



Double Tragedy at Karuah

Fatal accident involving Mk 30 Vampires A79-453 and A79-83 at Karuah River, NSW on 13 May 1951.

On Sunday 13 May 1951 a formation of four Vampire jet aircraft from No 75 Squadron took off at 1020 hrs from RAAF Williamtown, NSW. The mission was to carry out a battle climb to 35 000 ft and conduct interceptions at 25 000 ft.

The weather was fine and cloudless; wind was westerly at about 4kts and visibility about 20nm.

The formation consisted of two experienced Vampire pilots occupying Nos 1 and 3 positions in the formation; the other two members of the formation (Nos 2 and 4) were two pilots undergoing the Vampire conversion course prior to posting to No 77 Squadron.

Only two aircraft were to return from the mission; the other two aircraft, A79-453 and A79-83, were totally destroyed when, following steep dives at high speed, they both crashed in or near the Karuah River respectively, killing their pilots instantly.

The tragedy, to this day, remains something of a mystery, the causes somewhat inconclusive-no doubt a good case study for budding accident investigators.

The formation took off in pairs and climbed, in battle formation, to 35 000 ft where several crossover turns were carried out. Then, the leader ordered dive brakes out and the formation descended to 25 000 ft. After settling down at this altitude with the two pairs flying line abreast, an interception was commenced by Nos 1 and 2, making a 270 degree turn to starboard; and Nos 3 and 4, a 270 degree turn to port. The interception was made and the pairs

then manoeuvred in order to make passes at each other.

The trouble starts

During the third such pass, with Nos 3 and 4 making a rear quarter attack on Nos 1 and 2, one of the four pilots radioed stating "*I'm in compressibility*".

The formation leader immediately ordered "*dive brakes out, throttle off*", and began searching for the aircraft in distress somewhere below him. Another call came soon afterwards, "*I'm still in compressibility, I'm inverted*". The leader advised the as yet unidentified aircraft's pilot to roll out, select his dive brakes out and to throttle off. After a further minute or so, the formation leader spotted the aircraft in trouble descending steeply, so he pulled out his dive brakes and followed the other aircraft down.

Shortly after, there was yet another call over the R/T, "*I'm still in compressibility, I can't recover, this is it*". The leader saw the aircraft crash and instructed No 3 to inform Williamtown Tower. Then, on checking his formation, he received no reply from No 2, whom he subsequently reported as missing.

However, from the ground, two Vampire aircraft were seen to crash from steep dives at high speed and within a few seconds of each other. One crashed into the Karuah River, and one on the river bank some 1300 metres away. The first aircraft proved to be A79-453 and the second, A79-83.

Aircraft histories

A79-453. The aircraft was a DH-100 Vampire, Mk 30, manufactured and assembled at the de

Havilland company at Bankstown, NSW. Only five months previously. Following an RAAF acceptance flight of 40 minutes on 5 February 1951 the aircraft free of faults, was delivered to No 78 Wing (78WG) at Williamtown eight days later. From this date the aircraft remained hangered, for three months, and was not flown until the fatal flight, at which time its total flying time was only 11 hrs. Similarly, the engine had only accumulated a little over 30 hrs running time.

A79-83. This aircraft was also a DH-100 Vampire, Mk 30, manufactured at Bankstown. It was delivered to 78WG on 14 March 1951. At the time of its final flight it had accrued only 27.3 hrs and the engine, 36.5 hrs.

Both aircraft were signed up as serviceable for the intended flights. They were flying at a normal loading for training, with full internal fuel, guns installed but without ammunition, and without wing drop tanks. The take off weight of each aircraft would have been 10 122 lb and the CG 5.8 inches aft of the datum. The maximum permissible weight for all forms of flying the Vampire Mk 30 was 10 400 lb, and the CG limits were from 3.6-8.4 inches aft of the datum.

Aircrew histories

The pilot of A79-453 was a Sergeant pilot. After graduating from 1FTS at Point Cook, Vic. And a short period with 34SQN at Mallala, S.A, he was posted to 1AD Laverton, Vic. where he flew Mustang, Dakota, Anson, and Lincoln aircraft. Following a further short period with No 3 Tac/R Squadron at Canberra, ACT, he joined 78WG in February 1951 and, after completing the preliminary conversion phases, commenced flying Vampires in April. His total flying experience was 600 hrs (400 single engine, 200 multi engine) including 131 hrs in the previous six months.

The pilot's Vampire training up to the fatal flight included:

- one high-speed run to M 0.7;
- circuits/overshoots
- cross-country sorties;
- aerobatics; and

- formation flying.

The pilot of A79-83 was a Flying Officer who enlisted in the RAAF in June, 1943. After completing his training at Uranquinty, NSW he was posted to England for further training – but saw no operational flying. He returned to Australia early in 1945 and, after a two year administrative posting, returned to flying duties at Rathmines, NSW where he flew for several months as copilot on Catalina flying boats. Following Dakota training with 36SQN at Schofields, NSW the officer completed a QFI's course at CFS. After QFI duties with 34SQN at Mallala, S.A he commenced flying at 78WG. He had completed the Wirraway and Mustang phases of his fighter conversion training and had made seven flights in Vampire aircraft up until his final flight. His flying experience totaled 2 160 hrs experience (590 single-engine, 1570 multi-engine), including 162 hrs during the previous six months.

The pilot's Vampire training up to the fatal flight was similar to that of A79-453's pilot.

Wreckage information

Both aircraft crashed near the junction of the Karuah River and Limeburner's Creek, approximately 14nm northwest of RAAF Williamtown, NSW. The aircraft crashed within three-quarters of a mile of each other, A79-453 in the river and A79-83 on the bank of the river.

The wreckage of A79-453 was confined to a very small area, the main portion of it being buried in the mud under approximately eight feet of water. The wreckage indicated that the aircraft had completely disintegrated after striking the water at high speed and was of little value in determining the cause of the crash.

The main wreckage of A79-83 was buried deep in a hole in soft mud in a mangrove swamp, but portions of it had been thrown, together with some mud, some 200 metres up the bank of the river in a southerly direction. Salvage of the main portion of the aircraft was impractical. Of the remaining portions scattered fanwise in a southerly direction from the hole, the only item which proved to be of any value was a dive brake jack which was damaged whilst in the extended position. The manner in which mud and small pieces of wreckage thrown up indicated that the aircraft had struck the ground,

not vertically, but at some smaller angle of dive, from the north.

Examining the evidence

Evidence as to the likely cause(s) of the accident originated from three main sources:

- the two remaining pilots of the formation;
- eyewitnesses on the ground; and
- from wreckage examined.

From the evidence of the remaining pilots of the fateful formation it was established that, whilst carrying out practice interceptions in pairs at 25 000 ft, No 2 pilot of the attacking pair of the formation lost control of his aircraft (A79-453), apparently due to compressibility. Both Nos 1 and 3 of the formation were quite clear that at no time were the pairs sufficiently close to cause a collision between Nos 2 and 4, and there was no other evidence of collision. Three other factors precluding the possibility of a collision were:

- A79-453's pilot would have been unlikely to communicate via R/T as he did without some mention of a collision;
- there was no radio call from the pilot of A79-83 mentioning a collision; and
- ground eyewitnesses stated that the aircraft appeared to be externally complete and serviceable until impact.

The evidence further indicated that at some time during the turn to intercept the other pair, AA79-453's pilot felt the onset of compressibility and radioed his leader to that effect. Just prior to his turn A79-453 had been observed by Lead to be ahead of him and slightly below and had been ordered to regain formation, which was acknowledged. It is not known whether A79-453 actually did regain formation.

It was considered possible that, already, A79-453 was approaching the speed at which compressibility effects were being felt and, in the attempt to reform on Lead, may have aggravated this condition.

As the leader of the whole formation was flying at Mach 0.70 in level flight when A79-453's pilot first called to say he was in compressibility, it would be quite possible for the latter, in attempting to regain formation, to feel the effects of compressibility either by gaining speed, applying "g", or a combination of both.

Another possibility was that, in attempting to regain formation, the pilot of A79-453 executed a steep turn and applied sufficient "g" to stall the aircraft, in which case the aircraft would almost certainly have flicked onto its back. If the pilot had then attempted to recover by pulling through in a straight dive without using dive brakes or throttling back, the aircraft's speed would have rapidly built up to a Mach number where compressibility effects would have been serious.

Why didn't A79-453 recover?

Why the pilot of A79-453 was unable to recover, however, was not clear. The first thing he should have done when he felt the effects of compressibility was to put out his dive brakes and reduce power. This technique was stressed throughout training on Vampire aircraft and thus he would have been aware of the correct technique. This procedure was also specifically covered during the briefing for the sortie. Additionally, when he radioed to advise that he was in compressibility, the leader instructed him to put out his dive brakes and throttle back. This instruction was repeated when the pilot radioed a second time advising that he was inverted. However, it is not known whether the pilot actually received these final instructions over the R/T as he did not acknowledge them.

There is no reason, however, to suppose that the pilot did not extend his dive brakes. They were known to have been serviceable up to the time of the manoeuvres at 25 000 ft, as they were used by all members of the formation in their descent from 35 000 ft.

If the pilot of A79-453 did put out his dive brakes, and did throttle back which is most likely, as these procedures would have been the natural things to do, the reason for his inability to recover is obscure. It was known that up to Mach 0.78, the Mk30 Vampire would recover from the effects of compressibility if the dive brakes were selected out and the throttle was closed. (During the few days immediately following the

investigation, all serviceable Vampires of 75SQN were test flown and found to recover quite normally from Mach 0.76 when the correct technique was used.)

If the pilot had not been able to recover, or had delayed recovery action until he was at a much lower altitude, it is most likely that by then his airspeed would have been such as to his being physically incapable of pulling the aircraft out of the dive. This is because the stick forces vary as the square of indicated airspeed, and indicated airspeed increases with the decrease in altitude. At 15 000 ft and Mach 0.78, in a Mk30 Vampire, the pull force required would probably exceeded 100 lb.

Although the degree of aircraft damage to A79-453 precluded finding any evidence of structural failure, such a failure could not be ignored by the accident investigators. The pilot had commented over the R/T that he was in compressibility and was unable to recover his aircraft. It is reasonable to assume that he was making every effort to recover and there was no suggestion of panic. Therefore, it was possible that, apart from the pilot allowing his aircraft to exceed the limiting Mach number of 0.76, something went wrong over which the pilot had little or no control. For example it was possible the pilot mistook the effects of some structural failure for those of compressibility. If a failure occurred which gave him the impression that he was in compressibility; ie, a nose down change of trim it was conceivable that such a mistake could have been made.

If, for this reason, the pilot was unable to pull his aircraft out of the dive, and he did put out his dive brakes and throttle back, then it was possible that he was never in compressibility. This could explain why the pilot of A79-83 was able, as later evidence shows, to catch up to and remain with A79-453 in the dive and then, at the last moment, make some attempt at recovery of his own aircraft.

A79-453 had not previously flown at the unit since its arrival three months prior to its final flight, nor had any inspection been carried out- other than the daily inspection prior to the fatal flight. It had been flown at Mach 0.76 by both the factory test pilot and the RAAF test pilot as part of RAAF acceptance flying and performed satisfactorily. So, unless something happened to the aircraft during its three months

in the hanger, there was no reason to suppose it would have not again behave normally on its next flight – the accident sortie. In that case it could only be concluded that the problem was one of pilot error in allowing the aircraft to exceed the maximum permissible speed.

Final moments of A79-83

There was no direct evidence whatsoever to indicate what happened to the pilot of A79-83, but from the evidence available the most likely possibilities are explored below.

A79-83 apparently disappeared from the formation at about the same time as the pilot of A79-453 radioed to say that he was in compressibility. A79-83 was last sighted by both Nos 1 and 3 of the formation in approximately the correct position on the left of No 1. The pilot of A79-83 was No 2 of the pair being intercepted and called his leader to inform him that there were aircraft “on his tail”. This was acknowledged by No 1, who told him to maintain his position, this instruction being acknowledged.

The next call over the R/T was that from A79-453’s pilot saying that he was in compressibility. It was considered unlikely that A79-83’s pilot failed to hear this call, which both Nos 1 and 3 heard quite plainly. A79-83 was turning left with his leader, at the time of A79-453 pilot’s radio transmission. On hearing this call, No 1 the formation leader, straightened up from the turn and began looking for the aircraft in trouble. From this point A79-83 was not seen again, nor was its pilot heard on the radio.

The only logical explanation for the actions of A79-83’s pilot appears to be that he lost sight of his leader, either during the left turn or when his leader straightened up from the turn, and the first aircraft he saw then was A79-453, who could have been somewhere just below him. Presumably, he mistook this aircraft for that of his leader and followed it, attempting to regain formation in the process. One argument against this possibility is that if A79-83 had received A79-453’s first call of distress, he surely would not have followed the first aircraft he saw after losing his leader, when that aircraft was obviously in a steep dive. Even if he had made this initial mistake, it seems incomprehensible that he would have continued to follow this aircraft when it was obviously in a very steep dive, probably over the vertical, and when

someone was calling on the on the R/T that he was inverted and still unable to recover from the effects of compressibility. Would he not have taken a quick glance at his Machmeter.

A point in favour of the pilot of A79-83 mistaking A79-453 as that of his leader was that no word was heard over the R/T from A79-83 throughout its dive. It could be assumed from this, excluding the slight possibility of R/T failure, that the pilot of A79-83 believed all was well and no comment from him was necessary. Possibly he believed that the dive was part of the evasive tactics by his leader

Evidence of ground eyewitnesses

There were several people fishing on the river who witnessed both aircraft crashes. Through their evidence a fairly clear reconstruction of the final part of the two fatal dives could be made.

The formation was observed manoeuvring at altitude some small distance west of the scene of the crash sites, when one of the aircraft was observed to leave the formation and enter a dive of approximately 45 degrees. This aircraft was closely followed by a second which continued in the same angle of dive and on the same course, ie, approximately southeast.

Sometime during the respective dives, whilst still fairly high, either smoke or a vapour trail was seen to leave the first aircraft. This apparently happened shortly after the aircraft left the formation.

At some lower height the angle of the dive of the first aircraft was seen to go beyond the vertical, and then, shortly afterwards, the aircraft “wobbled” or “turned” and the angle of dive decreased to about 75-80 degrees. It was at about this time of this change of angle of dive that puffs of “smoke” were seen to leave the first aircraft.

It was not established what caused the “smoke”, but one possibility was that the engine flamed out, causing unburnt fuel to pass through the engine and leave the tail pipe in the form of vapour.

From this point the first aircraft was seen to continue its dive into the Karuah River. The second aircraft continued in the same dive

for awhile, and then at about 1 000-2 000 ft it began a slight turn to the right and the angle of dive reduced to approximately 35 degrees. However, it struck the mud on the west bank of the river, about three quarters of a mile southwest of the first aircraft. The turn and decrease in the angle of the dive of the second aircraft suggests that some attempt was made to pull out of the dive. The time interval between the two aircraft impacts was assessed as between 10-20 seconds.

Because the second aircraft was at exactly the same angle of dive as the first, on the same course, and so close behind (estimates varied from 200 ft to half a mile) most ground eyewitnesses believed that it was deliberately following the first aircraft.

This evidence tallied with the possibility suggested from the evidence of Nos 1 and 3 of the formation, that the pilot of A79-83 followed A79-453 down. This was also supported by the evidence that the pilot of A79-453 made some attempt to pull out when he at last realised that all was not what it seemed.

Some of the estimated intervals between the two aircraft may seem to indicate that the second aircraft was not necessarily following the first. When it was realised that, at the speed at which they would have been travelling, say 477 kts, 20 seconds represents approximately 16 000 ft, it suggests that either the distance between the aircraft was much greater than some witnesses thought, or the time interval had been overestimated. Although the aircraft were diving from almost directly above the ground eyewitnesses so that the distance between them would appear fore-shortened, it was considered that the latter was the more likely (ie, the time interval had been overestimated).

None of the eyewitnesses saw any pieces fall away from either aircraft and there was no other evidence of pieces separating in flight. It was considered that both aircraft were externally intact at the time of impact.

From the wreckage of the first aircraft to crash (A79-453) it was not possible to determine whether the dive brakes had been extended at impact. However from the wreckage of A79-83, evidence was available to indicate that the dive brakes were extended at impact. It was therefore considered impossible for the pilot of A79-83 to follow A79-453 from 25 000 ft and

finish so closely behind the latter aircraft had the leading aircraft not had its dive brakes out.

Accident causes

There was no direct evidence available as to the cause of the crash of either aircraft. However, after consideration of the evidence available, the causes were considered to be:

A79-453. The pilot, whilst flying as No2 in a pair engaged in interception practice at 25 000 ft, reported feeling the effects of compressibility. For some reason(s) undetermined he lost control of the aircraft and was unable to recover from the dive. The most likely causes of this inability to recover (assuming the dive brakes were extended and the engine throttled back), were considered to be:

- that he allowed A79-453 to exceed Mach 0.76 before extending dive brakes and they were then ineffective in recovering from the effects of compressibility; or
- that the trouble was not compressibility, but structural failure which gave a nose down change of trim beyond his capability to overcome.

A79-83. There was no evidence, either technical or from eyewitnesses, to show why the pilot of A79-83 should have left the formation and dived into the ground so closely behind A79-453. However, the most likely reason for him to dive as he did was that he lost his leader in a turn and followed A79-453 in the mistaken belief that it was his leader's aircraft and subsequently realised his error too late to enable recovery from the dive. It was believed that his inability to pull out of the dive in time to clear the ground was due to high stick forces caused by the high indicated airspeed at low altitude.

There was a further possible explanation of the A79-83 accident. As mentioned above, its pilot was apparently attempting to recover the aircraft from its dive just prior to impact. That he was able to lessen the angle of descent as much as he did suggests A79-83 was not feeling the effects of compressibility at the time. It is conceivable therefore, that on hearing the R/T call from A79-453, the pilot of A79-83 followed the other aircraft down (aware of which aircraft he was following), merely with the object of keeping it

in view. If so, he may have kept a close watch on his Machmeter and carried out his descent, dive brakes out, with complete safety from compressibility. Then, at a late stage in the descent, when he realised that A79-453 was not going to recover from its dive, he may have made a belated, unsuccessful attempt to recover his own aircraft.

Conversely, if A79-453 did not enter compressibility, as suggested earlier, A79-83 could have stayed with the leading Vampire, but not felt compressibility effects either. This explanation implies, of course, a complete lack of air discipline on the part of the pilot of A79-83.

Recommendations

As a result of this accident the following recommendations were made:

- that dual-controlled trainer aircraft be utilised from introducing pupils to high speed flight and, in the interim, trialling a technique for introducing pupils to high speed flight by having an instructor and pupil fly in company in separate aircraft; and
- greater attention be given to aircraft not being regularly flown.

DFS comment:

A further plausible explanation as to why A79-453 failed to recover from its dive, is that the pilot selected flaps out instead of dive brakes in the heat of the moment. This would help explain the nose down change of trim and the high stick forces caused by the excessive speed.

It is not known what the outcome was of the trial involving an instructor and pupil flying in company in separate aircraft. However, dual seat Vampire (ie, Mk 33, Mk 34/34A, Mk 35/35A) aircraft were used from as early as 1952 for a wide variety of training (and other) tasks in the RAAF and RAN.