PART 1.6 – CONVENING AUTHORITY COMMENTS

1.6.1 This tragic accident in which 5 servicemen lost their lives has been a significant challenge for the Service Inquiry (SI) Panel. The Panel was presented with an accident for which there were no known eye witnesses, partly recovered wreckage, limited access to the crash site and no Flight Data Recorder (FDR). Fortunately, the Cockpit Voice Recorder (CVR) survived the impact and has provided invaluable voice data from Lynx 1 crew and passengers throughout the entire sortie. Despite the lack of an FDR, from detailed analysis of the evidence available, the Panel was able to discount technical failure, hostile action, aircraft performance and any of its handling characteristics as potential causes. They were also able to determine, to a high standard of evidence, that incapacitation of the Pilot and any restrictions of the aircraft's flying controls were highly unlikely to have been factors. In contrast, there was strong evidence that the crew were in control of the aircraft throughout, and that they were trying to recover from a high rate of descent when the aircraft hit the ground. I therefore support the Panel's findings that the accident was a Controlled Flight into Terrain event caused by the aircraft being established in a descent from which it was not fully recovered prior to impact with the ground. Expressed more directly, the helicopter was serviceable and under the control of the crew when it was accidently flown into the ground.

1.6.2 There were a range of contributory, aggravating and 'other' factors surrounding this accident and it is important to understand the significance of this terminology when reading the Report. A contributory factor is one which did not cause the accident but made it more likely; an aggravating factor made the outcome worse; 'other' factors could cause or contribute to future accidents and 'observations' are made where further safety improvements could be made. As this is a safety investigation[1], the job of the SI is not to apportion blame, but if we are to learn from this tragedy and prevent a reoccurrence, detailed analysis of the crew's actions become an important part of the process. The report and my comments will make uncomfortable reading in parts, but as professional aviators we must try to understand what went wrong and learn from this for the benefit of others and ourselves. Accordingly, there are a number of supervisory and airmanship issues surrounding the accident, from which we can all learn. Whilst some were contributory, the majority were 'other' factors which did not cause, contribute to or aggravate the outcome but do contain important lessons for the future. I will make some general comments with regard to the accident before tackling the related issues with specific reference to those factors that were contributory. Overall, I accept the findings and recommendations of the Panel but I put no weight on the potential for pilot fatigue to have influenced the outcome as a result of the Pilot having reported a poor night's sleep prior to the accident.

[1] As a safety investigation the Service Inquiry will not consider criminal or Service offence matters. These are considered and investigated separately by the Chain of Command.

1.6.3 By way of context, this accident happened at the end of a long military campaign with a Squadron that had a strong operational focus and team ethos, and a critical role in that campaign. Of note, the accident occurred during a period of reduced operational tempo as the campaign approached its culmination and there was no undue operational pressure on the Lynx Detachment at the time. However, the Panel believed that the length of the campaign had had an impact on individuals and on the Squadron at an organizational level, with evidence of what they referred to as 'procedural drift'. This included instances of poor flying administration, expired currencies, absent supervisory signatures, missed training, training recommendations not being followed through and non-Suitably Qualified and Experienced Personnel (SQEP) in key posts. It is well documented that the Squadron was under-resourced for the demands of their task and had articulated that point to both the command chain and manning organization during the previous 2 years. In particular, the Squadron's aircrew manning was insufficient to meet its commitments whilst maintaining an effective training and supervisory system. This had led to double-hatting of key jobs, including the Squadron Qualified Helicopter Instructors (QHIs) and the supervisory chain.

1.6.4 The Squadron's supervisory Delivery Duty Holder (DDH), known as Commander Aviation Reconnaissance Force (Comd ARF) commanded a wide range of units with a mix of 5 types of helicopter and fixed-wing aircraft dispersed over 9 locations across the globe. The SI Panel observed that Comd ARF's span of Command and Control had significantly increased prior to the accident without a commensurate increase in staff. When this is considered alongside his remote basing from the Squadron, then the task of supervisory oversight becomes increasingly difficult. Indeed, meeting his responsibility for airworthiness, maintenance and safe use of the air systems within his area of responsibility could be described as highly challenging at the very least. The Station Commander (Stn Cdr) at RAF Odiham, where the Squadron was based when not deployed, exercised command of the Wing of which the Squadron was a part, but as described above the DDH role was being exercised by Comd ARF based at RNAS Yeovilton. This made for structural complexity with regard to supervision of the Squadron's training and preparation for operations. An example being that reference is made in documents to the 'Force Commander' but the SI Panel was unable to determine who this actually was and what the responsibilities were as both Comd ARF and Stn Cdr RAF Odiham did not believe that they conducted the Force Commander role. Of course we cannot simply organize ourselves to suit the best safety and supervisory model at the expense of operational efficiency. However, when organizational structures need to be complex through operational necessity, we must ensure that any weakness in supervisory oversight that may be introduced as a result is effectively mitigated. Overall, the Command and Control and Duty Holding arrangements in this case were structurally complex which resulted in a demanding supervisory task which required particularly effective, resourced and competent supervision at all levels. This did not happen to the degree expected.

1.6.5 The accident sortie was a training flight into a weapons range called the Bowling Alley, some 20 kms south of Kandahar Airfield. The Lynx pair was programmed to conduct operational training and to carry 2 service passengers from within the unit for the passengers' experience and benefit. A third service passenger was added to Lynx 2 (the non-accident aircraft) as the crews walked to their aircraft. The sortie was intended to be a relatively straightforward air-to-ground gunnery event. However, there is little doubt that this was a sortie of 2 distinct parts. The first half was role specific training as a pair, consisting of simulated Vehicle Interdiction serials with live firing and stoppage drills against academic range targets. The second part involved the individual aircraft conducting firing serials purely for the benefit of the passengers. The aircraft set themselves up flying a racetrack pattern taking them into the Bowling Alley valley and abeam a series of pre-established targets. The sortie generally proceeded as expected until the final pass when Lynx 1 was seen (on Kandahar's radar) to descend from the downwind portion of the racetrack pattern and into the Bowling Alley valley (about 400 ft deep and 300 metres wide at that point). Radar contact was lost with Lynx 1 as it entered the valley and the characteristics of the descent itself had to be calculated by considering entry parameters (height and speed), the depth of the valley, ground track to the accident location, elapsed time and the characteristics of the accident site debris field. Analysis of this data and the CVR (both voice and rotor noise audio recordings) allowed an estimation of the aircraft's final flight path, rate of descent and attitude in its final moments. Lynx 1 had completed its turn and was established on a northerly track towards the targets when it struck the ground some 16 seconds after tipping (beginning the descent) into the range, 400 feet below the tip in point.

1.6.6 The difficult question as to why a competent and experienced crew, on an excellent weather day (with the sun behind and only a light headwind), would inadvertently fly their serviceable aircraft into the ground is compounded by the fact that they did not recognize their impending situation until just before the aircraft impacted the ground. Unfortunately, this was too late for their last-second recovery action to be effective. The Panel has therefore focussed on what factors could have come into play to distract or make them lose situational awareness with regard to their rate of closure with the ground. Whilst we may never be certain, it is highly likely that this resulted from a number of factors rather than one single issue. Firstly, the Ac Comd elected to cut the range pattern (ground track) short from the patterns used on previous passes to save time and allow for further passenger firing of the Crew Served Weapon (CSW) without unduly extending the sortie duration. This resulted in the Ac Comd directing the Pilot to tip into the Bowling Alley valley much earlier than had been the case in their previous profiles. The terrain was steeper and the valley deeper at this point in comparison to previous entry points. As a result of this short cut, the crew needed to concentrate on visually acquiring and maintaining separation from Lynx 2 who was

now only a short distance ahead and engaging the targets. The handling pilot also appears to have elected to descend all the way down to very low level on the final, condensed profile, probably aiming for 50 feet above ground level as had been done previously (using a 50 foot ingress followed by a climb to 200 ft prior to the shoot). However, trying to achieve this with the limited ground track available between their tip in point and the targets would have compounded the time pressure and resulted in the need for a high rate of descent into the valley in order to get to low level. Whether the Pilot intended to descend to low level for the benefit of the passengers or because he was committed to replicating the previously adopted flight profile despite the limited ground track available cannot be determined. Analysis concludes that whilst the Pilot had started his recovery, he did not arrest the high rate of descent early enough and neither crew member noticed their impending situation until very late (about one second before impact) when the Ac Comd verbally intervened and one (or both) of them made a large collective control demand which came too late to avoid impact with the ground. The exact reason that the crew did not recognise the impending situation which they had placed themselves into may never be known for certain due to the lack of FDR data or witnesses. The Panel believed the recovery technique used during the final stages was a factor and there is some evidence to suggest the recovery was cyclic-led which would have been less effective at arresting the rate of descent than use of the collective control. Finally, it should be noted that the aircraft was heavy and the Density Altitude[2] for the range was 5,400 feet on the day which, although well within the flight envelop of the Lynx, would nonetheless have had some impact on recovery performance. Accordingly, taking all the factors into account, it is concluded from the available evidence that the late initiation of an effective recovery action was a skills based error caused by the crew's lack of situational awareness with regard to their proximity to the ground during a high rate of descent manoeuvre.

1.6.7 The Panel found that there had been indications on one of the early range serials that the Ac Comd had flown the aircraft in a way that induced low or negative 'g' forces. During a tactical descent in the first part of the sortie, the Ac Comd appears to have unloaded the aircraft either by rapidly lowering the collective lever or by pushing forward on the cyclic control which resulted in low or negative 'g' forces causing one of the passengers to use the phrase "Voyager flashbacks". This was taken to be a reference to an incident on a Voyager aircraft on which this particular individual had been a passenger some 2 months previously, where the aircraft had unexpectedly pitched down, inducing negative 'g'. Negative 'g' is prohibited in the Lynx aircraft Release to Service which also states that any inadvertent experience of low 'g' should be stopped. During the final circuit before the accident, the Pilot asked if everyone was strapped in before making a remark about a "bit of floaty". While it is not possible to definitively determine the Pilot's

[2] Density Altitude is formally defined as "pressure altitude corrected for nonstandard temperature variations" where Pressure Altitude is the indicated altitude when an altimeter is set to 1013 hPa. It is primarily used in aircraft performance calculations and in high-altitude flight.

intent from this phrase alone, I consider that it potentially highlights an aspiration to induce a similar weightless or floating sensation to that experienced during the Ac Comd's earlier descent. There is no indication that the Pilot then actually carried out such a manoeuvre and shortly after mentioning the phrase, the Ac Comd told him to cut the range pattern short. There is subsequently no expression from anyone on board to suggest low or negative 'g' was then experienced. However, the Panel considered that the high rate of descent may have been compounded by an attempt to introduce a floating sensation for the benefit of the passengers, although this remains unknown. I believe the "floaty" comment perhaps gives some indication of the crew's shifting focus away from role based training towards the more passenger orientated nature of the later training serials.

1.6.8 There are numerous supervisory aspects related to this flight which need to be recognised, and while I intend to be clear when these either contributed to the cause or aggravated the outcome, I must stress that not all of them did so. On the face of it, this was a relatively simple flight profile for the crew. There is no record of any planning or sortie specific crew briefing being conducted before the crews of Lynx 1 and Lynx 2 and the 2 approved passengers met at the Operations Desk for the pre-flight out-briefing with the Duty Flying Supervisor shortly before take-off. It surprises me that some form of sortie specific briefing did not take place at least to cover items such as the firing serials, de-confliction, emergencies, intelligence and other pertinent factors. Accordingly, there are indications on the CVR to suggest that the flight, particularly the second half of it, was ad hoc and suffered from a lack of a pre-flight preparation. More significantly, whilst the passenger firing of the CSW was neither cleared nor explicitly prohibited in Joint Helicopter Command (JHC) orders, this element of the sortie was a clear human-factors violation[3] of JHC Operational Shooting Policy as there was no CSW Instructor available to supervise the firing. The intent for the passengers to fire the CSW was also not relayed to the Duty Flying Supervisor, nor was the intent to fly a third passenger in Lynx 2. It appears that this had been provisionally arranged by Lynx 1 Ac Comd the previous evening.

1.6.9 For a number of reasons, detailed in the Report, the Duty Flying Supervisor was not SQEP for the role in which he was operating in that he was neither qualified to act as an authoriser nor had any rotary specific expertise. This resulted in the Lynx crews cross-authorising each other which is contrary to the JHC Policy for independent authorisation with cross-authorisation only being allowed 'in-extremis'. Cross-authorisation undermines one of the fundamental principles of independent authorisation, as the key role of the Authoriser is to question and challenge the crews in some detail about the nature of the flight. As well as not being qualified, the Duty Flying Supervisor witnessed the out-briefing in the presence of the Squadron Commander, Squadron

[3] Deliberate and conscious departures from established rules/procedures, although often with no intent to cause harm (see Part 1.4, para 1.4.5.b).

Second in Command and the Detachment Commander, all of whom were due to take part in the sortie, and so his lack of SQEP was possibly compounded by the authority gradient which existed. Overall, I assess that the out-briefing and authorisation were ineffective as a supervisory tool.

1.6.10 There were also a number of issues with regard to passenger flying including the administration of passenger briefing forms and the carriage of the third passenger in Lynx 2. The carriage of the 2 deceased passengers in Lynx 1 had been correctly considered and approved by the command chain and was, in this instance, fully justified. However, the third passenger in Lynx 2 was not approved and the Operations Staff could not establish with certainty which passengers were on the accident aircraft until after Lynx 2 returned to base following the accident. This very unsatisfactory situation illustrates most clearly why it is important to maintain an accurate passenger manifest on the ground. Finally, there were a wide range of disappointing currency and qualification issues which were considered by the Panel as 'other' issues and are too numerous to detail here, but they are captured by this Report's recommendations and must now be addressed.

1.6.11 This accident also contained a number of key airmanship issues; first and foremost concerning the use of the Radar Altimeter (RadAlt) for height monitoring and the setting of the RadAlt height warning bug which should be used for ground proximity warning as detailed in the JHC Flying Order Book (FOB). The crew were authorised to low fly to a minimum height of 50 feet above ground level and in accordance with JHC rules, they should have set the RadAlt bug to no lower than 20% below this minimum authorised height (i.e. no lower than 40 feet) to provide audio and visual warning of any low height infringement. However, the Ac Comd intentionally set the bug at 25 feet, which was 50% below the minimum authorised height and this was verbally condoned by the Pilot. This setting was a serious human factors violation of the JHC FOB. From wider interviews conducted, it is believed that the Ac Comd routinely set the RadAlt bug at 25 feet. The Panel determined that some personnel in the Squadron were aware of this practice and yet it appears not to have been challenged which I find disappointing. Of note, the Ac Comd's 6 monthly QHI check was some 3 months out of date at the time of the accident. In addition to assessing pure flying ability, when conducted effectively, these checks should identify and correct non-compliance with standards and procedures in order to provide some assurance of standardisation to the Chain of Command. The crew also made little reference to the RadAlt height readings during any of their range profiles, most noticeably when conducting the practise tactical climbs and descents in the early stages of the sortie. I also find this surprising. With the RadAlt bug set at 25 feet, it alarmed approximately half a second prior to ground impact and following the Ac Comd calls of "pull up, pull up, pull up". If the bug had been set at the correct minimum setting of 40 feet then the crew would have had a slightly earlier alarm warning. Given the high rate of descent, the Panel thought it unlikely that a setting of 40 feet would have provided timely warning to initiate recovery

but this cannot be definitively determined and remains unknown. However, the RadAlt system could have been used to monitor height during the descent to ensure recovery action was initiated at an appropriate level and completed by a safe margin. The Panel therefore concluded that correct use was not being made of the RadAlt system and this was a contributory factor in the accident. Finally, from the CVR, this was a sortie of few verbalised crew checks, such as after take-off, fence-out[4], HASELL[5] and routine fuel and airmanship checks. It is possible that some of these were done silently and we should give the crew the benefit of the doubt on this.

1.6.12 This unfortunate accident happened when a competent and experienced crew were caught out on what was, in comparison to their operational routine, a very straightforward training sortie. The supervisory system in place was not robust enough and in parts too complex to catch a range of issues, some caused by resource to task mismatch and some likely through procedural drift, but all exacerbated by both individual and unit exposure to a long and demanding operational campaign. Unfortunately, there are disappointing aspects to this sortie, some of which contributed to the accident and others that did not but which highlight useful lessons for all those who fly. The Panel has done everything possible to establish what happened and given the constraints they faced I am satisfied that we could not discover more. In summary, the crew put themselves under pressure in deciding to shorten the range pattern whilst still attempting to get down to very low level with a much reduced ground track in which to do so, whilst at the same time monitoring the progress and position of Lynx 2 who was ahead and firing on the targets. This led to them conducting a high rate of descent into a part of the valley that was much steeper and deeper than they had previously experienced. For some reason which we will never know for certain, neither of the crew noticed their impending situation until it was too late for their initial recovery and last second actions to avoid ground collision. There is much to learn from this tragic accident with an experienced crew being caught out during a relatively simple task on a perfect weather day. Whilst no single factor led to this accident there were disappointing aspects including planning, briefing, authorisation, supervision, currencies, training and adherence to checks and procedures. These have been recurrent factors in a number of recent aviation SIs and Duty Holders across Defence should take note of the 33 recommendations made by the Panel which will not be unique to this accident or aircraft type.

DG DSA

[4] Fencing in and out checks are conducted on arrival to/departing from a safe location and involve ensuring the aircraft is appropriately prepared for flight in an operational environment or is made safe when returning.
[5] HASELL checks are conducted before any rapid change in an aircraft operating height, to ensure all airmanship considerations have been addressed.