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- independent investigation of transport accidents and other safety occurrences
- safety data recording, analysis and research
- fostering safety awareness, knowledge and action.

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Australia

1800 020 616

+61 2 6257 4150 from overseas

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# Aircraft proximity event, VH-FKU and VH-HJH Bankstown Aerodrome, New South Wales 25 August 2009

## Abstract

On 25 August 2009, a Piper Cherokee PA28-161 aircraft, registered VH-FKU, was approaching Bankstown Aerodrome, New South Wales (NSW) from reporting point 2RN in the south-west to join on a crosswind leg for runway 29 right (29R). At the same time, a Piper Chieftain PA31-350 aircraft, registered VH-HJH, was approaching Bankstown Aerodrome from Cessnock to join on a downwind leg for runway 29R. Both aircraft were being operated under the visual flight rules.

The pilot of the Cherokee was given traffic information by air traffic control and instructed to widen out to the left and told to expect to follow the Chieftain that was tracking to join on a downwind leg for runway 29R. The pilot of the Cherokee acknowledged the instruction, but subsequently turned downwind in front of and inside the flightpath of the Chieftain. Traffic information was passed to the pilots of both aircraft and the pilot of the Chieftain made a steep descending turn to avoid a collision.

Cherokee solo under the visual flight rules (VFR)<sup>1</sup>. The pilot held a Student Pilot (Aeroplane) Licence and had a total aeronautical experience of 175.3 flying hours.

A Piper Chieftain PA31-350 aircraft (Chieftain), registered VH-HJH, with a pilot in command and three passengers was approaching Bankstown Aerodrome under the VFR from the north-west, on a charter flight from Cessnock. The pilot held a Commercial Pilot (Aeroplane) Licence that was issued on 7 January 2004 and had a total aeronautical experience of 2,208 flying hours, with 80 flying hours on the Chieftain aircraft type.

General Aviation Aerodrome Procedures (GAAP)<sup>2</sup> applied to the airspace at Bankstown Aerodrome. There were several other aircraft flying in the control zone (CTR), but they were not relevant to the occurrence.

The Australian Transport Safety Bureau (ATSB) examined the recording of the air traffic control (ATC) radar data and the transmissions made on the Bankstown Control Tower radio frequency. The examination revealed that at 17:05:23 Eastern

## FACTUAL INFORMATION

### Sequence of events

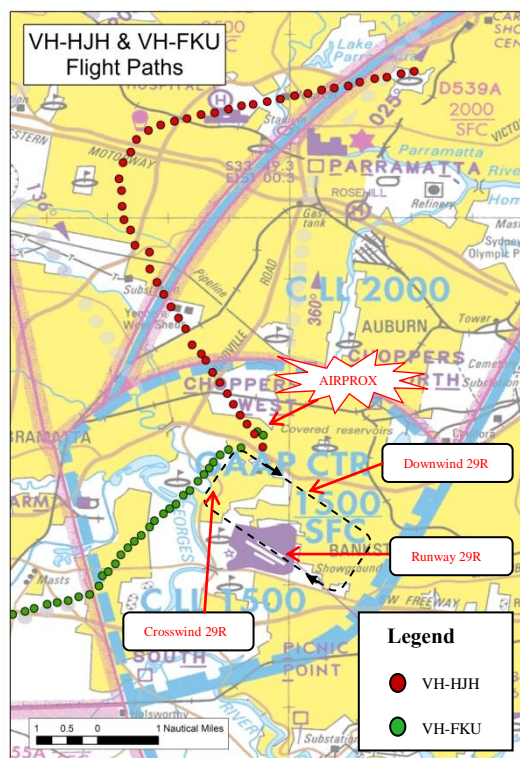
On 25 August 2009, a Piper Cherokee PA28-161 aircraft (Cherokee), registered VH-FKU, was approaching Bankstown Aerodrome, New South Wales, from the south-west. The student pilot had completed a period of flying training in the local training area. The pilot was flying the

- 1 Rules and procedures that require the pilot to visually remain clear of obstacles and other aircraft.
- 2 Prior to 3 June 2010, GAAP was a class of airspace that was defined as 'CTRs of defined dimensions where special procedures (GAAP) apply for high density general aviation aircraft operations'. GAAP procedures were replaced by Class D airspace procedures on 3 June 2010.

Standard Time<sup>3</sup>, when approaching reporting point 2RN from the south-west, the pilot of the Cherokee made a radio broadcast to ATC and was instructed to join the circuit on a crosswind leg for runway 29 (Figure 1).

At 17:06:40, the Chieftain was approaching Bankstown Aerodrome from the north-west, and the pilot was instructed by air traffic control to join on a downwind leg for runway 29.

**Figure 1: Flightpaths of Chieftain VH-HJH and Cherokee VH-FKU.**



At 17:08:25, when the Cherokee was continuing approach on an early crosswind leg for runway 29R, the pilot was instructed to ‘...widen to the left, expect to follow a Chieftain on early downwind...’. The pilot of the Cherokee conducted a slight course deviation to the left and continued on the crosswind leg. The Chieftain was in the Cherokee’s 10 o’clock position at about 3.1 NM (6 km) at that time.

At 17:08:54, the aerodrome controller, who was under training,<sup>4</sup> asked the pilot of the Cherokee whether the Chieftain was in sight. The pilot replied in the negative. The trainee controller then instructed the pilot of the Cherokee to ‘...widen out to the left’. The aircraft were by now on converging courses at 1.6 NM (3 km).

Instead of turning left, the pilot of the Cherokee turned to the right to join on a downwind leg for runway 29R, in front of and inside the flightpath of the Chieftain. The Chieftain continued on a south-easterly heading to also join on a downwind leg for runway 29R.

As the trainee aerodrome controller attempted to provide traffic information to the pilot of the Cherokee, the supervising aerodrome controller interrupted the transmission with ‘Foxtrot Kilo Uniform turn onto downwind now, break break, Hotel Juliet Hotel traffic off to your right’. The pilot of the Chieftain had already reacted and had conducted an evasive steep turn to the left and descended below 1,000 ft above mean sea level (AMSL) to avoid a collision with the Cherokee.

The Chieftain pilot’s notification report stated that the sudden evasive manoeuvre caused the pilot’s head to hit the roof of the cockpit. The pilot of the Cherokee said that the Chieftain was not sighted until 1 or 2 seconds before the aircraft proximity event occurred.

The pilot of the Cherokee later reported that the sequencing instruction from the aerodrome controller was not understood. The pilot did not know which of the aircraft was number one in the sequence, but believed that the Chieftain would be sequenced behind the Cherokee.

## Weather conditions

The recorded aerodrome information advised that the prevailing wind was blowing from the north-west at 12 kts, with the visibility in excess of 8 km and the sky clear.

<sup>3</sup> The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time (EST), as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

<sup>4</sup> Air traffic controller training includes on-the-job training where a trainee controller is authorised to control air traffic under the direct supervision of another controller. The supervising controller is monitoring the controller’s actions and instructions and is able to override a trainee controller’s instructions using their own headset or transmission device.

Data from Geoscience Australia showed that at the time of the occurrence, the sun's azimuth<sup>5</sup> was 285° and that its elevation was 4° above the horizon. Sunset was at 1733.

### Aircraft proximity event

An aircraft proximity event (Airprox) is an occurrence in which two or more aircraft come into such close proximity that a threat to the safety of the aircraft exists or may exist, in airspace where the aircraft are not subject to an air traffic separation standard or where separation is a pilot responsibility.<sup>6</sup>

While operating in GAAP CTR airspace, the pilot of an aircraft was assisted to sight other air traffic by the provision of relevant traffic information. There was no requirement for positive control instructions to be provided by the controller as a backup to ensure separation, if the traffic could not be sighted by the pilot.

### Pilot responsibilities

The Aeronautical Information Publication (AIP) ENR 25.1 specified a number of pilot responsibilities as follows:

A pilot must:

- a. sight and maintain separation from other aircraft whilst operating in the GAAP CTR;
- b. comply with ATC instructions while ensuring that separation is maintained from other aircraft;
- c. Immediately advise ATC if unable to comply with a control instruction;
- d. advise ATC if unable to sight, or if sight lost of, other aircraft notified as traffic;

### Air traffic control procedures

Chapter 13 of the *Manual of Air Traffic Services* (MATS), entitled 'GAAP TWR Differences', specified the ATC responsibilities in GAAP CTR airspace. MATS 13-10-410 stated that:

Within the GAAP CTR:

- a. apply runway separation standards

- b. issue instructions and/or traffic information to regulate traffic
- c. provide relevant traffic information inside the CTR
- d. maintain surveillance of aircraft activity within the CTR and on the aerodrome, where practicable.

In addition, MATS 13-10-560 provided information regarding differences in the provision of ATS traffic information as follows:

Traffic Information.

Issue traffic information when:

- a. the pilot of one aircraft is required to give way to, follow, or otherwise adjust the aircraft's flight path relative to that of another aircraft or manned balloon
- b. you cannot establish the relative positions of aircraft, and a collision or near miss is possible unless one or both aircraft adjust their respective flight paths. Prefix alerting services with cautionary word ALERT.

There were a number of generic ATC procedures for when pilots were able to be assigned responsibility for self-separation. MATS 10-50-250 included the following considerations:

Limitations to visibility

Consider the following limitations to a pilot's ability to comply with ATC instructions:

- a. the field of vision from the cockpit
- b. the contrast of aircraft with the background against which it will appear
- c. glare of the sun
- d. restrictions on atmospheric visibility which may not be currently apparent to the pilot eg loss of forward visibility following descent into a haze layer.

Additional requirements were listed in MATS 10-50-260 as follows:

Pass traffic information

When assigning visual separation responsibility to the pilot, pass traffic information in sufficient time and detail to enable the pilot to identify and maintain separation from other aircraft.

<sup>5</sup> Azimuth is the clockwise horizontal angle (in degrees minutes and seconds) from true north to the sun/moon.

<sup>6</sup> Transport Safety Investigation Regulations 2003.

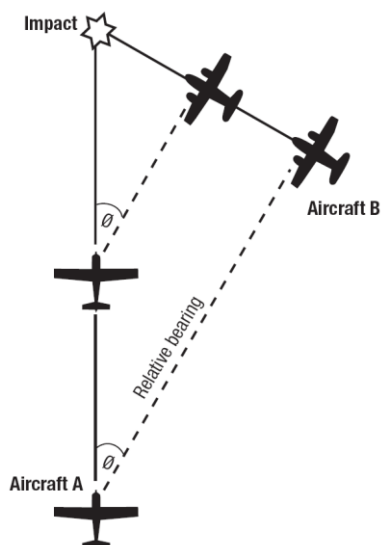
## Relative motion of aircraft

The ATSB Research Report *'Limitations of the See-and-Avoid Principle'*, published in April 1991, explained the lack of relative motion when aircraft are on a collision course as follows:

### Lack of relative motion on collision course

The human visual system is particularly attuned to detecting movement but is less effective at detecting stationary objects. Unfortunately, because of the geometry of collision flightpaths, an aircraft on a collision course will usually appear to be a stationary object in the pilot's visual field. If two aircraft are converging on a point of impact on straight flightpaths at constant speeds, then the bearings of each aircraft from the other will remain constant up to the point of collision. From each pilot's point of view, the converging aircraft will grow in size while remaining fixed at a particular point in his or her windscreen [Figure 2].

Figure 2: Lack of relative motion.



The flightpaths of both occurrence aircraft were such that the relative motion was not obvious to either pilot (Figure 3).

Figure 3: Lack of relative motion between VH-HJH and VH-FKU.



## ANALYSIS

When flying in airspace designated as a General Aviation Aerodrome Procedure (GAAP) control zone (CTR), separation between aircraft was primarily a pilot responsibility. Pilots were assisted to sight each other by the provision of relevant traffic information by air traffic control (ATC). If the traffic was not in close proximity, or likely to be in conflict, there was no requirement for controllers to advise pilots of other aircraft, unless air traffic control considered the traffic to be relevant.

The occurrence took place during the late afternoon when the sun was low in the sky. The pilot of the Cherokee may have had difficulty sighting the Chieftain due to its relative position north of the Cherokee, as the setting sun would likely have been in the pilot's peripheral vision. The guidance given by ATC to '...widen to the left...' would have resulted in the pilot turning the aircraft towards the sun, which would have exacerbated the effect of the sun's glare.

Normally, the position of the sun would be a consideration when providing traffic information, including during operations where aircraft were

required to self separate, such as at GAAP aerodromes. The investigation did not determine whether such factors were considered by the controller when traffic information regarding the Chieftain was passed to the student pilot in the Cherokee.

In any event, traffic information about the Cherokee was not communicated to the pilot of the Chieftain until immediately before the occurrence. In that context, the aircraft's converging courses resulted in a lack of relative motion between the two aircraft. That would have made each aircraft difficult to sight by the respective pilots.

Once both aircraft were on the Bankstown Tower radio frequency, ATC determined that the projected flightpaths of the Cherokee and Chieftain were in conflict. This is evident from the controller's instruction to the pilot of the Cherokee to '...widen to the left, expect to follow a Chieftain on early downwind...'.

The pilot of the Cherokee did not understand the instruction given by air traffic control, but executed a slight turn to the left and continued to try and sight the Chieftain. Despite a requirement for pilots to notify ATC when they were unable to sight advised traffic, the student pilot did not do so.

As the two aircraft continued to close on each other, the controller asked the pilot of the Cherokee to confirm that the Chieftain was in sight. The pilot responded '...negative...'. Until that time, the pilot of the Chieftain had not been issued with any traffic information about the Cherokee.

It was possible that the pilot of the Cherokee may have sighted the Chieftain if the instruction provided by ATC to widen the turn to the left had been understood and performed. A turn to the left would probably have removed the lack of relative motion between the two aircraft and may have increased the conspicuity of the Chieftain.

When the aerodrome controller became aware that the pilot of the Cherokee had not sighted the Chieftain, and that there was a likelihood of a conflict, the controller instructed the pilot a second time to '...widen to the left...'. The pilot did not understand that instruction. An alternative may have been for the controller to instruct the

Cherokee pilot to make a left orbit, which would then probably have assured separation.

Section 10-50-260 of the Manual of Air Traffic Services (MATS) stated that traffic information shall be passed in sufficient time and detail to enable the pilot to identify and maintain separation from other aircraft. That instruction was consistent with International Civil Aviation Organization standards. Although not clearly stated in MATS Part 13 GAAP TWR Differences, it is reasonable to deduce that traffic information passed to pilots in a GAAP CTR should be passed in sufficient time and detail to enable the pilot to identify and maintain separation from other aircraft.

The use of standard phraseology by ATC may have lessened the opportunity for an aircraft proximity event to occur. Phraseology such as '...widen to the left and expect to follow...' was not understood by the student pilot. An alternative sequencing instruction, such as '...Traffic is... you are number 2, Follow...' or '...Make one left orbit, you are number 2, Follow...' may have been clearer and may have assisted the Cherokee pilot's situational awareness. Similarly, when a conflict became likely, prefixing transmissions with the standard phraseology words '...Traffic Alert...' would likely have highlighted ATC's concern to the pilots of both aircraft.

## FINDINGS

From the evidence available, the following findings are made with respect to the aircraft proximity event between PA28-161 Cherokee aircraft registration VH-FKU and the PA31-350 Chieftain aircraft, registered VH-HJH at Bankstown Aerodrome on 25 August 2009, and should not be read as apportioning blame or liability to any particular organisation or individual.

### Contributing safety factors

- Despite being given traffic information, the pilot of the Cherokee did not advise air traffic control (ATC) of being unable to sight the Chieftain until specifically asked by ATC shortly before the aircraft proximity event.
- The pilot of the Cherokee entered the Bankstown General Aviation Aerodrome Procedure control zone from the south-west and did not see the Chieftain, which was

coming from the north-west, until a few seconds before the occurrence.

- The pilot of the Cherokee did not understand the air traffic control instruction to widen the circuit to the left and expect to follow the Chieftain.
- The pilot of the Chieftain was not provided with traffic information on the Cherokee in sufficient time to enable the pilot to identify the traffic and safely maintain separation.

Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the flight crews and operators of both aircraft, Airservices and the Civil Aviation Safety Authority.

Submissions were received from Airservices and an air traffic controller. The submissions were reviewed and, where considered appropriate, the text of the draft report was amended accordingly.

### Other safety factors

- The aerodrome controller did not use standard phraseology to pass traffic information or sequencing instructions.

### Other key findings

- Both aircraft would have appeared to be stationary objects in each pilot's visual field, decreasing the likelihood that the respective pilots would sight the other aircraft.

## SOURCES AND SUBMISSIONS

### Sources of Information

The main sources of information during the investigation included:

- the aircraft operator
- the pilot of VH-FKU
- the pilot of VH-HJH
- Airservices Australia (Airservices)
- the Bureau of Meteorology
- the International Civil Aviation Organization.

### References

Australian Transport Safety Bureau, *Limitations of the See-and-Avoid Principle*, April 1991.

Airservices Australia; *Manual of Air Traffic Service*, September 2009.

### Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003*, the Australian Transport Safety Bureau (ATSB) may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the