

## AIRPROX REPORT No 2011135

Date/Time: 5 Oct 2011 0726Z

Position: 5818N 00620W  
(6nm N Stornoway  
Airport)

Airspace: Scot FIR      (Class: G)  
Reporting Ac      Reporting Ac

Type: SF340      SF340

Operator: CAT      CAT

Alt/FL: 2000ft      2000ft  
QNH (993mb)      NK

Weather: IMC KLWD      IMC KLWD

Visibility: 0      0



### Reported Separation:

200ft V/1nm H      0ft V/NK H

### Recorded Separation:

500ft V/0.1nm H

**BOTH PILOTS REPORTED**

### PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

**THE SF340 (A) PILOT** reports that they were cleared for the [LOC/DME/NDB (L)] procedure for RW18 and were inbound heading 180° at 160kt under a PS from Stornoway, squawking 7000 with Modes C and S. Just before, as they were turning base, another ac was cleared for the same procedure but instructed to maintain 3000ft until informed. They [ac A] were level at 2000ft and as they approached the descent point at about 7nm, traffic was seen on TCAS at the same level. The crew had a quick discussion to prepare for any following TCAS command; a TA was issued, followed by a RA 'descend descend' now at a commanded rate of 2000fpm. ATC was told of the RA and they replied, "that should be a company ac at 3000ft".

They received a 'clear of traffic' at 1300ft and then performed a go-around to re-join the hold.

He assessed the risk as being high.

**THE SF340 (B) PILOT** reports flying a scheduled passenger flight inbound to Stornoway under IFR and in receipt of a PS from them while squawking 7000 with Modes C and S. They were No2 behind another scheduled passenger ac, were heading 315° at 200kt, on the STN (VOR) 321° radial to join the RW18 LLZ NDB DME approach. The ac ahead had followed the same initial approach for RW18 and was established inbound on the Localiser at 2000ft. They [ac B] had been cleared for the procedure from the STN at 2000ft by Stornoway ATC and had descended to 2000ft (he suggested that the ATC tapes be checked as he was unsure as to whether ATC, the pilot or both had made the error) as (with hindsight) he realised that they should have been at 3000ft until the preceding ac had landed; he could not recall how he got to that position.

Initially they observed the other ac on TCAS as proximate traffic (blue) then TCAS enunciated 'traffic'; they were yellow 01 [TA 100ft relative alt], becoming 02 and then they received an RA. The RA was 'do not descend' (red arc, lower VSI) and the other ac had an 'RA climb'. Both ac followed their respective RAs; the other ac then commenced go around climbing to 3000ft, he thought, and they (SF340 (B)) were instructed to continue as No1.

He was uncertain of the range of the other ac as he was aware of it only from its TCAS indication.

He submitted an ASR to the company FSO and an Airprox report, assessing the risk as Medium to High.

UKAB Note (1): The pilot included a copy of the Approach Plate in use at the time.

**ATSI** reports that SF340 (A) was inbound Stornoway from Aberdeen and in receipt of a PS from Stornoway APP; meanwhile SF340 (B) was inbound Stornoway from Inverness also in receipt of a PS from Stornoway APP on the same frequency.

The Stornoway controller was providing a combined PS and ACS, had been on duty for 1:50 and was assisted in the Tower by an ATSA. The controller had been at the unit since January and, although previously validated elsewhere, was validated as a controller at Stornoway on 21 June.

The controller considered the operational duty as a 'normal' day and the workload, complexity and RTF loading were all described as 'moderate'. RW18 was in use, the surface was declared as 'wet' with no equipment unserviceabilities affecting the operation and there were no noted distractions.

ATSI had access to both pilots' reports, the controller's report and unit investigation, a transcription of the RT frequency in use and a radar recording of the Prestwick Multi-Radar Tracking system.

The METARS were:

METAR EGPO 050650Z 21014KT 9999 FEW009 SCT024 13/12 Q0993=  
METAR EGPO 050720Z 21012KT 9999 FEW009 SCT012 BKN020 13/12 Q0993=

The controller stated that a functioning DF was available in the tower and that he did not recall any 'visibility' to the NW i.e. neither ac was visible as they approached or left STN (VOR/DME).

SF340 (A) called Stornoway at 0713:08 descending to FL070 with 11nm to run to STN; a PS was agreed and the QNH was confirmed.

Inbound estimates for the STN are provided by Prestwick Centre (PC) about 7min in advance of the estimate for the beacon; a release is agreed and PC will ensure inbound ac are level separated. On receipt of the estimates for the two SF340s, the controller stated that he performed a mental check of all the details: level, release point, time; and ensured that the details were correct.

When determining which approach procedure to allocate the controller stated that ac order, QNH, and RW in use are all factored in. Commercial SF340s approaching from the SE generally fly the 'Initial Procedure' via STN when the weather precludes visual manoeuvring.

The controller stated that when two or more ac are presented in succession and their estimates are less than 10min apart, the second and successive ac are issued with an EAT. The landing interval at Stornoway is 1 every 10 min. The controller also stated that he perceived a need for expediency. This, he stated, came from the local operators who are reluctant to enter the hold if it is for only one hold. The controller noted that it remained at the controller's discretion as to whether or not successive ac are 'brought in' at intervals of less than 10min.

At 0713:38 the controller cleared SF340 (A) for the 'Initial Approach' and instructed the pilot to descend to altitude 2000 ft. The Stornoway Initial Approach V OR S TN RW18 procedure is promulgated as:

Arrival not below MSA. Overhead V OR/DME S TN (IAF) at **3000** or as instructed by ATC (lowest altitude to start procedure from hold is **2000**). Fly outbound on VOR STN R330 (CAT A,

B); VOR STN R321 (CAT C, D) descending to **2000**. At STN D14 turn right onto VOR STN R338 (QDM 158°) inbound to intercept and establish on LOC or FAT. When established continue with appropriate LOC or NDB(L) procedure.

SF340 (B)'s first call was at 0714:14, descending FL85 with 25nm to run to STN; a PS was agreed and the QNH confirmed.

The controller calculated that the two ac would arrive at STN with only 3min separation, which would have the effect of 'taking away the option of building in expediency' and the second ac [to arrive] would have to hold; therefore, he asked SF340(A) pilot for his STN estimate, which was given as 'minute 17'. The controller then asked SF340 (B), "*if you can reduce your speed what will be your estimate for the STN*"; the pilot replied with an estimate of minute 24 and the controller informed him that, based on that estimate, there would be no delay.

The controller explained that the requesting a speed reduction by SF340(B) had the effect of increasing the time separation (based on estimates) to 7 min and created a 'different scenario' to manage, stating that, with only 7min between the ac there was still an option to send SF340(B) around the hold once; however, he judged that he could manage both the flights 'without delay' by making use of vertical separation and a "MATS Part 2 Local separation, whereby the second ac could be descended once 5 DME or more from the STN outbound". (The unit report states that the second ac should not be descended until the first ac has landed).

At 0716:39 the controller instructed SF340 (B), "*not below flight level 85 initially you are cleared the initial approach from the STN runway 18.*" This was read-back correctly by the pilot.

The controller stated that it was quite normal to have two ac in the approach procedure during the first morning rotation; he also observed that the operator's schedule had four ac arriving at the aerodrome within 15min of each other (3 commercial passenger flights and one newspaper flight). However, all 4 corresponding departures were timed as being at 10 minute intervals.

At 0717:41 SF340 (A) reported overhead STN passing at 5200ft and beacon out bound. The controller instructed SF340 (A), "*you're number one report localiser established or visual*"; SF340 (B) was then given descent to FL065 and SF340 (A) was instructed to report passing 3000ft.

At 0720:37 SF340 (A) reported passing 3000ft. The controller then instructed SF340 (B) to descend to altitude 3000 ft. [UKAB Note (2): This was correctly readback by the pilot at 0721:00.] The controller requested a level check from the SF340 (B), which was given as passing 5900ft, and instructed SF340 (B) to report beacon out bound.

SF340 (B) reported beacon out bound at 0723:41 and the controller replied, "*Roger you are number two report localiser established*" and the pilot replied, "*Wilco*". [ATSI Note: Based on actual report times, there was then 6min between the ac].

The unit MATS Part 2 states:

'If there is a need to restrict descent, this should be stated **before** issuing a clearance for the IAP e.g. 'not below altitude 3000 ft until advised, cleared LLZ/DME/NDB Runway 18, report Beacon out bound.' And stated **AGAIN** once the pilot has reported 'commencing the procedure' e.g. 'not below altitude 3000ft, report LLZ established'.

The radar replay showed that at 0723:41, SF340 (A) was at FL026 (altitude 2060ft) [Mode S SFL020] turning right to intercept the localiser and SF340 (B) was less than 1 nm from STN descending through FL040 (altitude 3460ft) [SFL030].

At 0724:00 SF340 (B)'s SFL changed to 020 as the ac descended through FL036 (A3040).

SF340 (A) reported, “*localiser established nine and a half miles*” at 0724:01; the controller cleared the ac to land and at that point he assimilated that it would take it a further 3 min to land. Estimating SF340 (B) as having with a speed of 4nm/min, he calculated that it would then be at about 12nm on the outbound leg. The controller stated that he was comfortable with this situation as, should the first inbound require a go-around, the unit’s MATS Part 2 Local separation standard would allow the second ac to be level changed with the first if the second ac was more than 5nm outbound.

At 0725:03 the radar replay showed SF340 (A) at 7.5nm on the final approach indicating FL026 (A2060) with SF340(B) in its 11 o’clock at a range of 5.3nm converging, also at FL026 (A2060). By 0725:24 the distance between the two ac had decreased to 3.2nm, the relative bearing and level being unchanged.

At 0725:32 SF340 (A) commenced a descent, passing FL024 (A1860) 6.5nm from touchdown with SF340 (B) at FL025 (A1960) converging from the left at a range of 2.5nm.

At 0725:48 SF340 (A) was 6nm from touchdown passing FL023 (A1760), SF340 (B) was still in its 11 o’clock, range 1.1nm at FL025 (A1960).

At 0725:49 SF340 (A) called, “*TCAS RA*” and the controller replied, “*It’s a company Saab er in descent to altitude 3000 feet*” and gave a further wind check.

The controller recalled his mental checklist: he was particularly aware that in TCAS RA situations the controller response is ‘Roger’ (MATS Part 1). The controller looked at his strips, which again gave him procedural confirmation that SF340 (A) was at 2000 ft and SF340 (B) was at 3000 ft. The controller felt that his knowledge of the situation must be incomplete and that it was important for him to re-establish control of the situation using standard phraseology.

When the controller heard SF340 (A) call “*TCAS RA*” he recalled that his initial thoughts were ‘from what?’ his mental picture told him that he only had one other ac under his control, which was separated from SF340 (B) by 1000ft. He stated that it is common for pilots to request information on ac in the vicinity showing on their TCAS display. He also pointed out that, being in Class G airspace, there could have been other traffic in the vicinity but that this would be highly unusual in such a position on the final approach. The controller noted again that so far, the day had been ‘normal’ but yet there might be traffic that he did not know about.

The controller recalled that his immediate actions included using the binoculars to look out the window to obtain any visual information. The RTF was on loud speaker in the tower and the ATSA, also aware of SF340 (A)’s statement, was also looking out for any visual clues. No visual sightings were apparent and both staff were left wondering ‘what’ had happened.

At 0726:00 surveillance replay showed SF340 (B) pass behind SF340 (A) by less than 0.1nm. SF340 (A) was at FL020 (A1460); SF340 (B) was at FL025 (A1960). Four sec later SF340 (A) reached FL019 (A1360) before starting a climb along the final approach track in reaction to the RA. SF340 (B)’s reported Mode C remained constant at FL025 (A1960) before, during and after the encounter.

At 0726:12 the controller requested SF340 (A)’s intentions, the pilot replied, “*going around*,” and the controller instructed a standard missed approach.

The controller recalled saying to the assistant “with TCAS, don’t the ac talk to each other”; this he recalled was a confirmatory statement in his own mind that he would have expected a similar call from the second ac.

The controller noted that he had received no notification from either pilot that they were ‘clear of conflict’.

At 0726:38 the controller requested a level report from SF340(B) pilot who replied, “*My mistake we’re now at we’re at 2000 feet climbing to 3000 feet...we’re one one miles outbound to the northwest.*”

When the controller heard SF340 (B) report its level as 2000ft, he immediately thought 'have I given him any indication that he can go to 2000ft?' The controller also decided that, given the ac position, he would use the local separation standard (see above) and instruct the ac to remain at 2000ft. At 0726:58 the controller instructed the ac to descend to altitude 2000ft and report localiser established. SF340 (A) had been instructed to climb to 3000ft and the controller judged that by the time SF340 (A) was in the left hand turn back to the SAY [Locator], the ac would be at 3000ft thus restoring separation.

The controller stated that the duty of care he had towards ac under his control was important and during the incident it was important for him to establish that both ac were 'OK' and to try and establish if there was a third unknown ac in the equation. His plan was then to land SF340 (B) and hold the SF340 (A), thereby 'settling the situation'.

The controller believed that the SF340 (B) pilot must have believed he was cleared for the *full* procedure with no vertical restriction i.e. the previous restriction of 3000ft had become non-applicable.

At 0727:12 SF340 (A) was instructed to continue RW track and climb to alt 3000ft. The pilot requested entry into the SAY hold [overhead the airfield] and he replied, "*initially report reaching altitude 3000 feet*".

At 0727:53 the controller instructed SF340 (B) to report reaching 2000ft, to which the pilot replied that the ac was maintaining alt 2000ft; he then instructed SF340 (A) to take-up the SAY hold at 3000ft.

SF340 (B) continued its approach and was cleared to land from a 10nm final.

SF340 (A) remained in the SAY hold for a short period before commencing the alternate NDB procedure and landing without further incident.

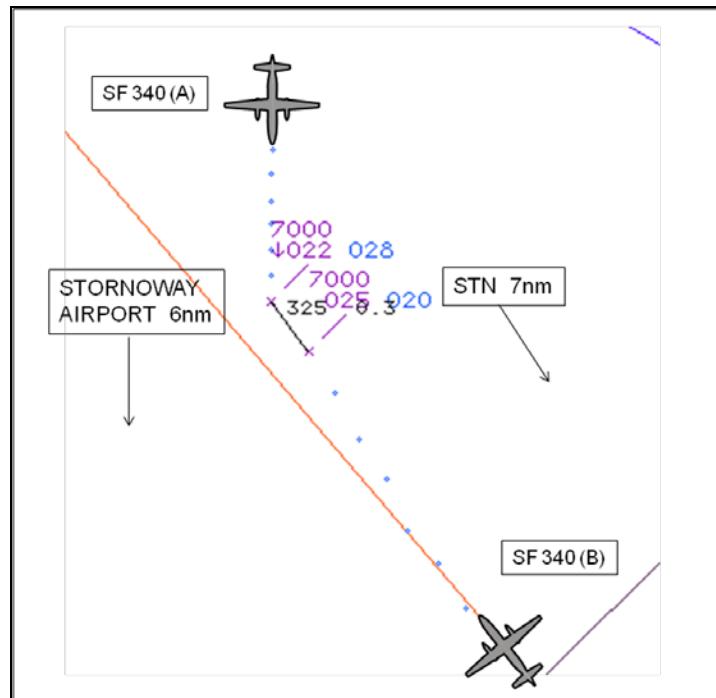


Fig (2): Four sec before the CPA.

When discussing ways of preventing a re-occurrence the controller stated that re-iterating the 3000ft restriction was a possibility but he considered that pilots were 'aware' of their place in the arrival sequence. He also stated that during his training with various OJTIs, only 1 had practised the

repetition of level instructions and the other 2 had not. He noted that it was not normal at the unit and was perceived as increasing RTF traffic.

The controller observed that there was potential for 'tonal' feedback by pilots when previously stated clearances were re-iterated; and this too fostered a reluctance to re-iterate clearances.

The controller stated that he was familiar with the 'voice' of the SF340 (B) pilot and considered that this particular pilot's RTF, being of a highly standard nature, gave him confidence in the pilot's actions. The controller described an implicit feedback of 'trust', as opposed to a pilot that he was unfamiliar with, or a pilot that was unfamiliar with the aerodrome. The controller stated that he was used to hearing this particular pilot on 3 or 4 mornings each week.

The controller was presented with two commercial IFR inbound flights without the standard arrival time separation of 10min. He formulated a plan based on increasing the time separation between the two flights. He would then use vertical clearances to maintain procedural separation until such time as he considered he could use a local separation standard to descend the second ac for an approach.

Having extended the arrival interval between the two ac from three to seven minutes and calculating that his proposed plan would work, the controller cleared SF340(B), "*not below flight level 85 initially you are cleared the Initial Approach from the STN runway 18*". This clearance contained a vertical restriction.

It is assumed that SF340 (B) crew were aware of SF340 (A) ahead. This should have been reinforced by the controller's provision of sequence information and that the ac was then descended procedurally following the first arrival.

After SF340 (B) went outbound from the STN the sequence of events on the flight deck is unknown as no comprehensive investigative interview was available to ATSI. However, from the evidence provided, it is assumed that there was a likelihood of some degree of automaticity on the flight deck with regard to selecting altitude 2000ft once outbound. This is supported by:

- (i) The SF340(B) pilot's recognition on the RTF that an error had been made;
- (ii) His subsequent report statement, '...3000ft is where my ac should have been...', and;
- (iii) His reporting '...I can't state without doubt how I got to this position.'

The Stornoway controller was operating in the belief that SF340 (B) would adhere to the level instructions given sequentially: i.e. 'not below FL085', amended by 'descend FL 065' and then 'descend to altitude 3000ft'.

HERA Analysis [see ATSI note below] of the incident determined that the main Error Mode on the part of the controller was in planning and decision making: in so far as the controller's decision not to re-iterate the 3000ft level restriction removed a warning to the SF340 (B) crew that they should not descend when out bound from the STN. In mitigation the controller had taken several factors into consideration when he chose to state, "...number two," to SF340 (B) when it went beacon outbound:

- (i) The trust he gained from familiarity with the pilots known voice and demeanour;
- (ii) The professional balance of 'restating' previously issued instructions, and;
- (iii) All the indications that, so far, the controller's plan was working to its desired effect.

[ATSI Note (1): Eurocontrol HERA-JANUS analysis on file including ICAO Human Factors issues affecting human performance in ATS proforma.]

It is not known what the SF340 (B) crew's actual interpretation/understanding of the subsequent level clearances was: or if this was allied to or contrary to the controller's belief that the levels assigned (FL065 and 3000ft) were not to be descended below until further instructed. There may therefore

have been an inherent miss-match of the controller's expectations and pilot's actions in this Class G non-surveillance Approach - PS environment.

The Airprox occurred when SF340 (B) went out bound from S TN and descended from 3000 ft to 2000ft and crossed the RW18 final approach in conflict with SF340 (A).

The controller made a judgement not to re-iterate the level restriction when SF340 (B) was beacon outbound based on several factors; however, the MATS Part 2 required that, if there was a need to restrict descent, it is reiterated once the pilot has reported commencing the procedure.

The controller's provision of a PS was predicated upon his belief that, having formulated a safe, orderly and expeditious plan for the benefit of the arriving ac, SF340 (B) would adhere to the previously issued 3000ft level instruction until further advised.

The exact human factors sequence of events on the flight deck of SF340 (B) was not able to be determined by this investigation.

#### Recommendation:

It is recommended that the CAA's Regional ATS (Northern) Inspectorate in conjunction with the unit should ensure that MATS Part 2 procedures for management of multiple ac in the approach pattern are reviewed and followed as prescribed.

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

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar recordings, reports from the air traffic controller involved and reports from the appropriate ATC authorities.

Members were concerned that flexibility and expediency appear to have led the use of non-standard procedures at Stornoway. A Controller Member observed that, while standard procedures can at times appear unwieldy or inefficient, they are in place almost without exception to ensure ac safety. In assessing this incident, controller and pilot Members alike noted instances of non-standard RT and procedures that they would have expected to have been identified and corrected during routine checks.

The Board noted that the operator's arrival schedule required [and on a further check on 27 Apr still requires] arrivals at intervals closer than the I MC separation on R W18 of 10 minutes between landings. Clearly, on the many occasions when visual approaches can be conducted this is not a problem, but controllers should not allow themselves to feel pressurised into accepting a greater flow rate than (MATS Pt 2) procedures permit. Similarly, recognition of pilot's voices must not be allowed to prompt abbreviated RT.

Members considered that although the instrument approach procedure for the approach being used is satisfactory and allows for both full instrument and instrument-to-visual approaches from the VOR, it is lengthy and complex and its full use necessarily restricts traffic flow and may require following ac to hold or, as in this case, reduce speed; however, a pilot Member observed that in this case even this speed reduction achieved only 6min separation rather than the 10 required by MATS Pt 2.

Pilot Members (including one with experience of operating in the Highlands and Islands) observed that from 0716:39 the controller passed an ambiguous series of instructions to the crew of SF340 (B), beginning with "*not below flight level 85 initially you are cleared the initial approach from the S TN runway 18...*", followed shortly by, "SF340 (B) callsign descend Flight Level Six Five" and then "(SF340 (B) callsign) descend to altitude Three Thousand Feet on the QNH ...". Since the clearances to FL65 and altitude 3000ft did not re-clear the SF340 (B) for the Initial Approach, the

crew could have inferred that they were cleared to descend to the relevant FL/ alt, but no longer cleared for the procedure. The pilot of SF340 (B) apparently, and also some Members, interpreted the instructions to mean that the ac was cleared to the STN at 3000ft, and also cleared for the 'Initial Approach Procedure', as per [and descending in accordance with] the Approach Plate, without any altitude restriction af ter t he pr ocedure had been c ommenced at t he V OR. Some M embers considered that, since the pilot was familiar with Stornoway and being aware of SF340 (A) ahead of him, he should have known about the MATS Pt 2 requirement to maintain 3000ft outbound until the ac ahead had landed. Certainly, he immediately realised what had happened when the TCAS RA was reported by t he ot her pi lot. Further, a pi lot M ember opined t he t here m ight hav e been a CRM/HF issue whereby the 1<sup>st</sup> Officer did not question the altitude restriction before changing the SFL to 2000ft. Notwithstanding this, Members agreed that the crew should have been reminded that they were not cleared below 3000ft by ATC when they called 'Beacon Outbound' in accordance with the MATS Pt 2.

Due to the complexity and crossing of flightpaths on the instrument approach procedures, the situation whereby two consecutive ac follow the same approach, requires careful monitoring and positive procedural deconfliction by the controller. MATS Pt 2 requires the preceding ac to have landed before that following one is cleared to descend below 3000ft; controller Members observed that this is clear, unambiguous and inherently safe. Further, a pilot familiar with the SF340 pointed out that t here i s no di fficulty i n des cending such ac r elatively q uickly from 3000f t to attain t he glidepath as soon as cleared to do so. This rule (procedure) was however, not fully assimilated by the controller who had a different perception of the descent profile and this had (apparently) not been identified and corrected during routine checks.

One pilot Member opined that the Instrument Approach procedure is unnecessarily complicated but another (familiar with Stornoway) considered it flexible in that it facilitated a 'cloudbreak' close enough to the airfield to be followed by a visual approach should conditions permit. There was also discussion regarding the provision of radar at Stornoway and although Members agreed unanimously that this would enhance safety and flexibility, an Advisor informed the Board that he thought the NATS SSR at Stornoway was unsuitable for use as an Approach Radar.

[Post Meeting Note: It is understood that the airline, the airport operator and DAP are examining, with a view to revising, clarifying and simplifying the instrument approach procedure for RW18. Until a revised procedure is introduced company pilots have been instructed to maintain 3000ft outbound in the procedure until they are clear of any inbound traffic ahead of them.]

Members agreed unanimously that clear and concise RT, as promulgated in CAP413 almost always removes ambiguity in the minds of controllers and pilots alike; all too frequently, as in this case, non-standard RT leads to incidents.

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

Cause:

1. Stornoway APP did not reiterate the alt restriction of 3000ft to the crew of SF340 (B) as required by MATS Part 2.
2. The crew of SF340 (B) descended below 3000ft without clearance.

Degree of Risk: C.