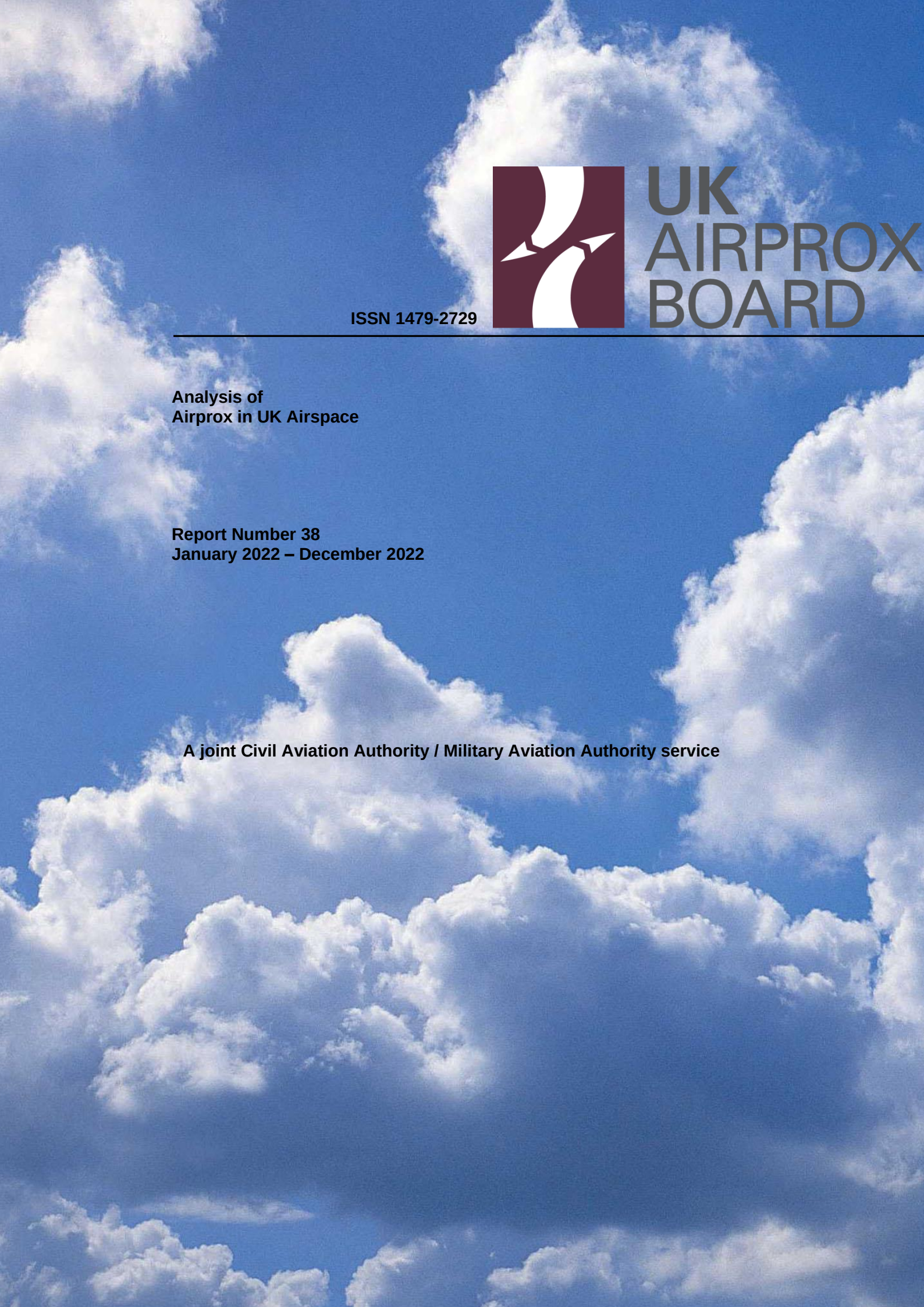

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UK AIRPROX BOARD

Analysis of Airprox in UK Airspace

Report Number 38
January 2022 – December 2022

A joint Civil Aviation Authority / Military Aviation Authority service

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Thirty-Eighth Report by the UK Airprox Board

Analysis of Airprox in UK Airspace
(January 2022 to December 2022)

Compiled by Director UK Airprox Board for

The Chief Executive Officer
UK Civil Aviation Authority

and

The Director
UK Military Aviation Authority

CONTENTS

EXECUTIVE SUMMARY

Airprox reporting in 2022, purely in terms of numbers, saw an overall increase in the order of 10% over the numbers reported in 2021. Within this, aircraft-to-aircraft Airprox reporting grew by 13%. The impact of COVID-19 restrictions on GA flying in 2020 will clearly have an impact on the 5-year average figures for the next 3 years, so comparisons with previous years' levels will give a more coherent indication of reporting trends.

Once again, the vast majority (93%) of aircraft-to-aircraft events involved General Aviation Sports and Recreational aircraft. This is an increase over the 10-year average of 85% and represents a concerning trend whereby this sector is exerting an increasing influence on overall performance of the safety barriers to mid-air collision. Reinforcing this assertion is the fact that 99% of all risk-bearing aircraft-to-aircraft events involved a General Aviation Sports and Recreational aircraft (which includes those Airprox where the description of an unknown or untraced aircraft fitted this category). Therefore, it is by influencing the performance of this sector – by education and regulation (if appropriate) – where the biggest gains in terms of a enhancing the safety of the contemporary operating environment will be made.

As with previous years, this contemporary operating environment is, essentially, Class G airspace below an altitude of 3000ft. For aircraft-to-aircraft events, 96% occurred in class G airspace and 81% took place below 3000ft, so it is here where efforts should be concentrated most on improving matters. With the backdrop of an increase in RPAS BVLOS operations outside segregated airspace on the horizon, this becomes even more important because an already highly-populated sector of UK airspace will be opened-up to new users in the near future.

There has also been an increase in the trend of the numbers of Airprox occurring in an ATZ or MATZ. Occurrences around airfields account for about a quarter of all aircraft-to-aircraft events and, whilst this might be expected because there will naturally be a higher concentration of traffic in the vicinity of aerodromes, these are areas where processes and procedures are in place which should reduce the likelihood of a loss of safe separation. Here, it is assessed that education is the key – there is evidence that published procedures are not being followed and/or that non-standard activity is not being announced to improve the situational awareness of others. Clearly, an aerodrome's procedures are published in order to maintain a degree of 'predictability' to the activity around that airfield, but there does appear to be a reluctance from pilots to speak on the radio when they have chosen – or are obliged – to deviate from those published procedures. That an increasing percentage of aircraft-to-aircraft Airprox is being seen year-on-year indicates that there may be room for pilot training (initial and refresher) to be enhanced in this regard, with more exposure to different types for airfield join and departure, and training in considerations for any necessary deviations from the published procedures.

Airprox involving military aircraft (which includes foreign military aircraft, such as visiting forces or those permanently based in the UK) represent 20% of all aircraft-to-aircraft Airprox (including those cases involving RPAS where a full evaluation has been made). With such a small sample size (42) it can be difficult to draw any firm conclusions, but analysis of the factors contributing to these Airprox does draw out a number of recurring themes. It is clear that significant work has been undertaken to enhance the electronic conspicuity capabilities of military aircraft. Many now carry combinations of equipment that will give increased coverage of the myriad solutions that are available to the General Aviation market, but compatibility and/or performance issues are prevalent. Although the UKAB does not have the technical resource to understand why EC interactions do not occur when they would be expected to do so, it is likely that this is down to the siting in the aircraft of carry-on EC equipment adversely affecting the detectability of the devices concerned. There is also some evidence that the transition to new military air traffic control equipment and a new 'hub and spoke' model of regional control centres may be having previously unexpected impacts of the performance of the Ground Elements – Situational Awareness barrier. The factors contributing to the performance degradation of this barrier are the late or non-passage of Traffic Information (suggesting that controller workload was high) and an expectation/assumption on the part of the controller that the situation was different from

the reality. It is important that any second or third order effects of the continued transition to new equipment and working practices be closely monitored.

For Airprox involving RPAS when a full evaluation has been possible (i.e., where the Airprox was reported by the RPAS operator, or the UKAB has been able to trace the RPAS operator) the weaknesses of all the traditional barriers is concerning. Again, the sample size is extremely small (13) but little has changed from previous years – the Ground Elements are seldom, if ever, aware of the RPAS operations and so add little to the mitigation of the collision risk. For the Flight Elements, pre-flight notification of RPAS activity below 400ft in the Open category is essentially non-existent – the NOTAM system is not a viable method, and RPAS operators use a number of different notification systems for their activity (although there is no requirement for them to do so), none of which are regulated. Given the size of RPAS in the Open category, the See and Avoid barrier is only really viable from the RPAS operator's perspective, so it is difficult to see where effective barrier mitigations to an Airprox with an RPAS once airborne can be made UNLESS interoperable EC equipment is mandated throughout Class G airspace, to increase the effectiveness of the Electronic Warning Systems and Situational Awareness barriers for the Flight Elements. By extension, this should also improve the performance of the See and Avoid barrier, although pilots of crewed aviation need to be aware that, from their perspective, reliance on the See and Avoid barrier in Class G airspace currently offers little defence against an Airprox (or a collision) with an RPAS because, in all but one of this type of Airprox in 2022, the pilot of the crewed aircraft was never aware of the RPAS' presence.

The dominance of the GA Sports and Recreational community in the Airprox landscape is unsurprising, given the preponderance of Airprox that occur in Class G airspace. The proportion of risk-bearing Airprox which involve the GA community is increasing, which points to successes in other sectors (particularly military) at reducing their risk. The Barrier performance and Contributory Factors allow focus on certain areas, but the fact that the observations and the associated Contributory Factors are relatively constant, and have remained so since this data has been collected, indicates that it may be time to look at regulatory intervention to improve the picture. A review of the private pilot training syllabus in the General Aviation Sports and Recreational sector may help to identify areas where this can be expanded, to include additional training in those areas that have been identified as weak by UKAB analysis. Furthermore, an understanding that a lack of currency and recency has an effect on human performance will help individuals to plan to operate within their own personal limitations, but may also indicate that more frequent flights with an instructor might be necessary. However, given the expansion into RPAS BVLOS operations outside segregated airspace, and the enablers for this to occur, the single improvement that would have the biggest impact in terms of mid-air collision risk mitigation would be a single, interoperable electronic conspicuity protocol being mandated throughout all classes of airspace in the UK – any airspace is only as safe as its weakest performing element.

INTRODUCTION

In 2022 the UK Airprox Board (UKAB) assessed 277 Airprox, of which 195 were piloted aircraft-to-aircraft events with 82 involving UA/Other. 2022 saw not only a full return to previous years' historic levels, but a growth in the number of reports compared to those received in 2021, even when the restrictions on General Aviation Sports and Recreational (GA) flying in the early part of that year are accounted for. Although the number of aircraft-to-aircraft reports did not reach the levels projected in the 2021 Annual Report, the increased numbers still represent an overall growth in Airprox reporting of around 10% in total, and of 13% for aircraft-to-aircraft Airprox, over the numbers received in 2021. Although it will take time for the statistical effects of the COVID-19 restrictions on the aviation sector to be overcome, when these restrictions are accounted for then we are experiencing a consolidated increase of 10% year-on-year for Airprox, which gives an estimate of 215 aircraft-to-aircraft events in 2023.

Through the assessment of safety barriers and the collection of contributory factors, the insight that can now be achieved is continuing to provide an essential and consistent view of the factors which underpin the reasons behind Airprox; this is what I shall concentrate on in the majority of this report. It is only by directly focussing and targeting specific areas of the aviation community, and by tackling their specific behaviours, that we can begin to impact the instances of Airprox, mitigate Mid Air Collision (MAC) risk and contribute to augmenting Air Safety for all.

As with the approach adopted in the previous 2 years, this report will cover in detail the 5 weakest performing barriers and examine the observed behaviours behind them to identify areas where interventions can be more effectively focussed to better mitigate against the risk of MAC and enhance air safety. As in previous reports I will, of course, present statistics, but these need to be taken in the context of the environment from which they are elicited; care must be taken not to draw inaccurate or incomplete conclusions, and comparisons with previous years should not be made apart from in specific and focussed areas.

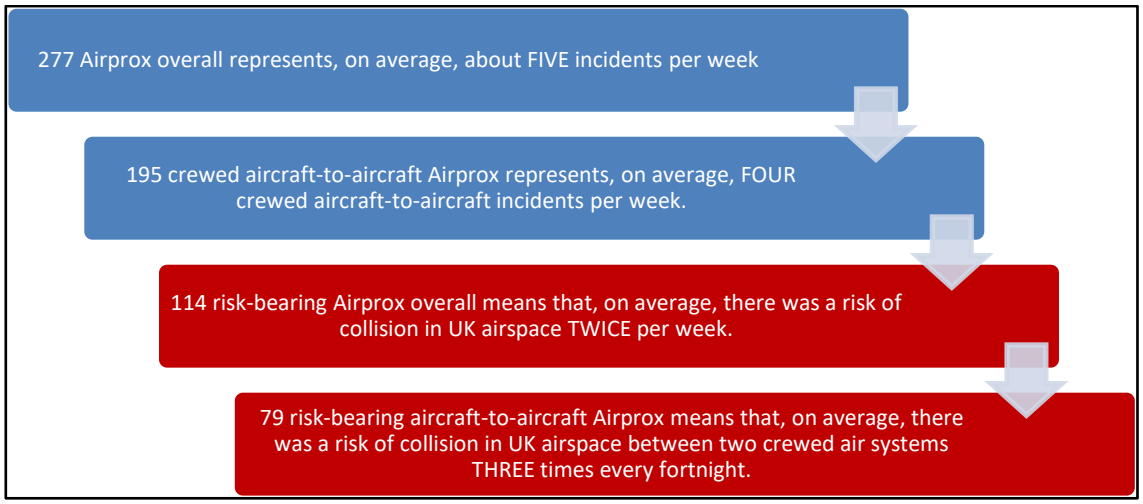
Although establishing what happened to lead to an Airprox is important in terms of understanding the context of an individual event, no two Airprox will be the same. It is for this reason that it is important to focus on the 'why' and the 'so what' as opposed to just the 'what' and 'how many'; observations from this Airprox year reinforce those of the last annual report in the identification of the areas in which we can make the most difference; by identifying the weakest barriers, understanding the reasons for their poor performance and targeting positive outreach action in these areas, we will be able to make the most tangible difference. Notwithstanding, this approach does rely on each of the aviation communities understanding their own context and safety culture, and it is for them to ensure that there are appropriate mechanisms and measures in place to elicit change. Be they a General Aviation flying or gliding club, an airfield, a military unit, a commercial operating authority or an individual General Aviation pilot, the responsibility to exercise the privilege of operating in unregulated airspace and the ability to enjoy the freedoms it gives carries an individual and collective responsibility to continually strive to augment air safety and help to maintain a safe environment that can be enjoyed by all.

The weakest areas continue to be: situational awareness which is captured in the **Ground Elements – Situational Awareness barrier** and the **Flight Elements – Situational Awareness barrier**; communication, planning and execution which is captured in the **Flight Elements – Tactical Planning and Execution barrier;** Electronic Conspicuity (EC) which is captured in the **Flight Elements – Electronic Warning Systems barrier**, and; the **Flight Elements – See and Avoid barrier**. Within these barriers, the most common Contributory Factors (CF) are generic, inaccurate, late or no situational awareness; planning and communication; incompatibility of EWS, and; lookout and visual scanning for potential threat aircraft. There is still a welcome focus within the DfT and CAA on promoting EC, and a common approach will certainly improve situational awareness in both ground and air elements. The current funding initiative has been extended until 31st March 2024, and one hopes that there will be funding available beyond that.

Electronic conspicuity devices | Civil Aviation Authority (caa.co.uk)

Whilst there is a technical element to the performance of the barriers (most noticeably the **Flight Elements – Electronic Warning Systems** barrier), it is increased adoption of EC, an understanding of how to best exploit the information it provides and, most importantly, an acknowledgement that there needs to be a consistency in approach which promotes compatibility of equipment which operate to agreed standards that will deliver the most benefit. It is also important to recognise that the performance of all the barriers can be compromised by Human Factors, and that this can be addressed through recognising and accepting the observations, a willingness to learn from the actions of others, a commitment to learning, a sense of personal responsibility with respect to threat and error management and an appreciation of the effects of poor preparation, currency and recency.

HEADLINE FIGURES AND HISTORIC DATA



All Airprox 2012 - 2022

RISK	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	10yr AVERAGE
A	18	22	28	41	51	45	65	60	17	43	37	41
B	27	43	68	66	72	82	96	86	41	60	77	69
C	97	72	86	78	104	111	120	147	73	118	128	104
D	5	9	9	12	11	12	5	11	3	6	5	8
E	14	26	33	20	27	22	33	24	29	26	30	27
Risk Bearing	45	65	96	107	123	127	161	146	58	103	114	110
% Risk Bearing	28%	38%	43%	49%	46%	47%	50%	45%	36%	41%	41%	44%
Total	161	172	224	217	265	272	319	328	163	253	277	249

Table 1: All Airprox 2012-2022 by Risk Category

Once figures have been adjusted to take account of the effects of the COVID-19 restrictions in 2020 and the first three months of 2021, there has been a steady and concerning 10% year-on-year increase in the numbers of reported Airprox. However, those involving UA/Other appears to have begun to plateau, with a similar number of reports in 2022 to 2021. Furthermore, the increase in reporting of Airprox by the RPAS community seen in 2021 has continued in 2022, demonstrating an increased belief in the value-added by submitting such reports. This increase in reporting from the RPAS community is encouraging as it allows us to conduct a full evaluation process and learn as much as possible from these events which

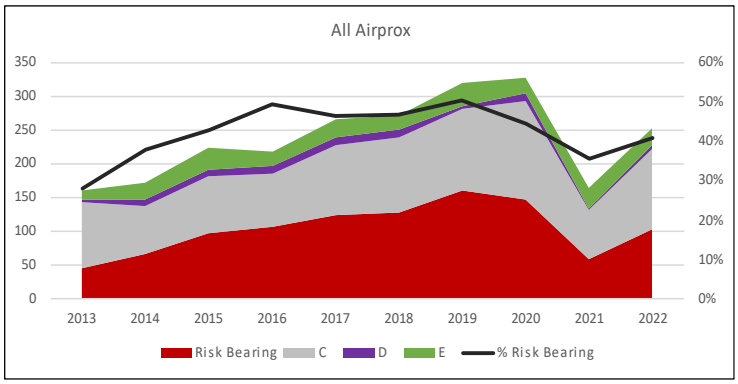


Figure 1: All Airprox 2013-2022 by Risk Category

might otherwise go unreported; in all but 2 cases, the pilot of the other aircraft did not see the UA and in the two cases where they did, it was too late for them to have altered their flightpath. The particular sub-set of the aviation community reporting the most observations of encounters with UA/Other is still the Commercial Air Transport (large carriers) (CAT) category. It is likely that the reasons for this remain related to the stages of flight in which they observe the UA/Other, which are predominantly in the departure or landing phase, a phase typically characterised by high workload and high rates of climb/descent which tend to precipitate a fleeting encounter whereby it is impossible for the pilots to manoeuvre effectively to increase separation. This results in an event which, by its very nature, often presents a risk of collision. As a result, and in order to gain a better appreciation of Airprox and the associated risk of collision, it is useful to think about the 2 areas (aircraft-to-aircraft encounters and UA/Other encounters) separately.

All Aircraft-to-Aircraft Airprox 2012 - 2022

RISK	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	10yr AVERAGE
A	18	22	25	27	17	13	20	18	8	22	20	19
B	27	43	64	52	41	49	50	50	32	42	57	48
C	96	72	85	75	79	75	80	106	51	80	91	79
D	1	9	6	5	8	5	2	6	2	5	1	5
E	13	26	33	18	25	20	29	23	25	23	26	25
Risk Bearing	45	65	89	79	58	62	70	68	40	64	77	67
% Risk Bearing	29%	38%	42%	45%	34%	38%	39%	33%	34%	37%	39%	38%
Ac-Ac Total	155	172	213	177	170	162	181	203	118	172	195	176

Table 2: All aircraft-to-aircraft Airprox 2012 – 2022 by Risk Category

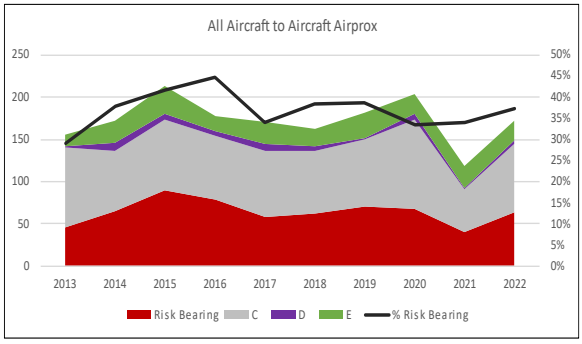


Figure 2: All Airprox 2013 – 2022 by Risk Category

As can be seen in Table 2 and Figure 2, the reported numbers and the associated proportion of Airprox assessed by the Board to have been risk-bearing have remained largely constant over the last 10 years, notwithstanding the sharp drop experienced as a direct result of the COVID-19 restrictions in 2020. In fact, the percentage risk-bearing for 2022 is around the current 10-year average at 39%. However, this does represent a proportional increase over the last 3 years in this category of event. What is more interesting is the sector mix composition of risk-bearing events, where it is evident that the GA Sports and Recreational community has experienced a steady rise in the proportion of risk bearing Airprox over the last 3 years but 2022 saw this increase all but arrested. The other significant area, those involving military aircraft, has experiencing a marked and decline over the previous 3 years but it seems that this may have now bottomed-out. This will be explored further in the coming sections.

Turning specifically to Airprox involving UA/Other, the 10-year picture has been included to explicitly demonstrate the surge which started in 2014 as the small drone recreational market, and reports of Airprox with these types of aircraft, took off.

Airprox Involving UA/OTHER 2012-2022

RISK	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	10yr AVERAGE
A	0	0	3	14	34	32	45	42	9	21	17	22
B	0	0	4	14	31	33	46	36	9	18	20	21
C	1	0	1	3	25	36	40	41	22	38	37	24
D	4	0	3	7	3	7	3	5	1	1	4	3
E	1	0	0	2	2	2	4	1	4	3	4	2
Risk Bearing	0	0	7	28	65	65	91	78	18	39	37	43
% Risk Bearing	0%	0%	64%	70%	68%	59%	66%	62%	40%	48%	45%	52%
Total	6	0	11	40	95	110	138	125	45	81	82	73

Table 3: Airprox Involving UA/Other 2012 – 2022 by Risk Category

Following the initial increase in reported Airprox involving UA/Other, the picture began to stabilise with the introduction of regulation and registration. The increased and continued focus on this area remains critical as commercial entities seek to exploit technological advances, generating new opportunities which will take larger, non-recreational drones more into the realms of Class G Airspace. Airprox observations have reinforced the concern over interactions in the sub-500ft AGL height band, where neither the RPAS flyer (often sub-400ft AGL), nor the piloted aircraft (military or those civilian-regulated aircraft that have been granted a CAA exemption from the '500ft rule' through ORS4) need to gain permission for, or are required to promulgate, their activities. The continued potential for an increased risk picture in this area is concerning; however, the biggest area for potential risk lies in the development of Beyond Visual Line-Of-Sight (BVLOS) capabilities which will most likely see RPAS venturing into Class G airspace above 500ft AGL, and almost certainly in the 0-3000ft altitude band, which is where the majority of all Airprox occur. That said, it is pleasing that there is continued and increasing evidence of RPAS operators taking responsibility to report Airprox. This means that we have an opportunity to thoroughly examine the event, trace the other aircraft, understand the context and fully discuss and evaluate the circumstances surrounding the event. This has led to some interesting insights into Airprox involving UA/Other and raised some previously unknown issues with regard to the performance of the 'traditional' MAC safety barriers and how those performance deficiencies can be mitigated. Please see the UA/Other section for analysis.

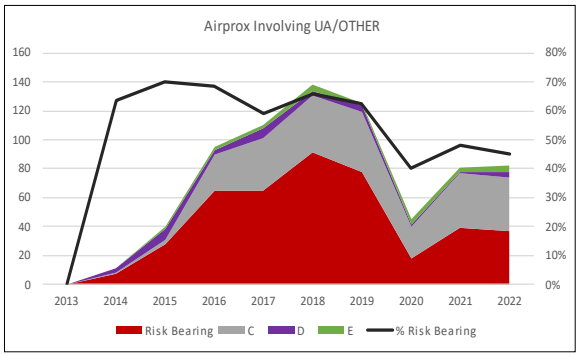


Figure 3:Airprox involving UA/Other 2013 – 2022 by Risk Category

SECTOR MIX 2013-2022

Airprox vary by sector. They vary by risk distribution, airspace and altitude and each sector requires specific examination to best understand the Airprox landscape. There are 7 sectors of interest: General Aviation (including Sports and Recreational and PPL/CPL training), Civil Commercial (including air taxis, and commercial rotary); Commercial Air Transport (primarily large air carriers); Military (including Foreign military); Emergency Services (covering air ambulance, fire, police and coastguard); Unknown aircraft (although the aircraft in this category could not be traced, their descriptions are almost exclusively descriptions of general aviation light aircraft or gliders) and finally, UA/Other.

For the purposes of this report, these sectors will be abbreviated as follows: GA, Civ_Comm, CAT, Mil, Emerg-Servs, Unk ac and UA/OTHER

This section presents the data in graphical and diagrammatic form and describes Airprox in terms of sector mix, altitude, airspace, and risk category. It describes the 'what' and makes no attempt to deduce the 'why' at this point in the report. Observations and insights as to the 'why' will be explored in the Safety Barriers and Contributory Factors sections.

It is important to understand the context around those that operate within certain sector definitions: Civ_Comm, Emerg Servs and Mil sectors are professional pilots operating in primarily Class G airspace; The CAT sector represents professional pilots, primarily operating in Controlled Airspace and the GA and Unk ac (including untraced) sector represent pilots flying primarily for recreational purposes, operating in Class G airspace and flying the most diverse set of air vehicles including gliders, lighter-than-air vehicles, microlights and light-aircraft of numerous configurations. Figure 4 below depicts these sector interactions from 2013. The areas of interest are any mix which involves GA aircraft, specifically GA-GA, and any involving Military aircraft.

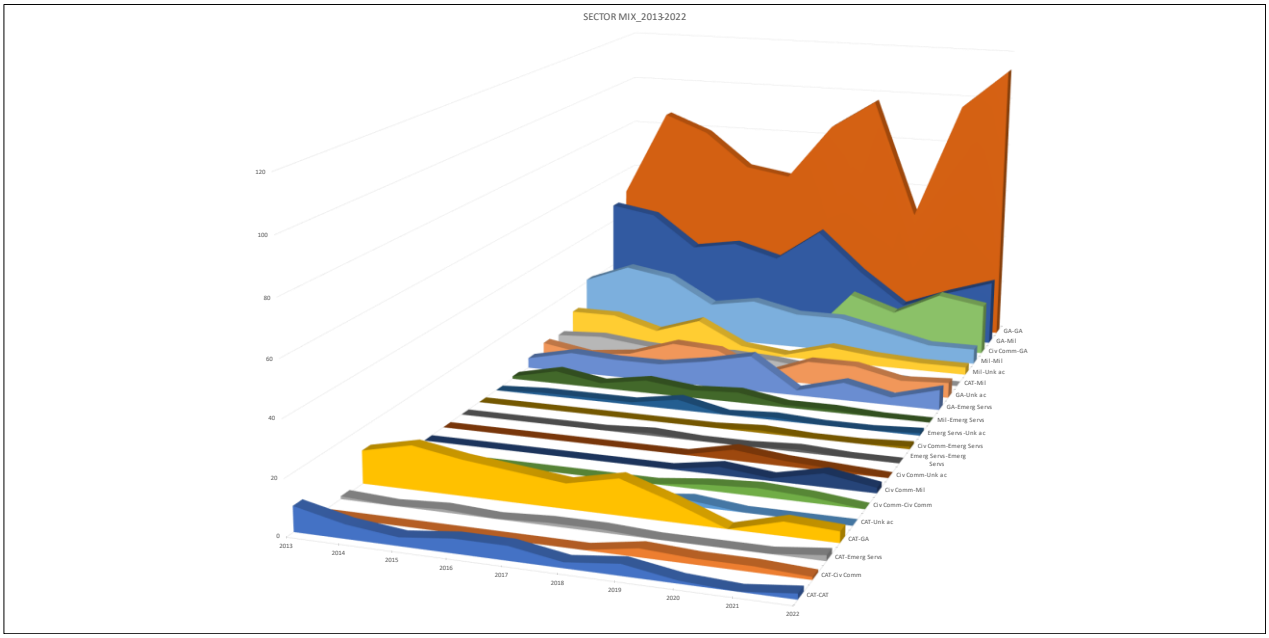


Figure 4: All Airprox 2013 - 2022 by Sector Mix

Figure 5 shows the Sector mix interaction as a percentage of the 1763 aircraft-to-aircraft occurrences reported between 2013 and 2022 (note that the small numbers of Emerg Servs and Civ_Comm reflect their recent inclusion as a specific category where previously they would have been captured in either CAT or GA.). It is striking that only 15% of the chart shows non-GA sector interactions. A similar ratio is also reflected in the 2021 distributions.

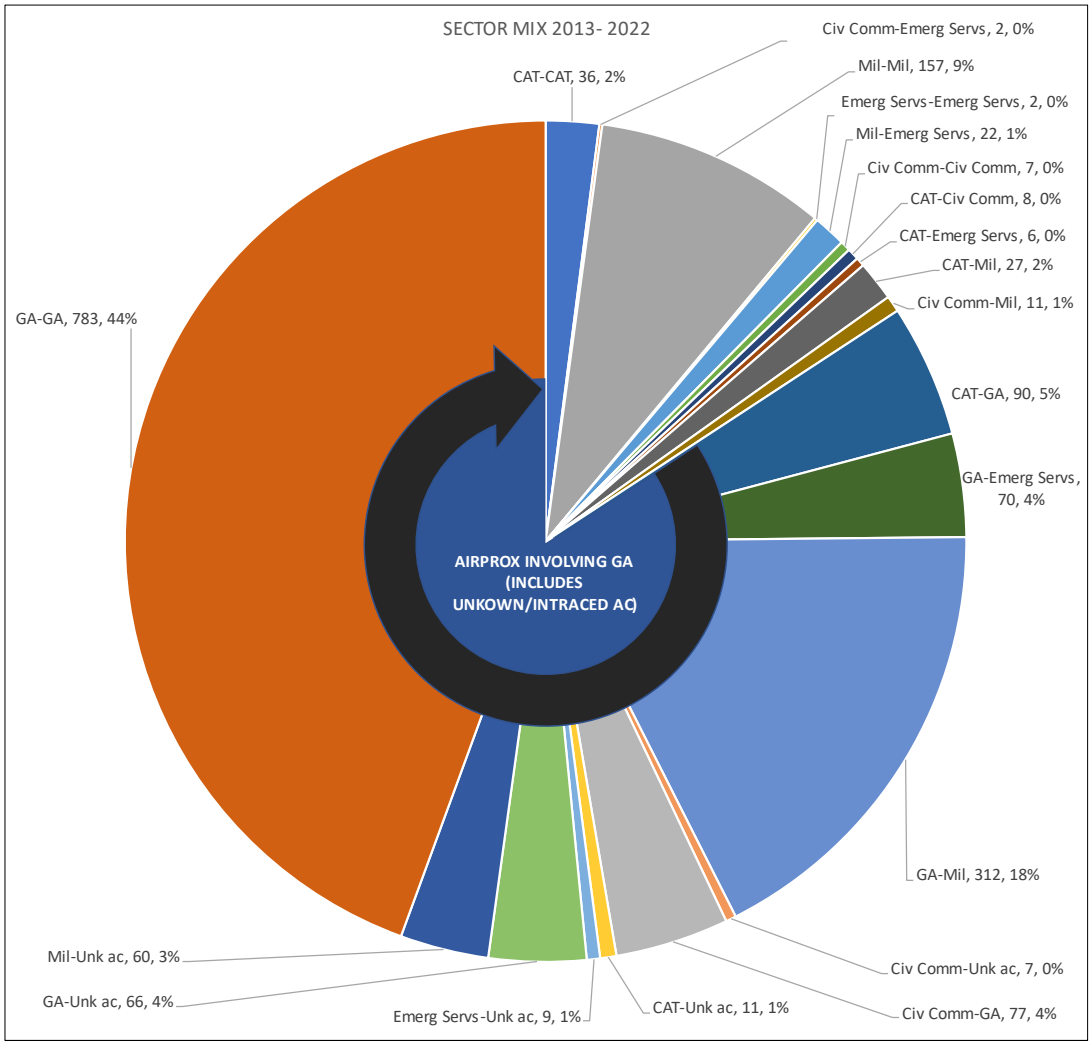


Figure 5: All Aircraft-to-Aircraft Airprox 2013 - 2022 by Sector Mix

Understanding this picture is important as it describes the significant influence of the GA Sports and Recreational community on the Airprox landscape and emphasises the importance and value of the sectorised approach to understanding Airprox.

2013-2022

85% of aircraft-to-aircraft events involved a GA Sports and Recreational light aircraft (this number includes Unknown_Untraced aircraft where the description fitted this category)

Also, it is useful to think about the percentage of risk-bearing Airprox, in terms of overall percentage, and percentages of risk-bearing of those events involving GA, Mil and CAT_Civ_Comm.

RISK BEARING TRENDS

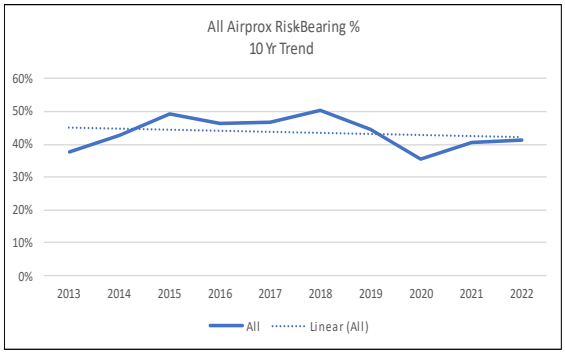


Figure 6: All Airprox Risk Bearing % 2013-2022

The percentage risk-bearing figures for 2022 are slightly below the 10-year average, and the overall linear trend now indicates a gradual decline in the percentage of risk bearing Airprox. It should be noted that Airprox involving UA/Other are included in this graphic which, given that the majority of UA/Other encounters are within the Civ_Comm and CAT sectors where we see a higher proportion of events that are determined to be risk-bearing, will have a more negative influence on the trend-line.

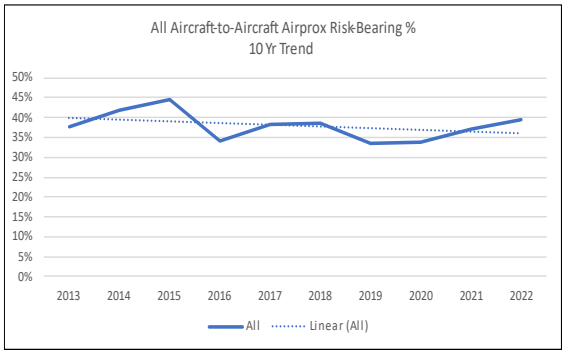


Figure 7: All Aircraft-to-Aircraft Airprox Risk Bearing % 2013-2022

When looking at aircraft-to-aircraft events in isolation – Figure 7 – the picture is more positive, also showing a decreasing trend over 10 years but with a steeper downward gradient than the graph at Figure 6. However, it is useful to consider the sector distribution: Figure 8 depicts the risk-bearing percentage by sector of all aircraft-to-aircraft Airprox.

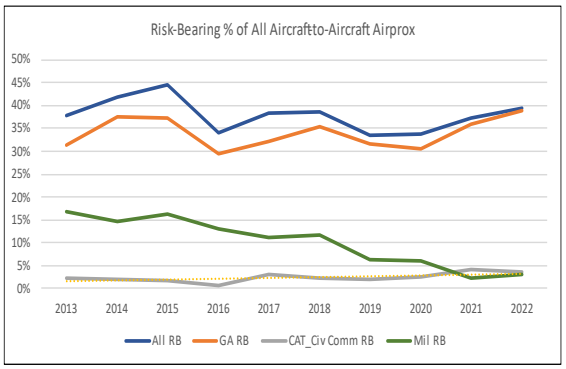


Figure 8: All Aircraft-to-Aircraft Airprox Risk Bearing % by sector 2013–2022

In 2022, risk-bearing Airprox involving Military aircraft represented 3% of all aircraft-to-aircraft Airprox and risk-bearing Airprox involving GA aircraft represented 39% of all aircraft-to-aircraft Airprox. The steady decline over the last 10 years in those risk-bearing events involving Military aircraft has been encouraging, although it is likely that this has now reached its nadir. Moreover, the military SMS is clearly effective, and I consider it unlikely that the military will be able to eradicate risk-bearing events entirely in the current regulatory landscape.

The final graphs and charts in this section – Figures 9 and 10 – show the *sector risk-bearing percentage* of all risk-bearing aircraft-to-aircraft Airprox. It can be seen that the GA Sports and Recreational community represented around 83% of all risk bearing aircraft-to-aircraft Airprox in 2013 and this has steadily increased over the years to 91% in 2018 and now to a near-total dominance of risk-bearing events at 99%. For the military sector, 45% of risk bearing aircraft-to-aircraft Airprox involved military aircraft in 2013, decreasing to 30% in 2018 and now at only 8% in 2022 (although this does represent a marginal increase in percentage share over 2021). Note – the percentage totals per year do not add up to 100%. This is because (at least) 2 aircraft are involved in a single Airprox event, and when those Airprox involve differing sectors, the instance will be counted in the figures for each sector.

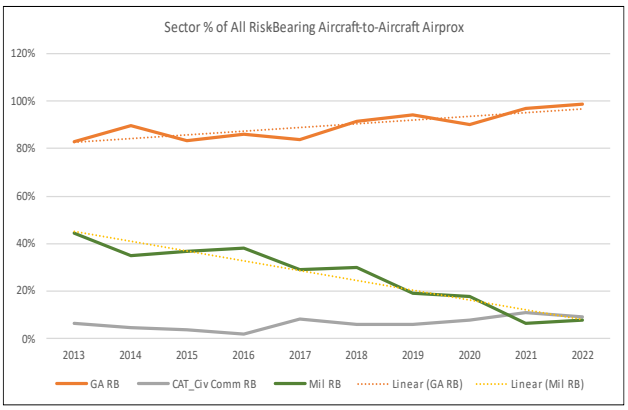


Figure 9: All Aircraft-to-Aircraft Airprox Risk-Bearing % by sector 2013–2022

In 2022 - 93% of aircraft-to-aircraft events involved a GA Sports and Recreational light aircraft (this number includes Unknown_Untraced aircraft where the description fitted this category)

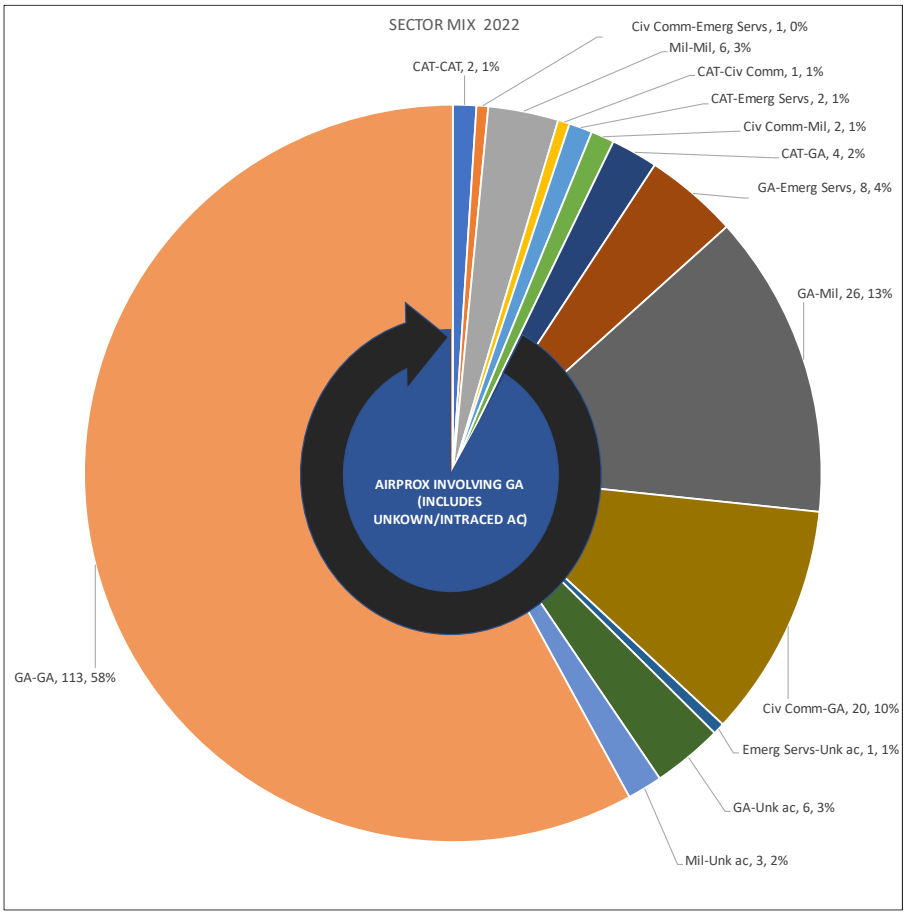


Figure 10: All Aircraft-to-Aircraft Airprox % by Sector 2022

In 2022 - 99% of all risk-bearing aircraft-to-aircraft events involved a GA Sports and Recreational light aircraft (this number includes Unknown_Untraced aircraft where the description fitted this category)

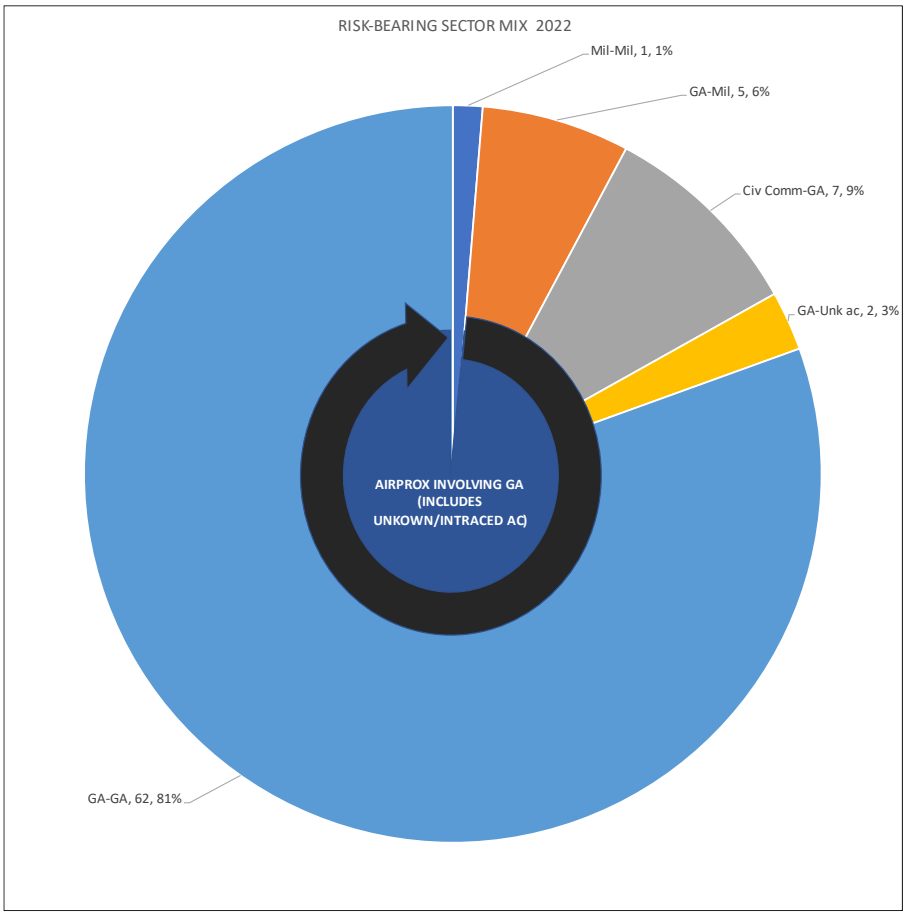


Figure 11: All Risk-Bearing Aircraft-to-Aircraft Airprox % by Sector 2022

ALTITUDE, AIRSPACE AND RISK – 2022 OVERVIEW

The following collection of charts depicts airspace, altitude, and risk combinations for 2022. As previously articulated, 93% of all aircraft-to-aircraft Airprox involved either the GA community or unknown/untraced aircraft; most of these occurred in Class G airspace below 3000ft.

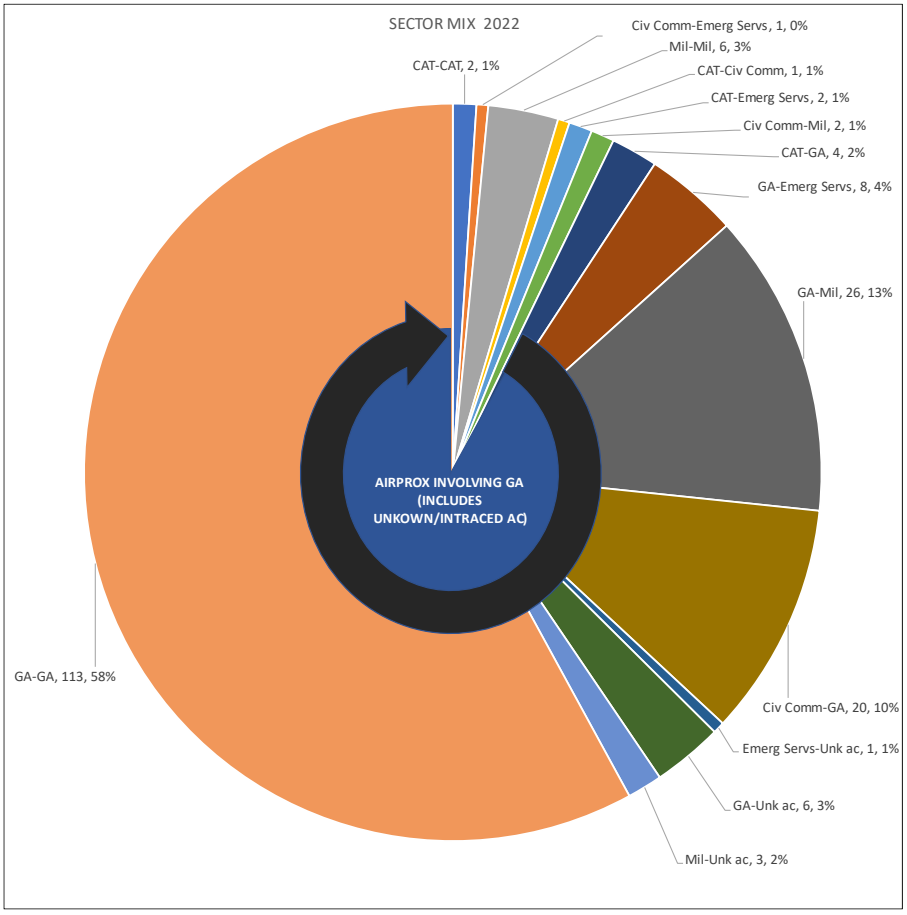


Figure 12: All Aircraft-to-Aircraft Airprox % by Sector 2022

In 2022 – 93% of aircraft-to-aircraft events involved a GA Sports and Recreational light aircraft (this number includes Unknown_Untraced aircraft where the description fitted this category)

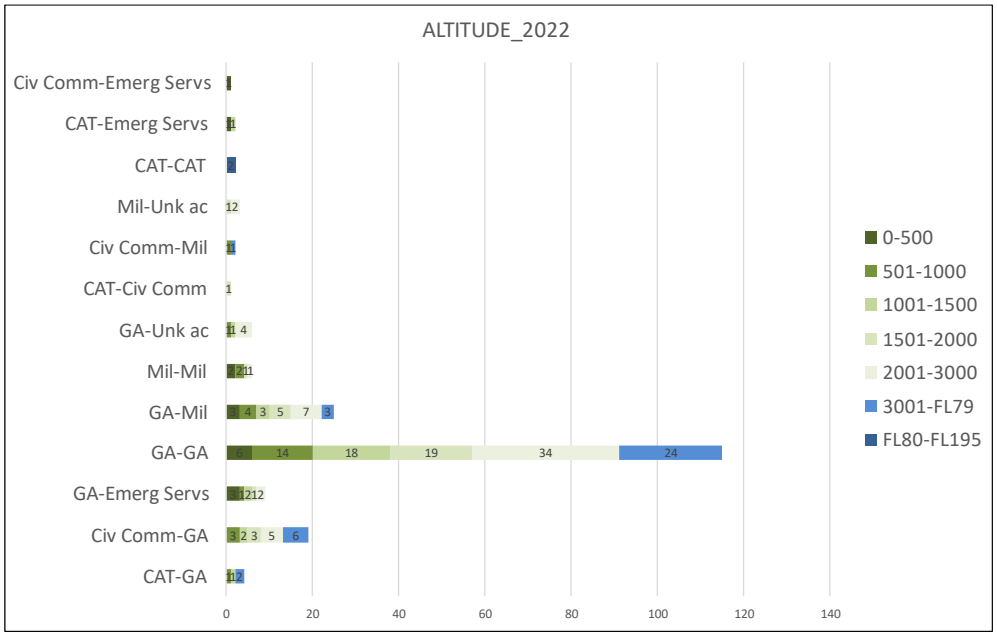


Figure 13: All Aircraft-to-Aircraft Airprox by Sector and Altitude 2022

In 2022 – 74% of all events and 81% of all aircraft-to-aircraft events took place at or below an altitude of 3000ft.

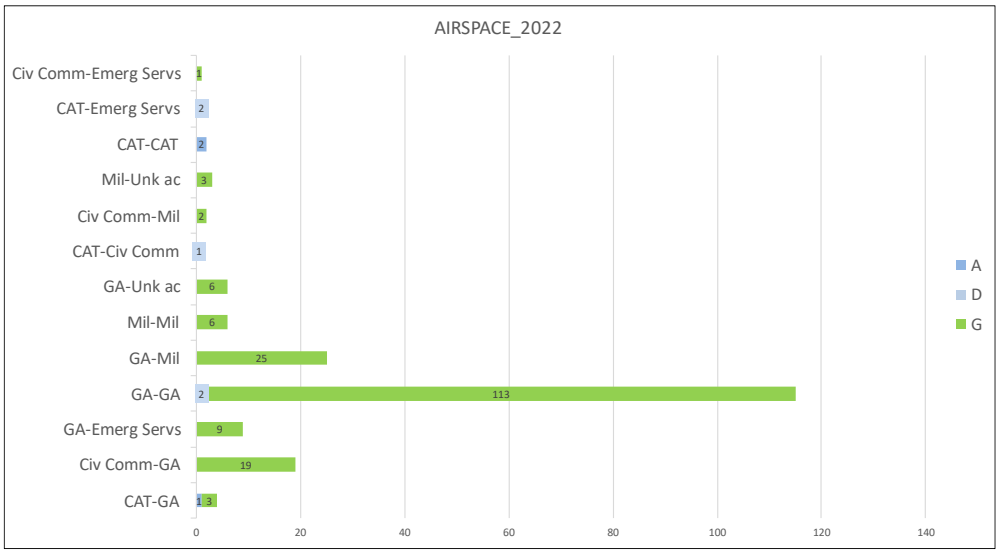


Figure 14: All Aircraft-to-Aircraft Airprox by Sector and Airspace 2022

In 2022 – 78% of all events and 96% of all aircraft-to-aircraft events took place in Class G Airspace

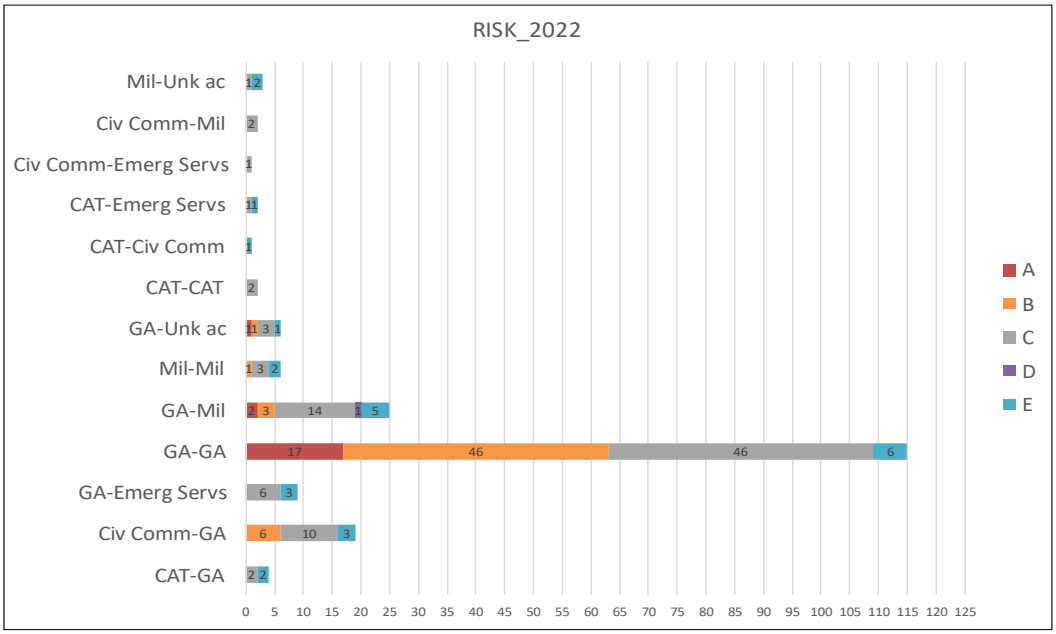


Figure 15: All Aircraft-to-Aircraft Airprox by sector and Risk 2022

We have already seen that 99% of all risk-bearing aircraft-to-aircraft Airprox occur in the GA Sports and Recreational community, but it is useful to have a graphical breakdown of the specifics. The above chart clearly shows the sector mix distributions, and the levels of risk for each sector combination. Tables 4 and 5 provide links to all aircraft-to-aircraft risk-bearing events.

In 2022 – **ALL** Category A aircraft-to-aircraft Airprox involved GA Sports and Recreational light aircraft.

Airprox No	Year	Alt Block	Risk Category	Sector Mix
2022004	2022	1001-1500	A	GA-Mil
2022012	2022	501-1000	A	GA-GA
2022050	2022	1001-1500	A	GA-Mil
2022052	2022	2001-3000	A	GA-GA
2022063	2022	1501-2000	A	GA-GA
2022072	2022	1501-2000	A	GA-GA
2022073	2022	2001-3000	A	GA-GA
2022079	2022	3001-FL79	A	GA-GA
2022086	2022	501-1000	A	GA-GA
2022087	2022	3001-FL79	A	GA-GA
2022101	2022	2001-3000	A	GA-GA
2022113	2022	3001-FL79	A	GA-GA
2022114	2022	3001-FL79	A	GA-GA
2022153	2022	1501-2000	A	GA-GA
2022162	2022	2001-3000	A	GA-GA
2022163	2022	1501-2000	A	GA-GA
2022175	2022	2001-3000	A	GA-GA
2022198	2022	3001-FL79	A	GA-GA
2022214	2022	2001-3000	A	GA-GA
2022225	2022	2001-3000	A	GA-Unk ac

Table 4: 2022 Category A Aircraft-to-aircraft Events

Airprox No	Year	Alt Block	Risk Category	Sector Mix
2022002	2022	0-500	B	GA-GA
2022009	2022	2001-3000	B	GA-GA
2022011	2022	2001-3000	B	GA-GA
2022013	2022	0-500	B	GA-GA
2022020	2022	501-1000	B	GA-GA
2022032	2022	3001-FL79	B	GA-GA
2022039	2022	3001-FL79	B	GA-GA
2022053	2022	1501-2000	B	GA-GA
2022062	2022	2001-3000	B	GA-GA
2022064	2022	2001-3000	B	GA-GA
2022081	2022	2001-3000	B	GA-GA
2022082	2022	3001-FL79	B	GA-GA
2022084	2022	501-1000	B	GA-Mil
2022085	2022	3001-FL79	B	GA-GA
2022102	2022	501-1000	B	GA-GA
2022112	2022	1501-2000	B	GA-GA
2022116	2022	1501-2000	B	GA-Mil
2022119	2022	2001-3000	B	GA-GA
2022120	2022	2001-3000	B	GA-GA
2022123	2022	1001-1500	B	GA-GA
2022125	2022	2001-3000	B	GA-GA
2022134	2022	3001-FL79	B	GA-GA
2022138	2022	3001-FL79	B	GA-GA
2022139	2022	501-1000	B	GA-Mil
2022152	2022	2001-3000	B	GA-GA
2022158	2022	3001-FL79	B	GA-GA
2022167	2022	2001-3000	B	GA-GA
2022171	2022	3001-FL79	B	GA-GA
2022173	2022	2001-3000	B	GA-GA
2022185	2022	0-500	B	GA-GA
2022196	2022	1501-2000	B	GA-GA
2022199	2022	3001-FL79	B	GA-GA
2022201	2022	3001-FL79	B	GA-GA
2022205	2022	2001-3000	B	GA-GA
2022208	2022	1001-1500	B	GA-GA
2022209	2022	2001-3000	B	GA-GA
2022216	2022	3001-FL79	B	GA-GA
2022218	2022	2001-3000	B	GA-Unk ac
2022220	2022	1501-2000	B	GA-GA
2022224	2022	2001-3000	B	GA-GA
2022230	2022	2001-3000	B	GA-GA
2022238	2022	1501-2000	B	GA-GA
2022242	2022	2001-3000	B	GA-GA
2022247	2022	1001-1500	B	GA-GA
2022256	2022	501-1000	B	GA-GA
2022264	2022	501-1000	B	GA-GA
2022265	2022	2001-3000	B	GA-GA
2022268	2022	1501-2000	B	GA-GA
2022269	2022	1001-1500	B	GA-GA

Table 5: 2022 Category B Aircraft-to-aircraft Events

In 2022 – **56 out of 57** Category B aircraft-to-aircraft Airprox involved GA Sports and Recreational light aircraft.

In 2022 – There were **4** Category B aircraft-to-aircraft Airprox involving Military aircraft.

ATZ AND MATZ AIRPROX

Purely in terms of numbers, those instances occurring within an ATZ or MATZ has remained relatively constant over the past 10 years, although the trend is increasing year-on-year (Figure 16). That said, the total number is relatively low when taken in the context of all Airprox, and the percentage of risk-bearing events that take place in a MATZ or an ATZ is lower still. All bar one of these events involve the GA Sports and Recreational sector and the top 5 Flight Elements' contributory factors (CF) associated with these Airprox are shown in Table 6. Links to those events occurring in 2022, including the risk and sector mix, are in Table 7 for ease of reference.

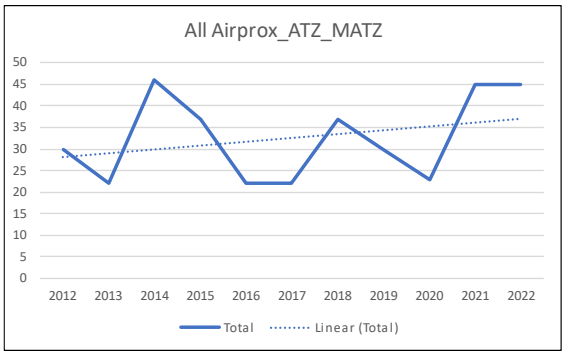


Figure 16: All Aircraft-to-Aircraft Airprox in ATZ_MATZ 2022

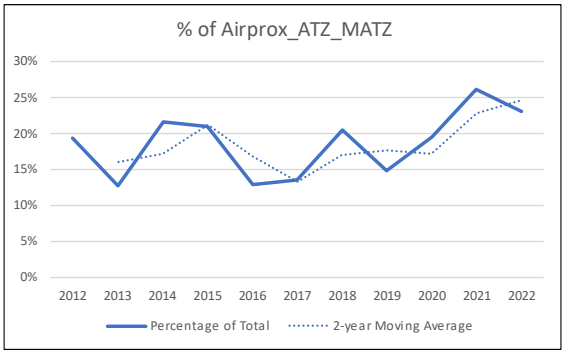


Figure 17: % of All Aircraft-to-Aircraft Airprox in ATZ_MATZ 2022

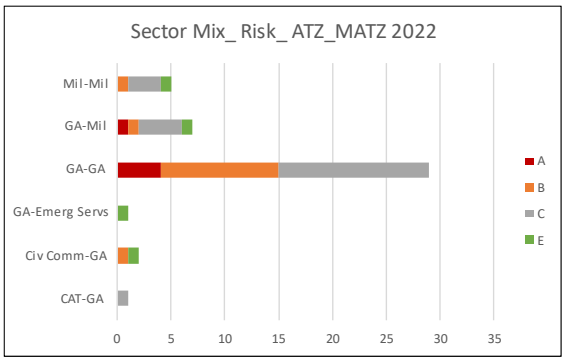


Figure 18: Risk Profile of Aircraft-to-Aircraft Airprox in ATZ_MATZ 2022

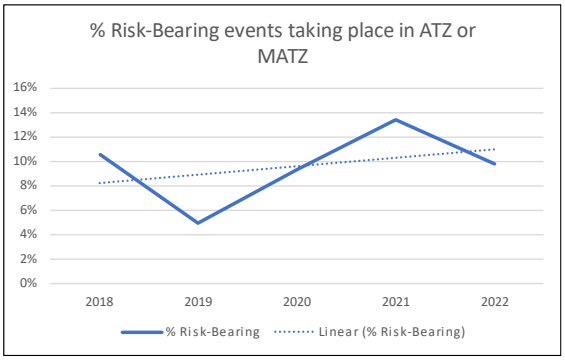


Figure 19: 5-year trend for Aircraft-to-Aircraft Airprox in ATZ_MATZ

Barrier	CF
Regulations, Processes and Procedures	Did not comply with Regulations and/or procedures
Tactical planning and Execution	Incorrect or ineffective execution
	Did not conform with or avoid the established pattern of traffic
See and Avoid	Non-sighting or Effective non-sighting
	Late sighting by one or both pilots

Table 6: Top 5 CF – ATZ_MATZ 2022

Airprox No	Year	Alt Block	Risk Category	Sector Mix
2022002	2022	0-500	B	GA-GA
2022004	2022	1001-1500	A	GA-Mil
2022012	2022	501-1000	A	GA-GA
2022013	2022	0-500	B	GA-GA
2022020	2022	501-1000	B	GA-GA
2022052	2022	2001-3000	A	GA-GA
2022063	2022	1501-2000	A	GA-GA
2022081	2022	2001-3000	B	GA-GA
2022086	2022	501-1000	A	GA-GA
2022102	2022	501-1000	B	GA-GA
2022139	2022	501-1000	B	GA-Mil
2022152	2022	2001-3000	B	GA-GA
2022185	2022	0-500	B	GA-GA
2022208	2022	1001-1500	B	GA-GA
2022242	2022	2001-3000	B	GA-GA
2022258	2022	0-500	B	Mil-Mil
2022264	2022	501-1000	B	GA-GA
2022269	2022	1001-1500	B	GA-GA
2022274	2022	501-1000	B	Civ Comm-GA

Table 7: All Aircraft-to-aircraft Risk-Bearing Airprox in ATZ/MATZ - 2022

SAFETY BARRIERS AND CONTRIBUTORY FACTORS

The conceptual model, which was first presented in the Annual Report for 2020, has been further developed and is now mature. However, it is worth taking some time to explain the depictions below. For completeness and by way of example, I will introduce the concept of barrier weighting and explain the different weightings assigned when in Controlled Airspace, as it serves to demonstrate a little more of the rationale behind those used for analysis within Uncontrolled Airspace.

In the model developed by the UKAB, there are 9 barriers to Airprox. They interact fluidly, not necessarily sequentially, nor do they all have to be engaged; they are, however, all linked, and one can draw a path through them for any given occasion by examining their specific performance and Contributory Factors as they are evaluated, on a collective or an individual basis. In addition, there is a recognition that the type of airspace will dictate the relative influence of the barriers on an Airprox – is it in Controlled Airspace - a known traffic environment? Or in Uncontrolled Airspace – a normally unknown traffic environment?

Consider an Airprox as a whole event, where the constituent parts – in terms of barrier performance – add up to 100%. With 9 barriers available to be in play, each makes a hypothetical contribution, but some are more influential than others: The conceptual depictions below have been scaled to represent the relative influence of the Ground Elements and the Flight Elements and the associated barriers within each of the Elements. The first thing to note is that, in Controlled Airspace, the Ground Elements collectively constitute 60% of the total barrier weighting, with Regulations, Processes and Procedures carrying the most weight. This is closely followed by the supporting barriers of Manning and Equipment and Situational Awareness which are then complemented by Electronic Warning Systems. For the Flight Elements the emphasis is largely on the Electronic Warning Systems barrier. This speaks directly to EC in all its forms and, for operations inside Controlled Airspace – particularly in Classes A and C airspace – the carriage of such equipment is mandatory and required to meet certain standards of accuracy and technical compatibility.

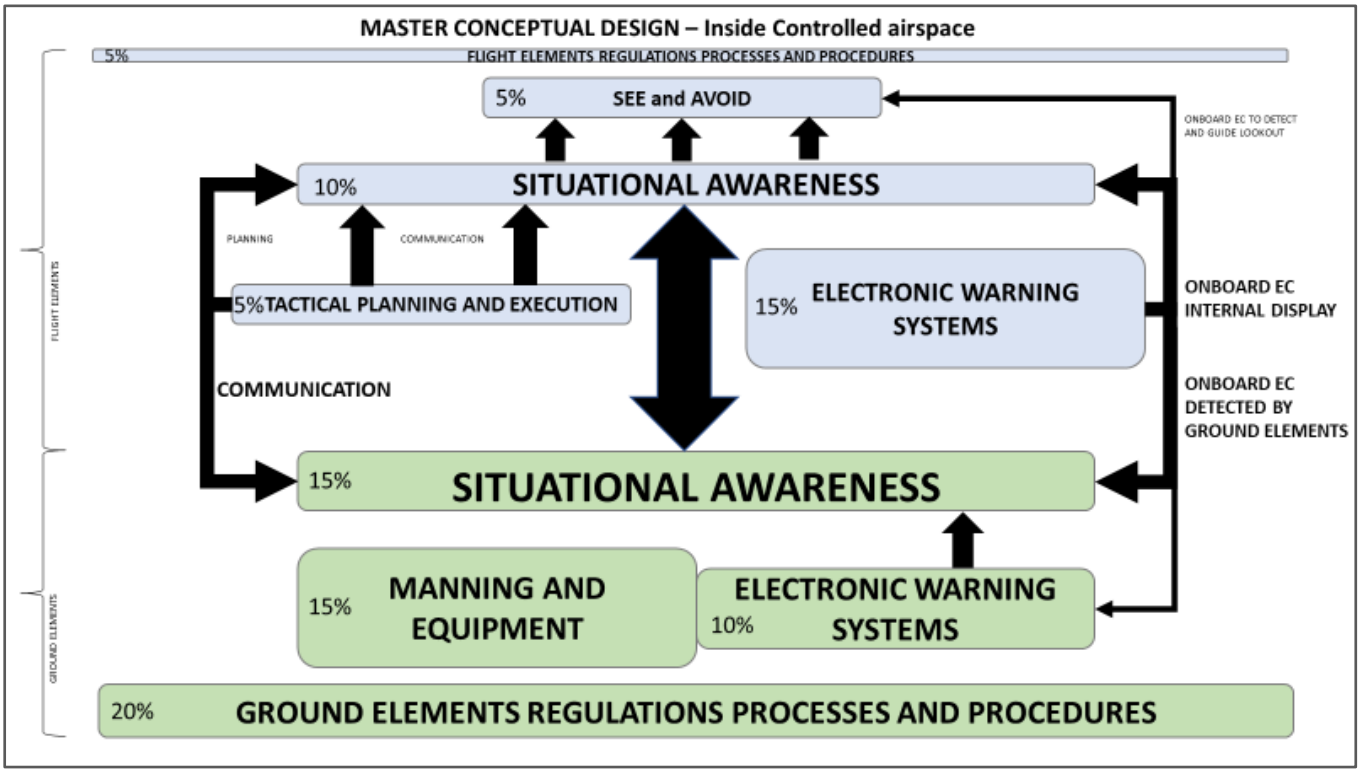


Figure 20: Schematic representation of top-level barrier interactions INSIDE CONTROLLED AIRSPACE

It should be noted that there is minimal emphasis on the See and Avoid barrier, and the reasons for this are obvious – Controlled Airspace is a known traffic environment and is relatively highly regulated. ANSPs conform to traffic separation minima, and it is their responsibility to control the traffic in such a manner as to not compromise these minima – See and Avoid is almost redundant and appropriately so, although it should not be discounted altogether because, as we have often seen, inadvertent penetrations of Controlled Airspace by non-squawking traffic do occasionally occur.

In contrast to the barrier diagram for Inside Controlled Airspace, with that of Outside Controlled Airspace – Class G airspace – the emphasis is almost entirely with the Flight Elements, with 75% of the barrier influence residing in this area. See and Avoid and Situational Awareness are paramount for the Flight Elements and are complemented with Electronic Warning Systems (in the form of EC) and the communication, planning and the execution aspects which are contained in the Tactical Planning and Execution barrier.

Only 25% of the total barrier contribution comes from the Ground Elements and is captured primarily in the Situational Awareness barrier. In Airprox barrier methodology, the only way to augment the Ground Elements Situational Awareness is through communication, the use of an appropriate level of Service and through the use of EC – which for the Ground Elements refers directly to transponding traffic which can be verified and identified on radar displays (although the use of Flight Information Displays (FIDs) – which use information from both assured and unassured sources – is on the increase, supported by appropriate regulation for the use of such devices).

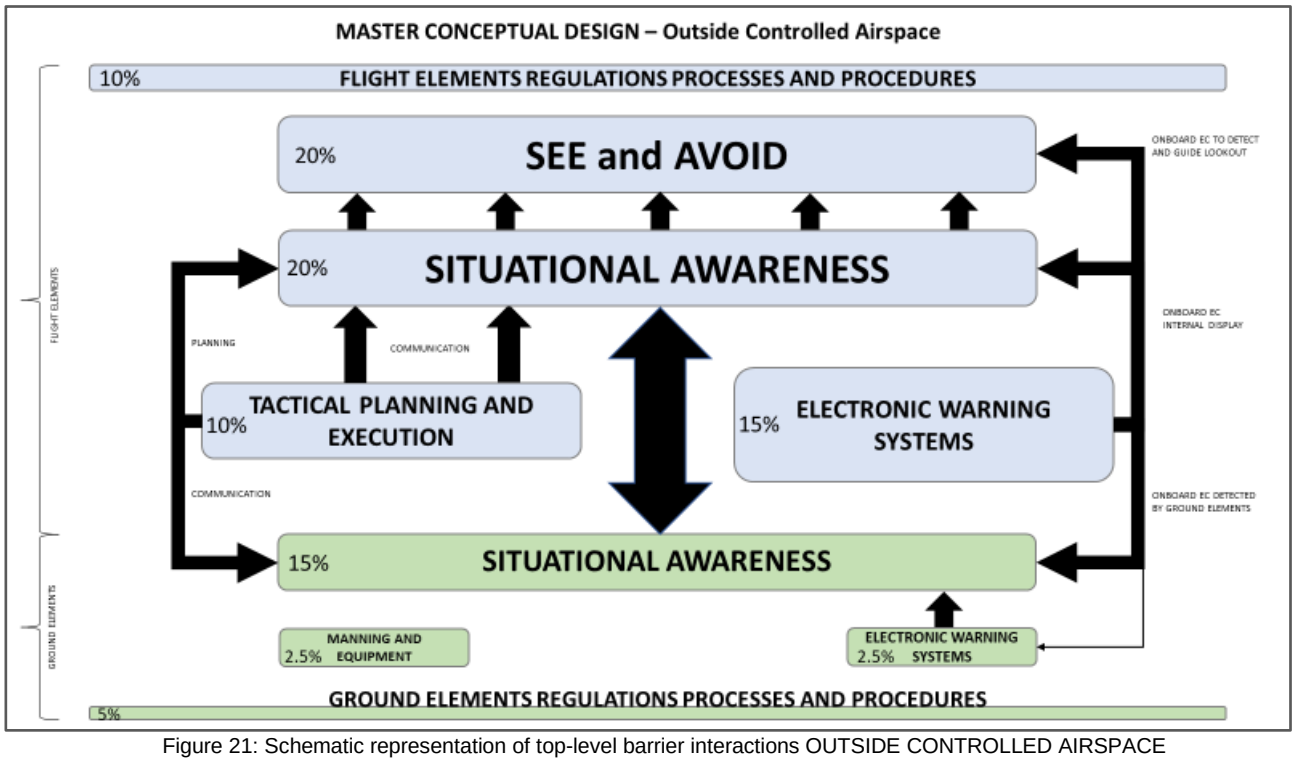


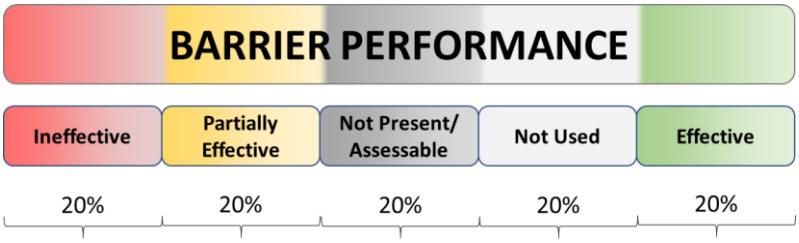
Figure 21: Schematic representation of top-level barrier interactions OUTSIDE CONTROLLED AIRSPACE

The specific weightings are shown in each diagram and help us to focus on appropriate areas where potentially minimum action will have a proportionately significant effect.

The vast majority of Airprox in the UK take place in Uncontrolled Class G Airspace. Therefore, it is the diagrammatic representation in Fig 21 that I shall take forward and develop further. The following section uses colour to indicate the overall performance of each barrier and uses the percentage performance distributions in representative proportions dependent on the risk being discussed at the time. This is a continued development of the concept and a way of illustrating the barrier interactions. As with the last 2 years, I will compare risk-bearing performance with Category E barrier performance

and will also compare the Category C events. Category C events are important because they qualify those occurrences where safety has indeed been degraded but where there has not been an actual risk of collision. By comparing the performance of the barriers for these categories, I will show that the principle of See and Avoid is the overriding factor in MAC mitigation outside Controlled Airspace. I will also show that the effectiveness of the See and Avoid barrier can be enhanced most effectively by focussing effort on promoting the use of compatible EC equipment, carrying a transponder and communicating with an appropriate ANSP whilst engaging the best Service possible. As further mitigation, adopting a considerate, defensive and responsible attitude to flying will strengthen the Tactical Planning and Execution barrier – as long as the rules, regulations and procedures have been followed.

Colouring metric with consistent ordering from left to right:



Each of the following diagrams of this type has accurate barrier colouration and accurate barrier proportion; the GA Sports and Recreational community is used as the example Sector Mix, unless otherwise stated.

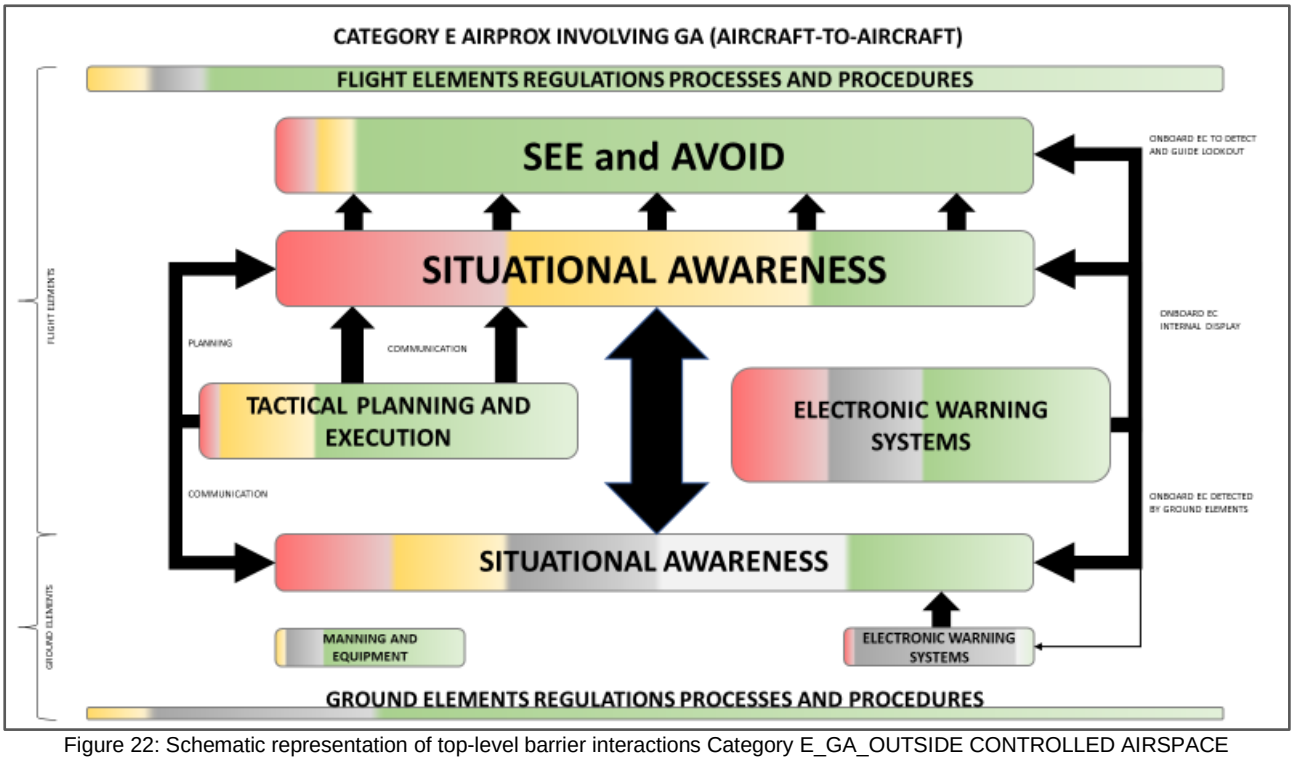


Figure 22: Schematic representation of top-level barrier interactions Category E_GA_OUTSIDE CONTROLLED AIRSPACE

For Category E Airprox:

Figure 22 above depicts barrier performance for all category E events in 2022 that involved GA. These are events in which the Board has determined that there was no degradation of safety and normal safety parameters have been met (for the context in which the Airprox took place). Category E events

are useful because we are able to collect information detailing the perspectives of the individuals, the facts and the circumstances of an event which would otherwise not be available to us. If we then look at the performance of the barriers over the set of category E events, we can show what an uneventful encounter looks like and use it as a baseline comparator for Airprox where safety is degraded and where one is risk-bearing.

What is most noteworthy from the examination of Figure 22 is the fragility of the Flight Elements Situational Awareness barrier. As previously discussed, once airborne, this barrier can only be augmented through the use of an appropriate ANSP (coupled with the use of an appropriate service – captured in the Tactical Planning and Execution barrier) or through information gleaned from an EC device. The green portion of the Tactical Planning barrier tells us that, for the most part, the pilots had planned and executed their sortie effectively and that they were talking with an appropriate agency for the majority of the time. However, the white portion of the Ground Elements Situational Awareness barrier tells us that there is still a large percentage of flights where the pilots only choose a Basic Service – i.e., the barrier is engaged through communication, but it is Not Used as the pilot(s) are only in receipt of a service where ATC is not required to monitor their aircraft or the controller/FISO is not equipped with surveillance equipment. Where the barrier is green, this represents occasions where a Traffic Service (or higher) is in play or ATC happens to be actively involved in communicating with the pilot(s) of one or both of the aircraft at the time of the Airprox.

Electronic Warning Systems are employed 75% of the time and are effective for half of the Category E Airprox in 2022. Use of EC equipment significantly enhances Flight Elements Situational Awareness and directly influences the See and Avoid barrier. With See and Avoid being the primary (and usually final) barrier to avoiding Airprox, it is essential that any and all tools are employed to strengthen this barrier.

For Category E Airprox, the EWS barrier was Effective (Green) 50%, Not Present in either aircraft (Grey) only 19%, Not Used in 4% and fitted but Ineffective (Red) in 27% of the total aircraft-to-aircraft occurrences in 2022.

For Category E aircraft-to-aircraft Airprox in 2022, the Ground Elements Situational Awareness barrier was Effective (Green) 42% of the time, Not Used (Basic Service) or Not Present at all 34% of the time and Ineffective only 12% of the time.

For Category E aircraft-to-aircraft Airprox in 2022, the Flight Elements Situational Awareness barrier was Effective (Green) 35%, Partially Effective 38% or Ineffective 27% of the time.

For risk-bearing Airprox, the picture is markedly different:

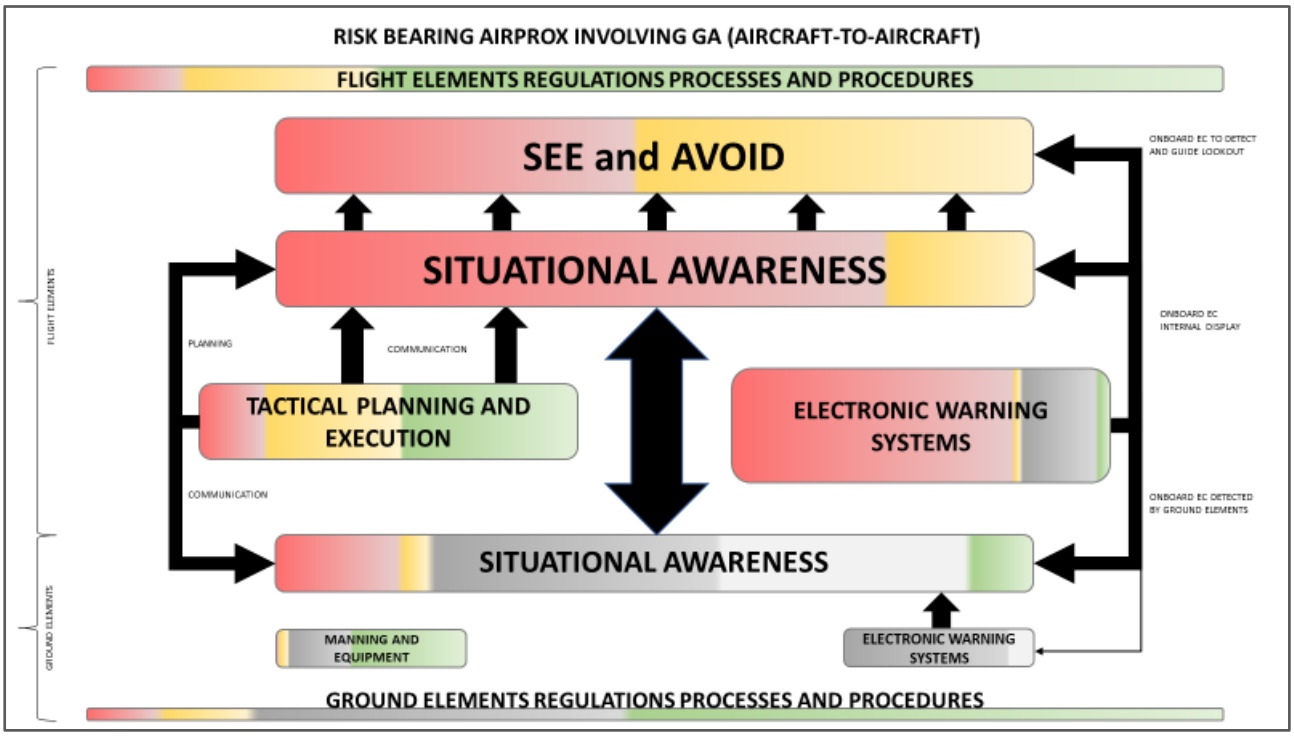


Figure 23: Schematic representation of top-level barrier interactions Risk Bearing_GA_OUTSIDE CONTROLLED AIRSPACE

The changes in the performance of all the Flight Elements barriers, together with that of the Ground Elements Situational Awareness barrier, is evident. The poor performance of the Electronic Warning Systems barrier, through either incompatibility or non-fitment of EC equipment, combined with poor planning and execution and the proportion of the time when the Ground Elements Situational Awareness barrier (normally ATC) was not engaged at all or Not Used (Basic Service), means that the Flight Elements Situational Awareness barrier was NEVER fully effective. With little or no chance of any external influence to guide pilots' lookout, it is purely the quality of an individual's lookout, or indeed good fortune, which led the outcome to be an Airprox and not a MAC.

For risk-bearing Airprox, the Flight Elements Electronic Warning Systems barrier was Effective (Green) only 4%, Not Present in either aircraft (Grey) for 20%, Partially Effective 2% and fitted in at least one aircraft but Ineffective (Red) 74% of the time.

For risk-bearing Airprox, the Ground Elements Situational Awareness barrier was Effective (Green) 9%, Not Used (Basic Service) 32% or Not Present at all 38%, Partially Effective 5% and Ineffective 16% of the time.

For risk-bearing Airprox, the Flight Elements Situational Awareness barrier was NEVER FULLY EFFECTIVE.

Category C Airprox represent those times where there has been no risk of collision but where safety has been assessed by the Board to have been degraded. The main changes in the barrier performances of this set of occurrences is evidence of an increase in the effectiveness of the Electronic Warning System barrier (albeit there is still some way to go to improve the performance of this barrier), a potentially associated increase in the performance of the Flight Elements Situational awareness barrier, a marked reduction in the proportion of time that pilots are not communicating at all with an ANSP and a resultant and significant increase in the performance of the See and Avoid barrier. Of course, it could just be that pilots who have Category C Airprox conduct a better lookout or are better served by the 'application of the big sky theory'. However, it is more likely to be as a result of increases in performance of the other critical barriers and their combined influence on the critical, and final, See and Avoid barrier.

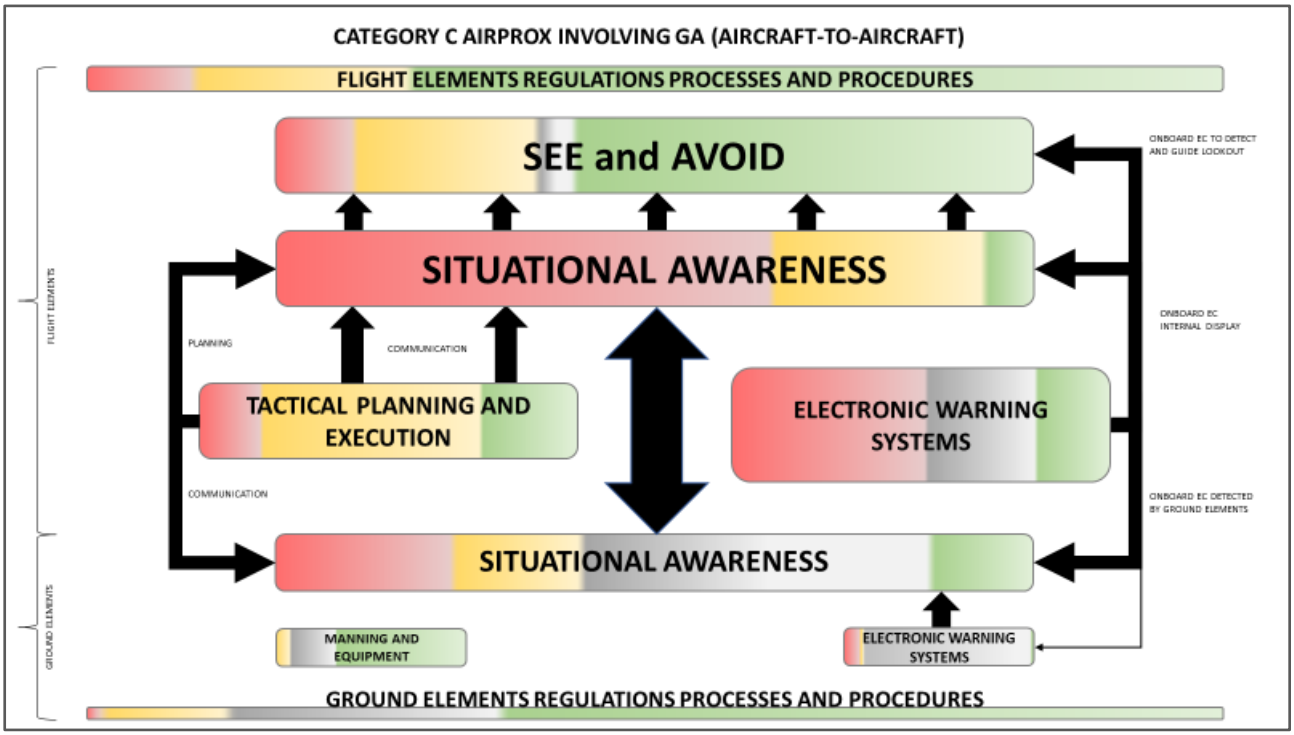


Figure 24: Schematic representation of top-level barrier interactions Category C_GA_OUTSIDE CONTROLLED AIRSPACE

For Category C Airprox, the Flight Elements Electronic Warning System barrier was Effective (Green) 23%, Not Present in either aircraft (Grey) 29% and fitted in at least one aircraft but Ineffective (Red) 48% of the time.

For Category C Airprox, the Ground Element Situational Awareness barrier was Effective (Green) only 14%, Not Present (Grey) 24%, Not Used 20%, Partially Effective 19% and Ineffective (Red) 23% of the time.

For Category C Airprox, the Flight Elements Situational Awareness barrier was Effective (Green) only 8%, Partially Effective 31% and Ineffective (Red) 61% of the time.

In the 2020 annual report the concept of barrier interactions was introduced, and these interactions were demonstrated by plotting the effectiveness of one barrier against another. Book 36, 2020 annual report can be found at this link: https://www.airproxboard.org.uk/media/oahp00s3/bluebook36.pdf

BARRIERS AND CONTRIBUTORY FACTORS BY SECTOR

Having examined the barrier interactions in a slightly different way, scaling the relative influences of each on Airprox outcomes and having used colour to represent the collective performance of the barriers for GA Sports and Recreational instances, it is still useful to examine performance of the specific barriers as individual entities, and to draw out the top five Contributory Factors which have influenced those performances. It is important to remember that Contributory Factors are generally only assigned when the barrier has been compromised, so these Contributory Factors indicate areas for individuals, clubs, operating authorities, or responsible bodies to consider when assessing what it is that they can do to improve either individual or collective performance and help to inform risk mitigation strategies and develop regulation with a view to improving collective safety.

We will consider the barriers and top 5 Contributory Factors for Airprox involving the GA Sports and Recreational community, those involving the military community and those where the RPAS flyer reported the Airprox.

Before looking at each of the sectors, it is useful to summarise the key points associated with the five worst performing barriers where Human Factors are the main influence:

Ground Elements – Situational Awareness

The Ground Elements Situational Awareness barrier is a two-sided barrier based upon the relationship between an ANS provider (controller/FISO/AGO) and a pilot. For the barrier to be fully effective, the controller/FISO themselves *must* have situational awareness about the 2 aircraft involved in the Airprox. For a large number of Airprox, the type of service provided either did not require the ANS provider to monitor the aircraft on surveillance equipment (Basic Service), was not using surveillance equipment, or was not permitted to manage the traffic in the visual circuit (FISO/AGO i.e., not a controller). In these circumstances, the Board normally assesses the barrier as 'not used'. Furthermore, even when providing a service whereby the controller was required to give Traffic Information, if the controller has no knowledge of the conflicting aircraft, Traffic Information cannot be provided; examples of this might be a glider not displaying on radar or an intermittent primary-only contact. Finally, the controller must be able to pass on the associated information to the pilot, and so 2-way communication is essential to this barrier's function.

Flight Elements Situational Awareness

The Flight Elements Situational Awareness barrier describes all elements of situational awareness available within the cockpit, be that controller-derived from listening-out on a frequency or from EC equipment. The Board may also be of the view that a pilot should have generic situational awareness derived from planning documents: e.g., gliders should be expected near a glider site marked on a chart, increased aerial activity can be expected in areas marked on charts as AIAA.[1]

Tactical Planning and Execution Barrier

The Tactical Planning and Execution barrier involves both pre-flight and in-flight planning, plan adaption, communication and execution and it is available to be used in all Airprox environments. It also forms a fundamental and intrinsic part of Threat and Error Management and should be diligently undertaken prior to every flight. This barrier is primarily concerned with conducting thorough flight preparation on the ground to release capacity in the air, which then enables accurate and effective execution of the task and comprehensive communication with ground agencies and other air users. As such, it should be the easiest barrier for pilots to address. It is, however, the barrier most susceptible to human performance-driven errors – especially those rooted in inexperience.

[1] Area of Intense Aerial Activity.

Electronic Warning Systems Barrier

The Electronic Warning Systems barrier is available for use in all Airprox and indeed forms a key element in the safety barrier system. Like the Tactical Planning and Execution barrier, it contributes to both the Ground and Flight Elements Situational Awareness barrier, but also contributes to the See and Avoid barrier (through guiding visual acquisition) and additionally to the Ground Elements Electronic Warning Systems barrier. This barrier is slightly different from the others in that it is independent to a very large degree of Human Factors: a system is either fitted (appropriately) or it is not. Of course, its efficacy also depends on the geometry of the Airprox and the familiarity of the user with their equipment (amongst other factors), however, these factors feature less than the presence of EC equipment or its compatibility. It should be noted that the proliferation of carry-on EC equipment has led to a higher proportion of Airprox where the barrier is available, but this may not equate to an improved performance of this barrier.

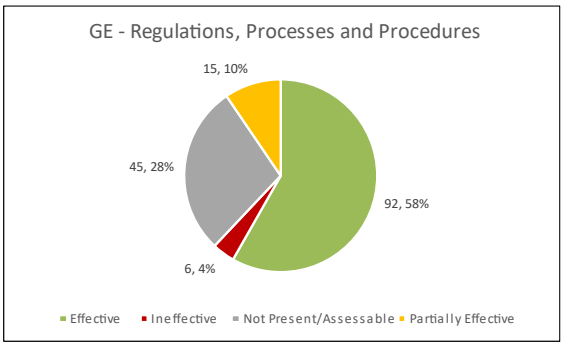
See and Avoid Barrier

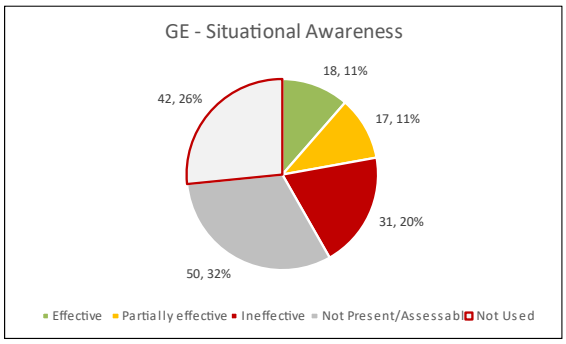
The See and Avoid barrier, according to the conceptual model presented at Figure 21, can be considered to be the last barrier to any Airprox – however, it should be noted that barrier interactions are rarely consecutive in nature and any one of them can be in play at any one time. Additionally, the influence of this barrier overrides the performance of any of the others.

> In 2022, where the Flight Elements See and Avoid barrier was FULLY EFFECTIVE**,** the result of the encounter was either a Category C, D or E (i.e., non-risk-bearing) event in **ALL** of those Airprox.

AIRPROX INVOLVING GA SPORTS AND RECREATIONAL AIRCRAFT – RISKS A/B/C

GROUND ELEMENTS



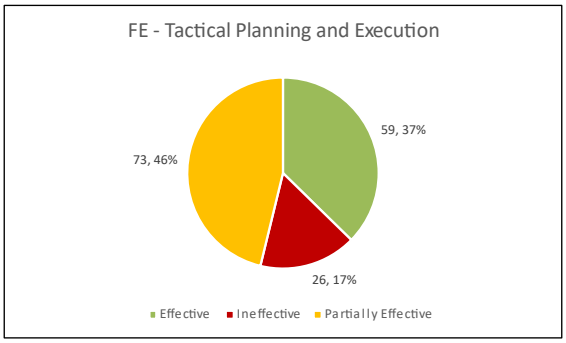


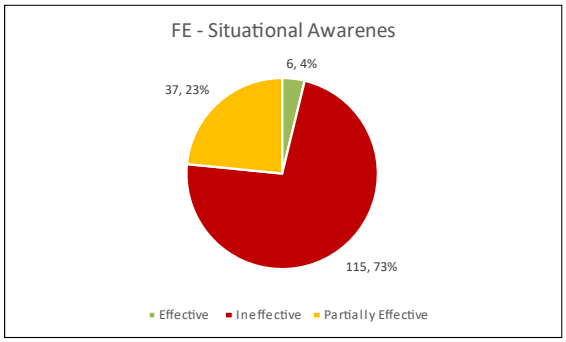
Key Points:

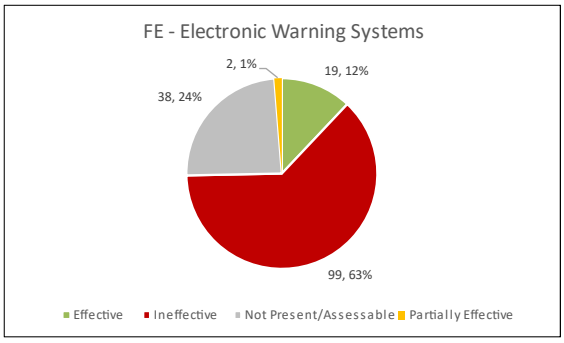
These Barriers were not engaged at all on 45 occasions (28% of the time). This is because neither aircraft's pilot was communicating with an ANSP, or there wasn't one available (e.g., no coverage or away from the environs of an airfield). Where the Regulations, Processes and Procedures barrier was engaged, it was largely effective, however, it is also evident that the Situational Awareness barrier was Not Used 26% of the time – which is an improvement over 2021 – but this still shows that either a pilot had only agreed a Basic Service with the controller, or the aircraft was joining/departing an airfield or in a circuit environment with an AGO or AFISO. On 72% of occasions, there was an opportunity for the Ground Elements to play a positive role in the interaction, but they were either denied the ability to do so by the Flight Elements, or were unable to do so by virtue of the privileges of their licence, for 37% of those occasions. This has a direct impact on the Flight Element Situational Awareness barrier and is evidenced by its particularly poor performance in Category A/B/C Airprox.

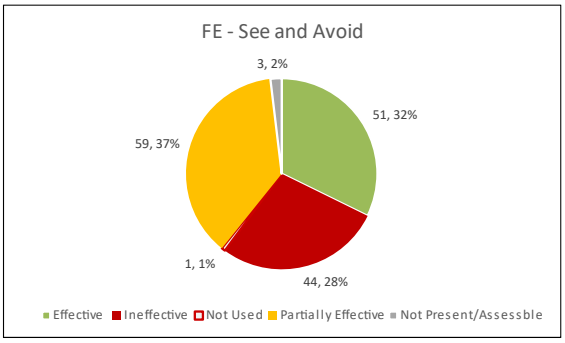
> Agreeing an appropriate level of service (surveillance-based, where available) from an ANSP will markedly increase the performance of the Ground Elements and will directly affect the performance of the Flight Elements Situational Awareness barrier.

FLIGHT ELEMENTS









The key point from this set of charts is that, for 96% of the time, the Flight Elements have only partial or no situational awareness of the evolving scenario, and so we must refer to the Tactical Planning and Execution and the Electronic Warning Systems barriers to understand why this might be the case. The most prevalent Contributory Factors for the Flight Elements Situational Awareness barrier are:

FLIGHT ELEMENTS SITUATIONAL AWARENESS - AIRPROX INVOLVING GA SPORTS & RECREATIONAL – RISKS A/B/C
Situational Awareness and Sensory Events-Pilot had no, late or only generic, Situational Awareness
Lack of Action-Pilot flew close enough to cause concern despite Situational Awareness
Understanding/Comprehension-Pilot did not assimilate conflict information
Lack of Communication-Pilot did not request additional information
Mentoring

Table 8: Flight Elements Situational Awareness – Airprox involving GA Sports and Recreational aircraft.

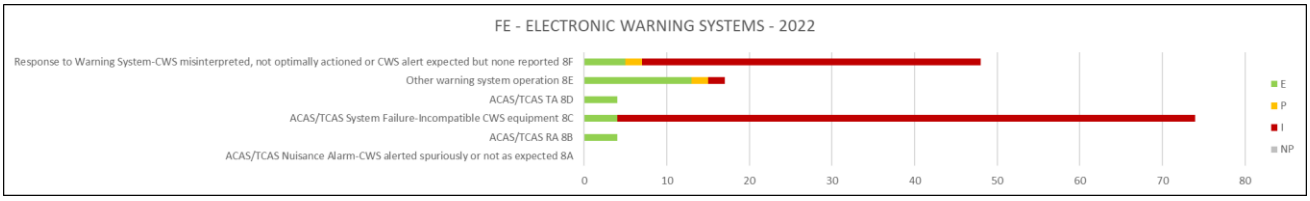
The Board evaluations determined that the Tactical Planning and Execution barrier was only fully effective 37% of the time (although this is an improvement over 2021). The Contributory Factors for this barrier are key and it can be seen from Table 9 that they are, essentially, all aspects of what is known as threat and error management. This barrier includes the checking NOTAMs (pre-flight and in-flight), planning the route to avoid areas of active airspace (e.g., avoiding overflying gliding sites, where possible), understanding and following the departure/arrival procedures at airfields, recognising personal limitations in terms of currency and recency and finally in the communication plan for the flight.

For the Tactical Planning and Execution barrier the following are the Contributory Factors which are worthy of further consideration by all communities:

TACTICAL PLANING AND EXECUTION – AIRPROX INVOLVING GA SPORTS & RECREATIONAL – RISKS A/B/C
Insufficient Decision/Plan (Inadequate plan adaption)
Action Performed Incorrectly (Incorrect or ineffective execution)
Monitoring of Other Aircraft (Did not avoid/conform with the pattern of traffic already formed)
Communications by Flight Crew with ANS (Pilot did not communicate with appropriate ATS provider)
Accuracy of Communication (Ineffective communication of intentions)

Table 9: Tactical Planning and Execution barrier – Airprox involving GA Sports and Recreational aircraft.

Finally, the EWS barrier is either not present or is ineffective 87% of the time. With no equipment fitted the barrier does not contribute in any way to the mitigation of mid-air collision; with incompatible EC equipment fitted it is equally redundant. One key take-away from the work of the UKAB is this area and this specific point. The current regulatory position regarding EC in Class G has led to myriad systems available to pilots, very few of which are compatible with each other. Furthermore, and as a secondary but equally influential factor, is training in the interpretation of the information available from the interactions of compatible equipment. This is the second most prevalent reason for the failure of the EWS barrier.

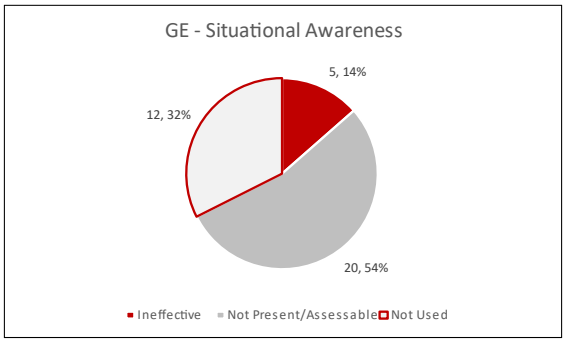


Every opportunity to augment Situational Awareness should be taken: Plan, revise if necessary and communicate. Fit and understand your EC equipment. Proper preparation will increase capacity and all of the above will contribute to your ability to concentrate on a robust and accurate LOOKOUT, which is the **final** barrier to mid-air collision in Class G Airspace.

AIRPROX INVOLVING GLIDERS – RISKS A/B/C

One of the main subsectors within GA Sport and Recreational aircraft is those Airprox involving Gliders. There are specific challenges which highlight areas of concern with the integration of powered and non-powered aircraft into the same minimally regulated portion of airspace that is characterised by Class G operations.

GROUND ELEMENTS

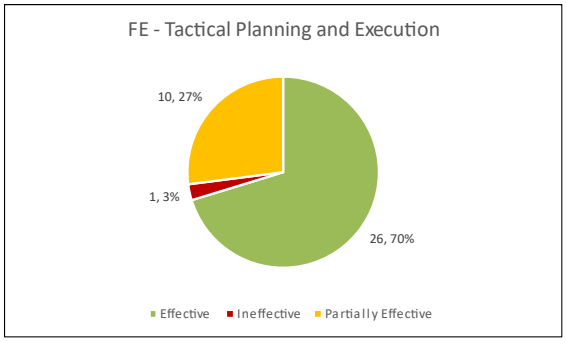


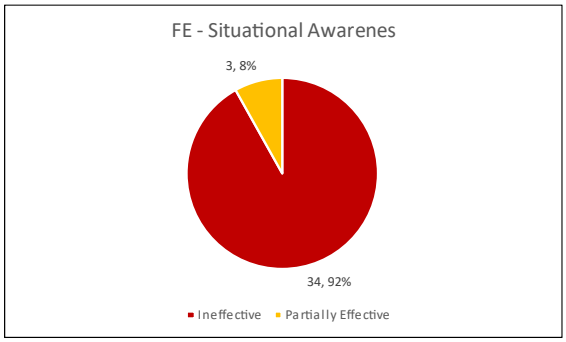
For Airprox involving Gliders, the Ground Elements are only engaged in an active way 14% of the time, with only a Basic service being provided on 22% of the occasions (almost exclusively by the pilot of the powered aircraft). Notably, for Airprox involving Gliders, the Ground Elements Situational Awareness barrier was NEVER effective in 2022. It is acknowledged that Flight Radio Telephony Operator's Licences (FRTOL) are not required for glider pilots. However, the utility of communicating with Air Traffic Control cannot be understated and the efforts taken by the BGA in promoting the benefits of obtaining a FRTOL are extremely welcome.

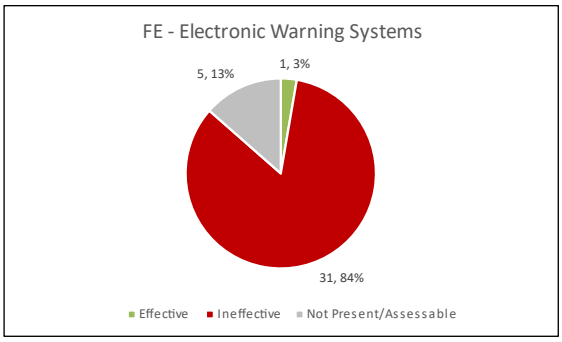
There is little else to comment on with regard to the Ground Elements for Airprox involving Gliders, apart from noting that the majority of gliders do not carry transponders and will only occasionally appear as primary returns with no information on ATC radar equipment, if installed. However, it has become apparent that more glider pilots are carrying devices with an ADS-B-out function to highlight their presence to those capable of receiving an ADS-B signal. It is worth noting, though, that glider pilots tend not to exploit the data from these devices, preferring to use a system designed specifically for the gliding community.

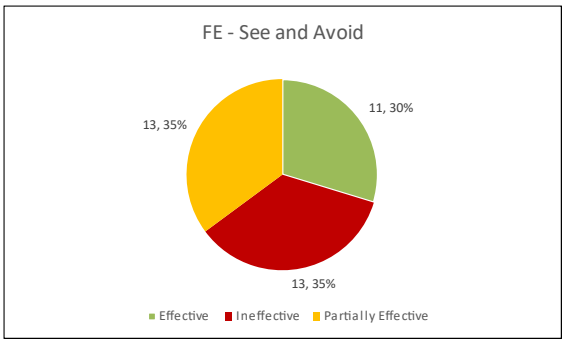
FLIGHT ELEMENTS

There are, however, a number of significant differences when one examines the Flight Elements, either in the performance of the barriers or, where the performances seem similar, in the contributory factors underpinning them:









Whilst the Tactical Planning and Execution barrier appears to perform markedly better in Airprox involving gliders, the Contributory Factors are markedly different – for Airprox involving GA Sports and Recreational aircraft (which would also have included gliders) the most frequent were 'Insufficient Decision/Plan' and 'action performed incorrectly'.

For Airprox involving Gliders, the top 5 Contributory Factors are:

TACTICAL PLANING AND EXECUTION – AIRPROX INVOLVING GLIDERS – RISKS A/B/C
Communications by Flight Crew with ANS (Pilot did not communicate with appropriate ATS provider)
Pre-flight briefing and flight preparation
Aircraft Navigation-Flew through promulgated and active airspace
Transponder Selection and Usage
Accuracy of Communication (Ineffective communication of intentions)

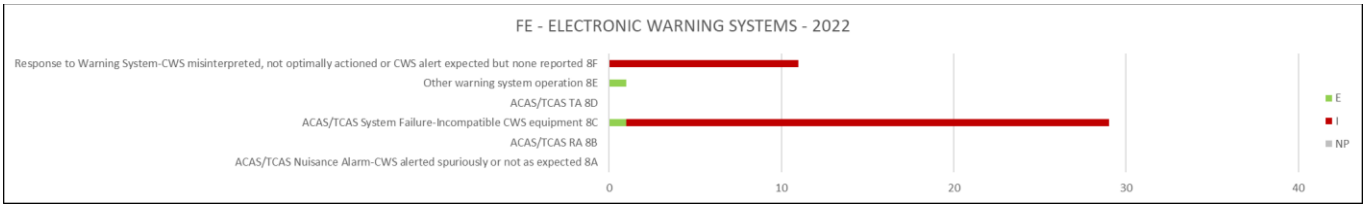
Table 10: Tactical Planning and Execution barrier – Airprox involving Gliders

Not only are the Contributory Factors different (apart from the communication piece) but it is an observed fact from the Board's deliberations that the degradation in this barrier from what appears to be poor planning and the resultant actions of flying through promulgated and active airspace *and* having an Airprox are normally the actions of the pilot of the powered aircraft.

The Situational Awareness barrier is NEVER fully effective – this is normally only observed with risk bearing Airprox, not with Airprox categorised A to C. Because so few glider pilots are permitted to communicate with ATC (unless they hold a FRTOL), the only other way to positively influence the Situational Awareness barrier is through EC as captured in the Electronic Warning Systems barrier, which is equally weak. For the See and Avoid barrier, it is the accuracy and quality of lookout – cued from EC equipment where it is fitted and compatible. It therefore follows that the performance of the EWS barrier is important and intrinsically linked to SA and the See and Avoid barrier.

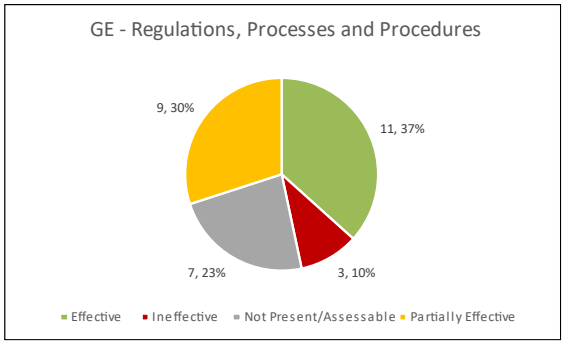
Alarmingly, for the subset of Airprox in the GA Sports and Recreational sector which involve gliders, the Electronic Warning Systems barrier is Ineffective 84% of the time, Not Present 13% of the time and Effective only 3% of the time. Where the barrier is Ineffective, it is as a result of incompatibility of electronic compatibility equipment on 70% of those occasions.

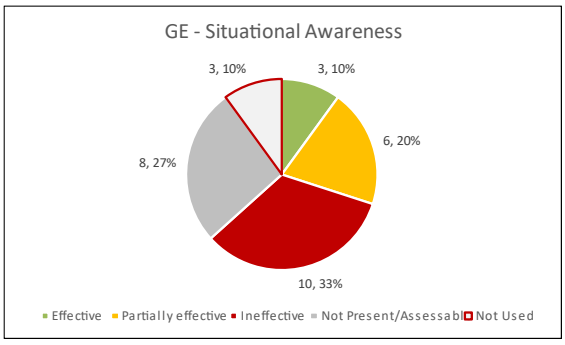
> EC equipment which responds and reacts only to transponding traffic will NOT be effective with Gliders as the majority of them do not have transponders and, if they are fitted, they are often turned OFF to conserve battery power.



AIRPROX INVOLVING MILITARY AIRCRAFT – RISKS A/B/C

GROUND ELEMENTS





For Airprox involving military aircraft, we can see a markedly different distribution of the performance of these 2 barriers. Note the percentage of time that the Ground Elements Situational Awareness Barrier is not engaged at all – only 27% (compared to 32% for Airprox involving GA). This means that for 73% of the time one or both of the pilots were engaged with ANSPs. Additionally, the barrier is Not Used on only 10% of the occasions. This means that the ANSPs involved were offering a service greater than a Basic Service. With Airprox, it is the case that we collect information when something strays from normal operations – it is crucial that the correct conclusions are drawn as it would be easy to conclude that the performance of the Ground Elements Situational Awareness barrier is 'not as bad' when the barrier is not used (as in Airprox involving GA). The Regulations Processes and Procedures barrier seems to perform less well than with GA, and the proportions of Partially Effective and Ineffective are larger. Although this may appear to be an overall weaker performance of the Barrier, when we combine the proportions of Ineffective and Not Present for each sector then we see that the Barrier is at least Partially Effective for a broadly similar proportion of events in both sectors, as we will see when we look at the performance of the Flight Elements Situational Awareness barrier. What this data reveals are the main areas that compromise a barrier *when that barrier is* engaged. Note that there were only 42 Airprox involving Military aircraft, and this includes 5 that were reported by the UA/Other operator but were fully evaluated.

Furthermore, where the Ground Elements Situational Awareness barrier was Ineffective or Partially Effective, the Ground Elements Regulations, Processes and Procedures barrier was also compromised on 58% of occasions (usually due to Traffic Information having not been passed when it should have been – see Table 11 below).

GROUND ELEMENTS SITUATIONAL AWARENESS BARRIER – AIRPOX INVOLVING MILITARY – RISKS A/B/C
ANS Traffic Information Provision-TI not provided, inaccurate, inadequate, or late
Expectation/Assumption-Concerned by the proximity of the aircraft
Conflict Detection-Not Detected
Conflict Detection-Detected Late
ANS Flight Information Provision-The ATCO/FISO was not required to monitor the flight under a Basic Service

Table 11: Ground Elements Situational Awareness – Airprox involving Military Aircraft

Airprox worthy of further study from the Ground Elements perspective are:

Airprox No	Year	Alt Block	Risk Category	Sector Mix
2022004	2022	1001-1500	A	GA-Mil
2022015	2022	0-500	C	Mil-Mil
2022038	2022	0-500	C	Mil-UA/Other
2022050	2022	1001-1500	A	GA-Mil
2022092	2022	2001-3000	C	GA-Mil
2022100	2022	1001-1500	C	GA-Mil
2022202	2022	2001-3000	C	GA-Mil
2022237	2022	501-1000	C	Mil-Mil
2022250	2022	1501-2000	C	GA-Mil

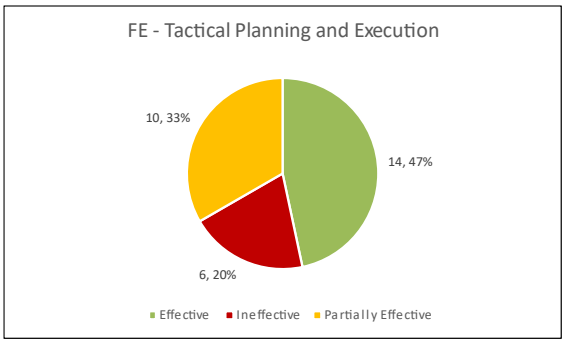
Table 12: Airprox involving Military Aircraft – worthy of study

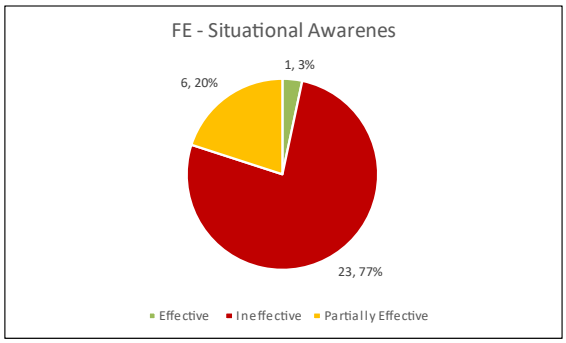
FLIGHT ELEMENTS

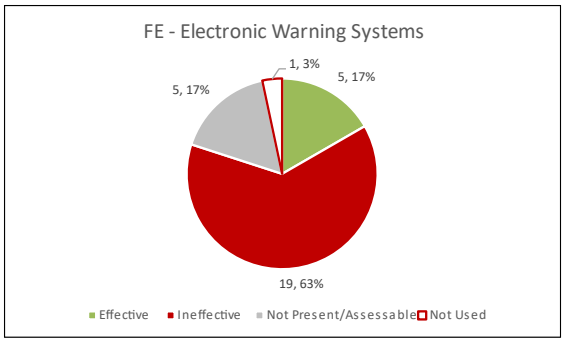
What is striking in this set of graphics is the similarity in performance of the Tactical Planning and Execution and Situational Awareness barriers when compared with the General Aviation sector. This is unsurprising when we consider that 67% of Airprox involving military aircraft were with the GA sector. Similarly, the Electronic Warning Systems barrier does not perform markedly better than for the GA sector, but it is worthy of note that there is a higher percentage of encounters where EC equipment is fitted, reflecting the extensive work that Defence has undertaken in this regard. Sadly, barrier performance will remain weak unless or until a common standard for EC is agreed and mandated for carriage in Class G airspace. Finally, we can see that the See and Avoid barrier shows a pronounced improvement over the GA sector, and this is likely because lookout is formally instructed in the military and is continually assessed.

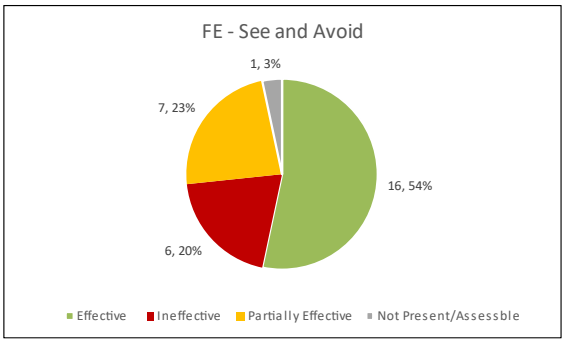
FLIGHT ELEMENTS SITUATIONAL AWARENESS BARRIER – AIRPROX INVOLVING MILITARY AIRCRAFT – RISKS A/B/C
Situational Awareness and Sensory Events-Pilot had no, late or only generic, Situational Awareness
Understanding/Comprehension-Pilot did not assimilate conflict information
Unnecessary Action-Pilot was concerned by the proximity of the other aircraft
Interpretation of Automation or Flight Deck Information-Pilot engaged in other tasks
Lack of Action-Pilot flew close enough to cause concern despite Situational Awareness

Table 13: Flight Elements Situational Awareness – Airprox involving Military Aircraft









Interestingly the Tactical Planning and Execution Barrier performs significantly better than in those Airprox involving GA Sports Recreational aircraft; the top 2 reasons for barrier compromise are the same as for the GA sector, but note the appearance of Flight Planning Information Sources and Pre-Flight Briefing and Flight Preparation:

TACTICAL PLANING AND EXECUTION – AIRPROX INVOLVING MILITARY AIRCRAFT – RISKS A/B/C
Insufficient Decision/Plan-Inadequate plan adaption
Action Performed Incorrectly-Incorrect or ineffective execution
Flight Planning Information Sources
Pilot did not request appropriate ATS service or communicate with appropriate provider
Pre-flight briefing and flight preparation

Table 14: Tactical Planning and Execution barrier – Airprox involving Military aircraft

Noting that the top 2 contributory factors reflect either not taking the most appropriate course of action or selecting the correct option but not quite executing it correctly, it is perhaps a little concerning that, with dedicated resources to ensure that planning information is available to crews, this barrier is compromised by information being unavailable on the ground prior to flight or being available but not referenced by crews. With so few Airprox involving Military aircraft, it must be said that there is not a very high count of these contributory factors but, nonetheless, it can be seen that a less-than-thorough pre-flight preparation can have an impact on the safe execution of the flight.

Finally, when the Electronic Warning Systems barrier was Ineffective, it was always a mix of Military and either GA Sports and Recreational aircraft or RPAS, where compatibility and/or carriage of equipment was a significant issue.

It should be noted that there were only 6 aircraft-to-aircraft risk-bearing Airprox that involved Military aircraft. The majority of them were categorised as Category C, where safety was degraded but there was no risk of collision. This distribution is largely down to the performance of the See and Avoid barrier, meaning that the conflicting aircraft (either sector) was seen with sufficient time to introduce deconfliction without the need for emergency or radical avoiding action. It is noteworthy that, in 2022, the contributions of the Situational Awareness barrier and the Electronic Warning System barrier to the performance of the See and Avoid barrier are limited and does not reflect the relationship between these barriers that has been seen in previous years. It may be that less attention is being paid to EC devices that may give unreliable indications – or not – of nearby traffic, or that lookout is preferred over other means of threat detection; with such a small sample size, it is impossible to draw firm conclusions. However, there are areas which deserve focus, and these are summarised below:

ALL AIRPROX INVOLVING MILITARY AIRCRAFT	
GROUND ELEMENTS	**FLIGHT ELEMENTS**
ANS Traffic Information Provision-TI not provided, inaccurate, inadequate, or late	**Incompatible CWS equipment**
ATM Regulatory Deviation-Regulations and/or procedures not fully complied with	**Monitoring of Other Aircraft-Non-sighting or effectively a non-sighting by one or both pilots**
Expectation/Assumption-Concerned by the proximity of the aircraft	**Identification/Recognition-Late sighting by one or both pilots**
Aeronautical Information Services-The Ground entity's regulations or procedures were inadequate	**Insufficient Decision/Plan-Inadequate plan adaption**
Radar Coverage-Non-functional or unavailable	**Flight Planning Information Sources**

Table 15: General Contributory Factors – Airprox involving Military Aircraft

AIRPROX REPORTED BY RPAS (FULL BOARD EVALUATIONS) – RISKS A/B/C

The final bespoke section concerns the findings relating to interactions between RPAS and piloted air vehicles. Although the numbers are small, these Airprox are significant because the RPAS flyer has reported the occurrence. This simply means that the UKAB Secretariat is able to trace the conflicting aircraft and the Board is therefore able to conduct a full evaluation of the event.

This is not the case with UA/Other Airprox where the non-piloted vehicle is usually untraceable. As with all sectorised Airprox, it is the differences in the barrier performances which are illuminating, so it is useful to use the barrier conceptualisation diagram to illustrate the dynamics of the situation. For these cases, I will also present the See and Avoid barrier qualified from both the perspective of the RPAS flyer and then the Piloted aircraft.

It is clear that the Ground Elements play very little, if any, part in this type of Airprox, realistically leaving the Flight Elements with the only levers to mitigate against an occurrence.

We can also see that the Regulations, Processes and Procedures barrier generally performs well.

For the Tactical Planning and Execution barrier the main Contributory Factors to an Ineffective or only Partially Effective barrier are planning, preparation and plan adaption, driven by the difficulties of either party having any prior knowledge during the pre-flight planning stage of the presence of the other, and are therefore unable to modify their plan to take account of this.

> The Ground Elements are not able to add much, if any, value to RPAS Flyer operations.

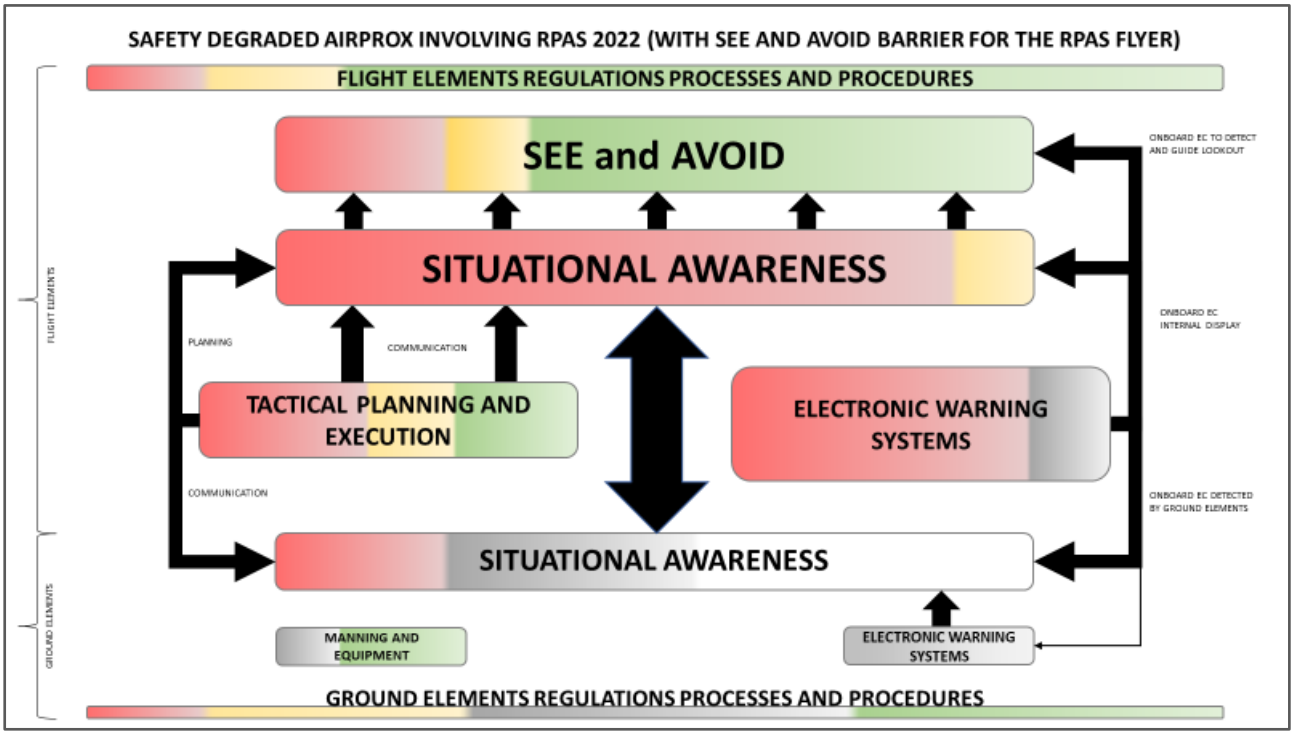


Figure 25: Schematic representation of top-level barrier interactions_RPAS reported_A/B/C_See and Avoid from RPAS operator.

On 2 occasions the RPAS was fitted with a form of EC, or the operator was utilising an ADS-B-based situational awareness tool, which alerted the flyer to the presence of the approaching aircraft; in both these cases a Risk Category of E was assigned by the Board. In all other cases, it was either

Ineffective through incompatibility where a piece of equipment was fitted to the piloted aircraft and not fitted to the RPAS, an alert was not received or there was no equipment fitted to either aircraft.

The Situational Awareness was never Effective, being Partially Effective only once.

When all these points are taken into consideration the feeds into the See and Avoid barrier are degraded significantly. However, if one looks at Fig 25 the barrier performs quite well. This is because on every occasion where this barrier was fully effective it was the RPAS Flyer who heard an aircraft in the vicinity and was able to acquire it visually and take action to avoid it.

Figure 26 has been constructed using the See and Avoid barrier information from the perspective of the piloted vehicle – the pilots involved only saw the RPAS on one occasion.

> In all but one of the cases where the RPAS flyer has reported the Airprox, the pilot of the crewed aircraft was NEVER aware of its presence.

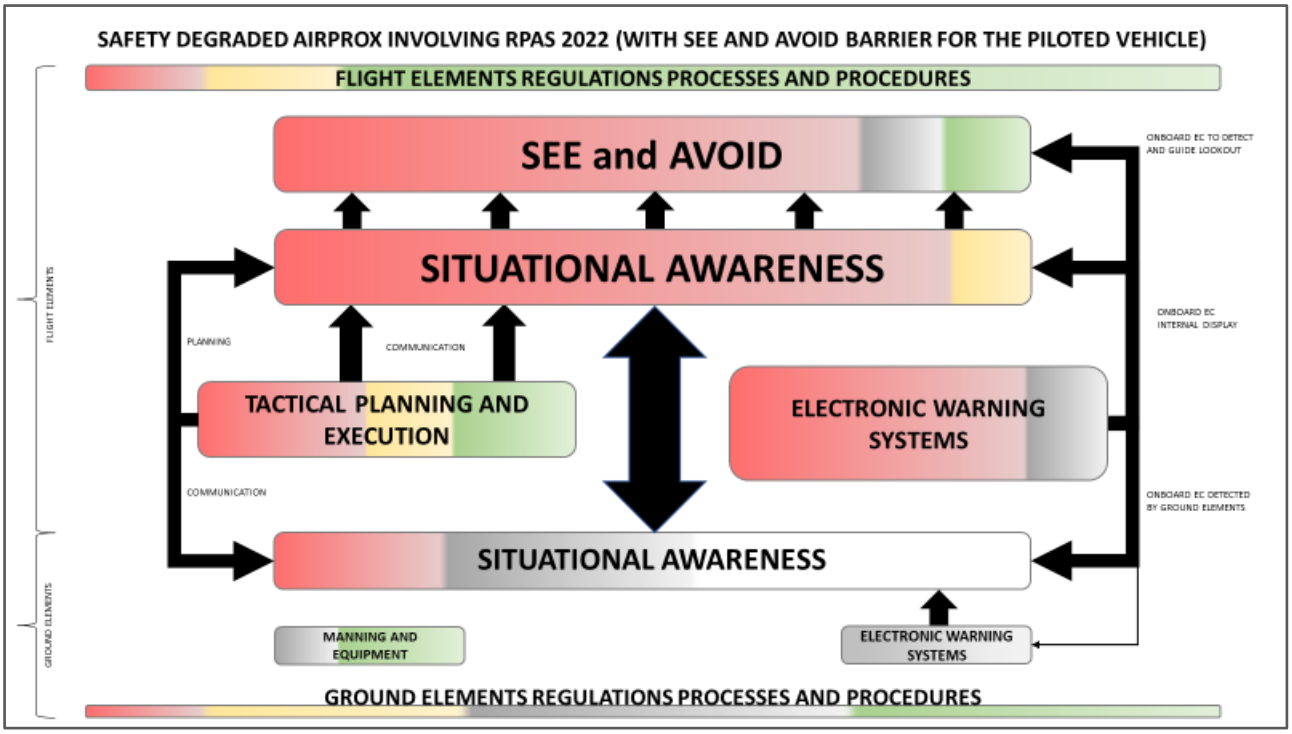


Figure 26: Schematic representation of top-level barrier interactions_RPAS reported_A/B/C_See and Avoid from piloted vehicle.

Although the data set for these occurrences is incredibly small, consisting of only 13 Airprox, these 13 Airprox elicited a Safety Recommendation where the Board was seeking to improve the promulgation of planning information for RPAS activity. It is difficult to cater for all circumstances, but there is justifiable apprehension surrounding the regulatory requirements as technological advances bring us ever closer to civilian BVLOS RPAS operations in Class G Airspace. Although BVLOS RPAS are likely to have a larger visual cross section, they will still be significantly smaller than piloted aircraft, rendering the See and Avoid barrier more vulnerable than it already is. For the RPAS, the See and Avoid is likely to be some form of a Sense and Avoid, yet Class G airspace does not require, and the regulations do not support, a known air traffic environment. It is difficult to see where effective barrier mitigations to an Airprox with RPAS once airborne can be made UNLESS interoperable EC equipment is mandated throughout Class G airspace. Pilots of crewed aviation need to be aware that, from their perspective, reliance on the See and Avoid barrier in Class G airspace offers little defence against an Airprox (or a MAC) with an RPAS.

The table below provides links to the 13 Airprox where the Board was able to conduct a full evaluation:

Airprox No	Year	Alt Block	Risk Category	Sector Mix
2022021	2022	0-500	E	GA-UA/Other
2022024	2022	0-500	B	Mil-UA/Other
2022038	2022	0-500	C	Mil-UA/Other
2022047	2022	1001-1500	C	GA-UA/Other
2022077	2022	0-500	E	GA-UA/Other
2022097	2022	0-500	C	UA/Other-Unk ac
2022154	2022	0-500	A	GA-UA/Other
2022170	2022	1001-1500	C	Emerg Servs-UA/Other
2022219	2022	501-1000	E	Mil-UA/Other
2022253	2022	501-1000	C	Mil-UA/Other
2022260	2022	0-500	E	GA-UA/Other
2022270	2022	0-500	C	Mil-UA/Other
2022275	2022	1001-1500	C	GA-UA/Other

Table 16: Airprox involving UA/Other – worthy of review.

Final Comments

This report has been compiled in such a way as to highlight the criticality of barrier interactions for all sectors. The dominance of the GA Sports and Recreational community in the Airprox landscape is unsurprising, given the preponderance of Airprox that occur in Class G airspace. The proportion of risk-bearing Airprox which involve the GA community is increasing, which points to successes in other sectors at reducing their risk. The Barrier performance and Contributory Factors allow us to focus on certain areas, but the fact that the observations and the associated Contributory Factors are relatively constant, and have remained so since we have been collecting this data, indicates that it may be time to look at regulatory intervention to improve the picture.

Airprox analysis has consistently highlighted the key areas:

- Compatibility of EC
- Electronic conspicuity devices | Civil Aviation Authority (caa.co.uk)
- Appropriate selection of available ATC services
- Planning, including choice of routes, NOTAMs, Wx, proximity to CAS etc
- Understanding the value and use of Basic Service, Listening Squawks, and responsibilities when flying VFR in Class D airspace and/or flying IFR in Class G airspace
- Threat and Error Management in general
- Lack of familiarity with circuit procedures and/or services provided by and responsibilities of AGOs, FISOs and controllers
- Quality of lookout

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ADDITIONAL INFORMATION

The following section is additional data comprising the following:

- A set of 5 charts for each sector where one can easily refer to the Sector Mix, the Altitude, the Airspace and the Risk distributions. These charts provide a quick access overview of the Airprox demographic:

UA/OTHER	CAT Civ Comm	GA Unk ac	Mil

- A summary of Safety Recommendations (2022)

- The 2022 Airprox Catalogue including links to specific reports.

UA/OTHER SECTOR MIX

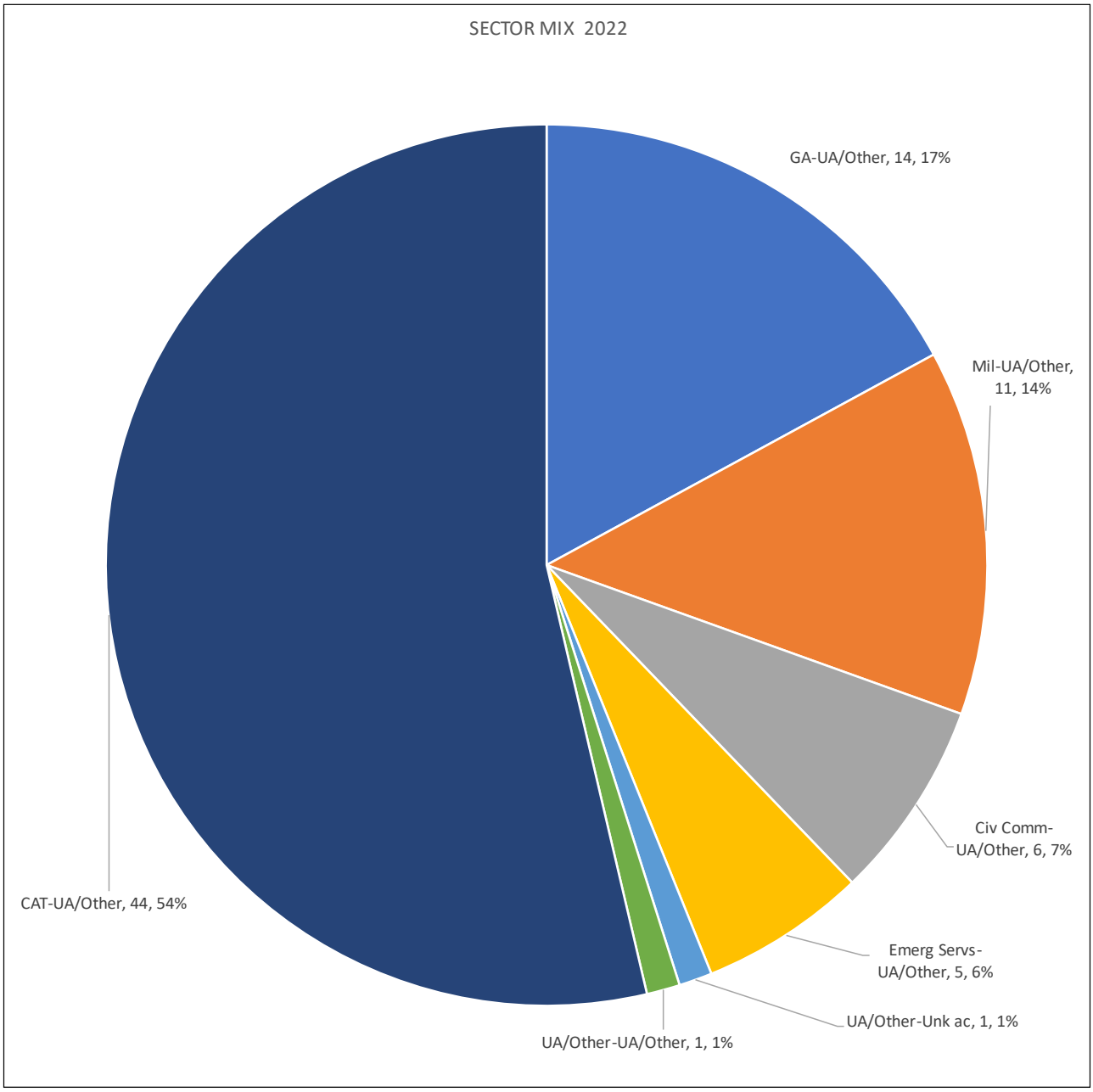

Figure 27: UA/OTHER Sector Mix – 2022

UA/OTHER SECTOR MIX – ALTITUDE

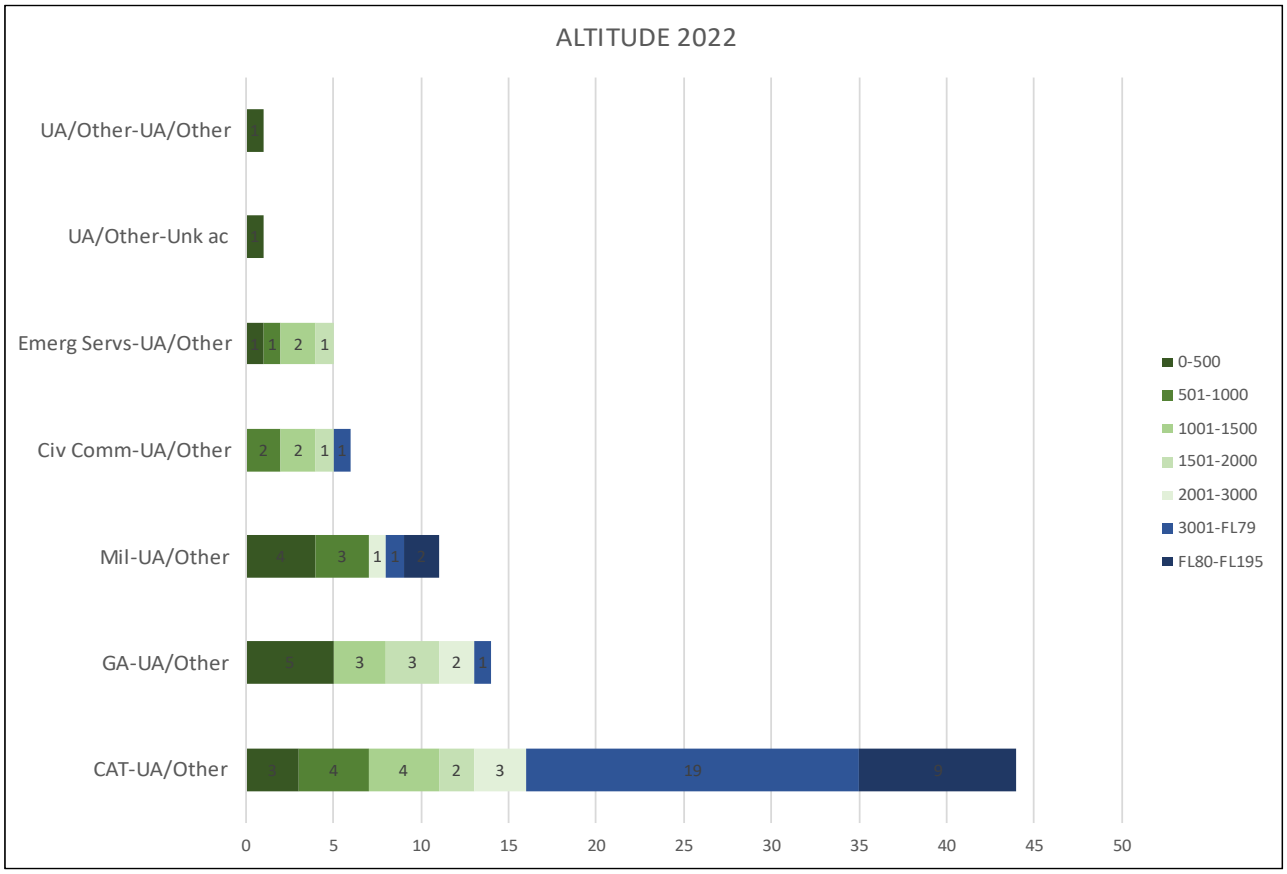

Figure 28: UA/Other Sector Mix – Altitude – 2022

UA/OTHER SECTOR MIX – AIRSPACE

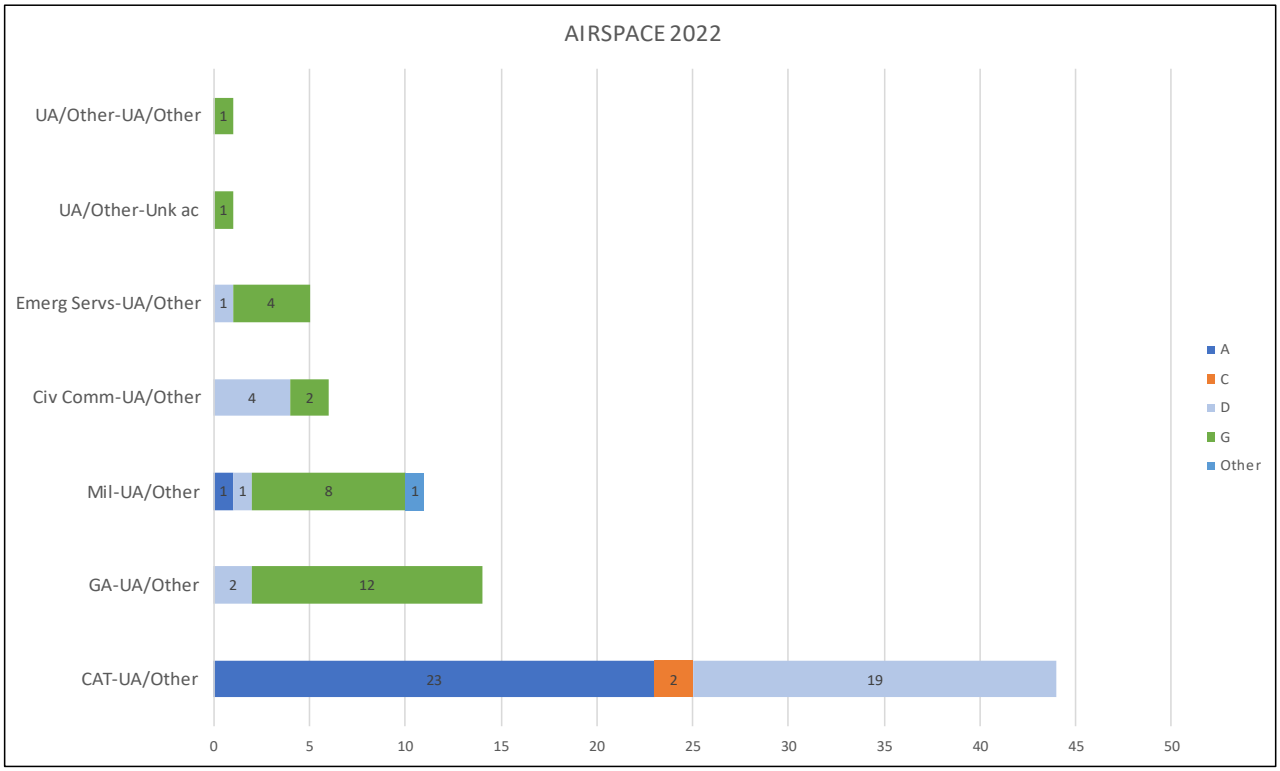

Figure 29: UA/OTHER Sector Mix – Airspace – 2022

UA/OTHER SECTOR MIX – ALTITUDE – RSK-BEARING

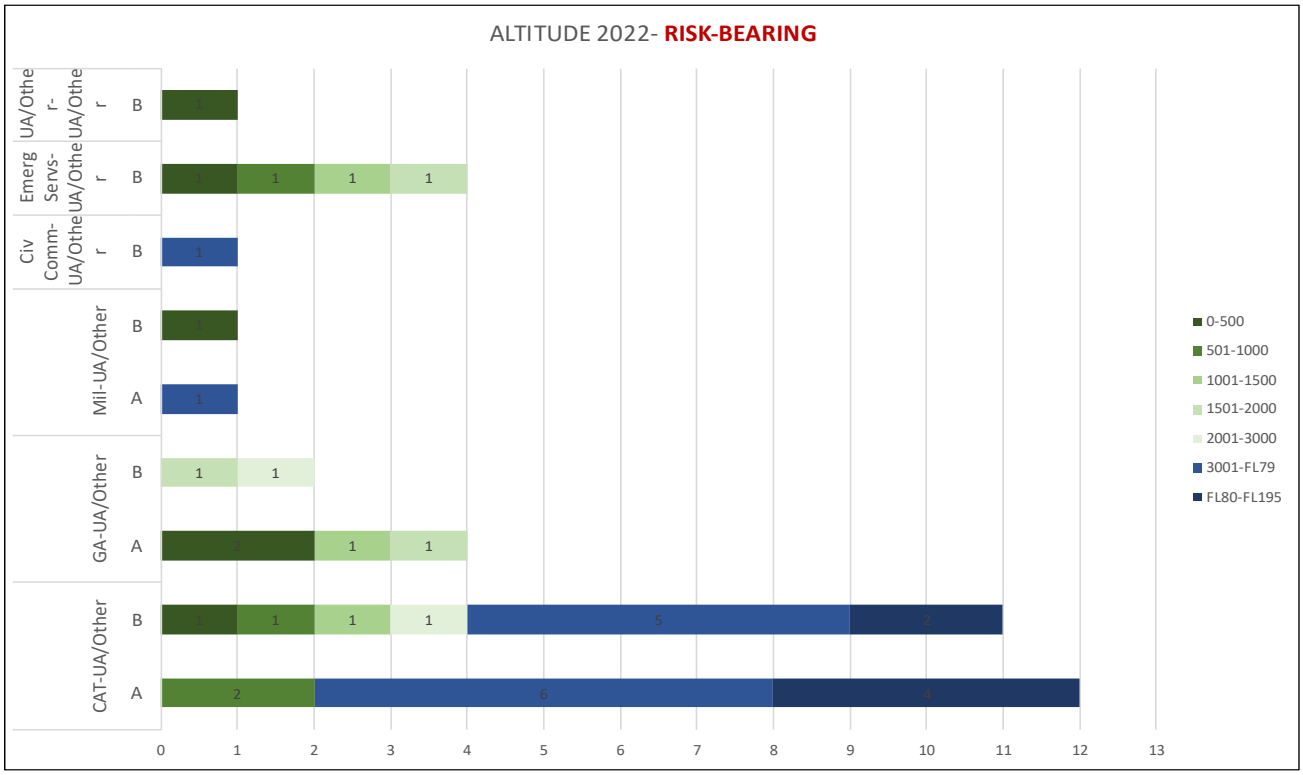

Figure 30: UA/OTHER Sector Mix – Altitude – Risk-Bearing 2022

UA/OTHER SECTOR MIX – RISK

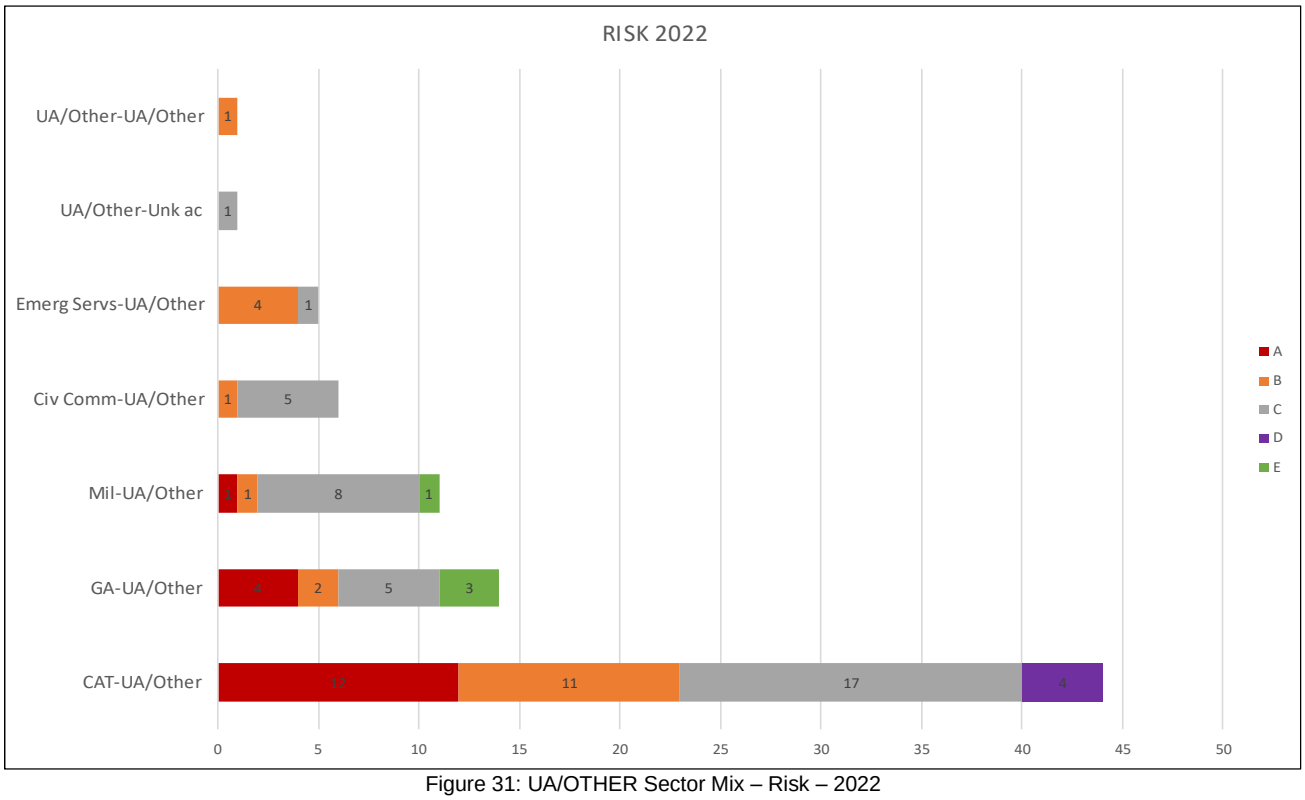

Figure 31: UA/OTHER Sector Mix – Risk – 2022

CAT_CIV COMM SECTOR MIX

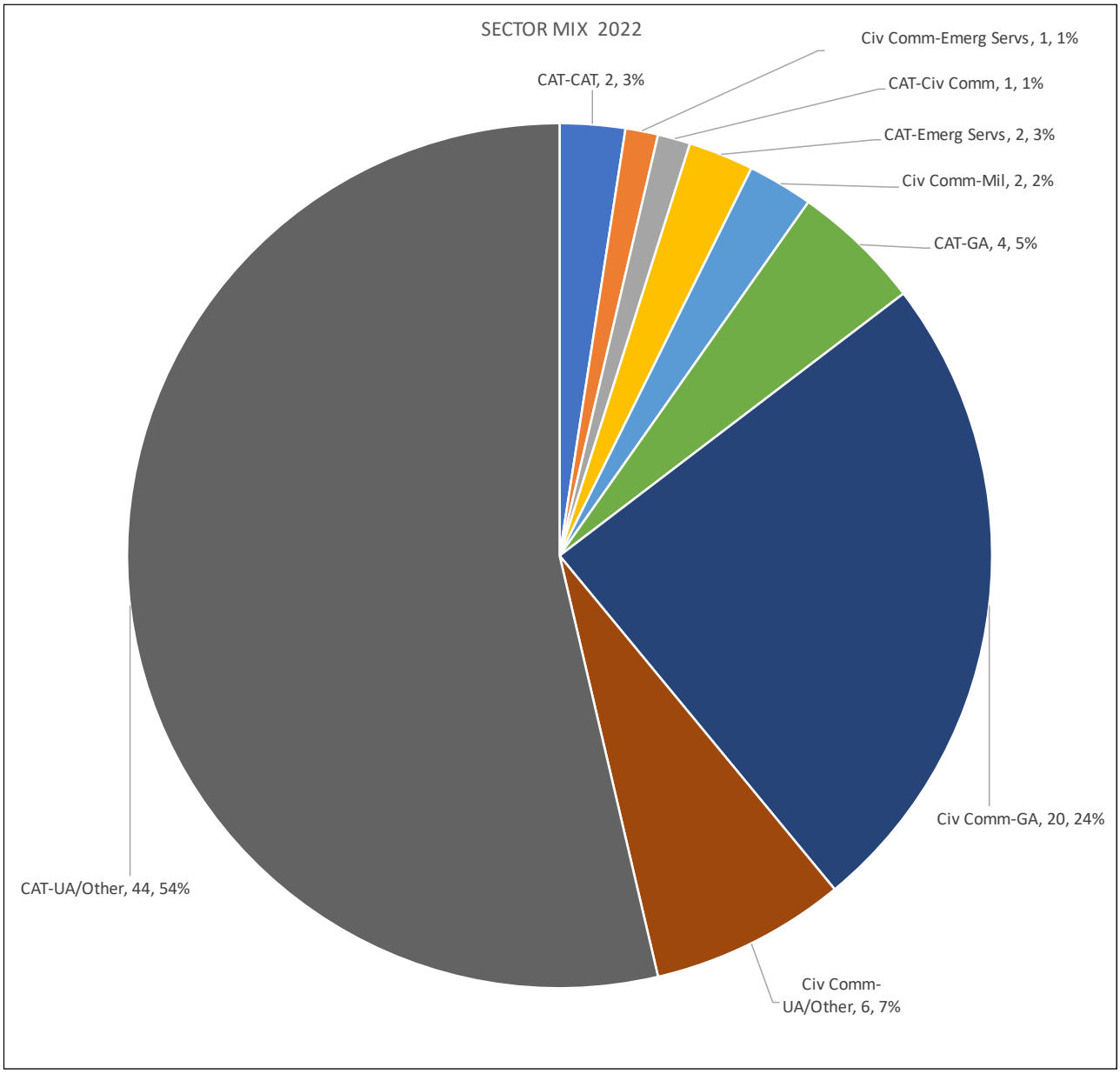

Figure 32: CAT_Civ Comm Sector Mix – 2022

CAT_Civ Comm SECTOR MIX – ALTITUDE

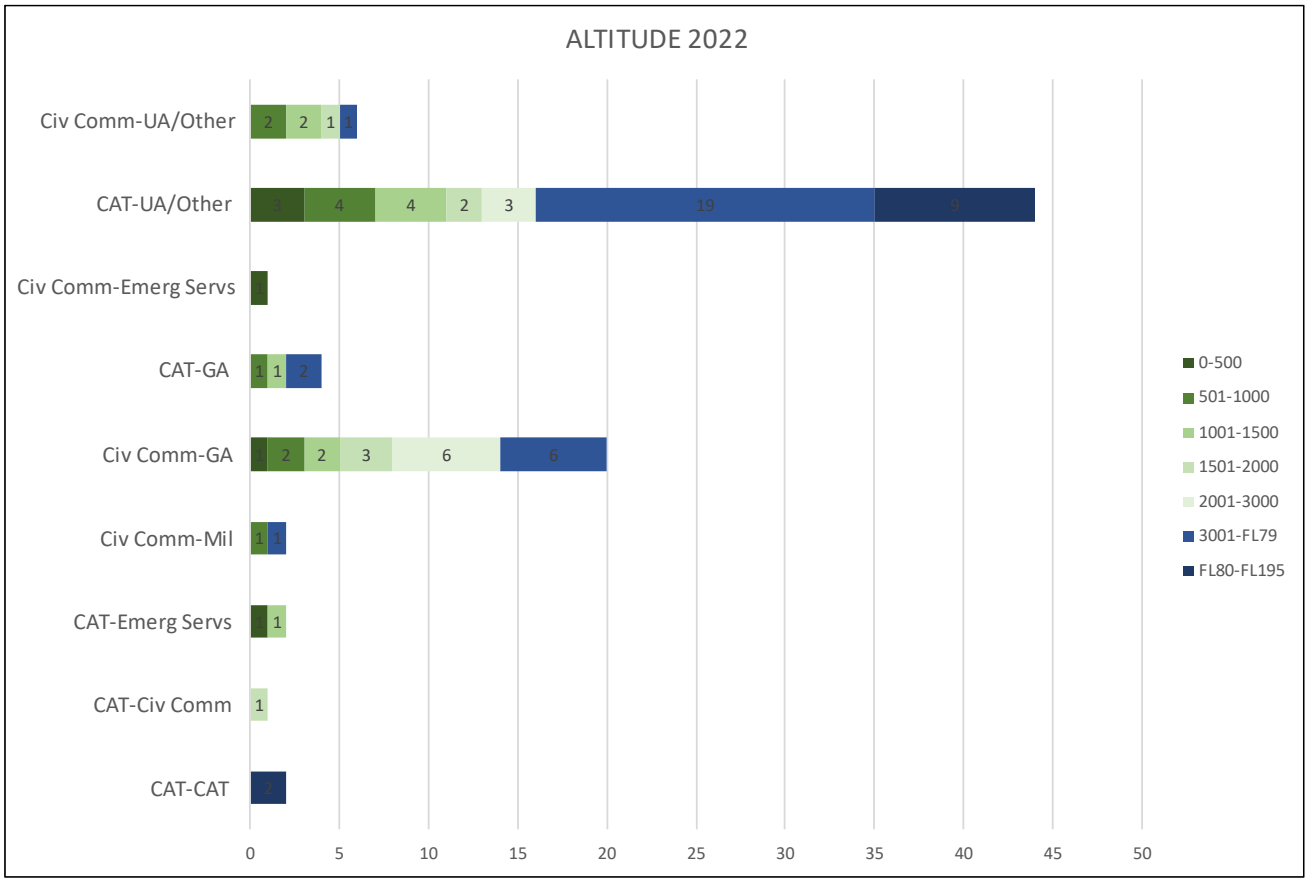

Figure 33: CAT-Civ Comm Sector Mix – Altitude – 2022

CAT_Civ Comm SECTOR MIX – AIRSPACE

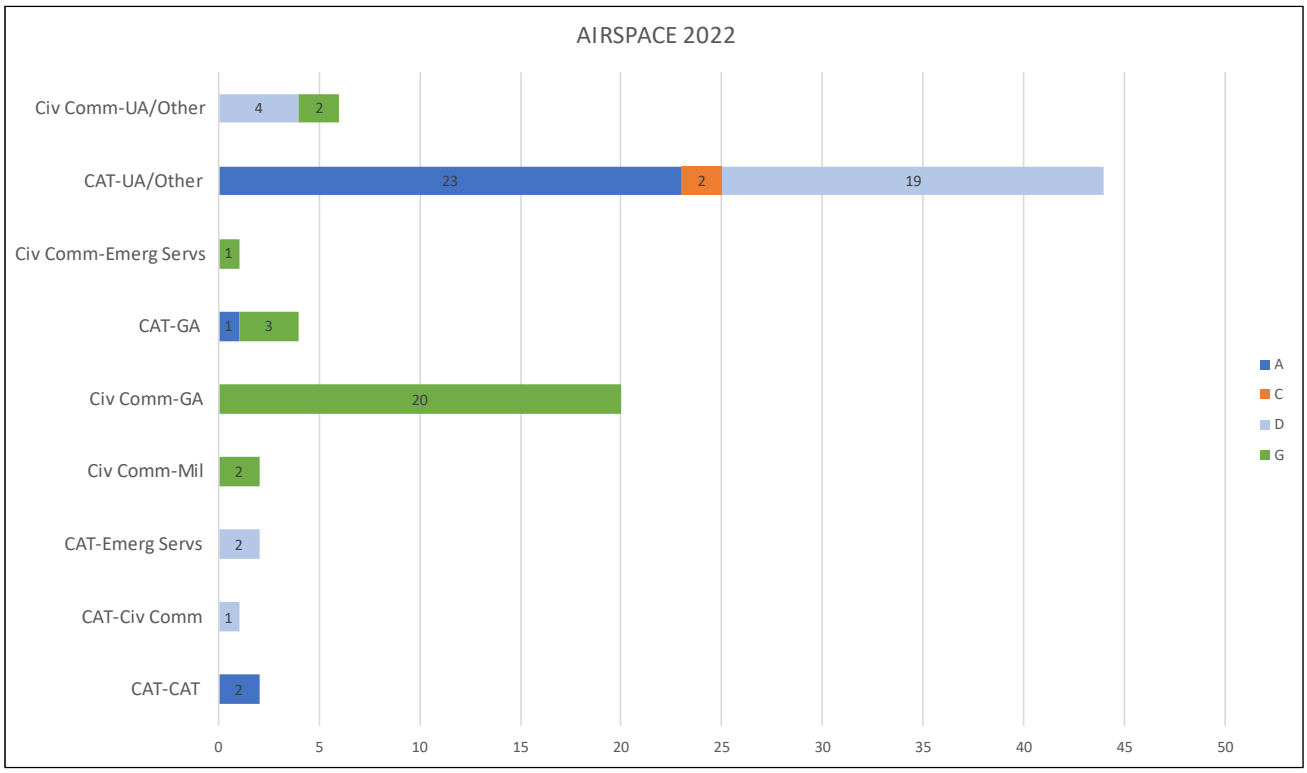

Figure 34: CAT-Civ Comm Sector Mix – Airspace – 2022

CAT_Civ Comm SECTOR MIX – ALTITUDE – RISK-BEARING

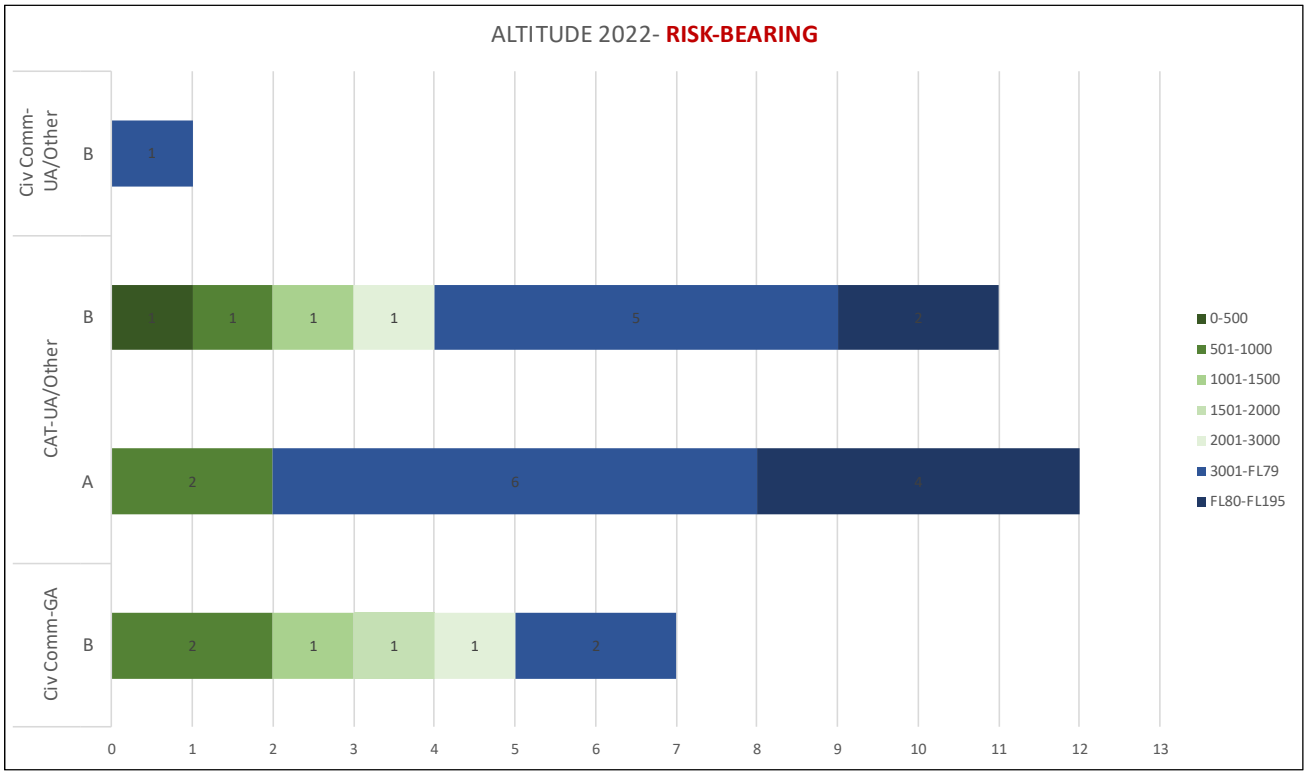

Figure 35: CAT_Civ Comm Sector Mix – Altitude – Risk-Bearing – 2022

CAT_Civ Comm SECTOR MIX – RISK

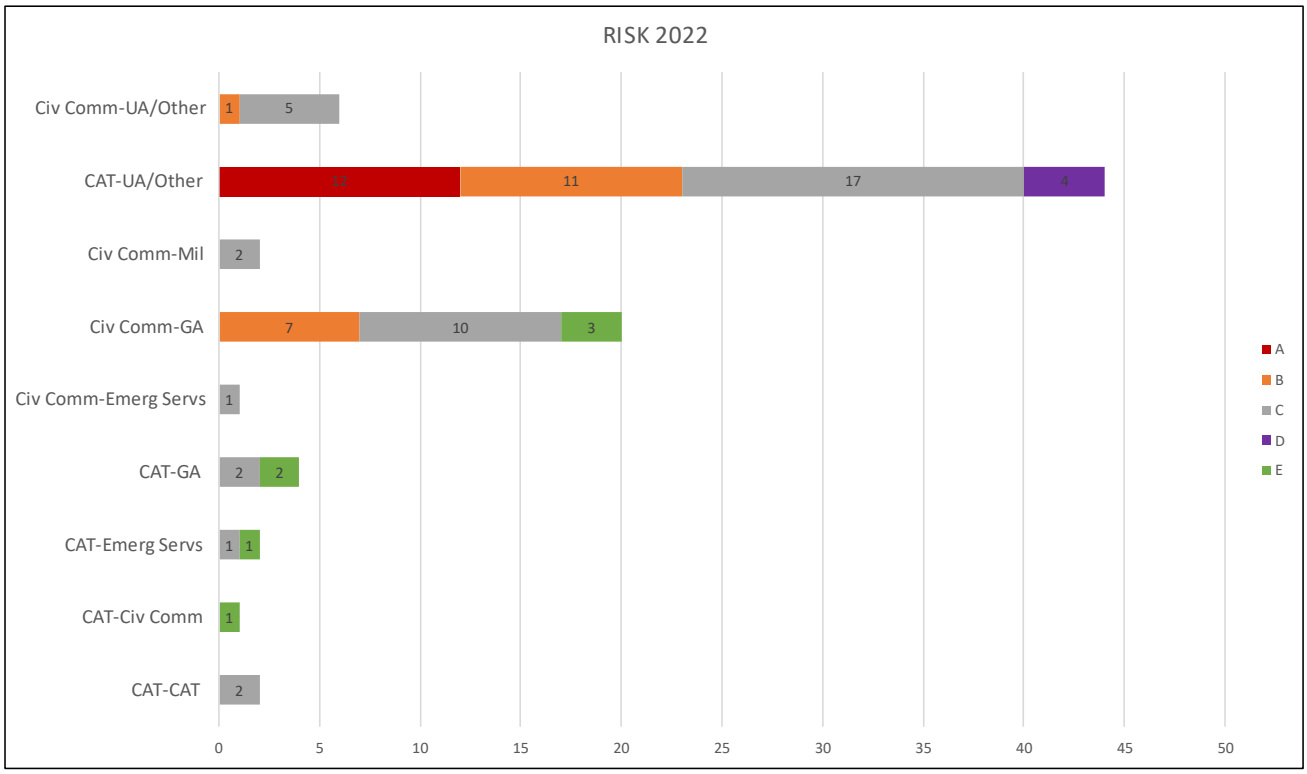

Figure 36: CAT_Civ Comm Sector Mix – Risk – 2022

GA (Sports and Recreational – including Unknown/Untraced) SECTOR MIX

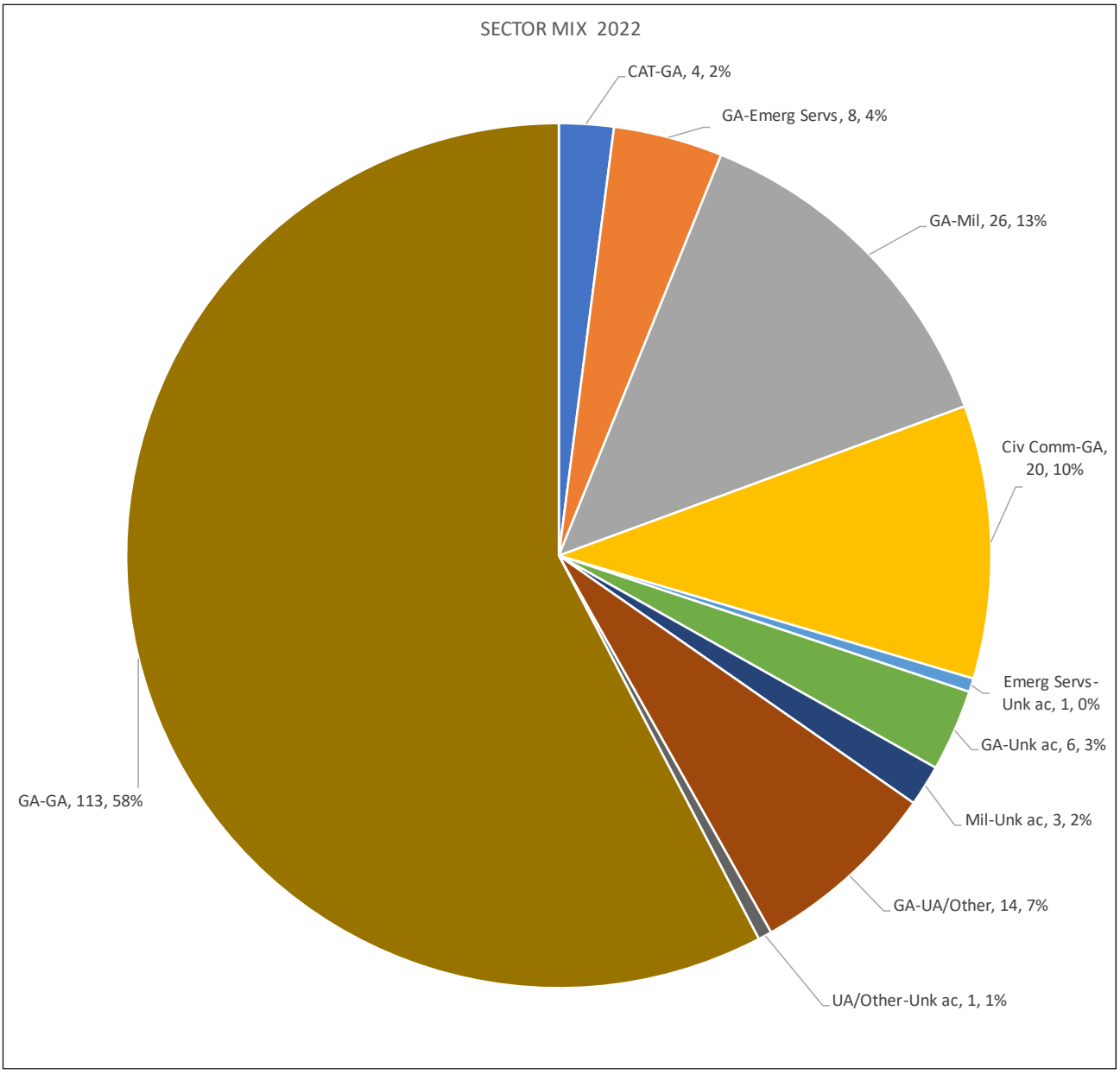

Figure 37: GA_Unk ac Sector Mix – 2022

GA_Unk ac SECTOR MIX – ALTITUDE

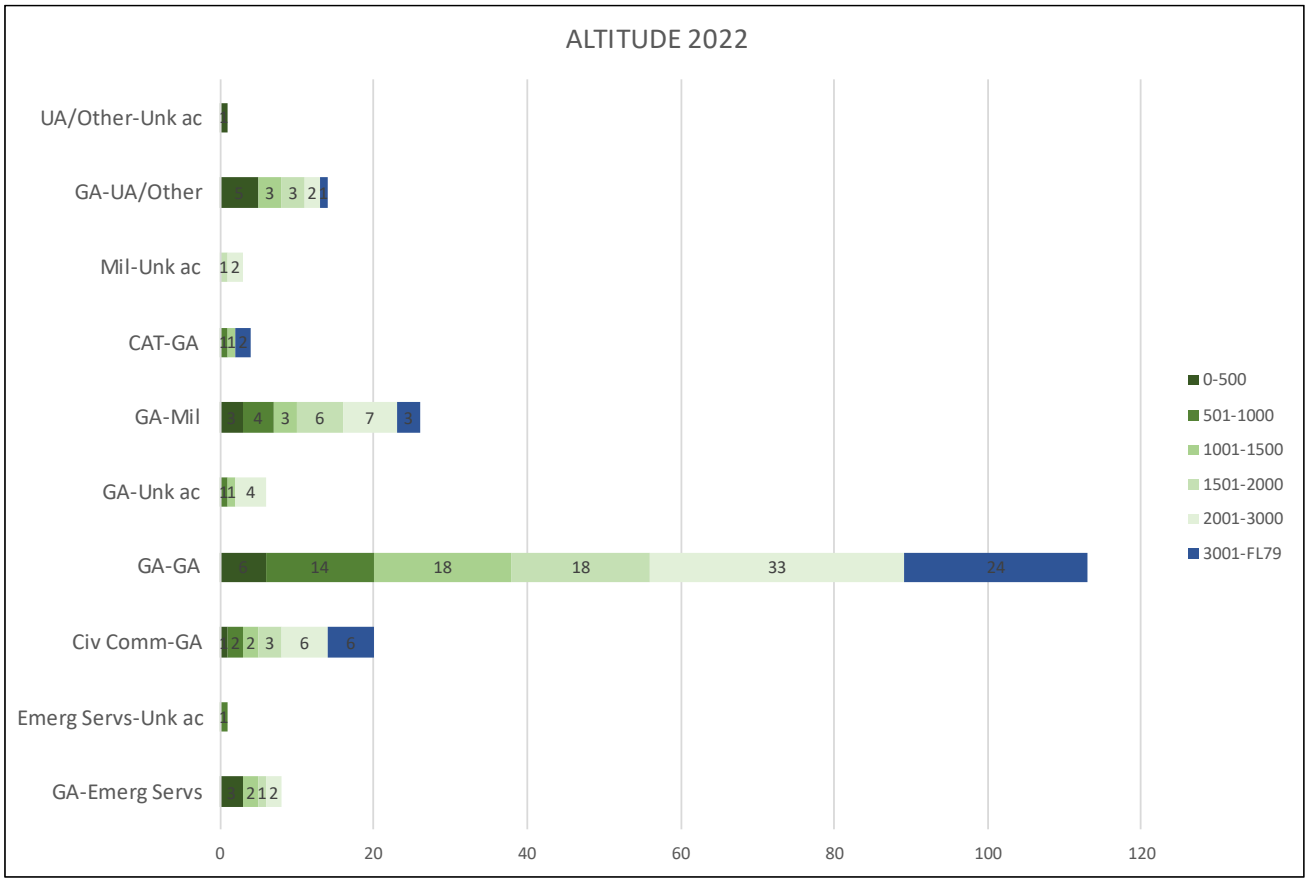

Figure 38: GA_Unk ac Sector Mix – Altitude – 2022

GA_Unk ac SECTOR MIX – AIRSPACE

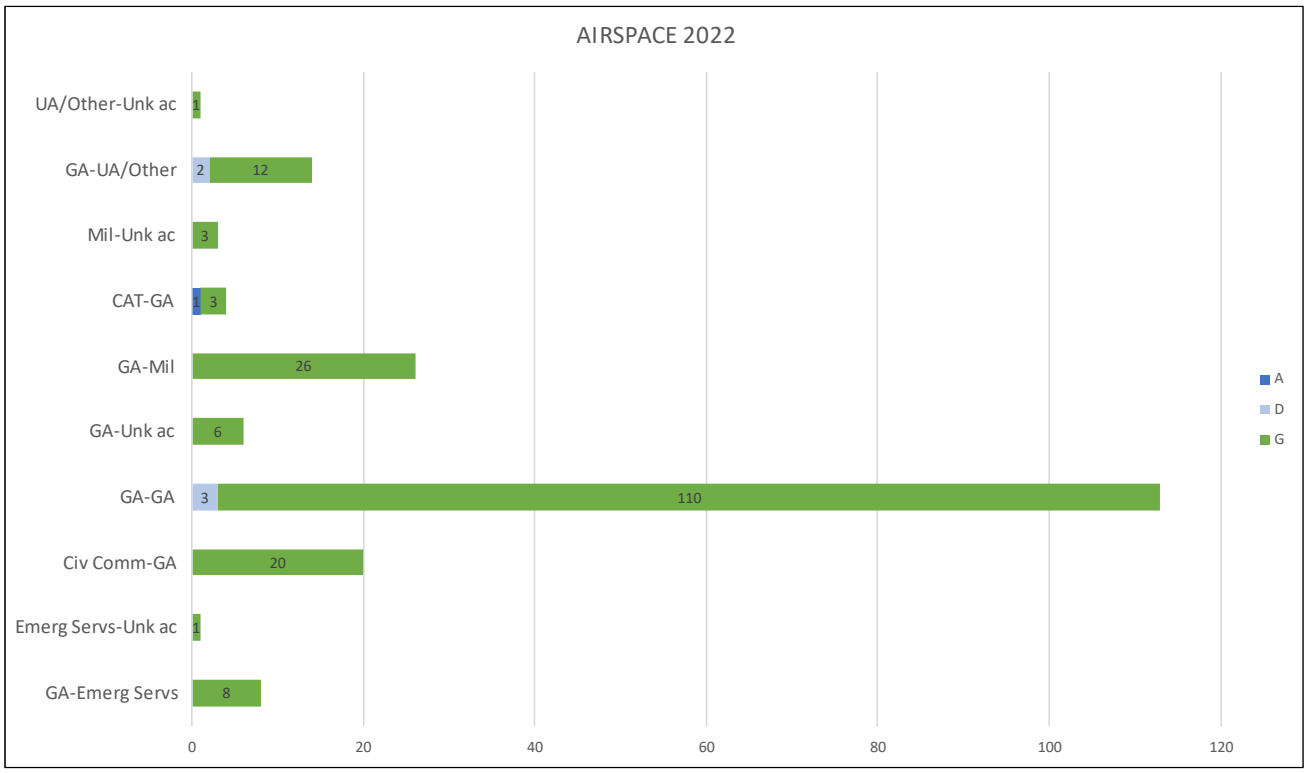

Figure 39: GA_Unk ac Sector Mix – Airspace – 2022

GA_Unk ac SECTOR MIX – ALTITUDE – RISK-BEARING

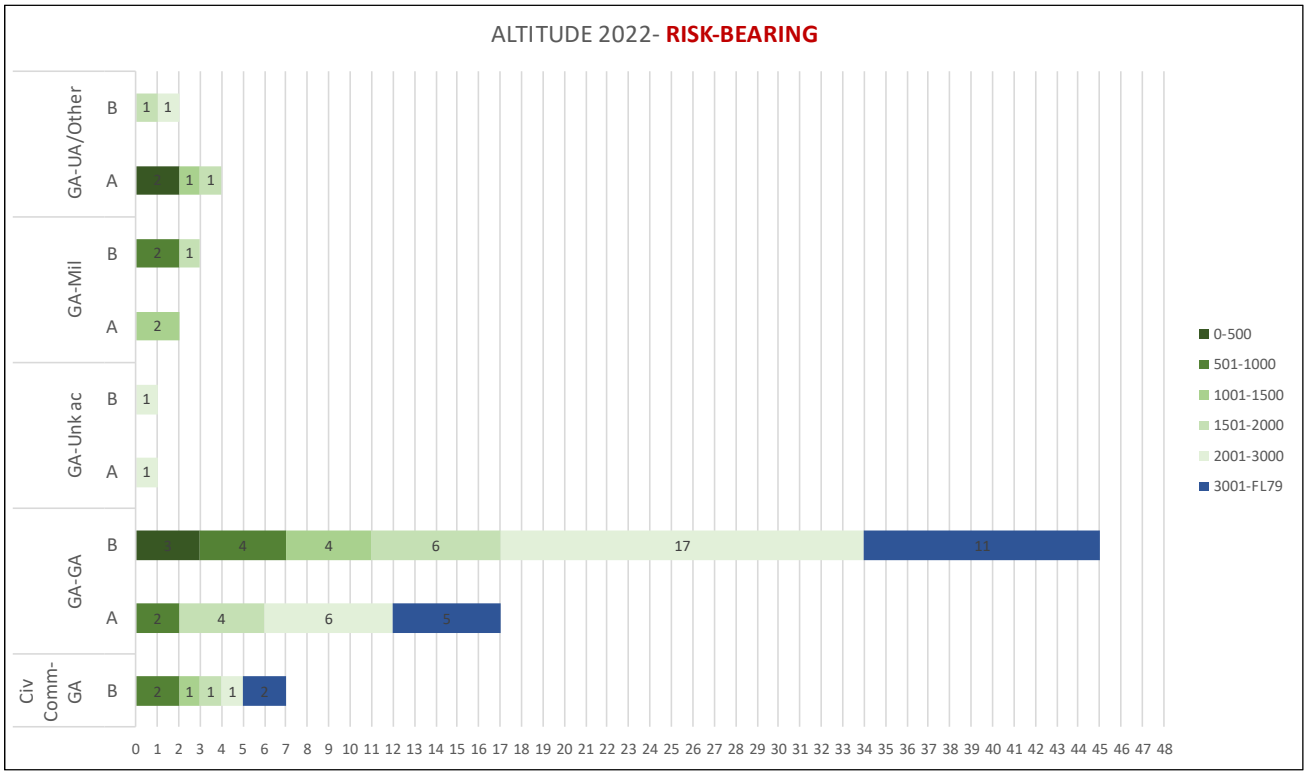

Figure 40: GA_Unk ac Sector Mix – Altitude – Risk-Bearing – 2022

GA_Unk ac SECTOR MIX – RISK

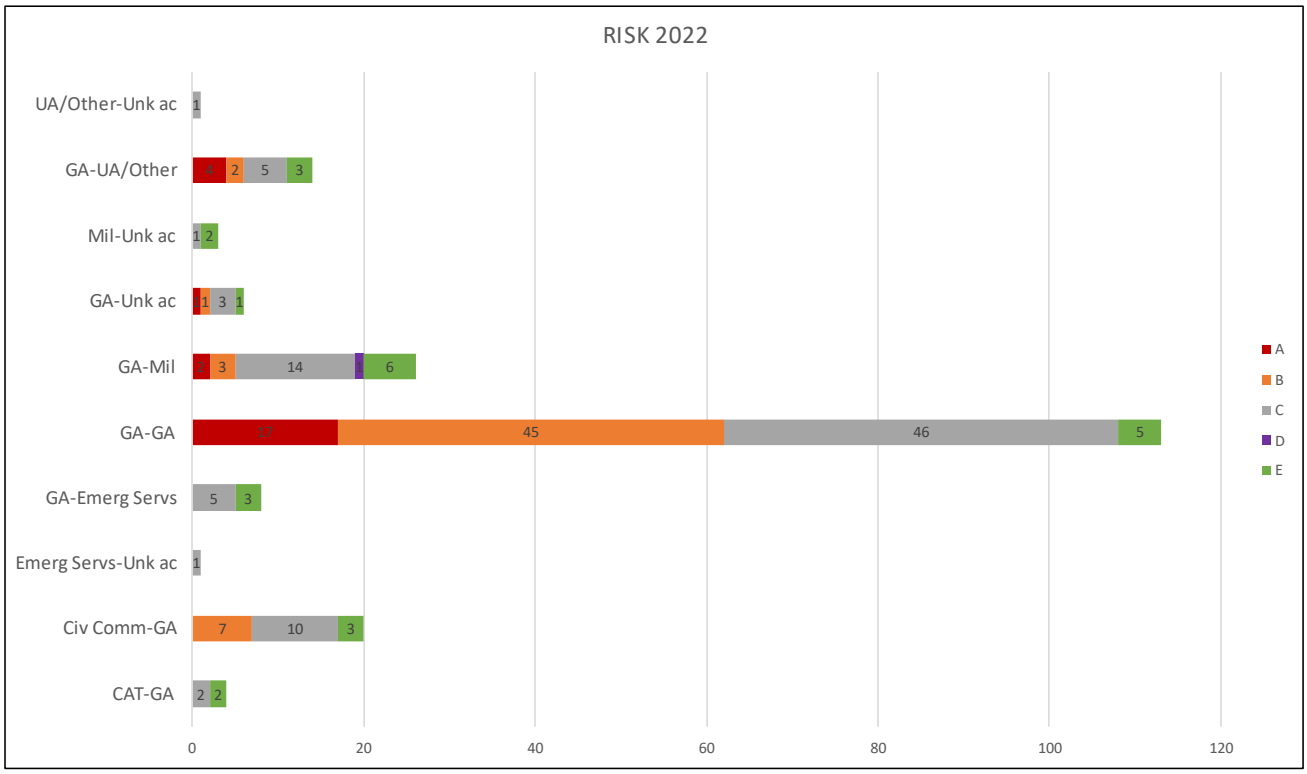

Figure 41: GA_Unk ac Sector Mix – Risk – 2022

MILITARY SECTOR MIX

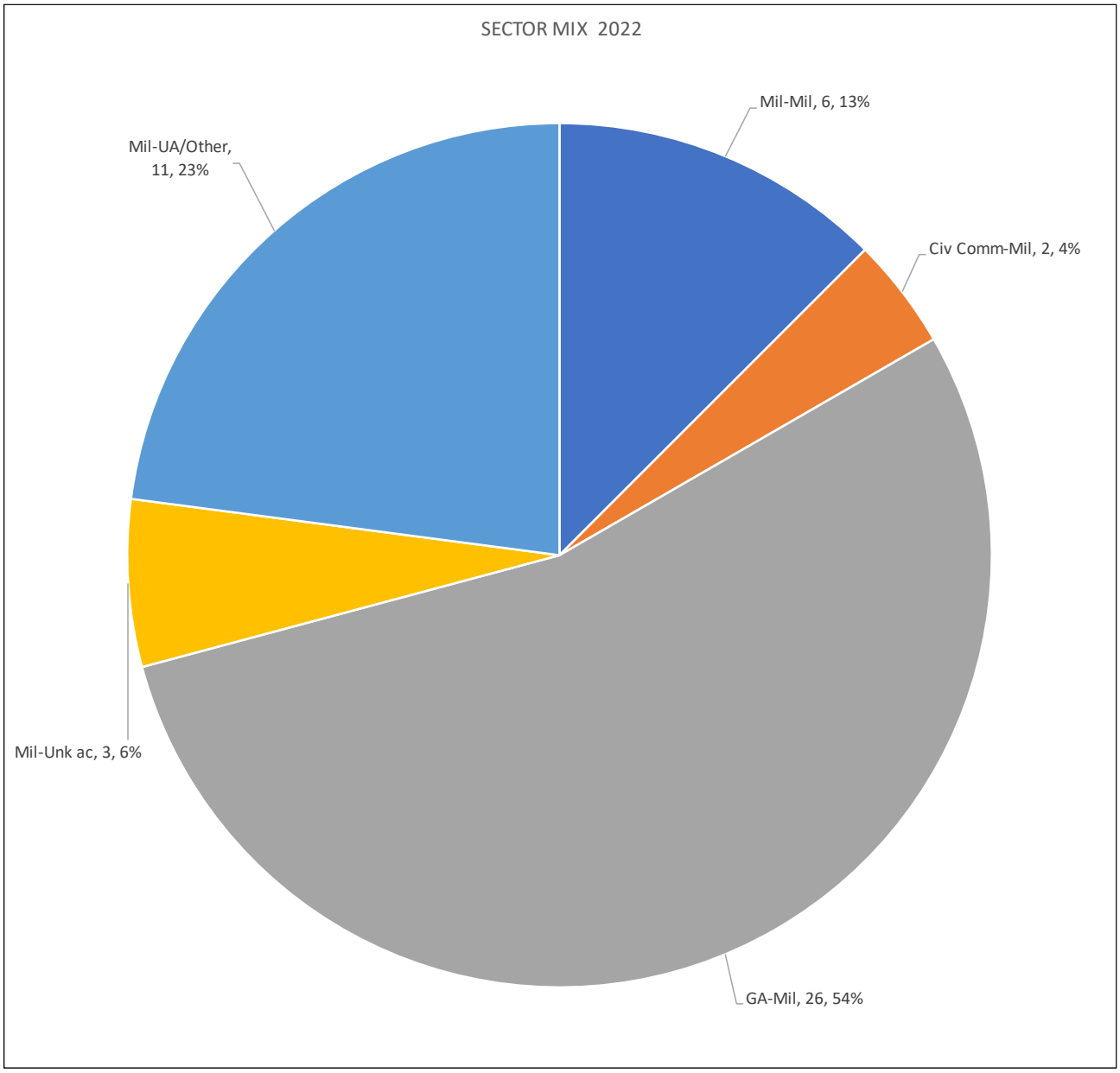

Figure 42: Mil Sector Mix – 2022

MILITARY SECTOR MIX – ALTITUDE

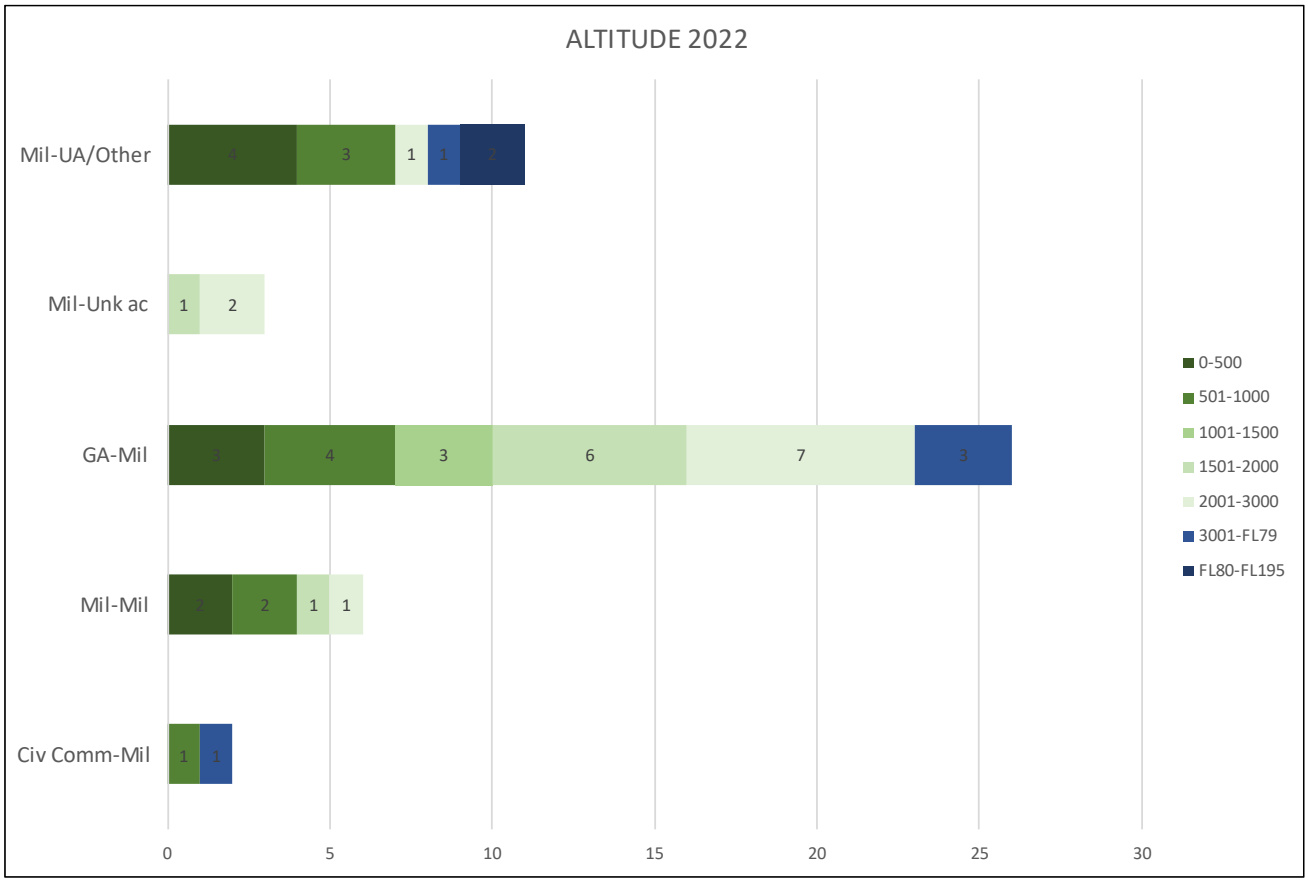

Figure 43: Military Sector Mix – Altitude – 2022

MILITARY SECTOR MIX – AIRSPACE

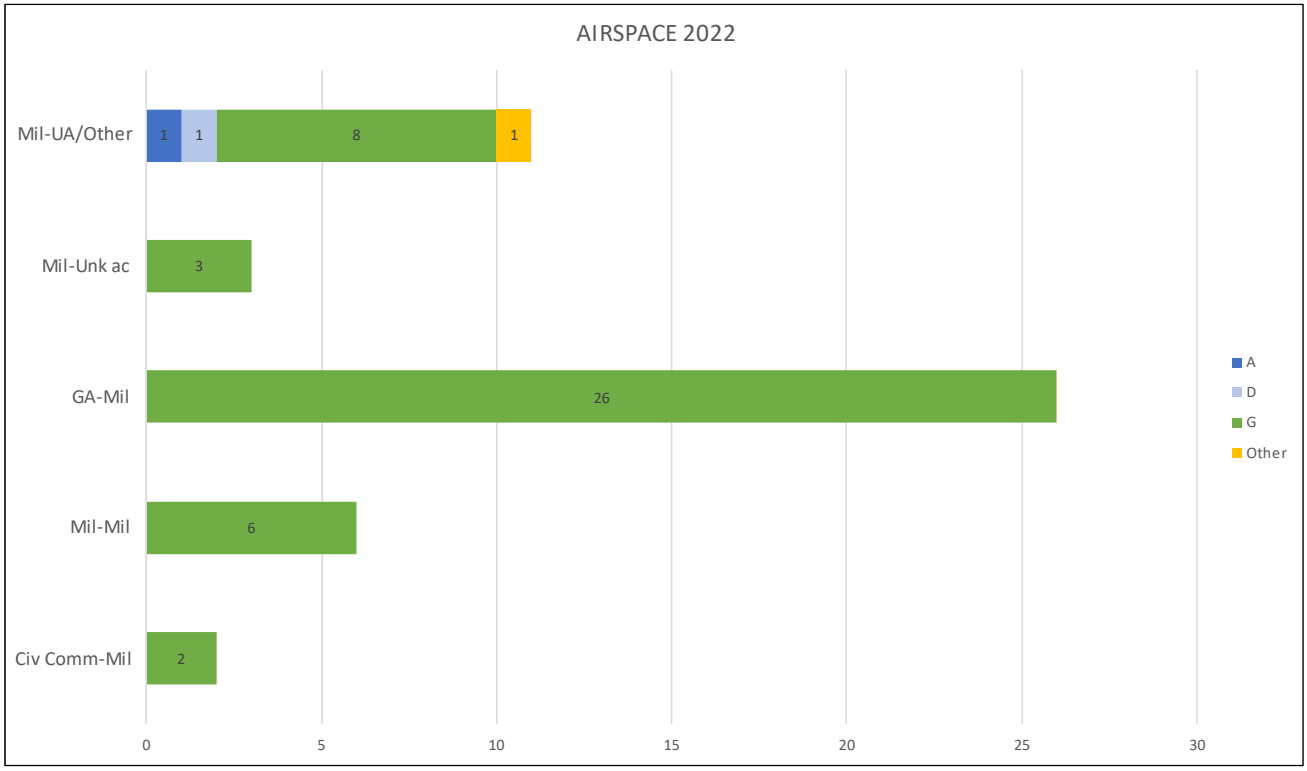

Figure 44: Military Sector Mix – Airspace – 2022

MILTARY SECTOR MIX – ALTITUDE – RISK-BEARING

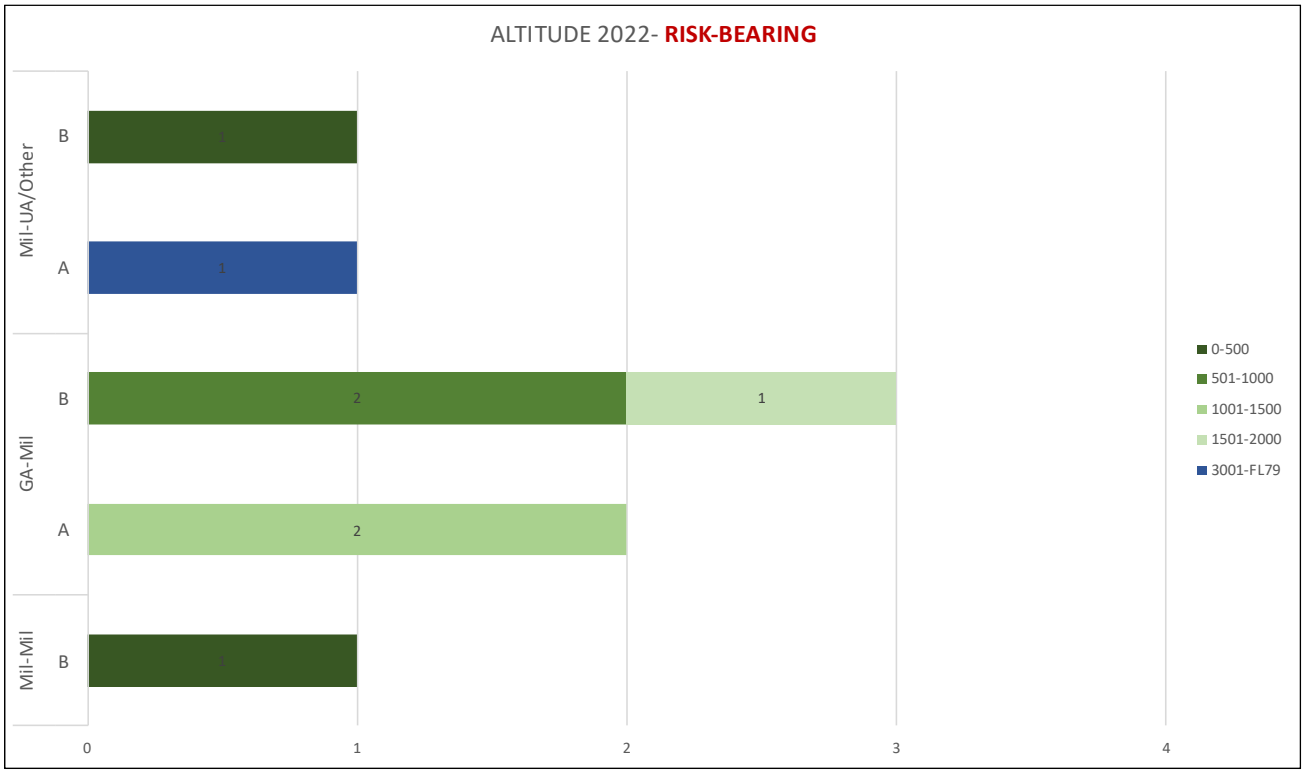

Figure 45: Military Sector Mix – Altitude – Risk-Bearing – 2022

MILTARY SECTOR MIX – RISK

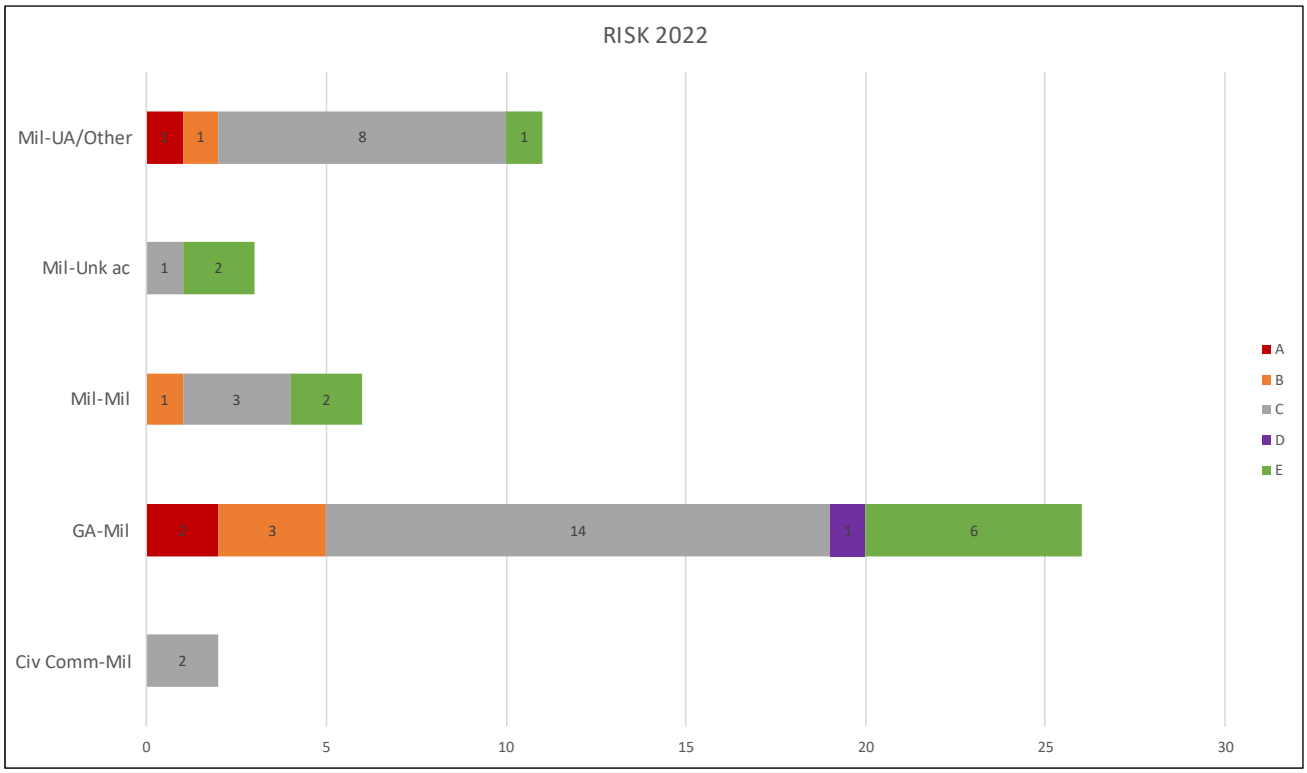

Figure 46: Military Sector Mix – Risk – 2022

UKAB 2022 SAFETY RECOMMENDATIONS

The table below is correct at the time of publication of this report. More up-to-date information on the status of OPEN Recommendations can be found on the UKAB website at https://www.airproxboard.org.uk/reports-and-analysis/safety-recommendations/.

ACCEPTED	PARTIALLY ACCEPTED	REJECTED	OPEN

Airprox	Recommendation	Comments
2022024	The CAA and MAA jointly consider a coherent means by which non-recreational drone activity can be promulgated by drone operators and an associated method through which this information can be made available to other air users operating in either the UK Military Low Flying System or with a CAA permission to operate outside the provisions of ORS4 No.1496.	Both the CAA and the MAA acknowledge that the NOTAM system can be used to highlight unusual activity (such as non-routine UAS operations above 400ft agl) but that this system is not suitable for notification of routine UAS operations at or below 400ft agl. It is also acknowledged that there are several disconnected applications that are currently used by the RPAS industry but that their use is not mandated. Their disconnected nature would make reliance on their use impractical for crewed aviation as this would not provide a common picture. The CAA and MAA undertake to work in the existing joint working groups to consider how non-recreational drone activity can be integrated with, and communicated to, manned aircraft activity (military and civilian) below 500ft agl such that crews may plan to avoid them in a timely manner.
2022030	The CAA facilitates the production of a consolidated data file, in a suitable electronic format, which permits the display of published Instrument Approach Procedures for aerodromes in Classes E, F and G airspace on moving map devices.	The CAA is working in collaboration with the UK AIS to deliver all digital datasets required by UK legislation (UK Reg (EU) 2017/373) and specified in ICAO Annex 15. This also includes Instrument Flight Procedure (IFP) datasets provided in AIXM data exchange format. In addition to the specified ICAO derived digital datasets, the CAA created a list of additional UK-specific datasets which the UK AIS has also been requested to deliver as part of the same implementation process. One of those additional datasets, an ICAO IFP Approach Chart Data Subset, to be provided as a separate subset (2D or 3D KML output), or part of a wider AIP Google Earth Data Subset, will directly address the UKAB Recommendation. The target date for all IFP-related tasks in this dataset workstream is for completion by the end of 2024, which takes into account the time necessary to develop the required enhancements in digital data exchange format and to review the associated costs to ensure that the necessary funding is in place.
2022084	That JHC, HQAC, RNHQ and the CAA refresh publicity regarding the hazard associated with rotor downwash on low-mass air vehicles.	JHC: The February 2023 edition of JHC Air Safety Digest includes publication of an article on helicopter wake turbulence and downwash, an extract of Airprox 2022084, an extract of Chinook DASOR 22\10331 (now Airprox 2023246) and a link to 'Air Clues' Edition 15 with the article '"Hang Glider Awareness and Avoidance'.

ACCEPTED	PARTIALLY ACCEPTED	REJECTED	OPEN

Airprox	Recommendation	Comments
		HQAC: RAF Air Clues Issue 40 includes publication of an article by the Chairman of the Yorkshire Dales Hang Gliding and Paragliding Club, highlighting the hazards to hang-gliders and paragliders created by helicopter downwash and wake turbulence. RNHQ: An article was published in the November 2022 BrieFSCan RN Flight Safety Bulletin highlighting Airprox 2022084 and the vulnerability of paragliders to helicopter wake/downwash. Additionally, the issue is to be highlighted in the spring edition of Cockpit magazine. CAA: The CAA will undertake the following actions: Publish a modernised CAA Safety Sense Leaflet No.17, Helicopter Airmanship, by August 2023, making more prominent and impactful its existing content reminding pilots of the effects of rotor downwash on other aircraft, particularly lighter aircraft such as hang-gliders and paragliders; Recommend that the British Hang-gliding and Paragliding Association (BHPA) include in their pilot training awareness of the dangers of hang-gliding, self-propelled hang-gliding, paragliding and paramotor operations near helicopters.
2022086	Blackbushe aerodrome reviews published circuit occupancy limitations to ensure that traffic complexity levels are appropriate for solo student pilot operations.	A full review of options to reduce circuit capacity and integration of dissimilar types has been undertaken. The outcome of the review has been to limit circuit numbers to a maximum of 3 fixed-wing on circuit detail, plus one aircraft departing and one aircraft returning, providing for a maximum of 5 fixed-wing at a time, together with limits on solo-student flying and limits on rotary aircraft.
2022133	In the near-term, the CAA engages in a robust communication campaign to inform paramotor pilots of where and when they can operate.	The CAA will work with the British Hang-gliding and Paragliding Association to update and revise their Paramotor Code document which they last jointly published in June 2019, and then actively promote this document on the CAA website and Skywise mailouts. The aim for completion of this work is by the end of April 2023.
	In the medium-to-long-term, the CAA considers how best to integrate paramotor activity into UK Airspace as part of the Airspace Modernisation Strategy.	The CAA will convene discussions by June 2023 with the paramotoring community experts along with CAA focal points in General Aviation and the Airspace Modernisation Strategy to explore possible measures to better integrate unregulated Self-Propelled Hang Glider operations into UK airspace. The aim is to develop recommendations for action by the end of September 2023.
2022134	The CAA, in consultation with the MAA through an appropriate forum (such as the JANSC), considers a means by which existing facilities are utilised to provide a LARS in areas that are	The CAA accepts the UKAB Safety Recommendation associated with Airprox 2022134 for the JANSC to consider a means by which existing facilities are utilised to provide a LARS in areas that are currently not included in existing UK LARS provision. The outcome of the discussion was that the JANSC determined that consideration of how

ACCEPTED	PARTIALLY ACCEPTED	REJECTED	OPEN

Airprox	Recommendation	Comments
	currently not included in existing UK LARS provision, prior to the implementation of the Airspace Modernisation Strategy.	existing facilities are utilised to provide a LARS was best considered as part of the LARS review scheduled for 2024. The UKAB recommendation will therefore be included within the scope of the LARS 2024 report.
2022152	Cotswold Airport reviews published procedures and considers creation of circuit occupancy limitations to ensure that traffic complexity levels are appropriate.	Under Consideration.
2022165	The CAA considers reviewing the extant guidance to flight instructors for conducting exercises on quiet frequencies and include a recommendation that the flight be conducted in receipt of an appropriate level of ATS.	(i) The CAA is reviewing the extant guidance of Standards Doc 10 (A) and (H) ensuring that this recommendation is included in the amendment. (ii) The CAA is committed to conduct the whole review of this document to ensure that all guidance for Instructors is up to date, fit for purpose and appropriate.
2022173	Aston Down and Cotswold Airport work together to establish a mechanism to facilitate the notification of Aston Down's activity to pilots operating to, or from, Cotswold Airport.	Under Consideration.
2022176	Lakenheath ATSU reviews its employment of STCA in support of UK FIS with regard to the potential for controller desensitisation.	Provision of Traffic Information under a Basic Service was reviewed with all of the air traffic controller leadership and training team to ensure that there were no ill-equipped or ill-informed controllers. Requirements and responsibilities were briefed and trained on extensively with not only the controllers involved, but all controllers. Additionally, due to the unique nature of the mission in support of two high-traffic airports handling over 60 fighter and 20 tanker/cargo operations daily, as well as a significant amount of civilian aviation traffic, it is imperative to maintain usage of STCA as a situational awareness and safety tool for all air traffic operations. Lakenheath RAPCON takes any safety incident seriously and this Airprox was handled internally with the utmost scrutiny on controller practices and air traffic control processes. Monitoring, evaluation and adjustment of processes will continue to ensure that a high level of flight safety is maintained.
2022233	The Cranfield aerodrome operator considers a means by which controller SA of traffic utilising airspace surrounding the Cranfield ATZ can be improved.	Cranfield is in the process of having an ADS-B system approved with a view to ATCOs utilising it for situational awareness in both the tower and approach positions and has commenced a project to install radar, with the application for planning permission already with the local authority.

ACCEPTED	PARTIALLY ACCEPTED	REJECTED	OPEN

Airprox	Recommendation	Comments
	Cranfield-based training organisations review their risk assessments with respect to their local operations without a surveillance-based ATS.	Under Consideration.
2022241	Gloucestershire Airport considers applying for an SSR transponder conspicuity code.	Under Consideration.
2022248	The Cranfield aerodrome operator considers a means by which controller SA of traffic utilising airspace surrounding the Cranfield ATZ can be improved.	Cranfield is in the process of having an ADS-B system approved with a view to ATCOs utilising it for situational awareness in both the tower and approach positions and has commenced a project to install radar, with the application for planning permission already with the local authority.
	Cranfield-based training organisations review their risk assessments with respect to their local operations without a surveillance-based ATS.	Under Consideration.
2022249	The Cranfield aerodrome operator considers a means by which controller SA of traffic utilising airspace surrounding the Cranfield ATZ can be improved.	Cranfield is in the process of having an ADS-B system approved with a view to ATCOs utilising it for situational awareness in both the tower and approach positions and has commenced a project to install radar, with the application for planning permission already with the local authority.
	Cranfield-based training organisations review their risk assessments with respect to their local operations without a surveillance-based ATS.	Under Consideration.
2022250	The CAA includes a means on VFR charts to highlight the military airfields that operate Instrument Approach Procedures outside controlled airspace, and that pilots are strongly recommended to contact the ATSU before flying within 10NM.	Under Consideration.
2022274	Gloucestershire aerodrome operator reviews and clarifies the published standard helicopter departure.	Under Consideration.

AIRPROX CATALOGUE 2022

The table below is an abbreviated form of the 2022 Airprox Index that is available on the UKAB website - individual reports can also be accessed using the hyperlinks within the table.

Airprox No	Risk Category	Aircraft 1 Type	Aircraft 2 Type	Sector Mix
2022001	C	CESSNA - 172	OTHER - Military (Typhoon)	GA-Mil
2022002	B	PIPER - PA24	BOEING - EC135	GA-GA
2022003	E	OTHER - Military (Hawk T1)	OTHER (Canopy Suspended)	GA-Mil
2022004	A	OTHER - Military (Juno)	OTHER (WT9 Dynamic)	GA-Mil
2022005	E	OTHER (AW169)	PIPER - PA28	Civ Comm-GA
2022006	B	OTHER (Cabri G2)	UNKNOWN (RPAS)	GA-UA/Other
2022007	C	OTHER (H145)	UNKNOWN	Emerg Servs-Unk ac
2022008	B	PIPER - PA28	CESSNA - F406	Civ Comm-GA
2022009	B	CIRRUS - SR22	PIPER - PA28	GA-GA
2022010	C	OTHER - Military (Puma)	SCHEMPP HIRTH - DISCUS A	GA-Mil
2022011	B	MAURO - EASY RIDER	PIPER - PA28	GA-GA
2022012	A	OTHER (Cabri G2)	PIPER - PA28	GA-GA
2022013	B	ROBINSON - R22	VANS - RV8	GA-GA
2022014	C	BEECH - 200	SOCATA (TBM940)	Civ Comm-GA
2022015	C	OTHER - Military (Juno)	OTHER - Military (Juno)	Mil-Mil
2022016	B	PARTENAVIA - P68	UNKNOWN (Object)	Civ Comm-UA/Other
2022017	B	PIPER - J3 (Cub)	CESSNA - 421	Civ Comm-GA
2022018	B	AIRBUS - A321	UNKNOWN (RPAS)	CAT-UA/Other
2022019	A	BOEING - 737	UNKNOWN (RPAS)	CAT-UA/Other
2022020	B	PIPER - PA28	COMCO IKARUS - IKARUS C42	GA-GA
2022021	E	OTHER (RPAS)	PIPER - PA28	GA-UA/Other
2022022	C	CESSNA - 152	PIPER - PA28	GA-GA
2022023	C	SLINGSBY - T67 - M	UNKNOWN (RPAS)	GA-UA/Other
2022024	B	OTHER (DJI Mavic 2 RPAS)	OTHER - Military (Texan II)	Mil-UA/Other
2022025	C	PIPER - PA28	AERMACCHI - SF260	GA-GA
2022026	C	DIAMOND - DA40	CIRRUS - SR22	GA-GA
2022027	B	BOEING - 787	UNKNOWN (Object)	CAT-UA/Other
2022028	B	SCOTTISH AVIATION - BULLDOG	AEROSPATIALE - AS355	Civ Comm-GA
2022029	E	OTHER (Skyranger)	OTHER - Military (CL600)	GA-Mil
2022030	C	HAWKER SIDDELEY - HS125	SCHLEICHER (ASG29)	Civ Comm-GA
2022031	A	AIRBUS - A320	UNKNOWN (RPAS)	CAT-UA/Other
2022032	B	OTHER (ASG29)	NEW GLASAIR - GLASAIR SUPER II	GA-GA
2022033	C	ATR - ATR72 - 200	ATR - ATR72 - 200	CAT-CAT
2022034	C	LEARJET	UNKNOWN (RPAS)	Civ Comm-UA/Other
2022035	C	PIPER - PA28	AEROSPATIALE - AS350	GA-GA
2022036	C	DIAMOND - DA40	SOCATA - TB10	GA-GA
2022037	C	PIPER - PA28	UNKNOWN (RPAS)	GA-UA/Other
2022038	C	OTHER - Military (Puma)	OTHER (Mavic Pro RPAS)	Mil-UA/Other
2022039	B	OTHER (Canopy Suspended)	CIRRUS - SR20	GA-GA
2022040	C	BOEING - 737	UNKNOWN (RPAS)	CAT-UA/Other
2022041	C	AIRBUS - A320	UNKNOWN (RPAS)	CAT-UA/Other
2022042	C	PIPER - PA28	ROBINSON - R44	GA-GA
2022043	C	PIPER - PA28	UNKNOWN (Object)	GA-UA/Other
2022045	E	AIRBUS - A320	EUROCOPTER (EC45)	CAT-Emerg Servs
2022046	B	BOEING - 737	UNKNOWN (RPAS)	CAT-UA/Other
2022047	C	OTHER (RPAS)	AGUSTA BELL - AB139	GA-UA/Other
2022048	C	SCHLEICHER (ASG29)	DE HAVILLAND - DHC6	Civ Comm-GA
2022049	C	OTHER (Canopy Suspended)	OTHER - Military (F35)	GA-Mil

2022050	A	OTHER - Military (F35)	COMCO IKARUS - IKARUS C42	GA-Mil
2022051	E	OTHER (AW189)	SUPERMARINE - SPITFIRE	GA-Emerg Servs
2022052	A	ROLLADEN SCHNEIDER - LS8	PIPER - PA28	GA-GA
2022053	B	LUSCOMBE - 8	CIRRUS - SR22	GA-GA
2022054	A	ATR - ATR72	UNKNOWN (Object)	CAT-UA/Other
2022055	C	CESSNA - 152	PIPER - PA28	GA-GA
2022056	C	PIPER - PA28	PIPER - PA32	GA-GA
2022057	C	OTHER - Military (C130)	UNKNOWN	Mil-Unk ac
2022058	C	CESSNA - 182	SUPERMARINE - SPITFIRE	GA-GA
2022059	C	COMCO IKARUS - IKARUS C42	SIKORSKY - S76	Civ Comm-GA
2022060	C	JABIRU - J430	AGUSTA BELL - AB139	GA-GA
2022061	A	AIRBUS - A319	UNKNOWN (RPAS)	CAT-UA/Other
2022062	B	CIRRUS - SR22	SCHLEICHER (ASG29)	GA-GA
2022063	A	DIAMOND - DA40	PIPER - PA28	GA-GA
2022064	B	PIPER - PA28	VANS - RV6	GA-GA
2022065	C	CESSNA - 152	OTHER (Sopwith Triplane)	GA-GA
2022066	C	EMBRAER - ERJ190	UNKNOWN (RPAS)	CAT-UA/Other
2022067	A	PIPER - PA25	UNKNOWN (RPAS)	GA-UA/Other
2022068	C	BOEING - 787	UNKNOWN (RPAS)	CAT-UA/Other
2022069	C	AEROSPATIALE - AS350	OTHER - Military (F15)	Civ Comm-Mil
2022070	C	OTHER - Military (Apache)	OTHER - Military (Apache)	Mil-Mil
2022071	C	SCHLEICHER - KA6	CESSNA - 172	GA-GA
2022072	A	OTHER (Skyranger Nynja)	PIPER - PA28	GA-GA
2022073	A	CESSNA - 172	PIPER - PA28	GA-GA
2022074	C	EVEKTOR AEROTECHNIK - EV97	AEROSPATIALE - SA341	GA-GA
2022075	C	PIPER - PA28	GLASFLUGEL - KESTREL	GA-GA
2022076	B	OTHER (AW189)	UNKNOWN (RPAS)	Emerg Servs-UA/Other
2022077	E	OTHER (RPAS)	CESSNA - 152	GA-UA/Other
2022078	C	AIRBUS - A320	UNKNOWN (RPAS)	CAT-UA/Other
2022079	A	CESSNA - 150	UNKNOWN (Glider)	GA-GA
2022080	C	RUTAN - LONGEZ	CESSNA - 208	Civ Comm-GA
2022081	B	SCHLEICHER - ASK13	BEECH - 33 - F33A	GA-GA
2022082	B	SCHEIBE - SF25	PIPER - PA28	GA-GA
2022083	B	SCHEMPP HIRTH (Arcus)	PIPER - PA31	Civ Comm-GA
2022084	B	OTHER (Canopy Suspended)	OTHER - Military (Wildcat)	GA-Mil
2022085	B	SCHEMPP HIRTH - DISCUS A	CIRRUS - SR22	GA-GA
2022086	A	OTHER (Sonaca S200)	PIPER - PA28	GA-GA
2022087	A	SCHEMPP HIRTH - DISCUS A	PIPER - PA28	GA-GA
2022088	C	OTHER (Skyranger)	PIPER - PA28	GA-GA
2022089	C	SOCATA - TB10	PIPER - PA28	GA-GA
2022090	C	OTHER (Canopy Suspended)	PILATUS - PC12	GA-GA
2022091	C	EVEKTOR AEROTECHNIK - EV97	OTHER - Military (Tutor)	GA-Mil
2022092	C	OTHER - Military (Phenom)	SCHLEICHER - ASW20	GA-Mil
2022093	C	OTHER - Military (Wildcat)	UNKNOWN (RPAS)	Mil-UA/Other
2022094	D	AIRBUS - A319	UNKNOWN (RPAS)	CAT-UA/Other
2022095	E	OTHER (DG1001)	PILATUS - PC12	GA-GA
2022096	E	EUROCOPTER (EC145)	PIPER - PA28	GA-Emerg Servs
2022097	C	OTHER (DJI Mattrice RPAS)	UNKNOWN	UA/Other-Unk ac
2022098	A	PIPER - PA28	UNKNOWN (RPAS)	GA-UA/Other
2022099	C	AIRBUS - A321	UNKNOWN (Balloon)	CAT-UA/Other
2022100	C	OTHER - Military (F35)	CESSNA - 182	GA-Mil
2022101	A	SCHEMPP HIRTH - DUO DISCUS	PIPER - PA28	GA-GA
2022102	B	AVIONS ROBIN - DR400	PIPER - PA28	GA-GA
2022103	E	ATR - ATR42	PIPER - PA28	CAT-GA
2022104	C	AGUSTA - A109	SCHLEICHER - ASW27	GA-Mil

2022105	C	PARTENAVIA - P68	OTHER (Canopy Suspended)	Civ Comm-GA
2022106	D	BOEING - 787	UNKNOWN (RPAS)	CAT-UA/Other
2022107	C	ROBINSON - R44	UNKNOWN (Object)	Civ Comm-UA/Other
2022108	C	CESSNA - 560	GROB - G115	Civ Comm-GA
2022109	C	AEROSPATIALE - AS365	OTHER (Flex-wing microlight)	GA-Emerg Servs
2022110	C	EUROPA - EUROPA - XS	VANS - RV8	GA-GA
2022111	C	PZL BIELSKO - SZD51	OTHER - Military (C130)	GA-Mil
2022112	B	CESSNA - 172	OTHER (Skyranger Nynja)	GA-GA
2022113	A	SCHLEICHER (ASH31)	PIPER - PA30	GA-GA
2022114	A	SCHLEICHER - ASK21	EVEKTOR AEROTECHNIK - EV97	GA-GA
2022115	C	AIRBUS - A319	UNKNOWN (RPAS)	CAT-UA/Other
2022116	B	OTHER - Military (Hurricane)	PIPER - PA28	GA-Mil
2022117	C	EMBRAER - ERJ190	UNKNOWN (Object)	CAT-UA/Other
2022118	C	DE HAVILLAND - DHC6	OTHER (Skyranger)	CAT-GA
2022119	B	CIRRUS - SR22	PIPER - PA28	GA-GA
2022120	B	CESSNA - 182	GRUMMAN - AA5	GA-GA
2022121	C	PIPER - PA25	ROBINSON - R44	GA-GA
2022122	C	BOEING - 757	UNKNOWN (RPAS)	CAT-UA/Other
2022123	B	OTHER (Skyranger Nynja)	PIPER - PA28	GA-GA
2022124	C	SIKORSKY - S92	AERO - AT3	GA-Emerg Servs
2022125	B	PIPER - PA28	CESSNA - 172	GA-GA
2022126	C	SCHLEICHER - ASK13	PIPER - PA28	GA-GA
2022127	E	EVEKTOR AEROTECHNIK - EV97	SIKORSKY - S76	Civ Comm-GA
2022128	D	OTHER - Military (T50)	CESSNA - 208	GA-Mil
2022129	A	AIRBUS - A320	UNKNOWN (RPAS)	CAT-UA/Other
2022130	C	GROB - G102 - ASTIR CS	BELL - 206	GA-GA
2022131	C	AGUSTA (AW169)	SUPERMARINE - SPITFIRE	Civ Comm-Emerg Servs
2022132	C	BOEING - 737	UNKNOWN (Object)	CAT-UA/Other
2022133	C	EMBRAER - ERJ190	UNKNOWN	CAT-GA
2022134	B	SCHEMPP HIRTH - DISCUS A	DIAMOND - DA42	GA-GA
2022135	A	AIRBUS - A320	UNKNOWN (Object)	CAT-UA/Other
2022136	E	PIPER - PA28	PIPER - PA30	GA-GA
2022137	C	ROBINSON - R44	PILATUS - PC12	GA-GA
2022138	B	SCHEMPP HIRTH - VENTUS2A	SOCATA (TBM8)	GA-GA
2022139	B	OTHER - Military (Juno)	EUROPA	GA-Mil
2022140	C	PIPER - PA28	UNKNOWN	GA-Unk ac
2022141	C	CESSNA - 172	CESSNA - 152	GA-GA
2022142	C	OTHER (Canopy Suspended)	OTHER (AW189)	GA-Emerg Servs
2022143	C	BOEING - 737	UNKNOWN (RPAS)	Civ Comm-UA/Other
2022144	C	OTHER - Military (Chinook)	UNKNOWN (RPAS)	Mil-UA/Other
2022145	E	DIAMOND - DA42	PIPER - PA32	GA-GA
2022146	E	SCHEMPP HIRTH - DISCUS B	DIAMOND - DA42	GA-GA
2022147	C	DIAMOND - DA40	GROB - G109	GA-GA
2022148	C	BOEING - 737	UNKNOWN (Object)	CAT-UA/Other
2022149	C	AIRBUS - A320	UNKNOWN (RPAS)	CAT-UA/Other
2022150	C	OTHER (Eurofox)	OTHER - Military (F15)	GA-Mil
2022151	C	CESSNA - 560 - XL	EXTRA - 300	Civ Comm-GA
2022152	B	VANS - RV9	DIAMOND - DA40	GA-GA
2022153	A	OTHER (Aeropro EuroFox)	AVIONS ROBIN - DR400	GA-GA
2022154	A	OTHER (Mavic Pro 2)	AGUSTA - A109	GA-UA/Other
2022155	A	BOEING - 737	UNKNOWN (RPAS)	CAT-UA/Other
2022156	B	AIRBUS - A320	UNKNOWN (Object)	CAT-UA/Other
2022157	C	SCHLEICHER - ASW28	UNKNOWN	GA-Unk ac
2022158	B	SLINGSBY - T67	OTHER (ASG29)	GA-GA
2022159	E	SIKORSKY - S92	AIRSPORTS - PEGASUS QUIK	GA-Emerg Servs

2022160	C	OTHER - Military (Puma HC2)	DE HAVILLAND - DH82	GA-Mil
2022161	E	OTHER (Canopy Suspended)	OTHER - Military (AH64 Apache)	GA-Mil
2022162	A	EVEKTOR AEROTECHNIK - EV97	SUPERMARINE - SPITFIRE	GA-GA
2022163	A	PIPER - PA28	PIPER - PA38	GA-GA
2022164	C	OTHER - Military (A400)	UNKNOWN (RPAS)	Mil-UA/Other
2022165	C	OTHER (CSA Sportcruiser)	CESSNA - 150	GA-GA
2022166	C	DIAMOND - DA40	DIAMOND - DA42	GA-GA
2022167	B	OTHER (Canopy suspended)	SCHLEICHER - K8	GA-GA
2022168	C	OTHER (Nova Paraglider)	BOEING - EC135	GA-Emerg Servs
2022169	C	PIPER - PA28	OTHER (Canopy suspended)	GA-GA
2022170	C	EUROCOPTER (EC145)	OTHER (DJI Mavic RPAS)	Emerg Servs-UA/Other
2022171	B	CIRRUS - SR22	AVIONS ROBIN - DR400	GA-GA
2022172	B	AIRBUS - A319	UNKNOWN (RPAS)	CAT-UA/Other
2022173	B	SCHLEICHER - ASK13	CESSNA - 401	GA-GA
2022174	C	CESSNA - 172	SLINGSBY - T67	GA-GA
2022175	A	PIPER - PA28	CIRRUS - SR20	GA-GA
2022176	C	CESSNA - 172	OTHER (Eurofox)	GA-GA
2022177	C	EMBRAER - ERJ190	UNKNOWN (RPAS)	CAT-UA/Other
2022178	C	AGUSTA BELL - AB139	OTHER - Military (Typhoon)	Civ Comm-Mil
2022179	E	SAAB - 340	AEROSPATIALE - AS350	CAT-GA
2022180	B	BOEING - EC135	UNKNOWN (RPAS)	Emerg Servs-UA/Other
2022181	C	DIAMOND - DA42	CHAMPION - 7ECA	GA-GA
2022182	B	AGUSTA (AW169)	UNKNOWN (RPAS)	Emerg Servs-UA/Other
2022183	C	OTHER (AW189)	BEECH - 24	GA-Emerg Servs
2022184	C	BOEING - 737	UNKNOWN (RPAS)	CAT-UA/Other
2022185	B	EUROCOPTER - EC135	PIPER - PA28	GA-GA
2022186	B	AIRBUS - A320	UNKNOWN (RPAS)	CAT-UA/Other
2022188	B	BOEING - 737	UNKNOWN (RPAS)	CAT-UA/Other
2022189	E	PIPER - PA28	PIPER - PA28	GA-GA
2022190	B	OTHER (RPAS)	UNKNOWN (RPAS)	UA/Other-UA/Other
2022191	A	AIRBUS - A320	UNKNOWN (Object)	CAT-UA/Other
2022192	C	SCHLEICHER - ASK13	PIPER - PA28	GA-GA
2022193	C	OTHER - Military (F35)	UNKNOWN (RPAS)	Mil-UA/Other
2022194	C	OTHER - Military (F35)	UNKNOWN (RPAS)	Mil-UA/Other
2022195	C	ROLLADEN SCHNEIDER - LS3 - A	OTHER - Military (A400M)	GA-Mil
2022196	B	LUSCOMBE - 8	SCHEIBE - SF25	GA-GA
2022197	C	PIPER - PA28	PIPER - PA28	GA-GA
2022198	A	SCHEMPP HIRTH (Arcus)	CESSNA - 150	GA-GA
2022199	B	GLASER DIRKS - DG300	SOCATA (TBM930)	GA-GA
2022200	E	OTHER (Canopy Suspended)	UNKNOWN (Light aircraft)	GA-Unk ac
2022201	B	OTHER (SB5)	PIPER - PA28	GA-GA
2022202	C	OTHER - Military (Juno)	GIPPSLAND - GA8	GA-Mil
2022203	C	BEAGLE - B121	EXTRA	GA-GA
2022204	C	PIPER - PA25	PILATUS - PC12	GA-GA
2022205	B	GRUMMAN - AA5	VANS - RV7	GA-GA
2022206	C	DIAMOND - DA40	EVEKTOR AEROTECHNIK - EV97	GA-GA
2022207	E	OTHER - Military (Merlin)	OTHER - Military (Tutor)	Mil-Mil
2022208	B	CESSNA - 172	CESSNA - 150	GA-GA
2022209	B	DIAMOND - DA42	GROB - G102 - CLUB ASTIR	GA-GA
2022210	C	PIPER - PA28	OTHER (Skyranger)	GA-GA
2022211	E	OTHER - Military (Avenger)	UNKNOWN	Mil-Unk ac
2022212	B	AIRBUS - A319	UNKNOWN (RPAS)	CAT-UA/Other
2022213	C	OTHER (Canopy Suspended)	CIRRUS - SR22	GA-GA
2022214	A	GROB - G102 - ASTIR CS	PIPER - PA28	GA-GA
2022215	C	ROBINSON - R44	EXTRA - 300	GA-GA

2022216	B	OTHER (Canopy suspended)	MOONEY - M20	GA-GA
2022217	A	BOEING - 787	UNKNOWN (RPAS)	CAT-UA/Other
2022218	B	COMCO IKARUS - IKARUS C42	UNKNOWN	GA-Unk ac
2022219	E	OTHER (Mavic Pro RPAS)	OTHER - Military (Juno)	Mil-UA/Other
2022220	B	OTHER (Cabri)	CESSNA - 152	GA-GA
2022221	E	OTHER - Military (Chinook)	UNKNOWN (Light aircraft)	Mil-Unk ac
2022222	D	AIRBUS - A320	UNKNOWN (Object)	CAT-UA/Other
2022223	B	AIRBUS - A320	UNKNOWN (Object)	CAT-UA/Other
2022224	B	PIPER - PA28	AVIONS ROBIN - DR400	GA-GA
2022225	A	PIPER - PA28	UNKNOWN	GA-Unk ac
2022226	C	BOEING - 737	UNKNOWN (Object)	CAT-UA/Other
2022227	A	AIRBUS - A319	UNKNOWN (RPAS)	CAT-UA/Other
2022228	C	AIRBUS - A319	UNKNOWN (RPAS)	CAT-UA/Other
2022229	A	AIRBUS - A320	UNKNOWN (RPAS)	CAT-UA/Other
2022230	B	DIAMOND - DA42	OTHER (Jonker JS3)	GA-GA
2022231	B	PARTENAVIA - P68	PIPER - PA28	Civ Comm-GA
2022232	B	BOEING - 737	UNKNOWN (Object)	CAT-UA/Other
2022233	C	DIAMOND - DA42	UNKNOWN (Glider)	GA-Unk ac
2022234	C	BOEING - 737	BOEING - 737	CAT-CAT
2022235	C	CESSNA - F406	UNKNOWN (RPAS)	Civ Comm-UA/Other
2022236	C	EUROCOPTER (EC175)	UNKNOWN (RPAS)	Civ Comm-UA/Other
2022237	C	OTHER - Military (Wildcat)	OTHER - Military (Tutor)	Mil-Mil
2022238	B	JODEL - DR1050	CESSNA - 172	GA-GA
2022239	C	SCHLEICHER - ASK13	OTHER - Military (C130)	GA-Mil
2022240	C	DIAMOND - DA40	CESSNA - 208	GA-GA
2022241	E	SOCATA - TB20	AEROSPATIALE - AS355	Civ Comm-GA
2022242	B	PIPER - PA28	EXTRA	GA-GA
2022243	A	AIRBUS - A320	UNKNOWN (Object)	CAT-UA/Other
2022244	C	BOEING - 737	UNKNOWN (RPAS)	CAT-UA/Other
2022245	D	AIRBUS - A319	UNKNOWN (Object)	CAT-UA/Other
2022246	E	OTHER (Canopy Suspended)	OTHER - Military (Chinook)	GA-Mil
2022247	B	AGUSTA - A109	NORTH AMERICAN - HARVARD	GA-GA
2022248	C	PARTENAVIA - P68	DIAMOND - DA42	Civ Comm-GA
2022249	C	DIAMOND - DA40	EUROCOPTER - EC155	Civ Comm-GA
2022250	C	OTHER - Military (Prefect)	CFM - SHADOW	GA-Mil
2022251	C	AVIONS ROBIN - DR400	CESSNA - 182	GA-GA
2022252	E	OTHER (Canopy Suspended)	OTHER - Military (Osprey)	GA-Mil
2022253	C	OTHER - Military (Puma AVRPAS)	OTHER - Military (CV22 Osprey)	Mil-UA/Other
2022254	B	PARTENAVIA - P68	CIRRUS - SR20	Civ Comm-GA
2022255	C	SCHLEICHER - ASK21	AEROSPATIALE - AS355	GA-GA
2022256	B	OTHER (Skyranger Swift)	CESSNA - 152	GA-GA
2022257	C	AIRBUS - A320	EUROCOPTER - EC135	CAT-Emerg Servs
2022258	B	OTHER - Military (Prefect)	OTHER - Military (Phenom)	Mil-Mil
2022259	A	OTHER (Canopy Suspended)	UNKNOWN (RPAS)	GA-UA/Other
2022260	E	OTHER (DJI Matrice RPAS)	CESSNA - 172	GA-UA/Other
2022261	B	AGUSTA - A109	UNKNOWN (RPAS)	Emerg Servs-UA/Other
2022262	E	OTHER - Military (C17)	DIAMOND - DA40	GA-Mil
2022263	A	OTHER - Military (Atlas)	UNKNOWN (Object)	Mil-UA/Other
2022264	B	PIPER - PA28	ULTRALIGHTS - IKARUS C42	GA-GA
2022265	B	PIAGGIO - P149	ROCKWELL	GA-GA
2022266	C	PIPER - PA28	EUROPA	GA-GA
2022267	E	OTHER - Military (Juno)	OTHER - Military (Tutor)	Mil-Mil
2022268	B	PIPER - PA28	OTHER (Skyranger)	GA-GA
2022269	B	CESSNA - 152	PIPER - PA28	GA-GA
2022270	C	OTHER (AV Wasp RPAS)	OTHER - Military (A400)	Mil-UA/Other

2022271	C	SCHEIBE - SF25	PIPER - PA28	GA-GA
2022272	C	SOCATA - TB10	CESSNA - 152	GA-GA
2022273	C	PIPER - PA28	CESSNA - 152	GA-GA
2022274	B	EUROCOPTER - EC135	PIPER - PA28	Civ Comm-GA
2022275	C	OTHER (Ultra TD-2 RPAS)	PIPER - PA28	GA-UA/Other
2022276	B	EVEKTOR AEROTECHNIK - EV97	UNKNOWN (RPAS)	GA-UA/Other
2022277	C	OTHER (Cabri G2)	PIPER - PA28	GA-GA
2022278	E	AIRBUS (A220)	EUROCOPTER - EC155	CAT-Civ Comm
2022279	B	DE HAVILLAND - DHC8	UNKNOWN (RPAS)	CAT-UA/Other