

PART 1.5 – RECOMMENDATIONS

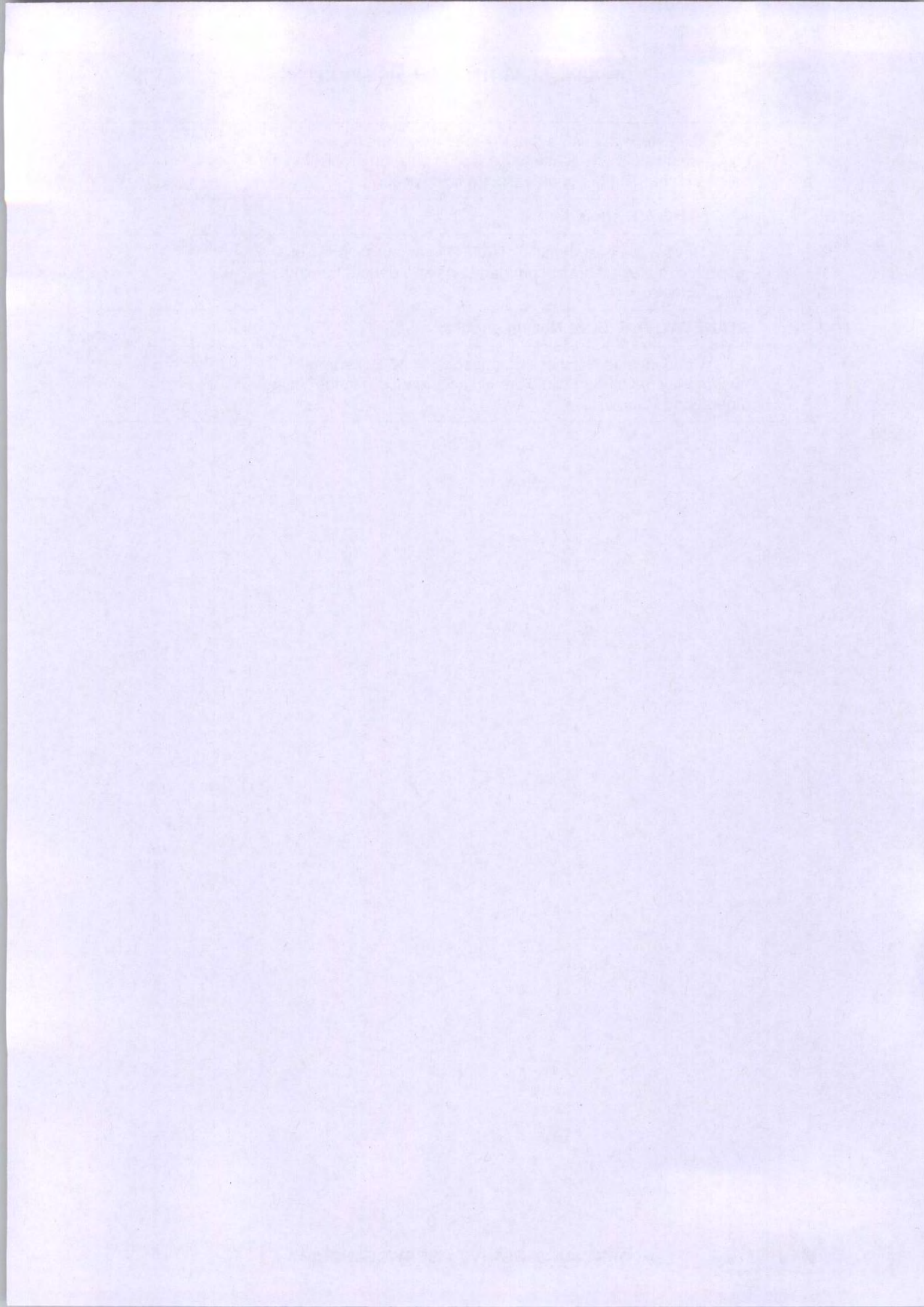
Recommendation	Analysis Reference
1.5.1. Introduction. The following recommendations are made in order to enhance Defence Air Safety:	
1.5.2. AOC 2 Gp (ODH) should:	
a. Implement a comprehensive strategy to affect a positive change in the safety culture with respect to loose articles on the flight decks of 2 Gp aircraft. The strategy should promote awareness of the risks loose articles pose to flight safety, and improve behaviours and accountability.	1.4.35-36, 37d, 39, 40-41
b. Conduct a review of the items carried by crews on all 2 Gp aircraft types, and take steps to minimize what is carried on the flight deck and maximize the use of designated stowage areas.	1.4.35
c. Review the rules governing crew members at their station to minimize the risks associated with having a single pilot on the flight deck.	1.4.36c
d. In consultation with AirTanker Services Ltd and Airbus, ensure that the Voyager Document Set is configured to capture all the manufacturer’s safety advice, including that contained within supplementary documents.	1.4 37d
e. Examine methods of enhancing seatbelt use amongst air transport passengers, including (but not limited to) policy, the content and frequency of briefings, and publicity.	1.4.62-63, 65-71, 78
f. Amend the policy on Cabin Crew restraint to reduce the risk of Cabin Crew injury during in-flight upsets. Specifically, Cabin Crew should wear a seatbelt during controlled rest periods.	1.4.71
g. Ensure that crews on all strategic air transport flights carry a flight sub-impres.	1.4.88
h. Clarify and re-promulgate the hierarchical status of the Voyager Operations Manual in relation to MRPs, 2 Gp Air Staff Orders and BZAOs.	1.4.114-118
i. Ensure that the Voyager Operations Manual is compliant with MRPs, is coherent with 2 Gp Air Staff Orders and BZAOs, and that this is supported by a timely and robust amendment process.	1.4.114-118
j. Clarify the circumstances in which the Voyager Operations Manual policy on reduced cabin crew operations may be applied.	1.4.117
1.5.3. Director Air Support DE&S should:	
a. Examine and, if possible, implement measures that could help prevent the placing of loose articles in close proximity to the side-stick of aircraft so equipped.	1.4.39b

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1.5.4.	COS Ops PJHQ and COS Ops Air Command should:	
	a. In consultation with AOC 2 Gp, produce a contingency plan for unplanned diversions of strategic air transport aircraft. The plan should be held by an appropriate operational level HQ, should clarify command and control responsibilities and, where necessary, have stand-by resources attributed.	1.4.81-95
1.5.5.	ACOS J1/J4 PJHQ should:	
	a. Stipulate the carriage of NATO Travel Orders by all UK military passengers on strategic air transport flights.	1.4.88
1.5.6.	MAA Oversight & Analysis Hd should:	
	a. Conduct an audit of the authorization process on the Voyager Force to ensure that local procedures and practices are satisfactory and in compliance with Military Regulatory Publications.	1.4.112
1.5.7.	MAA Certification & Regulation Hd should:	
	a. Issue advice for Duty Holders on the preservation and handling of CVRs post-incident.	1.4.122
1.5.8.	Air Mobility Force Commander should:	
	a. Ensure that the list of suggested en-route diversions for operational strategic air transport tasks is informed by an operational risk assessment of the consequences of diverting into each location.	1.4 99
1.5.9.	DACOS AvMed, RAFCAM should:	
	a. Examine ways of managing low in-flight pilot workload to minimize boredom and underload.	1.4.36b
1.5.10.	Stn Cdr RAF Brize Norton (DDH) should:	
	a. Take measures to further strengthen the reporting culture and OSI process at RAF Brize Norton to ensure that risks are being adequately captured.	1.4.35
	b. Take steps to ensure that Voyager crews are fully conversant with the overspeed recovery drill, as stipulated in the Voyager Flight Crew Operations Manual.	1.4.51d
	c. Ensure that the critical importance of a clear handover of control (in accordance with Regulatory Article 2309(5)) in side-stick equipped aircraft is emphasised throughout type-specific training.	1.4.51c
	d. Reinforce in Stn Post Occurrence Management Procedures, the requirement for key decisions to be recorded in a written log.	1.4.86

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	e. Take steps to ensure that Voyager crews are fully conversant with the Release to Service stipulation prohibiting the on-board charging of portable electronic devices.	1.4.120
1.5.11.	A1 Ops HQ AIR should:	
	a. Review the post of Incirlik RAFLO to establish terms of reference, a clear chain of command and appropriate training requirements.	1.4.132
1.5.12.	STANEVAL, RAF Brize Norton should:	
	a. Conduct a 100% check of logbooks on 10 Squadron to ensure they have been completed in accordance with the Voyager Operations Manual.	1.4.130



CONVENING AUTHORITY COMMENTS

1. On Sunday 9 Feb 14, 189 passengers and 9 crew were 5 hours into their flight from RAF Brize Norton to Camp Bastion on board Voyager ZZ 333. The aircraft was cruising at FL 330 when the Captain's personal D-SLR camera was placed between his seat-arm rest and his side-stick controller. Shortly afterwards, when he adjusted the position of his seat, the side-stick was deflected fully forward which resulted in the aircraft rapidly entering into a steep descent. The Captain, who was alone on the flight deck while the Co-pilot took a break, was unaware that his camera had caused the pitch down. The Co-pilot, now weightless due to the negative 'g' forces and just outside the cockpit door, managed to traverse the cockpit ceiling to get back to his seat where he was able to pull his side stick fully aft. In the ensuing dive the aircraft achieved a maximum rate of descent of 15,800 feet per minute and lost 4,400 feet in just 27 seconds while reaching a speed of Mach 0.9. From the onset of the pitch-down until the removal of the camera 33 seconds later neither pilot had control of the aircraft; however, the aircraft's automatic high-speed protection system triggered after 13 seconds, reducing the engines to idle before commencing a sustained positive 'g' recovery. Once the obstruction had been cleared, the crew were able to regain control of the aircraft and divert to Turkish Air Force Base Incirlik.

2. I classify this incident as a near-miss for very good reason; frankly, without the excellent technology of the Airbus A330 flight control laws, the outcome could have been very different, with the realistic potential for the loss of the aircraft and 198 of our people. It is important to reiterate that the purpose of the Service Inquiry (SI) is to investigate the circumstances surrounding an incident in order to prevent a reoccurrence and not to apportion blame. The Panel has been careful to respect this separation.

Without this thorough SI, and the full support of Airbus and AirTanker, we might never have known what exactly happened that night, potentially leaving low passenger confidence in the RAF Voyager and wider A330 fleets. I commend the SI Panel for an exceptional job and I agree with the findings of the report and support all of their recommendations. I also commend interested parties to read the full report as there are many lessons but I will limit my comments to 3 key areas; flight administration, loose articles on the flight deck and post-incident handling including Command and Control.

3. The authorisation system employed was weak. The flight was pre-authorised 2 days in advance. On the day of the flight the Duty Authoriser could not be reached by phone and the Squadron Commander had to be contacted to give approval for a reduced cabin crew complement after one member reported in sick. Following the pitch-down event, it became clear the crew had little if any situational awareness of en-route diversion possibilities. After issuing a Mayday call they elected not to use the nearest suitable option suggested to them by Turkish Air Traffic Control at Trabzon 60nm away and instead requested a diversion to Istanbul, 500 nm away. Air Traffic Control eventually offered the option of diverting to Incirlik, at a range of 340 nm, which the crew accepted. It is clear that a lack of preparation and understanding with regard to en-route diversion options had the potential to exacerbate what was a potentially serious situation by inhibiting the crew from landing as soon as possible. Following a highly unusual emergency and with a potentially damaged airframe I consider this lack of situational awareness and the subsequent decision making in relation to selecting a suitable diversion to be below

the standard that I would expect from such an experienced crew. Further, I would question why the crew did not make more use of the electronic data available to them from the aircraft's navigation systems to assist them in the process of selecting a suitable diversion. From a broader perspective I am concerned that no form of operational risk assessment (of military, security and diplomatic factors) was available to the crew, either prior to flight or on board, to inform their choice of potential diversions en-route. Given that the aircraft was minutes from Georgian and Armenian airspace when the incident occurred, the task of dealing with the aftermath could have had challenging diplomatic and security implications.

4. The event took place during a period of exceptionally low workload for the crew. [REDACTED]

[REDACTED] The Panel found that the Captain had used his camera as recently as 3 minutes and 20 seconds prior to the incident. The sequence of events involving the D-SLR camera was established following the detailed analysis of the data from the Cockpit Voice Recorder (CVR), the Flight Data Recorder, the D-SLR camera and its image data, and the forensic examination of the damaged camera body and side-stick unit. The analysis was supported by subsequent simulator trials that were readily able to replicate the chain of events. I am entirely satisfied that at some point in the 3 minutes and 20 seconds prior to the event, the Captain placed his camera on the flat surface between the side-stick controller and his seat arm-rest. At one minute and 44 seconds prior to the event, the CVR detected the noise signature of the seat electric motor as the Captain moved his seat slightly forward¹. Coincident with this movement, a small pressure on the side-stick was detected, moving it forward by between 0.5 to 0.9 degrees, caused by the initial interaction between the arm-rest, camera and the side-stick. The autopilot remained engaged as the pressure applied remained below the threshold required for automatic disengagement and the aircraft attitude was unchanged. The Captain again moved his seat forward (motor noise signature audible), this time causing a geometrical lock to form between the camera, the arm-rest and the side-stick base, resulting in the fully forward deflection of the side-stick, the disengagement of the autopilot and the aircraft's steep descent. During the event, the Captain pulled hard back on the stick, but was unable to move it as it was locked by the obstruction. He struggled to disengage the autopilot, not realising it had already disengaged, while calling for the co-pilot to do the same. Concurrently, the crew manually placed the throttles to idle, despite the automatic high speed protection system having already reduced engine power, but failed to deploy the speed brakes in accordance with the high-speed recovery technique. At 29 seconds into the event, the Captain said "ok.....ok, ok, ok" which was followed by a succession of rapid small lateral (left, right) movements of his side-stick which the SI Panel assesses is the moment when the camera became free. There then followed a distinctive thud on the flight deck, beyond the general background noise, which the Panel believes could be attributable to the camera falling to the back of the cockpit.

5. The operation of the camera on the flight deck was of pivotal significance in the chain of events. Whilst the carriage of the camera was not specifically prohibited by any rule or regulation, the Voyager Operations Manual states that lone flight crew must refrain from non-relevant duties. This would clearly include taking photographs. This incident also highlights that the side-stick is vulnerable to accidental operation by a foreign object. However, industry employed mitigations have proven effective for over 190 million flight hours on this family of Airbus aircraft and this was the first

¹ Prior to movement of the seat, it was assessed by the SI Panel to be in a correct and safe flying position as required when alone on the flight deck. It was quite normal to adjust the seat position at points during the flight.

flight control/object/armrest interaction of this nature to be reported to Airbus. Investigation by the Panel has shown that across the 2 Gp fleets the carriage of loose articles into cockpits and the storing of items around the flight deck has become normalised behaviour. While the hazards posed by loose articles had been previously identified, attempts at remedial action, including a previous Occurrence Safety Investigation (OSI), failed to adequately address the issue. To prevent future reoccurrence, AOC 2 Gp has now instigated a strategy to promote awareness of this issue and improve behaviours and accountability for the items that are necessarily taken into cockpits.

6. The post incident handling of this event also highlights several important lessons. The diversion into Turkey caused immigration problems as passengers did not have visas or NATO travel orders and no imprest was available to satisfy the demands of the Turkish Authorities. Overall, the Brize Norton Executive staff gripped the situation quickly, providing leadership of a whole range of activity beyond their Duty Holder (DH) responsibilities. The Panel considered their actions to be fast, thorough and effective but their lead was not through formal arrangement with the PJHQ or DSCOM, both of whom adopted a supporting role. Many decisions made by Brize Norton, with the best of intentions, including which passengers would return to the UK, remount to Theatre or return to their home unit, should have been taken by the operational chain of command. It is likely that this resulted in issues regarding medical support, Trauma Risk Management and mental health being carried forward into the operational theatre without clarity, documentation or accountability. Up to 24% of the aircraft occupants were rendered temporarily unfit for duties following the incident. At the point of writing this report the Panel had found no evidence that the overall medical outcome of this incident was being tracked. I have now taken this up with the Surgeon General as the long-term psychological impact of this incident on those passengers involved needs to be understood. It is also clear that there is currently no contingency plan to deal with the unplanned en-route diversion of a large strategic aircraft. I recommend that such a plan is now developed (including the Command and Control aspects) and held by a suitable Operational-level headquarters.

7. In summary, I consider this extraordinary and unnecessary incident, caused by the unfortunate placing of a camera close to the aircraft side-stick, to be an extremely serious near-miss. The culture and behaviours with regard to taking non-essential loose articles onto the flight deck is a major concern and needs to change. While this incident has highlighted lapses within the Air Transport community in relation to the carriage of loose articles, which I know the DH will resolve, it also serves as a timely reminder to all aviation platform operators of the dangers that loose articles pose. Clearly, certain equipment and articles need to be taken into cockpits for the flight to be conducted effectively but they should be stowed safely and in an accountable manner. There were a number of disappointing flight administration issues and an unacceptable lack of situational awareness was shown by the crew with regard to unplanned diversions. There were also some weaknesses in post occurrence Command and Control. Conversely, the calm and professional actions of the aircraft Purser and Cabin Crew should be commended during their handling of a confused and alarming scene in the immediate aftermath of the incident, as should the Brize Norton Executive team for their fast and effective response. On this occasion, the A330 automatic self protection systems likely prevented a disaster of significant scale. The loss of the aircraft was not an unrealistic possibility. While at its heart this incident was caused by the simple and unthinking act of placing a loose article close to the aircraft controls, there are broader lessons to learn here. Modern technology may be capable of reducing crew

workload to historic lows and aircraft can now protect themselves as never before, but the requirement for crews to understand and interact with the aircraft and its systems when things deviate from the norm remains as challenging as ever.

DG MAA