

**Aviation Safety Investigation Report
199402604**

**Cessna Aircraft Company
Conquest
British Aerospace Plc
BAe 146-200A**

13 September 1994

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Occurrence Number: 199402604 **Occurrence Type:** Incident
Location: 100km WSW Kalgoorlie
State: WA **Inv Category:** 4
Date: Tuesday 13 September 1994
Time: 0819 hours **Time Zone:** WST
Highest Injury Level: None

Aircraft Manufacturer: British Aerospace Plc
Aircraft Model: BAe 146-200A
Aircraft Registration: VH-JJQ **Serial Number:** E2038
Type of Operation: Air Transport Domestic High Capacity Passenger Scheduled
Damage to Aircraft: Nil
Departure Point: Kalgoorlie WA
Departure Time: 0808 WST
Destination: Perth WA

Crew Details:

<u>Role</u>	<u>Class of Licence</u>	<u>Hours on</u>	
		<u>Type</u>	<u>Hours Total</u>
Pilot-In-Command	ATPL 1st Class	3500.0	14000

Aircraft Manufacturer: Cessna Aircraft Company
Aircraft Model: 441
Aircraft Registration: VH-AZW **Serial Number:** 0026
Type of Operation: Air Transport Domestic Low Capacity Passenger Scheduled
Damage to Aircraft: Nil
Departure Point: Perth WA
Departure Time: 0731 WST
Destination: Kalgoorlie WA

Crew Details:

<u>Role</u>	<u>Class of Licence</u>	<u>Hours on</u>	
		<u>Type</u>	<u>Hours Total</u>
Pilot-In-Command	ATPL 1st Class	200.0	20000

Approved for Release: Monday, December 11, 1995



CIRCUMSTANCES

History of Flights

VH-JJQ taxied at Kalgoorlie at 0805 and departed at 0809. The crew had planned to cruise at 24,000 feet (FL240) and track via Southern Cross. VH-AZW reported at the Southern Cross position at 0808 at FL270, with an estimate for Kalgoorlie of 0829. At time 0819, with VH-JJQ maintaining FL200 and VH-AZW on descent, VH-AZW passed approximately 500 feet below VH-JJQ on a reciprocal track. Neither crew took evasive action.

Personnel Information

The occurrence involved flight crew, as indicated earlier in the report, an air traffic controller (ATC) responsible for the control of Perth sector 4 (SEC4), controlled airspace (CTA) between Perth and Kalgoorlie, and a flight service officer (FSO) working Perth flight information service position 8 (FIS8) and providing IFR traffic information and coordination for uncontrolled airspace (OCTA) around and to the north of Kalgoorlie.

The ATC was correctly licensed to operate sector 4. There was no evidence that shift cycles, fatigue, working conditions or console workload, affecting the ATC, were factors in the occurrence.

The FSO was experienced having been initially rated in 1989. He had completed nine shift cycles, including two ten hour shifts, in the ten days preceding the occurrence shift and he had one rostered day off. There had also been a number of late changes to the FSO's shift program during the ten day period. The FSO indicated that during the seven weeks since he had returned from leave the workload on FIS8 had not reached the levels that it had at the time of the occurrence. He also indicated that although fatigue had not been a factor in the occurrence there were several other ongoing personnel issues that he believed could have affected his performance. These were low morale resulting from length of shifts, shift amendments, lack of breaks, staff shortages and the use of contract staff.

The FSO had not undergone a performance check during the preceding twelve months.


Communications

Communication frequencies and agencies applicable to the incident were:

1. 134.3 mhz Perth control (SEC4) and
2. 122.1 mhz Perth flight service (FIS8).

The crew of VH-JJQ reported that they did not hear some transmissions made by the pilot of VH-AZW on frequency 122.1 mhz and they had difficulty contacting FIS8 on that frequency on their VHF communication transceiver No. 2. No fault was reported or found with the transceiver.

The following is a summary, with remarks, of the recorded communications relating to the traffic confliction between VH-JJQ and VH-AZW.



Recorded of Communications

Time (hours minutes.seconds)

Summary

- Remarks

0806.07

FIS8 advised SEC4 that VH-JJQ was taxiing at Kalgoorlie for Perth.

-SEC4 had coordinated VH-AZW's estimate for Southern Cross (0809) with FIS8 shortly after the aircraft departed Perth at 0731. This information should have alerted FIS8 that VH-AZW was potential traffic for VH-JJQ once descent had been initiated.

-When FIS8 coordinated the taxi advice on VH-JJQ to SEC4 and in anticipation of completing the departure coordination, FIS8 ticked VH-JJQ's Flight Progress Strip (FPS) to indicate that the action was completed. However, the coordination did not take place and there no longer existed a cue to indicate to the operator that the action was outstanding.

0809.03

The pilot of VH-AZW contacted SEC4 with his Southern Cross position and gave it as Southern Cross 08, FL270, Kalgoorlie 29. SEC4 then asked the pilot of VH-AZW to report established inbound on the Kalgoorlie VOR with advice of the inbound radial.

0809.07

The crew of VH-JJQ reported to FIS8 that they had departed Kalgoorlie at time 08, that they were tracking 256 degrees for Perth and they had left 5000 ft in the climb.

0809.31

FIS8 called SEC4 on intercom with the comment, 'one for you'. SEC4 replied with 'two for you' and immediately began to give VH-WCE's descent time but was then interrupted by the pilot of VH-AZW stating that he was on the Kalgoorlie 225 radial.

-FIS8 was about to give VH-JJQ's departure information to SEC4 but was interrupted and did not do so. A review of the tapes indicated that the SEC4 operator used the interruptive technique, when answering the intercom, on more than this occasion.

0810.26

SEC4 asked the pilot of VH-AZW where he expected to be on his normal descent profile at time 20.

- SEC4 was attempting to calculate a time of passing and whether it would be inside or outside controlled airspace.

0811.08

SEC4 and FIS8 re-established intercom, FIS8 asked for VH-WCE's descent time and then gave other traffic (VH-HSW) taxiing at Leonora but still did not give VH-JJQ's departure.

- By this time the FPS for VH-JJQ had been incorrectly notated to indicate that the coordination actions had been completed.

0811.22

The pilot of VH-AZW called SEC4 and gave FL160 as his expected level at time 20.

- When SEC4 received the taxi report on VH-JJQ, he calculated a rough time of passing with VH-AZW of 0820 based upon a projected departure time for VH-JJQ of 0810. SEC4 then asked the pilot of VH-AZW which level he would be at on descent at time 0820 and when the pilot indicated he would be at FL160, SEC4 correctly concluded that the conflict would occur OCTA (the base of CTA is FL200).

0811.49

FIS8 asked for SEC4's additional traffic and SEC4 gave VH-AZW, at Southern Cross 08, FL270 Kalgoorlie 0829 with an estimated top of descent 12, and indicated that he would give the pilot of VH-AZW traffic information on VH-JJQ.

- SEC4's closing comment was misleading in that it supported FIS8's misconception that VH-JJQ's departure information had been given to SEC4. SEC4, having indicated that he would provide traffic information to VH-AZW on VH-JJQ did not request departure information from FIS8.

- FIS8 did not notate VH-AZW on VH-JJQ's FPS in anticipation that traffic information would be required.

- FIS8 incorrectly entered the estimated descent time as 0822 on VH-AZW's FPS.

0812.44

The pilot of VH-AZW requested descent and SEC4 stated 'leave control area on descent. IFR traffic for descent JJQ a BAe 146, taxied Kalgoorlie for Perth at time 06 will be on climb and a rough estimated time of passing with that aircraft 20'.

- As SEC4 had not received a departure report on VH-JJQ from FIS8 the aircraft was not, in ATS terms, traffic for VH-AZW. SEC4 was attempting to give the pilot of VH-AZW early information on possible traffic. The advice from SEC4 did not include a destination altitude as would be provided in a normal traffic information message. For VH-JJQ to be traffic SEC4 needed to have the VH-JJQ's Kalgoorlie departure time.

- When the pilot of VH-AZW was given traffic on VH-JJQ, SEC4 included the time of passing as a guide to the pilot. The aircraft was transferred to FIS8 frequency 122.1 as soon as descent was commenced. However, the pilot of VH-AZW did not communicate directly with the crew of VH-JJQ to establish an accurate awareness of the traffic situation.
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- The pilot of VH-AZW indicated that he based much of his judgement on the rough time of passing advised by SEC4.

- Although the time of passing was not given as definite the pilot of VH-AZW had been told to expect VH-JJQ to pass his aircraft at about 0820. Standard operating procedures allow SEC4 to wait 10 minutes before following up an anticipated departure coordination.

0813.11

The pilot of VH-AZW called SEC4 indicating that he was leaving FL270. SEC4 then instructed the pilot of VH-AZW to call FIS8 and to report leaving FL200 on that frequency.

- SEC4 did not advise FIS8 that VH-AZW had left FL270 on descent nor did he complete the process of passing traffic information on VH-JJQ to the pilot of VH-AZW.

- Up to this point VH-JJQ had been listening out on FIS8's and the Kalgoorlie MTAF frequencies and had not heard any of the exchanges between SEC4 and VH-AZW. VH-AZW had been listening out on SEC4 and Perth Approach's frequencies and had not heard any of the exchanges between VH-JJQ and FIS8.

0813.59

The pilot of VH-AZW reported to FIS8 that he had left FL260 on descent and he was at 83 DME from Kalgoorlie. FIS8 confirmed with the pilot of VH-AZW that SEC4 had provided traffic information on VH-JJQ.

- The pilot of VH-AZW indicated that he made this call expecting the crew of VH-JJQ to hear it. The crew of VH-JJQ were listening out on FIS8 frequency by this time, but did not hear the call. The pilot of VH-AZW did not follow up on the lack of response.

0814.36

FIS8 attempted to call the crew of VH-JJQ to pass traffic on VH-AZW but was interrupted by another aircraft.

0815:02

FIS8 commenced passing traffic on VH-WCE to VH-JJQ, but quickly realised that this was an error.

- For some reason FIS8 had entered VH-WCE on VH-JJQ's strip and ticked it to indicate traffic had been passed. VH-WCE was an aircraft tracking between Perth and Mount Morgans and was not in conflict with VH-JJQ.

- During the period from 0812.02 to 0815.27 FIS8 was also busy dealing with other traffic and had attempted to call the crew of VH-JJQ on at least two occasions, to give them traffic information on VH-AZW, without success.

0815.27

FIS8 passed traffic on VH-AZW to VH-JJQ; however, it included advice that VH-AZW was maintaining FL270 and an incorrect descent time of 0822.

- The pilot of VH-AZW was listening out on FIS8 frequency at that time but did not register the incorrect descent time that was given to VH-JJQ.
- FIS8 passed traffic on VH-AZW to VH-JJQ at 0815.27, and included a descent time of 0822 as was indicated on the strip. Although VH-AZW had been on descent for two and a half minutes, the crew of VH-JJQ were led to believe that there was no urgency in establishing contact with VH-AZW. The pilot-in-command of VH-JJQ thought there was something odd about the descent time and estimated time of arrival at Kalgoorlie; however, following discussion with the first officer it was accepted. No attempt was made to confirm the information with FIS8.
- The crew of VH-JJQ was passed traffic on VH-AZW 3 minutes 35 seconds after SEC4 coordinated the Southern Cross position with FIS8. During this time frame FIS8 asked the crew of VH-JJQ if they had traffic on VH-AZW. Although there was no reply FIS8 did not pursue VH-JJQ's lack of response. He proceeded to perform low priority coordination tasks and it was not until the crew of VH-JJQ prompted FIS8 that he provided traffic on VH-AZW.
- Although busy, FIS8 had the opportunity to anticipate the traffic conflict between VH-AZW and VH-JJQ and pass the traffic information earlier. He could have done this when the pilot of VH-AZW called that he had left FL260 on descent. Instead FIS8 afforded other actions a higher priority. When VH-AZW was passed as traffic to the crew of VH-JJQ, FIS8 did not notate the FPS to indicate it had been done.

0817.17

The crew of VH-JJQ requested an airways clearance from SEC4. SEC4 asked the crew of VH-JJQ to stand by then acknowledged a descent time given by VH-LBZ.

- SEC4 then attempted to calculate the respective positions of VH-AZW and VH-JJQ so he could give VH-JJQ a clearance to enter controlled airspace. The aircraft passed before this was completed.
- VH-AZW was still listening out on SEC4's frequency and should have heard this call. This call should also have confirmed to SEC4 that VH-JJQ had departed Kalgoorlie. A review of the SEC4 tape indicates that the SEC4 controller spent some time, following the request for a clearance from the crew of VH-JJQ, attempting to resolve the time and altitude of passing, because of his responsibilities in relation to traffic information and separation, without contacting either aircraft or FIS8 to resolve outstanding issues such as VH-JJQ's departure time from Kalgoorlie.

0818.40

The pilot of VH-AZW made a general broadcast to FIS8 and the crew of VH-JJQ indicating that the aircraft was at 56 DME Kalgoorlie and on descent through FL200.

- VH-AZW passed beneath VH-JJQ approximately 20 seconds later.
- The pilots had not communicated with each other to arrange separation.

Medical



There were no predisposing medical conditions other than the possibility of short or long term fatigue/stress resulting from the conditions imposed, on the FSO, by the roster arrangements and working environment.

Workload

Both SEC4 and FIS8 had high workload situations at the time of the occurrence. Although there were only eight active aircraft in FIS8's area, there were several items of coordination to process, traffic information was required to be passed to several aircraft, and there were communication difficulties with an aircraft on high frequency (HF) radio. Most of the traffic in the sector was in an area to the north of Kalgoorlie. FIS8's attention was focused on this traffic at the time VH-JJQ departed from Kalgoorlie.

Technical Equipment

There were no direct technical/equipment failures identified as having occurred during the course of the incident. However flight service staff identified a number of potential factors which may have caused distraction. Examples were noise in the room, lighting deficiency, air conditioning faults, headset problems, HF/ VHF frequency problems, and location of the map display. At the time of the incident a number of Perth flight service area frequencies were combined on the FIS8 console through the use of the retransmit facility. Whilst the retransmit facility helps to reduce ATS operator workload by queuing aircraft calls as if only one frequency existed, it can increase pilot workload by increasing the number of non-applicable transmissions aircrew have to monitor.

Airspace Procedures and Requirements

The provision of IFR/IFR traffic information to aircraft outside controlled airspace is a feature of the current airspace system. Aeronautical Information Publication (AIP) RAC 11.6, titled Traffic Information Outside Controlled Airspace, contains the following statements:

- '11.6.1. Outside controlled airspace a traffic information service is provided to IFR and MLJ [Military Low Jet] aircraft about other conflicting IFR or MLJ aircraft...'
 - '11.6.2. An IFR or MLJ aircraft reporting taxiing or airborne at an aerodrome within an MTAF or CTAF area will be advised of conflicting IFR or MLJ traffic which is not on MTAF or CTAF'.
 - '11.6.3. An IFR or MLJ aircraft inbound to an aerodrome within an MTAF or CTAF area will be advised of conflicting IFR or MLJ traffic regardless of whether the confliction will occur inside or outside the MTAF/CTAF area...'
 - '11.6.9. Pilots intercepting broadcasts from aircraft in their vicinity which are considered to be in potential conflict must acknowledge the intercept by transmitting callsign and, as appropriate, aircraft type, position, actual level and intentions'.
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With the traffic alerting system operating correctly, it is reasonable for flight crews to anticipate that they will be provided with a directed flight information service on other conflicting IFR aircraft. It is reasonable for them to expect that such information will be provided at a time that will facilitate the resolution of any traffic conflicts. However, it is also important that pilots accept responsibility for maintaining continued situational awareness as per paragraph 11.6.9 and being prepared to intercept and acknowledge pertinent broadcasts.

ANALYSIS

Flight Service Officer Performance

The FSO on position FIS8 made a number of procedural errors during the period leading up to the occurrence. These errors led to a failure to provide accurate and timely traffic information to IFR aircraft on opposing tracks. Whilst the FSO was unable to pinpoint any specific reason for his failure to perform at optimum level there were a significant number of workload, environmental, human performance and organisational issues that probably contributed. The FSO indicated that he may have been suffering from a level of long and/or short term stress as a result of the environmental, human performance and organisational issues.

The FSO's procedural errors may not have been due to a recent reduction in his overall performance. It is possible that his performance had deteriorated over a period of time and the lower levels of activity on the consoles he operated, during previous shifts, did not disclose this. The lack of a performance check also meant the deterioration was not disclosed in time for remedial action to be taken before it led to an air safety occurrence.

Air Traffic Controller Performance

The SEC4 ATC answered intercom calls in a dominating manner, resulting in caller's priorities being altered, and in a manner not in accordance with standard operating procedures. This situation can lead to failure of the calling party to achieve complete information transfer. SEC4 did not coordinate VH-AZW's descent to FIS8 and this possibly contributed to an incorrect situational awareness of the crew of VH-JJQ and FIS8 when assessing traffic information parameters. SEC4 did not complete the exchange of traffic information to the pilot of VH-AZW and he did not avail himself of all the information that was available when attempting to resolve the time and altitude of passing parameters.

Flight Crew Performance

It is apparent that each aircraft had been alerted to the operation of the other. However, the opportunity for the flight crew to recognise the problem and take corrective action was diminished by a number of factors. In the case of VH-AZW, the information provided on VH-JJQ was incomplete in that advice of the departure of VH-JJQ was not provided. In the case of VH-JJQ, the information was flawed, in that an incorrect descent time and an incorrect statement that VH-AZW was maintaining FL270 were provided and the crew did not hear critical radio transmissions.

Environmental Issues

A number of environmental issues were identified and these may have degraded the FSOs performance at the time of the occurrence. These were:

- noise in the room;
- lighting deficiencies;
- air conditioning faults;
- headset problems;
- HF/ VHF frequency problems and
- the location of the map display.

Human Performance/Organisational Issues

A number of human performance and organisational issues were identified which may have contributed to the occurrence. These were:

- low morale;
 - length of shifts;
 - shift amendments;
 - lack of breaks;
 - staff shortages;
 - the use of contract staff and
 - the failure of the performance checking system.
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