

## AIRPROX REPORT No 2011167

Date/Time: 31 Dec 2011 1146Z

Position: 5818N 00621W (5nm N  
Stornoway - elev 26ft)

Airspace: SFIR (Class: G)

Reporting Ac Reported Ac

Type: SF340 BE200

Operator: CAT Foreign Mil

Alt/FL: 2000ft NK  
QNH (990hPa) QNH

Weather: IMC KLWD NK

Visibility:

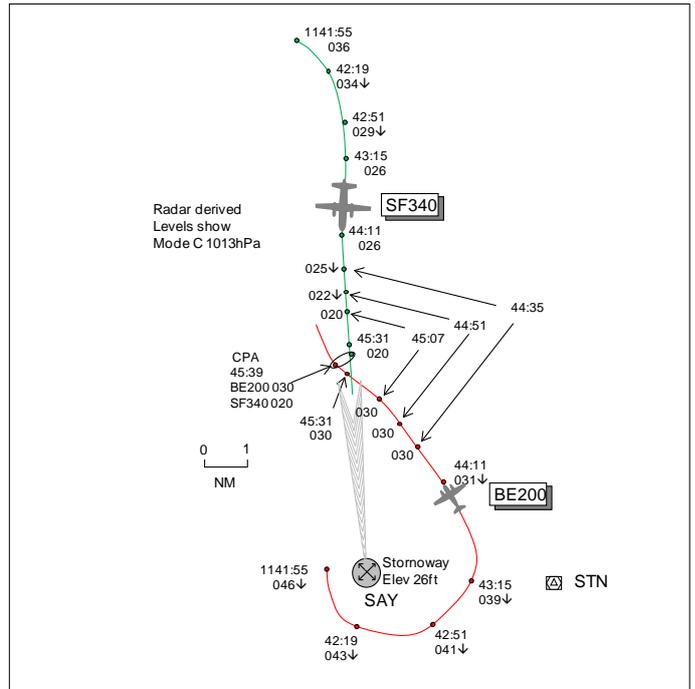
Reported Separation:

300ft V/4nm H TBC

Recorded Separation:

1144:35 400ft V/4.7nm H

OR 1145:39 1000ft V/0.4nm H



## PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

**THE SF340 PILOT** reports inbound to Stornoway, IFR and in receipt of a PS from Stornoway Approach on 123.5MHz, squawking 7426 with Modes S and C. They were approaching Stornoway at the same time as 3 foreign military ac which were using the same c/s prefix with different suffix numbers. As they started their approach the first of these ac had landed, the second ac was on the LLZ RW18 and their SF340 was initially restricted to 3000ft whilst the third ac, the subject BE200, was behind [to the S approaching the SAY] and above them. As they approached the LLZ they were now at 2000ft on QNH 990hPa and the BE200 following them was cleared outbound in the procedure not below 3000ft until advised. Several times during all radio calls the QNH was given as "990 hectopascals or millibars". On their TCAS display they could see that the BE200 traffic 12nm away following them in the procedure did not level-off 1000ft above but kept on descending. Heading 190° at 160kt level at altitude 2000ft flying in cloud in IMC, they were now opposite direction with the distance between them quickly reducing. They asked ATC to confirm the BE200's cleared altitude and ATC replied 3000ft before asking the BE200 flight to confirm their altitude. The BE200 crew confirmed that they were at 3000ft; however, TCAS showed the BE200 as 300ft above their ac. By now separation was around 4nm and reducing so he decided to leave 2000ft early to ensure more vertical separation; this descent was initiated probably 1nm early. Having local knowledge of flying in and out of Stornoway he knew that terrain separation would be alright, with terrain up to 800ft on their L but only a few hundred feet elevation between their ac and the airport. It so happened that there was an opening in the clouds just as the BE200 passed over their ac. They saw it for only a few seconds but judging the separation visually they thought it was 1000ft above; they were passing 1300ft. After landing they told the BE200 crew to check their QNH as 990. An altimeter setting of 1013hPa or 29.90in would result in an ac flying 700ft too low.

**RAC MIL** reports the BE200 was transiting through Stornoway en-route to the USA. Assistance was requested through HQ3AF to contact the pilot concerned; however, no report has been forthcoming.

**ATSI** reports that the Airprox was reported by the pilot of a SF340 against a BE200, as the SF340 approached to land at Stornoway, RW18.

The SF340 had departed Edinburgh on a flight to Stornoway and was in receipt of a PS/Aerodrome Control Service (ACS) from Stornoway ATC on 123.5MHz. The BE200 had departed Prestwick on a flight to Stornoway and was in receipt of a PS from Stornoway ATC.

The Stornoway controller was providing a combined PS and ACS. When the SF340 and BE200 flights initially called Stornoway, service was provided by an outgoing controller. A handover/takeover of the operational position took place and at the time of the incident both flights were being controlled by the second controller.

**Meteorological Information:**

METAR EGPO 311120Z 20019KT 6000 -RADZ FEW005 SCT009 BKN011 10/10 Q0990=  
 METAR EGPO 311150Z 20018KT 9999 FEW008 SCT022 11/10 Q0990=

[UKAB Note (1): The UK AIP at AD 2-EGPO-8-1 promulgates the Stornoway LOC/DME/NDB(L) for RW18 as O/H NDB(L) SAY at 3000ft track QDR 360° descending to 2000ft until 6.5D and then carry out a procedure turn L before turning R inbound to establish on FAT 180°. The SAY hold is 1min RH racetrack QDM 180°. The alternate procedure (extended holding pattern) is O/H NDB(L) SAY at 3000ft extend the outbound leg of the RH holding pattern descending to 2000ft, at STW DME 9 (CAT A,B) STW DME 10 (CAT C,D) turn R onto LOC and continue as for the basic procedure.]



The SF340 flight called Stornoway Approach at 1123:20 (UTC) maintaining FL100, 46nm from the STN (VOR/DME). A PS was assigned and an EAT of 1140 was issued. The SF340 flight was instructed to route to the SAY (NDB) to hold. Further descent to FL085 was given.

The BE200 flight called Stornoway Approach at 1125:30 passing FL130 for FL110. A PS was assigned, an EAT of 1150 was issued and the flight was instructed to route to SAY to hold. The BE200 pilot responded, "*Roger at one one thousand c/s.*"

At 1130:10, the SF340 crew was cleared, "*descend to altitude three thousand feet the QNH niner niner zero hectopascals.*" This was read-back correctly by the pilot. After the SF340 had left FL085, the BE200 flight was cleared, "*(BE200 c/s) when ready descend flight level eight five.*" The pilot responded, "*(BE200 c/s) out of one one zero for eight five.*"

Between 1131 and 1134 there was a handover/takeover of the Stornoway Approach controller position.

At 1135:50, following a discussion about speed reduction and the prevailing traffic situation, the SF340 flight was instructed, "*...you're clear for the localiser NDB DME procedure runway one eight from the Sierra Alpha Yankee not below three thousand until advised...*"

At 1136:40, having confirmed that altitude 4000ft had been vacated by the SF340, the controller instructed the BE200 to, "*...descend to altitude four thousand feet on the QNH niner niner zero hectopascals.*" This was read-back by the BE200 pilot as, "*Roger down to four thousand nine nine zero for (BE200 c/s).*"

The SF340 crew called beacon outbound at 1137:40 maintaining altitude 3000ft and was instructed to report localiser established. The Prestwick Centre Multi-Radar Tracking replay displayed the SF340 and BE200 levels in relation to Standard Atmospheric pressure, i.e. as FL. QNH was 990hPa, therefore (23hPa x 27ft/hPa) there was a level difference of 621ft between the displayed FL and the ac's actual altitude. When the SF340 crew called beacon outbound the ac was at FL037.

[UKAB Note (2): The radar recording at 1137:40 shows the BE200 carrying out a parallel entry into the SAY hold from the S tracking N descending through FL080. The ac then turns L at 1139:00 5.5nm N of SAY rolling out on a S'y track 1min later.]

At 1138:30 the controller requested a level check from the BE200 flight. The BE200 pilot responded, "*Roger seven thousand two hundred...*" Replay showed the BE200 at FL072. The controller requested a further report when the BE200 was, "*...passing altitude six thousand.*" The BE200 pilot reported, "*...(BE200 c/s) is six thousand*", at 1140:30.

The SF340 flight became number one to land at 1142:00 and was cleared to continue descent, report leaving altitude 3000 feet and report when localiser established. The SF340 was at FL036 (~A3000ft). The SF340 pilot replied that the ac was localiser established and that the ac was now descending to 2000ft at 11nm. The ac was observed to descend and level at FL026 (~A1979ft).

At 1142:50 the controller instructed the BE200 crew to, "*...descend to altitude three thousand feet on the QNH niner niner zero hectopascals and report your position in the procedure now, in the hold I should say*". The BE200 pilot replied, "*descending through four thousand for three thousand and we are turning back to sierra alpha uniform currently*".

Between 1142:59 and 1143:07 the BE200 was observed momentarily to be maintaining FL040 (~A3379ft) as it made a L turn outbound from the SAY, having passed 1nm W abeam the NDB. The BE200 flight was then cleared, "*(BE200 c/s) there's er one aircraft ahead on the localiser approximately ten miles at this er time on er passing overhead the sierra alpha yankee overhead the airfield you are clear to commence the alternate procedure that's the er extended holding pattern procedure er from the Sierra Alpha Yankee but not below three thousand feet until advised.*" The BE200 pilot replied, "*(BE200 c/s) roger er we'll extend our holding pattern.*"

The SF340 flight was cleared to land at 1143:50. After the SF340 crew read-back the landing clearance the following RT exchanges took place:

SF340: *"Er Stornoway confirm cleared altitude for the number two aircraft"*  
Controller: *"(BE200c/s) [1144:10] you may descend to altitude three thousand feet but to continue not below three thousand feet until advised"*  
BE200: *"(BE200 c/s) roger we are levelling at three thousand."*

At 1144:20 the controller asked the BE200 pilot if he was familiar with the procedure for extending the holding pattern and then turning onto the localiser. The BE200 pilot responded, *"(BE200 c/s) yes sir I'm completely er we're we're fighting this wind right now we're trying to get back over on that side."* After this exchange the SF340 again enquired as to the altitude of the BE200:

SF340: *"Can we just double check that aircraft's altitude we've got him as yeah he's about four miles about eight hundred above [1144:50]"*  
Controller: *"That er that's er level at three thousand feet for the BE200 c/s (SF340c/s)" [1145:00]*  
Controller: *"(BE200 c/s) just confirm that you're level at altitude three thousand feet on the QNH of niner niner zero hectopascals"*  
BE200: *"Yes sir [1145:10] level three thousand two nine nine zero".*  
Controller: *"Roger."*

At 1144:35 the SF340 commenced a descent from altitude 2000ft (FL026) approximately 7nm N of the Aerodrome Reference Point (ARP). The BE200 was in the SF340's 11 o'clock, range 4-7nm maintaining FL030 (~A2379ft), converging from the L.

At 1145:07 the SF340 had descended to maintain FL020 (~A1379ft) with the BE200 in its 11 o'clock, from the L, range 2-3nm maintaining FL030 (~A2379ft).

The SF340 crew reported at 4nm at 1145:30 and was again cleared to land. The BE200 passed through the SF340's 12 o'clock, L to R, at 1145:31 at a range of 0-7nm, the ac are maintaining FL030 and FL020 respectively. The ac are approximately 5nm N of the ARP. The SF340 is observed to continue its descent at 1146:20.

[UKAB Note (3): The CPA occurs 1145:39 as the BE200 passes 0-4nm SW of the SF340 with vertical separation still 1000ft.]

At 1147:20 the BE200 pilot requested when permission would be given to, *"...turn back inbound... and descend to two thousand."* The controller instructed the BE200 flight to turn inbound and establish on the localiser and that further descent would follow in approximately 30sec.

As the BE200 continued its approach the following RT transmissions took place:

SF340: *"And (BE200 c/s) check your QNH nine nine zero"*  
Controller: *"(BE200 c/s) that's affirm er niner niner zero hectopascals er or niner niner zero millibars that's what it used to be [1148:50]"*  
SF340: *"Yeah that's what we thought thanks".*

The BE200 flight was cleared to land at 1149:50.

Both controllers that spoke to the BE200 flight passed the pressure in the correct manner, i.e. when pressures are below 1000hPa; "hectopascals" is appended to the QNH value in RT transmissions.

Neither controller challenged the pilot of the BE200 on the quality of read back information, e.g. "one one thousand", "down to four thousand nine nine zero". The BE200 crew never included the word 'hectopascals' in any read back of pressure setting.

At 1145:10 the BE200 pilot gave a read-back of the pressure as, *"two nine nine zero."* This went unchallenged by the controller. It is not known if the controller fully heard this read-back; however,

the absence of a challenge likely indicates the controller had not assimilated what had just been said.

29.90 inches of Mercury is equivalent to 1013hPa – Standard Atmospheric Pressure. Allied with the surveillance replay, it can be seen that the BE200 was flying in relation to Standard Atmospheric Pressure, and not the local QNH.

The SF340 crew was fully aware of the developing situation and most likely understood the error that had been made on the flight deck of the BE200. The SF340 pilot adjusted the level of his ac so that the BE200 passed ahead and above by 1000ft.

## **PART B: SUMMARY OF THE BOARD'S DISCUSSIONS**

Information available included reports from the pilots of the SF340, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Members were disappointed that a report from the BE200 crew had not been received, which denied Members an insight of the crews perspective on the incident. From the thorough ATSI report and the recorded radar data it was clear that the BE200 crew had erroneously set an incorrect pressure on their altimeter subscale, which had led to the crew descending below their cleared altitude and into conflict with the SF340, causing the Airprox.

In the UK it is incumbent on flight crews to ensure that the pressure passed by ATC is assimilated and set correctly on the altimeter subscale, taking into account the units passed and any conversion that needs to be applied for it to be set on the altimeter subscale. The potential for confusion arises when the atmospheric pressure falls below 1000hPa as the value, in this incident 990hPa, was taken as (2)9.90inHg. Procedures in the UK specifically address this issue by requiring the controller to include the unit of hPa with the actual pressure value.

Conversely, CAT pilot Members, familiar with flying operations abroad where inHg are used, stated that careful attention is paid when the atmospheric pressure is given in inHg to ensure the correct conversion is made to hPa from a conversion table, if needed, on the flightdeck. Modern flightdecks with glass cockpits have the ability to set either pressure on the appropriate MFD. Also, UK ac that are manufactured in countries where inHg is the standard pressure unit usually have dual subscales on the altimeter. CAT Members also stated that it is common in the USA that if the pressure is <30.00inHg the value passed by ATC omits the leading 2 from the 4 figure value and no units are mentioned, i.e. "altimeter 990" (29.90inHg).

From the ATSI report it is evident that the Stornoway APP had on several occasions passed the QNH with hPa units however the BE200 crew did not include the word 'hectopascal' in any read back of the pressure setting. Military controller Members advised that Mil ATC units have conversion tables readily available to controllers and routinely pass the pressure in both hPa and inHg to visiting flights from countries where inHg is SOP. Members noted that the APP did have 1 opportunity to break the chain when, just 30 sec before the CPA, on being asked to confirm their altitude on 990hPa, the BE200 crew had read back "level 3000 2990", the incorrect pressure setting. Without knowing the clarity of the RT read back, it was not known if the numbers "2990" were clear enough for the APP to have heard the initial 2 ahead of the 990; up until then the BE200 crew had only ever read back "990" with no mention of units. For whatever reason this incorrect value was not assimilated by the APP who appeared to be unaware of the potential for confusion between units of pressure when the barometric pressure is <1000hPa. Members believed that this potential for confusion needed to be highlighted to controllers and pilots and agreed that a recommendation should be made to the CAA to this effect. Apart from it leading to this Airprox, setting an erroneous pressure setting does have the potential for CFIT with an ac flying below MSA whilst positioning towards the FAT in IMC - a salutary lesson for all aviators.

Members agreed that the SF340 crew had shown excellent SA and correctly alerted APP that they had seen on TCAS the BE200 descending below 3000ft. However, this warning did not have the desired outcome, as the BE200 crew was convinced they were flying at the correct altitude on the correct barometric pressure and the incorrect pressure read back went unchallenged by the APP. In the end, cognisant that the BE200 was flying 600-700ft too low, the SF340 crew elected to descend early to increase vertical separation. This prevented any TCAS alerts/warnings, the ac eventually passing with 1000ft of vertical separation at the CPA with the SF340 crew in visual contact with the BE200 well above. The Board considered that had the SF340 crew maintained 2000ft, their TCAS would almost certainly have generated an RA 'descend' or 'maintain v/s', depending on where the LOC procedure descent profile had occurred, but probably only for a short duration owing to the 300-400ft of separation that pertained initially. Members discussed the wisdom of this early pre-emptive descent and agreed it was the correct thing to do. It was done in exceptional circumstances by a crew with excellent SA, familiar with the local terrain in an ac equipped with GPWS. This had placed the ac marginally below the nominal GP initially but the actions taken had removed any risk of collision between the subject ac.

Members noted that the BE200 crew had not flown the alternate procedure (extending the downwind leg of the hold) but had erroneously turned L at the NDB instead of turning R; this had the effect of reducing the lateral separation at the CPA but vertical separation would have still been lost.

Director UKAB was directed to ensure that the US FAA and DoD are made aware of this incident

### **PART C: ASSESSMENT OF CAUSE AND RISK**

- Cause: Having set the incorrect pressure on the altimeter subscale, the BE200 crew descended below their cleared altitude and into conflict with the SF340.
- Degree of Risk: C.
- Recommendation: The CAA is recommended to issue a Safety Notice reminding controllers and pilots of the potential for confusion over the units of pressure, which could lead to incorrect altimeter subscale setting when the barometric pressure is below 1000hPa (or 30.00inHg).