

PART 1.3 – NARRATIVE OF EVENTS

All times local (Zulu plus 1 hour).

Synopsis

1.3.1 On 3 Oct 13 Sea King Mk 4 ZE428, from 845 Naval Air Squadron (NAS) at Royal Naval Air Station (RNAS) Yeovilton, was used in a composite abseiling and 40ft Advanced Single Engine Failure¹ (40ft ASEF) training sortie at the home airfield. The crew comprised a Qualified Helicopter Instructor (QHI) as the aircraft captain, a pre Certificate of Competence² (CofC) pilot as the Handling Pilot (HP) and a qualified aircrewman in the cabin. Another pre CofC Squadron (Sq) pilot was seated in the cabin waiting to fly the next abseil exercise.

Witness 1

1.3.2 The crew completed the first abseiling exercise and once the abseil team and ropes were clear of the aircraft it was repositioned to the threshold of Runway 04 in preparation for the 40ft ASEF exercise. The QHI pre-briefed exercise before conducting a demonstration. The demonstration landing caused the cabin door Helicopter Emergency Egress Lighting System (HEELS) system to illuminate and generated 3 Health and Usage Monitoring System (HUMS) exceedances. These were not considered by the QHI to be unusual for the exercise. Given the firm nature of the landing the QHI opted to commence the exercise for the HP from approximately 30ft whilst setting the manually controlled engine to a slightly higher power setting. The HP proceeded with the exercise by selecting a nose down attitude before correcting it with an application of aft cyclic³. As the aircraft reached an attitude of 4 degrees nose up the tail wheel struck the ground and became detached, coming to rest approximately 10m from the point of impact. The aircraft then violently pitched forward onto the nose then back onto the rear of the lower fuselage (in the area of the tail wheel mounting), causing the damage to the airframe that is detailed in para 1.3.28. The aircraft came to a standstill, upright, on the taxiway. The crew then shut the aircraft down, called for assistance on the radio and egressed without further incident.

Witness 1, 2,
3
Exhibit 1,2

1.3.3 The aircraft is declared as Cat 3 Depth.

Exhibit 3

Pre-Incident Events**Crew Composition**

1.3.4 **Aircraft Captain (A2 QHI).** The Aircraft Captain for the sortie was a Sq QHI. He is graded as an A2 QHI⁴ with 3136.25 hours total, 1715.20 of which are on Sea King Mk 4. He is the Sq Principal Training Officer (TO1), making him responsible for the training and development of all Sq pilots. He has been a QHI since Nov 08

Witness 1

Exhibit 4

¹ 40ft ASEF – An advanced single engine failure exercise this is started from the 40ft hover. Its purpose is to train the actions on a single engine failure during the connection or disconnection of an under slung load, in accordance with (iaw) Commando Helicopter Force (CHF) Sea King Flying Procedures Vol 1 2009 Edition 1 Change 2.

² Certificate of Competence – On award of the Flying Badge aircrew shall undergo a period of consolidation in role not normally to exceed 15 months prior to the award of the Certificate of Competence. Regulatory Article (RA) 2102(1), Book of Reference digital (BRd) 767 2102(1)(2)

³ The Cyclic control of a helicopter controls the motion of the aircraft in pitch and roll. The aircraft pitches forwards and aft, and rolls port and starboard (left and right).

⁴ A2 QHI – The A2 QHI qualification criteria are to have been a qualified instructor for at least 15 Months, have 250 instructional hours (including 10 at night). RA 2125(1)

when he joined 848 NAS instructing on the Sea King Mk 4. He then joined 845 NAS as the TO1 in Apr 11, which coincides with him qualifying as an A2 QHI.

1.3.5 Handling Pilot (HP)

a. **848 NAS.** The HP joined 848 NAS on 16 May 11. Whilst on this Sqn he undertook Sea King Mk 4 conversion, scoring 70% in the flying syllabus and 95% for the ground school syllabus. Pass marks for these elements are 50% and 80% for the flying and ground school elements respectively. On completion of the conversion to Sea King Mk 4 a number of flying exercises that were unable to be completed on 848 NAS were given over to 846 NAS for completion during formal On Job Training (OJT) at the frontline Squadrons, who will administer this OJT in the form of a Task Book⁵. These exercises were; the 40ft ASEF, door gunning and fighter evasion with a recommendation in the final training report from 848 NAS that the 40ft ASEF be completed on the Change of Unit Check. These sorties were entered into his Task Book⁶ on joining 846 NAS.

Witness 2

Exhibit 5, 19

b. **846 NAS.** The HP joined 846 NAS, his first frontline sqn, on 10 Apr 12. In his time on the Sqn he conducted a number of training detachments including; being embarked on HMS ILLUSTRIOUS, deploying to the US for his Desert Environmental Qualification (EQ) and Norway for his Arctic EQ, as well as other UK-based exercises. The training shortfalls carried over from 848 NAS were not completed during this time.

Exhibit 5,6

c. **845 Sqn.** The HP joined 845 NAS, his second frontline sqn, on the closure of 846 NAS on 1 Jun 13. During his tenure on 845 NAS he conducted a number of sorties working up to, and including, passing his CofC test flight on the second attempt on 16 Sep 13. Although he had passed the CofC test flight he could not be awarded CofC status until he had completed the remaining flying exercises detailed in his Task Book. The remaining exercises were the abseiling sortie and the 40ft ASEF. Upon completion of this composite sortie on 03 Oct 13 the HP would have met the requirements to be awarded CofC. The HP had 564.40 flying hours total of which 386.20 were on Sea King Mk 4. He had flown 49.45 hours in the 3 months preceding the incident.

Exhibit 5,6

1.3.6 **Aircrewman** The Aircrewman is a Sea King Mk 4 aircrewman with more than 460 hrs experience. 845 NAS is his first front line sqn which he joined in Jan 2012. He was qualified and current to dispatch abseilers, having passed the course on 13 Jun 13. He had not previously experienced a 40ft ASEF.

Exhibit 7

Aircraft History

1.3.7 **ZE428** is a Sea King Mk 4 which entered service on 17 Dec 85. It has since flown 9247.35 airframe hours. It has been modified to the latest Theatre Entry

Witness 1, 2,
3, 4

⁵ In accordance with CHF SK4 Commando Aircrewman Operational Performance Statement, contained within the 848 NAVAL AIR SQUADRON MASTER TRAINING DOCUMENT

⁶ Task Book – Military General Training Task Book (MGT). Formalizes the workplace training required to enable an ab-initio aircrew officer to achieve the standards specified in the Operational Performance Statement (OPS) for a naval officer in the Fleet Air Arm (FAA).

Standard (TES). The Aircraft was serviceable at the start of the sortie, having had a Partial Test Flight (PTF) on the morning of the incident to confirm the serviceability of the Radar Altimeter (Rad Alt), which had recently been replaced. All indications suggest that ZE428 was serviceable as the HP took control at the beginning of his 40ft ASEF exercise. On the day of the incident the aircraft basic weight was 16850 lbs.

Exhibit 8

Previous 24 Hours

1.3.8 The QHI had 8 hours sleep prior to coming to work that morning and he considered during his interview that his pre-shift sleep and rest was 'Okay to ideal'. He considered his body clock to be settled and rated his alertness and readiness as 'Ideal' both before and during the sortie. He felt fit to fly and was reported by the HP as appearing fit to fly. The incident occurred about 4.5 hours into the QHI's duty and towards the beginning of the sortie.

Exhibit 9

1.3.9 The HP had 8 hours sleep prior to coming to work that morning and he considered during his interview that his pre-shift sleep and rest was 'Ideal'. He considered his body clock to be settled and rated his alertness and readiness as 'Okay' both before and during the sortie. He felt fit to fly and was reported by the QHI as appearing fit to fly. The incident occurred about 4.5 hours into the HP's duty and towards the beginning of the sortie. The HP was due to deploy on OP HERRICK on the evening of the incident. As his aircrew medical was due to expire on the day that he was scheduled to return to the UK, he had booked an examination for the afternoon of the incident. As part of the medical assessment to be conducted that afternoon he attended the medical centre for preliminaries between the morning brief⁷ and the sortie brief.

Exhibit 9

Sortie Details and Preparation

1.3.10 The main purpose of the sortie was to carry out an abseiling exercise that was required by 9 of the Sqn pilots for their Task Books. The sortie had been initiated in the preceding week by the HP, who had confirmed the feasibility of the exercise with the QHI and liaised with the Commando Mobile Air Operations Team (Cdo MAOT), based at RNAS Yeovilton, to ensure that a number of abseilers and an abseil instructor would be available on the day. There were a total of 6 pilots who were going to undertake the sortie during the day under the supervision of the QHI. Five were pre CofC pilots and one was undergoing a refresher course. One of the other pre CofC pilots took the lead for preparing and delivering the sortie brief, including the aircraft particulars such as weight and performance. The HP, QHI, aircrewman and the other 5 pilots attended the sortie briefing. At some point during the morning, before the pre flight brief, the HP approached the QHI to request the addition of the 40ft ASEF exercise to the sortie, these 2 exercises being the only remaining serials in his CofC Task Book. The QHI agreed and it was arranged that the HP would be the first of the pilots to undertake the abseil serial, with the sortie tailored to meet his 40ft ASEF shortfall.

Witness 1, 2,
3, 4, 5
Exhibit 10

1.3.11 The briefing for the abseiling portion of the sortie was comprehensive and covered all the necessary details, including the mechanics of how the 6 pilots were to be rotated through the sortie in order to complete the exercise. The QHI took an active role in the briefing, discussing the requirements, pitfalls, potential hazards and dangers, in detail, of the abseiling portion of the sortie. The fact that the 40ft ASEF

Witness 1

⁷ The morning brief includes weather forecast, flying programme and aircraft serviceability state.

portion of the sortie was going to take place was mentioned but was not briefed further. The finer detail was to be briefed in the aircraft prior to the exercise by the QHI. The sortie was out-briefed by the QHI and authorised by the Sqn Senior Pilot in accordance with Commando Helicopter Force (CHF) Flying Order Book (FOB) 2306.100.3, where the 40ft ASEF, including wind limitations, was discussed and its approval annotated in the Flight Authorisation sheets.

Sortie Execution

1.3.12 At 1224 hrs on 3 Oct 13, Sea King ZE428, callsign Y413, from 845 NAS, Commando Helicopter Force (CHF), departed the dispersal to conduct a composite abseil and ASEF training sortie at its home base of RNAS Yeovilton. The crew comprised the Sqn TO1, an A2 QHI as the aircraft captain, a pre CofC pilot as the HP and an aircrewman in the rear cabin. Another pre CofC Sqn pilot was seated in the cabin awaiting his turn to fly the abseiling serial. Due to the planned sortie duration and the fact that there was a thunder storm warning expected over the airfield later that day, the aircrewman elected to fuel the aircraft to 3600 lbs prior to the sortie, making the All Up Weight (AUW) on take off approximately 19950 lbs. The weight at take off was discussed at the pre-flight brief.

Exhibit 1, 2,
10

Witness
1,2,3,4,5,

1.3.13 The crew successfully completed the first abseiling serial and, once the abseil team and ropes were clear of the aircraft, the aircraft was repositioned on the taxiway close to the threshold of Runway 04 to perform the 40ft ASEF. The QHI checked the wind speed and its direction with Air Traffic Control (ATC), which confirmed they were into wind and that the strength was 12-14 kts. With the aircraft on the ground the QHI then completed a pre-brief of the exercise, which was from memory. He explained the actions to set up the aircraft, with No1 engine Manual Throttle Lever set to a power level⁸ of 104% torque. He also described the non handling pilot's actions to initiate the exercise, which were to retard the No2 engine SSL to the ground idle gate⁹. The QHI asked the HP to confirm his understanding of the exercise and, based on this, added a few points of clarification, in particular noting the need to create forward motion in order to clear the simulated load. The QHI then demonstrated the exercise from approximately 45 feet. He used a maximum nose down attitude of 9 degrees to gain forward motion. The CHF Sea King IV Flying Procedures Volume 1 (Basic Exercises), Exercise 9, Advanced Single Engine Failures recommends 5 degrees nose down. He then adopted a 3 degree nose up landing attitude, before applying collective¹⁰ pitch to cushion the landing. The crew commented that the demonstration resulted in a 'firm' landing which activated the rear cabin door HEELS and generated 3 HUMS exceedances, which were identified by the aircrewman and brought to the attention of both pilots. The HUMS exceedances, which were engines No1 torque above 111%, rotor RPM (Nr) below 95%¹¹ and Nr below 91%¹², although not expected by the aircrewman, were not considered by the QHI to be unusual for this exercise. The QHI then analysed the demonstration, attributing the firmness of the landing to him not having given a high enough power

Exhibit 1, 2,
10

⁸ The exercise requires the No 1, engine to be in manual control and at a power setting calculated on twin engine hover power to simulate maximum available power when the No 2 engine is retarded to simulate an engine failure. This also protects that engine from over torque during the exercise.

⁹ This simulates the failure of No2 engine.

¹⁰ The Collective control on a helicopter alters the pitch of the main rotor blades. It is effectively a control of how much lift the helicopter generates.

¹¹ 95% Nr is the lower limit of Nr during normal flight.

¹² 91% Nr is the lower limit of Nr during emergency manoeuvres.

setting on the No1 engine, that he had not used sufficient collective pitch to cushion the landing and the possibility that there may not be quite as much wind as indicated by ATC.

Accident Events

1.3.14 Given the firm landing from the demonstration, the QHI elected to commence the exercise for the HP from a non-standard height of 30ft¹³ and with a higher power setting of 109% on the manually controlled engine. The wind direction was checked once more with ATC, and the aircraft was repositioned by the HP into a 33ft hover. The QHI initiated the serial for the HP by retarding the No2 engine SSL to the ground idle gate. The HP then selected a maximum nose down attitude of approximately 13.5 degrees followed by a rapid rate of pitch-up. As the aircraft attitude reached approximately 4 degrees nose up, the aircraft tail wheel struck the taxiway and broke off, coming to rest approximately 10m from the aircraft. The aircraft then violently pitched forward onto the nose and then back onto the rear of the lower fuselage (in the area of the tail wheel mounting), causing the tail pylon to fracture on the port side (at Station 565) but remain attached to the starboard (stbd) side. The thrust generated by the tail rotor then caused the tail pylon to fold to stbd until the horizontal stabiliser impacted the stbd side of the aircraft, just aft of the cabin door. The aircraft came to a standstill, upright, on the taxiway.

Exhibit 1, 2,
11

Post Accident Events

1.3.15 The crew then shut the aircraft down, called for assistance on the radio and egressed without further incident. The crew were taken by ambulance to the Medical Centre where they were examined. [REDACTED]

Witness 1, 2,
3, 4

Exhibit 2, 11

[REDACTED] The other 3 crew were uninjured in the incident.

Escape and Survival

1.3.16 All the crew members evacuated the aircraft without assistance. Once clear of the aircraft they waited in a safe area for the emergency crews to attend.

Witness 1, 2,
3, 4

Post Crash Management

1.3.17 As the aircraft came to a stop (at 12:48 hrs) the QHI made a PAN¹⁴ call to the ATC Tower. This initiated the paramedics and fire service to attend. The Duty Air Traffic Control Officer (DATCO)¹⁵ made the pipe 'State One',¹⁶ including activation of the crash alarm.

Exhibit 13

1.3.18 The Duty Flying Supervisor (DFS)¹⁷ immediately went up to the Visual Control Point (VCP) and assisted the DATCO. The fire service and the paramedics were by then in attendance. The Watch Manager provided updates and confirmed that there appeared to be no injuries to the 4 crew or the MAOT on the ground. The aircraft was checked and was reported as safe (initially by the crew before they

Exhibit 13

¹³ The CHF Flying Guide states that the purpose of the exercise, which is to clear a simulated load, cannot be achieved from below 40ft.

¹⁴ The PAN call on the radio is an internationally recognised call stating that there is an emergency on board and aircraft but that there is not an immediate risk to life.

¹⁵ Duty Air Traffic Control Officer – This is the individual that has operational control of the Visual Control Position (VCP) and staff.

¹⁶ Pipe State One – Base wide main broadcast system announcement that there had been an aircraft accident requires a large number of organisations, personnel and flexibility to respond to the situation.

¹⁷ Duty Flying Supervisor – Role to take immediate control of any APCM activities.

egressed and subsequently by the Watch Manager). Due to a small fuel/liquid spillage the crash crews dispensed foam and water. There was no fire. The National Air Traffic Services (NATS) Distress and Diversion Cell was informed that the airfield was declared Black (unusable not due to weather) and MOD Boscombe Down was informed that RNAS Yeovilton could no longer act as their diversion airfield. The Ops Room Manager was tasked to take charge of the MAOT to ensure that they gave statements and that these were independent. They were also reminded that any photos taken were not to be distributed. Once the statements were taken the MAOT were instructed to attend the Sick Bay. A cordon was put in place around the aircraft by the Watch Manager with assistance from the Salvage Team.

1.3.19 The DFS remained at the VCP until the Senior Air Traffic Control Officer (SATCO) arrived to support the DATCO. On SATCO's arrival at the VCP the DFS then went to the Ops Room to set up the Incident Control Point IAW the Post Crash Management orders and take control as the Station Incident Officer until either Lieutenant Commander Flying (known as 'F') or Commander Air (known as 'Wings') were available to take over.

Exhibit 13

1.3.20 702 NAS offered to provide an aircraft to take aerial photos of the incident. The Fire Service Watch Manager was asked to confirm that he could achieve Fire Risk Management Crash Cat 2A¹⁸ before this aircraft was allowed to proceed. This was achieved at 1429hrs.

Exhibit 13

1.3.21 The following authorities were informed by phone: Deputy Chief of Defence Staff Duty Officer (DCDSO), Station Commodore (Cdre), Navy Command Head Quarters Duty Air Staff Officer (NCHQ DASO), Environmental Health Officer (EHO), Commando Helicopter Force (CHF), Public Relations Officer (PRO), Royal Air Force Regional Liaison Officer (RAFRLO), Avon and Somerset Police, Joint Aircraft Recovery and Transportation Squadron (JARTS), Military Aviation Authority (MAA) and Joint Helicopter Command (JHC).

Exhibit 13

1.3.22 The DFS contacted the Senior Pilot from 845 NAS to ensure that all documentation had been impounded. This was confirmed by the Senior Pilot 845 NAS.

Exhibit 13

1.3.23 Commander Air was briefed in the Ops Room on the conduct of the PCM. He requested that a 24 hour guard be placed on the cordon to ensure the preservation of any evidence in the area of the aircraft. The salvage caravan was despatched to the Incident Control Point (ICP) and the Station First Lieutenant was tasked to organise the guard force.

Exhibit 13

1.3.24 Responsibility for the incident site was handed to the Station Flight Safety Officer at 1519hrs.

Exhibit 13

1.3.25 Military Air Accident Investigation Branch (MilAAIB) personnel arrived at approximately 1600hrs and were briefed in the Ops Room located in ATC.

Exhibit 13

1.3.26 The Service Inquiry (SI) Panel was formally convened on 7 Oct 13. The Panel viewed the scene of the incident and the aircraft on the same day. The aircraft had by that date been recovered by JARTS to Hangar 6 at RNAS Yeovilton under the direction of the MilAAIB.

Exhibit 13

¹⁸ Crash Cat 2A - is a level of immediate emergency response sufficient to allow rotary wing use of the airfield.

1.3.27 **Media.** Other than a short article in the local newspaper there was no other media interest in the incident.

Damage to Aircraft, Public and Civilian Property

1.3.28 **Aircraft.** The aircraft suffered the following damage:

Exhibit 3

- a. MX15 Camera mounting twisted and sheared, upper strut sheared at lower eye end and skin adjacent to upper strut airframe attachment point evidence of 'pulling'.
- b. Port undercarriage oleo collapsed with evidence of fluid leakage, Port collapsible strut was intact with no evidence of collapse or movement.
- c. Slight evidence of 'panting' skin between Station (Stn) 357 to 400, Water Line (WL) 160 to 180, but this is nothing out of the ordinary for mark and age of aircraft, and may not be attributable to this incident.
- d. 2 x aerals at Stn 375 WL80 and Stn 430 WL80 both pushed upwards into belly of aircraft with supporting skin panels cracked.
- e. Tail wheel sheared off and support fitting bolts sheared and fitting detached from Stn 493 lower bulkhead.
- f. 3 x chine angles eroded and distorted and associated lower skin panels distorted and cracked from Stn 478 to 493, WL80.
- g. Rear fuselage fractured along the port side and folded to starboard, remaining attached by a flap of skin and the tail rotor control wires.
- h. Crease in skin at Stn 478-493 WL 124 BL12R, with MOD 830 strengthening plates overlapped.
- i. Internal frames Stn 478 to 493 WL 80 to 106 distorted and buckled.
- j. Stn 493 upper web outer flange cracked and tailcone fwd stbd frame distorted at WL124 BL12R.
- k. Stbd skin Stn 391 to 415 WL 120 to 130 holed by impact of stabiliser, outer capping angle flange of Stn 391 frame distorted inboard by impact and frame web appears to bulge slightly.
- l. Numerous longeron and stringers and small frames above refuel/defuel point damaged between Stn 391 to 415 and WL120 to 130.
- m. Stbd side Stn 82 to 160 WL80 to 106 BL0 to 30R, lower skin rippled, and internal frames appear to be buckled, unable to inspect due to full Line Replaceable Units fitted in Nose Bay. Centre chine angle eroded, anti-collision lamp and homer aerial plinths both pushed in.
- n. Stn 82 WL112, both nose bay door hinges sheared.
- o. A number of the instruments were found to be damaged on

inspection and showed signs that were consistent with shock loading.

1.3.29 **Aircraft Costs.** The Sea King Project Team estimated the cost of repair to be approximately £2.8M. The net book value of the aircraft was assessed to be £670k and therefore the decision was taken to retire the airframe from service.

Exhibit 46

1.3.30 **Civilian Damages.** There were no civilian damages incurred by this incident.

Salvage Operations

1.3.31 ZE428 remained in Hangar 6, to which it was recovered until released back to the Front Line Command by the President of the SI Panel on 5 Nov 13.

1.3.32 No remediation of the incident site was required.