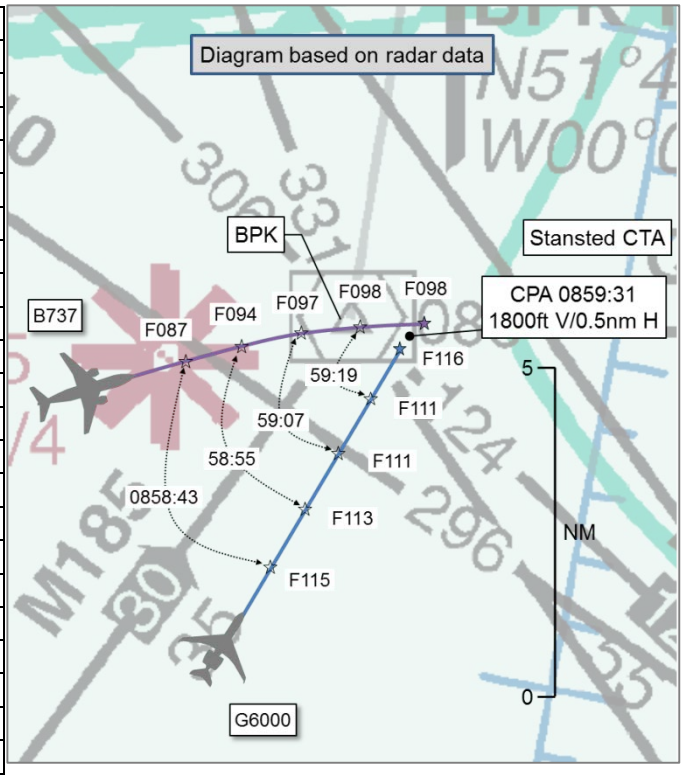
AIRPROX REPORT No 2015201

Date: 4 Nov 2015 Time: 0859Z Position: 5145N 00005W Location: Brookmans Park (BPK)

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	Global 6000	B737
Operator	Civ Exec	CAT
Airspace	London TMA	London TMA
Class	A	A
Rules	IFR	IFR
Service	Radar Control	Radar Control
Provider	Swanwick	Swanwick
Altitude/FL	FL115	FL98
Transponder	A/C/S	A/C/S
Reported		
Colours	NK	Blue/white
Lighting	NK	NK
Conditions	IMC	IMC
Visibility	In cloud	In cloud
Altitude/FL	FL110	FL100
Heading	NK	085°
Speed	220kt	250kt
ACAS/TAS	TCAS II	TCAS II
Alert	RA	RA
Separation		
Reported	NK	NK
Recorded	1700ft V/0.5nm H	



THE GLOBAL 6000 PILOT reports that they entered IMC at about FL140. They were issued with a radar heading of 017°, followed shortly afterwards by a clearance 'direct BKY'. Initially, they were cleared to descend to FL120, which was revised during the descent to FL110. Their Rate of Descent was 1500fpm, speed approximately 220kt. When reaching about FL114 they spotted a traffic target on the Primary Flight Display (PFD) at their approximate 9 o'clock position. At about the same time they heard a TCAS TA 'Traffic, Traffic' the pilot automatically reached over to the rate control wheel, instantly thinking about reducing the rate of descent. But a glance at the Flight Mode Annunciator showed that the autopilot had already captured FL110 and was levelling off. During the level-off they received a TCAS RA 'Climb, Climb'. He immediately disconnected the autopilot and manually followed the 'green box' on the PFD. They both expected to get away from the traffic quickly. They were in 'full IMC' and never had visual contact with the traffic. He commented that the RA kept going for quite a while. To their surprise the target, now a solid red square, still showed an arrow upwards. He opined that this circumstance showed them that the other traffic did not do anything to avoid a collision. His Co-pilot immediately notified ATC "[C/S] is following a TCAS RA". The controller seemed a bit confused and acknowledged it with something like "...that's copied" and instructed them to return to FL110. Probably just 20 seconds later he transferred them to the next sector without mentioning the situation again.

He assessed the risk of collision as 'High'.

THE B737 PILOT reports that he received a TCAS TA followed by an RA to 'adjust vertical speed' in the vicinity of BPK. He wondered whether the other aircraft had a high rate of descent and this may have been part of the reason for the RA. He reported he had been climbing at 1200fpm.

He assessed the risk of collision as 'None'.

THE SWANWICK NE DEPS RADAR CONTROLLER reports that the B737 pilot had been cleared to climb to FL100; the Global 6000 pilot had been instructed to descend to FL110. The two aircraft were due to cross at BPK. When the B737 was passing FL85, Short Term Conflict Alert (STCA) activated. The pilot said 'approaching FL100'. He was instructed to maintain the level as there would be traffic crossing right to left 1000ft above. Both aircraft subsequently reported TCAS RAs. There was no loss of separation.

Factual Background

The weather at Luton was recorded as follows:

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METAR EGGW 040850Z 00000KT 5000 RA BCFG NSC 11/11/Q1013=
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With reference to maximum Rates of Climb the UK AIP[1] states:

> 'In order to ensure the credible interaction of Airborne Collision Avoidance Systems and ground based safety nets, other than aircraft in emergency and certain specific conditions for military aircraft (as detailed in Military AIP and MAA Regulatory Publication RA 3000 Series), all aircraft when operating under normal circumstances, when inside Controlled Airspace within the London and Scottish FIRs/UIRs should not operate with a climb or descent rate exceeding 8000 ft per minute. Aircraft when first approaching a cleared flight level and/or when changing flight level in Controlled Airspace should ensure that the vertical closure speed is not excessive. **It is considered that, with about 1500 ft to go to a cleared level, vertical speed should be reduced to a maximum of 1500 ft per minute and ideally to between 1000 ft per minute and 500 ft per minute.** Pilots should ensure that the aircraft neither undershoots nor overshoots the cleared level by more than 150 ft, manually overriding if necessary.'

ICAO Annex 6, Part 1[2] states a 'Recommendation' that:

> 'Unless otherwise specified in an air traffic control instruction, to avoid unnecessary airborne collision avoidance system (ACAS 11) resolution advisories in aircraft at or approaching adjacent altitudes or flight levels, **operators should specify procedures by which an aeroplane climbing or descending to an assigned altitude or flight level, especially with an autopilot engaged, may do so at a rate less than 8 m/sec or 1500ft/min (depending on the instrumentation available) throughout the last 300m (1000ft) of climb or descent to the assigned level when the pilot is made aware of another aircraft at or approaching an adjacent altitude or flight level**.
>
> Note. Material concerning the development of these procedures is contained in the PANS-OPS (Doc 8168) Volume 1, Part 111, Section 3, and Chapter 3'

Analysis and Investigation

CAA ATSI

The pilot of the descending Global 6000 filed an Airprox in relation to a climbing B737. Both pilots had been cleared to levels separated by 1000ft, with the B737 climbing to FL100 and the Global 6000 descending to FL110, which was confirmed on the Mode S Selected Flight Level readout for both aircraft. The rate of climb (ROC) of the B737 was, at one point in the climb, measured at 4100fpm and, although it started to decrease, was still indicating 3700ft/min as the B737 was passing FL90. The Global 6000's Rate of Descent (ROD) was decreasing from 1700fpm. Both pilots reported receiving TCAS RAs. The controller's actions were correct and there were no apparent ATM implications nor a loss of separation.

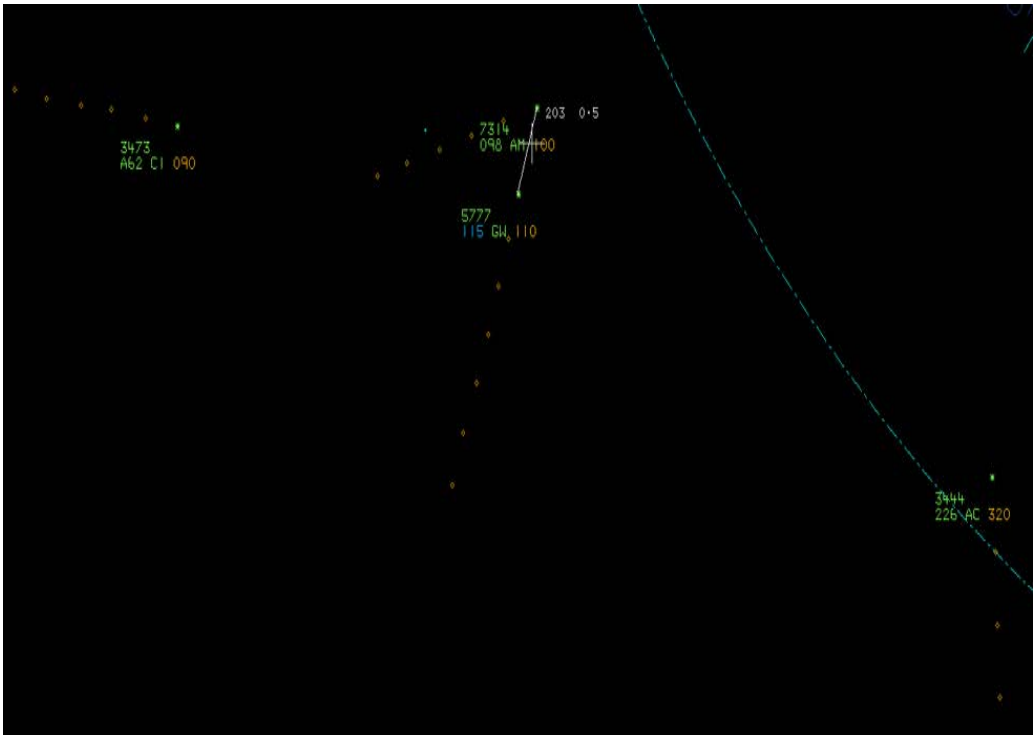
[1] ENR 1.1-12, Paragraph 3.2.2.3.1.
[2] Paragraph 4.4.10 Aeroplane operating procedures for rates of climb and descent.

UKAB Secretariat

Both pilots were cleared to levels separated by 1000ft and complied with their ATC instructions. Standard vertical separation of 1000ft was maintained.

Occurrence Investigation

Radar recordings show that the Global 6000 pilot was descending at approximately 1500fpm after passing FL122. However, the B737 pilot was climbing at between 3000-4500fpm on approaching FL93, this then decreased to approximately 1500fpm on approaching his cleared limit of FL100; he levelled at FL98.



CPA Figure 1 0859:28-Squawk 5777=Global 6000. Squawk 7314=B737.

Summary

An Airprox was reported when a Global 6000 and a B737 received TCAS RAs at 0859 on Wednesday 4th November. Both pilots were operating under IFR in IMC, in receipt of a Radar Control Service from the NE Deps Radar controller. The B737 pilot had been cleared to climb to FL100 and the Global 6000 pilot to descend to FL110. Both pilots complied with their respective clearances and standard separation was maintained, although TCAS RAs were generated in both aircraft.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from both pilots, the controller concerned, area radar and RTF recordings and reports from the appropriate ATC and operating authorities.

The Board noted that, although having been cleared to separated levels, both pilots had received TCAS RAs and it was quickly decided that the only reason for the generation of TCAS RAs must have resulted either from a high ROD by the Global 6000 pilot or a high ROC by the B737 pilot, or a combination of both.

The radar recordings in the period leading up to the Airprox showed that the Global 6000 pilot had reduced his ROD to approximately 1500fpm as he had passed FL122; this was in accordance with published advice. However, the Board noted that the B737 pilot had been climbing at between 3000-

4500fpm within 1000ft of his level-off altitude. Civil Airline Pilot members explained that this was not an unusual ROC for that type of aircraft if light-weight on a relatively short flight. Board members observed that the initial high ROC had reduced as it had approached FL90; however, some members judged that the B737 was probably climbing in excess of 1500fpm as it had passed FL90, which had been 1000ft below its cleared level. Because he had been advised of adjacent traffic 1000ft above, the ICAO recommendation states that a pilot should climb at less than 1500fpm throughout the last 1000ft of climb. However, a Civil controller member warned against trying to judge accurately the ROC over a short period because the radar picture displayed could be 2 or 3 sweeps (8-12secs) behind what the aircraft had actually been performing. Nevertheless, although an accurate ROC could not be determined, members agreed that both pilots had received a TCAS RA and the Board considered that the cause of this was the B737 pilot's high rate of climb.

Civil Pilot members then discussed the potential anomalies between the ICAO ROC recommendation and the computer software technology fitted to the autopilot, which controls an aircraft's ROC. They explained that the autopilot is programmed to produce the best climb aspect for optimal aircraft performance, rather than to comply with the recommended ROC. To ensure that an aircraft's ROC approaching another vertically adjacent aircraft complied with ICAO's recommendation the pilot would probably have to revert to manual control. Some members wondered whether this was common knowledge amongst pilots, and it was pointed out that most airlines' SOPs call for prudent control of Vertical Speed in these circumstances in order to prevent unnecessary TCAS RAs, unlike what had occurred on this occasion.

Nevertheless, the Board noted that the ICAO procedures were recommendations rather than hard limits and so they quickly decided that normal operating procedures had applied; the aircraft had been cleared to separated levels and the pilots had complied with their clearances in this respect. Consequently they assessed the risk of the Airprox as risk category E for this event.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: The B737 pilot's high rate of climb resulted in TCAS RAs.

Degree of Risk: E.