

[REDACTED]
[REDACTED]

23 February 2018
Reference: F0003578

Dear [REDACTED]

I am writing in respect of your request of 30 January 2017, for the release of information held by the Civil Aviation Authority (CAA). Your request has been considered in line with the provisions of the Freedom of Information Act 2000 (FOIA).

Your request:

- 1. I am advised that a single value of +/- 150ft is used when considering the accuracy of an aircraft's altitude, when measured by radar. I am led to believe that this figure is used consistently, irrespective of aircraft size, elevation, altitude, distance from the radar, weather or model of radar used. It is my understanding that an aircraft's altitude (relative to the radar itself) is calculated from the radar-measured distance from the radar and the angular elevation of the received signal. Both of these inputs are opportunities for inaccuracy.**

The effect of angular measurement tolerance on reported altitude is dependent upon the actual elevation (eg. angular tolerance will have a negligible effect on the reported altitude of an aircraft directly overhead, whereas the reported altitude of an aircraft on the same horizontal plane as the radar would result in an error of 100%) and the actual distance of the aircraft from the radar (eg. the reported altitude of an aircraft close-by will be affected little by angular tolerance but the reported altitude of an aircraft at a distance may be influenced a great deal).

Furthermore, the effect of distance tolerance on the reported altitude is influenced by the actual distance from radar and the actual angular elevation, in the opposing manner to that described above.

Additionally, different radar models have different levels of accuracy, differ in proportional accuracy between elevation and distance and groups of radar might be used to improve accuracy.

How can one, therefore, declare the accuracy of altitude measurement by radar to be one value, irrespective of these factors? Is it not dependent upon the specific scenario?

For air traffic control purposes, there are two main types of radar systems – primary and secondary.

Primary surveillance radar provides basic information about the position (range and bearing) of an aircraft relative to the radar head using reflected radio signals. The altitude of an aircraft cannot be identified directly using primary radar.

Secondary surveillance radar (SSR) on the other hand supplements the basic primary radar information with additional information from the aircraft itself, such as its identity and altitude. The altitude information in an SSR system is not calculated from the radar-measured distance and angular elevation as you have suggested. It is taken directly from the aircraft's pressure altimeter, which is transmitted by a transponder onboard the aircraft. The altitude information from the aircraft can be reported in either 100 feet or 25 feet increments depending on the type of transponder fitted, and it is always referenced to a reference atmospheric pressure of 1013.25 hPa.

2. Please provide a copy of the CAA investigation officer's manual, otherwise know as the IO's Manual

Please find attached Investigation Officer Training and Procedures Manual.

If you are not satisfied with how we have dealt with your request in the first instance you should approach the CAA in writing at:-

Caroline Chalk
Head of External Information Services
Civil Aviation Authority
Aviation House
Gatwick Airport South
Gatwick
RH6 0YR

caroline.chalk@caa.co.uk

The CAA has a formal internal review process for dealing with appeals or complaints in connection with Freedom of Information requests. The key steps in this process are set in the attachment.

Should you remain dissatisfied with the outcome you have a right under Section 50 of the FOIA to appeal against the decision by contacting the Information Commissioner at:-

Information Commissioner's Office
FOI/EIR Complaints Resolution
Wycliffe House
Water Lane
Wilmslow
SK9 5AF
<https://ico.org.uk/concerns/>

If you wish to request further information from the CAA, please use the form on the CAA website at <http://publicapps.caa.co.uk/modalapplication.aspx?appid=24>.

Yours sincerely

A handwritten signature in black ink that reads "Rihanne Stephen". The signature is written in a cursive style with a light blue background behind it.

Rihanne Stephen
Information Rights Officer

CAA INTERNAL REVIEW & COMPLAINTS PROCEDURE

- The original case to which the appeal or complaint relates is identified and the case file is made available;
- The appeal or complaint is allocated to an Appeal Manager, the appeal is acknowledged and the details of the Appeal Manager are provided to the applicant;
- The Appeal Manager reviews the case to understand the nature of the appeal or complaint, reviews the actions and decisions taken in connection with the original case and takes account of any new information that may have been received. This will typically require contact with those persons involved in the original case and consultation with the CAA Legal Department;
- The Appeal Manager concludes the review and, after consultation with those involved with the case, and with the CAA Legal Department, agrees on the course of action to be taken;
- The Appeal Manager prepares the necessary response and collates any information to be provided to the applicant;
- The response and any necessary information is sent to the applicant, together with information about further rights of appeal to the Information Commissioners Office, including full contact details.

Investigation Officer

Training & Procedures Manual

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PREFACE

This document is designed to provide a combined training aid for Investigators joining the Investigations and Enforcement Team (IET) and a procedures document to be followed by Investigating Officers during their day-to-day operations.

Reference must also be made to the Investigations and Enforcement Team Code of Practice; the CAA Employee Handbook (which can be found on the CAA intranet); the Police and Criminal Evidence Act 1984 (including the Codes of Practice) and the Regulation of Investigatory Powers Act 2000.

Updated March 2017

The Civil Aviation Authority

The Civil Aviation Authority (CAA) was established by Parliament in 1972 as an independent specialist aviation regulator with its sole purpose being to protect the interests of the public and consumers.

The operating costs of the CAA are funded mainly through charges levied by the CAA against service users, details of which can be found in the CAA Scheme of Charges documents available on the CAA website.

The CAA is not part of the Civil Service and might best be thought of as a Corporation such as the BBC. It has independent powers to set its own personnel policies, pay, pensions, and conditions of service. It is comprised of a variety of Subject Matter Experts including:

- (i) Engineers who set safety standards for airlines and aircraft manufacturers.
- (ii) Pilots who monitor airlines and pilot training standards.
- (iii) Air Traffic Control (ATC) Officers and specialists in telecommunications, electronics and radar.
- (iv) Doctors responsible for Aeromedical-research and fitness standards for flight crew members and ATC Officers.

Safety & Airspace Regulation Group (SARG)

The role of the SARG is to ensure that UK civil aviation standards are set and achieved in a co-operative and cost-effective manner. The CAA must satisfy itself that aircraft are properly designed, manufactured, operated and maintained; that airlines are competent; that flight crews, air traffic controllers and aircraft maintenance engineers are fit and competent; that licensed aerodromes are safe to use and that air traffic services and general aviation activities meet required safety standards.

SARG is also responsible for the planning and regulation of all UK airspace including the navigation and communications infrastructure to support safe and efficient operations. Staff includes civilian and military experts with experience of commercial, business, recreational and military aviation. The needs of all users are accommodated, as far as possible, with regard for safety as well as environmental, economic and national security considerations.

General Aviation Unit

The General Aviation Unit (GAU) covers most aspects of recreational aviation plus regulation of commercial balloon operations and oversight of airshows. It regulates non-complex aircraft including microlights, amateur built and historic aircraft, balloons, gliders, piston twins and singles up to 5,700kg maximum takeoff weight and single pilot helicopters up to 3,175kg. It also oversees non-EASA aerodromes.

Airworthiness.

SARG's Airworthiness Capability Team is responsible for the oversight of airworthiness in the UK. The regulatory functions include the approval and oversight of maintenance and production organisations; the issue of Certificates of Airworthiness; SAFA and SANA (Safety Assessment of Foreign/National Aircraft); ACAMs (Aircraft Continuing Airworthiness Monitoring) oversight of engineering licenses; the oversight of operational and continued airworthiness and, for aircraft that are not subject to European regulations, establishing and finding compliance with design certification requirements. Airworthiness also carries out a range of tasks on behalf of the European Aviation Safety Agency and assists the Military with their oversight of design & production work, as well as providing training, all under contracts managed through CAAi.

Airworthiness includes staff from a wide range of backgrounds, organised into 6 sectors:

- Fixed Wing
- Rotorcraft
- Propulsion, Component & Specialist Services (including Engineering Licensing)
- Civil & Military Design, Production & Continuing Airworthiness (including SAFA)
- Continued Airworthiness (Monitoring of significant activities/events, whistle-blowers, MORs, lessons learnt, changes required/implemented)
- IOs & TOs – provide para-technical support to all of the above sectors

Flight Operations.

Regulatory functions include the approval and oversight of Air Operator Certificated (AOCs) entities, Non-commercial complex (NCC) aircraft operations, Commercial & Airline Transport Pilot Licensing, including Crew Training & Medical aspects, and Dangerous Goods.

The Team also carries out a range of tasks on behalf of the European Aviation Safety Agency, e.g. support of Rule Making Tasks (RMTs), Simulator Evaluations (via CAAi contract) and additional Subject Matter Expertise (SME) support of ISP-led/EASA Flight Operations Policy work streams.

Consumers & Markets Group (CMG)

The role of CMG is to oversee Economic Regulation, Competition and Consumer Enforcement. This includes enforcing consumer law, competition law and sector regulations in aviation.

Intelligence, Strategy & Policy (ISP)

The ISP team uses information to drive strategies and policies that deliver preferred safety and airspace utilisation outcomes in a coherent, consistent and collaborative manner. The ISP function is formed of four teams and details of each are provided below:

- **Intelligence Team**

The Intelligence team supports SARG's needs for information by proactively acquiring and analysing all data necessary to robustly identify ongoing and, where possible, future "system-wide" safety and airspace issues. It generates the information to allow us to decide what actions to take and tracks the effectiveness of actions designed to address those issues.

- **Policy & Programmes Team**

The Policy & Programmes team deliver safety programmes, strategies and policies, securing defined outcomes, protecting coherence of policies within and across capability areas, adopting better regulation principles and working in partnership with experts across CAA and, where appropriate, industry.

- **Strategy and Safety Assurance Team**

The Strategy and Safety Assurance team directs analysis of the current and future "system wide" situation. It runs CAA's Safety Assurance function through the SAG, SRB, SIAG, SSB, CAA Board (identify and prioritise existing and future safety risks across the aviation system, define outcomes and actions required, confirm actions secure the required outcomes); checks actions taken match the need and are effective.

- **Technical Support Team**

The Technical Support team ensures work flowing through ISP is properly acquired, directed, resourced, tracked and delivered and secures business-enabling activities (e.g. financial and manpower planning and tracking, office support functions, support to policy consultations and publications, provision of management information); Co-ordination of responses to EASA consultations.

Office of the General Counsel.

The Office of the General Counsel (OGC) is part of the CAA Corporate Centre and works at the heart of the CAA to enable the best outcomes by providing professional legal and investigative expertise.

The Investigations and Enforcement Team (IET) is part of the Office of the General Counsel. IET Investigation Officers investigate criminal breaches of aviation legislation and provide investigative support to colleagues across the CAA.

Delegated Regulation.

- **The CAA has delegated regulation to certain other bodies with who regular liaison is maintained, including -Hot Air Balloons**

The British Balloon and Airship Club (BBAC). The CAA has approved the BBAC to make recommendations for the issue and renewal of Certificates of Airworthiness for balloons and airships.

- **Microlight Aircraft**

The CAA has approved the British Microlight Aircraft Association (BMAA) and the Light Aircraft Association (LAA, formerly the Popular Flying Association) to make recommendations for the issue and renewal of Permits to Fly for microlight aircraft. Overall responsibility for the safe regulation of flying remains with the CAA.

A microlight aeroplane is one designed to carry not more than two persons which has a Maximum Total Weight Authorised (MTWA) not exceeding:

- 300 kg for a single seat landplane.
- 390 kg for an amateur built single seat landplane for which a UK Permit to Fly or Certificate of Airworthiness was in force prior to 1 January 2003
- 450 kg for a two seat landplane
- 330 kg for a single seat amphibian or floatplane
- 495 kg for a two seat amphibian or floatplane
- 315kg for a single seat landplane equipped with an airframe mounted total recovery parachute system

- 472.5kg for a two-seat landplane equipped with an airframe mounted total recovery parachute system
- A microlight must also have a stalling speed at the maximum weight authorised not exceeding 35 knots calibrated speed.

- **Gliders**

Gliders are represented by the British Gliding Association (BGA), The BGA is a fully CAA-accredited Continuing Airworthiness Management Organisation and manages the ongoing airworthiness of the UK glider fleet, working closely with the UK CAA.

- **Hang-Gliders**

These are represented by the British Hang-Gliding & Paragliding Association (BHPA). The BHPA oversees pilot and instructor training standards, and provides technical support such as airworthiness standards, and coaching courses for qualified hang gliding and paragliding pilots.

- **Parachuting**

The British Parachute Association (BPA) is the governing body for all sport parachuting in the UK, both civilian and military. It is the only sport parachuting organisation in the country approved by the CAA.

Article 90 ANO 2016 (Dropping of persons) states that before parachuting can take place an operator (club/team) must have a written 'Permission' from the CAA.

The required operating standards for sport parachuting in the UK are set out in various documents comprising:

- CAP 660 - the CAA's minimum requirements for the grant and renewal of parachuting permissions;
- the BPA Operations Manual that represents the accepted standard for sport parachuting in the UK. Parachute Training Organisations (PTOs) may achieve an acceptable standard for operations by compliance with the BPA manual;
- individual PTO Standard Operating Procedures (SOPs) that amplify the BPA Operations Manual in the light of conditions that apply specifically to that PTO.

- **Model aircraft**

The Large Model Association (LMA) was formed in the UK in 1982 to represent to the CAA and other bodies, the views and concerns of those who fly large models and to bring together those who share a common interest in them. CAA CAP 658 is a comprehensive source of information regarding the definitions, rules and regulations for model aircraft.

- **Unmanned Aerial Vehicles**

Most offences concerning Unmanned Aerial Vehicles (UAV) are dealt with by the police and the National Police Chief's Council has provided guidance to all police forces. CAP 722 is also a comprehensive source of information regarding the definitions, rules and regulations for these aircraft.

INVESTIGATION POLICY AND PRACTICE

Aviation safety legislation applicable in the UK includes EC Regulations and Directives, the Air Navigation Order 2016 (ANO 2016), the Aviation Security Act 1982, Regulations made under the ANO 2016 and its predecessors, such as the Rules of the Air Regulations 2015, and the Air Navigation (Dangerous Goods) Regulations 2002.

1. Overview

- 1.1 The general procedure for investigation alleged breaches of aviation legislation is similar to that you would have employed as a police officer, however, your powers are limited to those of an “Authorised Person” as defined in Schedule 1, ANO 2016. You should also be familiar with powers detailed in Articles 235, 237 and 257 ANO 2016.
- 1.2 You will complete reports in a standard format for submission to a CAA Legal Adviser for an assessment in accordance with the Code for Crown Prosecutors. Having assessed the evidence, the Legal Adviser will recommend a case outcome to the relevant CAA department.
- 1.3 If the decision is to offer an adult Caution (either Simple or Conditional), you will be instructed to make the offer and subsequently administer the Caution. Please note, you cannot offer a Caution on your own authority. Where it is decided to deal with the matter by Warning Letter, the letter will be sent by the Head of IET.
- 1.4 If the decision is in favour of prosecution the CAA Legal Adviser will lay the information for the issue of the summons. The CAA brings the prosecution NOT the CPS.
- 1.5 The position is different in Scotland, the Isle of Man and the Channel Islands. The CAA is not a Prosecuting Authority in Scotland; the local Procurator Fiscal (PF) is the person responsible. It is also important to remember that PACE does not apply in Scotland and CJ Act witness statement forms are not used. It is advisable when dealing with Scottish cases to liaise with the PF at an early stage and be guided by their requirements. Advice on Scottish procedures (and law in dealing with suspects) can always be obtained from the local police. When your enquiries are complete, address your report to the PF and submit it to the Head of the IET, who will forward it with a covering

letter offering observations and an offer of help if the PF requires advice on aviation matters.

- 1.6 You will be required to attend case conferences with Counsel and to attend court in contested cases (as 'officer in the case') even if you not required to give evidence.
- 1.7 You may encounter confusion between the role of IET and investigators of the Air Accident Investigation Branch (AAIB). In essence, the AAIB investigate accidents (under their own statutory powers) to determine the cause so as to prevent a recurrence. It is not part of their remit to allocate blame. The AAIB investigators do not operate under PACE and much of the information they obtain is confidential and could not be used in evidence.
- 1.8 The purpose of appointing an IO in fatal air accidents is to provide the police with a single point of contact with the CAA. The expectation is that the IO will act as a liaison/focal point with the police by providing them with information about and access to CAA knowledge and expertise as appropriate. It is not the purpose (even supposing the AAIB would allow it) for IET to become involved with the AAIB safety investigation or to ask questions of or seek information from the AAIB, whether on behalf of the police or otherwise. If and when there are grounds to believe that there may have been a breach of the ANO, the normal IET procedures will commence.
- 1.9 The United Kingdom Airprox Board (UKAB), a joint CAA/military body based at RAF Northolt, determines the causal factors and make recommendations to prevent recurrent Airprox (Aircraft Proximity i.e. near mid air collisions) incidents. Whilst the UKAB has no statutory powers, they do operate a confidential system similar to that employed by the AAIB. They are a flight safety body using privileged information provided under the Mandatory Occurrence Reporting Scheme (MORs) details of which can be found under CAP 382. Where we need the detail contained in an MOR a separate statement will need to be taken from the reporter, even if the details are identical to those on the MOR. The Head of IET will ask the Head of Safety & Investigations Data Department to contact the reporter and obtain his or her permission in writing to use the original report. Both documents should then be placed in the file.

2. IET investigation procedure

2.1 An investigation will be electronically opened to you and a folder opened in the ■ drive casework folder.

You should be informed of the offence(s) alleged together with details of the alleged offender where known.

Investigation Officers have access to CAA pilot and aircraft databases where details may be found to indicate the current status of the pilot's licensing and medical history and also the aircraft airworthiness status. The databases should only be used as a guide and a formal request should be made to the subject of the investigation for production of the relevant documents.

2.2 Do not become blinkered by the offence initially alleged. It is not unusual for other offences to come to light during the course of an investigation. You should check that all statutory requirements regarding licence validity, insurance certificate, medical certificate currency, aircraft certificate of airworthiness/permit to fly currency are correct.

2.3 Timescale is important. Many offences are time-barred at six months.

Sometimes we do not hear about an incident until some time has passed, so you need to be conscious of the time-bar date. Schedule 13 Parts 1 and 2 of the ANO lists the offences which are time-barred at six months; Parts 3 and 4 list the triable either-way offences which are not time-barred. Be aware that you may have a combination of both to investigate.

2.4 Six weeks after receipt of the allegation, you should provide the Investigations and Enforcement Manager with a brief update on the progress of your investigation. At that stage, unless you have recently been in contact, you should inform the original complainant of the current status of the enquiry.

2.5 There should be a review of each investigation four months from the date when the investigation is opened and at further intervals as agreed with the Team Leader. You should aim to complete an investigation within four months from the date of the alleged offence for those offences that are summary only.

The complainant and witnesses should be further updated at this stage, unless you have been in recent contact with them.

- 2.6 Complainants particularly those who are members of the public, may feel 'left in the dark' as to the progress of their complaint. Whilst in some cases it may be inappropriate to inform a complainant even in general terms of progress (e.g., cross-contamination of evidence, risk that alleged perpetrator may be informed), IOs should as a minimum observe the courtesy of informing members of the public of the progress of their complaint at the six week and four month stage, if the case has not been closed.
- 2.7 Radar evidence and transcripts of radio tapes must be requested through the Investigations and Enforcement Manager.
- 2.8 The team operate a shared Outlook calendar which must be kept updated by all IO's. Each day should have an entry showing the location of the IO that day, together with relevant case numbers for the work being undertaken.
- 2.9 All IO hours, whether worked in or out of the office, must be recorded against the relevant investigation file reference number. These figures are used to compile schedules of costs for the courts.
- 2.10 Witness statements
- 2.10.1 Pro-forma witness statements are available in the I&ET Standard Forms folder on the shared drive.
- 2.10.2 The rear of the witness statement contains a consent authority for release of the information to other parts of the CAA for regulatory decisions
- 2.10.3 Witnesses who are familiar with aviation have a tendency to use technical terms, jargon and acronyms. However, the eventual audience for their statements may be lay magistrates or a jury. Please ensure that any technical terms are explained or, if possible, avoided.
- 2.11 'Expert' witness statements
- 2.11.1 It is important to differentiate statements of fact from witnesses with some expert knowledge, e.g., Dangerous Goods Inspectors, and statements of opinion from expert witnesses, e.g., a Flight Operations Inspector as to a pilot's conduct.

2.11.2 In the former example, a Dangerous Goods Inspector will provide factual evidence as to their observations about a consignment as well as setting out their expertise in the area of dangerous goods. Their statements should not include opinion evidence, for example, whether a consignment breaches the Dangerous Goods regulations (although they may set out the requirements of the Technical Instructions). Such statements are obtained routinely and form part of the basic investigation.

2.11.3 In the latter example, a Flight Operations Inspector must provide objective, unbiased opinion evidence on matters within his/her expertise, based upon the factual accounts of witnesses as given in their statements. Usually, such expert statements will not be obtained as part of the basic investigation but sought after a lawyer has reviewed the case file and determined the appropriate expert evidence required. In some cases, this will mean seeking an expert outside the CAA.

2.12 Interviews

2.12.1 All suspected persons should be given an opportunity to respond to an alleged offence before a decision is made whether to prosecute.

2.12.2 If a suspected person declines the opportunity to be interviewed, he should be invited to submit a prepared statement.

2.12.3 All interviews must be conducted in accordance with the relevant provisions of PACE, particularly Code C and Code E. An interview must be under caution. The interviewee must be offered the opportunity to have a legal representative present and advised that they may stop the interview at any time.

2.12.4 The suspect should be given disclosure of evidence prior to the commencement of any interview. It is for the IO to determine what material is provided to the suspect, which may include a copy of all witness statements and documentary exhibits, a statement of facts or no material at all. A record must be kept of pre-interview disclosure to the interviewee.

2.12.5 All interviews should be pre-planned and if appropriate a checklist prepared of points that need to be covered.

2.12.6. If the accused is a pilot, it should be established at an early stage who was the pilot in command of the aircraft at the time of the alleged offence. If a person is being interviewed on behalf of a company their position should be established together with the identity of the Managing Director (if not known) and confirmation obtained that they have the authority to act on behalf of the Company.

2.13 Recommendation

At the conclusion of an investigation, an IO may have a preliminary view of an appropriate disposal of the case, based upon his interaction with the witnesses and accused person. If you wish to recommend a particular course of action to the Head of IET you may do so at the conclusion of the Report and should briefly explain your reason for that recommendation.

2.14 Next steps

2.14.1 Your report will be considered by a CAA Legal Adviser who will recommend a disposal option to the decision maker in the relevant CAA department.

2.14.2 If the decision maker decides that no further action is to be taken, you may be required to write and inform the accused person and witnesses.

2.14.3 If the decision maker decides that the case does not require formal action, the Head of IET may send a 'Warning letter' to the accused.

2.14.4 If the accused has made full admissions and the decision maker decides that the case merits a Caution, you will be responsible for administering the Caution. The CAA Legal Adviser will be responsible for drafting the Caution.

2.14.5 If the CAA decision maker considers the case is suitable for prosecution, the Legal Adviser will commence the prosecution in the Magistrates' Court. You will be kept informed of the progress of the case.

- 2.14.6 If the matter proceeds to trial, you may be required to assist in pre-trial liaison with witnesses. You will be required to attend Court for the trial, irrespective of whether you are required to give evidence.
- 2.14.7 Defendants and witnesses may contact you after the case file has been passed to the Legal Adviser. You must ensure that you make a file note of any telephone conversations; notes and any written correspondence must be placed on the file. If no disposal decision is made within 4 weeks of the file submission all further enquires on the case will be referred directly to the relevant Legal Adviser.
- 2.14.8 At the conclusion of a case, you should inform the witnesses of the outcome.

COMMONLY INVESTIGATED OFFENCES AND YOUR POWERS

A. AIR NAVIGATION ORDER (ANO) 2016

The provisions of the ANO apply to all UK-registered aircraft wherever they may be and, unless the ANO states otherwise, to foreign-registered aircraft in the UK. Provisions of the ANO relevant to persons or crew apply to persons in or the crew of UK-registered aircraft wherever they may be.

Registration and Marking of Aircraft (Articles 24 to 32, ANO 2016)

These Articles are quite straightforward and show that the CAA is responsible for maintaining the UK Register of Aircraft and issuing registration marks. All UK registered aircraft have a registration mark which begins with the letter G followed by a hyphen and then four more letters (e.g. G-ABCD). Aircraft details can be obtained from the G-INFO database on the CAA website.

If formal evidence is required to prove a registration, staff in Aircraft Registration will prepare their own witness statements and forward them in the Internal Despatch following a written request.

Operation of Aircraft

Runway Visual Ranges are dealt with under Articles 75 & 76 ANO. Allegations that aircraft had descended to land in poor weather when the runway visual range (how far you can see down the runway in use at ground levels) fell below the published minima used to be investigated frequently but far less so now.

Pre-Flight Actions by Aircraft Commander are dealt with under Articles 68 to 76 and 105 to 107 ANO and place particular responsibilities on the commander before takeoff. Probably our most common offence under these Articles is failing to ensure there is sufficient fuel for the intended flight. Such offences are usually brought to our notice when an aircraft makes an emergency landing after running out of fuel.

Picking-Up and Dropping of Articles by an Aircraft are covered by Articles 88 to 89 ANO and as far as we are concerned, usually relate to banner towing. We do get the occasional investigation and it is a case of reviewing the Articles to establish any offence.

Endangering the Safety of an Aircraft and Endangering the Safety of Any Person or Property are dealt with under Articles 240 & 241 ANO. These are probably the most serious offences under the ANO and ones with which you will become familiar. The wording of both is short

and to the point and they can be “catch-all” offences e.g. the pilot who runs out of fuel is likely to have also contravened Article 69 above. There are numerous examples of such combinations, but inevitably these offences will involve the obtaining of expert advice.

Drunkenness in Aircraft is dealt with under Article 242 ANO. Note that there are two subsections. Subsection (1) Deals with any person being drunk on an aircraft; Subsection (2) Deals with crew members being under the influence of drink or drugs. Aircrew, air traffic controllers and maintenance engineers are also required to comply with the Railways and Transport Act 2003, which is enforced by the Police and specifies the upper limits of alcohol allowed on breath. We occasionally receive allegations of pilots being under the influence of alcohol. There are no powers under aviation legislation to require breath tests or urine samples for analysis but the Railways and Transport Act 2003 allows police officers to breathalyse air crew, air traffic controllers and aircraft maintenance engineers. Any such allegations should be referred immediately to the Head of IET or, in their absence, to the Police force concerned if it is suspected that a pilot may be attempting to fly.

Passenger misconduct - Articles 243 to 245 ANO.

We receive a small number of complaints concerning unruly passengers, mostly on charter operations. Very often their behaviour is due to drink and/or smoking when it is not permitted. Cases involving passengers who drink to excess and become abusive/violent are in the main of cases dealt with by the police, either before/after departure or landing. It can be a problem for the cabin staff to identify the culprits by name/address. So, where we investigate after the incident, be sure to include descriptions of the offender. These issues are best dealt with at the time by the police at the airfield of landing.

In relation to Article 244, if the commander confronts an abusive passenger and instructs him to remain in his seat, the passenger could assault the commander and incapacitate him, perhaps thereby endangering the flight. Flight crews keep the door to the flight deck locked and hardly ever confront “stropky” passengers. A point to remember when gathering evidence therefore is that it must be clear that cabin staff are either relaying the commander’s instructions, or that he has clearly delegated this authority to, say, the senior cabin attendant.

Article 245(a) and (b) ANO are not unlike Section 5 Public Order Act 1986. Unusually for aviation offences Article 245(c) requires an intentional act. These offences make it easier to deal with passengers who behave in a disruptive manner.

One of the main problems with dealing with an alleged offence that has occurred during a flight is finding the crew members involved. They will often not fly together on a regular basis. However, use the airline's security manager or Flight Crew Manager as a liaison point.

Fatigue of Crew: Articles 174 to 179 ANO. This is a specialised subject and should only be dealt with after discussions with a Flight Operations Inspector.

Documents and Records

Requests for production.

Article 235 ANO specifies the documents which you, as an Authorised Person, can request the commander or the operator to produce (See Annex 2).

A template letter to pilots and/or operators requesting production of documents can be found in [REDACTED] and should be used so that, where appropriate, we can prosecute for failing to produce.

You will wish to see some documents on a regular basis. You will find, in practice that aircraft commanders and aircraft operators will comply with your verbal request for sight of documents and photocopies. Very occasionally an operator may ask you to put your request in writing and more rarely you will find the occasional pilot who you feel is giving you the "run-around". If you suspect this might be the case (because you've had difficulty in arranging an appointment to see him for example), go prepared with a letter of request for production. Additionally, a good tip is to carry unaddressed copies so that, if necessary, you can serve one immediately.

The CAA has no powers to confiscate or seize these documents. Article 237 ANO gives authorised persons the power to inspect AND COPY any document, certificate etc which he has the power to require to be produced to him. The power to "copy" documents has not been defined. To photocopy may involve removal of the documents. How you deal with this is a matter for the individual. Remember, all police officers are Authorised Persons who have many powers that you do not have as an IO. Very often a difficult individual will cooperate when faced with having no choice between dealing with an IO under the ANO and the Police under some other legislation. You must, of course, always act in accordance with PACE.

The suspension, revocation and variation of certificates, licences and other documents is dealt with under Articles 253 to 255 and on occasion you may be required to serve such notices and/or re-possess licences.

Offences in relation to documents and records are dealt with under Article 256 ANO, some of which are similar to fraud offences. Article 256 contains many combinations of offences in relation to documentation.

The Rules of the Air Regulations

Article 249 ANO makes provision for the Secretary of State to make regulations under the Rules of the Air, which will figure prominently in many cases you investigate.

The Rules of the Air Regulations 2015 and the Standardised European Rules of the Air (SERA) should be studied in depth.

Article 249 ANO allows the Secretary of State to prohibit flights in the public interest in certain circumstances.

Air Traffic Controllers

Articles 188 to 198 ANO deal exclusively with matters relating to ATCOs and creates offences e.g. exercising the privileges of an ATC licence whilst under the influence of drink and drugs etc.

Foreign-registered aircraft operated in the UK for valuable consideration

Broadly speaking, Articles 250 and 252 ANO require foreign-registered aircraft to obtain permission from the Secretary of State to operate flights in the UK for public transport, aerial work etc for payment.

Power to prevent aircraft flying

Article 257 ANO gives you some important powers as an Authorised Person, so you must be aware of this Article. There are circumstances where you might be called upon to exercise these powers, without reference to anyone e.g. where a pilot is under the influence of drink/drugs and is about to fly.

A pro-forma 'no-fly' Direction can be found in [REDACTED] \Cautions and Directions and must be used to ensure that a Direction is legally enforceable.

Article 264 makes it an offence for a person, without reasonable cause, to fail to comply with any direction or provision of the ANO.

Obstruction of Persons

Article 263 ANO makes it an offence to intentionally obstruct or impede you in the exercise of your powers or the performance of your duties. One to bear in mind!

Penalties

Article 265 ANO and Schedule 13 deal with penalties. Accused persons frequently ask, “What’s the penalty for this?” or “How much can the court fine me?” and it is helpful to be able to answer the questions..

Particular attention is drawn to be sub-sections (2) – (4), in that they can provide a defence to some charges. Please read them carefully.

Interpretation

Schedule 1 ANO gives definitions of many terms used within the ANO.

B. RULES OF THE AIR REGULATIONS 2015 (‘RAR’) and THE STANDARDISED EUROPEAN RULES OF THE AIR (‘SERA’).

Airspace infringements

Infringements of controlled airspace are dealt with the Rules of the Air 2015 and Standardised European Rules of the Air (SERA).

See below for an explanation of the relevant aviation terminology

In short, a pilot must ask the relevant Air Traffic Control Unit for permission to enter their airspace zone. The witness statement from the controller must include the fact that permission was not requested or given; it is not sufficient for the evidence to infer that fact.

As soon as you receive the file, in discussion with Air Traffic Standards Investigators (ATSI) within SARG, contact the relevant ATC Managers. You should make a request through the Enforcement Manager to impound all necessary radio and radar recordings. Normally ATSI will have it in hand and in most cases they will contact the ATC Managers and arrange for collection of the radio evidence. Sometimes, if the aircraft has crossed different ATC zones and made radio contact with various airfields en route out of courtesy or duty, this extra evidence could become vital for continuity purposes particularly if the aircraft squawk remains at 7000 or if there is a break in radar cover. The easy job is where the offending aircraft is nominated a squawk after talking on the radio to a Controller, in these circumstances the evidence is relatively straightforward i.e. the infringing aircraft is seen on radar, the Controller talks to the pilot, asks him to squawk a particular number and that

number appears on his screen. In the more awkward cases a host of evidence is necessary from various airfields. We may have to wait some time for the Transcription Unit to supply us with CD recording of radio calls and so it is important to make contact with the controllers while events are still fresh in their minds.

ATSI will also obtain recordings of telephone conversations. The conversations may be between controllers or perhaps the pilot subsequently rings in to apologise.

In the case where an aircraft has departed from or landed at a small airfield, you will need to act promptly to obtain if necessary ATC flight strips from those airfields as they often do not retain the strips beyond a month.

You may contact the person believed to have been the pilot in command by telephone or letter. It is legitimate to ask if he was the commander at the time and his answer is admissible in evidence even though he has not been cautioned. If you receive an affirmative answer (i.e., a reasonable suspicion that this person has committed the infringement), he should be cautioned otherwise any further explanation is likely to be inadmissible. The pilot should be advised that an opportunity to respond to the allegation, usually by way of interview under caution, will be offered later.

A brief letter should be written to the pilot outlining the allegation and stating the offences allegedly breached irrespective of whether or not the pilot has been spoken to on the telephone. This letter should include a caution so that any further unsolicited comments by the subject or letters sent by him may be allowed in evidence.

When taking statements from Air Traffic Controllers they should be asked to listen to the CD of their radio call(s). This helps refresh their memory and also confirms the evidential point that they are the correct person to make the statement. The fact that they identify their voice should be mentioned in the statement and the exhibit label signed.

Low flying

Most people are poor judges of height. We will require a number of credible, corroborative witnesses in order to proceed with a low flying allegation.

'500 feet' in SERA refers to the distance of the aircraft from the person, vessel, vehicle or structure.

When seeking evidence as to whether or not a particular place is a 'congested area' local planning officials can provide helpful descriptive evidence, e.g., land uses and population

density. However, they should avoid stating their opinion as to whether a place constitutes a congested area: it is inadmissible.

C. AIR NAVIGATION (DANGEROUS GOODS) REGULATIONS 2002 ('Dangerous Goods Regulations')

The carriage of weapons, munitions of war and dangerous goods is dealt with in part by Articles 97 to 100 ANO.

The Dangerous Goods Regulations are supported by the ICAO Technical Instructions. The Technical Instructions ('TIs') are a practical guide to what may or may not be carried by air, type of aircraft (passenger or cargo only), quantities permitted, how they must be packed and the labelled and forms required.

Many items which can be carried by road and sea with limited regulation, cannot be carried in any aircraft without being subject to stringent regulations, e.g. chemicals, explosives etc. The Regulations prohibit anyone from delivering dangerous goods for carriage by air. The Regulations place particular responsibilities upon aircraft operators and the shippers of dangerous goods. Most cases concern failures by shippers to comply with the requirements.

Dangerous goods infringements are often discovered at cargo warehouses at airports and will be reported by the freight forwarder to the CAA's Dangerous Goods department. A Dangerous Goods Inspector will attend any incident in the first place, examine the consignment, photograph it, seize it and if a formal investigation is warranted, report it to IET.

It is advisable to speak to the Inspector at the earliest opportunity to gauge the seriousness of the case, any useful contacts and any details not mentioned in their proforma report. This is also a good time to obtain a comprehensive statement from him or her, producing as exhibits the photographs, notes, appropriate parts of the Technical Instructions and the areas apparently breached. Although it is worthwhile obtaining this statement first, as the DG Inspectors can be very busy, it is sometimes better to follow the trail backwards from the finders.

Very occasionally, you will need to obtain expert evidence from outside the CAA to analyse chemicals so that the consignment can be properly identified within the Technical Instructions. Again, consult our DG Office for contacts. You may also need to contact the Vehicle Certification Agency Dangerous Goods Office based at PIRA International, Leatherhead, who can give expert evidence about packaging and whether it meets the required test standard.

D. The Civil Aviation (Air Travel Organisers' Licensing) Regulations 1995 ('ATOL Regs')

The ATOL Regs deal with “the making available of flight accommodation” and the circumstances in which it can be provided and the conditions imposed in so doing.

The CAA's Consumers and Markets Group (CMG) monitors the selling of flights to the public by ATOL holders and non-licence holders. CMG refers matters to IET for investigation in much the same way as Dangerous Goods.

IOs have the ability to conduct test purchases. If required to do so, IOs should make reference to the Test Purchase Guidance Note and Application Form.

SOME AVIATION TERMINOLOGY EXPLAINED

Also see CAP 1430 – UK Air Traffic Management Vocabulary.

EASA

A substantial amount of aviation regulation is now derived from European legislation which has direct effect in English law.

The CAA became a member of the European Joint Aviation Authority ('JAA'). The JAA was a grouping of European national aviation authorities which developed and published Joint Aviation Requirements ('JAR') in the areas of aircraft operations, personnel licensing and airworthiness.

The JAA has now been replaced by the European Aviation Safety Agency ('EASA'). EASA is the Europe-wide body with responsibility for advising the EU on new legislation, implementing and monitoring safety rules, including inspections in the Member States, the type-certification of aircraft and components, as well as the approval of organisations involved in the design, manufacture and maintenance of aeronautical products.

The CAA is the 'competent authority' for the enforcement of EU aviation regulations in the UK.

Commercial air transport and public transport.

Commercial air transport is a term derived from EU legislation. It is not defined in the ANO beyond reference to EU-OPS.

Articles 6 and 7 of the ANO define 'public transport' and 'commercial operation'. Articles 9 to 16 ANO provide special rules and exceptions to the ANO prohibitions.

In simple terms, the ANO prohibits UK-registered aircraft from carrying passengers or cargo for payment unless the operator of the flight holds an Air Operator Certificate ('AOC'). An AOC is granted by the CAA when it is satisfied the operator is competent to safely conduct public transport flights. An AOC is difficult to obtain and expensive to maintain. A CAA Flight Operations Inspector oversees every company holding a UK AOC. There is a separate Inspectorate section for companies operating fixed wing aircraft and those operating helicopters. Aerial work is where payment is made in respect of a flight or for the purposes of the flight but which is not public transport, e.g., aerial photography, flying training, parachuting.

Foreign-registered aircraft are prohibited from carrying passengers or cargo in the UK, or conducting aerial work, unless they have been given Permission by the DfT or, in the case of passenger-carrying flights, are exempt under EU law (Articles 250 to 252 ANO).

Many of the complaints of illegal public transport and aerial work originate from companies who are the holders of an AOC. Companies undertaking public transport operations without an AOC or the DfT's Permission pose a commercial risk to legitimate companies and a physical risk to their passengers.

Investigations will involve identifying the operator of the aircraft, the pilot in command of the aircraft and passengers/cargo on board the aircraft and, crucially, evidence of any payment.

If you are unclear as to whether a flight has the potential to fall within the legal definitions, you should seek the advice of a CAA lawyer at an early stage.

PILOT LICENCES

Broadly, there are four types of pilot's licences: a National Private Pilot's Licence ('NPPL'), a Private Pilot's Licence ('PPL'), a Commercial Pilot's Licence ('CPL'), and an Airline Transport Pilot's Licence ('ATPL'). A NPPL is the lowest level of qualification in terms of age, fitness, skill and experience (it is for 'recreational' pilots, flying simple aircraft-types only, such as microlights) and an ATPL is the highest level. If the holder is licensed in respect of aeroplanes, the letter 'A' is appended; if the holder is licensed in respect of helicopter, the letter 'H' is appended, e.g., PPL(H).

Pilot licences granted under the JAR-FCL provisions are valid for 5 years. ATPLs and CPLs granted under the UK national provisions are valid for 10 years. All PPLs and NPPLs have lifetime validity.

All licence holders must have a current medical certificate (or in the case of NPPL, a medical declaration) in order for the licence to be valid.

A licence holder may add 'ratings' to his licence. The ratings can relate to a particular aircraft class or type, e.g., multi-engine piston aircraft (MEP). The ratings can relate to a particular skill, e.g. instrument rating. Broadly speaking, in order to be granted a rating a licence holder must have achieved a level of flying experience, passed an examination and a flight/skill test. Ratings have a period of validity. The holder must re-validate the rating during the period of validity in order to continue to exercise the privileges of the rating. Once the period of validity has expired, the holder must renew the rating (a different process to revalidation). The

licence document contains a Ratings page where Certificates of Revalidation are signed by a CAA-approved examiner.

The privileges that each licence and ratings type confers upon the holder are set out in Schedule 8 of the ANO.

United States Federal Aviation Administration (FAA) Licences

'Piggy-back' is where the FAA licence is granted on the back of a UK/JAR/ICAO licence. The FAA licence candidate must complete an FAA form to verify the UK/JAR/ICAO licence. Once the FAA has verified the licence, the FAA will send the candidate a letter and copy it to the Designated Pilot Examiner ('DPE'). The candidate must produce to the DPE this FAA letter, his/her licence, log book and a licence application form. If the DPE is satisfied with all these documents, the DPE will issue a FAR 61.75 licence.

Note: All the limitations on the UK/JAR/ICAO licence apply to the FAA licence.

'Stand-alone' - Candidates for a FAA PPL, IR or ME rating must first pass a security check. The candidate is then required to attend ground school and produce an Examiner endorsement to that effect. The candidate must pass a written test. The candidate must have 3 hours flight instruction with an instructor and then pass a flight test.

If the candidate has a UK/JAR/ICAO licence, the hours the candidate has flown on that licence will be accepted towards the FAA licence once the DPE has verified the hours.

FLIGHT RULES

Section 5 of the Standardised European Rules of the Air (SERA) sets out the rules for visual meteorological conditions (VMC), visual flight rules (VFR), special VFR and Instrument flight rules (IFR).

All aircraft must maintain a safe height above the ground.

Visual Flight Rules

Visual Meteorological Conditions ('VMC') must prevail before a pilot can legally fly VFR. VMC are conditions in which pilots have sufficient visibility to navigate the aircraft by using visual references, without reference to instruments, and can maintain visual separation from terrain and other aircraft. VMC are defined by certain visibility minima, cloud ceilings (for take-offs and landings) and cloud clearances. VFR flight is prohibited in the UK at night – regardless of the weather. In Class A Airspace, VFR flight is prohibited. In Class B, C, D &

E airspace, the flights must be operated within specified weather limits. Where the weather conditions are below the VFR minima, Instrument Meteorological Conditions ('IMC') apply. Instrument Flight Rules ('IFR') govern the conduct of flights under Instrument Meteorological Conditions.

Instrument Flight Rules (IFR)

There are three reasons for pilots to fly under IFR:

- a. When it is mandatory to do so (Class A airspace)
- b. When the weather conditions do not allow VFR
- c. Whenever the pilot wishes, regardless of weather and airspace classification.

Outside controlled airspace the aircraft must be flown at an appropriate cruising level related to the magnetic track of the aircraft given in SERA.

Inside controlled airspace, a flight plan must be filed and all ATC clearances and instructions complied with. In addition, the pilot must have available and be able to comply with the notified holding and instrument approach procedures at his destination.

Special VFR

This confusingly named procedure is a clearance granted by Air Traffic Control ('ATC') for an aircraft *not* to observe all the Instrument Flight Rules when, according to the reasons above, IFR should be observed. It is granted for a number of reasons, among which is to allow access to aircraft that are not certified for flight in Instrument Meteorological Conditions. These clearances are granted by ATC if traffic conditions permit. There are limitations on the minimum visibility needed by private pilots before they can accept SVFR clearances.

AIRSPACE CLASSIFICATION

Airspace exists in seven classes, A to G, in decreasing order of air traffic control regulation. Airspace is 'controlled' when under Air Traffic Control ('ATC'). Controlled airspace is airspace of defined dimensions within which air traffic control is provided in accordance with the airspace classification. Controlled airspace has lateral and vertical boundaries.

Classes A to E are controlled airspace and classes F and G are uncontrolled airspace. At one end of the scale in classes A and B airspace, all aircraft must be separated from each other. At the other end of the scale in class G airspace there is no requirement for any aircraft to be separated from each other. In the intermediate classes some aircraft are

separated from each other depending on the flight rules under which the aircraft are operating. For example in class D airspace, IFR aircraft are separated from other IFR aircraft, but not from VFR aircraft, nor are VFR aircraft separated from each other.

The classification of airspace is shown graphically on all aeronautical charts but, for official purposes, is *notified* in the UK Aeronautical Information Publication known as the Air Pilot and is on the Aeronautical Information Service website, in the “En-Route” section.

In air traffic control, separation is the name for the concept of keeping an aircraft in a minimum distance from another aircraft to reduce the risk of those aircraft colliding, as well as prevent accidents due to wake turbulence. Air traffic controllers apply rules, known as separation minima, to do this. Pairs of aircraft to which these rules have been successfully applied are said to be separated: the risk of these aircraft colliding is therefore remote. If separation is lost between two aircraft, they are said to be in a conflict.

Radar separation is applied by a controller observing that the radar returns from the two aircraft are a certain minimum horizontal distance away from each other, as observed on a suitably calibrated radar system.

Class A airspace

Instrument Flight Rules apply regardless of weather. Aircraft must file *flight plans* before entry and comply with ATC clearances (to ensure that the positions of all aircraft and their intentions are known to the control authorities at all times – the “Known Traffic Environment”). Examples of Class A Airspace: The London Control Zone around Heathrow, the London Terminal Manoeuvring Area (an area above the major London airports where their departing traffic is integrated and their arrival traffic segregated and streamed into landing sequence; Airways (usually 10 mile wide corridors running from a base height to an upper limit aligned with ground based navigational aids, controlled by a Sector Controller in a Area Control Centre such as Swanwick or Prestwick). (See UK AIP ENR 1-4-1).

Class D airspace

Is provided around airports where controlled airspace is required but does not warrant Class A. Aircraft may operate under either Instrument Flight Rules, or under Visual Flight Rules when the weather is suitable but must have ATC clearance for entry and must comply with all ATC clearances and instructions. It is therefore still a “known traffic” environment. Examples are the Control Zones associated with all the major airports except Heathrow. (See UK AIP ENR 1-4-4).

Class G airspace

The “see and avoid” method of separation applies. Aircraft are not required to file flight plans or even be in communication with an ATC unit.

Control Zones

A volume of airspace associated with a single major aerodrome which extends from the surface up to a designated height. The air traffic is predominantly arrivals and departures at the major airport and the zone exists to enable an orderly flow to be marshalled in such a way that the air movements can be coordinated with activity on the ground.

Terminal Manoeuvring Areas

A volume of airspace associated with a group of major aerodromes extending from a defined base height up to a top limit in which traffic arriving on airways is segregated into arrival streams for each of the airports and in which departures from the individual airports are integrated into a traffic stream for the airways. There are TMAs over London, Manchester and Scotland.

Control Areas

Are similar to TMA, but not associated with a single aerodrome.

Military Air Traffic Zones (MATZ)

An area, generally 5 nms radius up to 3,000ft, around a major military aerodrome with a “panhandle” out to 10 miles aligned with the main instrument runway. The MATZ has no status in civilian law and they are printed on civil aviation charts merely for information and guidance (See UK AIP ENR 2-2-4-1).

Aerodrome Traffic Zones (ATZ)

Every licensed civil and government aerodrome has an ATZ. The size of the ATZ is dependent upon the length of the longest runway. Runway >2000yds, ATZ is 2½ nms radius, extending up to 2,000ft. The ATZ automatically takes on the classification of the surrounding airspace. The additional rules for flight within an ATZ are covered in Rule 11 of the Rules of the Air Regulations 2015.

Transponder Mandatory Zone

Two TMZs in the vicinity of Stansted airport were introduced in 2009 at the request of NATS and following a period of consultation with the aviation community. The aim is to reduce the number and severity of airspace infringements in the area. The 2 TMZs are from the surface to 1,500ft within the lateral dimensions of the class D airspace CTAs to the north-east and south-west of Stansted. Aircraft entering the TMZs must either have a transponder reporting in Mode A or C (thereby showing ATC their location and height) or have obtained permission from ATC.

Prohibited Areas

These are areas, listed in ENR 5-1-1-1 and –2, where flight is prohibited in all circumstances, e.g., Dounreay. Legal force is given to these prohibitions in Statutory Instruments.

Restricted Areas

These are areas, listed in ENR 5-1-2-1 to –4, where flight is not permitted except in strictly defined circumstances, e.g., Devonport, Highgrove House, Belmarsh. They can apply to all classes of aircraft or be specific to a single class, for instance, the restrictions over top security prisons apply only to helicopters. Legal force is given to these restrictions in Statutory Instruments.

Danger Areas

There are numerous danger areas and they are listed in ENR 5-1-3-1 to 5-1-3-24, e.g., Pirbright, live firing. There is no legal status to the Danger Area designation although some have byelaws prohibiting entry. How these might be invoked to deal with overflight is by no means clear, but they can be used to deal with balloon landings. It is generally not an offence to fly through a danger area as such, but as this is notified as an area in which dangerous activities are taking place, it is often possible to bring a charge of endangering against a pilot who flies through such an area. It is necessary to establish the published hours of activity from the UK AIP ENR pages and to obtain a statement from the operating authority to say that dangerous activity was taking place at the time.

Parachuting Area

Again these have no legal status unless they also coincide with an ATZ (i.e. Sibson). Endangering is the only charge and to prove this we need to show actual rather than potential danger to the parachutists.

Restricted Airspace (Temporary) ('RA(T)')

Statutory Instruments are passed to cover specific events (e.g. Farnborough International Airshow, Glastonbury musical festival) or incidents for either air safety or national security reasons.

ALTIMETER.

Principles of the Altimeter

The altimeter is a precision barometer which measures the static pressure of the atmosphere at the point where the aircraft is. Pressure decreases with height at approximately 1 millibar for every 30ft of height in the lower atmosphere. The aircraft instrument is fitted with an adjustable “sub-scale” by which pressure datum set in the sub-scale window. Technically the pressures should be referred to as “hectopascals” – but in the trade they are usually referred to as millibars. American instruments have their settings in “inches of Mercury” 29.91 inches = 1013 millibars.

Altimeter settings

There are three sorts of “height” of interest to the pilot at different stages of flight.

Shortly after take-off or when cruising at fairly low level, the pilot is concerned with terrain clearance. As all the obstacles on maps are given as heights above sea level, this is what the pilot wishes to be displayed. Heights above sea level have, in aviation, the specific name of altitude. In order to make the altimeter display altitude, the sub-scale must be set to a figure known as QNH. Clearly QNH will only be accurate at the place where it was measured and if the aircraft flies away from that place the accuracy of its altitude information will degrade. Most low and slow flying aircraft would obtain updated QNH settings from each aerodrome they pass, but this is not a feasible proposition for fast aircraft like military jets or in remote areas where airfields are few. There is therefore a system which splits up the UK into a number of altimeter setting regions and disseminates the lowest forecast QNH for each region. This is known as the Regional QNH. While it is less accurate than the local QNH, it is at least safe in that it ensures that the aircraft is *never lower* than indicated on the altimeter (it may, of course, be somewhat higher, but that is unimportant if terrain clearance is the criterion).

In medium and high altitude cruise the pilot is concerned with separation from other aircraft. It is therefore important that all aircraft set the same pressure setting – the standard pressure setting of 1013.2 mb. An altimeter set to 1013.2 indicates “Flight Levels” which are referred

to as FL50 (approximately 5000ft), FL120 (approximately 12,000 ft) etc. The altitude above which all aircraft use the standard pressure setting is known as the Transition Altitude.

When approaching to land the pilot is concerned about his height above touchdown. There are two systems in use here. The pilot could set QNH, in which case the altimeter on touchdown will indicate the altitude of the touchdown point i.e. the airfield elevation. The alternative is to set a pressure known as the QFE which, when set, will cause the altimeter to read ZERO at the touchdown point. Thus, with QFE set, the altimeter indicates height above the touchdown point.

AERODROMES

Aerodromes are often referred to using an International Code of four letters. All UK aerodromes have codes starting EG with two other letters. For example, EGLL is Heathrow and EGKK is Gatwick.

Licensing

Civil Aerodromes are either *licensed* or *unlicensed*. Unlicensed does not mean illegal. There are hundreds of unlicensed aerodromes in the UK in daily use, some of which are quite big and busy (such as North Weald). Some licensed airfields are small and insignificant. The majority of fixed wing public transport flights must use licensed aerodromes. Articles 207 to 209 ANO specify what flight activities can be conducted only from licensed aerodromes and the safe conduct conditions for training flights from unlicensed aerodromes. The UK AIP contains the details of all licensed aerodromes. For details of unlicensed aerodromes you must consult Pooley's or the VFR Flight Guide. There are many farm strips which do not appear in any official publications.

Air Traffic Services at Aerodromes

The service being provided can be identified from the callsign of the radio station. If the callsign is "Approach" or "Tower", then the service is a full ATC service; if it is "Info", then it is an aerodrome flight information service; if it is "Radio" then it is limited to an air/ground communications service only.

- a. Air Traffic Control Service. This is a full service provided by licensed ATCO's. Aircraft are required to comply with the instructions given by the controllers.
- b. Aerodrome Flight Information Service. This facility is manned by Flight Information Service Officers (FISO's) who also hold a licence. They give

information to pilots so that the pilots may conduct their flights in safety, but have no authority to compel pilots to do anything.

- c. Air/Ground radio service. This can be manned by anyone who holds an R/T licence.

Runways

Runways, whether paved or grass, are referred to by the first two digits of their magnetic heading. Thus a runway which points in a westerly direction (270°M) would be referred to as “runway TWO SEVEN” and not “runway twenty seven”. Where, as at Heathrow, there are parallel runways, these are referred to as “TWO SEVEN LEFT” and “TWO SEVEN RIGHT” as viewed by a pilot on an approach to land. Runways, of course, have two ends. Thus, a strip of concrete might be referred to as “Runway ZERO NINE/TWO SEVEN”. Even grass fields usually have runway marked out either by mowing patterns or by marker boards placed on the airfield.

RADAR

Primary Radar

The principle is that a transmitter sends out a powerful pulse signal which is reflected back (much weaker) by anything in its path. The equipment measures the time difference between the sending of the pulse and the receiving of its reflection. This time difference is converted to distance and displayed as a blip of light, called a “primary return” on the display tube. The aerial rotates so that it scans through 360° at a fixed rate. The purpose for which the radar is used determines how fast the aerial is designed to rotate. Ground movement, where near real time position updates are essential, rotate very fast. ATC radars are relatively slow at around 6-10 rpm. Thus, as information is received from an individual aircraft at best once per revolution, and the “blip” appears to hop across the screen. The display allows the blips to remain illuminated for a short time, so the observer sees a short worm of blips, the latest position being at the head of the worm and the length of the trail and the distance between the individual blips being indicative of the speed of the aircraft.

The main problem with primary radar is the weakness of its returning signal. It is affected by weather, certain atmosphere conditions (rather like television), and the height of the aircraft. On the positive side, it requires no input from the aircraft.

Secondary Radar

This technique grew out of the “Identification Friend or Foe” (IFF) military equipment developed in WWII. Basically, the ground transmitter sends out a signal which, instead of being reflected by the aircraft, is received by the aircraft, boosted, and transmitted as a strong signal back to the ground. This is known as “transponding” or the slang term “squawking”. The time lag taken up by the reception, boosting, and retransmission by the aircraft is known and therefore can be allowed for in the distance calculation. Equipment has been developed to include more sophisticated data messages.

The simplest current system superimposes a four-digit code which is allocated by ATC to the aircraft. The code can indicate quite a few things to an expert, such as which ATC position is controlling the aircraft and what it is doing. But from our point of view the code is simply an identifier. The best way of obtaining an ident on an unknown non-transponding aircraft is to tell the pilot by radio to squawk a particular code and then see alongside which radar return the code appears.

A further development, universal in commercial aircraft and widespread in General Aviation aircraft is Mode C. When this is switched on, the returning data from the aircraft includes the height of the aircraft encoded from a gadget on the aircraft’s altimeter. Be careful and take expert advice if you wish to use Mode C heights as evidence as the witness will have to be absolutely sure what sort of “height” the readout is displaying (see the notes on altimeters) Mode S is a development of Mode C allowing far more data to be transferred.

ANNEX 1

Office Procedures

IO tasks must be shown on the Team Outlook calendar and include case reference number and location.

Timesheets must be compiled and reflect the actual time spent on an individual investigation. This includes time spent writing/typing letters and reports etc which must be allocated to the case reference number. Travelling time is allocated to the associated investigation.

Additional time worked will be recorded on the IET spreadsheet and taken as time off at the earliest opportunity. Unless authorised by the Head of IET, no more than 21 hours time off should be outstanding at any time.

Annual leave requests are made via the online request form being submitted to the Head of IET.

ANNEX 2

Production of documents

ANO Article	Person	Document(s) that may be requested
235(1)	Commander of any aircraft	Aircraft certificate of registration and C of A.
		Flight crew licences.
		Any other documents which the aircraft is required by Article 229 or any EASA Regulation to carry while in flight.
235(2) & (3)	Operator of UK-registered aircraft	Includes aircraft log book, aircraft certificate of registration and C of A for non-EASA aircraft.
		Operators manual if public transport flight.
235(4)	Holder of UK licence or medical certificate	Licence, including certificate of validation and medical certificate.
235(5)	Keeper of Personal Flying Log Book (PFLB) - flight crew of UK-registered aircraft	PFLB, 2 years' worth.

CA Ins Reg	Person	Document(s)
6(2)(a)	Air carrier or aircraft operator (registered owner) of UK-registered aircraft	Insurance certificate or other evidence of insurance re. aircraft operated by that air carrier/operator. Note: non-compliance is <u>not</u> a criminal offence.
6(2)(b)	Air carrier or aircraft operator (registered owner) of non-UK registered aircraft or UK registered aircraft with undischarged mortgage.	Insurance certificate or other evidence of insurance re. aircraft operated by that air carrier/operator.