1.4.6.195 Successful candidates are entitled to the title of FMO. Thereafter they will be considered especially suited for appointment as MOs on flying stations, as the non-specialist members of the staff of the CAM and CFMO( RAF).

1.4.6.196 The Panel observed there was no coherent auditing process of FMO currency for AvMed training although AP1268 states the CFMO is responsible for collating it. Records are kept of attendance at courses, but they are not used in conjunction with monitoring currencies.

1.4.6.197 At the time of writing, there are currently six RAF flying stns (out of 16) that have SMOs who are not DAVMed trained. (RAF Shawbury, RAF Valley, RAF Odiham, RAF Lossiemouth, RAF Linton-on-Ouse, and RAF Northolt).

1.4.6.198 Aviation Medicine Currency and Continuation Training. The Aviation Medicine Continuation Training Course (AMCTC) is held at CAM. Courses run at six monthly intervals. The aims of the course are to:

a. Provide an update on developments in Aviation Medicine, both clinical and non-clinical.

b. Provide a forum for feedback to CAM and CFMO( RAF) on aviation medicine practice and problems at flying units.

1.4.6.199 Attendance. Regular attendance on the AMCTC is an essential feature of the programme of continuation training in aviation medicine for General Duties MOs and CMPs employed on flying stns. All SMOs of flying stns and FMOs in posts concerned with the practice of aviation medicine are to attend the course, with a maximum interval between attendances of 18 months. CMPs on flying stns should attempt to attend the course with the same regularity as Service MOs.

1.4.6.200 MAMEs are required to undertake a minimum of 10 hrs AvMed Continuing Medicine Education every two years. FMOs are required to undertake 20 hrs every two years. Recognised courses/conferences for AvMed Continuation Medical Education (CME) include:

a. AMCTC (mandatory for FMOs and SMOs of flying units every 18 months)


c. International Congress of Aviation and Space Medicine.

d. NATO Flight Surgeons Conference.

e. CAA AME conference.

f. Association of Aviation Medical Examiner's Conference.

g. EASA AME course.

h. Clinical AvMed Update course (primarily for secondary care personnel).

1.4.6.201 Individual MOs and CMPs are to submit a copy of details of their continuation training to the appropriate CA or CFMO, verified by the appraiser. Failure to maintain currency in aviation medicine may result in:
a. A FMO losing the “F” symbol.

b. A SMO who is not a FMO being disqualified for selection for the DAvMed Course.

1.4.6.202 The Panel observed there is no tracking of MAME CME, although AP1269 states Air-Health-GPSO1 at HQ Air Command is responsible for collating it.

1.4.6.203 The Panel observed the CMP was out of date for Aviation Medicine Continuation Training, attending a MAME update in Apr 09. He had booked to attend the MAME refresher in Sep 12 as the course in late 11 was being re-organised and non-FMOs were no longer entitled to attend until a new course was confirmed.

1.4.6.204 The Panel observed that, although the SMO was in date for his CME, he stated he did not know if there was a currency requirement for training.

Flying Executive Records

1.4.6.205 The Panel tasked Typhoon OC STANEVAL from RAF Coningsby to carry out an external audit of the supervisory flying documentation. This was carried out with the observation that “there was no evidence within the documentation to indicate that there were any flying limitations or supervisory concerns” and that the WSO’s “Training Folder was practically non-existent and there were a number of F5363’s missing (in one case, two separately dated reports were identical).

1.4.6.206 The recording of medical-in-confidence information should not be within any medium other than DMICP, but there is a means of recording staff-in-confidence management information within the F5000. ASTON 1 WSO had shared his medical situation with the Flying Executive and his Sqn colleagues, allowing for staff-in-confidence recording of supervisory changes to his flying category (if only for a brief timescale).

1.4.6.207 General Administration Instruction (GAI) 1042 states the policy for Aircrew Assessments and Training Reports, and when explaining the Form 2020G (Aircrew Insert Slip) it states:

“...in order to assist with day-to-day supervision, brief notes should be made on the subjects Form 5200 as required throughout the year of any significant factors which, in the opinion of any of the supervisors, might be expected to have bearing on the individual’s ability to fulfil his/her flying duties in a safe and professional manner.”

“In general, the Reporting Officer should include all information which he/she would consider to be significant if he/she were a new supervisor on the unit with no prior knowledge of the individual concerned. To be of any value, the notes made throughout the year and the completed Form 2020G must be frank and honest. Individuals should be encouraged to inform their supervisors of factors that might influence their ability to carry out their flying duties.”

1.4.6.208 Individuals are recorded as being qualified for flying duties on their Operational Status Certificate (OSC) within their Training Folder. This document states the date of qualification, and the authority to grant the qualification. The WSO attained his Qualified Tactics Instructor (QTI) qualification on 9 Mar 05, which allowed him to instruct on the OCU and fly with student pilots. Any permanent change to status would be recorded on the OSC by removal of the dated signature; however, a temporary change to status is unlikely to be recorded. The WSO’s OSC had not been changed since Jan 12.
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1.4.6.209 Students and instructors who are under training or who are part of a scheduled work-up to gain currency, experience or a qualification place the specific syllabus into their Training Folders to record the planned flying, simulator and ground instruction that is required to achieve it. Sortie and simulator assessment forms are also placed within the Training Folder alongside the syllabus to record both completion of the syllabus and also to record the performance of the individual. Bespoke syllabi are sometimes created for specific individuals depending on experience, operational directives, time, qualification and circumstance. Return to instructional duties and exposure to ML flight could have been such an example of a bespoke syllabus for an instructor in current flying practise.

Analysis

1.4.6.210 The initial flow of information and handling of the medical situation took place in a considered and supportive manner. The discussion between the Sqn OC and the Medical Executive was discrete and appropriate and did not prejudice the care that the patient received in the diagnosis of his condition. The detail of the referral to the DCMH created an emphasis on keeping the patient flying.

1.4.6.211 The engagement with the Stn Cdr was also appropriate once the patient had given his permission to share medical in confidence information with the Flying Executive.

1.4.6.212 The SMO decided to issue two days absence from duties (grounding) after his initial consultation but elected not to issue a F Med 566, or place any further limitations on his JMES prior to any specialist psychiatric assessment. Instead the SMO fed back to the Flying Executive that he regarded the patient was fit to fly. There was no auditable review process put in place whereby the Flying Executive and SMO could discuss the appropriate method to progressively re-introduce the WSO to full flying duties as part of his treatment/recovery.

1.4.6.213 The SMO was not aware of the full scale of the anxiety from ASTON 1 WSO during the initial consultation.

1.4.6.214 The SMO briefed the CMP that the patient had only mild symptoms and was fit to fly; a description that did not trigger concern with the CMP. The CMP then went on leave for two weeks, without knowing that the WSO was attending the DCMH. Although the referral of a senior flying supervisor to psychiatric care on anxiety grounds is rare, the fact that the Flying Executive were aware of the situation, that the patient had not been issued with a limitation on his JMES, that there was no mandated review date specified and that there had not been a F Med 566 issued (which requires a mandatory review after 28 days) meant that the profile of the patient’s illness and treatment was not raised sufficiently to trigger a review of his documentation. Along with there being no DMICP “tasking” process used by the Consultant Psychiatrist, this meant that no MO reviewed either the CPN or Consultant psychiatrist documentation after the initial referral.

1.4.6.215 The DDH felt that his primary form of information regarding the situation was from the Sqn OC. "I don’t need to look the SMO in the eye, I need to look OC XV(R) in the eye, he needs to be doing the work of the SMO". This relied upon OC XV(R) getting independent medical information from the MO rather than from the patient. After the initial feedback from the SMO regarding the patient’s fitness to fly, OC XV(R) had no contact with the station medical centre and therefore the DDH did not gain any updates or analysis from the aviation medicine trained professionals, instead he received medical updates from the patient himself. The patient was an experienced, dependable and senior member of the Sqn who OC XV(R) trusted to give him the full information. This did not take place.

1.4.6.216 OC XV(R) did not feel there was a need for a structured programme to return
ASTON 1 WSO to full flying duties. The limitation to fly the WSO with staff instructor pilots rather than with students was a result of a discussion between the WSO, OC XV(R) and the DDH. The WSO returned to instructional duties at his own direction without any specified medical or flying review, but did not disclose specific medical information to his OC. OC XV(R) felt it was entirely within his remit to authorise changes in instructional status and expected the MO to advise him differently had there been pertinent information to take into account.

1.4.6.217 The CPN had no specific aviation medicine training and only basic aviation experience. He relied upon the patient to explain if symptoms were a limiting factor to his ability to carry out his duties and if they were a hazard. He did not feel that being unable to look out of an aircraft due to flying anxiety posed a flight safety hazard.

1.4.6.218 The Consultant psychiatrist was able to recommend that the patient was fit or unfit to carry out his flying duties. He did not have any aviation specific experience, but understood the channels he could use to gain support if he felt that it was required. He understood that “we have a GP [General Practitioner] behind us who is an experienced Air Force doctor” who would be reviewing the treatment and who “saw [the patient] in-between [psychiatric consultations] as well”. The SMO reviewed the CPN’s notes after his first assessment with no comment; the CMP did not review the WSO’s notes on DMICP and did not review the patient. The CMP did not know the patient was under the treatment of the DCMH. This meant the Consultant did not have GP (Mil) support in this case.

1.4.6.219 The Care Plan formulated for the WSO was not graduated, without stipulated review stages required for assessment and progression. It also did not encapsulate the occupational aspects of the condition that needed to be monitored by both the Flying Executive and the medical branch. The requirement to carry out a simulator assessment was never achieved, nor did the medical branch assess the WSO’s levels of anxiety during flying. There was a Care Plan, but it was not a holistic one which incorporated the Flying Executive, the Medical Executive, the patient and the treatment. A Care Plan needs regular and open channels of communication between the Medical and Flying Executive.

Figure 72. Information Flow after Initial Presentation to SMO

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1.4.6.220 The following facts led to the WSO being the sole conduit for all medical information to the Flying Executive:

a. OC XV(R) did not gain an update from the SMO/CMP;
b. the CMP did not review any medical documentation on DMICP due to no tasking process taking place and his belief that the patient did not need review at this stage due to the handover from the SMO;
c. the DDH regarded OC XV(R) as the information guardian, expecting him to have spoken to the MO;
d. the CPN relied upon the WSO to assess if his symptoms posed a FS hazard;
e. the Consultant Psychiatrist expected the Stn MO to review his notes as the supporting aviation medicine expert.

1.4.6.221 On his last meeting with the CPN, the WSO stated he was worried that the situation would affect his ability to continue in his current employment and could have a subsequent impact on his career (even though he had been assured by his OC that this was not the case). This is the only evidence the Panel has to suggest that these consequences affected the information the WSO was willing to give to the Flying Executive and his decision to resume instructional flying.

CAA Comparison

1.4.6.222 **CAA.** The Civil Aviation Authority (CAA) has a similar structure and process to certify that commercial and general aviation pilots are medically fit to fly. The Panel felt a comparison with the Civil Aviation medical process would be pertinent in identifying how an individual with a Class 1 medical certificate would be diagnosed, treated, assessed and disposed if they presented to their General Practitioner (GP) or Aviation Medical Examiner (AME) with flying anxiety.

a. **CAA Chief Medical Examiner (CME).** The CAA CME is responsible for the overarching policy and supervision of the medical process for all Class 1 and Class 2 medical certification of commercial and general pilots. In assessing the process of a current pilot presenting with anxiety to either a GP or an AME, she stated that normal practice would be for the AME to recommend a period of no flying while the pilot is assessed and treated for the condition. The treatment would be through a local GP and local mental health department, but the assessment would be via the CAA psychiatric department (normally via the AME). The patient would have access to occupational health specialists and the employer would be engaged to be informed of the situation, process and route to return to flying. This would involve the potential disclosure of medical in confidence information, which would require the permission of the patient. She explained that the AME had the power to withdraw the Class 1 medical certificate and this would be the initial action. She stated that, as this was the default action in all medical situations, it meant that all personnel holding the certificate knew the process and did not feel prejudiced as everyone went through the same process. Had there been different levels of response it could result in some patients feeling there was a potential worse outcome if their certificate was removed. When presented with the case in question, the CME stated unequivocally that the aircrew patient would have been grounded prior to treatment. Although the CME stated that engagement with the employer would be sought regarding any change in medical status, this engagement would take place through the individual. She stated, *we have no direct relationship with employers so our relationship is with the individual.*
certificate holder and then it is the responsibility of the certificate holder to liaise with their own operator". This places a significant responsibility on the individual to declare any changes in medical status, and highlights the positive relationship that military medical centres and specialist carers have with the Flying Executive. The CAA carry out "ramp inspections" to check if an operational limitation is being applied rather than engaging directly with the employers.

1.4.6.223 **Aviation Medical Examiner.** The AME had 40 years of aviation medical experience and had been a military doctor. When presented with the hypothetical situation of a patient with the same symptoms as the WSO, he diagnosed an anxiety disorder and stated that he would have wanted to ensure the patient agreed to a period of non-flying (grounding) while treatment took place. He stated this would be a removal of the Class 1 medical certificate and that he would seek psychiatric help for the patient within the CAA system. He stated that he could remain engaged with the patient as his GP/AME but there would be a necessity for CAA approval to regain his medical status via the psychiatric department. The AME diagnosed a moderate to severe anxiety disorder and would have liked to continue treatment to identify background/deeper triggers for the anxiety. On a hypothetical patient who attempted to pressurize the AME to remain flying in order to manage exposure to the anxiety, the AME maintained he would not allow the patient to continue flying as the symptoms were too severe.

1.4.6.224 **CAA Psychiatric Consultant.** The CAA Consultant had six months of experience working with the CAA, but had extensive experience in mood disorders, anxiety and psychiatry. His job is to assess treatment and the health of aircrew within the CAA medical system in order to give them the clearance to continue or resume flying. There is delineation between his role as an assessor and as a clinician in treating the patients (as there is a need for independence from these roles). In the hypothetical situation of a patient presenting with the symptoms of the WSO, he concurred with the AME diagnosis and would have supported the course of action and period of no flying while treatment took place. He explained that there could be a number of treatments for such disorders ranging from pharmacological to behavioural treatments and his role would be to assess the patient towards the end of the process. If he was consulted with a patient with the same symptoms as the WSO, he would consult with an occupational expert within the CAA, but the severity of the symptoms made it clear to him that he should not be flying until a structured return to health (care) plan had been put in place. He graded the condition as "...a significant anxiety disorder...there's physical symptoms...there's psychological symptoms...there's panic attack...there's avoidance, there's anticipatory anxiety...it's got all the hallmarks of a significant anxiety disorder." There is no common time frame for the treatment (and recovery) process, but the consultant believed it could take several weeks, or longer, if a period of medication is required.

**Conclusions.**

1.4.6.225 The CAA case study allowed the following conclusions:

a. The CAA would not have allowed aircrew to continue flying in parallel with assessment or treatment. The default process is a period of non-flying. The CAA stated that this would be a formalised process that would capture all examples. ASTON 1 WSO also had a period of non-flying, but it was not part of a formalised process.

b. The CAA regulate that an occupational check is required to gain full medical fitness (a simulator flight or a check flight) as well as a medical review. The CPN planned an occupational medicine check (simulator) but it was not mandated as part of the Care Plan.
CAA and G-BYXR and G-CKHT Accident Case Study

1.4.6.226  **G-BYXR and G-CKHT accident.** On 14 Jun 2009 there was a mid air collision between a Grob Tutor G115E and a Cirrus glider G-CKHT which resulted in two fatalities. The flow of medical information between MOs and the Flying Executive was analysed as being a factor in the accident, along with the lack of inclusion of occupational medicine in the assessment of the Grob pilot’s ability to carry out his full flying duties in light of his medical condition.

1.4.6.227  The Tutor pilot had the condition Ankylosing Spondylitis (AS). This is an inflammatory spinal disorder, which causes fusion of the bones of the spine and results in a fixed forward stooping posture. The MO assessing the pilot’s ability to fly (specifically if the pilot was capable of a full lookout manoeuvre due to the fusing of bones in his spine) relied upon the Commanding Officer (CO) to carry out a “cockpit check” in place of an FMO. The MO did not question the variance between the subsequent approval from his CO and a previous specialist opinion which assessed the pilot as having a range of movement limited to 50% of that of a healthy person. Having not seen medical records of past examinations, the MO could not gain a full medical picture regarding the pilot’s fitness to carry out his full duties, and did not link his corrective lenses with a compromised ability to conduct a comprehensive look out. The Grob pilot had been medically downgraded for many years and granted a medical waiver exempting him from carrying out parachute drills due to the risk of pathological fracture. This was not transmitted to his Flying Executive or recorded outside of the medical in confidence arena and so they were not able to make a judgement on the pilot’s suitability to fly with cadets. There were recommendations made within the accident report to ensure medical limitations are recorded in the F5000. Retention of flying assessment documentation might also have highlighted to the CO that there were concerns regarding look out.

1.4.6.228  This short summary to a lengthy analysis of the medical assessment of a pilot within the RAF system resulted in conclusions that the management of the pilot’s medical condition and supervision of his assessment of his ability to carry out his full duties were not sufficiently robust. In particular it was noted that there was a reluctance to question the pilot’s medical fitness for role and that this contributed to the accident. The Convening Authority commented that “we have a responsibility for understanding the health of all the pilots that fly our aircraft no matter what their status. If we are not fully aware of a Regular or Reserve RAF aircrew individual’s medical status then he/she should not be flying Service aircraft.”

1.4.6.229  The accident between Grob Tutor G115E and Cirrus glider G-CKHT is used as a case study at Aviation Medicine courses and continuing training courses, with the importance of information flow between the Executive and the medical branch being highlighted as vital to ensuring aircrew are fit to carry out their duties.

Analysis

1.4.6.230  Although the linkages are highlighted to military and civilian medical staff, there are inescapable parallels between the medical supervision and management of ASTON 1 WSO and the pilot of G-BYXR. The fact this can continue to occur after it being used as a case study and, with the perils of miscommunication being highlighted, poses questions to the current relationship between medical staff and Flying Executives.

Conclusions
1.4.6.231 The Panel concluded that:

a. the management of flying anxiety by exposure to the phobic activity is entirely reasonable and a recognised means to treat such disorders;

b. ASTON 1 WSO was part of a Care Plan, however it did not involve the Medical and Flying Executive of RAF Lossiemouth and was not of a suitably structured nature to ensure the correct level of oversight and supervision;

c. expert opinion was that ASTON 1 WSO’s symptoms and condition were of a more serious nature than “mildly anxious”. The information given to the Stn MOs who were involved in the supervision and treatment of the WSO did not reasonably allow a full diagnosis as they never received the full picture of his condition;

d. had a structured Care Plan been generated including RAF psychiatric consultation and aviation medicine oversight, a review based treatment plan would have ensured a “stepping stone” approach to instructional and ML flying under controlled conditions. This does not prejudice the quality of psychiatric treatment he received;

e. the Sqn OC made no auditable record of decisions wrt to ASTON 1 WSO’s instructional status or management;

f. the IT system in place to ensure information transfer has the requisite capability, but is subject to training and policy constraints which adversely impacted the efficacy of the system.

1.4.6.232 As described in para 1.4.3.51 h, the Panel could not rule out the influence of ASTON 1 WSO’s medical condition on his decision to descend into the Moray environs without a radar service, therefore the Panel concluded that the lack of a formalised and effective Care Plan of ASTON 1 WSO was a contributory factor.

Conduct, Management and Assurance of Aircraft Engineering

1.4.6.233 This subsection covers the conduct, management and assurance of aircraft engineering. It is subdivided into the following sections:

a. Aircraft Specific Faults

b. Documentation

c. Personnel

d. Sqn Supervision and Assurance

e. Stn / Air Cmd Assurance

f. MAA Assurance Audit

g. Analysis

h. Conclusion

Aircraft Specific Faults
The conduct and management of maintenance generated the following issues with regard to the serviceability of ZD812 and ZD743.

a. **ZD812 Left Hand Quarterlight Chip.** The chip had not been blended/polished out as required by the Project Team (PT) concession. Tornado Engineering Flight (TEF) had obtained the concession while conducting Primary Star (P*) maintenance. They sought the concession because this damage would have been assessed to have been minor had it occurred in a zone of the windscreen where damage is permitted. The concession details and requirement for blending/polishing had been entered into the Acceptable Deferred Fault (ADF) Log in the entry in which replacement of the quarterlight was deferred. TEF did not raise the task to perform the blending/polishing, and it was not done. Quarterlights are not replaced individually; instead Front Line (FL) units replace the whole windscreen. The Tornado windscreen is comprised of three panes of glass, two of which are the left and right hand quarterlights. On this occasion, the decision was made not to replace the windscreen until the aircraft went on its next Minor service. The equipment to blend/polish the chip is available in FL units and such tasks are routinely carried out.

b. **ZD743 Auxiliary Air Doors.** The auxiliary air doors of ZD743 were overdue maintenance which must be conducted every 300 flying hrs. Authority to defer this maintenance rests with the Engineering Authority (EA) unless the aircraft is “on Out of Area Operations”. This aircraft was not deployed out of area. The Senior Engineering Officer (SEngO) deferred the maintenance by a total of 20% without authority to do so.

**Documentation**

1.4.6.235 A Quality Audit (QA) of the preceding year’s documentation of each aircraft was conducted by the Joint Air Engineering Assurance Team (JAET) of Joint Helicopter Command (JHC). ZD743 was in the custody of XV(R) Sqn for the full year of documentation audited. ZD812 was in the custody of TEF from 6 Dec 11 to 19 Mar 12 for its P* maintenance and XV(R) Sqn for the remainder of the year audited. The QA identified no maintenance activity or issues which contributed to the incident. It did, however, identify several significant concerns with regard to maintenance personnel not adhering to regulations, orders and maintenance processes. These issues included:

a. Preparing aircraft for flight in the initially armed state without authorisation.

b. Conducting maintenance operations involving the use of tools without raising tool control entries in the MoD F700C.

c. Lack of rigour in the completion of maintenance documentation.

d. Signing for having completed QA/management checks without having completed the required work.

e. Authorising deferral of maintenance without adequate engineering authority.

**Preparing Aircraft for Flight in the Initially Armed State without Authorisation**

1.4.6.236 A maintenance procedure exists in DAP101B-4100-2(R)1, Part 1, Leaflet 408 to prepare the aircraft for flight with the Mauser Gun in the initially armed state. That Maintenance procedure states that:

"Normally, if a Tornado aircraft is not flying on a gun-firing sortie, the gun is to be unloaded. However, there are occasions when, for operational reasons, an aircraft..."
may be required to fly with the gun ammunition loaded but with the gun electrically disconnected (In the initially armed state law Reference A)."

"The gun is only to be flown in the initially armed state when ordered by the officer authorizing the flight. When a Tornado aircraft is required to fly with the gun in the initially armed state the following procedures are to be implemented and are to be documented in the MOD Form 700:

a. Electrical isolation and security of gun firing lead. When an aircraft is cleared for final arming, the gun firing lead connector is to be placed inside a suitable polythene bag and the gun firing lead is to be secured to the link chute with a minimum of 2 Ty-Wrap cable ties. It must be ensured that the gun firing lead, firing lead connector and polythene bag are firmly secured to prevent damage or loose article hazards. The gun bay access door is only to be secured following inspection and clearance by the aircraft commander.

b. Documentation. The final arming certificate on the MOD Form 705 is to be annotated, in red ink, "GUN INITIALLY ARMED - GUN FIRING LEAD IS BAGGED AND TIED BACK" and the MOD Form 705 signed as normal. The MOD Form 706 is to be completed in the normal manner. The work undertaken to blank and secure the gun firing lead, or to recover it to its original condition, is to be documented on MOD Form 707A and certified in the normal manner."

Reference A was a reference to Joint Air Publication 100A-01, which had been superseded by the Manual of Maintenance and Airworthiness Process (MMAP) known as MAP-01. The applicable reference in MAP-01 reads:

"Normally, if an aircraft that carries an installed gun is not flying on a gun-firing sortie, the gun(s) is/are to be unloaded. However, there are occasions when, for operational reasons, an aircraft may be required to fly with gun ammunition loaded but with the gun(s) in the initially armed state (ie electrically disconnected or similar inhibition). The gun(s) is/are to be flown only in the initially armed state when ordered by the officer authorizing the flight. Crew-served aircraft weapons must be operated in accordance with platform-specific procedures.

Procedures for preparing aircraft to fly with guns in the initially armed state
Where appropriate to the aircraft type, aircraft PTs must publish specific procedures in the Topic 2(N/A/R)11 for flying aircraft with gun ammunition loaded but with the gun(s) inhibited from firing."

Throughout the TGRF, Tornados were being flown routinely in the initially armed state. Both the DAP and MAP-01 permit flight with the gun in the initially armed state for "operational reasons". "Operational reasons" is not defined in MAP-01 or MAA02: Military Aviation Authority Master Glossary MAA02. Definitions are given for:

a. Operational Flying. "Any mission that is tasked under an operation order or air tasking order and is not for training purposes, or is flown to aid third parties, either civilian or military, where lives are at risk, or any authorized mission where the lives of the crew or crews may be threatened by a third party."

b. Operational Emergency Clearance. "Within the Release for an aircraft, there may be some sections that clear the use of equipments, systems or operating modes that do not satisfy the project safety standards for a Release but that can be included with special conditions attached. Such sections are defined as "Operational Emergency Clearances" (OEC) within the overall Release and will be marked as"
such."

1.4.6.239 The specific meaning of the words “operational reasons” is not clear. OECs, for example, are not restricted to use during operational flying. The intent, however, is sufficiently clear that this should not be considered a routine occurrence.

1.4.6.240 The maintenance documentation entries which cover tying back and arming the gun did not state what maintenance processes the work had been done in accordance with. It was not possible to confirm that the correct procedures were being followed. Entries on the MoD Form 705 did not meet the requirement of Leaflet 408.

1.4.6.241 Leaflet 408 and MAP-01 direct that aircraft are only to be flown in the initially armed state when ordered by the officer authorising the flight. The state in which aircraft were flown was driven by the flying programme (Flypro). The Flypro dictates what sorties are to be flown when, but it is not an order from the authorising officer. Aircraft were prepared to fly in the initially armed state by the engineering flight in accordance with the Flypro. It had become a matter of routine. The officers authorising flights were presented with a fait accompli with regard to the Flypro and aircraft states, and were not in a position where they would have needed to consider ordering the aircraft to be flown as such.

1.4.6.242 The process of flying an aircraft in the initially armed state had become routine on XV(R) Sqn. The engineering flight considered it routine and did not refer to the maintenance process when recording the work in the aircraft maintenance documentation. The aircrew considered it routine and not sufficiently out of the ordinary for it to require specific authorisation outside of the routine sortie planning process.

Conducting Maintenance Operations involving the use of Tools without raising Tool Control Entries in the MoD F700C

1.4.6.243 MRP RA 4251 Tool Control Procedures states:

"Organizations within the Military Air Environment shall employ control procedures to ensure full accountability and traceability of all hand tools used on aircraft or aircraft associated equipment."

1.4.6.244 The Acceptable Means of Compliance (AMC) are contained within MAP-01. The AMC contains the following direction:

"MMT\[16\] – Each aircraft must be allocated an MMT. Before hand tools may be used to carry out maintenance of an aircraft, a tradesman must take control of the MMT, raise an entry in the aircraft MOD Form 700C to this effect using the appropriate MOD Form 707 series and take it to the issue centre. Whenever the MMT is in the issue centre it indicates that tools may be issued for use on that aircraft. Use of the MMT is detailed in paragraph 7.1."

1.4.6.245 The MoD F700 paperwork present in the MoD F700C and previous 12 months archive of both incident aircraft contained few tool control entries. On average, each aircraft had one tool control entry raised per month. The tool control entries covered periods of a few hours. The timings of the entries did not coincide with particular maintenance operations. Major rectifications and inspections were carried out without tool control entries having been made.

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16 Master Maintenance Tally – This is a single Master tally.
Lack of Rigour in the Completion and Management of Maintenance Documentation

1.4.6.246 A general lack of rigour in completion of maintenance documentation was identified. This resulted in difficulty identifying which tradesman completed which task, and what procedures each task was completed in accordance with. Errors found repeatedly included the following:

a. Missing or inaccurate detail including Airframe (AF) hours, start date/time, Original Serial Number of Work (SNOW).

b. Mandatory wording not used for tool control and to raise independent checks.

c. The majority of work orders had two printed 707B front sheets. The two sheets often bore conflicting or inaccurate details. Signatures were spread across the two sheets and continuation sheet details were often omitted. Having two sheets often resulted in the same work order being co-ordinated by two different tradesmen.

d. Multiple maintenance tasks were entered on the same 707A. Multiple 1st signatories signed for the work, but it was not clear which signatory was signing for what work. Similarly, where parts of a maintenance procedure (MP) were completed by different tradesmen, the MP was not ruled off to delineate which tradesman had completed each task.

e. References to the Tornado Aircraft Document Set (ADS) to identify what procedures work was conducted in accordance with were often omitted.

f. Some required forms, such as the 799/1, were not present. Many in use forms had been superseded by newer versions but had not been replaced.

These omissions and errors would also have made it challenging to conduct effective QA activity.

Signing for having completed QA/Management Checks without having completed the required Work

1.4.6.247 The QA checks identified a number of issues within the MoD F700 paperwork, which are specifically listed for checking within the Mgt 8 checks. Personnel responsible for the conduct of Mgt 8 checks had signed the check paperwork to state that they had completed the required check, but the issues they were specifically required to check were not identified or resolved. Specified checks included:

a. “Check that all MOD F700 forms are in the correct order and correct revision state iaw JAP100A-02.”

b. “…check all forms are completed accurately iaw JAP100A-01, JAP100A-02, AP100C-02, MOD F799 series and MOF F300 poster series.”

c. “Check all SNOW, Dates, A/F Hours, WHF code and Originator Names are correctly entered for all in use SNOWs…”

d. “Check that the MOD F799/1(Tornado IDS) is the correct revision iaw JAP100A-02.”

1.4.6.248 It was observed that the MoD F700 Quality Checklist in use for the Mgt 8 checks in Feb 12 was at amendment level (AL) 14 and contained out of date references to
Joint Air Publications (JAP). At that time the TGRF Aircraft Engineering Standing Orders (AESOs) were at AL 31, issued in Feb 12. The order within which the checklist is published was previously amended in AL 29 in Dec 11. The Mgt 8 checklist in use had been printed from an out of date version of AESOs. The update in AL 29 did not include any amendments of the out of date references. The checklist would have contained out of date references even had the extant checklist been used.

Authorising Deferral of Maintenance Without Adequate Engineering Authority

1.4.6.249 Special Instruction (Technical) SI/Tornado/265 had been deferred for the Auxiliary Air Doors fitted to ZD743. The same SI(T) was also found to have previously been deferred on ZD812. MAP-01 Chap 5.3 para 7. states:

"Special Instructions (Technical) (SI(T)) are not to be considered as scheduled maintenance activities when applying latitudes. Any permitted latitudes for SI(T) will be promulgated as part of the instruction in accordance with RA 4457 and Chapter 10.5.4 and Chapter 10.5.5."

Deferral of this SI(T) can only be made by the EA unless the aircraft is deployed out of area (OOA). Neither aircraft was deployed OOA at the time of the deferral, thus the exception did not apply. EA authority was not obtained for either deferral.

Personnel

1.4.6.250 In interview the engineering flight personnel, up to SNCO level, were found to have a poor understanding of engineering authorisations. Of those asked, none said they had been given a copy of their own authorisations, although most had an idea of where they might be held within the unit. It is difficult for a unit to ensure that maintenance is conducted by appropriately authorised personnel when neither the personnel conducting the maintenance, nor their supervisors know, or can check who is authorised to conduct which maintenance operations.

1.4.6.251 An example of this is where, in interview, an experienced SNCO with responsibilities as a MoD F700C Coordinator did not understand what was meant by the term engineering authorisations. He did not know his own authorisations and was unsure of the regulations pertaining to them. He did not know that Joint Air Publications (JAP) had been replaced by the Manual of Maintenance and Airworthiness Processes (MAP) (the change had occurred a year beforehand). The responsibilities of a MoD F700C Coordinator are detailed in MAP-01 Chap 2.8 para 13.3:

"MOD Form 700C Coordinator"

When all the necessary flight servicings have been completed, the MOD Form 700C Coordinator clears the aircraft for flight by signing the co-ordinating certificate of the relevant FSC. This signature certifies that, from examination of the MOD Form 700C and, if appropriate, any IS documentation:

1 No limitations or acceptable deferred faults are due for rectification or removal.

2 The flying hours and component running hours recorded in the flying log and equipment running logs have been calculated correctly from the previous sortie details and the totals prior to that sortie.

3 Any flying requirements have been entered in the Aircraft Maintenance Log and the relevant FSC annotated appropriately.
4 With the exception of entries authorized by RA 4261 and Chapter 6.10, the aircraft is serviceable in accordance with RA 4300 and Chapter 7.2.

5 No preventive maintenance or component replacements are due or will become due during the planned sortie.

6 An authorized tradesman has certified all entries in the Acceptable Deferred Husbandry Log (MOD F704A).

7 All hand tools have been accounted for in accordance with RA 4251 and Chapter 6.1.1.

8 The appropriate flight servicings have been completed and certified.

1.4.6.252 Responsibility 6 requires a knowledge of engineering authorisations and responsibility 7 requires a knowledge of up to date tool control procedures. The Panel observed that the SNCO’s understanding of the general conduct of maintenance had stagnated at the point at which he last received formal training from a training organisation.

1.4.6.253 The individual had been employed at RAF Lossiemouth since at least 2006 when JPA recording began. He was promoted once within that period and was moved between RAF Lossiemouth based units. In that time he attended some equipment maintenance courses focused on specific equipment, rather than the general conduct of maintenance. He had not had any reason to return to a training organisation for general training. Such reasons might have included being trained in the skills needed to take on additional responsibility, as might be required at specified career points or when assigned to a different post.

1.4.6.254 Similar issues were evident in those personnel interviewed from SNCO down. Those personnel who had come from training most recently were aware of more recent regulations and policy, but were accepting of the norms presented to them by their seniors. OC XV(R) Sqn believed that his Sqn suffered from stagnation to a greater degree than the remainder of the TGRF. The XV(R) Sqn Task is more static than other TGRF Sgns and thus they can accommodate more non deployable personnel. Typically, once posted to XV(R) Sqn, these personnel would not return to the FL. It is noted that Central Line Training (CLT) conducts much of its training on the line at XV(R) Sqn. The practices at XV(R) Sqn are taught to TGRF ab-initio technicians.

1.4.6.255 Local methods for keeping personnel up to date included low level briefings when specific changes took place and personnel being required to read technical bulletins and sign for having done so. These methods do not appear to have been effective in communicating more fundamental changes such as the supporting mechanisms for Engineering Authorisations and changes from JAP to MAP.

1.4.6.256 Levels of knowledge were markedly better from the rank of Flt Sgt upwards. They knew their own authorisations and the MRP well; despite this, they had not identified the specific failings raised in the QA of documentation. Some of those interviewed had specific responsibilities to grant/Manage authorisations, oversee maintenance operations on the Sqn and to conduct QAs of completed documentation. This indicates that whilst the individuals understood the regulations, policies and orders which govern their work, either they did not supervise and oversee the work being done on their behalf sufficiently well to recognise where it fell short of the requirement, or they too had become accepting of the norms and did not challenge them.

Sqn Supervision and Assurance

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Miliary Aviation Authority

MAA

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1.4.6.257  OC XV(R) Sqn did not have TORs. He had no formal guidelines on a Sqn Commander’s responsibility with regard to his engineering flight. Notwithstanding, he understood that he had command of the engineering flight, which included establishing priorities and matching the task to the resource to reduce the build up of pressure/friction. He was acutely aware that whatever task he set had a direct impact on the pressure the engineering flight felt, either self-imposed or real. He understood, however, that he had no levers on engineering standards and practices and that responsibility for this fell to OC ELW. OC XV(R) Sqn was not involved in ensuring that maintenance operations were being conducted correctly.

1.4.6.258  Direct supervision of the engineering flight was performed by the SEngO and his three Junior Engineering Officers (JEngOs). One of the JEngOs was an exchange officer from the German Air Force still receiving training to enable him to work in the RAF. A second JEngO had arrived fresh from training and had only been granted engineering authorisations the week preceding the accident. Thus, at that point, amongst the Engineering Officers only the SEngO and one JEngO had sufficient experience to effectively supervise maintenance operations, and to recognise any drift from published orders and procedures.

1.4.6.259  The Engineering Officers were directly supported by a Warrant Officer (WO) and three Flight Sergeants (Flt Sgts). These posts were filled with Suitably Experienced and Qualified Personnel (SQEP).

1.4.6.260  The SEngO and JEngOs did not believe that any significant problems currently existed on the XV(R) Sqn engineering flight. The flight was very busy, but it was successful. They considered that the conduct of split Sqn operations introduced additional challenge in terms of having sufficient personnel to perform the task. They were aware of the additional pressure this might place on individuals and were managing it carefully.

1.4.6.261  The maintenance personnel interviewed shared the views of their SEngO and JEngOs that whilst additional demands were being placed upon them, the impact was being managed well.

1.4.6.262  Twelve months before the accident, XV(R) Sqn had achieved 5000 flying hrs in a year of flying. This was the result of a command led push to maximise flying activity. The push saw activity in the engineering flight concentrated on the activities required to produce flying hours at the cost of those that did not directly contribute. Such non-contributory activities included Physical Training (PT), Adventurous Training (AT), training courses and leave. The engineering flight estimated that at normal work rates, it required an additional 40 personnel to complete the task. Personnel were required to work additional hours to make up the shortfall.

1.4.6.263  The Panel also considered that the ongoing Armed Forces Redundancy Programme had increased pressure on XV(R) Sqn by reducing available manpower. 20 Junior Non Commissioned Officers (JNCOs) from XV(R) Sqn were selected for redundancy in tranche 2, announced on 12 Jun 12. Some of those JNCOs had already commenced resettlement training at the point of the accident, placing additional pressure upon the remaining personnel who were also split between Cyprus and RAF Lossiemouth.

1.4.6.264  The SEngO took command of the Engineering Flight following the achievement of 5000 flying hours and identified shortcomings in the standards and practices exhibited in

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the conduct of maintenance. He and OC XV(R) Sqn noted that significant improvements had been made in the subsequent year leading up to the accident.

1.4.6.265 Given the consensus on the Sqn that the demands upon them were being managed well, the conclusion is drawn that the maintenance practices identified through the JAEAT QA were not a product of a short term increase in demand on the engineering flight or pressure exerted upon individuals. The current Sqn leadership stated that practices had improved in the short term (previous 12 months). These maintenance practices had developed over a period of years and had become normalised and persistent such that they were not readily recognised as being deficient.

Stn / Air Cmd Assurance

1.4.6.266 There is a comprehensive system of internal and external quality assurance at RAF Lossiemouth coordinated by the Engineering and Logistics Wing (ELW).

a. **RAF Lossiemouth Internal Quality Assurance (IQA).** Stn level assurance is a product of Sqn Quality Audits (SQAs) and Internal Quality Audits (IQAs) conducted by the Stn based Quality and Continuous Improvement Team (QCIT) on behalf of the Stn Cdr. The QCIT audits are conducted in accordance with a rolling programme encompassing all RAF Lossiemouth based units. QCIT also conducts bespoke audits when directed by OC ELW. Audit findings are presented to OC ELW and unit commanders.

b. **Air Command External Quality Assurance (EQA).** The Command External Quality Audit Team (CEQAT) carries out Command External Quality Audits (CEQAs) on all Main Operating Bases (MOBs) and Deployed Operating Bases (DOB). At RAF Lossiemouth, CEQAT audits are enabled by the ELW, but are run to the programme of Air Command. Findings are reported to the Executive Officer (XO), Chief Engineer (Air) (CE(AIR)) and COS Support of Air Cmd. Feedback is also provided to the relevant AOC and Stn Cdr.

1.4.6.267 **RAF Lossiemouth IQA.** OC ELW maintained up to date charts showing the findings of SQAs and QCIT led IQAs. He organised the findings into a colour coded petal diagram which enabled him to see, at a glance, the assessment of standards in each unit. This provided OC ELW with an understanding of the strengths and weaknesses of each unit. The accuracy of that understanding was reliant upon the rigour with which the SQAs and IQAs were completed.

1.4.6.268 As at 3 Jul 12, the petal diagram indicated that minor issues existed in a number of areas, but that there was nothing seriously wrong in XV(R) Sqn and RAF Lossiemouth as a whole. In fact, XV(R) Sqn was considered to be strong and concerns of poor performance lay elsewhere as a result of another sqn having had a particularly high tempo of commitments.

1.4.6.269 The SQA/IQA audits focussed on assessing whether or not processes and procedures were both compliant with regulation and sensible for users to follow. There is evidence that the SQAs/IQAs were effective in identifying how processes could be optimised/improved and that they were having a positive effect in XV(R) Sqn and across the stn as a whole.

1.4.6.270 Where IQAs did include assessment of conformity of maintenance line activity and documentation standards, QCIT did not identify the maintenance issues raised by JAEAT. QCIT would not routinely check a full year’s worth of documentation for a single aircraft, and would not be expected to identify all of the issues above. However, most of the
issues are evident in even a small snapshot of the aircraft documentation. Similar to the XV(R) Sqn management, QCIT either did not identify the issues or had also become accepting of the norms.

1.4.6.271 A SQA of aircraft documentation took place in Mar 12. It identified that the MoD F700 of ZD745 contained a number of out of date forms. The summary of the IQA did not reflect this finding and stated that there were no areas in need of improvement. The SEngO made a comment on the summary, but did not refer to or address the issue with documentation. The Quality System Owner (QSO) made comment after the SEngO and recommended that all of the MoD F700s held on XV(R) Sqn should be checked for similar discrepancies. There is no evidence of subsequent action following up on this recommendation.

1.4.6.272 Observations from Previous Service Inquiry. The Service Inquiry investigating the accident to Tornado GR4 ZG792 on 29 Jan 11 recommended that “Stn Cdr RAF Lossiemouth conducts a full review of F700 documentation to ensure it is at the correct amendment state”. On 12 Jun 12, OC ELW reported progress on implementing this recommendation to the MiiaAIB. OC ELW reported that procedures had been put in place which would see all MoD F700s brought up to date. Full fleet rectification had not yet been achieved, but for each aircraft would occur no later than their next Mgt 8 check. The Mgt 8 check is a monthly managerial check of the documentation in the MoD F700.

1.4.6.273 Neither MoD F700 of ZD743 and ZD812 contained all of the required forms. A number of the forms that were present in each MoD F700 were found to be out of date. A Mgt 8 check was carried out on ZD743 on 06 Jun 12 and on ZD812 on 19 Jun 12. That both sets of aircraft documentation had been checked by management personnel and had not been rectified demonstrates that the standards and practices exhibited within them had become normalised and accepted within XV(R) Sqn.

1.4.6.274 The state of the MoD F700 of ZD812 was not to the required standard despite the improved processes put in place by OC ELW. OC ELW reported progress in bringing the MoD F700s up to date six days after the Mgt 8 check had been completed for ZD743. It is possible that it had not been captured prior to that point. The MoD F700 of ZD812 had a Mgt 8 check completed on 19 Jun 12; it had not been brought up to the required standard and there was no discernible improvement in comparison to ZD743.

1.4.6.275 It is of note that over this period and at the time of the incident, OC ELW was busier than usual training to be the COS Spt for the joint Leuchars/Lossiemouth (L2) EAW in addition to his responsibilities as OC ELW. He considered that he was very busy, but that he was able to manage the workload.

1.4.6.276 Air Cmd EQA. The Air Cmd EQA findings are presented in a colour coded petal diagram enabling the reader to see, at a glance, the CEQAT assessment of standards. Six of the areas assessed by CEQAT are identified as COS Support’s (Spt) “Big Six”. These areas are:

a. Aircraft Standard
b. Data Integrity
c. IQA/SQA
d. Tool Control
e. Authorisations
f. Documentation & Publications

1.4.6.277 The most recent CEQAT audit of RAF Lossiemouth took place over the period 17-21 Oct 11. The executive summary noted that "Although areas of non-compliance were found, almost all were deemed to be minor in nature". Within COS SpT's Big Six, two areas were identified as carrying unacceptable risk. They were Tool Control and Documentation & Publications. Tool Control was identified as a high risk and Documentation & Publications was identified as a medium risk. The CEQA Petal Diagram is shown in Figure 73.

1.4.6.278 IQA/SQA. IQA/SQA, also within the Big Six, was graded as acceptable despite the station IQA/SQA not having identified and addressed the unacceptable risks within the Big Six, in Figure 73. Additionally, the SQA audit guide was singled out for praise for having "ensured all working areas conducted robust and coherent tool control audits" despite the negative assessment of actual standards in tool control.

1.4.6.279 Aircraft Standard. In order to assess the standard of aircraft at RAF Lossiemouth, the CEQAT examined one Tornado from XV(R) Sqn. That aircraft had been checked by the unit the day before. The standard of the aircraft was assessed as high. Although the aircraft had been checked by unit personnel the day before, there were still a number of issues with the MoD F700. The CEQAT assessed that these issues were "indicative of a Sqn that was suffering from stretch due to a lack of manpower". Based on the assessment of this single aircraft, the standard of aircraft at RAF Lossiemouth was assessed to be good.

MMA Assurance Audit

1.4.6.280 A MMA Assurance Audit of 1Gp took place over the period 9-12 May 11. The aim of MMA assurance activity is for DG MMA to satisfy SoF, via visibility of appropriate evidence, Defence aviation is well regulated and that Air Safety risks are being managed to at least Tolerable and As Low As Reasonably Practicable (ALARP).
The audit examined systems, processes and procedures associated with the MAA assurance aim in order to confirm that they were compliant with relevant regulations. The audit report concluded that most of the systems, processes and procedures were in place and were compliant, but still developing and increasing in their effectiveness.

The MAA audit did include assessment of engineering assurance processes in 1Gp. The audit team concluded that engineering assurance at sqn level across 1Gp was good. RAF Lossiemouth was not included in the audit visits on this occasion. The assessment was based upon audit of the assurance processes and interviews with key personnel. No checks were conducted to confirm that the product of assurance was a true reflection of the standards in conduct of engineering.

Analysis

Significant procedural drift had occurred in XV(R) Sqn. It can be seen that the omissions in procedures both simplified and sped up provision of aircraft to the flight line. There was no short term driver for this in terms of additional pressure. The drift occurred over a long period of time (years) and was allowed to persist, at least in part, through a lack of adequate supervision to identify the issues, and leadership to correct them.

Almost all assurance effort from Sqn to Regulator was focussed on ensuring that policy and processes are compliant with regulations. As a result, the policy and processes supporting engineering in 1 Gp and RAF Lossiemouth are of very high quality. There is a significant imbalance in the effort expended ensuring the existence of policy compliant processes at the expense of ensuring they are being implemented effectively.

There was insufficient independent assurance of conformity with process. Familiarity with how maintenance is being conducted, and what norms are accepted, is inevitable at Sqn and Stn level. External assurance of conformity, by the CEQAT, was limited to assessment of a single pre-selected and specifically prepared aircraft at RAF Lossiemouth.

On the occasions when conformity with process and the quality of the end product were checked, elements of the issues raised in this report were identified. On each occasion, the issues were assessed to be minor and no further action was taken.

Stagnation of personnel had become an issue in XV(R) Sqn and RAF Lossiemouth. Where personnel spent years working in the same job and with the same people, norms developed. The Panel identified a lack of churn of personnel between jobs and stns to ensure personnel are updated and assessed, and for processes to be questioned and refreshed as they are learned by new personnel.

Conclusion

The Panel concluded that breaches of recognised and mandated engineering safeguards is an other factor as it could cause, contribute to or aggravate another accident.

TGRF Assurance

The TGRF is subject to a number of different assurance visits at sqn, stn and Gp level. This section of the report details the assurance visits common to both XV(R) Sqn

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17 The TGRF is part of 1Gp with two MOBs (RAF Lossiemouth and RAF Marham) comprising five FL sqns and XV(R) Sqn OCU.
OCU and the Front Line (FL), and examines the differences between OCU and FL assurance. Assurance of aircrew documentation is examined, and a review of the accident crews' documentation is provided. It is divided as follows:

a. Assurance Visits Common to FL and OCU
b. Assurance Discrete to FL: Tornado Standardisation Visit (TSV)
c. Assurance Discrete to OCU: Central Flying School (CFS) Visit
d. Aircrew Documentation
e. Analysis
f. Conclusions

Assurance Visits Common to FL and OCU

1.4.6.290 **Military Aviation Authority.** The Military Aviation Authority (MAA) has a two year rolling assurance programme to satisfy the Sectary of State, through Director General MAA, that Def aviation is well regulated and that Air Safety risks are being managed to at least Tolerable and ALARP. The last MAA assurance visit of 1Gp lasted four days and included a visit to two Main Operating Bases including RAF Marham. As well as assuring compliance with MAA regulations, the objectives of the visit included: confirming that a robust Operational Duty Holder (ODH) plan is in place for the delivery of the Aviation Duty Holder concept in order to manage Air Safety, and to confirm that an effective Gp-wide Air Safety Management System (ASMS) is in place.

1.4.6.291 **RAF Flight Safety.** The RAF Flight Safety (FS) assurance team conducts FS Assurance Visits for the Chief of the Air Staff (CAS) as the Senior Duty Holder (SDH). The assurance team endeavours to visit each stn every two years with the aim being to assess the effectiveness of the ASMS. Whilst the team does conduct a limited amount of dip checking of currencies and documentation, they are more focussed on the supporting culture: senior leadership, effective risk management, active FS committee and awareness levels across the organisation.

1.4.6.292 **1Gp Safety Training Assurance Regulation (STAR).** 1Gp STAR performs stn level assurance visits to provide internal assurance to AOC 1 Gp and external assurance to stn cdrs. Typical visit objectives include evaluating the ASMS and A3 and A4 safety activities and to provide advice and guidance if needed. The 1Gp STAR visit to RAF Lossiemouth from 17-21 Sep 12 consisted of six personnel; the team were scheduled to spend approximately 4 hrs with each of the Lossiemouth Tornado Wing sqns.

Assurance Discrete to FL: Tornado Standardisation Visit

1.4.6.293 **Introduction.** 1Gp ASOs requires that sqns have standardisation visits at intervals not exceeding two years. FL sqns are principally assured through Tornado Standardisation Visit (TSV) conductor by the Tornado Standardisation Unit (TSU). TSU is led by OC Standards, XV(R) Sqn, and comprises the STANEVAL from both RAF Marham and RAF Lossiemouth Ops Wgs.

1.4.6.294 **TSV Aim and Objectives.** 1Gp ASOs state "the aim of the formal

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18 FL sqns also receive HERRICK Standardisation Visits (HSV) and Wing Standardisation Visits (WSV), pre and post Op HERRICK deployments.
standardisation visits is to ensure the maintenance of the highest standards of pure and tactical flying, and of simulator instruction." TSV reports state that "the principal aim of the TSV is to formally assess the TGRF's health, in terms of core competencies and operational effectiveness. The secondary aims of TSV are the identification of best practices, the standardisation of operating procedures and the cross pollination of ideas across the Force."

1.4.6.295 Visit Resources. The visit team will normally consist of five to seven personnel including OC Standards, XV(R) Sqn CFS Agent, RAF Marham Standards and Evaluation (STANEVAL) and RAF Lossiemouth STANEVAL. A TSV will usually last five days.

1.4.6.296 Visit Metrics. TSV assess aircrew using oral examinations, pilot-pilot check sorties, WSO checks sorties, and tactical pair and four-ship sorties. A review of TSV reports between Jun 10 and Feb 12 indicates that a TSV normally consists of approximately seven pilot-pilot check sorties, seven WSO check sorties, five tactical pairs sorties and two four-ship sorties. The vast majority of sqn aircrew would be assessed during TSV.

1.4.6.297 Sqn Preparation. Individual sqn's preparation for TSV differ but will typically include a month long period of increased ground training focussing on rules and regulations, aircraft systems and aircraft operating considerations/limitations. The preparation period is considered by the FL as one of the main benefits. A check of aircrew documentation is performed by sqn pers prior to a TSV.

1.4.6.298 Visit Report. TSV reports cover a number of topics including: aircrew knowledge, aircraft availability/engineering, planning, briefing, airborne events, simulator events and supervision. Sortie Planning includes: planning room and sortie content. Sortie Briefing includes: Met/Ops Brief, Sortie Brief, Ops Desk, Outbrief and debriefing. Airborne and Simulator events cover both tactical and core flying skill competencies.

Assurance Discrete to OCU Assurance: Central Flying School Visit

1.4.6.299 XV(R) Sqn OCU receives Central Flying School (CFS) visits every 18-24 months.

1.4.6.300 Visit Aim and Objectives. The CFS Visit Op Order states that "in order to satisfy the requirements of the CFS accreditation for the QPI / QTI [Qualified Pilot Instructor/ Qualified Tactics Instructor] scheme, a team of CFS Examiners will visits XV(R) Sqn." The CFS team "observe all aspects of the QPI/QTI scheme...in order to:

(1) Assess the standard of flying instruction.
(2) Check the competencies of QPI/QTI pilots and WSOs.
(3) Assess the standard of ground instruction.
(4) Advise on matters as requested by the Stn Cdr or OC XV(R) Sqn."

1.4.6.301 OC XV(R) Sqn considered that CFS assures instruction: the level of student instruction is correct, delivered in the correct way and the syllabuses behind the courses are generating the correct product for the FL. He considered that the standardisation of teaching is achieved through internal Sqn processes and informal visits from STANEVAL. OC CFS Exam Wing considers that CFS Visits assure the standards of instruction and core flying skills, acknowledging that the CFS examiners are not current to assure tactical practices.

1.4.6.302 Visit Resources. The last CFS Visit to XV(R) Sqn included one pilot (OC Exam Wg) and one WSO (Fast Jet WSO Examiner). Previous visits have included two sorties and
between six and nine simulator sorties. A typical CFS visit will last four days. Both of the CFS examiners had a Tornado GR1/GR4 background but neither was current on the Tornado GR4 at the time of the last visit. CFS Exam Wg staff do not need to have a background from the specific aircraft type or category. During the last visit, half a day to a day was spent getting up to speed with aircraft checks and flying clothing fitting; although OC CFS Exam Wing considered this as another opportunity to assess the standard of instruction.

1.4.6.303 Visit Metrics. CFS Examiners assess aircrew via a flying check sortie, simulator events and, in the classroom, through the delivery of Phase Briefs. XV(R) Sqn Standards Fit decide which sqn instructors participate in the CFS Visit in order to “provide the best cross-section of experience” and maximise the opportunity for instructor upgrades. XV(R) Sqn has a CFS Accredited Pilot and WSO which are expected to participate in the visit, in addition a further five QPI/QTIs were assessed during the last CFS Visit. The last CFS visit to XV(R) Sqn included one pilot-pilot sortie and six simulator sorties; CFS would usually try and conduct approximately five sorties.

1.4.6.304 Sqn Preparation. XV(R) instructors are made aware of the CFS Visit and those that have been selected for check rides are informed so that they have time to prepare. “Other than that there was no significant diversion from normal ops.” A check of aircrew documentation is performed by sqn pers prior to a CFS Visit.

1.4.6.305 Visit Report. CFS reports cover a number of topics related to instructional technique: classroom instruction, role of QTI pilots, syllabus development, aircrew instructor course and simulator instruction. CFS Visit reports also comment on Unit Issues with “no specific unit issues noted by the Team” during the last visit to XV(R) Sqn in May 12.

Aircrew Documentation

1.4.6.306 General. Aircrew flying documentation includes logbooks, training folders and RAF Form 5200 (F5200), which is used to record a comprehensive record of an individual’s Service flying. This part of the report examines the assurance of TGRF aircrew documentation and details a review of both accident crews’ aircrew documentation.

1.4.6.307 RAF Flight Safety Assurance Visit. Whilst the RAF FS Assurance Team conducts a limited amount of dip checking of documentation on biennial visits, it is more focussed on the areas described above. In addition to biennial assurance visits, the team conducts focussed interventions which included a Flying Standards Health Check Deep Dive of XV(R) Sqn in Feb 12. The report noted that the team “undertook a percentage check of the XV(R) Sqn aircrew documentation. With the exception of a single case, all documentation was found to be maintained to a high standard.” The single case referred to a pilot that was missing a F5363 (Standardisation Test) course report and sortie report.

1.4.6.308 1Gp STAR. A 1Gp STAR Assurance Visit of RAF Lossiemouth three months after the accident “reviewed how each unit managed the supervision and maintenance of Log Books and Trg Records and although the processes all differed slightly, they all appeared effective; a dip check of documents found no significant issues.”

1.4.6.309 STANEVAL. 1Gp ASOs require STANEVAL to conduct periodic checks of aircrew documentation between 1Gp STAR visits. STANEVAL are required to cross check Training and Capability Tracking System and authorisation sheets with unit/sqn aircrew documentation and produce a formal report. RAF Lossiemouth STANEVAL conducted a check of XV(R) Sqn aircrew documentation in Feb 12. A formal report was not produced as the requirement for aircrew documentation check of XV(R) Sqn was not introduced until Jun 12. However, the RAF FS Flying Standards Health Check Deep Dive noted that the XV(R)}
Sqn view “was that the STANEVAL function worked well and this was borne out from the document check where all appropriate STANEVAL activity had been carried out and recorded to a high standard.”

1.4.6.310 **ASTON 1 Pilot.** A review of ASTON 1 Pilot’s logbook, training folder and F5200 found that overall his documentation was in good order with the following exceptions:

a. The logbook Record of Service had not been updated for XV(R) Sqn.

b. Simulator reports from 21 and 24 May were missing from the Pilot’s training folder.

1.4.6.311 **ASTON 1 WSO.** A review of ASTON 1 WSO’s logbook, training folder and F5200 found that:

a. Simulator reports were absent from the WSO’s training folder for logbook recorded events on 29 Feb, 1 Mar, 15 Apr and 15 May.

b. The logbook Record of Service had not been updated since Oct 04.

c. Instructor re-categorisation sorties from 21 May 10 and 11 Jun 09 were not recorded or signed for in the WSO’s logbook.

d. A F5363 was absent from the WSO’s F5200 for the re-categorisation sortie on 10 Jan 12 and for any check sortie during 2008.

e. The WSO’s F5200 contained two F5363s dated 21 May 10 and 11 Jun 09 which had identical narratives.

f. The WSO’s F5200 contained a F5363 which lacked a signature for the award of CFS Accredited Instructor.

1.4.6.312 **ABBOT 2 FS Pilot.** A review of ABBOT 2 FS Pilot’s logbook, training folder and F5200 found that:

a. The Pilot’s training folder lacked 10 simulator reports for logbook recorded simulator events after 26 Feb.

b. The F5200 did not contain an Aircrew Insert Slip (AIS) from the pilot’s 208 Sqn QFI tour.

c. The F5200 contained a Tac Weapons end of course report which had not been signed by the pilot.

1.4.6.313 **ABBOT 2 RS Pilot.** ABBOT 2 RS Pilot is part of STANEVAL and is therefore not assigned to a flying sqn. A review of ABBOT 2 RS Pilot’s logbook, training folder and F5200 found that:

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19 1Gp ASC 2103 states that “Units are to maintain a training folder for all pilots and WSOs. It is to include all flight check reports not retained on the F5200 and all work-up sortie Reports.” The order does not specify if the Training Folder is to be electronic, physical or a combination of both. XV(R) Sqn staff use a combination of Training Folders and “e-Folders”.

20 An incomplete F5363 for a sortie in Jun 12 was also provided to the Panel.

21 The Tornado Training Syllabus states that “OC Ops Wg is to maintain a Training Folder on all Tornado aircrew that fly with the Wg but who are not assigned to a sqn.”
There was no logbook signature for the IRT conducted on 25 Apr 12.

There was no Record of Service update to the Pilot’s logbook since posting to XV(R) Sqn in Oct 01.

The F5363 Tactical Check dated 13 Jun 12 was located in the Pilot’s Training Folder rather than in the F5200.

A Standard Check/A2 Check was reported in the training folder 24 Jun 11, but no corresponding F5363 was found in the Pilot’s F5200.

The most recent F5363 in the Pilot’s F5200 was found to be 22 Mar 07, despite more recent checks recorded in the Pilot’s logbook.23

A shared STANEVAL training folder at XV(R) Sqn contained an Op HERRICK work up sortie report from 617 Sqn dated 9 Jul 09. The Pilot had another training folder which was kept in the STANEVAL office.21

The review of aircrew documentation was conducted by Typhoon STANEVAL. The Panel observed that the use of a STANEVAL representative from another platform could improve the effectiveness of assurance visits and facilitate cross-pollination between platforms.

MAA, biennial RAF FS and 1Gp STAR assurance visits require the assurance teams to visit a number of sections, or indeed in the case of the MAA, different stns, and therefore time spent with individual flying sqns can be limited.

The Panel identified that the OCU does not receive focussed 2nd party assurance of aircrew operations as a whole. The scope of CFS assurance visits is different from that perceived by OC XV(R). Furthermore, standardisation of OCU teaching is not externally assured. CFS assures the method of teaching, but not what is actually taught.

Through the vehicle of TSV, FL sqns receive a far greater scope and scale of assurance than the OCU with CFS visits. The vast majority of FL sqn aircrew are assessed during TSV; approximately 20% of OCU staff were assessed during the last CFS visit.

It would appear that FL sqns’ preparation for TSV is far greater and encompasses the vast majority of aircrew, when compared with the level of preparation for a CFS Visit to the OCU.

The Panel considered that a number of topics which are examined in this report are observed and commented on in TSV reports but are not covered in XV(R) Sqn CFS reports. These topics include: sortie planning, sortie briefing, supervision, planning room, Met/Ops brief, sortie briefing, outbrief and Auth’s/Ops desk. A number of these topics have contributed to factors in the accident.

The Panel considered that external assurance visits are too focussed on assurance of process with insufficient assurance of product. RAF FS Flying Standards Health Check Deep Dive performed a percentage check of XV(R) Sqn aircrew documentation and noted that documentation was maintained to a high standard; ASTON 1 WSO and ABBOT 2 FS Pilot’s documentation contained several omissions.
1.4.6.321 Although STANEVAL have not yet formally conducted a review of XV(R) Sqn aircrew documentation it is of concern that ABBOT 2 RS Pilot, a member of STANEVAL, had significant omissions from his own aircrew documentation.

1.4.6.322 The Panel observed that OCU staff Operational Status Certificate (OSC) would be easier to interpret if they broke down the various categories of instructor qualification, for example dates of B2 QTI, then subsequent upgrades to B1/A2. Furthermore, an OSC for OCU students would make it easier to identify clearances and qualifications rather searching through the detailed course-progres paper word.

Conclusions

1.4.6.323 The Panel concluded that because of:

a. the insufficient scope and scale of focussed XV(R) Sqn 2nd party assurance and;

b. the lack of assurance of a number of areas which have contributed to factors in the accident including: Met/Ops brief, sortie planning, planning room ergonomics and information display, sortie briefing, outbrief, Auth's Desk procedures, Ops Desk procedures and supervision;

that ineffective assurance of the OCU is a contributory factor.

Academic Air Weapons Range Governance

Introduction

1.4.6.324 This section covers Academic Air Weapons Range (AWR) Governance. Academic AWRs comprise Defence Training Estate (DTE) Pembrey Sands, DTE Holbeach, DTE Donna Nook and DTE Tain. It is divided into the following sections:

a. Background
b. Regulation, Policy and Orders
c. Safe Place: DTE
d. Safe Practice: 1Gp Ranges
e. Academic AWR Requirement
f. Analysis
g. Conclusions

Background

1.4.6.325 The responsibility for Academic AWR estate transferred from RAF to DTE on 1 Apr 06. Previously, AWRs were manned by an RAF OC and RAF personnel with a clearly defined command chain. At present, DTE provide Training Area Safety Officers (TASOs) and 1Gp provide Range Safety Officers (RSOs). An agreement in principle between DTE

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22 Before TASOs the titles were OC AWR and then DTE AWR Comdt.

23 RSO were later renamed Air Weapons Range Controller (AWRC).
and HQ 1Gp recorded that TASOs would be responsible for providing a Safe Place and RSOs for ensuring Safe Practice, two of the pillars of the Safe System of Work detailed in para 1.4.6.327. A DTE AWR Directive published in Oct 07 noted that the DTE task was to “meet AIR’s training requirement in a safe and timely manner within budget.” The DTE task was updated in Jun 11 to “deliver and maintain a Safe Place to train” and it was noted that RSOs “primarily provide support to the [TASO] for ensuring Safe Practice under the overarching umbrella of Safe Place.” Minutes of meetings between HQ 1Gp and HQ DTE from 2007-2012 capture debate surrounding several issues: division of responsibilities; variance between the DTE AWR Directive (used by TASO), Air Command Air Weapons and Electronic Warfare Range Orders (ACAWEWROs) (used by RSO); and AWR management safety structure and working practices. The first joint DTE/1Gp management instruction, co-signed at SO1 level, formally agreeing the division of responsibility, was published six years after the organisational change, the week before the accident.

1.4.6.326  Culture can be defined as:

“A pattern of basic assumptions, invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore is taught to new members as the correct way to perceive, think, and feel in relation to those problems.”

“The assumptions that Schein refers to are commonly known as norms, ways that people act, perceive, and interpret the values that they share, that may be unspoken but nevertheless perceived, felt and practiced by members of the group.”

Furthermore:

“Culture is both a dynamic phenomenon that surrounds us at all time, being constantly enacted and created by our interactions with others and shaped by leadership behaviour, and a set of structures, routines, rules, and norms that guide and constrain behaviour.”

Regulation, Policy and Orders

1.4.6.327  Health and Safety at Work Act 1974. The Health and Safety at Work Act states:

“It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees” and specifies that the employer’s duty extends to “the provision and maintenance of plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health.”

1.4.6.328  JSP 403 Handbook of Defence Land Ranges Safety. JSP 403 Handbook of Defence Land Ranges Safety contains both regulation and best practice measures for range safety. JSP 403 is sponsored by the Defence Land Ranges Safety Committee, with HQ 1Gp (SO2 Ranges) having the lead in coordinating fixed wing joint service procedures (Vol III Chapter 3). JSP 403 states that in order to comply with the Health and Safety at Work Act:

“a Safe System on a MOD land range must comprise four essential elements: safe people, safe area, safe equipment and safe practice... On ranges used for training Service personnel a Safe System of Training is to be applied... hazards must have been assessed and

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23 Organizational Culture and Leadership, Pg 1, Edgar Schein.
25 Organizational Culture and Leadership, Pg 1, Edgar Schein.
identified and the consequent controls integrated in to formal procedures in order to reduce the risks to as low as reasonably practicable.”

1.4.6.329  **JSP 403 Vol III Chapter 3: General Orders for Aircrew.** JSP 403 Vol III Chapter 3 requires that:

“Squadron Commanders are to ensure that all aircrew taking part in air weapon sorties are fully conversant with the contents of JSP 403 Volume III and any additional operating authority orders... They are to ensure that aircrew sign as having read and understood the orders on the following occasions:

a. On arrival at the unit.

b. Immediately after the incorporation of an amendment.

c. Annually”

1.4.6.330  JSP 403 Vol III Chapter 3 directs the following content as mandatory information to be included in a AWR join request: Joining the range pattern, (requested by aircraft captain), giving call-sign, number and type of ac, booked or bootleg, TOT, event and target.

1.4.6.331  **Air Command Air Weapon and Electronic Warfare Range Orders (ACAWEWROs).** SO2 Ranges, HQ 1 Gp, is responsible for the maintenance of ACAWEWROs, which is a “live” document updated as necessary. Several orders make reference to JSP 403. ACAWEWROs state:

“all AWR users are to sign for having read and understood JSP 403 Vol III – Handbook of Defence Land Ranges Safety.”

1.4.6.332  ACAWEWROs state the following mandatory information should be passed by aircraft requesting joining clearance: Callsign of range, Callsign of ac, Number of ac, POB, ETA (Slot time), target/s, line or sector of attack and event/s.

1.4.6.333  **Management Instruction for DTE AWR.** The Management Instruction for DTE AWR, co-signed by HQ DTE and HQ 1Gp, noted that the management and control of ranges, safe practice and procedures, is recorded in JSP 403 Handbook of Defence Land Ranges Safety Vol III for air to ground training. It also requires that AWR practices are conducted in accordance with ACAWEWROs for air to ground activity.

**Safe Place: DTE**

1.4.6.334  **Safe Place: Land, Sea and Air.** Safe Place, including airspace, is the responsibility of DTE. HQ DTE lacks air expertise, has no RAF personnel and therefore relies on HQ 1Gp for guidance on AWR airspace matters; SO2 Ranges represents the user community at the AWR Working Group, chaired by DTE. A number of measures are employed to ensure Safe Place for 1st and 3rd party. Warning signs, fencing and spotters are used to prevent trespassing on the AWR Danger Area. In addition, maritime radar is used to identify shipping which may have infringed the Danger Area. Air Weapon Range Controllers (AWRCs) rely on visual lookout and radio to ensure the integrity of AWR airspace; AWRCs do not have an air radar or other Situational Awareness (SA) tools to detect aircraft in or around AWR airspace which could present a hazard to users.

1.4.6.335  **AWR Infringements.** It is not uncommon for AWR airspace to be infringed by civilian aircraft. AWRs remain Visual Flight Rules (VFR) environments, where the principle
of “See and Avoid” still applies. In practice, timing and height deconfliction, together with well defined patterns and radio calls ensures safe separation between AWR users at times when the effectiveness of “See and Avoid” may be reduced due to high cockpit workload. 1Gp AWR Standards Bulletin noted in Jul 10 that “there have been a number of reported infringements of Das [Danger Areas]...it is a trend which is hopefully just a blip.” A United Kingdom Airprox Board (UKAB) report from Aug 10 highlights that the RSO was unaware that a light civilian aircraft had encroached Tain AWR airspace. The aircraft was observed by a Tornado GR4 crew just prior to commencing a high energy pop manoeuvre. The UKAB determined that “although this had been a serious airspace infringement...there had not at any time been a risk that the ac would have collided.” The report also notes that “ac performing high-energy weaponry delivery profiles sometimes preclude normal lookout since crewmembers need to concentrate on flying the weaponry pattern.” The following Tornado Defence Air Safety Occurrence Report (D-ASOR) excerpts highlight two further AWR infringements:

“Chieftan 3 joined Holbeach AWR from Marham, on initial RT contact Chieftan 3 was advised of a light aircraft outside the AWR, just west of the tgt sets. Post a laydown attack the jet was turned off target and began a shallow climb. During this turn the light aircraft was sighted above Chieftan 3, with vertical separation estimated at 800ft and lateral separation estimated at 200ft.”

“Whilst operating as number 2 in a pair of GR4s (c/s LANCER 13/14) at Pembrey range, LANCER 14 nearly collided with a light aircraft (assessed to be a piper pa28). LANCER 14 was in a base turn for a 5deg dive attack on tgt 4, LOA 240deg climbing gently (1.5deg) through 1100ft. The light aircraft was spotted at estimated 300m and avoiding action was taken. LANCER 14 passed estimated 200ft low and left of the light aircraft.”

1.4.6.336 AWR Traffic Conflicts. 1Gp AWR Standards Bulletins have highlighted airprox incidents adjacent to AWRs. The Jul 10 bulletin posed a number of questions: “Is there a possible hazard for traffic ingressing/egressing the Range?” The following Typhoon D-ASOR highlights the issue:

“The SID2 was flown at RAF Coningsby, which ends at FL150 with a track of 010M. Coningsby Departure handed control over to London Military towards the top of the climb with a traffic service. The controller informed us that Donna Nook range was active and we elected to route to the north of the range. As we began our right turn from North onto East, traffic was called to us in our right 3 o’clock at 5nm and indicating 300’ below. As we looked into the range pattern to our South East, we saw a typhoon fly approximately 300’ beneath us heading from North to South. We recovered to straight and level flight. We were then told that there was traffic North of us by 1nm, 300’ below heading South. Looking North, we could see another typhoon flying approximately West and 3nm away.”

1.4.6.337 On this occasion the Typhoon pilot using Donna Nook AWR was aware of the traffic departing RAF Coningsby:

“Whilst conducting air to surface weapon training in Donna Nook range an airprox occurred. The pattern when conducting air to surface training involves exiting the marked Danger Area into Class G airspace. During this time I held a radar contact that was becoming a conflation and suitable avoidance was initiated. Tally was achieved at approx 2nms with no danger of collision. The other aircraft was a Typhoon from RAF Coningsby.”

However, this D-ASOR highlights the issue of AWR users having to continually leave and re-enter AWR airspace to conduct operationally representative training.
1.4.6.338  **AWR Airspace Dimensions.** Training for Op TELIC and Op HERRICK has meant that TGRF AWR weapon employment is often conducted from a Close Air Support (CAS) wheel. While operating in a CAS wheel workload can be high, lookout can be reduced and the wheel profile can mean that aircrew are unsighted or “belly up” for lengthy periods of time. The TGRF Pocketbook details a 5.0 nm radius CAS wheel for a 30° dive strafe attacks from 15,000 ft (Figure 80), a profile used during operations and practised during Pre Deployment Training (PDT). This profile, together with AWR airspace dimensions, can mean that aircraft are required to operate outside of the Danger Area with reduced capacity to “See and Avoid”. RAF Marham has previously raised concerns that TGRF crews operate in Class G airspace while focussing on the target area, often without a radar service, with potentially reduced SA of other traffic.

![Figure 80. 5.0 nm CAS Wheel Centred on DTE Holbeach Strafe Target and DTE Donna Nook Strafe Target](Exhibit 351)

**Safe Practice: 1Gp Ranges**

1.4.6.339  **AWR Safe Practice.** A number of AWR issues relating to Safe Practice have been highlighted by aircrew and AWRC. ACAWEOs contain the contact details of SO2 Ranges for users to provide feedback and to make general enquiries. Safe Practice is the responsibility of HQ 1Gp. HQ 1Gp Ranges is comprised of SO2 Ranges, the current incumbent of which has a background as a Hercules navigator, and a WO Ranges, currently in his first AWR tour, coming from a background in ATC. HQ 1Gp provides AWRC; to qualify as an AWRC personnel must have completed the Joint Air Traffic Control Course, have served a tour as an ATC terminal controller and also have completed a training package before final assessment and the award of an AWR controller endorsement.

1.4.6.340  **AWR User Issues.** In addition to the AWR airspace dimensions detailed above, the position of the Tain AWR (Figure 81) hold was raised several times during interview. Aircrew and AWRC highlighted that the position of the hold is unsuitable due to its proximity to Inverness Airport. The Tain AWR hold is defined in ACAWECs and lies outside the Danger Area. The position of the hold has remained unchanged for many years, while activity at Inverness Airport has increased. Although it is generally accepted that the hold is not used or very rarely used, it was noted on a visit to Tain AWR that a formation from a foreign air force had established in the hold prior to joining the AWR. This highlighted to the Panel that only users who are unfamiliar with the AWR and read (and enacted) the AWR orders, use the hold.
1.4.6.341 **AWRC Endorsement.** AWRC endorsements are not regulated and controlled to the same level as Air Traffic Controller endorsements, despite AWRCs providing an Air Traffic Service (ATS).

a. **Background.** AWRC endorsements used to be managed by the Air Traffic Management (ATM) organisation. Following an Air Traffic Control Examining Board (ATCEB) assurance visit to an AWR, the ATCEB raised concerns that they had no personnel with AWR experience and therefore could not validate AWRCs. Subsequently, the ATM organisation ceased to manage AWRC endorsements.

b. **Regulation.** There are no regulations defining who has the authority to award ATC endorsements or to what level the award of ATC controller endorsements can be delegated.

c. **Air Officer Battlespace Management Responsibilities (AOBM).** The ATM Assurance Manual (ATMAM) states that:

"AOBM has responsibility for the safe provision of aircraft control and navigation services for the RAF in accordance with MAA, national and international requirements. Included within this remit is an effective ATM safety oversight system that regulates the delivery of Military ATM services and includes an audit and assurance process for these services."

27 ATCEB later became ATM STANEVAL.
d. **ATM Endorsement Authority and Policy.** AOBM has delegated authority to ATM STANEVAL to appoint Local Examining Officers (LEO); LEO can then award endorsements to ATC controllers in accordance with the ATMAM. Endorsements are then recorded in individuals’ F5994 Certificate of Competency. The ATMAM states that:

“The F5994, Certificate of Competency (CoC), is an official document issued to graduating students of the Joint Air Traffic Control Course (JATCC) and is used to record the extent of the holder’s proficiency and experience… Only holders of a F5994, or equivalent document, bearing the appropriate endorsements are authorised to provide an air traffic control service solo at a specified unit.”

e. **AWRC Endorsement Authority and Policy.** ATCEB were no longer content for the Terminal Control (AWR) endorsement to be awarded under their auspices. The Terminal Control (AWR) endorsement was removed from the ATMAM list of approved endorsements that could be recorded in individuals’ F5994. Subsequently, a Range Safety Officer (RSO (Air)) endorsement was created by HQ 1Gp Ranges. The RSO(Air) endorsement continues to be recorded in AWRC’s F5994. The AWR Assurance Manual states that SO2 Ranges can award the Exam and Standards Officer (ESO) endorsement to WO Ranges, but the authority under which he does so is not stated. WO Ranges can then award the RSO(Air) endorsement. A MAA audit of 1Gp in May 11 stated that “doubt exists as to whether SO2 Ranges is SQEP to award the Exam and Standards Officer endorsement [to WO Ranges] and under what authority he does so.” WO Ranges has also raised concerns of the controlling endorsements under which AWRC operate and the “legality” of him awarding endorsements as he believes “there is no doubt that AWRCs are providing an ATS.”

1.4.6.342 **Assurance.** Following the separation of AWRS from the ATM organisation there is a lack of comprehensive AWR 2nd party assurance. The May 2011 MAA 1 Gp audit raised concerns that “the AWR Safety Management System lacked sufficient 2nd party assurance.” Currently ATM STANEVAL conduct biennial assurance of AWR Training, Standards and Safety Management but do not undertake Practical Assessment Check (PAC) of AWRCs.

1.4.6.343 **AWRC Awareness of ATM Procedures and Issues.** Following the separation of AWRS from the ATM organisation, AWRC awareness of changes to procedures, phraseology and ATM issues has, at times, been lacking. A recent example was the change in usage of pressure measurement units, replacement of Milibars with Hectopascals, which was only made known to AWRCs by coincidence rather than in a deliberate manner. Furthermore, AWRCs have raised concerns over their authority to control aircraft and type of ATS they can provide to civilian traffic, for example air ambulance, wishing to transit AWR airspace.

**Academic AWR Requirement**

1.4.6.344 **Introduction.** The joint Management Instruction for DTE AWR captured the DTE mission: “to develop and deliver a safe, secure and sustainable training estate and facilities in order to support the endorsed and contingent training requirements of Defence.” At present, HQ 1 Gp and DTE do not have a holistic defined requirement for current and future use of Academic AWR.

1.4.6.345 **AWR Requirement Review.** HQ 1Gp AWR reviews have discussed the requirement for Academic AWR, but do not fully capture and define what is required at the operator level. An AWR Review published in Nov 05 examined the requirement out to 2025 based on predicted platform ISD/OSD, together with some high level specific requirements
including the need for operationally representative target sets. Subsequently, the requirement was captured by the Defence Training Requirement Organisation and approval sought to improve the AWR target set “to ensure that Pre-Deployment Training keeps pace with developing requirements in theatre and is made as realistic as possible within the UK.” A further review in 2010 recommended that the requirement for Academic AWR be revisited post future Fast Jet basing decisions and also examined the airspace requirement.

1.4.6.346 **AWR Airspace Requirement Review.** The AWR airspace review conducted by SO2 Ranges in 2010 highlighted that CAS wheel procedures require aircraft to operate higher and further away from the AWR targets. The review identified that “occasionally aircraft would need to operate outside Provost Marshall Restricted (PMR) areas to conduct profiles”. The review assessed the feasibility of extending the PMR around DTE Donna Nook and DTE Holbeach. The review concluded that:

a. PMR would not prevent civilian aircraft operating in them and extending the PMR would restrict the flexibility of military aircraft operating close to AWRs.

b. As the Danger Area is not designed to provide protection for aircraft utilising the area but to provide separation between any weapons dropped and other aircraft, it considered that the airspace around all AWRs is suitable and should remain unchanged.

1.4.6.347 SO2 Ranges has stated that the review reached its conclusions on the basis that:

a. Extending Danger Areas and PMR airspace would be of inconvenience to other aircraft and would create surrounding bottlenecks.

b. The “CAA want to reduce number, size and operating times of Das [Danger Areas] to ensure greater airspace flexibility so any suggestion of increasing DA sizes around AWRs would receive stiff opposition.”

c. It was considered that the best way to prevent mid air collision/airprox in the vicinity of AWRs was to educate military aircrew to avoid AWRs and the surrounding airspace. Subsequently an article was published in a flight safety publication highlighting the issue.

1.4.6.348 **User Requirements.** RAF Marham has continued to raise concerns that TGRF crews operate in Class G airspace while focussing on the target area, often without a radar service with potentially reduced SA of other traffic. RAF Marham has stated that USAF crews, based at RAF Lakenheath, also share these concerns. The East Anglia Airspace User Working Group Feb 13 minutes captured that: “concern was raised regarding ac operating close to the range danger area and the potential of Mid Air Collision (MAC) with ac operating on the range.” RAF Marham STANEVENT have stated that they would prefer DTE Donna Nook and DTE Holbeach airspace dimensions to be changed to accommodate CAS wheel profiles. A Tornado Standardisation Visit (TSV) report in Feb 11 concluded that the team “deem[sic] the East Coast Ranges protected airspace at ML inadequate. Given the nature of air-to-ground weaponry, and the potential for mid-air collision with non-range traffic, greater protection should be sought as a priority. As an absolute minimum, 5nm up to 15kft around the principal targets should be sought; however, it would be prudent to seek greater airspace protection.”

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20 Provost Marshall Restricted areas are established around Donna Nook and Holbeach to provide an element of protection to ac conducting high energy manoeuvres. PMR are only recognised by military aircraft; civilian ac may operate in PMR airspace, though outside the Danger Area.
Analysis

To comply with the Health and Safety at Work Act, a Safe System of Training is required that incorporates Safe Place, Safe Practice, Safe Equipment and Safe People. These cannot be seen as discrete entities. In seeking to delineate Safe Place (DTE) and Safe Practice (1Gp) responsibilities have been unduly complicated.

1.4.6.349 A clearly defined operator level requirement for academic AWR, capturing pan-Defence user requirements across the Defence Lines of Development, does not exist. Therefore the DTE mission "to support the endorsed and contingent training requirements of Defence" is in doubt with respect to Academic AWR.

1.4.6.350 AWR airspace is the responsibility of DTE but the associated issues cross cut the four pillars of a Safe System of Training.

1.4.6.351 DTE is responsible for AWR airspace but lack Air SQEP. DTE relies on HQ 1Gp Ranges for Air SQEP.

1.4.6.352 Current measures to identify AWR traffic infringements, ensuring it is a Safe Place, are insufficient.29

1.4.6.353 HQ 1Gp Ranges lacks weaponising and tactical SQEP. 1Gp Ranges lacks comprehensive 2nd party assurance.

1.4.6.354 AWR user issues have not been adequately captured and addressed, as demonstrated by AWR airspace dimensions and the position of the Tain AWR hold. There is no forum for HQ 1Gp Ranges to collate AWR user issues from suitably empowered representatives of different aircraft types and therefore these issues often remain unaddressed. This raises doubts over the Safe System of Training for Academic AWRs, and whether risks are ALARP and Tolerable. Although the 2010 1Gp airspace review concluded that AWR airspace was suitable, the Panel considered that a change to PMR dimensions could reduce mil-mil airprox and a change to Danger Area dimensions could reduce mil-mil and mil-civ airprox.

1.4.6.355 The Panel observed that there are no regulations defining who has the authority to award ATC endorsements or to what level the award of ATC controller endorsements can be delegated. This has contributed to the current situation whereby SO2 Ranges, with no ATM background, has authorised WO Ranges to award the RSO(Air) endorsement to AWRCs.

1.4.6.356 The removal of AWRCs from the ATM umbrella has facilitated a situation whereby AWRCs provide an ATS, without sufficient oversight from the ATM organisation.

1.4.6.357 JSP 403 and ACAEWROs are in need of review to ensure that they are coherent and relevant. JSP 403 and ACAEWROs differ in areas, for example AWR joining calls. SO2 Ranges has explicitly stated that aircrew do not sign for having read and understood JSP 403 despite both JSP 403 and ACAEWROs stating that crews are to have done so. JSP 403 does not feature on the Training And Capability Tracking System TGRF mandatory reading list and therefore the vast majority of TGRF aircrew are unaware of the document.

29 DASORS/ASIMS provide an open reporting environment where land, sea or air infringements are reported and lessons can be learned from them. This does not, however, provide a dynamic/real-time identification of infringements.
Conclusions

1.4.6.358  Procedural Drift of AWR Practices and Procedures, not just limited to the accident sorties, was identified in Section 1.4.4. A number of issues have been highlighted in this report; AWR Safe System of Training is in doubt; DTE and HQ 1 Gp Ranges lack SQEP; AWR orders are, in areas, considered out of date and incoherent; AWRCs provide an ATS, without sufficient oversight from the ATM organisation; an environment has developed in which aircrew choose which orders to comply with and which orders to ignore. The Panel considered that the most suitable description was that of a culture, as described in para 1.4.6.327. Therefore, the Panel concluded that AWR Culture was a contributory factor.

RAF Kinloss Monopulse Secondary Surveillance Radar (MSSR) and Tactical Air Navigation (TACAN) Safeguarding

Introduction

1.4.6.359  As part of the investigation into the unavailability of Secondary Surveillance Radar (SSR) on the day of the accident, it became apparent that issues existed with the safeguarding of the MSSR and TACAN at RAF Kinloss. This sub-section is divided as follows:

a. Situation
b. Regulation, Policy and Orders
c. RAF Kinloss Infringements
d. Stakeholder Responsibilities
e. Maintenance, Survey and Assurance
f. Continued Use of MSSR and TACAN
g. Analysis
h. Conclusion

Situation

1.4.6.360  RAF Lossiemouth ATC receives its SSR feed from the RAF Kinloss MSSR. The MSSR provides altitude and aircraft identification information. The TACAN provides omni-directional navigation information for non-precision approaches to RAF Lossiemouth. Both the MSSR and TACAN operate upon the principle of propagation of radio waves along a Line Of Sight (LOS). Most physical objects act as reflectors or diffractions of radio signals. A combination of object size, material, proximity and incident radio wavelength affect their efficiency as reflectors or diffractions. Technical site safeguarding, a process applied as part of the technical safeguarding of Ground Radio Installations (GRIs), seeks to prevent any development near to a radio transmitter or receiver site, which may degrade the radio signal by enabling such reflection or diffraction.

Regulation, Policy and Orders

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1.4.6.361 MRP RA 3016 Classification of Aerodromes and Manual of Aerodrome Design and Safeguarding (MADS). The MAA are responsible for Regulation and Safeguarding of Aerodromes. MRP RA 3016 Classification of Aerodromes states that:

"Military Aerodrome Design and Safeguarding shall be in accordance with criteria specified in the Manual of Aerodrome Design and Safeguarding."

1.4.6.362 MADS states that:

"The criteria that should be observed for the safeguarding of radio/radar navigational aids, together with the relevant information on siting restrictions can be found in AP 100G-03 - Site Restrictions for Ground Radio Installations."

1.4.6.363 This reference to AP 100G-03 is out of date; JSP 846 MoD Radio Site Clearance and Protection details safeguarding criteria.

1.4.6.364 JSP 846 MoD Radio Site Clearance and Protection. Protective measures are required to prevent interference as described above. For MoD operated GRI, those measures are detailed in JSP 846 MoD Radio Site Clearance and Protection. The measures are produced by the DE&S Air Defence and Air Traffic Systems Delivery Team (ADATS DT) and they include the site requirements for MSSR and TACAN. JSP 846 states that a Ground Radio Installation (GRI) whose site restrictions are found to be compromised by a permanent infringement, either sited on or off MoD property, and for which no concession has been formally authorised, is not to be used until it is deemed safe.

1.4.6.365 Infringement Control Process. JSP 846 also details an Infringement Control Process to be used where infringements of the protective measures exist. The first course of action is for unit personnel to take remedial action against the infringement. If this is not possible, they are to request an Engineering Appraisal (EA) from ADATS DT. The ADATS DT EA will establish whether or not the specific infringement compromises the performance of the GRI and whether or not the reduction in performance is acceptable. Following the EA, ADATS DT makes a concession recommendation to HQ 1Gp Battlespace Management Air Traffic Management Engineering Role Office (BM ATM Eng RO). The BM ATM Eng RO decides whether or not to issue a Concession Certificate to permit continued use of the infringed GRI. The stated ADATS DT policy is not to recommend concessions for vegetation infringement although they did support a concession for vegetation infringement at RAF Akrotiri in 2008.

1.4.6.366 MSSR Protective Measures. JSP 846 Annex L states that no vegetation exceeding 1 m in height is permitted within a 120 m radius circle centred on the vertical axis of the antenna tower as shown in Figure 82.
1.4.6.367 Within the area bounded by circles of 120 m and 480 m no object is to exceed the height of the line of slope 1:250, originating at a point on the SSR tower at a level of 10 m below the base of the aerial turning gear. The annex also defines protected zones between 480-960 m and 960 m - 4 km.

1.4.6.368 **TACAN Protective Measures.** JSP 846 Annex C safeguarding requirement states that no vegetation exceeding 1 m in height is permitted within a 75 m radius circle centred on the TACAN antenna tower as shown in Figure 83.

**Figure 83. JSP 846 Annex C – TACAN Safeguarding**

1.4.6.369 Within the annular area bounded by circles of 75 m and 300 m radius centred on the TACAN antenna tower, no object of any description is to exceed the height of a line of slope 1:20 originating at a point 5 m below the top of the structure supporting the antenna or the ground line depending if the system is tower or ground mounted. The annex goes on to define a further protected zone between 300 m and 1 km.

**RAF Kinloss Infringements**

1.4.6.370 **MSSR Site.** Vegetation, including trees, has encroached on the 120 m protected zone of the RAF Kinloss MSSR, shown in Figures 84 and 85. The tops of the trees within the 120-480 m protected zone are approximately level with the base of the antenna platform and are therefore encroaching on the safeguarding zone.
1.4.6.371  **RAF Kinloss TACAN Site.** The tree line is approximately 5 m from the TACAN shown in Figure 86. JSP 846 states that a 75 m radius safeguarding zone is required.
Stakeholder Responsibilities

1.4.6.372 **General.** MSSR and TACAN maintenance is conducted on a daily, weekly, monthly, quarterly, half yearly and annual basis. The technical complexity of each maintenance activity increases as the interval increases. The annual service is conducted by the ADATS DT 3rd Line organisation. With the exception of the annual service, unit personnel are responsible for maintenance (Command, Control, Communications, Computers and Intelligence Sqn (C-4I)). The HQ 1Gp ATM Eng RO is responsible for assurance, direction and support to unit personnel and is the tasking authority for ADATS DT.

1.4.6.373 **Unit Responsibilities.** Maintenance of the MSSR and TACAN was the responsibility of OC Base Airfield Communications (BAC) Flt within C4I Sqn, RAF Kinloss; responsibility for the site was handed over to RAF Lossiemouth\(^\text{30}\) between Jan – Apr 12. Following handover, OC Systems Flt within C4I Sqn, RAF Lossiemouth assumed responsibility for RAF Kinloss’ GRIIs. Within BAC Flt/Systems Flt, Ground Radio Maintenance Section (GRMS) is responsible for carrying out 1st and 2nd Line maintenance. To assure the integrity of a GRI, monthly site checks are carried out by a GRMS Senior Non-Commissioned Officer (SNCO) and a quarterly site check is carried out by OC BAC/GRMS Flt in accordance with AP600. The quarterly check comprises a full site inspection and Range Card accuracy check. Range Cards are used to summarise the safeguarding requirements laid down in Air Publications (APs) and JSP 846 and to relate them to specific GRI sites. A Range Card Check Sheet is produced for each site on an annual basis and their accuracy reviewed as part of the monthly site checks.

1.4.6.374 **DE&S ADATS DT.** DE&S ADATS DT is the single point of contact for the

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\(^{30}\) RAF Kinloss was handed over to the Army and became Kinloss Barracks. RAF Lossiemouth assumed responsibility for the airfield (Relief Landing Ground Kinloss).
through life management of air defence, air traffic and ground-based EW systems. ADATS DT has embedded enabling services including Radio Site Protection (RSP) teams, 3rd line repair bays, and mechanical and electrical support. ADATS DT produces an annual schedule of 3rd and 4th line maintenance activities which is subsequently agreed with the BM ATM Eng RO. ADATS DT also manages flight checking of NAVAIDS and airfield approach aids. The issue of trees infringing the TACAN at Kinloss was first raised in 2009 with BM ATM Eng RO and SATCO, RAF Kinloss by Vortech Ltd, subcontractor to Thales Ltd, contracted by ADATS DT.

1.4.6.375 **HQ 1Gp BM ATM Eng RO.** The HQ 1Gp BM ATM Eng RO is established to ensure that ATC capability is available to operations and is maintained to an appropriate standard. The BM ATM Eng RO considers its top two priorities to be assurance visits and Infringement Control. BM ATM Eng RO responsibilities include:

a. **Assurance.** Providing assurance that airfield equipment is being maintained in accordance with engineering policy. This is achieved through annual External Quality Audit (EQA) of Stns.

b. **Direction and Support to GRMS.** The BM ATM Eng RO provides direction and support to GRMS.

c. **Tasking Authority for ADATS DT.** The BM ATM Eng RO is used as a conduit between Main Operating Bases (MOBs) and ADATS DT to coordinate 3rd and 4th Line (contractor) maintenance activities. The BM ATM Eng RO agrees the annual ADATS DT 3rd and 4th Line maintenance schedule.

**Maintenance, Survey and Assurance**

1.4.6.376 **RAF Kinloss C41 Sqn Maintenance.** OC C41 Sqn from Sep 09 to the present stated that his role was administrative and dealt primarily with personnel and management issues; he had delegated his responsibility to check GRI sites to OC BAC FIt and his Flight Sergeants (Flt Sgts). As BAC Flt and Sqn internal assurance processes had not reported to him any infringement concerns, he was unaware of any issues. Furthermore, he understood that the BM ATM Eng RO would check GRIs for infringements during EQA. He also understood that if a GRI passed Flight Check (FC) then the system was fully serviceable.

1.4.6.377 **OC BAC Flt from Sep 08 to Jun 11 was familiar with JSP 846 and would complete monthly GRI inspections.** He stated that he was unaware of vegetation infringements of the MSSR or TACAN. He also stated that he had never received any user feedback and thought that the JSP 846 safeguarding zones were “overly cautious.”

1.4.6.378 **OC BAC Flt between Jun 11 and Mar 12 carried out quarterly site checks with reference to AP600 and JSP 846 but did “…not recall any significant infringements…” and that “…this was supported by successful Flight Checks….and surveys carried out by 3rd and 4th line agencies…” JSP 846 contains safeguarding restrictions for two different types of TACAN and he believed the restrictions were incoherent and could lead to confusion. He also noted that the MSSR and TACAN safeguarding restrictions do not specifically state that vegetation should be referenced from ground level. His interpretation of the JSP 846 led him to believe that there was a degree of flexibility in the way in which site restrictions could be interpreted. However, JSP 846 does not allow a corresponding increase in vegetation height for tower mounted GRIs. He concluded that it was the responsibility of the “Engineering Officer, TG4 SME’s and SATCO to access (sic) any possible risk of infringement and act according.” OC BAC Flt had completed Engineer Officer Foundation Training in Jun 11. The training included Radio Site Protection with specific reference to JSP 846 and MSSR site restrictions.
1.4.6.379  Flt Sgt GRMS between Nov 05 and Jan 11 had noted that trees had infringed both the MSSR and TACAN but with "...no effect on the picture presented...". The Flt Sgt had played a role in having a large number of trees removed from the MSSR site circa 2008, noting that it was a considerable effort and required several agencies to complete the clearance. The Flt Sgt was concerned that, due to the current financial environment it would not be a good use of resources to pursue removal of the trees. He stated that no effect was noticed in the operation of the system and that "...routine light checking of the NAVAIDS presented no limitation due to vegetation..." and that he would use the FC as a confirmation that a GRI was serviceable.

1.4.6.380  The Flt Sgt stated that although EAs were submitted to ADATS DT they were "immediately rejected" and were informed that they would not be conceded. Smaller vegetation was removed wherever possible, but this was considered a low priority by the STn. He felt that without any reported degradation of the performance of the NAVAIDS, there was insufficient evidence to support major works to remove the larger vegetation. Although there had been little done since 2008, the Flt Sgt felt he had "tried to comply with the requirements of the JSP".

1.4.6.381  The Flt Sgt had also noted that as some of the trees which infringe the TACAN lie outside the boundary of MoD property, they were not within the remit of RAF Kinloss to remove. Infringements outside of MoD property are addressed by the Defence Infrastructure Organisation (DIO) who would normally be informed by ADATS DT as part of the Infringement Control Process. The Flt Sgt stated a mixed understanding of the safeguarding requirements. He understood the SSR requirements and stated unequivocally the vegetation limits. He caveated them, however, with the belief that, because the navais were elevated, there was some flexibility in the overly conservative JSP 846 restrictions. He understood that no vegetation was allowed within 75 m of the TACAN but not to be greater than 1 m above the TACAN tower. The TACAN is mounted on a 15.6 m tower; he therefore understood that vegetation could grow to 16.6 m before it would contravene JSP 846. He also stated that infringements are noted by "...3/4 line team and radiation check teams on their annual visits...". Vortech Ltd, subcontractor to Thales Ltd, contracted by ADATS DT, raised the issue of the TACAN being infringed in 2009 but an EA was not raised (trees infringing the TACAN are outside of the stn perimeter) and ADATS DT did not inform DIO.

1.4.6.382  Between Mar 11 and Apr 12, Flt Sgt GRMS believed both sites to be "...within the scope of the JSP 846...". He also stated that a "...Radio Site Infringement Survey..." carried out in Jun 11 by ADATS DT would identify any vegetation infringements. As nothing was subsequently reported, he concluded that vegetation was not a problem.

1.4.6.383  RAF Lossiemouth C41 Sqn Maintenance. OC Systems Flt, C41 Sqn, RAF Lossiemouth identified the vegetation encroachment as a potential problem on his first quarterly site check following site handover in Apr 12. EAs were requested from ADATS DT RSP on 11 Jun 12 for the MSSR and TACAN with a view to seeking a concession. Due to the nature and severity of the vegetation encroachment, ADATS DT were unwilling to recommend that a Concession Certificate be issued and have ceased to underwrite the Kinloss MSSR and TACAN Safety Cases. This removes the endorsement of the system by the Engineering Authority.

1.4.6.384  ADATS DT Site Survey and Maintenance. The Cartography Section, which is part of the ADATS DT RSP, carried out a site survey of RAF Kinloss over the period 20-24 Jun 11. The Cartography Section consists of cartographers who do not assess infringements or necessarily have a detailed knowledge of JSP 846. On this occasion, the Cartography Section was accompanied by an RSP Technical Analyst to assist in