AIRPROX REPORT No 2020157

Date: 02 Nov 2020 Time: 1810Z Position: 5804N 0606W Location: 11NM SE of Stornoway

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	BE200	Embraer 145
Operator	Civ Comm	CAT
Airspace	Scottish FIR	Scottish FIR
Class	G	G
Rules	IFR	IFR
Service	Procedural	Procedural
Provider	Stornoway	Stornoway
Altitude/FL	FL065	FL070
Transponder	A, C, S	A, C, S
Reported		
Colours	Not reported	White, Black
Lighting	Not reported	Strobe, Nav
Conditions	VMC	VMC
Visibility	Not reported	10KM
Altitude/FL	6000ft	FL070
Altimeter	QNH (995hPa)	QNH (1013hPa)
Heading	In the turn	343°
Speed	Not reported	220kt
ACAS/TAS	TCAS I	TCAS II
Alert	TA	RA
Separation		
Reported	500ft V/2NM H	500ft V/Not reported
Recorded	500ft V/0.9NM H	

THE BE200 PILOT reports that they were departing Stornoway and were given a Scottish Control clearance to depart direct to the GOW climbing to FL150, with a Procedural Service after departure from Stornoway, and advised of a local restriction to follow. They briefly discussed that there may be a local restriction to intercept a radial outbound and/or a level restriction. They heard on the R/T inbound traffic calling up on frequency who were cleared to descend to FL070. Subsequently they were given a local restriction, believed to be because of the inbound traffic, which was to climb and maintain FL060. There was no mention of any further restrictions. They were cleared to enter, back-track and line up RW18 and report when ready for departure. At this time the Coast Guard helicopter was landing on the threshold of RW24 and the BE200 crew were asked if they were visual with them, to which they confirmed that they were. They then reported ready for departure and were cleared for take-off. Shortly after passing 1500ft, after setting climb power and engaging the autopilot, ATC instructed them to intercept the 161 radial from the STN, the STN VOR is not located on the airfield. They subsequently turned left onto a heading of about 120° to intercept the 161 radial. They were passing the 240 radial, at this point tracking southbound. ATC had asked the inbound aircraft what radial they were on but the BE200 crew cannot recall what that was. At this stage they were focused on following ATC's instructions and became aware that their flight path was taking them directly towards the inbound traffic. This distracted them from completing the after take-off and climb checks and the normal triggers to set the standard pressure setting (1013hPa). They levelled off at altitude 6000ft on QNH 995hPa. At this point they noticed that the height difference on TCAS I was less than 1000ft and they were flying directly towards the other traffic. The PF announced that they were unhappy about this situation, at which point they realised that they had omitted setting 1013hPa and simultaneously received a TCAS TA. As they were visual with the traffic, they disconnected the autopilot and took avoiding action, turning to the right onto a heading of 180°, with the other traffic passing down their left-hand side. The other aircraft pilot declared a TCAS RA and then shortly after, that they were clear of conflict. Once they were clear of the conflict visually, and heard the same from the other pilot, they turned left again to return to an intercept

track to establish on the 161 radial. They estimate that they had 500ft vertical separation at worst case and about 2NM laterally, the lateral element would have been less had they not taken avoiding action. ATC then asked them what altitude they were at, to which they replied altitude of 6000ft and FL65. They also acknowledged their error and conveyed their sincere apologies to ATC and the other traffic and that they would submit an ASR/MOR. ATC requested they establish on the radial they were crossing, which was 165°, to which they replied that they would intercept the 161 radial as they had it all setup now and were already closing in. They requested further climb, which was delayed by 30sec from ATC, and eventually received their further climb to FL150 and were handed over to Scottish Control. The rest of the flight was uneventful with a safe approach and landing at their destination.

THE EMBRAER 145 PILOT reports that they were on approach to Stornoway. They were instructed to descend to and maintain FL070 for separation into Stornoway, due to departing traffic, and establish inbound to the STN 161 radial and then outbound on STN 004 radial for the direct arrival procedure RW18. Traffic was seen on TCAS II and acquired visually about 8NM away from STN at 18:09Z, they noted that the traffic was instructed to climb to FL060, then they noticed that the traffic was continuing to climb on TCAS II to 500ft below them. They received a proximity traffic warning on the TCAS II which was soon followed by a TCAS RA 'monitor VS'. ATC were notified of the TCAS RA by the PM and they were then notified when the Embraer 145 was clear of the traffic. The intruding aircraft's pilot asked ATC to confirm their climb clearance and the Embraer 145's level whilst they made an avoiding turn to the right. The conflicting aircraft pilot realised their mistake and apologised instantly on the radio. An uneventful approach and landing were then carried out.

The pilot assessed the risk of collision as 'Medium'.

THE STORNOWAY CONTROLLER reports that the Embraer 145 was inbound on the STN 161 radial and the pilot was given descent to FL070. The BE200 pilot was instructed to stop climb FL060 after departure and read that back. After the BE200 pilot departed he was instructed to establish on STN 161 radial and report established. The BE200 pilot was then asked to report reaching FL060. The BE200 pilot reported levelling off at FL060. The BE200 pilot then requested the level of the inbound traffic. During that transmission "Traffic" was overheard being announced in the cockpit. When asked to report their level the Embraer 145 pilot replied "FL070 and TCAS RA". Both aircraft were visible from the VCR and the BE200 was observed making a right turn away from the Embraer 145. The Embraer 145 pilot reported clear of traffic. The BE200 pilot apologised and stated that the 'report when established on the radial' was a distraction. The BE200 pilot was asked to report their level, they reported FL65. Standard separation was then applied.

Factual Background

The weather at Stornoway was recorded as follows:

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METAR EGPO 021750Z 25006KT 9999 FEW016 FEW020CB 06/04 Q0995
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Analysis and Investigation

CAA ATSI

ATSI had access to reports from the pilots of both aircraft, the Stornoway controller and the HIAL investigation report. The Stornoway controller was operating in a non-radar environment. The area radar replay and the Stornoway RTF were reviewed for the period of the event. Screenshots in this report have been taken from the area radar replay. The RTF loading in the lead up to the event was very low.

Prestwick Centre (PC) and the Stornoway controller agreed that the Stornoway controller would provide the climb separation against the Embraer 145 which was descending to FL080. The Stornoway controller passed the departure clearance to the pilot of the BE200 that they were cleared direct to the GOW climbing FL150, to Squawk 6305, and that there would be a local restriction to follow. The Embraer 145 (E145) pilot reported established inbound on the STN 161 radial.

At 18:05.00 the controller instructed the BE200 pilot to *"hold position and after departure stop climb FL060".* The pilot readback *"hold position, after departure stop climb FL060".* The controller requested that the pilot report ready for departure.

At 18:06.20 the BE200 pilot called ready for departure. The controller passed the surface wind and cleared the pilot for take-off RW18.

At 18:06.40 the Embraer 145 pilot reported 25 DME and was instructed to descend FL070.The pilot responded *"descend FL070"*.

At 18:07.20 the Embraer 145 pilot was instructed *"not below FL070, cleared direct arrival to Localiser/DME/NDB RW18, report STN outbound"*. The pilot readback *"not below FL070, cleared to the direct arrival RW18 NDB/Localiser and report beacon outbound".*

At 18:07.50 the BE200 pilot was instructed to establish on the 161 radial outbound from STN and report established. The pilot asked the controller to say again and the controller repeated the instruction. The pilot responded with Wilco.

At 18:09.40 the BE200 pilot was instructed to report reaching FL060. The pilot confirmed that they were just levelling at FL060 (Figure 1).

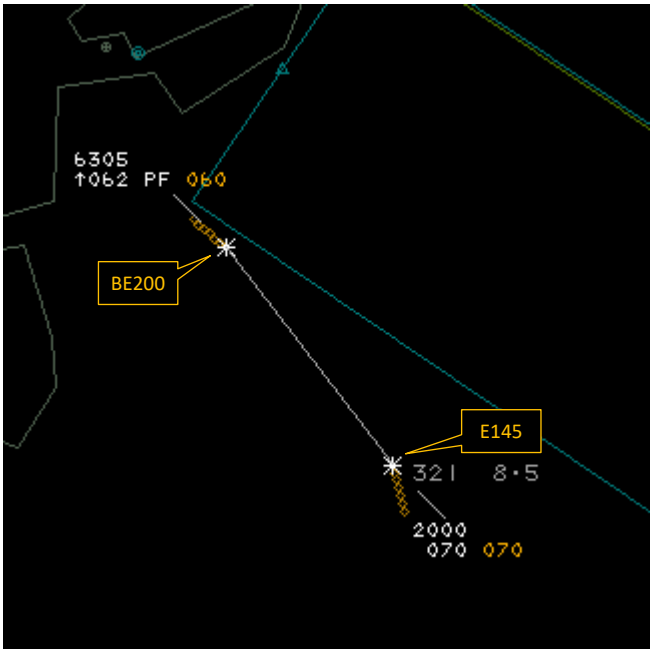


Figure 1 - 18:09.40

At 18:10.20 the BE200 pilot was heard saying *"what's the eh flight level"* but did not complete the rest of the transmission.

At 18:10.30 the controller asked the Embraer 145 pilot to report their level. The pilot responded that they were at FL070 and had a TCAS RA (Figure 2).

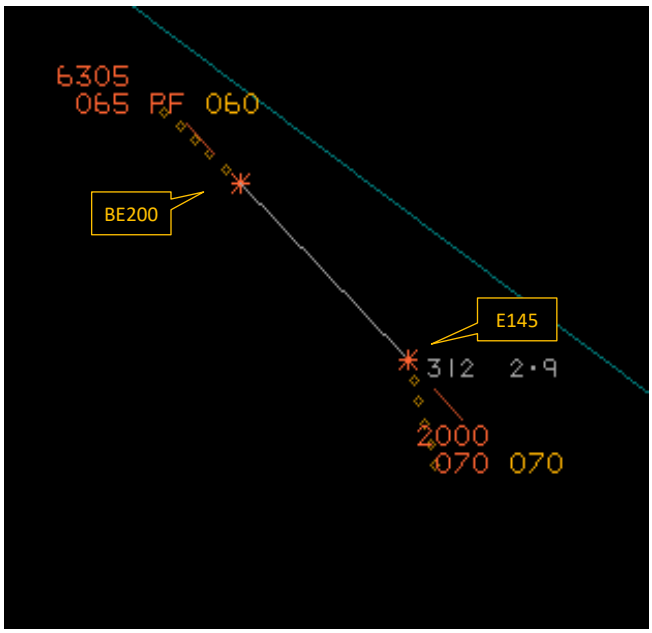


Figure 2 - 18:10.30

At 18:10.49 CPA occurred, with the aircraft separated by 0.9NM horizontally and 500ft vertically (Figure 3).

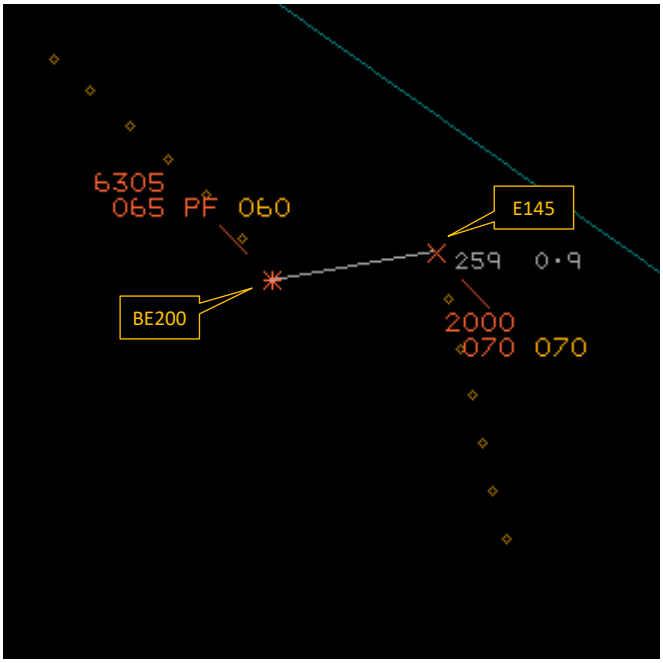


Figure 3 - 18:10.49 CPA

At 18:11.00 the Embraer 145 pilot reported *"clear of traffic".* The controller replied *"roger".*

At 18:11.10 the BE200 pilot said, *"I've got to offer my sincere apologies there, with the distraction of radial 161 we omitted to set the standard, my sincere apologies, an ASR will be submitted".*

At 18:11.40 the controller instructed the BE200 pilot to, *"report your level".* The pilot advised that they were at FL65.

At 18:12.20 the controller asked the BE200 pilot, *"are you established on radial 161 now"?* The BE200 pilot enquired as to whether this call was for them, the controller replied that it was and repeated the question. The pilot responded, *"we're re-establishing, we took avoiding action to the*

right, we were visual with the traffic, re-establishing on the 161". The controller instructed the pilot to report established. The pilot responded, *"Wilco".*

At 18:12.55 the BE200 pilot requested further climb and was advised to expect this in 30 seconds.

At 18:13.00 the Embraer 145 pilot reported *"beacon outbound".* The controller responded, *"roger"* and then asked the BE200 pilot *"what's your nearest radial now"?* The pilot responded with 165. The pilot was instructed to establish on the 165 radial and climb FL150. The pilot readback the instruction initially and then went back to the controller and advised that they were just establishing on the 161 radial now and would maintain that. The controller acknowledged and instructed the pilot to maintain the 161 radial and climb to FL150.

The level allocated to the outbound BE200 pilot (FL060) was separated from the level allocated to the inbound Embraer 145 pilot (FL070) by the standard 1000ft. The departure clearance provided to the pilot of the BE200 before departure did not contain an instruction to establish on a radial. The intention of the controller was to maintain vertical separation initially, establish both aircraft on reciprocal VOR radials and use the same exact reporting point (*a position established by the VOR radial combined with a range from the DME)* to achieve the required level change. The controller workload and RTF loading in the lead up to the event was such that there had been opportunities to pass the required radial to the pilot ahead of their departure, rather than at a time when cockpit workload was high.

The instruction for the BE200 pilot to establish on the 161 radial was issued when the aircraft was in the initial climb phase and during a period of high cockpit workload, resulting in the pilot becoming distracted and omitting to set the standard 1013hPa. The QNH of 995hPa had been set by the BE200 pilot prior to departure, and this resulted in a level bust from what should have been FL060 to FL65.

The range checks on the Embraer 145, passed by the PC controller, and the Embraer 145 pilot on their initial call, indicated that the pilot would be very unlikely to make their original ETA of 18:08.00. The ETA on the flight progress strip for the Embraer 145 remained as 18:08.00, which could indicate that the controller may not have realised that the pilot was not likely to make their original ETA. This may have impacted the controller's plan.

The following 3 recommendations have been raised by HIAL as a result of their own unit investigation:

- Provision of a Flight Information Display (FID) to aid situational awareness and highlight any potential safety issues.
- Use the scenario to increase ATCO awareness on pilot workload in an APP environment.
- ATCOs should include any planned radial, track, route or time restriction instruction as part of the local restriction prior to departure, where applicable.

UKAB Secretariat

The BE200 and Embraer 145 pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard.[1] If the incident geometry is considered as converging then the BE200 pilot was required to give way to the Embraer 145.[2]

[1] SERA.3205 Proximity.
[2] SERA.3210 Right-of-way (c)(2) Converging.

Summary

An Airprox was reported when a BE200 and an Embraer 145 flew into proximity at 11NM SE of Stornoway at 1810Z on Monday 2nd November 2020. Both pilots were operating under IFR in VMC at night, and in receipt of a Procedural Service from Stornoway.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate operating authorities. Relevant contributory factors mentioned during the Board's discussions are highlighted within the text in bold, with the numbers referring to the Contributory Factors table displayed in Part C.

Due to the exceptional circumstances presented by the coronavirus pandemic, this incident was assessed as part of a 'virtual' UK Airprox Board meeting where members provided a combination of written contributions and dial-in/VTC comments.

The Board began by looking at the actions of the Embraer 145 pilot. They had first been alerted to the BE200 on their TCAS II which allowed them to acquire it visually at the early stages. Their TCAS II subsequently displayed a TA warning which developed into an RA warning, on following the resolution instructions the conflict was resolved (**CF7**).

Next the Board looked at the actions of the BE200 pilot. The Board commended them for their honest reporting. They had been cleared to FL060 but had inadvertently forgotten to change their altimeter from 995hPa to 1013hPa when the Stornoway controller passed an instruction (**CF4&5**). This had resulted in the aircraft climbing through their clearance restriction of FL060 and levelling at 6000ft altitude – equivalent to ~FL065 given the difference in pressure(**CF3&6**). The Board heard that some operating companies have procedures which advise setting of the appropriate hPa subscale prior to departure. They agreed that (if this procedure was in accordance with company policy) then it represented good practice, as it could be a significant factor towards the mitigation against the risk of inadvertent level busts of this kind. The BE200 crew noted reduced height indications against the other traffic and noticed the incorrect altimeter subscale at the same time as they received a TCAS TA (**CF8**), they altered their course and increased the separation before returning to their cleared level.

Turning to the actions of the Stornoway controller, Board members discussed why the aircraft had been given reciprocal radials to fly. The ATC Board member said this was normal practice when handling aircraft procedurally as it allows ATC to quickly and accurately establish when 2 aircraft have passed each other and are therefore able to continue with climb or descent instructions: when separated by altitude and on reciprocal radials, the range query is the only information that ATC needs to be able to manage aircraft separation. In this case the aircraft would have been separated by 1000ft vertically; it was unfortunate therefore that the BE200 pilot had not set the correct altimeter subscale whilst climbing to their assigned level. As aircraft were receiving a Procedural Control Service and with Stornoway not having a radar, the controller was reliant upon the pilots concerned to adhere accurately to instructions so that their situational awareness remained accurate. As the vertical contract had been breached, through the mis-setting of the altimeter, the controller could not maintain situational awareness making it impossible for them to detect the conflict **(CF 1&2)**. The Board were heartened that Stornoway have recommended the introduction of a FID to enhance their controller's situational awareness.

The Board discussed at detail the merits of raising the Transition Altitude (TA) from 3000ft to a higher altitude. It was noted that this had been investigated before but was not progressed due to several factors. Members agreed that it would be beneficial to review the feasibility of increasing the TA which would reduce the workload for pilots when aircraft are at a lower level. The Board hoped the CAA would investigate this as part of the Airspace Modernisation Strategy (AMS). The Board opined that a higher TA would have prevented the level bust that resulted in this Airprox, in fact they believed that it would reduce other inadvertent level busts.

Finally, the Board looked at the Risk. The Embraer 145 crew were visual with the BE200 and had TCAS information. When the BE200 crew realised their mistake they quickly changed their heading to increase

the separation between the aircraft. Because of the actions of both pilots the Board agreed that, although safety was degraded, there was no risk of collision, a Risk category C.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2020157		
CF	**Factor**	**Description**	**Amplification**
	Ground Elements		
	• Situational Awareness and Action		
1	Contextual	• Situational Awareness and Sensory Events	The controller had generic, late or no Situational Awareness
2	Human Factors	• Conflict Detection - Not Detected	
	Flight Elements		
	• Regulations, Processes, Procedures and Compliance		
3	Human Factors	• Flight Crew ATC Clearance Deviation	
	• Tactical Planning and Execution		
4	Human Factors	• Action Performed Incorrectly	Incorrect or ineffective execution
5	Human Factors	• Operation with Incorrect Altimeter Setting	
6	Human Factors	• Flight Level/Altitude Deviation (Level Bust)	
	• Electronic Warning System Operation and Compliance		
7	Contextual	• ACAS/TCAS RA	
8	Contextual	• ACAS/TCAS TA	

Degree of Risk: C.

Safety Barrier Assessment[3]

In assessing the effectiveness of the safety barriers associated with this incident, the Board concluded that the key factors had been that:

Ground Elements:

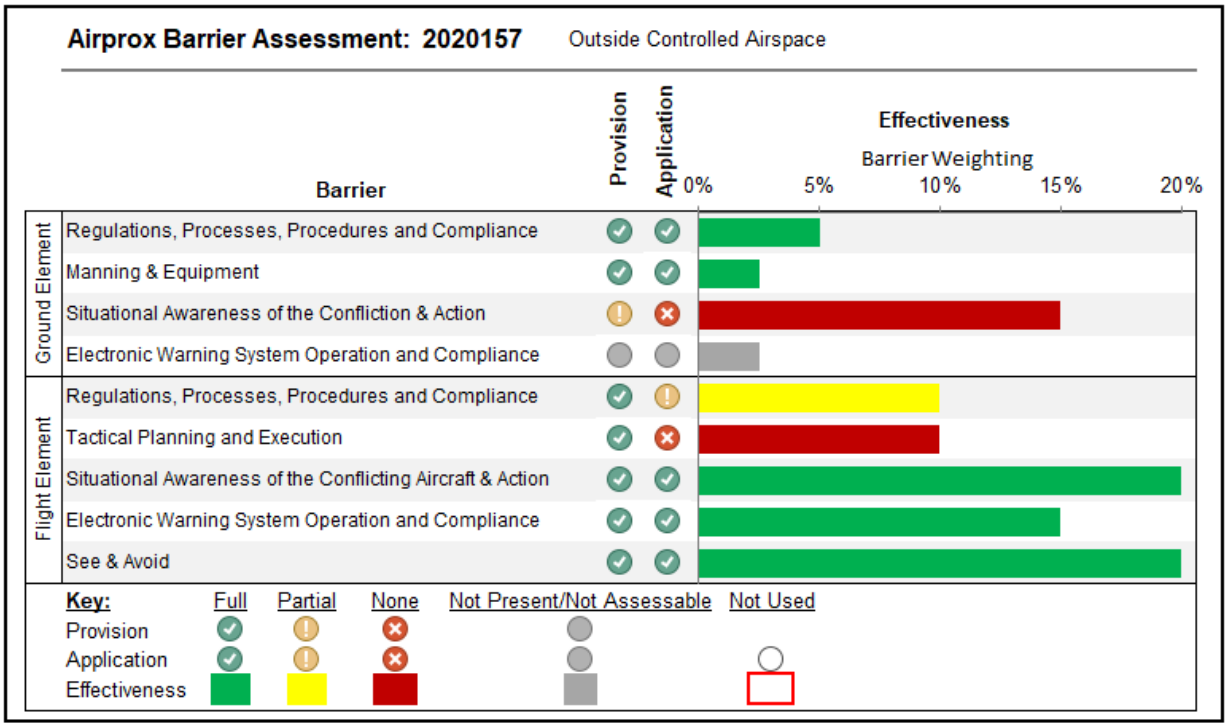
Situational Awareness of the Confliction and Action were assessed as **ineffective** because the aircraft were receiving a Procedural Service, this is non-radar and the controller was not aware of the loss of vertical separation crated by the BE200 pilot's level bust.

Flight Elements:

Regulations, Processes, Procedures and Compliance were assessed as **partially effective** because the BE200 pilot did not stop their climb at the FL060 clearance limit.

Tactical Planning and Execution were assessed as **ineffective** because the BE200 pilot did not change their altimeter setting and subsequently flew above their FL060 clearance limit.

[3] The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the UKAB Website.


Airprox Barrier Assessment: 2020157
Outside Controlled Airspace
Barrier
Provision
Application
Effectiveness
Barrier Weighting
0%
5%
10%
15%
20%
Ground Element
Regulations, Processes, Procedures and Compliance
Manning & Equipment
Situational Awareness of the Confliction & Action
Electronic Warning System Operation and Compliance
Flight Element
Regulations, Processes, Procedures and Compliance
Tactical Planning and Execution
Situational Awareness of the Conflicting Aircraft & Action
Electronic Warning System Operation and Compliance
See & Avoid
Key:
Full
Partial
None
Not Present/Not Assessable
Not Used
Provision
Application
Effectiveness