INTRODUCTION

1. On Sat 06 May 06, a Lynx AH Mk7 XZ614 (call-sign XXXXX) of 847 Naval Air Squadron (NAS) Detachment (Det), assigned to the Joint Helicopter Force (Iraq) (JHF(I)) based at Basra Air Station (BAS), was conducting a local area recce overhead Basra city. The aircraft exploded in mid-air and crashed onto the rooftop of a residential building in the centre of Basra. The 5 occupants of the aircraft were fatally injured. There were no immediate fatalities on the ground, however the incident sparked local unrest and there were reports that several civilians died during the resultant rioting. The initial accident signal is at Enclosure 2. A Naval Board of Inquiry (BOI) was convened on Sun 07 May, under the authority of the Commander Joint Helicopter Command (JHC) (Reference A), to conduct an investigation into the circumstances surrounding the crash.

METHODOLOGY

2. Following briefings from the Convening Authority and a FLEET legal advisor the Board flew immediately to BAS and spent 6 days interviewing key witnesses, visiting the
crash site, witness locations and gathering additional evidence in theatre. Simultaneously, a technical investigation team from the Royal Navy Flight Safety and Accident Investigation Centre (RNFSIAIC) commenced a preliminary technical investigation of the crash site and wreckage, which had been recovered to a hangar at BAS. On return to the UK the Board reassembled at the RNFSIAIC at Royal Naval Air Station (RNAS) Yeovilton on Mon 15 May 06 and sought advice from Subject Matter Experts (SME) as required. The Board conducted the Inquiry in accordance with References B and C. A list of abbreviations and acronyms is at Annex A.

**NARRATIVE OF EVENTS**

3. The following table summarises key events and is compiled from witness statements, the aircraft Form 700, the JHF(I) Tactical Supply Wing (TSW) refuelling log and various Ops and ATC logs:

**Fri 05 May 06 (all timings local (D))**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1700</td>
<td>Crew take over ‘Lynx 2’ duty for the next 24 hr period.</td>
</tr>
<tr>
<td>1717</td>
<td>Lt Cdr Chapman (Aircraft Captain) signs out Lynx XZ614.</td>
</tr>
<tr>
<td>1800</td>
<td>XZ614 departs on Lynx 2 sortie.</td>
</tr>
<tr>
<td>2045</td>
<td>XZ614 returns from sortie.</td>
</tr>
<tr>
<td>2200</td>
<td>Lt Cdr Chapman visits Bde G2 cell with</td>
</tr>
<tr>
<td>2245</td>
<td>Lt Cdr Chapman returns from Bde and retires to bed.</td>
</tr>
</tbody>
</table>

**Sat 06 May 06 (all timings local (D))**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>0803</td>
<td>Lt Cdr Chapman signs out XZ614.</td>
</tr>
<tr>
<td>0830</td>
<td>XZ614 lifts for rotors running refuel.</td>
</tr>
<tr>
<td>0840</td>
<td>XZ614 conducts rotors running refuel at JHF(I) refuel point, then departs on Lynx 2 sortie (search in local area).</td>
</tr>
<tr>
<td>1010</td>
<td>XZ614 returns from sortie and refuels at JHF(I) refuel point.</td>
</tr>
<tr>
<td>1020</td>
<td>XZ614 repositions to Lynx dispersal and shuts down.</td>
</tr>
<tr>
<td>1045</td>
<td>XZ614 signed back in by Lt Cdr Chapman to allow LX/B6A320 and LX/B6A321 magnetic probe samples to be taken.</td>
</tr>
<tr>
<td>Time</td>
<td>Event Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------</td>
</tr>
<tr>
<td>1130</td>
<td>Crew had lunch with {Person D} (CHF(I) Ops Offr).</td>
</tr>
<tr>
<td>1205</td>
<td>Lt Cdr Chapman signs out XZ614.</td>
</tr>
<tr>
<td>1210-1330</td>
<td>Crew and passengers brief for the sortie, walk out and conduct pre-flight checks.</td>
</tr>
<tr>
<td>1331</td>
<td>XXXXX (XZ614) makes departure call to JHF(I) Ops.</td>
</tr>
<tr>
<td>1333</td>
<td>XXXXX makes departure call to BAS ATC, reporting 5 persons on board, departing to the E and requesting FIS.</td>
</tr>
<tr>
<td>1340 (approx)</td>
<td>XXXXX seen departing low level from the Shatt Al Arab Hotel, proceeding southbound down the river.</td>
</tr>
<tr>
<td>1345</td>
<td>XXXXX seen at Basra Palace HLS, departs to NW following Shatt Al Arab waterway initially at ‘low level’ before climbing rapidly to ‘medium level’.</td>
</tr>
<tr>
<td>1347</td>
<td>XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX. Eyewitness accounts of Lynx Mk 7 exploding in mid air to the S of Old State Building.</td>
</tr>
<tr>
<td>1353</td>
<td>XXXXX on BG comd net reports a helicopter being shot down overhead Basra city.</td>
</tr>
<tr>
<td>1403</td>
<td>IRT XXXXX launches and is directed to area of XXXXX to search for signs of a crash.</td>
</tr>
<tr>
<td>1405</td>
<td>Lynx XXXXX and Sea King XXXXX also launch from JHF(I) and proceed to area of</td>
</tr>
<tr>
<td>1417</td>
<td>XXXXX reports sighting of smoke to the S and departs with XXXXX to investigate.</td>
</tr>
<tr>
<td>1426</td>
<td>XXXXX conducts a low level pass of the crash site and confirms sighting of aircraft wreckage (including what appeared to be a Lynx tail boom).</td>
</tr>
</tbody>
</table>

**Table 1 – Narrative of Events**

### FACTUAL EVIDENCE

**SITUATION**

4. **Background.** Following the cessation of the ground war at the end of Op TELIC 1, the JHC battlefield and support helicopters were grouped under a single command. The JHF(I) was formed to provide support to MND(SE)’s mission to facilitate Security Sector Reform.
a. JHF(I) Flying Operations Overview.

b. Theatre Flying SOPs. JHF(I) operates as a Div Troops unit, albeit that the bulk of the tasking comes from the UK Bde. JHF(I) has developed aviation specific orders contained within the JHF(I) Flying Order Book (FOB) (Reference D). Each of the 3 flying dets supplements this with their own Standing Operating Procedures (SOPs). In the case of 847 NAS, the SOPs in use at the time of the crash were the CHF Lynx Det (847 NAS) SOPs, amendment 8, issued 05 Feb 06 (Reference E).

CRASH DETAILS

5. Sortie Preparation. This was the second sortie of the day for the crew, the first being a search conducted to the S of Basra Airfield lifting at around 060830D May 06 [A8]. On their return they signed in the aircraft [MOD F705 – Enclosure 3] and had lunch at 1130 in the Temporary Deployable Accommodation (TDA). The crew were unrushed and relaxed and Lt Cdr Chapman returned to the JHF(I) HQ building at around 1200 [A582]. The crew conducted a pre-flight brief in the Ops Room and Flight Planning Room, updating themselves on the meteorological (met) report, J2 and the task in hand, which was to be a JHF(I) internally-tasked local area reconnaissance (recce) of Basra Helicopter Landing Sites (HLSs) for the benefit of Wg Cdr Coxen (Comd JHF(I) (Desig)) and also a recce of the Old State Building (OSB) for suitability as an HLS following reports that the site was fouled by Warrior Armoured Fighting Vehicles [A733]. Although Comd JHF(I) {Person E} was due to accompany Wg Cdr Coxen on the airborne recce, he cancelled that morning in order to make himself available to brief the visiting Captain of USS Ronald Reagan. He therefore offered his seat to his Adjt (Flt Lt Mulvihill) as a replacement [A667]. Having completed the pre flight brief, the sortie was authorised as ‘Lynx 2 tasking i.a.w. JHF(I) FOB as required’ [Flight Authorisation Sheet – Enclosure 4] by {Person F}, and the crew (accompanied by the 2 passengers) walked to the aircraft. The crew were well rested [A8, A703] and had been the duty crew for Lynx 2 since 051700D May 06 (the previous day).

6. Sortie Routine Description. The aircraft started engines/rotors without incident and called departing to JHF(I) Ops at 1331 [JHF(I) radio log – Enclosure 5]. The crew called Basra Approach and were given a Flight Information Service (FIS) at 1333 [ATC Incident Report – Enclosure 6]. They were observed in the hover at the Shatt Al Arab Hotel (SAAH) (XXXXX) [XXXXX Statement – Enclosure 7] to the N of Basra, before departing and following the river to the S towards Basra Palace (BP). They passed to the E of BP, before conducting a right hand turn to approach XXXXXXX (in the Palace grounds) from the S. They hovered over the HLS for approximately 1 minute before departing low level NW up the river [A146]. The aircraft was photographed at this time with a high-resolution digital camera by one of the eyewitnesses [XXXXX photo – Enclosure 8]. The aircraft was then seen to climb to medium level before turning onto a more W’ly heading [A118, A146, A164, A201]. The aircraft transited for a further 2 km and then exploded above an area approximately 500m S of the OSB, descending thereafter in an uncontrolled manner.
before crashing onto a rooftop in a position approximately 500m SW of the OSB. The estimated route of the aircraft from BAS to SAAH to BP to the crash site is shown at Annex B.

7. **The Crash.** Evidence from witness statements suggested that whilst overhead grid reference 38R QU 716788, a mid-air explosion occurred emanating from the starboard rear quarter of the aircraft, between the fuselage and the tail pylon \([A350/351, A599, A615]\). This partially severed the tail cone leaving it loosely attached to the fuselage \([A599,A355]\). The aircraft was engulfed by a fireball and plummeted to the ground, impacting at grid ref 38R QU 71147883. The main fuselage struck and was held by a reinforced concrete roof with the aircraft wreckage orientated facing an ESE'ly direction (Site 1). Much of the cockpit was severed at the point of impact with the building and fell a further 2 floors to a narrow enclosed alleyway below (Site 2). It is suspected that shortly before or during impact the tail cone fully separated from the fuselage. It came to rest on the roof of a separate building 3 metres in front of the fuselage (Site 3). This was the only area of the crash site not to burn. A diagrammatic representation of the crash site is at Annex C whilst photographic evidence is presented at Figure 1.

![Figure 1 - Photographic Evidence of Crash Site](image)

8. **Suspicion of Hostile Attack.** Further evidence submitted to the Board suggested that the aircraft was subjected to hostile attack from the ground. The main evidence centred on witness statements describing an object hitting the starboard side of the helicopter from
the N, the nature and violence of the airborne explosion, noises heard prior to the aircraft explosion, witness statements detailing observed potential weapon firing points and smoke trail(s), and finally forensic evidence taken from the aircraft wreckage. The main evidence is summarised below concentrating on 5 principal areas, namely: the route and height of the aircraft; the airborne explosion; the potential firing point; smoke trail evidence linking the two and the crash site itself.

9. Route/Height/Airspeed of Aircraft Immediately Prior to the Crash. An estimation of the route followed by the aircraft, between BP and the area of the airborne explosion, is presented at Figure 2.

Figure 2 - Estimated Route of Aircraft

XZ 614 departed in a NE'ly direction from BP XXXXX transitioning low level over a line of street lights before turning left and routing, still low level, NW'ly up the Shatt Al Arab river [A117, A146, A154, A201]. Shortly thereafter, whilst approaching the bridge abeam XXXXX, the pilot executed a rapid climb to an estimated height of between XXXXXXXXX ft above ground level (agl) (see Annex D for explanation of calculations based on witness evidence) and, after levelling, turned left onto a more W'ly heading [A117, A146, A154, A201]. Evidence suggests that the aircraft followed a SW'ly track just to the S of a
tributary linking XXXXX to XXXXX [A369] passing to the S of the OSB (XXXXX). The aircraft maintained approximately level flight at medium level (estimated as approximately XXXXX ft agl) [A158, A191]. Immediately prior to the airborne explosion, the aircraft was observed by 2 witnesses to manoeuvre, including a bank to the left, but the degree of manoeuvring or the angles of bank achieved are not clearly defined [A603, A630]. During this period the aircraft’s speed was described as both ‘slow’ [A595] and ‘hovering’ [A168]. Following recovery of the wreckage, the investigation focused on the technical evidence provided by the heading indicator, the radalt indicator and the Ground Speed and Drift Indicator (GSDI) as shown in Figure 3.

![Flight Instruments Recovered from Wreckage](image)

Figure 3 - Flight Instruments Recovered from Wreckage

Advice from SMEs [RNFSIC (Field) Report – Enclosure 1] highlighted that these instruments are likely to have frozen at their indications at the time of the airborne explosion, showing that the aircraft was heading approximately 247º, at a height of approximately XXXXX ft agl and a groundspeed of approximately 98 kts (representing an airspeed of approximately 110 kts into a headwind of 12 kts).

10. **Airborne Explosion.** Witnesses at the SAAH [A271, A454a] recalled seeing the airborne explosion in their peripheral vision from the hotel, some 9 km to the N of the event. Witnesses from the OSB saw it almost directly above them [A595], and witnesses also viewed the explosion from BP [A118, A146, A164] some 3½ km to the SE of the event. Witnesses from BP all heard an explosion and then saw the aftermath in the form of a fireball, as did further witnesses from the OSB [A356, A393]. All witnesses described a fireball with black smoke plummeting in an uncontrolled manner to the ground broadly from E to W in an area to the S of the OSB. While all witnesses stated that the

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1 Due to the distances from which the witnesses were observing the aircraft, and the aspect presented to the viewer, the aircraft may have appeared to be moving slowly, but was unlikely to have been flown below 60 to 70 kts at any stage and certainly would not have been hovering at altitude.
surrounding fireball rendered the aircraft unrecognisable as a Lynx, witnesses closest (at the OSB) [A355/356, A395, A599] described the tail partially separating from the fuselage.

A witness at the OSB observed an object tracking very fast towards the aircraft from the N, immediately prior to the explosion [A614]. This object was described as "a circular… ball of flame", [A614]. A further local witness, {Person H } also stated that he saw an object track rapidly towards the helicopter from the N, before impacting with it resulting in the explosion and fireball. He described the object as “a missile” [A342]. Several witnesses reported hearing various noises, pops, bangs and explosions relating to the event. A summary table of eyewitness evidence is provided at Annex E.

11. Potential Firing Point (FP). Four witnesses from 2 different locations reported seeing a smoke trail emanating from a ground position and leading to the area of the airborne explosion [A300, A406/414, A451, A491]. Two of these witnesses were located at the SAAH [A271, A454] and one ran to Sanger 2 and took immediate compass bearings of the crash site smoke (2550 Mils) and of the ground end of the smoke trail (as a suspected FP) (XXXX) [A490]. This witness indicated that the ground smoke came from the XXXX [A513]. The other 2 UK mil witnesses conducting a mobile patrol check at QU 659841, approximately 1km S of the SAAH, also noted the airborne explosion to the S of their location and a simultaneous ground blast to the SE of them (suspected FP) [A405, A434]. This ‘ground blast’ was seen as a cloud of smoke at roof top level. Bearings of the suspected FP were taken by the mobile patrol comd, (magnetic from QU 659841) [A406], who also recognised the approximate location as being in the vicinity of XXXXXXXXXXXXXXXX patrol then mobilised to the area of XXXXX but no immediate evidence of an FP was found. Very soon afterwards they were re-tasked to support crash site cordon work. Subsequent cross-referencing of the bearings taken from the SAAH and the mobile patrol identified the potential FP as being centred on the area around XXXXXXXXXXXXXXXX from the airborne explosion.

12. Smoke Trail. Witnesses from both the SAAH [A454] and mobile patrol [A434] recalled observing a single white smoke trail rising from the potential FP (left to right from their vantage point) and coinciding with the location of the airborne explosion. A further witness from the SAAH stated that he saw 2 smoke trails, rather than the single trail described above [A373]. All 3 of these witness statements and diagrams indicated a smoke trail running from the XXXXXXXXXXXXXXXX to the airborne explosion, rising from left to right, although one witness’ diagram indicated that the smoke trail ran in the opposite direction [A411] (rising right to left) [See Witness Statements 11, 15, 16 and 17 for diagrams]. Two witnesses recalled that the smoke trail was white, [A434, A454] although a further witness remembered it as being dark coloured [A310].

13. Crash Site. The fuselage impacted very heavily in a near vertical trajectory and came to rest facing ESE on the flat roof of a house in central Basra. The main evidence to be gleaned immediately from the crash site was that the rotors were either stationary or

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rotating only very slowly at the point of impact with the ground [RNFSAC (Field) Report – Enclosure 1].

14. **Post Crash Management.** The crash site was confined to 3 principal areas; Site 1 contained the main fuselage, MRGB and engines on one reinforced concrete roof, Site 2 contained the cockpit in the base of a narrow alley and Site 3 contained the tail cone and TRGB on an adjacent similar roof on the other side of the alley [Annex C]. There was evidence of wreckage on the ground beneath the point of the initial explosion but the local population largely collected this wreckage with only a few pieces recovered by the investigators. Following the crash, the fuselage and cockpit section were ablaze, while the tail section was not. The strength of the building’s roof withheld the impact within a 1.2 m deep crater. Basra City Battle Group (BCBG) were informed of the crash within 5-6 minutes of the event [BG Cmd Net radio log – Enclosure 9], and quickly deployed to the area. The local authorities were the first on the scene and the Iraqi Fire Service extinguished the fire within approximately 45 minutes [BP CCTV – Enclosure 10]. At around the same time an inner and outer cordon was established by MND(SE), although there had been plenty of opportunity for local access to the wreckage [Local TV news footage – Enclosure 11]. Throughout the recovery phase, the cordon troops were subjected to sniper and mortar fire as well as blast and petrol bombs. Sizeable aggressive crowds continually harassed them, however they maintained the cordon throughout the night. This followed advice from JHF(I) Command that recovery of the wreckage would be crucial to the subsequent investigation and, more importantly, recovery of the bodies was essential. During the incident BCBG troops defended themselves with both baton rounds and small arms fire. Some UK military personnel sustained minor injuries and several civilians were reported killed in the post-incident riot.

15. **Injuries.** The 5 persons on board were fatally injured. There were no civilian injuries (directly attributed to the crash). The pathologist’s report was not available at the time of writing this report, but pathological details will be referenced in the RNFSAC final technical report. However, the extreme violence of the aircraft explosion, fire and subsequent high-g near-vertical impact resulted in this crash being considered unsurvivable.

16. **Aircraft Damage.** The damage to the aircraft is consistent with an explosion, a high-speed vertical impact and intense fire. The initial explosion is considered to have occurred within the rear electrical bay, and there is considerable evidence of fragmentation damage to the aircraft emanating from this area [RNFSAC (Field) Report – Enclosure 1]. XZ614 was categorised as Cat 5 (Scrap) at Reference F.

17. **Building Damage.** The aircraft came down on top of a 2 storey Iraqi residential dwelling. The roof of the building (described here as floor 3) was constructed from steel reinforced concrete. The aircraft had partially penetrated the roof and was held in place by the steel reinforcing bars. Damage was sustained to the roof, a first floor room and ground floor windows. HQ MND(SE) is liaising with the owner of the building in accordance with local procedures.

18. **Salvage and Recovery Details.** The roof was at third floor level and the narrow alleyway had no direct street access to it, making physical recovery of the wreckage extremely challenging. The severity of the local situation meant that an initial decision was
taken to recover man-portable wreckage only, as there was a risk that the cordon would be over-run. The RAF Fire Immediate Response Team (IRT) from BAS arrived on site at 2100 and, with the Royal Engineers (RE) and an 847 NAS engineering downbird party, proceeded to cut the wreckage into manageable sections for quick recovery using oxyacetylene torches and XXXXX hydraulic cutting equipment [A01, A567]. Preparation continued until 0400, when a lighting failure forced work to cease. Throughout the morning of Sun 07 May the aircraft parts were lifted from the 3 principal sites with considerable difficulty by both hand and by RE crane and recovered by road to a disused hangar at BAS. Although huge efforts were made to recover as much wreckage as possible, some of it was removed by local Iraqi members of the public [Local TV news footage – Enclosure 11] and many smaller pieces were left unsecured at the site following the collapse of the cordon during the afternoon of 07 May. A further inspection of the crash site by the Board, accompanied by the RNFSAIc team, on 11 May 06 revealed significant quantities of smaller pieces of wreckage throughout the crash site. The RE were then tasked to remove all of the remaining wreckage for further analysis. The crash site was open to contamination and interference from the outset.2

BACKGROUND DETAILS

19. **Aircrew Details.** The crew was properly constituted and they were all fit, well rested and fed prior to the sortie. There is no evidence to suggest any personal or professional distractions from the task in hand. They were all current in all relevant respects (References G, H and I), the exceptions being minor anomalies considered by the Board to have no bearing on the circumstances leading to this crash.3 Specific aircrew details are contained in Annex G.

20. **Seating Positions.** The aircraft was fitted in a conventional layout with the 6-man seat aligned longitudinally and the 3-man seat athwartships. The crew positions were not confirmed by eye-witnesses but the Board surmised that the positions, (based on Lynx SOPs and the photographic evidence taken from BP just prior to the crash), were as follows: Lt Cdr Chapman (Aircraft Captain) in front LHS, Capt Dobson (handling pilot) in front RHS and Mne Collins (Air Door Gunner (ADG)) in the cabin, port side, secured by a dispatcher’s harness. The passenger locations were: Wg Cdr Coxen seated in the forward stbd position on the 6-man seat and FltLt Mulvihill seated on the aft stbd position of the 6-man seat [Person I photo – Enclosure 8].

21. **Duty Status of Service Personnel.** As all 3 Services were represented on board the aircraft, the Board investigated the categorisation of duty status from a tri-Service perspective. The categorisation was found to be identical for all 3 Services as defined in the Annexes at References J, K and L. The key paragraph of each of the Annexes is paragraph 1, which details ‘activities directly or indirectly relating to Service functions or responsibilities’. Paragraph 1a further defines a person as being on duty if they are ‘performing a specific function required by the Service’. The Board concluded that the 3 crewmembers and CO JHF(I) (Desig) were all covered by this definition and they were

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2 Whilst it is possible that recovery of all the pieces of wreckage from the aircraft may have provided additional evidence, it is considered unlikely that this would have impacted on the Board’s overall findings.

3 There is no record of ‘reversionary night approaches to recognised aids’ for either pilot, as required by JHC Orders, and the Aircraft Commander was 25 minutes short of his rolling 3-monthly General Flying Practice (GFP) requirement of 3 hrs.
therefore all on duty at the time of the crash. The Adjt of JHF(I)’s status is covered by
paragraph 1b of the Annexes in that ‘her presence was necessary but she was not
performing specific Service functions’ and therefore, she was also on duty. Consequently
all personnel on board XZ614 were on duty at the time of the crash.

22. **Weather.** Conditions were good and typical for the theatre at the time of day; the
surface wind was forecast light NW'ly, although it was more SW'ly at the crash site [A74].
There was broken high-level cloud and nil weather. Visibility was approximately 20 km
and the temperature approximately +35°C. The weather was suitable for the task as
briefed. A summary of the weather conditions at the time of the crash is presented at
Enclosure 6.

23. **Aircraft Information and Maintenance History.** XZ614 had undergone significant
maintenance work in the weeks preceding the crash [A562]. In particular, a cracked
stringer had resulted in a Mobile Aircraft Support Unit (MASU) team deploying to theatre to
carry out a repair and the tail boom was removed and refitted to facilitate this. On rebuild,
both engines were rejected and a double engine change carried out. Following the crash
the MoD F700 was impounded by JHF(I) and the maintenance documents pack was
submitted to RNAS Yeovilton Quality Assurance (QA) Department for detailed analysis.
The aircraft documentation was generally to a very high standard and there were only
minor issues raised (as might reasonably be expected) following a thorough QA
[Enclosure 12].

24. **Aircraft Role Fit.** The aircraft was fitted with the following modifications relevant to
the theatre of operations (further details can be found in Annex H):

a. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

b. Mod 5086/5559 sand filters.

c. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

d. XXXXXX Missile Approach Warning System (MAWS).

e. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

f. SM/Lx/1020 Beyond Line Of Sight (BLOS) communications.

g. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

25. **Communications in Theatre.** XXXXX had communicated with the JHF(I) Ops room
on their primary VHF FM frequency. They had also received a Flight Information Service
(FIS) from Basra Approach through VHF. The aircraft was fitted with BLOS, although this
had not been tested during this particular sortie. It is unknown whether the crew were
talking to other agencies prior to the initial explosion. The ground stations heard no
MAYDAY call and there were no other aircraft from JHF(I) airborne at the time.

26. **Air Threat.** JHF(I) Intsums in the weeks preceding the crash showed no change to
the perceived threat to their assets.

XXXpennyXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
27. **JHF(I) Site Security.** The BOI reviewed site security in order to assess the likelihood of sabotage being a factor in this crash and there is no evidence to suggest that sabotage was a factor. A summary of JHF(I) site security is presented in Annex I.

28. **Other Human Factors.**

   a. **Living Accommodation and Working Conditions.** There is no evidence to suggest that accommodation and working conditions were a factor in this crash. A summary of JHF(I) accommodation and working conditions is presented in Annex I.

   b. **Technical Accommodation and Working Routines.** There is no evidence to suggest that technical accommodation and the working environment and routines were a factor in this crash. A summary of JHF(I) technical accommodation and working routines is presented in Annex I.

**INVESTIGATION**

**TESTS AND RESEARCH CONDUCTED**

29. The initial investigation took place in theatre over a period of 6 days, with time spent interviewing JHF(I) personnel and various eyewitnesses, and inspecting the crash site along with the recovered wreckage. On return to the UK the Board analysed all available information, (principally witness statements, maps and diagrams), evidence taken from the crash site and other supporting documentation, in order to gain an understanding of the events leading up to the crash. Additionally, various external agencies were tasked to provide specialist advice, including:

   a. **RNFSIAC.** An RNFSIAC technical accident investigation team visited the crash site and inspected the wreckage initially at BAS and subsequently at RNAS Yeovilton. Their preliminary (Field) report is at Enclosure 1.

   b. **RNAS Yeovilton QA Department.** The RNAS Yeovilton QA Department assessed all relevant aircraft documentation. Their report is at Enclosure 12.

   c. **Air Warfare Centre (AWC), RAF Waddington.** The AWC advised the Board on tactical and operational issues relating to the Iraq theatre of operations. Their advice was utilised predominantly in the analysis phase of this Inquiry.

   d. **Defence Science and Technology Laboratories (Dstl).** Dstl provided analysis of weapon systems and forensic support to the RNFSIAC technical investigations. The classified Dstl report at Reference M was utilised by the Board.
e. **Defence Intelligence Service (DIS).** A representative from DIS advised the Board on weapons characteristics and capabilities, particularly with regard to the potential MANPADS threat likely to be present in theatre.

f. **Materials Integrity Group (MIG), DERA Fleetlands.** MIG provided analysis of physical evidence and material forensic support as tasked by the RNFSAIC. The Board used a classified technical report relating to fragmentation evidence (Reference N).

**THE DAS FIT**

30. **Background.** The 847 NAS Lynx Mk 7s were originally fitted with a XXXXX flare system using stock held by the Lynx IPT from a legacy Service Modification. This was to satisfy an unfunded requirement to fit Lynx with DAS. More recently funding was released to fit a further 15 Hamden Lynx Mk 7 with a DAS fit. XXXXX was invited to deliver a further tranche of XXXXX, however it was no longer in production. The XXXXX chaff and flare system was offered as an alternative and due to its similarity with the XXXXX system, the Lynx IPT selected it to simplify the modification process. There was also an aspiration to upgrade the XXXXX to the XXXXX system in order to achieve fleet commonality and to improve supportability. This aspiration was eventually realised and XXXXX was introduced under a Service Deviation approved by the Release to Service Authority, HQ DAAvn (Reference O). The 847 NAS Lynx had the modification carried out in theatre by a Service mods team from 7 Bn REME.

31. **Advice on DAS Effectiveness.** The opinion of the AWC is that the Lynx has one of the most effective DAS suites of all the UK helicopter assets in theatre.

32. **DAS Components and Controls.** The Lynx DAS comprises a number of components and pilot-selectable control boxes/switch panels as detailed below, and shown in Figure 4:
Figure 4 - Lynx AH Mk 7 DAS Switches and Controls

a. **Master Armament Safety Switch (MASS).** A MASS is provided on the starboard side of the centre console. Selectable to SAFE/LIVE (and TOW\(^4\)) this is the master switch connecting dc power from the general and essential busbars to the armament busbars to enable armament and defensive aids to be operated. It incorporates a key needed to select LIVE (and TOW).

b. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
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   c. **IR Jammer.** The IRJ comprises a single transmitter, mounted on the rear fuselage under the tail cone, and a control unit mounted on the centre console with an IRJ ON/OFF switch.

   d. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
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\(^4\) TOW is the Tube launched Optically tracked Wire-guided missile system that was recently withdrawn from service. The TOW switch position is no longer used.
e. **MAWS/MANUAL Switch.** The switch is located to the left of the MAWS CIU.

f. **The Counter Measures Dispensing System (CMDS).**

The CMDS is controlled manually or automatically to launch decoy chaff and flares when a threat is detected. The system comprises the following primary components:

(1) **CFDCU.** The CFDCU (see Figure 4), fitted in the interseat console, controls the flares firing sequence in a number of pre-programmed patterns.

(2) **Chaff and Flare Dispenser Units (CFDUs).** The CFDUs are mounted on the rear of the aircraft’s skids. There are 2 ‘bins’ on each side.

(3) **FLARES ARM Switch.** The FLARES ARM ON/OFF switch, mounted on the centre console immediately below the CFDCU, inhibits flare firing at OFF and enables firing at ON.

(4) **Physical Evidence of DAS.**

The MASS was recovered from the wreckage. The panel supporting the FLARES ARM ON/OFF switch was recovered from the wreckage.

The CFDCU panel was also recovered from the crash site in a badly damaged state.

33. At the time of writing this report, the MAWS/MANUAL switch panel had not been found amongst the wreckage.

34. **Physical Evidence of DAS.**
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36. **Task.** This was a well-planned, operationally necessary sortie that was designed to furnish an incoming CO with knowledge of his AO and, in particular, local HLSs frequently used by his assets. It was internally generated by JHF(I), correctly authorised and briefed and an appropriate task given the prevailing weather, known threat levels and crew capabilities. The inclusion of the OSB recce was a sensible and operationally justifiable additional aim of the sortie. The sortie was planned, briefed and conducted to a high standard and in accordance with extant JHF(I) SOPs.

37. **Crew Composition.** The crew composition was very good, with a highly experienced and capable Aircraft Captain, (albeit with limited in-theatre time), paired with a very capable pilot with good in-theatre experience. The ADG was current and competent and well suited to his role. The Board concluded that although there were some minor anomalies in their JHC aircrew currency requirements, this was a well-constituted and experienced crew, who were correctly trained and capable of operating within this environment.

38. **Orders and Instructions.** The orders and instructions (References D, E and Q) were analysed and the Board concluded that with the exception of 2 minor observations, they were satisfactory and complied with. The observations were as follows:

   a. **Carriage of Passengers.** The original sortie aim was for the JHF(I) CO and CO (Desig) to conduct an airborne familiarisation recce together. Wg Cdr Coxen’s presence on the sortie was therefore an essential requirement for the task. As the result of a last minute change of plan, the CO became unavailable for the sortie and offered his place in the aircraft to his Adjt, who was the obvious choice to provide continuity of hosting. Notwithstanding that she was coming towards the end of a 2 month tour, her greater understanding of JHF(I) operations was of potential benefit both to her (professional development) and to the Unit (better understanding of Unit task). Given the known intelligence picture at the time of the crash, which stated that the main threat was from SAFIRE attack and that JHF(I) tactics were designed to counter that threat, the opinion of the Board is that the Adjt’s inclusion on the sortie was a justifiable decision. There was, however, no specific guidance on

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5 See Para 19 for confirmation of minor discrepancies in JHC pilot currency criteria.
passenger flying in a threat environment\textsuperscript{6}. The Board concluded that Command
guidance on the carriage of passengers in such circumstances was inadequate and
relevant guidance would be beneficial to in-theatre commanders. Therefore, the
Board recommends that this issue should be addressed by JHC.

b. **Passenger Manifest.** The Board noted that there was no passenger
manifest recorded within JHF(I) Ops, nor were there any passenger names entered
on the Flight Authorisation Sheet (RAF Form 1575B). The Flight Authorisation
Sheet for the sortie included only the 3 crewmembers. The authorising officer
stated to the Board that the passengers should be detailed on a separate manifest
held by JHF(I) Ops \[A20\]. The Board reviewed the passenger manifest procedures
for MND(SE) tasks and found them to be robust, with names being annotated to
specific manifests for specific tasks and checked by movements personnel at the
HLSs used regularly by JHF(I) assets. However, the Board was unable to obtain a
separate passenger manifest for this particular sortie that included the names of Wg
Cdr Coxen and Flt Lt Mulvihill. The lack of a passenger manifest was in
contravention of Regulation 340.145.2 of Reference Q. Further investigations
revealed that for externally generated tasking JHF(I) Ops did maintain a separate
manifest as detailed above, but for JHF(I) internally generated tasks there was no
clear guidance as to whether passenger details should be entered on the Flight
Authorisation Sheet or a separate passenger manifest \[A20, A678\]. The Board
concluded that passenger manifest procedures for internally generated JHF(I) tasks
were inadequate. It is recommended that a suitable passenger manifest system
should be implemented for all JHF(I) internal tasking, to align internally tasked
manifest procedures with the robust system already in place for external (to JHF(I))
tasking.

**SORTIE PROFILE**

39. **Tactical Aspects.** This routine sortie was carried out in accordance with the
guidance set out in 847 NAS SOP 005 paragraph 8 (Reference E), which requires crews
to operate both above and below the threat band. Therefore, JHF(I) assets were flown
predominantly at medium level during day tasking, in the height band between
XXXX ft agl, which was above the SA and RPG threat band (XXXXXXX ft agl) and also
below the upper operating height for helicopters, (separating them from fixed wing traffic),
which was XXXX ft.

40. **The Intelligence Picture.** J2 reports showed that a

\textsuperscript{6} The only reference to passenger flying in the JHF(I) FOB is Order 340.108.1.1 which states that, ‘CO
JHF(I) approves the carriage of all passengers as directed by MND(SE).’
41. **Discounted Potential Causes.** The following sub-paragraphs detail the Board’s deliberations on what could potentially have caused the crash but which, for the reasons stated, were discounted:

a. **SA Fire.** This was discounted as no automatic fire was heard prior to the explosion. Witnesses saw no tracer. The aircraft explosion was too violent. No evidence of SA attack was found in the wreckage.

b. **Improvised Explosive Device (IED).** This was discounted as BAS security is appropriately robust [Annex I]. Furthermore, the aircraft had undergone Daily Flight Servicing (DFS) at 060700D May 06 and the crew had loaded the aircraft, therefore several different people had checked it during the course of the morning. The aircraft had already flown that morning without incident and no evidence of an IED was found in the wreckage.

c. **RPG.** This was discounted as the aircraft was estimated as flying at a height of approximately XXXX ft agl, which is outside of the threat band for RPG. No evidence of an RPG was found in the wreckage.

d. **UAV Collision.** This was discounted as no friendly UAV was reported missing or operating within the area. No UAV was heard or seen by witnesses. UAV flying procedures and deconflictions with manned aircraft operating areas appeared to be adequate to enable separation criteria between manned and unmanned aircraft to be maintained. The violence of the explosion was probably too great for a simple collision. No evidence of a UAV was found in the wreckage.

e. **Artillery.** This was discounted, as there is no reported enemy artillery threat or capability within theatre.

f. **Mortar.** This was discounted as no mortar fire was heard or seen by witnesses. It is highly improbable that a mortar would be used as an aimed weapon against an aircraft. The conclusion is therefore that it would have been a coincidental impact, which is considered by the Board to be sufficiently unlikely as to be discounted.

g. **Guided Rocket – Command Line-Of-Sight (CLOS).** There was no intelligence indicating the presence of a CLOS anti-aircraft rocket capability in theatre. The target profile would not have lent itself to a successful engagement. No command wires were found (indicative of wire-guided CLOS systems).

h. **Unguided Rocket.** This was discounted as accuracy is very poor and the likely range would prohibit successful unguided engagement. No evidence of an unguided rocket was found in the wreckage.

i. **Mechanical Failure.** Despite the extensive mechanical work carried out on XZ614 in the weeks leading up to the crash, there is no evidence to suggest that the cause of the crash was mechanical failure. This is based on the technical
evidence available at the time of writing this report [RNFSIC (Field) Report – Enclosure 1]. Therefore the aircraft was considered by the Board to be airworthy.

42. **Main Cause.** Following considerable deliberation based on witness statements and SME advice, (primarily from the AWC and Dstl), the Board concluded that the main cause of the crash was a hostile MANPADS attack. The evidence leading to this conclusion is summarised below:

   a. **Potential FP.** A potential FP was identified through a combination of bearings taken [Person K Statement – Enclosure 16, A406] and local knowledge [A414]. Its visual signature was reported as being a cloud of smoke at roof top level in the area of XXXXXXXXXXXXXXXXX and close to XXXX. Evidence submitted to the Board therefore indicates that the FP was XXXXXXXXXXXXXXXXXXXX, although the Board acknowledges that this is based on limited witness evidence only and has not been confirmed by subsequent intelligence information.

   b. **Smoke Trail.** A smoke trail was seen to link the area of the FP observation with the airborne explosion. Two witnesses reported it as a single white smoke trail [A434, A454], while one reported twin darker coloured trails [A310]. Two witnesses saw smoke rising left to right from the area of the docks [A434, A454]. Only witnesses located to the N of the crash, in the area of the SAAB, reported seeing smoke trails, and this may have been due to their relative position from the potential FP, the position of the sun overhead and the contrast against the background sky. There are no known weapon systems present in theatre that would leave a dark smoke trail, or multiple smoke trails, and there is no evidence of multiple FPs. The Board considered that it is possible that some witnesses may, through ‘memory error’ have ‘coloured’ what they saw in hindsight. It is also possible that the light properties of the day gave the impression of a dark trail. It is further possible that some witnesses mistook the dark trail of the falling wreckage and subsequent billowing of the crash site smoke as a missile trail. The Board therefore considered that the white smoke trail described by most eyewitnesses was likely to have been the white trail of a SAM and that any multiple or dark trails reported would most likely have been due to a systematic error on the part of the witness. Additionally, the smoke trail drawn as ‘going from right to left’ [A411] was considered by the Board to be a systematic error based on memory fade.

   c. **Weapon Effect.** There was a large airborne explosion with considerable evidence of fragmentation [RNFSIC (Field) Report – Enclosure 1]. Therefore it is assumed that the weapon had a warhead.

   d. **Acoustic Signature.** Some OSB witnesses reported hearing a ‘whoosh’ followed by a ‘pop’ and then, a split-second later, a loud ‘bang’ [Annex E]. Following discussions with SMEs, the Board considered it likely that this was the acoustic signature of a high-speed missile.

43. **Discussion on Potential MANPADS Used and Supporting Evidence.** The Board considered the evidence available, along with SME advice, in an attempt to identify the most likely MANPADS used during this attack. The following factors were considered:
a. **Range.** Although most eyewitness accounts of the potential FP focused on XXXXXXXXXXXXXXX, the Board applied a 5º error margin on the bearings taken of the ‘ground blast’, (based on the graduations and level of accuracy expected from a Silva compass), to generate an ‘area of uncertainty’ of the potential firing point (see Figure ). This placed the potential FP-to-Tgt range as between XXXXXXXXXXXXXXX, as shown in Annex F.

![Figure 6 - Area of Uncertainty Surrounding Potential FP](image)

b. **Firing Solution.** Assuming that the potential FP was based XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX, the firer would have been presented with a clear view of the aircraft against an uncluttered background, although the aircraft would have appeared as a very small target above the horizon (see Annex J). The aircraft’s initial routing southbound, from the SAAH to BP may have alerted the firer to the possibility of a future engagement. As the aircraft climbed out of BP, approached the bridge abeam XXXXXX and turned to the SW, the firer would have seen an aircraft tracking slowly from left to right, at XXXXX altitude in level flight, presenting a starboard rear-quartering aspect, as illustrated in Figure . The Board concluded that this provided the firer with a firing solution, notwithstanding the fact that the distance was probably at the extreme range of the likely MANPADS used.
c. **In-theatre Credible Candidate Systems.** The evidence presented to the Board highlighted that candidate MANPADS which may have been utilised in this attack were the following:

   XXXXXXXX
   XXXXXXXXXX
   XXXXXXXXX
   XXXXXXXXXXX
   XXXXXXXXX

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Figure 7 - 'Firer's Eye View' from Potential FP

   XXXXXXXX

   c. **In-theatre Credible Candidate Systems.** The evidence presented to the Board highlighted that candidate MANPADS which may have been utilised in this attack were the following:

   XXXXXXXX
   XXXXXXXXXX
   XXXXXXXXX
   XXXXXXXXXXX
   XXXXXXXXX

   d. **Discounted Potential for XXXX.** Whilst not wholly discounted as the missile involved, the Board considered that the XXXX was an unlikely candidate missile system for the following reasons:

   (1) XXXXXXXX.
   XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
   XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
   XXXXXXXXX

   (2) XXXXXXXX.
   XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
   XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
   XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
   XXXXXXXXX

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7 Candidate MANPADS systems are based on the DIS-published ‘MANPADS Threat to Air Operations in Iraq’ (Restricted) dated 7 Sep 05 and advice from the DIS desk officer.
The WARE Cards state that the FLARES ARM ON/OFF switch should be selected OFF and that STBY should be selected on the CFDCU as part of a before landing and make safe drill. However, it was noted by the Board that Lynx aircrew were safeing the DAS with just the FLARES ARM ON/OFF switch (without selecting STBY on the CFDCU) for short duration, rotors turning HLS stops. Although this does not comply exactly with the WARE cards, the Board considered that this was sound practice and that it had no bearing on this crash.

e. **Discounted Potential for XXXXX.**

f. **Discounted Potential for XXXXXXXX and XXXXXXXXX.**

g. **Conclusion – XXXXXX.** Having reviewed all available evidence provided by the agencies at paragraph 29, in particular the fragmentation evidence detailed in Reference N, the Board concluded that on the balance of probability the most likely weapon system used in this attack was

44. **Routine DAS Aircrew Switching Procedures.** (See Figure 4 - Lynx AH Mk 7 DAS Switches and Controls). Routine DAS switching drills are conducted by the aircrew as part of the start-up or shutdown checks, or as after take-off/departure and pre-landing checks. The MASS, MAWS CIU, IRJ and CFDCU mode selector switches are only normally selected or deselected at the start of the sortie or at the end of. A system BIT is carried out as a go/no-go check prior to take off. The IRJ has associated IRJ ON and IRJ INOP captions displayed on the Central Warning Panel (CWP), which confirm that it is either switched on, or undergoing a one-minute cooling down period after being switched OFF.
This sortie was routine in nature and therefore the crew would have been subjected to minimal operational pressure and should have had plenty of spare capacity.
48. XXXXXXXXX
The DAS system upgrade was completed as detailed in paragraph 30.

49. XXXXXXXXX Upgrade Programme. The DAS system upgrade was completed as detailed in paragraph 30.
c. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX

d. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

e. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

f. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX. The Board concluded that had a fully crashworthy\(^9\) FDR/CVR been fitted, XXXXXXXXXXXXXXXXXXXXXXXX feedback to theatre Command could have been provided within days rather than weeks. The Board therefore recommends most strongly that rigorous efforts be made to procure a fully crashworthy FDR or CVR capability for all UK military aircraft.

52. **Meritorious Efforts During Wreckage Recovery.** The Board considered that the efforts made in the recovery of the wreckage were outstanding given the degree of hostility experienced at the time by the troops on the ground. It is clear that the cordon around the crash site was held only through the exceptional efforts of ground troops and Commanders. This supreme effort enabled much more aircraft wreckage to be recovered than might otherwise have been expected and, more importantly, enabled the recovery of the occupants’ remains. Whilst the Board does not have any direct evidence of meritorious service on the part of those involved in the initial protection and subsequent recovery of the wreckage, witness statements suggest that many individuals acted in the very best traditions of the British Armed Forces despite intense provocation from hostile crowds resulting in considerable danger to themselves and their colleagues. Should local Commanders assess that these efforts were sufficiently praiseworthy to merit special
recognition, this would be strongly supported by the Board. The Board concluded that
PCM was conducted to the highest standard possible under the circumstances.

53. The Board’s Appreciation of Assistance Received. The Board would like to
acknowledge the considerable and much valued assistance provided by various units and
agencies during the investigation into the circumstances surrounding this crash. Despite
the tragic circumstances and the traumas experienced in the immediate aftermath, JHF(I)
personnel were outstanding in their wholehearted support to the Board and the honesty
and clarity of their evidence was noteworthy. All of the Board’s requests for support were
met quickly and with a minimum of fuss, and the Board would like to formally acknowledge
the excellent assistance provided by all JHF(I) personnel involved. Additionally, the
support provided by the RNFSAlC was exemplary and the advice and technical assistance
provided was first class in terms of both content and timeliness. All other agencies
consulted by the Board and listed in paragraph 29 provided outstanding contributions,
often working long hours during off-duty periods, and their wholehearted assistance was
also very much appreciated.

54. Further Technical Analysis. The Board considered that there was significantly
more evidence to be gathered from analysis of the aircraft wreckage. It is therefore
recommended that technical investigations be continued in order to confirm with greater
confidence the likely missile type (explosive residue analysis, metallurgical analysis,
weapon parts analysis etc).

CONCLUSIONS

PRINCIPAL FINDINGS

55. Hostile Attack. The aircraft was shot down using MANPADS; the most likely
weapon system utilised being the XXXXXXXXX. [Paragraphs 42 and 43]

56. XXXXXXXXXX.

57. XXXXXXXXXX.

58. XXXXXXX.

59. XXXXX.
60. XXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX.

61. FDR/CVR. Had a fully crashworthy FDR/CVR been fitted, feedback to theatre Command could have been provided within days rather than weeks. [Paragraph 51]

62. Survivability Aspects. The extreme violence of the aircraft explosion, fire and subsequent high-g near-vertical impact resulted in this crash being considered unsurvivable. [Paragraph 15]

63. Carriage of Passengers. Command guidance on the carriage of passengers in a threat environment was inadequate and relevant guidance would be beneficial to in-theatre commanders. [Paragraph 38.a]

64. Passenger Manifest. Passenger manifest procedures for internally generated JHF(I) tasks were inadequate. [Paragraph 38.b]

65. Duty Status. All personnel on board XZ614 were on duty at the time of the crash. [Paragraph 21]

66. Post-Crash Management (PCM). PCM was conducted to the highest standard possible under the circumstances. [Paragraph 52]

67. Aircraft Airworthiness. The aircraft was airworthy. [Paragraph 41.i]

68. Flight Authorisation. The sortie was correctly authorised. [Paragraph 36]

69. Det Command and Control – Orders and Instructions. With the exception of 2 minor observations, the orders and instructions were satisfactory and complied with. [Paragraph 38]

70. Sortie Preparation/Conduct. The sortie was planned, briefed and conducted to a high standard and in accordance with extant JHF(I) SOPs. [Paragraph 36]

71. Aircrew Training and Experience. Although there were some minor anomalies in their JHC aircrew currency requirements, this was a well-constituted and experienced crew, who were correctly trained and capable of operating within this environment. [Paragraph 37]

72. Aircraft Documentation. The aircraft documentation was generally to a very high standard and there were only minor issues raised (as might reasonably be expected) following a thorough QA. [Paragraph 23]

73. Damage to Civilian Property. HQ MND(SE) is liaising with the owner of the building in accordance with local procedures. [Paragraph 17]
MAIN CAUSE

74. The Board concluded that the main cause of the crash was a hostile MANPADS attack. [Paragraph 42]

CONTRIBUTORY CAUSES

75. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX:

a. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

b. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

c. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

RECOMMENDATIONS

76. The Board proposes the following recommendations:

a. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

b. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

c. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

(1) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

(2) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

(3) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

(4) XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
d. **Fitment of Crashworthy FDR/CVR.** Rigorous efforts should be made to procure a fully crashworthy FDR or CVR capability for all UK military aircraft. [Paragraph 51]

e. **Carriage of Passengers.** Command guidance on the carriage of passengers in a threat environment should be addressed by JHC. [Paragraph 38.a]

f. **JHF(I) Passenger Manifest Procedures.** A suitable passenger manifest system should be implemented for all JHF(I) internal tasking, to align internally tasked manifest procedures with the robust system already in place for external (to JHF(I)) tasking. [Paragraph 38.b]

g. **Continued Technical Investigation.** Technical investigations should be continued to confirm with greater confidence the likely missile type (explosive residue analysis, metallurgical analysis, weapon parts analysis etc). [Paragraph 54]

**Annexes:**

A. List of Abbreviations and Acronyms.
B. Route Flown By XZ614 on 06 May 06.
C. Crash Site Schematic.
D. Height Estimations Based on Eyewitness Evidence.
E. Eyewitness Evidence Matrix.
F. Potential Distances for FP-to-Target Ranges.
G. Aircrew Details.
H. Aircraft Role Fits.
I. JHF(I) Location Specific Considerations.
J. Views of Lynx at XXXX ft from Various Ranges.

**Enclosures:**

1. RNFSAIC Accident Report No 1/06 (Field) dated 16 Jun 06.
2. JHF(I) Initial Accident Signal SIC ABA LBL EUL dated 061454Z May 06.
3. MoD F705(A) May/03 for XZ614.
4. RAF Form 1575B Authorisation Sheet dated 05 May 06.
5. JHF(I) Radio Log dated 06 May 06 (c/s ☐).
7. SIB Statement {Person G} dated 08 May 06.
8. Photograph taken from BP by {Person I}
9. BG Comd Net Radio Log dated 06 May 06 (c/s H3©).
10. BP CCTV Footage (CD).
11. Local TV News Footage (CD).
13. XXXXXXXXXXXXXXXXX on a Visit to 847 Sqn Det, at JHC Basra From 13 Apr to 27 Apr 06, by {Person J} dated 13 Feb 0210.
15. MoD F706A(Lynx)(Army) Weapons and Expendable Stores Certificate Sheet No 13 dated 03 May 06 and 2 locally produced Flare Usage Record Sheets for XZ614.
16. SIB Statement – {Person K} dated 08 May 06.
17. MoD F707B(IS) SNOW 0967 for XZ614 dated 14 Apr 06.

10 The report is incorrectly dated and should be dated sometime after 27 Apr 06.