PART 1.5
CAUSES

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1. The cause of the accident between aircraft G-BYUT and G-BYVN was the controlled flight of both aircraft into the same airspace at the same time as a result of both aircraft captains being unaware of the position and proximity of the other aircraft.

Contributory factors

2. The Panel identified the following contributory factors that did not directly cause the accident but made it more likely to happen:

a. **See and Avoid**. Both military and civil flights routinely employ See and Avoid procedures while operating under VFR. Nevertheless, reliance upon the See and Avoid principle, which is subject to fundamental limitations, was a contributory factor in the accident.

b. **Lack of additional deconfliction measures.** Though not mandated, the absence of additional deconfliction measures to reduce the probability that the 2 aircraft flew into the exact same airspace at the same time was a contributory factor in the accident.

c. **Incomplete Mental Air Picture**. The pilots of G-BYUT and G-BYVN were unaware of the position, proximity and track of each other which led them to inadvertently establish flight paths that converged. They would initially have been aware of their relative dispositions as a result of the departure profile but in the absence of an agreed plan or additional radio cues (such as updates from ATC or each other over the radio), their MAP would quickly degrade. An incomplete or erroneous MAP denied both pilots an opportunity to recognise that their separation was reducing and was a contributory factor.

d. **Local airspace/Sortie length**. The length of the AEF sorties and the limitations of the local flying area reduced the geographical area available for use and thereby increased the probability of the flight paths coinciding. The sortie length and limitations on the availability of suitable local airspace were therefore contributory factors.

e. **Collision warning**. The lack of in-cockpit aids to alert the pilots to the proximity of each other was a contributory factor.

f. **Obscuration**. The width of the Tutor canopy arch, the presence and size of the canopy spine and handle, and the lack of a 'go-forward' lever to enable the pilot to increase the range of in-cockpit movement, would have compromised the vision of both pilots at some points in the 30 secs leading to collision. Obscuration was therefore a contributory factor in the accident.

Probable contributory factors

3. **Conspicuity**. The white colour scheme of the Tutor, presenting very little contrast with a bright background of cloud, was a probable contributory factor.

Possible contributory factors

4. The Panel concluded that the following factors were possibly contributory to the accident:

a. **Corrective Flying Spectacles.** In the final seconds leading to collision, G-BYVN is likely to have dwelled in the peripheral vision of the pilot of G-BYUT, assuming that he was looking into the turn that he was maintaining. G-BYVN may have been obscured from view by the frames of his Corrective Flying Spectacles or been beyond the area of vision corrected by the lens, making visual acquisition even less likely. Corrective Flying Spectacles were therefore a possible contributory factor in the accident.

b. **Lookout technique.** The currently advocated lookout technique may not be the optimum for detecting conflicting traffic. The Panel could not determine what lookout technique either pilot was using. Any technique may be compromised by 'windscreen zoning' without specific training to counter it. Lookout technique was therefore a possible contributory factor.

c. **Glare.** G-BYUT approached G-BYVN in a clear sky from the general direction of the sun, which would have made the visual acquisition of G-BYUT more difficult. The Panel concluded that the position of the sun was a possible contributory factor in the accident.

d. **Traffic alerting.** The decision to forego ATC services, if available, to provide warning of the proximity of traffic was a possible contributory factor.

i. New local procedures which removed the requirement for pilots to contact Cardiff Approach on departure, adopting a 'Low VFR Departure' instead, made this course of action more available; revised local procedures were therefore also deemed to be a possible contributory factor in the accident.

e. **Distraction.** The Panel was unable to discount that either pilot may have been distracted by normal interaction with the cadets at a vital moment. The Panel considered that, on balance, distraction was unlikely but remained a possible contributory factor.

Aggravating factors

5. The Panel considered that the following factors increased the severity of the consequences of the accident:

a. Egress training does not routinely include practice of the motor actions required to operate the canopy emergency jettison mechanism. The lack of an opportunity to develop the correct motor actions was an aggravating factor.

b. Parachute drills do not include routine practice of the motor actions required to locate and operate the parachute handle. Furthermore, no practical exposure is provided to the additional difficulties that may be encountered when attempting this task in freefall. Unfamiliarity with the practical difficulties of locating the

parachute handle for the pilot of G-BYVN was therefore an aggravating factor.

c. Air cadet training in abandon aircraft drills comprises a video brief but this is unlikely to provide practical benefit under the duress of an emergency. The lack of practical familiarity with emergency drills was an aggravating factor.

Observations

6. In addition to factors in the accident, the Panel had the following observations.

a. AEF units should promulgate notice of their activities and most heavily used flying areas by NOTAM to encourage the General Aviation (GA) community to avoid these areas. Where discreet radio frequencies are used by the AEF unit then these should be promulgated within the NOTAM and GA users encouraged to make an information call, despite the absence of an ATS, to aid SA.

b. The fatality of all aircraft occupants left the panel with no evidence of in-cockpit information. This would have been mitigated if the aircraft had been fitted with CVR and ADR facilities.

c. The MOD St Athan FOB was not amended to reflect revised departure and arrival procedures.

d. Although the procedures for cadet briefing and handling were being carried out satisfactorily by VT Aerospace Survival Equipment personnel, the Panel could not identify any TORs or Work Instructions for the activity.

e. The cadets Tutor safety brief video is shown to all cadets pre-flight but it does not cover the operation of the Life Saving Jacket, as worn by cadets at MOD St Athan.

f. The cadets within G-BYUT and G-BYVN were fitted with an EB85/2 parachute and an LSJ. TGO(E)s detail that LSJs are not to be worn with EB85/2 parachutes, however the fitting procedures used by the VTAe SE staff are contradictory in that LSJs may be worn with EB85/2 parachutes if the 'Large' setting is selected on the riser straps adjustment. In G-BYUT the cadet's parachute was set at 'Large' but the parachute worn by the cadet in G-BYVN was too badly damaged by fire to assess.

g. The ability for some cadets to physically complete an abandon aircraft drill, even under benign conditions, is in doubt.

h. No transmissions were received from the ELT in G-BYUT while the ELT in G-BYVN provided a single transmission only that was not detected by the LEO SARSAT constellation that determines position. In the absence of eye-witnesses, the SAR response to the accident could have been delayed.

i. The Differential Global Positioning System (DGPS) ground station receives parameters and data from all RAF Tutor sorties but this is not recorded for future reference.

j. The DGPS ground station display is not employed in the same capacity at all Tutor units. More effective use of the DGPS as a supervisory tool might be possible and should be subject to review.

k. Service Inquiry reliance upon a single HF specialist (the RAF Aviation Psychologist) at RAFCAM can delay proceedings when demand for HF advice is high and represents a potential single point of failure should the current individual become unavailable.

l. Kinforming procedures relating to the accident were reviewed by an augmentee to the Panel and the report is enclosed at Annex AV. Annex AV

m. The Panel did not identify any Health and Safety at Work implications beyond the factors identified and detailed within this report.

n. The continued development of the relationship between AAIB and the RAF, especially at more senior levels, will greatly assist future investigations. It will also be vital to maintain the trust of the AAIB by treating that information which is released or shared with the utmost care.