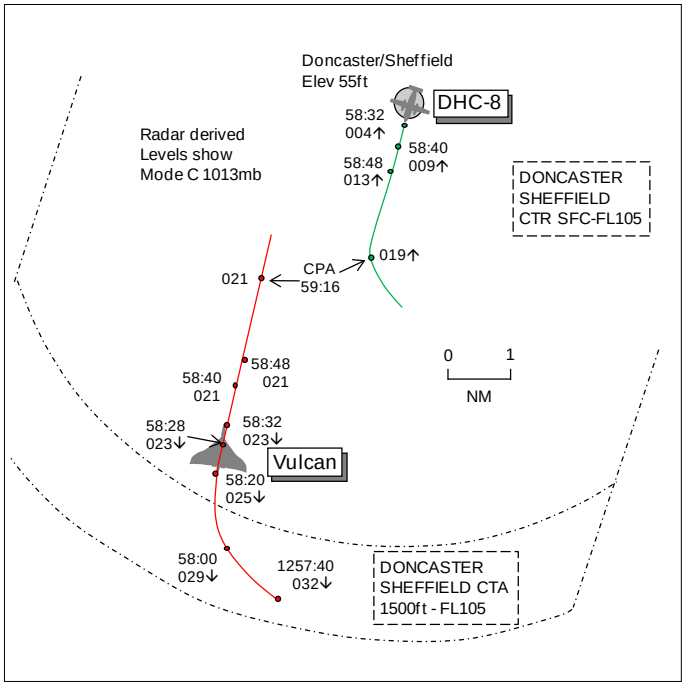
AIRPROX REPORT No 2011024

Date/Time:	29 Mar 2011 1259Z	
Position:	5326N 00103W (3nm SSW Doncaster/Sheffield - elev 55ft)	
Airspace:	CTR	(*Class: D*)
	Reporting Ac	*Reported Ac*
Type:	DHC-8	Vulcan
Operator:	CAT	Civ Pte
Alt/FL:	↑2000ft (QNH 1012mb)	2000ft (QNH 1012mb)
Weather:	VMC HAZE	VMC CLBC
Visibility:	5000m	8km
Reported Separation:		
	NR	Not seen
Recorded Separation:		
	Nil V/1·9nm H	



PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE DHC-8 PILOT reports on departure from Doncaster IFR and in communication with Doncaster squawking with Modes S and C. Their departure clearance from RW20 was an UPTON 1A SID squawk 7773 climbing to FL60. The departure involves making a series of R turns shortly after departure based upon ILS/DME distances from Doncaster and using/establishing on radials from GAM VOR, which is 12nm S of Doncaster. Whilst taxying for departure they heard the Vulcan crew call on the Tower frequency stating the flight was at 4000ft 23nm S of the aerodrome requesting a visual recovery. Tower asked if the crew had called Radar, to which the crew replied, "negative" so the crew was instructed to call Radar. At the hold Tower told them to line up and as they entered the RW whilst awaiting take-off clearance they were given an amendment to their UPTON 1A departure clearance to stop climb at 5000ft QNH 1012mb, which was set and read back. After a pause Tower cleared them for take-off, gave surface wind information and then issued TI on the Vulcan S of the aerodrome joining RH downwind, he thought, for the RW20 cct. The FO asked Tower to confirm their take-off clearance which was confirmed. A normal full power, flap 5 take-off was carried out and on passing 600ft the Tower controller, with an urgent tone in his voice, instructed them to stop climb at 2000ft and to call Radar on 126·225MHz. This was read back and actioned by the PNF (Capt) changing the selected altitude to 2000ft and checking ALTSEL was still armed whilst the FO continued to hand fly correctly. On passing 1060ft, "one to go and acceleration altitude" was called followed by the FO calling, "flap zero" which was actioned by the PNF who changed frequency and called Radar as quickly as possible stating that they were climbing to 2000ft on RW heading. Heading 210° at 170kt they had not reached the first significant R turn on the SID at 1·5DME I-FNL but it was approaching very quickly. As there had been an urgent tone in the Tower controller's instruction and they knew the Vulcan was inbound from the S and the in-flight visibility was 4-6km at best, a developing uneasy feeling made him decide it was better to give their actual heading rather than the SID for speed of identification, clarity and accuracy. Radar instructed them to turn L heading 090° and maintain 2000ft without using any terminology such as 'immediately' or 'avoiding action' but there was a distinct urgent tone to his instruction. The PNF altered the heading bug and read back the instruction, the FO commenced the L turn by hand flying before engaging the AP to complete the turn which took them 160° or more away from the first track turn of the UPTON 1A and 110° off their current heading. Selection of AP also reduced the likelihood of an altitude bust during the level-off and the FO adjusted the power appropriately. The FO reported, from a quick glance to his R once he had commenced the turn, that he had seen the Vulcan pass down their RHS at the

same height and close but because of the poor visibility flying into sun and the physical side profile of the ac, the actual miss distance was difficult to judge. They were then in a position to continue with their normal take-off SOP actions of setting climb power and bleeds to on/normal. This had all happened very quickly owing to their full power, flap 5, 24-Tonne take-off with a 15° pitch-up climb attitude accelerating through 170kt to 200kt+ and a ROC >2500fpm. Radar then instructed them to climb to FL60 and turn L direct to UPTON and to call Scottish Control on 133·8MHz. After establishing with Scottish they were asked to contact Doncaster Radar on Box 2, which PNF did. They were asked if they had seen the Vulcan, how close it was, had they received a TCAS alert and would they be reporting the incident. The Capt confirmed that the FO had seen the Vulcan but owing to poor visibility the distance was difficult to judge and that a report would be submitted. No TCAS alerts had been generated and he assessed the risk as medium. He went on to state that the UPTON 1A and all Doncaster SIDs were not present in the FMS database which meant the departure was flown on raw data using the heading bug, initially hand flown until normally above acceleration altitude. With a normal take-off using FMS the PF asks for the FMS NAV mode to be engaged and he monitors the flightpath which would have, on this occasion, turned the ac R in accordance with the SID towards the oncoming Vulcan. However in this case the PF was actually hands-on controls following raw data and did not follow the SID R turn automatically and was able to react instantly to the L heading 090° instruction given by Radar.

THE VULCAN PILOT reports inbound to Doncaster VFR and in receipt of a TS from Doncaster Radar on 126·55MHz, squawking 6163 with Modes S and C. The visibility was 8km flying 2000ft below cloud in VMC. They were handed over to Doncaster Radar from Wyton and were issued a discrete code before they requested a visual join. They positioned to join downwind LH for RW20 at 180kt and were alerted to a DHC-8 getting airborne and they were told to maintain 2000ft but were not on a radar heading. They heard Radar tell the DHC-8 flight to turn onto 090° but they were not aware of its location relative to their ac and did not see it at any time.

THE DONCASTER/SHEFFIELD APR reports screening a U/T controller when the Vulcan flight requested a VFR joining clearance into the CTA for landing at Doncaster. The flight was issued a 6163 squawk and identified 4nm SE of GAM before being given clearance to enter VFR not above 4000ft. The crew requested to join downwind LH for RW20 and was cleared to do so. Meanwhile the DHC-8 flight had been released on an UPTON 1A departure climbing to 5000ft owing to overflying traffic. The Vulcan squawk was garbling with other traffic operating in the GAM area and when it reappeared it was noticed that the ac had tracked W through the RW20 climbout. At this time he had also taken over from the trainee and was attempting to stop the DHC-8 departure and also to ask the Vulcan flight to maintain 3000ft however, both attempts were unsuccessful. The Vulcan then turned R back towards the aerodrome for a LH cct and the DHC-8 flight, which was now on frequency, was given an immediate L turn and its climb stopped at 2000ft. The Vulcan passed behind the DHC-8 by about 2nm and joined downwind LH; the DHC-8 flight was given further climb once clear.

ATSI reports that the Airprox occurred at 1259:16 UTC, at a position 3nm to the SSW of Doncaster Airport, within the Doncaster CTR, Class D CAS. The Manual of Air Traffic Services (MATS), Part 1, Section 3, Chapter 4, Page 1, for the 'Integration of VFR flights with IFR Traffic in Class D CTR', paragraph 3.2 & 3.3 states:

> 'Instructions issued to VFR flights in Class D airspace are mandatory. These may comprise routeing instructions, visual holding instructions, level restrictions, and information on collision hazards, in order to establish a safe, orderly and expeditious flow of traffic and to provide for the effective management of overall ATC workload.
>
> Routeing instructions may be issued which will reduce or eliminate points of conflict with other flights, such as final approach tracks and circuit areas, with a consequent reduction in the workload associated with passing extensive traffic information. VRPs may be established to assist in the definition of frequently utilised routes and the avoidance of instrument approach and departure tracks. Where controllers require VFR aircraft to hold at a specific point pending further clearance, this is to be explicitly stated to the pilot.'

The Vulcan was inbound to Doncaster VFR from Lyneham in order to be based at the airfield for the summer season. The arrival of the Vulcan was considered to be a high profile event at the airfield. In this regard the Radar controller had been asked to arrange for the ETA to be notified to the airfield in advance of the Vulcan's arrival.

The DHC-8 was departing IFR from Doncaster Airport on a scheduled flight to Jersey and was cleared for the Standard Instrument Departure (SID) 'UPTON 1A' from RW20. This required a R turn after departure to the SW climbing to altitude of 5000ft.

[UKAB Note (1): The UK AIP states UPTON 1A SID as 'Climb straight ahead to 555 QNH (500 QFE) or I-FNL D0.5 whichever is later, then turn right onto track 210°. At I-FNL D1.5 turn right onto track 250°. When passing GAM VOR R331 turn right to intercept GAM VOR R325.Cross GAM D13 at or above 4000. At GAM D14 turn to intercept GAM VOR R328, cross GAM D18 at FL60, to UPTON. (8%).']

RW20 was the notified RW in use. The Radar controller was providing an Approach RCS, together with a trainee under supervision. The Radar controller indicated that traffic levels were moderate with a number of ac on frequency, including traffic crossing the CTR at FL65 and traffic holding overhead Gamston at 3000ft.

METAR EGCN 291220Z 19006KT 150V240 9000 NSC 15/06 Q1013=

At 1252:25 the Vulcan flight initially contacted the Tower for a visual join. The RT was distorted and required 2 calls to establish two-way communication. Tower instructed the Vulcan flight to contact Radar.

At 1253:04, the Vulcan flight called Doncaster Radar, *"...Vulcan is for recovery we're twenty miles to the southeast at four thousand feet on er one zero zero seven for a visual join."* Doncaster Radar instructed the Vulcan crew to squawk 6163 and passed the QNH 1012. The Vulcan crew did not respond to this transmission and the controller called the Vulcan flight again. The Vulcan crew responded *"er Vulcan is squawking six one six three."* There was no readback of the QNH.

At 1253:54, the Vulcan crew requested a Traffic Service and Radar responded, *"Vulcan roger it's a Traffic Service and you're clear to enter controlled airspace er on track the Foxtrot November Yankee er VFR not above altitude four thousand feet and report field in sight."* The Vulcan crew replied requesting the QNH and QFE. Radar passed the QNH 1012, RW20 and QFE 1011. The Vulcan crew acknowledged, *"One zero one one ???not above four thousand on the er QNH one zero one two Vulcan."* The radar recording shows the Vulcan's position, 18·2nm SSE of Doncaster Airport tracking directly towards the airfield.

The Vulcan's clearance to enter CAS on track the FNY NDB, VFR not above altitude 4000ft, had the potential to conflict with IFR departures from RW20. At this point the Radar controller made a phone call to advise the airport authority of the Vulcan's arrival.

At 1255:36, the radar recording shows the Vulcan at an altitude of 4000ft, crossing the boundary of CAS. Later, when discussed, the Radar controller acknowledged that the pilot was not advised of the change in service from 'Traffic Service' to a 'Radar Control Service'. The Manual of Air Traffic Services, (MATS) Part 1, Section 1, Chapter 5, Page 1, paragraph 1.2.2, states:

> 'Pilots must be advised if a service commences, terminates or changes when:
> a) they are operating outside controlled airspace; or
> b) they cross the boundary of controlled airspace.'

At 1256:00, Tower coordinated the release of the DHC-8 and Radar issued a clearance to route, "UPTON 1A stop climb at 5000ft on QNH 1022". This required a R turn at an altitude of 555ft.

At 1257:00, the radar recording shows the Vulcan to be 9·8nm S of Doncaster. The Vulcan flight reported, *"Er Vulcan's clear of Gamston and request further descent for a downwind left hand join."* Radar responded, *"Vulcan Roger you can descend at your discretion traffic shortly getting airborne from Doncaster is a Dash Eight er turning er initially southwest bound before turning northeast bound climbing through your level."* The Vulcan crew responded, *"That's copied are we er clear downwind join."* The Radar controller confirmed, *"Vulcan affirm you can expect a downwind lefthand join for Runway two zero."* The Vulcan crew replied, *"Downwind lefthand join approved Vulcan.*"

Meanwhile, at 1256:38, Tower cleared the DHC8 flight for take-off and passed TI to the DHC-8 on the Vulcan, *"(DHC8)c/s traffic is a Vulcan eight miles south of the airfield erm to the east of climb out to position downwind lefthand visual."* At 1257:35, the Tower confirmed that the DHC-8 flight was cleared for take-off.

Later the Radar controller indicated that the intended plan, was for the DHC-8 to depart to SW, with the Vulcan remaining E of the airfield to join downwind LH for RW20.

At 1257:40, the radar recording shows the Vulcan crossing the extended C/L for RW20 at a range of 8·2nm and tracking NW. In order to confirm the joining instructions Radar transmitted, *"Vulcan confirm you're looking for a downwind lefthand join for Doncaster."* The Vulcan crew did not respond to this transmission.

The Radar controller explained that the phone call to the aerodrome authority had proved distracting. This had resulted in the late recognition of the developing situation and potential conflict with the DHC-8 departure. The Radar controller contacted Doncaster Tower and instructed them to hold the departing DHC-8. The Tower controller advised Radar that the DHC-8 was already rolling.

Radar instructed the Tower to stop the DHC-8 climb at 2000ft and indicated the Vulcan would stop descent at 3000ft.

The Radar controller took over from the trainee and at 1258:01, instructed the Vulcan flight to stop descent at 3000ft, *"Er V-Vulcan er stop descent altitude three thousand feet."* There was no response from the Vulcan crew and the radar recording shows the Vulcan passing altitude 2900ft.

At 1258:20, the radar recording shows the Vulcan at a range of 7nm, indicating altitude 2500ft. The Radar controller called the Vulcan flight again, *"Vulcan Doncaster."* The Vulcan crew replied, *"Vulcan six miles field in sight to Tower."* Radar responded to the Vulcan, *"Yeah maintain three thousand feet Sir three thousand feet there's traffic just airborne below you climbing one thousand feet below."* The Vulcan crew did not respond to this transmission. The radar recording shows the Vulcan now passing altitude 2300ft at a range of 6·1nm tracking 005° on the western side of RW20 climbout.

Also at 1258:20, Tower instructed the DHC-8, *"...if you stop your climb now at two thousand feet."* This was acknowledged by the DHC-8 crew and at 1258:37, the DHC-8 flight was transferred to Radar. The DHC-8 crew's written report indicated that the urgent tone in the Tower controller's voice had caused an uneasy feeling and this would result in the pilot reporting to radar, RW heading, rather than the SID designator.

Following the lack of response to his last instruction, at 1258.40, Radar called the Vulcan, *"Vulcan did you copy."* The Vulcan crew replied, *"Vulcan Vulcan's levelling at two thousand feet."* The radar recording shows the Vulcan at range of 5·5nm indicating altitude 2100ft.

At 1258:50, the departing DHC-8 flight called Radar, *"(DHC8)c/s with you climbing two thousand feet runway heading at the moment."* Radar responded, *"(DHC8)c/s turn left immediately left please heading zero nine zero maintain two thousand."* The DHC8 pilot replied, *"Maintain two thousand left zero nine zero (DHC8)c/s."* The radar recording shows the range between the 2 ac is 3·8nm with the Vulcan indicating altitude 2100ft and the DHC-8 indicating altitude 1300ft.

At 1259:16 the radar recording shows the 2 ac, at a position 3nm SSW of Doncaster Airport, passing abeam each other at a distance of 1·9nm, with the Vulcan indicating altitude 2100ft and the DHC-8 indicating altitude 1900ft. Radar told the Vulcan flight, *"Vulcan the traffic just airborne in your right two o'clock at two miles turning east."* The Vulcan crew did not respond to the transmission. When the 2 ac had passed abeam, the DHC-8 was instructed to climb to FL60.

The Vulcan was now SW, tracking towards the W side of the airfield. Radar advised the Tower that the Vulcan would now be joining downwind RH. Radar instructed the Vulcan flight, *"and er Vulcan join downwind right hand for Runway two zero the circuits now clear contact the Tower one two eight seven seven five."* The Vulcan crew responded, *"Vulcan was that for us to Tower."* Radar replied, *"Affirm one two eight seven seven five."* There was no readback of the instruction to join downwind RH and the Radar controller did not challenge the Vulcan crew's incomplete readback. The Vulcan then turned R and crossed to the E side of the airfield and joined downwind LH.

The controller was asked if there was any action that might have prevented this incident or similar future occurrence. The controller indicated that the phone call to the airport authority had been distracting and resulted in a delay to the corrective action which would have resolved the situation earlier. The controller indicated that the Vulcan was a heavy, fast ac and considering the type of approach and high profile nature of the arrival, a restriction on all departures would have been appropriate. In addition, with the pilot's agreement, radar vectors to join a LH cct, would have ensured that safety was not compromised.

The controller indicated that the Vulcan pilot's lack of response to various transmissions was frustrating and not helpful in the circumstances. There was some discussion and speculation about the possible reasons. It later became apparent that the Vulcan crew had reported a control problem (Yaw damper) to the Tower on joining the cct. However it was not clear if this may have been a factor and there was not sufficient information to establish a cause for the Vulcan crew's non-response to Radar's transmissions. Rule 30 of the RoA states:

> 'Subject to Rule 31, whilst flying within Class B, Class C or Class D airspace during the notified hours of watch of the appropriate air traffic control unit, the commander of an aircraft shall:
> (a) cause a continuous watch to be maintained on the notified radio frequency appropriate to the circumstances; and
> (b) comply with any instructions which the appropriate air traffic control unit may give.'

Separation standards are not prescribed for application by ATC between VFR flights or between VFR and IFR flights in Class D airspace. However, ATC has a responsibility to prevent collisions between known flights and to maintain a safe, orderly and expeditious flow of traffic.

The controller had a responsibility to ensure that the Vulcan's routeing to join downwind LH was not in conflict with the departing DHC-8. The Radar controller, acting as the OJTI to the trainee, was distracted by the non-operational telephone call. CAA ATSI considered that this resulted in the situation developing, which the controller was unable to resolve in a satisfactory manner and for which the controller must accept some responsibility.

CAA ATSI considered the lack of response from the Vulcan crew on 6 occasions, was a significant contributory factor that caused a delay in resolving the conflict.

The DHC-8 pilot intuitively recognised that there was a problem and elected to report on RW heading, rather that R onto the SID. This significantly contributed to a resolution of the situation.

Recommendation.

CAA ATSI recommends that the ATSU reminds controllers of the requirement to ensure that non-operational conversations must not be permitted to interfere with a controller's operational duties. MATS Part1, Appendix E, Page 2, paragraph 2, states:

'Non-operational and other conversations have the potential to distract a controller from their primary task of providing a safe air traffic service. Examples include telephone conversations with external agencies, such as airline representatives, and discussions between controllers conducted on the telephone, intercom or, in some cases, face to face, following an unplanned traffic situation.

Non-operational conversations must not be permitted to interfere with a controller's operational duties. Procedures at units should ensure that non-urgent telephone calls from external agencies could be accommodated without prejudicing the controller's primary task.'

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 video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authorities.

Several elements highlighted in the comprehensive ATSI report were raised by Members in a lively and lengthy debate. From the initial call to Approach by the Vulcan crew, which was distorted and needed 2 calls to establish 2-way communication, there was a train of events which went unbroken leading to the Airprox. The Vulcan crew did not reply to the instruction to squawk, prompting another transmission from the controller to obtain a read-back but this reply did not include the QNH. The next RT exchange included a clearance to enter CAS, VFR on track to the Doncaster OH, which was answered with an incomplete read-back of the routeing that went unchallenged by the controller. At the time this instruction was issued the Radar controller was not aware of the impending DHC-8 IFR departure. The Radar controller expected the Vulcan would track direct to the OH and be in a position from which its crew would then join the visual cct. It was then that Radar telephoned the Airport Authority. When Tower called for a departure release on the DHC-8, the Radar controller was happy to release the flight on its UPTON 1A departure as he had formulated a plan to allow the Vulcan to join LH downwind which he assumed would keep the ac to the E of the RW20 climbout. So when the Vulcan crew called for further descent he cleared the flight to descend without a level restriction but passed inaccurate TI on the departing DHC-8's routeing once airborne, stating the ac would be turning NE instead of NW after departure before approving the LH downwind join by the Vulcan. Meanwhile the DHC-8 crew had been cleared for take-off by Tower and informed of the Vulcan's expected routeing to the E of the climbout. In passing TI to both flights the controller had discharged his responsibilities with respect to IFR and VFR traffic in Class D airspace; separation standards are not prescribed, and he believed that the ac would not be in confliction if the ac had followed his plan. However, it was apparent to controller Members that even if the Vulcan carried out the Radar controllers plan, flying towards the OH could still conflict with the DHC-8 as the ac could route very close to the extended C/L of the RW before turning R to position downwind LH. Had the controller been more positive with the Vulcan crew by stating that the flight must remain E of the RW20 climbout track and specified a distance, this would have clarified the Vulcan crew's 'air picture' of the traffic situation. When the TI and take-off clearance were issued to the DHC-8 flight, this was the last chance that its crew had to assess the information and elect not to take-off if they were unhappy with the Vulcan's flightpath. The DHC-8 crew was reminded, 1min after the initial take-off clearance and TI were issued, that the flight was cleared for take-off; this delay was thought by Members to have been due to the crew assimilating the traffic situation prior to departing.

From then on the situation deteriorated as the Vulcan did not route direct to the OH but tracked NW, crossing the RW20 climbout at a range of just over 8nm before Radar recognised the situation albeit late. Although the Vulcan's radar return had been garbling with traffic in the GAM area, Members were concerned that Radar allowed himself to be distracted in making the telephone call to the Airport Authority. This led to a late recognition of the Vulcan's flightpath, which was not in accordance with his intended plan, and this had caused the Airprox. He tried to confirm that the Vulcan would be turning R to join downwind LH, however this transmission went unanswered. Radar then tried to stop the DHC-8 departing but the ac was already rolling for take-off so he attempted to apply vertical separation by asking Tower to stop the DHC-8 at 2000ft, advising the ADC that he

would stop the Vulcan at 3000ft. However, when Radar instructed the Vulcan flight to stop descent the ac was already passing 2900ft and the crew did not respond. After another call to the Vulcan flight its crew replied that they were at range 6nm with the airfield in sight and transferring to Tower. Members commented that this call would have been normal had the ac been flying into a military aerodrome but flying into Doncaster within Class D airspace the Vulcan crew should not have expected 'military style' procedures to be acceptable. In the event, however the Vulcan remained on the Radar frequency. Given the METAR visibility value, this sighting is consistent with the in-flight visibilities reported by both crews, the Vulcan crew viewing down-sun and the DHC-8 crew flying into sun. Radar asked the Vulcan crew to maintain 3000ft and informed them of the DHC-8 traffic climbing 1000ft below however there had been no response. By now the Vulcan was W of the climb-out tracking 010° and towards the W side of Doncaster aerodrome. Radar again called the Vulcan flight asking if the crew had copied his last transmission but the crew then reported levelling at 2000ft. Immediately thereafter the DHC-8 flight made its initial call to Radar and was given an immediate L turn onto 090° and was told to maintain 2000ft. As the ac were about to pass at the CPA, Radar passed TI on the DHC-8 to the Vulcan crew but again this transmission was not acknowledged. Radar informed Tower that the Vulcan would be joining RH downwind, then instructed the flight to do so and passed the frequency but the crew queried whether that transmission was for their flight. Radar repeated the frequency but did not challenge the lack of read back to the joining instruction. Thereafter the Vulcan turned R and passed over the aerodrome to the E before turning downwind LH.

Pilot Members agreed that the DHC-8 crew had displayed excellent CRM. During a particularly high workload phase of their flight their SA of the situation was first-rate which had enabled them to execute a L turn immediately when instructed by Radar as the subject ac approached the CPA. Members agreed that the Radar controller's efforts were hampered by the communication difficulties with the Vulcan and were disappointed that the Vulcan crew had missed so many RT calls and repeatedly given incomplete read–backs. However, Members agreed that unless ATC challenged any missing or incomplete read-back there was no agreement reached between both parties. Although the DHC-8 passed the Vulcan unsighted by its crew, the flightpaths flown by both ac combined with the actions taken by Radar and the DHC-8 crew were enough to allow the Board to conclude that any risk of collision had been effectively removed.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: Late recognition that the Vulcan was not flying in accordance with the controller's expectations.

Degree of Risk: C.