

Summary of loss of RAN A-4G 872

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At about 1030 hrs on 17 July 1975 two A4-G Skyhawk aircraft from VF 805 Squadron — N13-155051 and N13-155055 — collided over the Beecroft Bombing Range. N13-155055 crashed onto the range killing the pilot — a recent addition to the squadron, having only just graduated from the Skyhawk OFS in VC 724 Squadron. The other aircraft, although severely damaged, was skilfully landed back at NAS Nowra by its pilot, VF 805's Commanding Officer (CO).

The following account of the accident has been compiled from the Board of Inquiry's Report and post-report review, interviews with personnel involved at the time, and recollections of the author who was serving as a Weapons Electrical Engineering Officer in VC 724 Squadron at the time.

As is sometimes the case with major accidents, confusion sets in and command and control breaks down in varying degrees. As will be seen, quite a few lessons in accident response were learned in the wash-up of this tragedy. As also will be seen, people on occasions can act with commendable initiative.

The article completes a trilogy of *Touchdown* articles on formation flying, accidents etc, the other two being *Formation Flying* (2/97) and *How Close is too Close?* (4/97).

Overview of accident

The sortie during which the aircraft collided was a training exercise conducted by the then RAN's front-line fighter squadron VF 805. *Delta* flight, consisted of two sections, a lead section of three aircraft and an additional section of two aircraft. It was briefed to carry out low-level navigation with a simulated strike on fleet units and divisional bombing on Beecroft Range.

The initial portion of the exercise went as briefed and, as also briefed, the second aircraft section detached after the strike on the fleet units leaving the lead section of three aircraft to proceed onto the range for the divisional bombing practice.

During the first dive the CO, in N 13-155051 (aircraft side number 870), felt a severe bump just prior to weapon release and subsequently experienced severe control problems. The pilot was eventually able to overcome the problems and recovered the aircraft to NAS Nowra via an arrested landing. During the landing roll-out the nose gear collapsed. The pilot was shaken but not injured.

The bump felt by the pilot in Skyhawk

870 was caused by Skyhawk N13-155055 (872) striking the rear lower fuselage of 870; Skyhawk 872 continued in its dive and crashed on the range. There was no evidence of an attempted ejection or recovery action. Indeed the evidence suggested that the pilot was probably incapacitated during the collision.

Aircrew aspects

Skyhawk N13-155055 (872). The pilot of 872 completed his Skyhawk OFS on 1 July 1975 and transferred to VF 805 six days later. He had accumulated a total of 397 hrs, including 132 hrs on A-4G Skyhawks.

Although the accident flight was not his first sortie with his new squadron, it did combine all of the most demanding facets of attack flying including low-level navigation, tactical formation flying, bogey evasion and divisional attacks. This was also the first time that the pilot had worn a cold weather immersion suit. Although wearing of this suit was not considered to restrict a pilot's movements or ability to satisfactorily perform the sortie task(s), it did require increased effort, particularly while manoeuvring, causing an increased loss of energy through body heat.

Skyhawk N13-155051 (870). The pilot of 870 was the Commanding Officer of VF 805, a very experienced jet fighter pilot

with total flying hours of 3,514 including 949 hrs on A-4G Skyhawks.

Aircraft particulars

The relevant documents of both aircraft involved in the collision were examined by investigators and, apart from two minor clerical discrepancies, were found to be in order and had no bearing on the accident.

Skyhawk 872. Whilst much of the aircraft's wreckage was fragmented in the post-collision ground impact on the range, much useful information was obtained by accident investigators assisting the BOI. Measurements made of the operating shaft of the horizontal stabiliser indicated that it was set at 0.5° nose down. This was as to be expected for the trimmed flight state of the aircraft prior to the collision and indicated that a nose-up trim runaway had not occurred. No other control surfaces or actuators recovered indicated evidence of malfunction prior to the collision. Additionally, an inspection of the remains of the engine suggested that it was developing power at the time of impact. There was no evidence to suggest that any malfunction of the aircraft, its systems, or engine, contributed to the collision and subsequent crash.

Skyhawk 870. There were no matters of significance regarding this aircraft and the accident. The collapse of the nose wheel

during the arrested landing proved to be due to an unrelated technical defect.

Sortie authorisation and briefing

The sortie was correctly authorised and the Board considered that all pilots taking part were fully competent to undertake the sortie.

The briefing board was prepared by the pilot of 872 but the briefing was carried out by the squadron CO and covered all aspects of the sortie. Although the weather was clear with little wind (and had no bearing on the accident), it was mid-winter, 11°C, and all the pilots involved were directed to wear immersion suits.

The five-aircraft sortie was to consist of a low-level sea navex culminating in a divisional attack on an RAN warship. On completion of the attack, the flight was to proceed to Beecroft Range where it was to divide into two divisions. The CO was to lead the first division with the pilot of 872 as his No 2 and an experienced pilot as No 3 in 874. The second division was to be led by the squadron Senior Pilot (SP) in 876 with another Skyhawk OFS graduate as his No 2 (885). The second division was to hold over St Georges Head whilst the first division carried out their bombing practice on the range. During actual passes on the range each pilot was required to call — on *Range* frequency — on rolling into the dive, and again during recovery from the dive.

The flight

The five aircraft, took off at 0918K and, after rendezvousing, carried out the sea navex as briefed. The strike on the RAN warship was carried out 58 minutes after take-off and no problems were encountered. The aircraft then departed to position for the next phase of the sortie, the strike on Beecroft Range.

At about 10 nm east of Point Perpendicular the SP and his wingman broke away and proceeded to St Georges Head as briefed. The first division then positioned for a standard divisional attack on the range. The CO, as Lead, contacted *Nowra Approach* and advised that the ship strike had been completed and the flight was transferring to *Range* frequency. All three pilots then transferred to *Range* frequency and the CO obtained a clearance for a live attack on the bombing target.

The aircraft were still at low-level and, on approaching Bowen Island, the CO called '*Pulling up*' and at the same time applied power for the climb. His No 2 (872) and No 3 (874) positioned themselves in preparation for the roll-in. It was determined that at this stage 872 was in the correct relative position.

In the event, the pull-up proved to be too steep, and in order to obtain the correct roll-in position the CO advised the flight that he would be levelling out slightly at the top. At 5,000 ft this was completed

and he rolled into a 20° dive, at the same time calling 'Rolling In'. This was followed some two seconds later by the pilot of 872 with a similar radio transmission, and two seconds later by No 3 in 874. At the roll-in No 3 assessed 872 to be correctly positioned for a No 2.

The CO set 87 per cent engine power and, when established in the dive, called 'The dive is good'. This power setting was maintained throughout the dive up to the collision. According to the four surviving pilots, this was the last transmission from Delta flight on Range frequency up until the collision.

From evidence presented to the Board, it was determined that students had become accustomed during their Operational Flying School (OFS) to rolling into 20° bombing dives with a power setting of 91-92 per cent. As their instructor had also used this power setting, the procedure had become routine for OFS students.

In a divisional attack the lead aircraft is solely responsible for establishing the direction of attack, the angle of dive and the power in the dive, and it is for the remainder of the flight to follow. On this occasion the CO used a power setting that was different to what the students were accustomed to, but which was his prerogative as the flight lead. There is a strong possibility that the pilot of 872 did not appreciate that his leader on this particular

sortie was using a power setting of 87 per cent and as a matter of routine set 92 per cent power. He then most likely proceeded to concentrate on the weapon release task, believing his spacing on the lead aircraft to be adequate. (The accident pilot had achieved very good to outstanding weaponry results during OFS and was known to be justifiably proud of his achievements.)

Subsequent tests carried out with Skyhawk aircraft and using a range of power settings — 85, 90 and 95 per cent — demonstrated that in a 20° bombing dive, an increase of 5 per cent in power produced a speed differential of 30-40 kts at the bottom of the dive. Analysis by the then Aeronautical Research Laboratories (ARL) revealed that the accident aircraft, 872, was flying 30-40 kts faster than 870 at the time of the collision. Thus it was most likely that 872 had a power setting 5 per cent higher than his leader in 870, where its pilot then devoted attention to weapon release, not appreciating that he was overtaking the lead aircraft. Once below his leader, it would have been difficult for the pilot in 872 to regain visual contact with 870 which was then directly up-sun.

The accident

The CO, in 870, settled into the dive without altering his power setting (87 per cent) and was preparing to release his bomb at

2,650 ft when he experienced a severe, loud explosion at the rear of his aircraft causing it to violently pitch nose-down. He was violently jolted and his hands were dislodged from the control column.

The explosion was the impact of 872. It appeared to one range member eye-witness that 872 overtook his leader from below and then climbed and drifted left before striking 870. This account was consistent with an expert witness from ARL who stated that initial contact occurred when the top of 872's canopy struck the rear fuselage access panel of 870. The expert also stated that just prior to impact, the relative pitch angle between the two aircraft was changing, but the collision occurred before this change could take effect in altering the closing velocity. This would be consistent with the pilot in 872 pushing the control column forward the instant before the collision occurred.

As a result of the impact it was considered most probable that the pilot in 872 had been incapacitated by resultant head injuries, if not killed outright. (In addition to canopy fragments, the top 20-30 cm of the pilot's ejection seat separated from the aircraft at the moment of collision.)

The two aircraft separated and 872 dived, rolling left wing down shortly before impact with the ground. where it disintegrated. The impact was witnessed by the range party and immediately a small team, equipped with firefighting equipment, and

led by the Range Officer, drove to the accident site. Nothing could be done for the pilot but a few small fires were quickly extinguished. At about the same time NAS Nowra were advised of the fatal accident.

Recovery of 870

The CO, in 870, recalled seizing the control column and pulling it back hard at about 2,000 ft and then noticing the engine rapidly decelerating — that it had flamed out. He transmitted a MAYDAY twice before losing radio sidetone — an indication that he had lost electrical power and to be expected after a flame-out.

He was aware that he was pulling high-G forces, but continued pulling until he noticed the horizon appear in his windscreen. He noted that he was level at 1,500 ft and 250 kts. Deployment of the air-driven emergency generator quickly restored electrical power. He transmitted a further MAYDAY, stating that he had flamed out and was heading seawards; he heard his emergency call repeated from the range. At this stage he expected to be ejecting shortly. However, on discovering that his engine was windmilling at 22 per cent (his initial reaction was that it had exploded), he attempted and succeeded in relighting the engine. Now at 220 kts, descending, and three miles to seaward from Beecroft Head, the CO turned his aircraft back to the west (towards land), and again was surprised to find that the aircraft's

control surfaces to be responding normally.

With the engine relit and all instruments indicating normally, although with some caution lights illuminated the CO decided to make an attempt to recover the aircraft to NAS Nowra. After advising Nowra of his intentions he called for one of the other aircraft airborne to assess his aircraft's degree of damage. The SP, with his No 2 in company, closed on the crippled aircraft and reported that apart from the fact that it was streaming fuel and the arrestor hook was down, all else appeared normal. The CO then advised *Nowra Tower* that he would be carrying out a straight-in approach to Rwy 26.

A *Utility Hydraulics* fault light was indicating; however, the arresting hook held down [this is normal — I guess the author means the hook cannot be retracted with Utility Hydraulics failure — it must have extended from damage to the aircraft]. (A lack of utility hydraulics rendered undercarriage, flaps and speed brakes inoperative.) The CO selected *emergency* landing gear down and subsequently received a cockpit indication that all three wheels were down and locked — confirmed by the chase aircraft pilot.

A straight-in approach was made to Rwy 26 with the power adjusted for a 160 kts landing. The CO advised the tower that he would be shutting down his engine just prior to touchdown, which he subsequently did. All three wheels touched

down at approximately 160 kts and the aircraft ran along the runway for a short distance before engaging the runway arrestor gear. As the aircraft's forward speed was retarded, the nose gear retracted and the aircraft scraped along on its nose until it eventually came to a halt.

The CO quickly egressed from the aircraft and boarded a waiting SAR helicopter which transported him to HC 723 dispersal. He was met shortly after by the Base Senior Medical Officer (SMO) who assessed that he was uninjured, albeit badly shaken by the experience.

Search and rescue

Alerted by a call from one of the range members that '*An aircraft was coming in*', the range party directed their attention to the target area and witnessed the impact of 872. A small team drove to the scene and, after quickly confirming that the pilot had not survived, attended to several small fires.

On hearing the MAYDAY calls from 870, one of the range party supervisors transmitted a series of MAYDAYs. While this action alerted other aircraft that someone was in distress, the supervisor did not state what the emergency was and the airborne aircrew assumed that it was 870's emergency — they were unaware that 872 had crashed on the range. Eventually, a call was made for silence on the Range frequency and this effectively

silenced the supervisor transmitting MAY-DAYS and thus the fact that an aircraft had crashed on the range was not broadcast at that time.

Another supervisor, however, on witnessing the crash of 872, telephoned the Operations Officer and Gunnery Officer at NAS Nowra and one other unidentified person in the Control Tower. Having carried out these actions, the range partly rightly believed that they had done everything possible towards alerting higher authority of the Skyhawk crash on the range. They then proceeded to direct their attention to attending the accident scene.

Air Traffic Control (ATC)

A Local Controller (LC) and Surface Movement Controller (SMC) were present in Air Watch in the NAS Nowra Control Tower at the time of the accident. At approximately 1025K the LC noticed a mushroom shaped cloud of smoke on Beecroft range, some 10-15 miles distant and this alerted him to the possibility of a crash on the range. Then, while calling the Approach Controller (AC) on intercom, he overheard a MAY-DAY call. Using commendable initiative, the LC pressed the airfield crash alarm and 'piped' (broadcast): '*Suspected crash at Beecroft Range, safety facilities close up*'. All safety facilities quickly responded and the SAR helicopter was scrambled, the LC's intention being to despatch it to the range. However, he amended his

actions when the CO in 870 called advising his intention for a straight-in for Rwy 26 (a non-duty runway). At the time there was a civilian vehicle parked with two civilians working on Rwy 26. Again, using his initiative, the LC despatched the SAR helicopter to clear the civilians from the runway while tower staff removed the vehicle. Due to the quick reactions of the LC, Rwy 26 was cleared just prior to 870 landing. All safety vehicles were in positions alongside Rwy 26 and followed the aircraft until it came to rest.

Confusion around 870. Three fire-fighting vehicles proceeded down the left (*downwind*) side of Rwy 26 following 870 during its arrested landing. Meanwhile, the SAR pilot, assuming that the fire fighting vehicles would proceed along the right (*upwind*) side of the runway, landed on the grass immediately opposite the now-halted Skyhawk. This action almost resulted in a collision between a fire fighting vehicle and the helicopter.

Although the SMO was present in the attending ambulance, the pilot of 870 immediately boarded the SAR helicopter which transported him to HC 723 where he was provided with coffee in the crew room. The SAR helicopter then returned to the vicinity of the Skyhawk on Rwy 26 and remained in this position until instructed by ATC to proceed to Beecroft Range.

In the general confusion the SAR

helicopter proceeded to the range without a medical officer on board. The SMO, who had firstly reported to the Control Tower in one of the Holden ambulances when the '*Suspected crash at Beecroft Range, all safety facilities close up*' broadcast was made, attended the landing of 870 on Rwy 26 and saw the CO board the SAR helicopter.

The normal medical procedure in response to an emergency broadcast was for a medical officer to board the only radio-equipped medical vehicle — the Bush Rescue Ambulance (BRA) — and proceed to HC 723 Squadron for possible embarkation aboard the SAR helicopter. On this occasion the BRA was unserviceable and the SMO used one of the normal ambulances to proceed to the vicinity of the Control Tower to await further instructions.

Realising he was no longer required at Rwy 26, the SMO proceeded to HC 723 where he met the pilot of 870. The SMO satisfied himself that the pilot was unharmed although shaken up. However, on returning to the sick bay he learned of the fatal accident at the range and, on quickly returning to HC 723, was transported to the range by a waiting Wessex helicopter.

The delay in sending the SAR helicopter to the crash on the range and the fact that it was despatched without a medical officer on board was of concern to the Board.

The Control Tower. Although the first

actions taken by the LC had been initiated by his belief that there had been a crash on the range, he soon became confused with conflicting reports that there was in fact only one emergency — that involving Skyhawk 870. Although the range party had informed the Operations Officer of the crash on the range, this information did not reach the AC or, if it did, it became lost in the confusion which followed.

The confusion in the tower was further contributed to by the switching of call signs by the VF 805 pilots still airborne. The flight had warned out as *Delta* flight, consisting of five Skyhawk aircraft; however, after 870 landed, the SP and his No 2 used call signs of *Hawk Leader* and 2, whilst the No 3 in the CO's formation — originally *Delta 3* — switched his call sign to his aircraft side number and, on occasions, even used his personal call sign.

Further confusion resulted from a telephone call to the range by the Senior ATC Officer (SATCO) who queried: '*How many aircraft do you have in the circuit?*' He received a reply: '*We had three and two departed over Currarong*'. What the member at the range was indicating was that there were three, one had crashed and the other two had departed over Currarong. However, SATCO interpreted the reply to mean: '*We had three*', which he took to be the three at NAS Nowra (870), and the aircraft belonging to the SP and his No 2, plus another two departing over

Currarong — providing a total of five Skyhawks which was the number he was accounting for.

At about the same time another pilot flying a VC 724 Squadron aircraft switched to range frequency and enquired if there was an emergency on the range. He was apparently advised of no emergency and subsequently advised *Nowra Approach* that there had been no crash on the range.

In the absence of taped transmissions the Board was unable to determine why such misleading messages were sent or who sent them. In fact it was not until the pilot in *Delta 3* called the range and asked if they had heard from *Delta 2* (872) that he was informed an aircraft had crashed on the range and he then relayed this information to the Control Tower.

A further demonstration of the confusion that existed was given by the controlling of two Sea King helicopters that were operating in Shoalhaven Bight. Aircrew in these aircraft saw the cloud of smoke on the range and shortly thereafter were requested by *Nowra Approach* to proceed to the range and investigate. They were in fact within a half mile of the crash site when informed by Nowra that there had not been a crash on the range and that the aircraft with the emergency had returned safely to base. The Sea King crews were then instructed to return to their exercise areas. They duly turned to the

north and proceeded towards Shoalhaven Bight but shortly thereafter were again directed to the range, where they confirmed to Nowra that a crash had occurred and that the pilot had been killed.

The Board was careful to stress that the resulting confusion and delay in clarifying the situation regarding the double emergency in no way affected the outcome of the accident involving Skyhawk 872. However, had there been an ejection and the pilot survived, the delay in his receiving medical attention could have been serious.

Medical considerations

Both pilots involved in the accident were completely medically fit for flying duties.

Following the accident a pathological examination of the remains of the pilot of 872 failed to find any evidence that he may have suffered a medical emergency prior to the collision which would have rendered him incapable of controlling his aircraft. According to expert ARL evidence it is probable that the pilot's head struck the rear wing spar of 870 incapacitating him, if not killing him outright.

Cause of accident

The Board determined that the cause of the collision between Skyhawks 872 and 870 was caused by the failure of the pilot of 872 to keep his leader in sight during a

divisional bombing attack, allowing his aircraft to overtake and collide with 870.

Once 872 was below and to the right of 870, the latter aircraft would have been directly up-sun and may explain why the pilot of 872 did not see the lead aircraft during the latter stages of the dive. In all probability, the pilot was concentrating on the weapon release and this target fixation was the primary cause of him losing sight of the lead aircraft. (The accident pilot had been involved in a similar incident during his Skyhawk OFS when he had allowed his aircraft to overtake the aircraft ahead of him and released a practice weapon close to the other aircraft.)

Following on from the Board's findings, Navy Office commented that the combination of the demanding activity and the immersion suit may have caused the pilot to become a little fatigued and incapable of focusing all of his concentration to the task at hand at the time of the accident. Such a reduction in concentration would have reduced his capacity to monitor the necessary parameters of divisional attack, including spacing from the lead aircraft, sight picture, dive conditions and release parameters.

Navy Office added that although the pilot had the ability to satisfactorily perform each single aspect of the sortie, the combination of them all in one sortie was approaching the limits of his capacity at that particular stage of his flying training.

By the time of the accident, the possibility of the pilot committing an error had increased, and his ability to appreciate a developing situation and to initiate recovery action was perhaps degraded.

BOI recommendations

The Board recommended that:

- flight leaders call power settings during divisional armament attacks when established in the dive, and to make further calls if subsequently reducing or adding power;
- specific briefings be given to pilots regarding action to be taken on losing sight of the leader in formations;
- the Control Tower procedures be reviewed for handling emergencies;
- procedures be reviewed for scrambling and direction of SAR helicopters during an emergency, with particular attention being paid to the rescue teams carried;
- aircrew exercise greater discipline in the use of call signs; and
- Beecroft Range Party Orders be reviewed to clearly detail procedures to be followed in the event of an accident on the range.

The Board was justifiably glowing in its praise of the Commanding Officer of VF 805. They considered that his skill, resourcefulness and presence of mind in a

situation fraught with danger, resulting in the saving of a valuable aircraft, was deserving of the highest commendation. (The officer was subsequently awarded the Air Force Cross.)

The Board also praised the quick thinking and initiative displayed by the Local Controller in the Control Tower.

Postscript

Perhaps Skyhawk 870 was never destined to see it through to an honourable retirement. Following the midair accident with 872, considerable Qantas contractor effort and RAN funds succeeded in returning 870 to full serviceable status and the aircraft finally found its way back onto the complement of VF 805 — the RAN's front-line fighter squadron. However, on 23 January 1979 the aircraft's luck finally ran out. Soon after carrying out an air-air refuelling exercise and, whilst engaged in 1v1 Air Combat Manoeuvring (ACM) with another squadron aircraft (887) in the Braidwood area of NSW, the aircraft suffered a catastrophic engine fire. The pilot successfully ejected at 13-14,000 ft and was later rescued by a RAAF Iroquois helicopter fortuitously operating nearby. The Skyhawk was not so lucky, burying itself in thick scrub country 3.5 km south of Monga township.