

~~RESTRICTED~~ – SERVICE INQUIRY

PART 1.4 – FINDINGS

(All timings are LOCAL unless otherwise stated)

Introduction

1. Although the convening order for the SI Panel indicated that the aircraft involved in this incident belonged to II (AC) Sqn, the first action for the Panel was to confirm the identification through the LFBC and then subsequently the aircraft RAIDS data to confirm the actual route flown versus the planned route. Although the aircraft (ZA557) had landed away from its normal base on 26 Sep 11, the subsequent capture of data was largely successful and ZA557 was identified as being the aircraft involved.

2. The Panel was able to interview the aircrew and the Northeast HAS Site DSoF at RAF Marham and study/copy relevant documentation as well as carry out analysis of aircraft and planning data. The Panel then travelled to Scotland and interviewed the Injured Party in hospital and the owner of Kailzie Equestrian Centre plus four eyewitnesses. The owner had not actually witnessed the incident. Detailed analysis of the RAIDS data was possible with the assistance of MBDA Missile Systems at Stevenage.

Available evidence

3. To assist in their deliberations, the Panel had available the following:

- a. Witness statements including the aircrew, DSoF, Injured Party and witnesses to the incident.
- b. TAMPA planning data for the ZA557 sortie on 26 Sep 11.
- c. R-ADR data from ZA557, exploited by Tornado Maintenance School (TMS) Avionics Instructors, RAF Marham.
- d. RAIDS data from ZA557, exploited by the Panel and subsequently MBDA Missile Systems, Stevenage.
- e. Engineering documentation for ZA557.
- f. Relevant orders and other documentation.
- g. Medical report for the Injured Party.

Unavailable evidence

4. The Panel did not have access to the following:

- a. **VRS.** The VRS system onboard ZA557 was discovered post-sortie to have failed to operate. This was disappointing as it may have helped in providing the forward view as the aircraft flew through the Peebles area as well as audio of the crew. The system was not reported as unserviceable pre-sortie.
- b. **Cockpit Voice Recorder (CVR).** A full download of the R-ADR was requested by the Panel via telephone to II (AC) Sqn. However that

Third Witness

Exhibit 3
Exhibit 18(1)

1.4 - 1

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was interpreted somehow to not include the CVR. Again, this was disappointing, especially as the VRS had failed to operate. However, on considering the time of the incident and subsequent landing time at RAF Waddington, it became apparent that the 40 minute continuous recording loop of the CVR precluded the time of the incident remaining recorded. There was no indication from the aircrew's statements that they had seen, or spoken of horses or the Equestrian Centre as they passed through the Peebles area.

Services

5. To assist the Panel in its deliberations, services from the following organisations were used:
 - a. MAAIB SI advisors.
 - b. MAA Legal advisor.
 - c. MBDA Missile Systems, Stevenage.
 - d. RAF Centre for Aviation Medicine advisor.
 - e. TMS, RAF Marham.

Factors considered by the Panel

6. The Panel considered the following factors when investigating the incident:
 - a. Aircraft data analysis.
 - b. Aircraft routing.
 - c. Aircraft height.
 - d. Aircraft speed.
 - e. Conspicuity of the riding school from the air.
 - f. Injuries to the rider.
 - g. Low Flying System and avoids.
 - h. Service personnel involved.
 - i. Crew fatigue.
 - j. Authorisation and supervision.
 - k. Serviceability of aircraft and relevant equipment.
 - l. Sortie planning and preparation.
 - m. Training, competencies, qualifications and currency.

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- n. Relevant equipment deficiencies.
- o. Post-incident management.
- p. Broader contributory factors or causes.
- q. Security of personnel, equipment or information.
- r. Value of loss/damage to Service and/or civilian property.
- s. Health and Safety at Work and environmental implications.

Analysis of factors

7. Aircraft data analysis.

a. **RAIDS.** Tornado GR4 ZA557 was identified as the military aircraft most likely to have been in the vicinity of Kailzie Equestrian Centre at the time of the incident. In order to confirm this, data from the RAIDS pod was analysed. The sortie can be debriefed using a variety of display views and is primarily used to debrief tactical lessons from training sorties between aircraft fitted with a RAIDS pod. A secondary use can be in providing flight path and parametric data as evidence in the case of incidents such as low flying complaints. The debrief display is able to show the actual flight path of the aircraft. The standard debrief format is a plan view of the aircraft flight path overlaid on MOD Low Flying Chart 1:500,000 scale for the area of interest which can be zoomed in and out. Other display windows can be opened to show a dynamic read-out of aircraft parameters including altitude Above Mean Sea Level (AMSL).

Exhibit 23
Exhibit 24
Exhibit 25
Annex D

b. **R-ADR.** ZA557 was also fitted with an R-ADR which is part of the aircraft On-Board Checkout and Monitoring System. According to the Aircrew Manual "The crash recorder continuously records certain parameters and events and the Central Maintenance Panel indicates failures in avionic and electrical systems to the ground crew. There are no cockpit controls associated with the system. The crash recorder stores audio and system parameters for post-flight ground analysis. Information is recorded on a 4-track continuous loop magnetic tape which runs through the complete loop in 40 minutes. Parameter and event data is recorded in digital form on three of the 40-minute tracks in sequence, so that only data acquired during the last 2 hours of aircraft operation is retained. All Communications Control Systems audio for the last 40 minutes is retained on the fourth track. With external AC power connected, recording commences when the ENGINE START switch is first selected to either RIGHT or LEFT. If an external AC supply is not used, recording starts when the first generator comes on line. Recording continues until the aircraft is on the ground and AC power is switched off." R-ADR data from ZA557 was requested on 29 Sep by the SI Panel and was secured on 30 Sep.

Exhibit 3
Exhibit 18
Annex E

8. **Aircraft routing.**

a. Examination of the RAIDS data confirmed that ZA557 commenced its takeoff from RAF Marham at 1035 hrs. After completing a simulated single engine heavyweight instrument approach to overshoot, the aircraft left the Marham area and climbed to medium level. It flew to the east of RAF Coningsby and over the western edge of Kingston upon Hull before beginning a descent and being established at low level approximately 15 miles west of RAF Linton on Ouse. It flew at low level through the Lake District and entered LFA 16 at 1119:55 hrs (1119 hours and 55 seconds) south of Dumfries. The point at which the aircraft passed closest to Kailzie Equestrian Centre is due south of the fenced in sand covered 'school' where the incident involving the horse and rider occurred.

Second Witness
Third Witness
Exhibit 23
Exhibit 24
Annex D

b. The data shows that at 1136:09 hrs (exactly 1136:09:40) ZA557 passed 155 m (508 ft) due south of the Kailzie Equestrian Centre on a heading of 090 degrees in a right hand turn. The flight-path is shown plotted onto a 1:25,000 map in Figures 1 and 2 below. Figure 3 shows the same flight path data plotted onto a Google Earth image of the area and it is possible to see the riding 'school' (sand covered area) at Kailzie Home Farm (Kailzie Equestrian Centre).

Exhibit 18(3)
Exhibit 23
Exhibit 24
Annex D
Annex E

c. The pilot stated that on approaching Peebles he flew further south of the town than planned to ensure he stayed clear of any built up areas. In low flying the planned line is only a guide and other factors such as terrain, weather, tactics and avoids determine the actual route flown.

Second Witness
Exhibit 7

The Panel finds there is no evidence that the aircraft flew directly overhead the 'school'. Statements from civilian witnesses all differ in their description, and perception, of where the aircraft actually passed.

9. **Aircraft height.**

a. Whilst ZA557 was within the confines of LFA 16 and overflying LFA 20(T), the RADALT bug had been set to 450 ft (MSD 500 ft less 10%). Due south of Peebles the aircraft left the northern boundary of LFA 20(T) but as the planned route took it back over LFA 20(T) a very short time later, the crew elected to leave the RADALT bug as it was. In accordance with the authorisation, the MSD could have reduced to 250 ft but the crew chose to remain at 500 ft. In contrast, a civilian witness states that the aircraft was 'directly above the trees'

Second Witness
Third Witness
Fifth Witness
Exhibit 6(2)

b. The crew were maintaining a MSD of 500 ft despite being outside the northern boundary of LFA 20(T). This was for 2 reasons; the crew elected to remain at 500 ft MSD and to leave the RADALT bug at 450 ft, and **(S40)** and the pilot states that he was deliberately trying to keep altitude and attitude changes to a minimum.

Second Witness
Third Witness
Exhibit 16(4)

c. Detailed analysis of the RAIDS data shows that the aircraft was at a height of 1542 ft AMSL at 1136:09 as it passed 508 ft due south of the school. The elevation of the ground beneath the aircraft at this time was 643 ft, as derived from Google Earth. TAMPA could not provide

Exhibit 23
Exhibit 24
Annex D

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more accurate data due to limitations in the satellite imagery in this area. This shows that the aircraft was at a height of 899 ft Above Ground Level (AGL), 649 ft above its authorised MSD.

d. After detailed analysis of the R-ADR data, the Panel believe that the time at which ZA557 flew closest to the Equestrian Centre occurred 31 minutes and 15 seconds after the start of the recording. At this time the aircraft was at a height of 908 ft AGL, 658 ft above its authorised MSD. The average height of the aircraft 15 seconds either side of the incident was 783 ft AGL.

Exhibit 18(3)
Annex E

e. Both the RAIDS and the R-ADR are susceptible to small errors in the accuracy of the displayed information and the results are subject to human interpretation. The panel investigated these areas extensively before deciding on their findings.

Annex D
Annex E

The Panel finds that the data from the RAIDS pod and R-ADR of ZA557 shows that the aircraft flew due south of the school at a height of 899-908 ft AGL. There is no evidence that the aircraft was 'directly above the trees'. Statements from civilian witnesses all differ in their description of what height it appeared to be at. The aircraft's height is considered **not a factor** in this incident.

10. Aircraft speed.

a. The maximum 'cruise' speed for aircraft in the UK Low Flying System is 450 kts. RAIDS data indicates the ground speed of the aircraft at the time of incident (1136:09:40) was 443 kts. At the same point the R-ADR indicates the calibrated airspeed as 422 kts.

Exhibit 16(1)
Exhibit 18(3)
Exhibit 23
Exhibit 24

b. The difference between the 2 speeds is explained by a variety of factors but the pilot is able to see both ground speed and calibrated airspeed in his Head-Up Display and both were below the maximum permitted.

The Panel finds that the data from the RAIDS pod and R-ADR of ZA557 accurately indicate that the aircraft was at a speed lower than the maximum permitted and is **not a factor** in this incident.

11. Conspicuity of the riding school from the air.

a. The horse and rider (Injured Party) were in a fairly confined area known as the 'school', a sand covered area bounded by a sturdy wooden post and rail fence some 4 ft high. The 'school' is surrounded by tall trees within a strip of wood extending southwest from the Equestrian Centre stables and other buildings. The estimated height of the surrounding trees is approximately 30-50 ft.

Fifth Witness
Eighth Witness
Annex A
Annex B
Annex C

b. From the direction of approach of ZA557 the whole of the Kailzie Equestrian Centre stables and buildings, as well as the 'school' are fairly well screened by trees. This can be seen in Figure 3 by the shadow cast on the ground by the trees. The point at which ZA557 would have crossed high ground to the west of Kailzie Equestrian Centre and the Centre itself is less than one km. The pilot commented that it was difficult to see and avoid individual animals at normal

Second Witness
Exhibit 23
Exhibit 24

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cruising speed and whilst low flying his attention would be concentrated well ahead of the aircraft. Pilots conducting low level flying are taught to glance vertically downwards as an aid to maintaining an accurate MSD. In this instance the pilot would have looked to his right and away (south) from the Equestrian Centre as the aircraft was banked to the right. In relation to the aircraft in a long shallow right turn, the Equestrian Centre would have been effectively beneath the belly of the aircraft. It is therefore considered very unlikely that the crew would have been able to identify the Equestrian Centre, let alone the horse and rider at short range.

The Panel finds that the crew of ZA557 were unaware of the location of Kailzie Equestrian Centre and the horse and rider as they flew west to east to the south of Peebles and this **was a contributory factor**.

12. Injuries to the rider.

a. The Injured Party has been described as a competent rider, and she stated that when the horse cantered forward unexpectedly she thought the horse might attempt to jump the fence at the edge of the 'school'. However, she became unseated as the horse veered suddenly to the right and very close to the boundary fence.

Fourth Witness
Fifth Witness
Eighth Witness

b. It is most unfortunate that the Injured Party struck the boundary fence (actually a fence post) after falling from her horse. The seriousness of her injuries is the reason for a SI being convened.

Fifth Witness
Eighth Witness

c. The wearing of a riding body protector and its usefulness in preventing injury was discussed when the Panel visited Kailzie Equestrian Centre. Opinion was mixed even amongst a small group of riders and there is no legislation directing the wearing of such equipment. It is not known whether the injuries sustained could have been prevented by wearing a body protector.

d. One witness suggested that a horse was more likely to take flight if startled in an enclosed space, whilst in a controlled environment saddled and with a rider, than if it had been unencumbered and in a large open space. Whether this is the case with the horse during the incident is open to conjecture.

Ninth Witness

The Panel finds that due to the suddenness of the incident and the relative speed of the horse and distance travelled across the 'school' before it veered sharply right, the rider was unseated and fell from the horse onto the boundary fence. The horse reacting to being startled by ZA557 passing the close vicinity of the 'school' is likely to be **the primary cause** of the incident. The horse veering sharply to the right at the boundary fence and the rider becoming unseated and falling onto the fence were **both contributory factors**. The horse being in a confined area and more likely to take flight if startled might be considered **an aggravating factor**. Comment has been made on the effectiveness or otherwise of wearing a riding body protector and whether it would have been of any use in preventing the injuries sustained. The Panel could not find enough evidence to give an informed opinion on this issue.

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Exhibit 16

13. **Low Flying System and avoids.** Military fast jet aircraft are allowed to book into the UK Low Flying System for routine low level training flights via the LFBC. The UK Low Flying System is regulated by MAA Regulatory Article (RA) 2330 and the UK Military Low Flying Handbook (UKMLFH). The UKMLFH details all sensitive and restricted airspace which must be avoided. At present crews are not required to avoid direct over flight of Kailzie Equestrian Centre. The Panel investigated current equestrian avoids, information provided to the general public regarding low flying and the feasibility of extending the eligibility criteria of selected equestrian centres.

a. Apart from airfields, large built up areas and danger areas there are 3 main types of avoid in the UK Low Flying System. These are Medical Establishments (ME), Industrial Sites needing protection (IS) and Environmental Avoidances (EA). ME and IS sites are to be avoided by 0.25 nm horizontally or 2000 ft vertically (unless otherwise stated). Equestrian establishments, if granted avoidance criteria, are listed as EA and the size of avoids vary dependant on the role of the site. At present there are 61 equestrian avoids listed in the UKMLFH¹, the majority of which are riding schools for the disabled. Generally the size of avoid is 0.25 to 0.5 nm (radius) horizontally or 1000 ft vertically and most are semi-permanent with associated operating times.

b. Information is available from the MOD website or the Low Level Advisory Service (by telephone) for members of the general public. The Panel found the website pages hard to locate and, once found, difficult to navigate. However, information pertaining to MOD low flying policy is clear and well structured. Rather than detailing exact aircraft movements the service provides warning of general activity in the Low Flying System. Under the present system it is impossible to establish if a known location may be over flown by military aircraft that day and is therefore limited as a planning tool for riders. This will continue to be the case unless all military low level flights are listed in detail before takeoff and no deviations in routing or timing are permitted. Apart from the security implications, such a system would appear to be impractical in practice.

c. The only way to potentially prevent over flight of selected equestrian centres is to grant them avoid status. Two main factors would have to be considered; the timing and extent of an avoid. A permanent avoid would be most favourable to the equestrian centre but least desirable to the MOD due to the potential restrictions placed on low flying operations. This would vary based on its location within the UK Low Flying System. If an avoid was warranted, a temporary avoid would be most favourable to the MOD, although restrictive to the equestrian centre. If an avoid was placed over Kailzie Equestrian Centre it would most likely be 0.25 nm (radius) horizontally and 1000 ft vertically in size. ZA557 flew south of the centre by 0.08 nm horizontally and over 900 ft vertically. Given the incident which occurred this indicates that protection could only be guaranteed with an avoid of greater vertical dimensions. If granted, the restriction placed on MOD low flying operations would be directly linked to the number of equestrian centres granted an avoid. The selection of eligible

¹ There are currently around 600 British Horse Society approved Riding Centres in the UK and the British Horse Directory lists 1,340 riding schools in the UK.

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equestrian centres and maintenance of a register would be a considerable task, let alone the potential restrictions imposed on low flying operations.

The Panel finds that incidents, such as occurred on 26 Sep, might be prevented in future if avoids of suitable dimensions were in place over selected equestrian centres within the UK Low Flying System. However, the size of avoid would probably have to be greater than the current standard EA dimension and the potential impact on low flying operations could be significant. The lack of a suitable avoid around Kailzie Equestrian Centre **was a contributory factor** in this incident.

14. **Service personnel involved.** The Panel found that the crew were on duty and all other service personnel involved were acting in the course of their duties. This was **not a factor** in the incident.

First Witness
Exhibit 22

15. **Crew fatigue.** The Panel found no evidence that the crew were not well rested and fit for the sortie and therefore this was **not a factor** in the incident.

16. **Authorisation and supervision.**

a. **Orders.**

(1) On investigation it was found that the DSoF had not signed for the amendment to the RAF Marham Flying Order Book (FOB); Supervision Order S3: TORs for the Northeast HAS Site DSoF. The TORs had been amended on 1 Feb 11, while II (AC) Sqn were preparing to deploy on Op ELLAMY. On return to duty in Sep II (AC) Sqn personnel liable for DSoF duties had yet to sign for the new TORs.

Exhibit 8

(2) On investigation the panel found that the crew of ZA557 had not contravened any low flying regulations.

Exhibit 16

b. **Authorisation.** The board found there is a discrepancy between the Marham Tornado Wing Authorisation Codes and the '138 Expeditionary Air Wing Record of Flight Form' regarding the correct code for Pre-Armed Thrust Reverse Landing but this was **not a factor** in the incident.

Exhibit 6(1 and 2)

c. **Equipment fit.**

(1) The aircraft to be delivered to RAF Waddington for the ACPV was to be in "either Op ELLAMY or HERRICK fit". There are a number of specified equipment fits dependant on the weapons being carried, and a request was made by RAF Marham to the Delegated Release To Service Authority (DRTSA) and HQ 1 Gp to fly the (S26)². However, ZA557 was actually equipped and flew on 26 Sep in the (S26) (the difference being the latter has (S26)), but with

Exhibit 17
Exhibit 20
Exhibit 26(1-4)
Exhibit 27
Exhibit 28

² (S26)

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a (S26) fitted. Although the (S26) series equipment fits are flown regularly on operations by TGRF crews, both fits are only cleared for flight under an Operational Emergency Clearance (OEC), hence the request to 1 Gp. An internal investigation is being conducted at RAF MARHAM into why this discrepancy occurred in order to learn lessons from this incident.

(2) HQ 1 Gp was asked to confirm that appropriate approval had been given for ZA557 to fly in an OEC equipment fit. The request from RAF Marham had been received and, according to the process then in force, "the approval was given by the [D]RTSA after endorsement by 1 Gp". However, if AOC 1 Gp as Operational Duty Holder (ODH) had been made aware of the request, there is no record of it. The endorsement of the request was made by a member of his staff and authorised by the DRTSA. It was acknowledged that the procedure had changed on 1 Aug 11 to one where the DRTSA endorse such requests and that AOC 1 Gp authorises them. The original request from RAF Marham was before this date but the approval came after.

(3) The current Tornado RTS precludes the fitting of the (S26) with the (S26) equipment fits. The crew believed they were familiar with the limitations of flying in this equipment fit but did not check the current RTS limitations.

(4) Standards and Evaluation of Flying (STAN F) at RAF Marham has stated that he would not recommend flying a single engine heavyweight instrument approach in an operational equipment fit due to the reduced safety margins in the event of an actual emergency.

(5) The outcome of all of the above is that ZA557 was flown on 26 Sep 11 in an unauthorised and incorrect equipment fit and that there is no evidence that the OEC clearance had been endorsed correctly by HQ 1 Gp. Whilst having no bearing on the incident itself, there are lessons to be learned from these observations by RAF Marham and the Tornado Force in general.

The Panel finds that the levels of authorisation and supervision covering the task were inadequate but **not a factor** in this incident.

17. Aircraft serviceability and relevant equipment.

a. **Aircraft VRS.** The VRS system onboard ZA557 was discovered post-sortie to have failed to operate. However, this would not have been of assistance at the time of the incident as there is no real-time feedback to the crew.

b. **Document audit.** There were minor discrepancies found in the aircraft documentation but this had no impact on the incident.

The Panel found that Tornado GR4 ZA557 and relevant equipment was serviceable and **not a factor** in the incident.

Exhibit 26(5)

Exhibit 28

Exhibit 33

Third Witness

Exhibit 17

18. **Sortie planning and preparation.**

a. The crew of ZA557 carried out the planning of their sortie in the normal manner utilising TAMPA. Their choice of low level route was to stay clear of larger built up areas and follow valley features. Examination of the route planned showed no infringements of known avoids or restricted airspace.

Second Witness
Third Witness
Exhibit 7
Exhibit 15

b. The choice of turning points on the planned route of ZA557 does not appear to indicate any intention of deliberately overflying any known equestrian establishment. The aircrew state that they had no idea that an equestrian centre lay under or near their planned route but would take avoiding action where possible if such an establishment was spotted from the air.

Second Witness
Exhibit 7

The Panel finds that the planning was commensurate for the planned sortie content. The route planned for ZA557 on 26 Sep 11 was not deliberately planned to overfly Kailzie Equestrian Centre and was **not a factor** in this incident.

19. **Training, competencies, qualifications and currency.**

a. When attempting to ascertain the aircrew qualifications of the WSO it was discovered that the paperwork trail was not as complete or clear as it could have been. He had arrived on II (AC) Sqn in Mar 11 and, due to his previous experience, it was decided he would complete an abridged combat ready work up. On completion, in accordance with Tornado Training Syllabus (TTS), he would require an Operational Service Certificate (OSC) to be signed by OC II (AC) Sqn and placed in his F5200 (Flying Record Folder). This had not been completed. OC II (AC) Sqn was asked to comment and he accepted that at the time he was committed to ensuring his squadron was ready for war fighting operations in Libya and that the OSC paperwork was awaiting his signature.

Exhibit 2
Exhibit 30(2)
Exhibit 31

b. GASOs mandate that all WSOs are required to complete a WSO check sortie every 12 months with an ACO pilot. This was listed in TACTS³ as being valid until 10 Feb 12. This means the check sortie would have been completed 12 months earlier when the WSO was completing his refresher training on the OCU. The OCU confirmed that although the WSO flew during that period it was not with ACO qualified pilots. II (AC) Sqn was asked to explain when the WSO check was completed. They stated that his arrival check on 7 Mar 11 was also counted as a WSO check. STAN F at RAF Marham was consulted as to the validity of combining the two checks and whether the WSO check could be conducted in the aircraft as the TTS mandates that the WSO check is to be conducted in the FMS. STAN F confirmed that GASOs state that the WSO check can be conducted in either the FMS or the aircraft and that the two checks could be completed together as long as the sortie content was suitable. STAN F was subsequently informed of the arrival check sortie content and confirmed that he was content that the sortie satisfied the requirements of a WSO check and therefore the

Exhibit 2
Exhibit 10
Exhibit 30(1 and 2)

³ Training and Capability Tracking System.

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WSO was current at the time of the incident. He commented that the only error II (AC) Sqn had made was that the sortie report was titled as an arrival check and not arrival check/WSO check.

c. It became clear to the Panel after numerous queries that OC II (AC) Sqn had ratified all of the relevant WSO's qualifications. It was also clear that the TGRF, and not just II (AC) Sqn, elected to hold and track nearly all of their aircrew qualifications and reports electronically. The Panel consider that this system has weaknesses, especially in that most of the documents are not protected and there was little proof that the person electronically signing the document had actually done so. During the II (AC) Sqn deployment on Op ELLAMY, all of the squadron OSC data was lost from the Marham computer server. Electronic qualification tracking is most useful but without a robust control process it can be prone to errors not suffered by a manual paper system. OC Ops and TGRF STANEVAL at RAF Marham advised the Panel that they had already identified this as a problem and were in the process of reviewing their procedures for the award and tracking of aircrew qualifications.

Exhibit 31

d. GASOs define 1 Gp front line crews as dilutee and non-dilutee. For an ab-initio aircrew member, the dilutee period is defined as 24 months (mths) from arrival on the front line squadron. Non-dilutee pilots are required to complete a day ACO handling check every 12 mths and a dilutee pilot every 6 mths. At the 24 mth point, under the present system, a dilutee is automatically granted non-dilutee status without a handling check. The last check completed (typically at the 18 mth point) is then extended for a further 6 mths. There appears to be no input or comment from Tornado standards or Sqn hierarchy of the abilities of the ab-initio pilot at the 24 mth point. Of secondary note, GASOs and TTS dictate that if a pilot handling sortie is completed as part of a Tornado Standardisation Visit it should be recorded as a 'red line' entry in the front of the pilots flying logbook and is valid for two years. Although current TGRF practice is that day ACO checks are completed every 12 mths (6 mths for ab-initios), carried out routinely by a standards pilot, the completion of a 2 yearly standards check is not mandatory.

Exhibit 30
(1,2 and 5)

The Panel finds that the aircrew were trained, competent, qualified and current to conduct the sortie and these were **not a factor** in the incident. The Panel also finds; the tracking system for aircrew qualifications requires tighter control and audit; there is no requirement to conduct a formal day handling check at the 24 mth point for ab-initio dilutee pilots; there currently is no mandatory requirement for Tornado pilots to conduct a formal standards check every 2 years and for it to be recorded in their flying logbook. These latter points are all **organisational observations**.

20. **Relevant equipment deficiencies.** The Panel finds that there were no apparent relevant equipment deficiencies.

Exhibit 17

21. **Post-incident management.**

a. The Panel found that no action was taken by RAF Marham until alerted by DFCIT of the incident. Once alerted, although aircraft data was secured, no formal post-'incident' (as opposed to 'crash')

Exhibit 4
Exhibit 34

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management procedures were available.

b. Due to internal procedures, the CVR download for this sortie was not completed despite a 'full milk' of the R-ADR being requested by the Panel.

Exhibit 3

22. **Broader contributory factors or causes.** The Panel finds that the requirement for fast jet aircrew to train at low level within the UK Low Flying System is a **broader contributory factor** related to this incident.

Exhibit 30(2)

23. **Security of personnel, equipment or information.** The Panel finds that the security of (military) personnel, equipment and information was not compromised during this incident.

24. **Value of loss/damage to Service and/or civilian property.** The Panel finds that no damage was done to military or civilian property in this incident.

25. **Health and Safety at Work and environmental implications.**

a. The Panel finds that there were no Health and Safety at Work implications for the crew of ZA557 at the time of the incident.

b. The implications for the Injured Party are self-evident in that serious injuries were sustained.

Exhibit 21

c. The Panel could find no evidence that MOD policy on reporting of incidents and injuries to the Health & Safety Executive (HSE) directly related to this incident had been complied with.

Exhibit 32

Summary of causes and factors

26. **Causal factors.** The Panel identified the following factors which, if removed, would have prevented the incident i.e. the injuries sustained by the Injured Party from occurring:

a. The horse reacting to being startled by the disturbance created by ZA557 passing close to its location was likely to be **the primary cause** of the incident.

27. **Contributory factors.** The Panel identified the following contributory factors which did not directly cause the incident i.e. the injuries sustained by the Injured Party but made it more likely to happen:

a. ZA557 overflying the close vicinity of Kailzie Equestrian Centre.

b. The crew of ZA557 not seeing the horse and rider.

c. The horse veering sharply to the right close to the boundary fence.

d. The rider becoming unseated [and falling onto a fence post].

e. The lack of any specific aircraft avoidance criteria relating to Kailzie Equestrian Centre.

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f. The requirement for fast jet aircrew to train at low level within the UK Low Flying System.

28. **Aggravating factors.** The Panel is of the opinion that the incident could have been aggravated by the horse being in a confined area, surrounded by fence and trees, saddled and harnessed with a rider on its back and more likely to 'bolt' than if it had been in a more open area.

29. **Other factors.** Nil.

Summary of observations

30. The Panel observes that:

a. The tracking system for aircrew qualifications requires tighter control and audit.

b. There is no requirement to conduct a formal day handling check at the 24 mth point for ab-initio dilutee pilots.

c. There is currently no mandatory requirement for Tornado pilots to conduct a formal standards check every 2 years and for it to be recorded in their flying logbook

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