



# SABRE MIDAIR COLLISION

Quirindi Airfield, NSW 19 September 1964

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At 1300 hrs on the 19th September 1964, four Sabre aircraft of No 2 (Fighter) Operational Conversion Unit, based at RAAF Williamtown, took off on a "round robin" flypast exercise planned as part of Air Force Week celebrations. The planned route was to take them over nine NSW towns, including Quirindi airfield and township, prior to returning to Williamtown. Arrival at Quirindi was planned to coincide with a local air pageant and would involve a number of flypasts in various formations as part of the pageant.

The mission proceeded as planned to Quirindi (the fifth town) where the briefed flypasts, in different formations, was begun. At about 1403 hrs, after completing a pass in box formation and two passes in low level battle formation, the aircraft were called into close formation for the final flypast. While rejoining into close formation the No 2 aircraft, A94-355 collided with the lead aircraft, A94-356. The No 2 aircraft impacted the ground five seconds after the collision killing the pilot. The lead aircraft was only slightly damaged and landed safely at Tamworth. The remainder of the formation returned directly to Williamtown.

The flight was one of a number of commitments accepted by the RAAF as a part of Air Force Week. However, because of urgent, unexpected operational tasks that has arisen since accepting the flypast commitment, No 2 (F)OCU lacked sufficient staff pilots to fly all the Air Force Week missions as well as routine training exercises. It was thus decided to utilise two student members of the senior conversion course in the flypast mission, to make up the required section of four aircraft. One of those selected was an experienced pilot with previous Sabre experience, who was deemed to be the most capable of the remaining pilots on the course.

At the briefing, all flight members were issued with prepared maps of the proposed route. All relevant details, such as route to be flown, timing, anticipated fuel consumption, reporting procedures etc were covered. Considerable emphasis was placed on the two types of formation to be flown - low level battle formation and close box formation.

The sequence to be flown over Quirindi consisted of a flypast at 500 ft AGL in a box formation, spreading into a low level battle formation for further passes over the airfield, reforming again into box formation with wheels down for a final pass, and then departure for Scone. The leader briefed that all power changes, formation changes, turns, use of speed brakes, and undercarriage selections would be called over the radio. A blackboard diagram was used to illustrate the types of formation, positions of members in the formation, and movement of the members of the formation during turns.

Duration of the flight was expected to be 1.25 hrs. The weather conditions prevailing at Quirindi for the flypasts were mainly cloudless, light winds, light turbulence and good visibility.

## Aircrew aspects

The leader of the formation was an experienced Sabre pilot with in excess of 1 000 hrs on type. He was also an FCI.

The pilot of the No 2 (accident) aircraft had accumulated 307 hrs total flying time, including 48 hrs on Sabre aircraft. He had been repeatedly assessed as an outstanding cadet during his basic training and won the Goble Trophy for best overall pilot on his course. During the Sabre operational conversion course he had exhibited a great deal of natural ability and determination. He had made good progress throughout the course,

having completed the pure conversion segment, and was coping quite well with the more advanced tactics phase. He has successfully covered all aspects of tactical and close formation flying with only minor faults.

### **The accident**

The accident occurred two miles from Quirindi airfield and was witnessed by some 2500 spectators at Quirindi airfield, as well as CAA officials and others involved in the organising of the local pageant. Other witnesses closer to the crash location, include two other members of the formation.

The pilot of the lead aircraft stated that as he passed over the airfield on the second pass, he called for speed brakes out. He was then level and also called that he was reducing power. Shortly after, while in a gentle 20 degree bank to starboard and climbing away gradually, he called for "box formation go".

The leader was, by now, looking out generally, in anticipation of initiating a left turn for the final pass over the airfield. Suddenly he felt a noticeable bump on his port wing and observed a shadow in his peripheral vision. No alterations to the aircraft's handling characteristics were noted. Following a query from the No 3 aircraft, the leader looked out at the port wing and confirmed that he had been hit. On steepening up to the starboard, he saw wreckage of A94-355 on the ground.

The pilot of the No 4 aircraft was the furthest pilot in the formation from the two aircraft involved in the collision, some 200 feet directly astern of his leader. Nevertheless, he had the best view of the two aircraft involved. He stated that moments earlier both he and the accident pilot had delayed opening of speed brakes to assist in catching up to the lead aircraft. Then, while he (No 4) had begun to regulate his closing on the lead aircraft, the No 2 aircraft had maintained a considerable closing speed. The pilot of the lead aircraft had, by this time, started a gentle turn to starboard and No 2 overshot his leader and appeared to pass slightly in front of and above the lead aircraft. It appeared to No 4 that No 2 was taking his aircraft to the outside of the turn to wash off excess overtake. No 2 then banked sharply to starboard and his starboard wingtip hit the leader's left wing.

According to the No 4 pilot, while the lead aircraft maintained its flight path and appeared to be unaffected by the collision, the

No 2 aircraft yawed sharply to the right, slightly above and in front of the lead aircraft, and about four feet of the right wing tip broke off with other parts also shredding from the damaged wing. The aircraft then rolled very rapidly to the right and passed underneath the lead aircraft. As it fell away from the formation it quickly became inverted, with the nose pointing down.

At this point No 4 briefly lost sight of No 2. When re-acquired the aircraft was flying straight and level approximately 20 degrees to the left of the formation heading and about 10 feet above ground level, in a slightly nose up attitude, yawing slightly and travelling parallel with the ground. It seemed that it was about to land and, just when it appeared to be touching down, it rolled rapidly to the right and impacted the ground on its right wing.

The pilot of the No 3 aircraft generally confirmed this sequence of events. Some 30 seconds after the call to rejoin for box formation, he was moving into the echelon left position when he noticed No 2 come quickly into view almost immediately above the lead aircraft. It was banked to starboard at an angle of about 90 degrees. At this time the lead aircraft was in a climbing turn to starboard. No 2 then appeared to roll rapidly, slightly in front of the lead aircraft and so close that No 3 thought their wings may have touched. Moments later, the No 2 aircraft went inverted and passed from view.

After A94-355 impacted the ground, progressively disintegration of the right wing occurred and a fire started soon after. The aircraft rolled inverted onto the canopy area, before rolling and tumbling along the ground.

Distribution of the wreckage was quite random and simply indicated a high degree of disintegration and dispersion due to speed at impact, the initial impact angle and the rolling/tumbling progress of the aircraft along the ground.

There was ample evidence to show that, in the final moments, the pilot attempted ejection.

### **Wreckage examination**

From impact marks on the ground, the degree of break-up of A94-355 and the distribution of the wreckage, it was apparent that the right wing tip had initially contacted the ground at fairly high speed and a low rate of

descent. The wreckage was spread along a path 300 metres long.

As is sometimes the case in accident investigations, physical evidence at the crash site conflicted with what was given by eyewitnesses. In this instance, the evidence of the No 4 pilot regarding a significant part of A94-355's right wing separating after the midair collision was not consistent with the evidence obtained during the wreckage inspection. The starboard wing, including the tip and outer section of the aileron were still attached to the aircraft when it impacted the ground.

In order to establish exactly what damage was inflicted on A94-355 by the collision, and to what extent effective control could have been maintained by the pilot, all the recovered portions of the right wing were collected and reconstructed. From this reconstruction, it was established amongst other things, that:

The right mainplane, flap and aileron, with the exception of that part of the aileron inboard of the aileron centre hinge and aileron jack, were still attached to the aircraft when it crashed.

Neither the aileron jack nor the hydraulic lines of either the normal or alternate control systems to the jack were damaged by the collision.

Since the centre hinge incorporates the actuating arm of the aileron jack, the outboard arm of the aileron would have responded in the normal way to control column deflections, contributing effectively to the lateral control available to the pilot.

### **The control problem**

Although the left aileron was intact and the remaining section of the right aileron was contributing to effective lateral control, the pilot of A94-355 still had a control problem. From the damage to the leader's aircraft and from scrape and scoring marks on the undersurface of the wingtip of A94-355 it was clear that the major forces of the collision acted on an area of the aircraft's right wing, behind a line approximately joining the centre aileron hinge and the pitot head. The impact resulted in distortion of the wing behind that outboard section of the aileron were bent up, thus placing the section of the wing at a marked negative angle of incidence. This,

effectively, would have produced a powerful rolling tendency to the right.

Both members of the formation who saw the collision commented on the aircraft's rapid roll to the right. It is highly probable that the pilot, on sighting the lead aircraft so close, or on feeling the impact, instinctively pulled back on the control column to break away. This would have produced a sudden increase in angle of attack and, because of the damaged tip of the starboard wing, would have increased the lift differential between the left and right wings (provided they were not stalled). The end result would have been a powerful tendency to the right. This would explain the rapid roll which placed the aircraft in the inverted position before the pilot was able to correct.

At this point, it is considered that the accident pilot moved the control column forward, in the belief that the rapid roll was induced by a stall or flick. This would result in a reduced rate of roll and, by the time the aircraft was approaching the upright position, he was able to check the roll with the left aileron.

That this would be possible, even with the damage believed to have resulted from the collision, had been demonstrated in previous instances of Sabre collisions. That the pilot was able to stop the roll is borne out by No 4's statement and by several ground observers witnesses stated that the aircraft was either "gliding down" or appeared to be attempting a landing.

### **Pilot's attempted ejection**

While the accident pilot's aircraft was badly damaged ion the collision, it should have been controllable, confirmed by the fact that the pilot did regain control for a brief period before crashing. Examination showed that the engine was operating normally at higher than 6000 rpm immediately prior to impact. Why then, was the pilot unable to retain control of the aircraft and gain height for a safe ejection?

Given time to consider his actions, or experience to temper his judgment, a pilot in this situation should have survived. The accident pilot had very little of both. Having regained some control over the aircraft, he was most concerned about the continued difficulty in maintaining level flight. Opening the throttle once level flight was attained was almost automatic. Up to this point his attention would have been directed entirely towards

achieving a safe attitude, but once level, he probably glanced out at the “heavy” starboard wing and saw the damaged wingtip and the sizeable gap in the trailing edge.

Realising for the first time that the aircraft was seriously damaged and suspecting what control he had could fail at any second, the pilot might have thought that ejection offered the best chance for survival. At this point, he released the controls and tried to eject by raising both seat handles; however the aircraft rolled rapidly to the right and the right wing struck the ground.

The condition of the ejection seat supports this probability. Both seat handles were fully up and locked. The canopy breaker bolt and spring were found out of the breaker frame, both bent in a manner consistent with their having been on the way out of their casing as the aircraft rolled to the inverted position and crashed onto the canopy.

Having elected to try and eject, the pilot had hold of both firing handles by the time the aircraft first struck the ground. Either from sheer desperation, or as a result of the crash forces, he continued the action of pulling the handles to the fully up position. While this was happening, the aircraft continued to roll to the inverted position and crashed onto the canopy as the breaker bolt and spring were clearing their casing. By the time the main initiators fired, the main initiator hose had separated from the M-5 catapult, and the seat firing sequence was interrupted.

### **What went wrong?**

From the evidence of the pilots of the No3 and No 4 aircraft in the formation, it became apparent that in attempting to move quickly from his low level battle formation position into echelon right (the briefed position when box formation was called), the accident pilot misjudged his overtake, and was embarrassed by a marked overshoot – not an unusual occurrence – even with experienced pilots. For an inexperienced pilot, possibly overawed by his first appearance in a public display, and anxious to impress by demonstrating his ability to move quickly from one formation position to another, it represents an error of judgment.

In a situation where the leader does not have speed brakes extended, such an overshoot is usually quite easily corrected with speed brakes and/or by reducing power. In this case however, the leader had his speed brakes

extended *and* had reduced power in order to slow down and lower the undercarriage for the final flypast in box formation. To correct an overshoot in this situation, with no drag differential and only a small power differential between the leader and the overtaking aircraft, required some form of lateral manoeuvring to enable the overshooting aircraft to fall back while washing off excess airspeed.

The evidence suggests that the accident pilot decided to cross to the left side and back to the right side to correct the overshoot. In doing so he elected to cross over, rather than under, his leader’s flight path. This is a highly dangerous practice, in that the pilot loses sight of the lead aircraft when manoeuvring close to it, and was contrary to the established technique taught at the unit, which required the wingman to manoeuvre with his leader in sight at all times.

Two factors which must be considered as having contributed to the accident are the pilot’s inexperience, and the fact that he had been airborne on a low level formation flying sortie for an hour when the collision occurred. It is an established fact that an inexperienced pilot tires more rapidly than an experienced pilot when engaged in missions requiring continued concentration, such as formation flying. The experienced pilot can relax more readily and his reflexes respond more or less automatically. The less experienced pilot must retain concentration at a higher level and does not relax readily. This could explain the lapse which caused the pilot to lose sight of his leader.

### **Summary**

The pilot of A94-355 used an incorrect technique to correct an earlier error of judgment when joining up with his leader into echelon right formation. As a result, he lost sight of the other aircraft and, instead of pulling well clear, tried to judge the relative position of the other aircraft and dropped his right wing to check visually. As a result, his right aileron struck the top of the lead aircraft’s wing.

The damage to the lead aircraft was relatively slight and the leader was able to land safely. However, as a result of the damage to the right wing and aileron of A94-355, the pilot lost control of the aircraft which rolled rapidly to the right and descended to a very low altitude. The pilot then regained control of the aircraft and, either from sheer panic or because of difficulties, decided to eject. When

he released the controls to operate both seat firing handles, the aircraft rolled rapidly to the right and impacted the ground before the ejection sequence was completed. In any case, the altitude at which he decided to eject precluded any chance of success, had the seat successfully cleared the aircraft.

Two factors which contributed to the accident were the pilot's inexperience, and fatigue from the relatively long period he had been flying at low level in formation before the collision occurred.

The tragedy of such an accident is made all the more bitter because both the collision and the loss of the pilot resulted from his own mistakes. Almost any other course of action would have given him a greater chance of survival. Sufficient power and control was available to permit a climb to a safe ejection altitude. On the other hand, the pilot could well have walked away from the aircraft had he elected to make a controlled crash landing straight ahead.

No doubt the pilot did make the wrong decision at the critical time but, considering the circumstances, who can blame him?