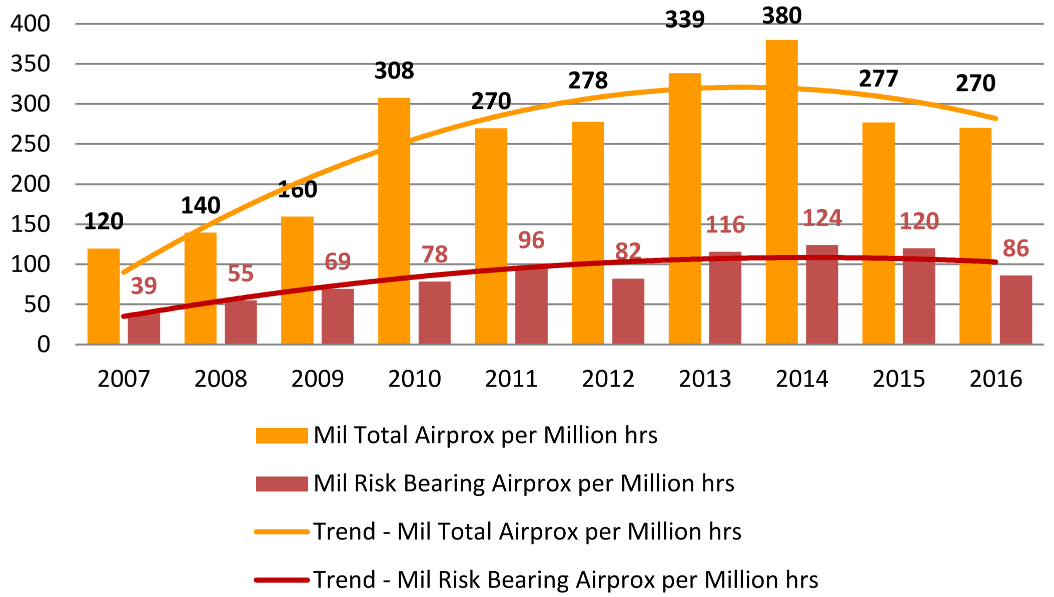


Figure 43. 10-year Military Airprox Rates per Million Flying Hours (without drone/SUAS)

A welcome initiative in 2014 was the introduction of a VHF low-level common frequency in Scotland.[7] There have been some anecdotal reports of its benefit, and a number of comments have been made to me during my visits to Regional Airspace User Working Groups (RAUWG) in England and Wales where GA pilots commented that they wished the frequency was available for use outside Scotland because they could have communicated with military aircraft to prevent a reported incident. As shown in Figure 44, historically, most Mil-GA low-level (below 3000ft) Airprox over the last 10 years have occurred in England and Wales, and so it may be that we have yet to see the full potential benefits of this scheme realised; its extension to cover the whole of the UK is wholeheartedly supported by the Airprox Board.

[7] Previously, military aircraft used only 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 is 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.

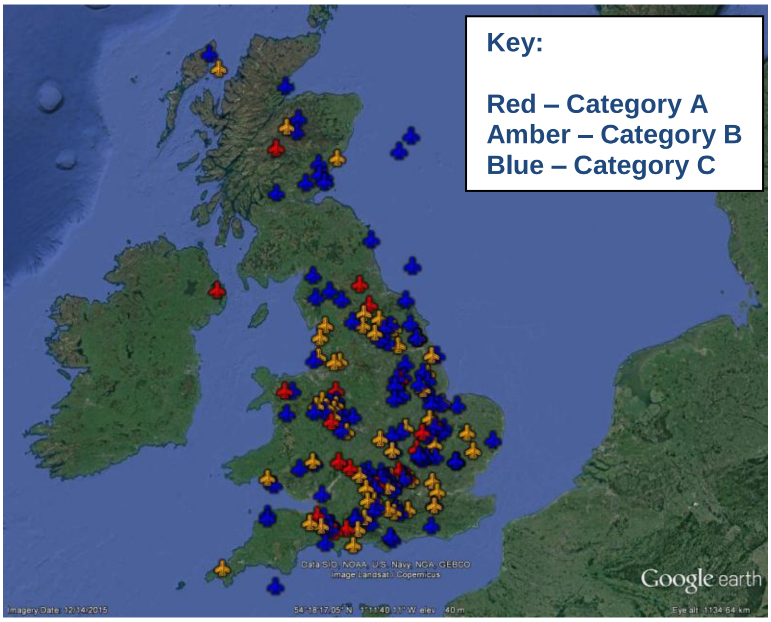


Figure 44. Mil-GA Airprox Distribution at or below 3000ft (2010 to 2016)

Military Causal Factors

143 cause factors were collectively assigned to Mil Airprox in 2016 (individual Airprox often have more than one causal factor). Table 19 and Figure 45 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.

The 2nd most frequent cause was 'Conflict in FIR' which describes situations where one, or both of the pilots probably 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. This cause group increased from 10 incidents in 2015 to 32 in 2016; the reasons for this marked increase are unclear, although it is interesting that most of these cause assignments (23) occurred below 3000ft where, in the low-level environment, terrain screening is a factor.

The 3rd most frequent cause, 'Flew too close/failure to separate', describes incidents involving 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. Encouragingly, these incidents reduced from 28 in 2015 to 15 in 2016; although this reduction may also be linked to the increase in 'Conflict in FIR' incidents described above (the 2 cause groups being sometimes interchangeable depending on how a pilot describes an incident).

Rank	Cause	Totals:
1(1)	Did not see traffic / late sighting / poor lookout	45
2(3)	Conflict in FIR	32
3(2)	Flew too close / failure to separate	15
4(3)	Late, ambiguous or no traffic info	11
4(6)	Sighting report / TCAS interaction / mistaken perception of separation	11
6(3)	Did not adhere to procedures / follow instructions	9
7(7)	Misunderstood ATS / poor coordination / confusion	8
8(8)	Distraction / high workload / kit interpretation or operation error	2
9(9)	Poor airmanship	1
10	Poor U/T supervision or pilot error	1

Table 19. 2016 Military Top-10 Airprox Causal Factors (2015 ranking in brackets)

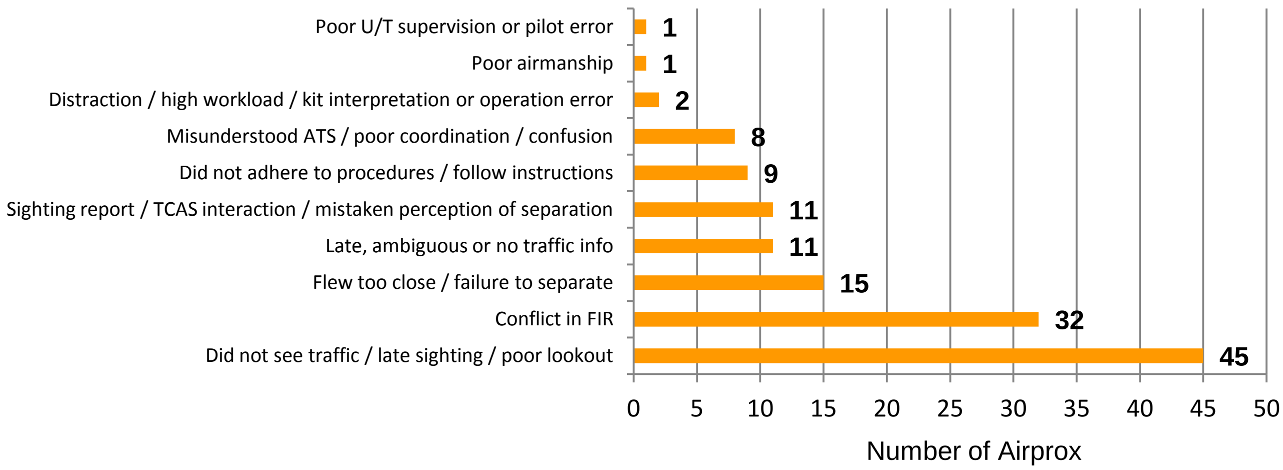


Figure 45. 2016 Military Top-10 Airprox Causal Factors

Finally, 2015 saw the phased introduction of TCAS to the Tornado fleet. Although reducing numbers of Tornado aircraft overall will also be a factor, of interest, Figure 46 shows Tornado Airprox distribution since 2010, with a sharp reduction in 2016 that probably reflects also the efficacy of TCAS.

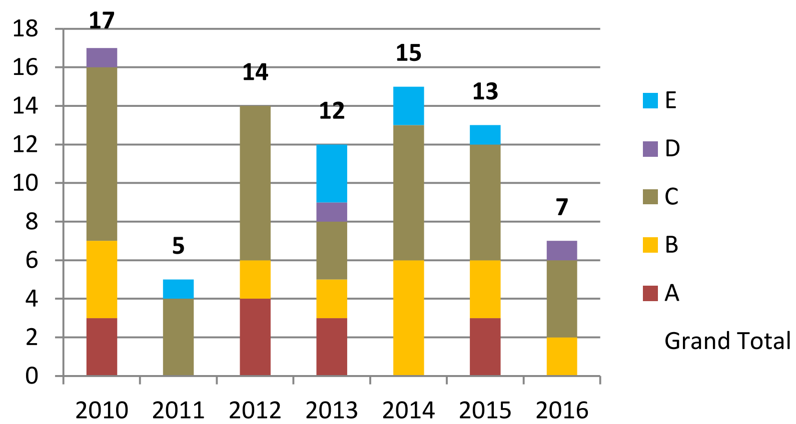


Figure 46. Tornado Airprox Distribution since 2010

EMERGENCY SERVICES

Emergency Services Airprox by Airspace

This is the first year that I have reported separately on Emergency Services Airprox rather than they being included in the GA figures. With the increasing numbers of police, ambulance and now coastguard SAR aircraft, (the latter previously contained within the military figures), the sector warrants its own analysis, although I have yet to identify a reliable source of hours data for all elements and so I have no statistics for Airprox per mfh as yet.

There were 10 overall Airprox involving Emergency Services aircraft in 2016; one involved drones/SUAS. These 10 Airprox represent 4% of overall incidents in 2016, which is consistent with previous year's data collected retrospectively (2015: 11 (5%); 2014: 14 (6%); 2013: 6 (3%); 2012: 8 (5%); 2011: 10(6%)). In airspace terms, and reflecting the nature of their tasking, the majority of Emerg Servs Airprox occurred in Class G/Low-Flying Area airspace below 3000ft as shown at Figure 47. The 2 incidents within Air Traffic Zones involved HEMS helicopters that were not directly related to emergency tasks but were simple miscommunications between ATC and the aircraft conducting routine flying operations.

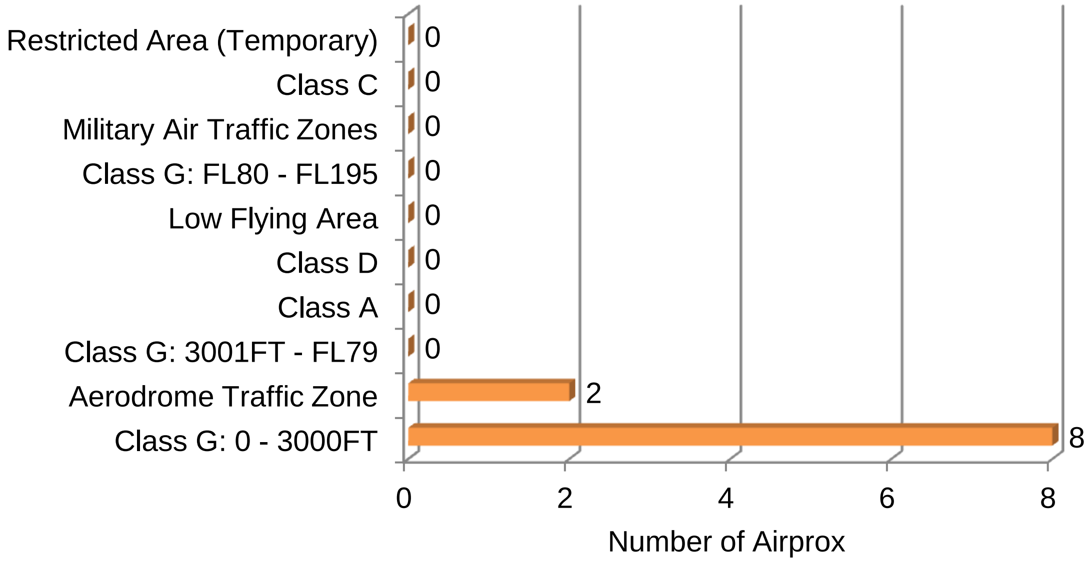


Figure 47. 2016 Emerg Servs Airprox by Airspace Involvement

Emergency Services Risk Distribution

Table 20 and Figures 48 & 49, illustrate the Emerg Servs Airprox statistics and risk distribution for the last 10 years. Although a little spiky due to the small numbers involved, a clearly increasing trend of overall Airprox and risk-bearing Airprox can be seen over the last 10 years. On average, about 30% of Emerg Servs Airprox have been risk-bearing over the last few years, similar to the headline military rate.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Emerg Servs Risk A	0	0	0	0	1	2	1	1	1	2
Emerg Servs Risk B	1	1	1	2	2	0	2	4	1	1
Emerg Servs Risk C	0	4	4	2	5	4	1	6	9	4
Emerg Servs Risk D	0	1	0	0	0	0	0	0	0	0
Emerg Servs Risk E	0	0	0	0	2	2	2	3	0	3
Emerg Servs Total	**1**	**6**	**5**	**4**	**10**	**8**	**6**	**14**	**11**	**10**

Table 20. 10-year Emerg Servs Statistics by Risk Classification

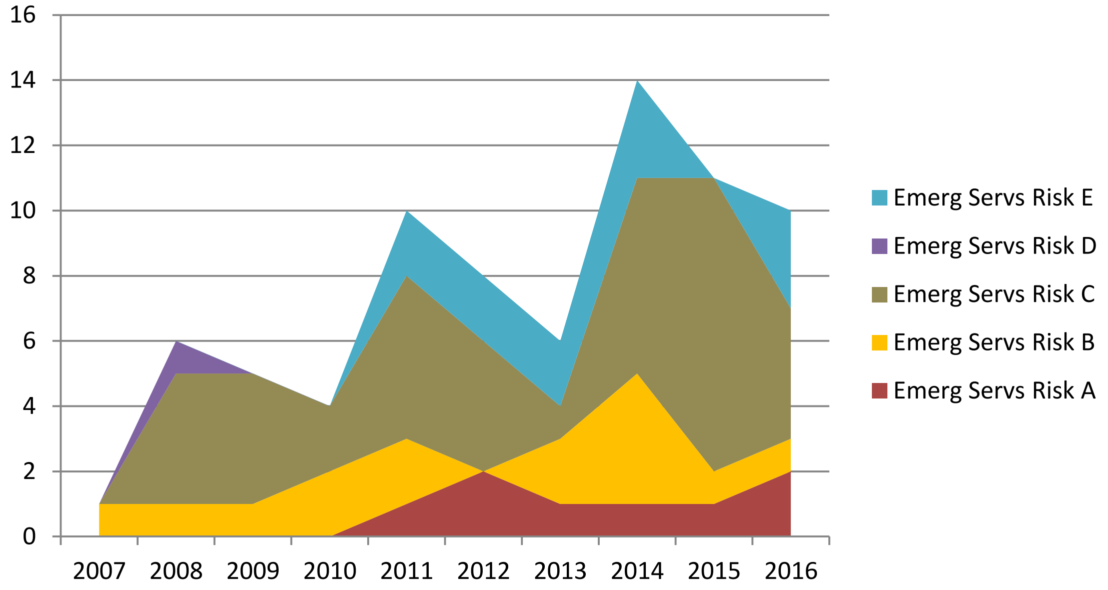


Figure 48. 10-year Emerg Servs Airprox Risk Distribution

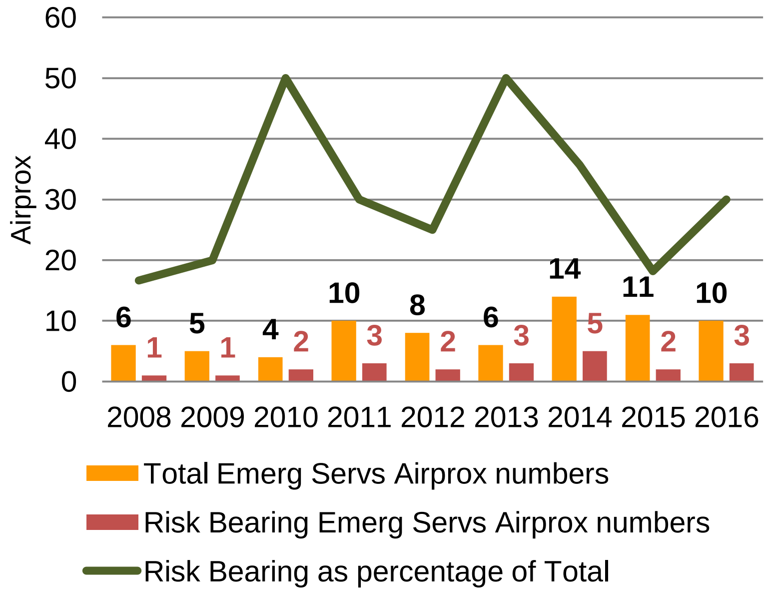


Figure 49. 10-year Emerg Servs Risk Bearing Distribution

Emerg Servs Airprox Rates

Table 21 shows the Emerg Servs Airprox rates over the last 10 years, and Figure 50 illustrates the breakdown by involvement. Although it's too early to come to many conclusions on an annual basis, I suspect that the formation of NPAS as an homogenous police aircraft operating authority (that became fully operational in October 2012), will have positively influenced reporting processes and overall safety culture as they collectively standardised safety management systems from 2011 onwards; this may account for much of the increased police reporting since 2011 as shown in Figure 50. There are no Coastguard Airprox to date due to the Coastguard Agency only recently taking over the role from the military in a phased approach through 2015-2016.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total Emerg Servs Airprox	1	6	5	4	10	8	6	14	11	10
Risk Bearing Emerg Servs Airprox	1	1	1	2	3	2	3	5	2	3
Risk Bearing as % of Total	100	17	20	50	30	25	50	36	18	30
Police	1	4	2	1	5	6	6	6	5	4
Ambulance	0	2	3	3	5	2	0	8	6	6
Coastguard	0	0	0	0	0	0	0	0	0	0

Table 21. 10-year Emerg Servs Airprox Rates

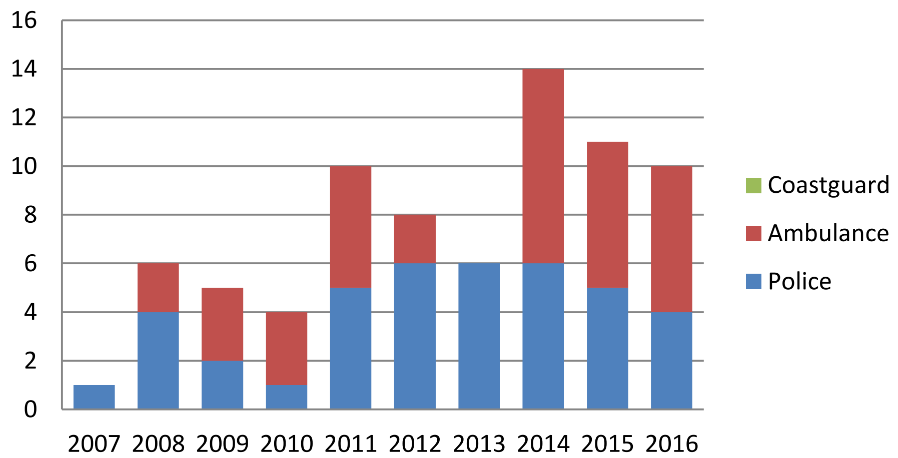


Figure 50. Emerg Servs Airprox by Involvement over the last 10 years

Emerg Servs Causal Factors

16 cause factors were collectively assigned to Emerg Servs Airprox in 2016 (individual Airprox can have more than one causal factor). Although few in number, and care therefore needs to be taken in drawing conclusions, Table 22 and Figure 51 show the causes assigned in rank order. Similar to GA and Mil, and again unsurprising in their primary operating environment of see-and-avoid Class G / Low-level airspace, 'Did not see traffic/late sighting/poor lookout' was the most frequent cause. The 2nd most frequent cause 'Flew too close/failure to separate', describes incidents involving inadequate avoiding action by pilots, or controllers failing to separate aircraft. In the Emerg Servs circumstances this cause often resulted from other pilots not giving Emerg Servs aircraft a wide-enough berth when they were carrying out their tasks. This is a theme that I

regularly offer during presentations at RAUWGs; a hovering helicopter is highly likely to be conducting an emergency task, and therefore unpredictable, so avoid by a wide margin.

Rank	Cause	Totals
1	Did not see traffic / late sighting	5
2	Not obeying ATC / flew too close / poor airmanship / pilot mistake	3
3	ATC did not adequately separate traffic, or late / no TI	2
4	Mistaken impression of loss of separation	2
5	Sighting report / TCAS / FIR/UIR conflict	1
6	Ambiguous / misunderstood ATC instructions or degraded comms	1
7	Other cause / unknown	1
8	Lack of / breach of ATC coordination	1

Table 22. 2016 Emerg Servs Airprox Causal Factors

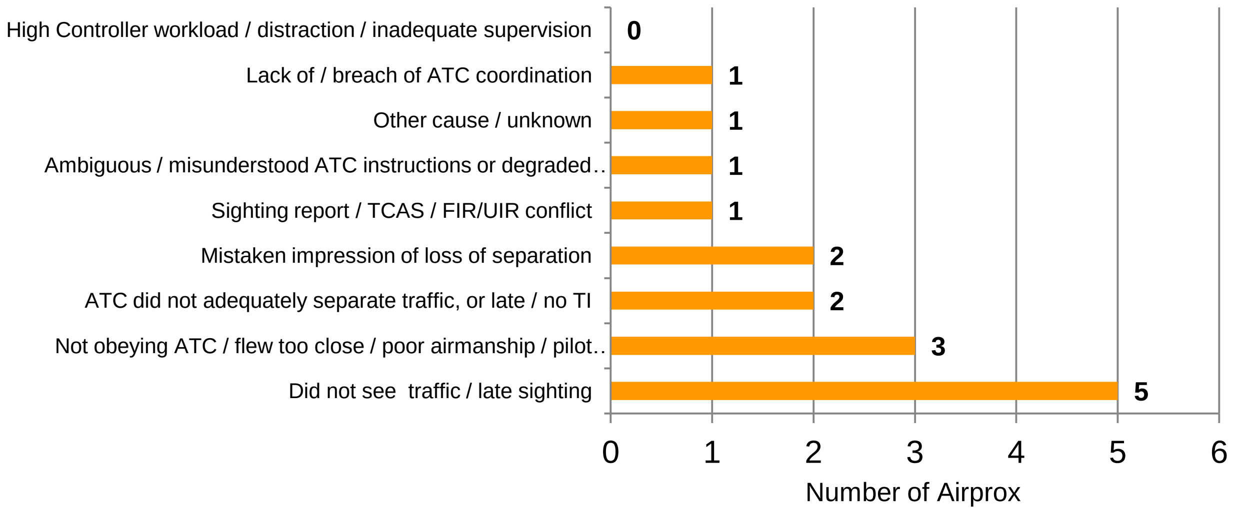


Figure 51. 2016 Emerg Servs Airprox Causal Factors

UKAB 2016 SAFETY RECOMMENDATIONS

Accepted Recommendations

Airprox	Recommendation	Comments
2016010	HQ Air Command review the provision of an appropriate Air Traffic Service within the Cranwell training areas.	Commandant of No 3 Flying Training School (3FTS) mandated that King Air crews operate under a Traffic Service for all training activity in Class G airspace.
2016025	HQ Air Command review coordination of military activity in the Lincolnshire AIAA.	A review was conducted and a number of recommendations made including: a reduction in the vertical limit of the AIAA to FL100, an extension of the lateral limits to include the Wittering area, division of the area into quadrants; new measures for using QNH, consideration of extending the use of CADS to include the AIAA.
2016032	HQ USAFE review their NOTAM notification procedures.	HQ USAFE made adjustments to their Low Fly awareness in CADS and undertook to continue to monitor the safety of their procedures to ensure they minimize these kinds of occurrences in the future.
2016068	Leicester review their circuit procedures.	The fixed-wing circuit height was increased to 1200ft QFE.
2016083	The Extra pilot uses the standard phraseology contained in CAP413 for transmitting blind.	The Extra pilot has agreed to use the phraseology outlined in CAP413.
2016124	Farnborough and Odiham review the purpose and effectiveness of their current agreement.	The LOA between Odiham and Farnborough was updated and includes changes to the co-ordination of aircraft in the radar training circuit.
2016186	The BGA provides guidance on NOTAM content sufficient to describe the extent of planned activity.	BGA issued guidance to their competition organisers to ensure that 2 NOTAMS are issued for competitions: an aerodrome NOTAM highlighting the activity at the base airfield; and an area NOTAM highlighting that groups of gliders may be operating up to xx miles from the airfield.
2016212	Dundee ATC include Errol airfield parachuting site details in their AIP entry and on their instrument procedure plates.	Dundee had already noted the lack of any depiction of Errol on their IAP charts following the production of their draft RNAV charts at the end of last year which had Errol indicated. On that basis they requested that their conventional IAP charts were amended to reflect the location of the parachuting site and the revised charts were published in the March AIRAC cycle (03 March 2017). Additionally, they undertook to make specific mention of the Errol drop zone in the notes section of their AIP to reinforce the charts.

Airprox	Recommendation	Comments
2016221	HQ Air Command review the tasking, manning and supervision during Northolt extended hours operations.	The BM Force reviewed the Northolt Approach manning situation at Swanwick and 2Gp's need to place Northolt on extended hours and possibly 24 hour operations. Subsequently, the BM Force HQ directed RAF(U) Swanwick to prioritise Northolt Radar manpower and a controller has already been moved from area control duties into Northolt Radar to alleviate their manning situation.
2016223	HQ JHC undertake a review of the Odiham and Lasham LOA.	A new MOU was issued Jun 17. Additionally a successful liaison day was organised, inviting Lasham pilots to Odiham for briefings and flying.
2016254	Oxford reviews the integration of traffic conducting instrument approaches and traffic in the visual circuit.	A new Supplementary Instruction was issued for controllers, outlining that when the RW01 visual circuit is active, ac undertaking the RW099 procedure must circle to RW01.

Partially Accepted Recommendations

Airprox	Recommendation	Comments
Nil		.

Rejected Recommendations

Airprox	Recommendation	Comments
Nil		

Recommendations Remaining Unresolved

Airprox	Recommendation	Comments
Nil		

AIRPROX CATALOGUE 2016

The table below is an abbreviated form of the full Airprox Index that is available on the UKAB Website at Airprox index from 2000 – 2016. Individual reports can be accessed using the hyperlinks within the table or at the appropriate tab for 2016 on 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
2016001	06/01/2016	A	AGUSTA A109	SKYRANGER
2016002	08/01/2016	C	LEARJET LR31,45,55,60	CHEROKEE / WARRIOR / ARROW
2016003	15/01/2016	E	GROB 115, TUTOR	TUCANO
2016004	16/01/2016	C	METRO	JETRANGER 206
2016005	21/01/2016	C	TORNADO GR, IDS	UAV UNSPECIFIED
2016006	20/01/2016	C	TORNADO GR, IDS	KING AIR 90/100
2016008	24/01/2016	B	EV97 EUROSTAR	EV97 EUROSTAR
2016009	16/01/2016	E	AIRBUS A320, A321	CESSNA 152
2016010	05/01/2016	B	SUPER KING AIR 200/300/350	F15 EAGLE
2016011	23/01/2016	A	BOEING B737	UAV UNSPECIFIED
2016012	04/02/2016	A	EUROCOPTER EC145	DA42 TWIN STAR
2016013	04/02/2016	C	CHINOOK CH47	BULLDOG SC3
2016014	11/02/2016	B	TB20 / TB21 TRINIDAD	PRENTICE
2016015	14/02/2016	A	AIRBUS A320, A321	UAV UNSPECIFIED
2016016	12/02/2016	C	GROB 115, TUTOR	MODEL AIRCRAFT
2016017	16/02/2016	C	EUROCOPTER EC225 (NEW AS332L)	CAP 10
2016018	16/02/2016	C	MERLIN, EH-101	CESSNA 152
2016019	16/02/2016	C	EMB-135,145	UAV UNSPECIFIED
2016020	23/02/2016	C	A319	UAV UNSPECIFIED
2016021	24/02/2016	B	HERCULES C130	EUROFIGHTER TYPHOON
2016022	23/02/2016	B	AIRBUS A320, A321	UAV UNSPECIFIED
2016023	12/02/2016	B	CHEROKEE / WARRIOR / ARROW	CHEROKEE / WARRIOR / ARROW
2016024	28/02/2016	C	SZD51-1 JUNIOR	BONANZA 35 (V-TAIL)
2016025	04/03/2016	B	GROB 115, TUTOR	HAWK
2016026	06/03/2016	A	BOEING B737	UAV UNSPECIFIED
2016027	07/03/2016	C	LYNX WILDCAT AH1 (AW159)	NH90
2016028	05/03/2016	A	BOEING B757	UAV UNSPECIFIED
2016029	03/03/2016	D	CESSNA 120	CESSNA 150
2016030	14/03/2016	B	RJ REGIONAL JET	RJ REGIONAL JET
2016031	13/03/2016	C	AIRBUS A320, A321	UAV UNSPECIFIED
2016032	03/03/2016	B	SIKORSKY S92 HELIBUS	F15 EAGLE
2016033	04/03/2016	B	A319	UAV UNSPECIFIED
2016034	24/02/2016	B	DISCUS GLIDER	AEROPRO EUROFOX
2016035	14/03/2016	E	AIRBUS A320, A321	AGUSTA A109
2016036	07/03/2016	A	ASK21 GLIDER	UNTRACED LIGHT AC
2016037	20/03/2016	B	DHC-8 (DASH 8)	UAV UNSPECIFIED
2016038	17/03/2016	C	UAV UNSPECIFIED	HELICOPTER (TYPE UNKNOWN)
2016040	25/03/2016	E	BOEING B737	CAP 232
2016042	30/03/2016	A	AIRBUS A320, A321	UAV UNSPECIFIED
2016043	22/03/2016	C	RV4, RV6, RV6A, RV8 HOMEBUILT	YAK 50, 52
2016044	01/04/2016	C	BOEING B737	B777
2016045	09/03/2016	A	HAWK	HAWK

Airprox No	Date	Risk Category	Aircraft 1 Type	Aircraft 2 Type
2016046	05/04/2016	B	MODEL AIRCRAFT	EUROPA
2016047	16/02/2016	C	SF25 "MOTORFALKE" A,B,C,E	AGUSTA A109
2016048	10/04/2016	C	CABRI G2	NANCHANG CJ6
2016049	28/03/2016	A	AIRBUS A320, A321	UAV UNSPECIFIED
2016050	13/04/2016	A	AIRBUS A320, A321	UAV UNSPECIFIED
2016051	13/04/2016	C	HAWK	UNTRACED LIGHT AC
2016052	01/04/2016	C	CABRI G2	CHEROKEE / WARRIOR / ARROW
2016053	01/04/2016	C	CHINOOK CH47	PARA-MOTOR/POWERED HANGLIDER
2016054	17/04/2016	B	DR 400/2+2	UAV UNSPECIFIED
2016055	19/04/2016	D	CHEROKEE / WARRIOR / ARROW	IKARUS C42 MICROLIGHT
2016056	19/04/2016	C	HAWK	CESSNA 310
2016057	31/03/2016	B	BOEING B737	UAV UNSPECIFIED
2016058	17/04/2016	E	MTO SPORT GYROPLANE	EC135
2016059	20/04/2016	E	PIPER SENECA	CHEROKEE / WARRIOR / ARROW
2016060	20/04/2016	C	BOEING 787 DREAMLINER	BALLOON - UNKNOWN TYPE
2016061	28/04/2016	C	C-17 GLOBEMASTER III	GLIDER (UNSPECIFIED)
2016062	01/05/2016	A	AIRBUS A320, A321	UAV UNSPECIFIED
2016063	26/04/2016	C	SIKORSKY S92 HELIBUS	UAV UNSPECIFIED
2016064	01/05/2016	B	A319	UAV UNSPECIFIED
2016065	03/05/2016	C	HAWK	GROB 115, TUTOR
2016066	09/04/2016	B	NAVAJO, CHIEFTAIN	MOONEY M20
2016067	03/05/2016	B	AIRBUS A320, A321	UAV UNSPECIFIED
2016068	30/04/2016	C	CABRI G2	CHEROKEE / WARRIOR / ARROW
2016069	30/04/2016	C	CHIPMUNK DHC-1	CAP 232
2016070	05/05/2016	E	SUPER KING AIR 200/300/350	KING AIR 90/100
2016071	25/04/2016	C	A319	A319
2016072	10/05/2016	E	SIKORSKY S92 HELIBUS	HAWK
2016073	08/05/2016	B	A319	UAV UNSPECIFIED
2016074	07/05/2016	A	DISCUS GLIDER	R44 ASTRO (ROBINSON)
2016075	24/04/2016	B	PARAGLIDER - UNSPECIFIED	UAV UNSPECIFIED
2016076	15/05/2016	D	LS8 GLIDER	UNTRACED LIGHT AC
2016077	15/05/2016	C	CHEROKEE / WARRIOR / ARROW	UAV UNSPECIFIED
2016078	03/05/2016	A	BOEING B737	UAV UNSPECIFIED
2016079	15/05/2016	A	SF340, 340A (SAAB)	UAV UNSPECIFIED
2016080	07/05/2016	E	CHEROKEE / WARRIOR / ARROW	CHEROKEE / WARRIOR / ARROW
2016081	15/05/2016	A	PARACHUTIST	CESSNA 152
2016082	22/05/2016	C	CESSNA 152	BEAGLE PUP
2016083	20/05/2016	B	EV97 EUROSTAR	EXTRA 200, 300 SERIES
2016084	22/05/2016	C	DC3	FIREFLY T67M
2016085	02/05/2016	C	CHINOOK CH47	ECUREUIL SA 350
2016086	19/05/2016	C	TUCANO	HELICOPTER (TYPE UNKNOWN)
2016087	22/05/2016	B	CESSNA 152	ROBINSON R22
2016088	23/05/2016	C	DA40,DA40D DIAMOND STAR	GROB 115, TUTOR
2016089	22/05/2016	B	A319	UAV UNSPECIFIED
2016090	24/05/2016	A	CHINOOK CH47	VENTUS GLIDER
2016091	24/05/2016	C	HAWK	GLIDER (UNSPECIFIED)
2016092	29/05/2016	C	M4, M5, M7 LUNAR/SUPER ROCKET	CHEROKEE / WARRIOR / ARROW
2016093	28/05/2016	C	CESSNA 172	EV97 EUROSTAR
2016094	27/05/2016	C	HERCULES C130	GROB 115, TUTOR
2016095	21/05/2016	A	A319	UAV UNSPECIFIED
2016096	02/06/2016	C	GROB 103 GLIDER	DC3
2016097	27/05/2016	D	AIRBUS A320, A321	CAP 232
2016098	06/06/2016	E	CESSNA 404	MICROLIGHT (UNSPECIFIED TYPE)

Airprox No	Date	Risk Category	Aircraft 1 Type	Aircraft 2 Type
2016099	07/06/2016	B	AIRBUS A320, A321	UAV UNSPECIFIED
2016100	05/05/2016	D	PARAGLIDER - UNSPECIFIED	MODEL AIRCRAFT
2016101	09/06/2016	D	AIRBUS A320, A321	UNKNOWN
2016102	10/06/2016	B	YAK 50, 52	CIRRUS SR22/SR20
2016103	11/04/2016	E	SUPER KING AIR 200/300/350	EC135
2016104	17/06/2016	A	A319	UNKNOWN
2016105	18/06/2016	E	AIRBUS A320, A321	CHEROKEE / WARRIOR / ARROW
2016106	18/06/2016	B	CHEROKEE / WARRIOR / ARROW	MODEL AIRCRAFT
2016107	19/06/2016	A	RJ REGIONAL JET	UAV UNSPECIFIED
2016108	19/06/2016	B	SPITFIRE	GROB 115, TUTOR
2016109	15/06/2016	E	BN2T TURBINE ISLANDER	DO82 228-200
2016110	20/06/2016	B	BOEING 787 DREAMLINER	UAV UNSPECIFIED
2016112	22/06/2016	C	KING AIR 90/100	MD520N, MD600N, MD902 EXPLORER
2016113	21/06/2016	B	CHINOOK CH47	MODEL AIRCRAFT
2016114	23/06/2016	B	JABIRU - ALL VARIANTS	UAV UNSPECIFIED
2016115	25/06/2016	B	ASW20 GLIDER	UNTRACED LIGHT AC
2016116	17/04/2016	B	CESSNA 172	SLINGSBY T67A
2016118	27/06/2016	C	CESSNA 150	CHEROKEE / WARRIOR / ARROW
2016119	25/06/2016	A	CITATION 550, 551,560 (II - V)	UAV UNSPECIFIED
2016120	23/06/2016	C	CHEROKEE / WARRIOR / ARROW	PITTS SPECIAL
2016121	18/06/2016	E	GROB 115, TUTOR	CESSNA 120
2016122	28/06/2016	C	KING AIR 90/100	UAV UNSPECIFIED
2016123	28/06/2016	B	AIRBUS A-340	UAV UNSPECIFIED
2016124	30/06/2016	E	CHINOOK CH47	PC-12 EAGLE
2016125	02/07/2016	B	ASK21 GLIDER	CESSNA 152
2016126	04/07/2016	C	CESSNA 182 SKYLANE	COMANCHE
2016127	01/07/2016	C	EXTRA 200, 300 SERIES	CHEROKEE / WARRIOR / ARROW
2016128	23/06/2016	B	"JUMBO" JET B747	UAV UNSPECIFIED
2016129	07/07/2016	C	CHINOOK CH47	STEARMAN
2016130	05/07/2016	C	BOEING B767	AIRBUS 380
2016131	10/07/2016	B	AGUSTA A109	AGUSTA A109
2016132	05/07/2016	B	PEGASE GLIDER	TORNADO GR, IDS
2016133	12/07/2016	A	A319	UAV UNSPECIFIED
2016134	16/07/2016	C	ASK 13 GLIDER	TB20 / TB21 TRINIDAD
2016135	12/07/2016	E	ATR42, -72	F15 EAGLE
2016136	02/04/2016	C	CESSNA 172	AVIAT HUSKY
2016137	17/07/2016	B	A319	UAV UNSPECIFIED
2016138	18/07/2016	B	DA42 TWIN STAR	UAV UNSPECIFIED
2016139	18/07/2016	A	AIRBUS A320, A321	UAV UNSPECIFIED
2016140	18/07/2016	A	PARA-MOTOR/POWERED HANGLIDER	A400M ATLAS
2016141	19/07/2016	E	EUROFIGHTER TYPHOON	UNTRACED LIGHT AC
2016142	16/07/2016	A	AIRBUS A320, A321	UAV UNSPECIFIED
2016143	23/07/2016	B	GLIDER (UNSPECIFIED)	A400M ATLAS
2016144	17/07/2016	C	VENTUS GLIDER	STEARMAN
2016145	22/07/2016	C	MD520N, MD600N, MD902 EXPLORER	PIPER APACHE
2016146	23/07/2016	C	CHEROKEE / WARRIOR / ARROW	MODEL AIRCRAFT
2016147	15/07/2016	C	DHC-8 (DASH 8)	MOONEY M20
2016148	25/07/2016	B	ISLANDER BN-2/BN-29	UNKNOWN
2016149	25/07/2016	D	DISCUS GLIDER	NAVAJO, CHIEFTAIN
2016150	27/07/2016	C	PEGASUS QUANTUM FLEXWING M/LGT	EUROFIGHTER TYPHOON
2016151	26/07/2016	B	AGUSTA 139	SPITFIRE
2016152	26/07/2016	B	TWIN ECUREUIL	UNTRACED LIGHT AC
2016153	25/07/2016	C	TWIN ECUREUIL	TOMAHAWK

Airprox No	Date	Risk Category	Aircraft 1 Type	Aircraft 2 Type
2016154	26/07/2016	C	CHINOOK CH47	MODEL AIRCRAFT
2016155	30/07/2016	C	DOMINIE HS 125	HURRICANE
2016156	28/07/2016	E	B777	B777
2016157	01/08/2016	E	DAUPHIN SA 365	KING AIR 90/100
2016158	20/07/2016	A	EMBRAER 190/195	UAV UNSPECIFIED
2016159	03/08/2016	C	EUROFIGHTER TYPHOON	EC-120 COLIBRI
2016160	22/07/2016	C	BOEING EC135	EV97 EUROSTAR
2016161	04/08/2016	A	AIRBUS A320, A321	UAV UNSPECIFIED
2016163	08/08/2016	C	CHINOOK CH47	UAV UNSPECIFIED
2016164	20/07/2016	A	BOEING B767	UAV UNSPECIFIED
2016165	08/08/2016	C	A400M ATLAS	CESSNA 182 SKYLANE
2016166	20/07/2016	E	EUROFIGHTER TYPHOON	F15 EAGLE
2016167	12/08/2016	C	AIRBUS A320, A321	MODEL AIRCRAFT
2016168	12/08/2016	C	A319	UAV UNSPECIFIED
2016169	06/08/2016	C	LS3A GLIDER	GLIDER (UNSPECIFIED)
2016170	10/08/2016	E	TUCANO	MTO SPORT GYROPLANE
2016171	17/08/2016	B	TORNADO GR, IDS	EUROFIGHTER TYPHOON
2016172	15/08/2016	A	AIRBUS A320, A321	UAV UNSPECIFIED
2016173	16/08/2016	B	CESSNA 182 SKYLANE	CHEROKEE / WARRIOR / ARROW
2016174	18/08/2016	B	BELL 430	TECHNAM P92E, P92G, SEASKY
2016175	17/08/2016	B	BULLDOG SC3	HARVARD
2016176	23/08/2016	A	AIRBUS A320, A321	UNKNOWN
2016177	16/08/2016	C	CITATION 550, 551,560 (II - V)	R44 ASTRO (ROBINSON)
2016178	23/08/2016	C	DAUPHIN SA 365	CHEROKEE / WARRIOR / ARROW
2016179	31/07/2016	B	A400M ATLAS	LIGHT AIRCRAFT CIVIL
2016180	09/08/2016	D	GROB 115, TUTOR	LIGHT AIRCRAFT CIVIL
2016181	24/08/2016	D	TORNADO GR, IDS	GLIDER (UNSPECIFIED)
2016182	26/08/2016	D	ROLLADEN SCHNEIDER LS4 GLIDER	CHEROKEE / WARRIOR / ARROW
2016183	25/08/2016	C	AIRBUS A320, A321	BALLOON - UNKNOWN TYPE
2016184	27/08/2016	C	BN2T TURBINE ISLANDER	CESSNA 303
2016185	26/08/2016	A	EUROCOPTER EC145	UAV UNSPECIFIED
2016186	23/08/2016	C	TORNADO GR, IDS	VENTUS GLIDER
2016187	23/08/2016	E	DHC-8 (DASH 8)	AGUSTA 139
2016188	22/08/2016	E	EMB-135,145	HAWK
2016189	27/08/2016	B	B777	UAV UNSPECIFIED
2016190	18/08/2016	B	AEROPRO EUROFOX	CESSNA 152
2016191	06/08/2016	B	JABIRU - ALL VARIANTS	CHEROKEE / WARRIOR / ARROW
2016192	15/08/2016	B	CHINOOK CH47	UAV UNSPECIFIED
2016193	29/08/2016	C	SUPER CUB	CT SERIES (FLIGHT DESIGN)
2016194	29/08/2016	A	B777	UNKNOWN
2016195	16/06/2016	A	CL-600 CHALLENGER	BALLOON - UNKNOWN TYPE
2016196	01/09/2016	B	FOURNIER RF3,4,5 PWRD GLIDER	CHEROKEE / WARRIOR / ARROW
2016197	07/09/2016	C	DHC-8 (DASH 8)	UAV UNSPECIFIED
2016198	14/08/2016	B	GROB 115, TUTOR	TOMAHAWK
2016199	14/09/2016	C	AIRBUS A320, A321	BOEING 787 DREAMLINER
2016200	14/09/2016	C	HERCULES C130	PARA-MOTOR/POWERED HANGLIDER
2016201	11/09/2016	A	CHEROKEE / WARRIOR / ARROW	CHEROKEE / WARRIOR / ARROW
2016202	15/09/2016	B	GEMINI M65	ECUREUIL SA 350
2016203	17/09/2016	B	CHEROKEE / WARRIOR / ARROW	MODEL AIRCRAFT
2016204	06/09/2016	B	AIRBUS A320, A321	UAV UNSPECIFIED
2016205	07/09/2016	B	TUCANO	MODEL AIRCRAFT
2016206	20/09/2016	E	EMB-135,145	BALLOON - UNKNOWN TYPE
2016207	23/09/2016	B	CESSNA 150	HERCULES C130

Airprox No	Date	Risk Category	Aircraft 1 Type	Aircraft 2 Type
2016208	23/09/2016	C	TORNADO GR, IDS	MD520N, MD600N, MD902 EXPLORER
2016209	23/09/2016	B	AGUSTA A109	LIGHT AIRCRAFT CIVIL
2016210	08/09/2016	A	RV9, RV9A	TWIN COMANCHE
2016211	02/10/2016	C	CESSNA 152	UAV UNSPECIFIED
2016212	02/10/2016	C	DHC-8 (DASH 8)	CESSNA 182 SKYLANE
2016213	01/10/2016	A	BOEING B737	UAV UNSPECIFIED
2016214	10/10/2016	E	PARA-MOTOR/POWERED HANGLIDER	PITTS SPECIAL
2016215	12/10/2016	A	CHEROKEE / WARRIOR / ARROW	BULLDOG SC3
2016216	23/09/2016	C	GROB 115, TUTOR	EUROPA
2016217	07/10/2016	C	A319	UAV UNSPECIFIED
2016218	23/09/2016	C	FOURNIER RF3,4,5 PWRD GLIDER	JETRANGER 206
2016219	10/10/2016	A	CESSNA 172	CESSNA 172
2016220	15/10/2016	C	EUROPA	CESSNA 152
2016221	10/10/2016	C	AIRBUS 380	GULFSTREAM III, IV, V
2016222	17/10/2016	B	CHINOOK CH47	MODEL AIRCRAFT
2016223	19/10/2016	B	CHINOOK CH47	SUPER CUB
2016224	20/09/2016	C	CL-600 CHALLENGER	CIRRUS SR22/SR20
2016225	23/10/2016	E	R44 ASTRO (ROBINSON)	UAV UNSPECIFIED
2016226	21/10/2016	A	DHC-8 (DASH 8)	WEATHER BALLOON
2016227	22/10/2016	A	ROLLADEN SCHNEIDER LS4 GLIDER	CHEROKEE / WARRIOR / ARROW
2016228	29/10/2016	C	VIGILANT MOTOR GLIDER	LIGHT AIRCRAFT CIVIL
2016229	30/10/2016	A	AIRBUS A320, A321	UAV UNSPECIFIED
2016230	20/10/2016	A	IKARUS C42 MICROLIGHT	CZAW SPORTSCRUISER
2016231	26/10/2016	C	MERLIN, EH-101	GROB 115, TUTOR
2016232	04/11/2016	C	CHINOOK CH47	GROB 115, TUTOR
2016233	12/11/2016	C	GIPPSLAND GA8 AIRVAN	HELICOPTER (TYPE UNKNOWN)
2016234	02/11/2016	A	CESSNA 152	CHEROKEE / WARRIOR / ARROW
2016235	14/11/2016	C	GROB 115, TUTOR	R44 ASTRO (ROBINSON)
2016236	13/11/2016	C	EMBRAER 190/195	TBM 700
2016237	14/11/2016	C	SIKORSKY S92 HELIBUS	HAWK
2016238	14/11/2016	B	HAWK	F15 EAGLE
2016239	11/11/2016	B	AIRBUS A320, A321	UAV UNSPECIFIED
2016240	03/11/2016	A	CHINOOK CH47	MODEL AIRCRAFT
2016241	13/11/2016	B	CHEROKEE / WARRIOR / ARROW	CHEROKEE / WARRIOR / ARROW
2016242	18/11/2016	A	AIRBUS A320, A321	UAV UNSPECIFIED
2016243	18/11/2016	C	LET410 TURBOLET	CHEROKEE / WARRIOR / ARROW
2016244	22/11/2016	B	AIRBUS A320, A321	UAV UNSPECIFIED
2016246	20/11/2016	C	AIRBUS A320, A321	UAV UNSPECIFIED
2016247	20/11/2016	C	B777	UAV UNSPECIFIED
2016248	25/11/2016	A	A319	UAV UNSPECIFIED
2016249	28/11/2016	C	CHINOOK CH47	UAV UNSPECIFIED
2016250	29/11/2016	C	CHIPMUNK DHC-1	EUROCOPTER EC145
2016251	29/11/2016	B	HERCULES C130	UAV UNSPECIFIED
2016252	29/11/2016	C	CHINOOK CH47	CHEROKEE / WARRIOR / ARROW
2016253	30/11/2016	C	ASK 13 GLIDER	CESSNA 182 SKYLANE
2016254	05/12/2016	C	DA42 TWIN STAR	CHEROKEE / WARRIOR / ARROW
2016255	02/12/2016	B	GROB 115, TUTOR	PARAGLIDER - UNSPECIFIED
2016256	29/11/2016	B	ALPHA JET	PARTENAVIA P68, VICTOR
2016257	07/12/2016	C	AIRBUS A320, A321	UAV UNSPECIFIED
2016258	11/12/2016	A	R44 ASTRO (ROBINSON)	UAV UNSPECIFIED
2016259	02/11/2016	A	ASK21 GLIDER	CHEROKEE / WARRIOR / ARROW
2016260	08/12/2016	C	SIKORSKY S76	CL-600 CHALLENGER
2016261	03/04/2016	A	GRUMMAN AA5	UAV UNSPECIFIED

Airprox No	Date	Risk Category	Aircraft 1 Type	Aircraft 2 Type
2016262	30/11/2016	C	HAWK	AVIAT HUSKY
2016263	11/12/2016	B	BOEING 787 DREAMLINER	UAV UNSPECIFIED
2016264	04/12/2016	C	EV97 EUROSTAR	UAV UNSPECIFIED
2016265	03/12/2016	C	TB20 / TB21 TRINIDAD	JODEL 1050/51
2016266	18/12/2016	C	DHC-8 (DASH 8)	UAV UNSPECIFIED
2016267	18/12/2016	A	A319	BALLOON - UNKNOWN TYPE
2016268	20/12/2016	E	AGUSTA 139	DA42 TWIN STAR
2016269	18/12/2016	B	PARTENAVIA P68, VICTOR	UNTRACED LIGHT AC
2016270	03/12/2016	B	AIRBUS A320, A321	UAV UNSPECIFIED
2016271	23/12/2016	D	EMBRAER 190/195	UNKNOWN
2016273	29/11/2016	A	MERLIN, EH-101	CABRI G2

GLOSSARY OF DEFINITIONS AND ABBREVIATIONS

Risk Categories

Risk Category	ICAO 4444 PANS-ATM AIRPROX risk classification	Eurocontrol severity classification scheme (ESARR 2)[8]	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.

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

Airprox Barrier Definitions (2016 Version)

Airprox Barrier Assessment Tool							
Barrier	Availability			Functionality			Unassessable / Absent
	Fully (3)	Partially (2)	Not Available (1)	Fully (3)	Partially (2)	Non Functional (1)	
Airspace Design and Procedures	Appropriate airspace design and/or procedures were available	Airspace design and/or procedures were lacking in some respects	Airspace design and/or procedures were not appropriate	Airspace design and procedures functioned as intended	Airspace design and/or procedures did not function as intended in some respects	Airspace design and/or procedures did not function as intended	The Board either did not have sufficient information to assess the barrier or the barrier did not apply; e.g. TCAS not fitted to either aircraft or ATC Service not utilised.
ATM Strategic Management and Planning	ATM were able to man and forward plan to fully anticipate the specific scenario	ATM were only able to man or forward plan on a generic basis	ATM were not realistically able to man for or anticipate the scenario	ATM planning and manning functioned as intended	ATM planning and manning resulted in a reduction in overall capacity (e.g. bandboxed sectors during peak times)	ATM planning and manning were not effective	
ATS Conflict Detection and Resolution[2]	ATS had fully serviceable equipment to provide full capability	ATS had a reduction in serviceable equipment that resulted in a minor loss of capability	ATS had a reduction in serviceable equipment that resulted in a major loss of capability	The controller recognised and dealt with the confliction in a timely and effective manner in accordance with the ATS provided	The controller recognised the conflict but only partially resolved the situation in accordance with the ATS provided	The controller was not aware of the conflict or his actions did not resolve the situation in accordance with the ATS provided	
Ground-Based Safety Nets (STCA)	Appropriate electronic warning systems were available	Electronic warning systems is not optimally configured (e.g. too few/many alerts)	No electronic warning systems were available	Electronic warning systems functioned as intended, including outside alerting parameters, and actions were appropriate	Electronic warning systems functioned as intended but actions were not optimal	Electronic warning systems did not function as intended or information was not acted upon	
Flight Crew Pre-Flight Planning	Appropriate pre-flight operational management and planning facilities were deemed available	Limited or rudimentary pre-flight operational management and planning facilities were deemed available	Pre-flight operational management and planning facilities were not deemed available	Pre-flight preparation and planning were deemed comprehensive and appropriate	Pre-flight preparation and/or planning were deemed lacking in some respects	Pre-flight preparation and/or planning were deemed either absent or inadequate	
Flight Crew Compliance with Instructions	Specific instructions and/or procedures pertinent to the scenario were fully available	Instructions and/or procedures pertinent to the scenario were only partially available or were generic only	Instructions and/or procedures pertinent to the scenario were not available	Flight crew complied fully with ATC instructions and procedures in a timely and effective manner	Flight crew complied later than desirable or partially with ATC instructions and/or procedures	Flight crew did not comply with ATC instructions and/or procedures	
Flight Crew Situational Awareness	Specific situational awareness from either external or onboard systems was available	Only generic situational awareness was available to the Flight Crew	No systems were present to provide the Flight Crew with situational awareness relevant to the scenario	Flight Crew had appropriate awareness of specific aircraft and/or airspace in their vicinity	Flight Crew had awareness of general aircraft and/or airspace in their vicinity	Flight Crew were unaware of aircraft and/or airspace in their vicinity	
Onboard Warning/Collision Avoidance Equipment	Both aircraft were equipped with ACAS/TAS systems that were selected and serviceable	One aircraft was equipped with ACAS/TAS that was selected and serviceable and able to detect the other aircraft	One aircraft was equipped with ACAS/TAS that was selected and serviceable but unable to detect the other aircraft (e.g. other aircraft not transponding)	Equipment functioned correctly and at least one Flight Crew acted appropriately in a timely and effective manner	ACAS/TAS alerted late/ambiguously or Flight Crew delayed acting until closer than desirable	ACAS/TAS did not alert as expected, or Flight Crew did not act appropriately or at all	
See and Avoid	Both pilots were able to see the other aircraft (e.g. both clear of cloud)	One pilots visibility was uninhibited, one pilots visibility was impaired (e.g. one in cloud one clear of cloud)	Both aircraft were unable to see the other aircraft (e.g. both in cloud)	At least one pilot takes timely action/inaction	Both pilots or one pilot sees the other late and one or both are only able to take emergency avoiding action	Neither pilot sees each other in time to take action that materially affects the outcome (i.e. the non-sighting scenario)	

Note that these barrier definitions were only applicable to the 2016 Airprox. They were modified for 2017 and beyond in light of experience gained.

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
SUAS	Small Unmanned Air System
SUAV	Small Unmanned Air Vehicle
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**

Intentionally Blank