Australian Government
Australian Transport Safety Bureau

Operation below minimum safe altitude involving Aero Commander, VH-TQA

7 km south of Townsville Airport, Queensland, 11 April 2013

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Aviation Occurrence Investigation
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Addendum

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Operation below minimum safe altitude involving Aero Commander, VH-TQA

What happened

An Aero Commander 500

Source: Roel van der Velpen

On 11 April 2013, at about 0851 Eastern Standard Time,[1] an Aero Commander 500-U aircraft, registered VH-TQA (TQA), departed Townsville, Queensland on a private flight to Moorabbin, Victoria, under the instrument flight rules (IFR).

Prior to taxiing, the pilot received a clearance from Townsville air traffic control (ATC)[2] to depart via the runway 19 TOWNSVILLE SOUTH THREE standard instrument departure (SID). Due to the proximity of Mount Stuart[3] and Restricted Areas 'R768A' and 'R768B'[4] (Figure 1), the SID required the pilot to turn left onto a track of 105°when at 1 NM; ATC will then issue radar vectors according to the flight planned track and other traffic at the time.

The pilot was familiar with operations at Townsville, but as he had not previously flown the TOWNSVILLE SOUTH THREE SID, he briefed himself on the departure and noted the requirement to turn left at 1 NM. After takeoff, while passing through 200 ft, the pilot attempted to establish communications with Townsville Approach ATC,[5] but no response was received. The Approach controller reported that they did not hear this call.

At about 0853, while passing through 400 ft, the pilot checked his radios to confirm the correct frequency had been selected. At the same time, the Tower controller alerted the Approach controller that TQA did not appear to be turning left at 1 NM, as per the SID. As TQA passed through 500 ft, the pilot attempted again to contact the Approach controller. The Approach controller responded and was about to question the pilot regarding the aircraft's track, when he noted that TQA's predicted tracking line on the radar display indicated that a turn in the direction of the SID had commenced. The controller stopped the rest of this response and advised the pilot to 'disregard'. The pilot reported that the controller's abnormal response had distracted him.

At the same time, while in visual meteorological conditions (VMC)[6] and encountering moderate turbulence, the pilot noted a disparity between the aircraft's two engine power gauges. Believing the aircraft may have had a partial engine failure, the pilot commenced his troubleshooting actions. He determined that the difference in indications had been caused by the turbulence.

When at about 3 NM from the airport, the Approach controller noted that the aircraft's predicted tracking line had changed and was pointing to the south, indicating the aircraft was not on the SID.

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1 Eastern Standard Time (EST) was Coordinated Universal Time (UTC) + 10 hours.
2 At Townsville, ATC is provided by the Department of Defence.
3 Mount Stuart has an elevation 2,422 ft AMSL.
4 A Notice to Airman (NOTAM) advised that Restricted Area R768B was active from 0700 until 1600 on 11 April 2013. This restricted area applied from 2,000 – 3,000 ft AMSL.
5 The same controller handles both Approach and Departure procedures at Townsville Airport, but is addressed as Townsville Approach.
6 Visual meteorological conditions is an aviation flight category in which visual flight rules (VFR) flight is permitted – that is, conditions in which pilots have sufficient visibility to fly the aircraft maintaining visual separation from terrain and other aircraft.

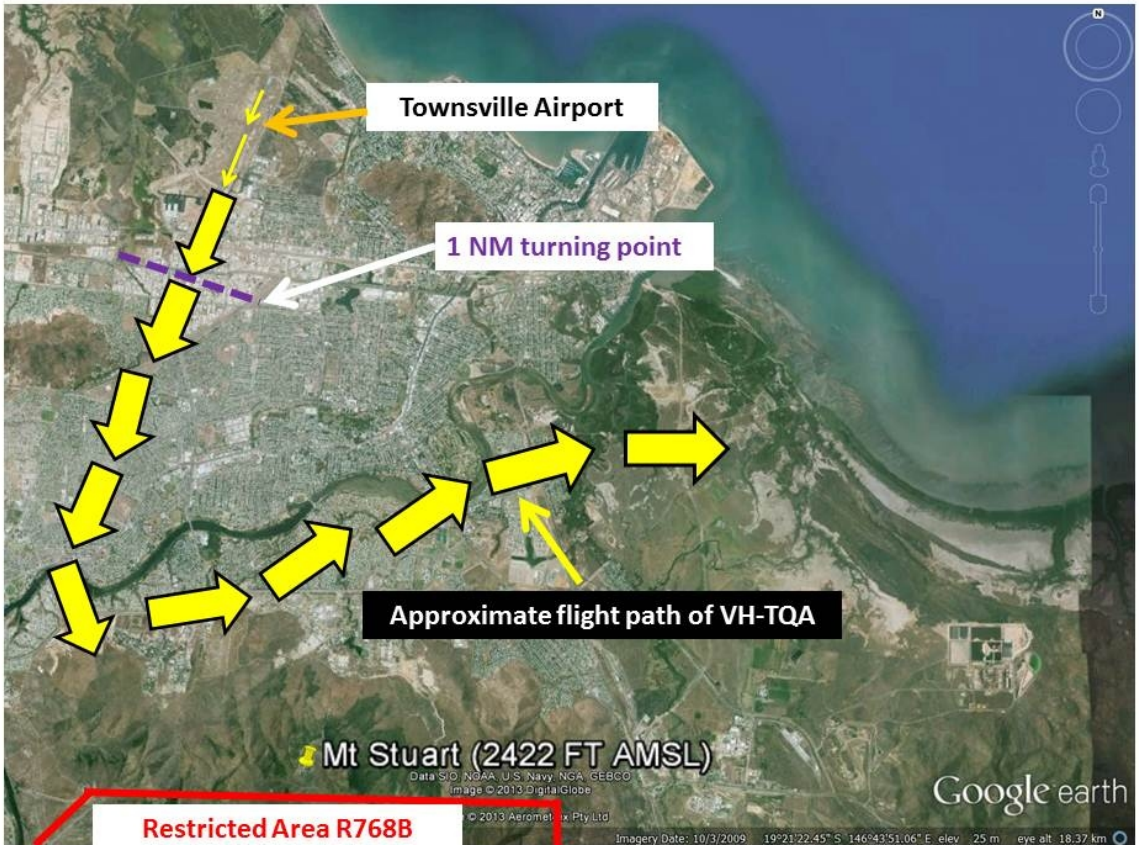
The Approach controller reminded the pilot of the SID requirement to turn onto a track of 105° at 1 NM.

The pilot misunderstood this comment to be a radar vector, read back 'left 105°' and commenced a turn onto that heading. The aircraft was now in instrument meteorological conditions (IMC)[7] and approaching 4 NM south of the airport. At that time, the aircraft was 1,500 ft below the radar terrain clearance chart (RTCC) step.

Shortly after, the Tower controller suggested to the Approach controller that a safety alert be issued. The Approach controller then issued a restricted airspace alert to the pilot. He also reminded the pilot that the lowest safe altitude (LSALT)[8] for the area was 3,500 ft, which the pilot acknowledged, advising TQA was now climbing through 2,500 ft.

As TQA continued to climb, the Approach controller vectored the aircraft back on track and then cleared the pilot to resume his own navigation.

Figure 1: Approximate flight path of VH-TQA



Source: Google earth

Pilot comments

The pilot of TQA could not recall the Notices to Airman (NOTAMs) advising of the Restricted Area R768B being active at the time. The pilot stated that the turn at 1 NM DME was not conducted as he had become distracted by the abnormal broadcast made by the Approach controller and the apparent engine issue.

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7 Instrument meteorological conditions describes weather conditions that require pilots to fly by reference to instruments, and therefore under Instrument Flight Rules (IFR), rather than by outside visual reference.

8 The segment minimum altitude for radar vectoring is 3,500 ft, however the minimum safe altitude (MSA) within 10 NM of the Townsville VOR is 3,600 ft.

Meteorological information

The Bureau of Meteorology (BoM) area 44 aviation weather forecasts ARFOR, which included Townsville, was valid until 1000 on 11 April 2013. It forecast moderate turbulence below 6,000 ft above mean sea level (AMSL) around coastal areas north of Mackay, which included Townsville.

Forecast weather[9]	**Actual weather**[10]
Light showers of rain	Heavy rain
Visibility of 10 km	Visibility reduced to 5,000 m
Scattered cloud at 1,400 ft	Broken cloud at 2,100 ft
Broken cloud at 2,500 ft and 4,000 ft	Overcast at 3,000 ft

Air Traffic Services provider

The Department of Defence conducted an internal investigation into the incident and identified the following:

- the Approach controller did not hear TQA call on frequency the first time
- it is common for the radar to show fluctuations in the aircraft's predicted track when an aircraft is just airborne on departure
- due to the abnormal response by the Approach controller to the second transmission from the pilot, the pilot was distracted
- the Tower controller suggested to the Approach controller that he issue a safety alert to the pilot
- the Approach controller did not check at any time, that the pilot was visual.

Safety message

This incident reinforced the need for ATC to remain vigilant and be proactive by responding promptly to any observed abnormal tracking or situation, and the importance of issuing an immediate safety alert when they become aware that an aircraft is in a situation that is considered to place it in unsafe proximity to terrain, obstructions, active restricted or prohibited areas, or other aircraft.

The incident further highlighted the importance of maintaining situational awareness. There is a substantial amount of aviation related situational awareness research. Much of this research supports loss of situational awareness mitigation concepts. These include the need to be fully briefed, in order to completely understand the particular task at hand. That briefing should also include a risk management or threat and error management assessment. Forewarned is considered being forearmed. Another important mitigation strategy is distraction management. It is important to minimise distraction, however if a distraction has occurred during a particular task, to 'back up 'a few steps, and check whether the intended sequence has been followed. A chapter dedicated to situation awareness is available in the book:

Flin, R., O'Connor, P., & Chrichton, M. (2008). Safety at the Sharp End: A Guide to Non-Technical Skills. Chapter 2.

While pilots are taught to 'aviate, navigate and communicate' when prioritising actions, this incident highlighted the importance of pilots alerting ATC as soon as possible, when a potential failure, error or malfunction presents itself. A recent Airservices Australia Safety Bulletin highlights different scenarios where early advice from the pilot to ATC, could have allowed for more timely and informed assistance and conflicting traffic management service.

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[9] The terminal area forecast (TAF) for Townsville Airport, valid from 0700 to 2000 on 11 April 2013.

[10] The automated airport special weather report (SPECI) at 0500.

The safety bulletin can be found at: http://www.airservicesaustralia.com/wp-content/uploads/Safety-Bulletin-April-2013_Early-Advice.pdf

The ATSB produced an Aviation Research paper covering a range of occurrences from the 1997 to 2004 period. This research found that the majority of over 500 occurrences studied, involved pilot distraction. The analysis highlighted that distractions can arise unexpectedly, during periods of high or low workload, and during any phase of flight. Furthermore, distractions can affect a pilot operating in any type of organisation, from general aviation through to major airlines. The report can be found at http://www.atsb.gov.au/publications/2005/distraction_report.aspx

General details

Occurrence details

Date and time:	11 April 2013 – 0853 EST	
Occurrence category:	Incident	
Primary occurrence type:	Operational non-compliance	
Location:	7 km south of Townsville Airport, Queensland	
	Latitude: 19° 19.13' S	Longitude: 146° 45.35' E

Aircraft details

Manufacturer and model:	Aero Commander 500-U	
Registration:	VH-TQA	
Type of operation:	Private	
Persons on board:	Crew – 1	Passengers – Nil
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Nil	

About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse

comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.