Airprox report number 2019027

Summary of Airprox Information from UKAB

Date: 14 Feb 19 Time: 1655Z Position: 5139N 00011E Location: Brentwood Altitude: FL140 Aircraft: B787 (CAT)

The B787 pilot reports approaching LAM from the east when the Cabin Crew Manager saw 2 multi-rotor drones on the right-hand side of the aircraft. The first drone was slightly low and a bit further out, whereas the second was close in at the same level and seemed to take avoiding action.

Reported Separation: 1. 30ft V/60m H *Reported Risk of Collision: High*
2. 0ft V/30m H

UKAB Cause/Risk Statement

Cause: The drones were being flown above the maximum permitted height of 400ft such that they were endangering other aircraft at that location. The Board agreed that the incident was therefore best described as the drones were flown into conflict with the B787.

Risk: The Board considered that the pilot's overall account of the incident portrayed a situation where providence had played a major part in the incident and/or a definite risk of collision had existed.

Airprox Reality Check Analysis

Analysis of this airprox produced a score of -75 using the Airprox Reality Check system[1]. Any score below 0 is considered unlikely to have involved a multirotor drone. -75 and below are considered very unlikely.

Altitude	G	12000ft+	-50
Location	A	Over accessible land (within 10 miles of a road)	0
Photo evidence	C	No photo evidence	0
Eyewitness reports	C	From a person other than flight crew or drone operator	-25
ID of drone & aircraft	B	Drone and operator not identified	0
Electronic evidence	B	Electronic evidence showing aircraft only	0
Description of drone	A	Description matches a multi-rotor drone	0
Light levels	A	Daylight	0
Weather	A	No precipitation	0
Wind Speed	A	<15mph at ground level	0
Geozone	A	Not within a Geozone	0
		Score	-75

Initial Scoring Written Summary

It is practically impossible for a multi-rotor drone to reach 14,000ft due the limitations of battery density/ mass. For two drones to reach this height at the same time, in the same location, is extremely unlikely. The B787 was flying at 277knots - if a drone was 30m away from a cabin window it would flash past in a few milliseconds - it would be impossible to identify. Commentary

of the radar at the time was not included in the airprox report, and no radar data was available to Airprox Reality Check. Weather: Clear, 2mph SSE ATC.

Further Analysis

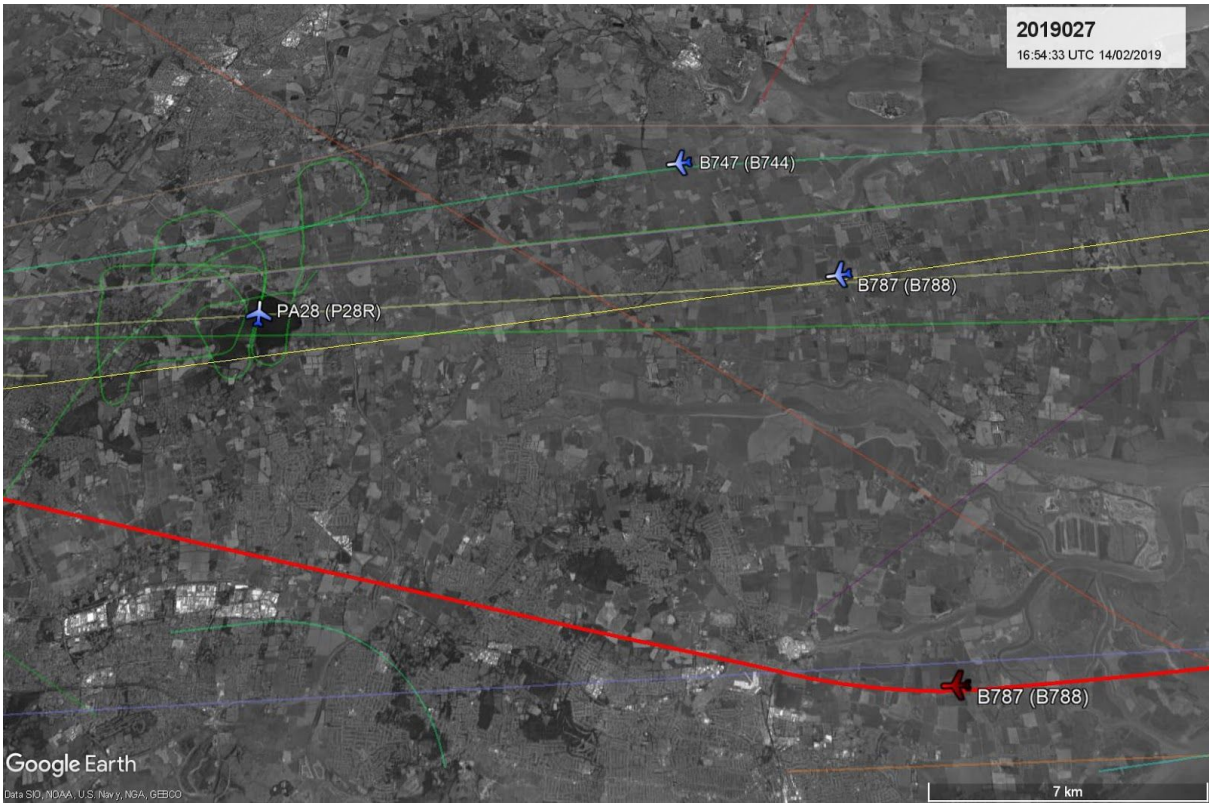
The B787 Dreamliner has windows that are 48cm tall and 20cm wide. The B787 max cabin width is 5.49m. The seating is usually arranged in three rows of three seats with two aisles. The centre of each aisle is approximately 1.83m from the windows. Therefore the horizontal field of view for someone in the aisle looking through the window is 6.265 degrees total. At 30m (where the closest drone was reported) the field of view is 3.28m wide. Taking into account the aircraft's forward speed of 277knots (142m/s), an object 30m away would have been in sight for 23 milliseconds (1/43rd of a second).

Commercial off the shelf multi-rotor drones are not capable of reaching 14,000 feet. (The maximum altitude that a typical high-end drone could physically reach is approximately 6,500ft for a DJI Phantom 4, firmware limits notwithstanding. It's loiter time at 6,500ft would be a few seconds.)

Even if a multi-rotor drone capable of reaching 14,000 feet (or higher) was available, loiter time at that altitude would be measured in seconds. The chances of an airliner flying past during those few seconds would be very small. The chances of this happening with two drones, 30m apart would be of a different order of magnitude.

It is significant that the flight crew did not see these 'objects'. The reported objects, at the reported distances, should have been clearly visible to the flight crew from their far superior vantage point, as they were approached. It is possible that the flight crew correctly dismissed the objects as distant manned aircraft without thinking about it.

ADS-B Analysis



Reporting B787; red track

Analysis of the ADS-B data shows that at the reported time of the incident, two aircraft would have been in view from the right side cabin windows. One was a B787-9 11.5 kilometres to the North at the same level, and the other was a B747-400 16.5km to the North and higher.

The B787-9[2] has a fuselage length of 63m. At 11.5km distance this would appear the same size as a typical 33cm drone at 60m. The B747-400 has a fuselage length of 70.9m. At 16.5km distance this would appear the same size as a typical 33cm drone at 76m.

These two aircraft would have been in view in the reported direction, at the reported time of the sighting, and their apparent sizes would have been similar to drones. Due to their similar speeds on broadly the same heading, they would have been visible for several minutes. ARC therefore reached the view that these aircraft were almost certainly the objects sighted by the cabin crew manager. This was not in fact an airprox. There was absolutely no risk of collision.

Airprox Reality Check Conclusion

This was a classic case of distant full-size aircraft being mistakenly identified as nearby drones.

In the sky, there is nothing to give scale to an object. Once the human brain leaps to the wrong conclusion about what the object is, the relative distance etc is 'calculated' on this 'wrong' basis.

About Airprox Reality Check

Airprox reports featuring unmanned aircraft are almost always pure eyewitness accounts, which are notoriously unreliable[4]. Airprox Reality Check analyses airprox data using its 'Reality Check System' to evaluate the likelihood of the event actually having involved a multirotor drone.

Airprox Reality Check believes that airprox data relating to drones should be an accurate and reliable indicator of the actual number of times drones come into proximity to manned aircraft, and is committed to achieving that goal.

References

[1] = The Airprox Reality Check system is explained here: https://www.airproxrealitycheck.org/reality-check-system/
[2] = Boeing 787-9 specification source: https://www.boeing.com/commercial/787/
[3] = Boeing 747-400 specification source: https://www.britishairways.com/en-gb/information/about-ba/fleet-facts/boeing747-400
[4] = This quote is from 'Reliability of Eyewitness Reports to a Major Aviation Accident' here: https://commons.erau.edu/cgi/viewcontent.cgi?article=1040&context=ijaaa
ADS-B data sourced from The OpenSky Network: http://www.opensky-network.org