

VERSION 2



THE SKYWAY CODE



Use the buttons above and right to navigate through the document and look out for orange links in the text content for further actions.

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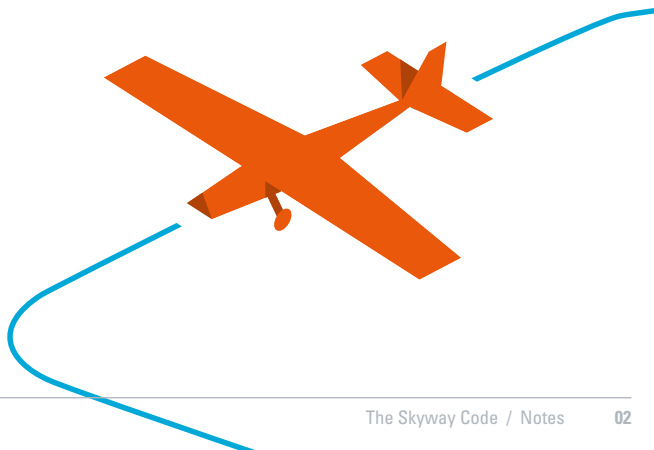
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Enquiries regarding the content of this publication should be addressed to: GA@caa.co.uk - please use subject line 'Skyway Code'.

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QUICK MENU

INTRODUCTION

The **Skyway Code** is intended to provide General Aviation pilots involved in non-commercial and flight training operations with practical guidance on the operational, safety and regulatory issues relevant to their flying. Pilots of all aircraft categories, powered or unpowered, should find it useful.

Its primary focus is:



SAFE AIRCRAFT OPERATIONS



SAFE USE OF AIRSPACE

- ☐ All users of uncontrolled airspace and aerodromes will find it relevant.
- ☐ It is oriented towards **Visual Flight Rules (VFR)** flight. It does not include comprehensive information on Instrument Flight Rules (IFR) flying.
- ☐ While elements of flight crew licensing and airworthiness requirements may be included where relevant, the detail of these subjects is not covered.
- ☐ The **Code** is a living publication that will be reviewed at least annually to ensure it reflects the latest regulatory requirements and best aviation practice.

Readers should note the **Code** is guidance only and not a definitive statement of the law. For this readers should see the underlying regulations, which are referred to in [section 11](#) (Finding out more [p.161](#)).

KEEP UP TO DATE

 For corrections or updates to content see www.caa.co.uk/skywaycode



PRE-FLIGHT CHECKLIST

<i>Including:</i>	07	Pilot	>
	07	Aircraft	>
	08	Pre-flight planning	>

PRE-FLIGHT CHECKLIST

This is designed to act as a quick reference that supplements the more detailed information provided later in the publication. It should cover most basic pre-flight items, although you are encouraged to adapt it to suit your own needs.



PILOT

- ☐ **Licence and rating** are appropriate, valid and carried.
- ☐ **Medical certificate** or **declaration** valid and carried.
- ☐ **90 day rule** completed (if carrying passengers).
- ☐ **Current to fly** under rules for club or group.
- ☐ **Fit to fly** the aircraft and in satisfactory physical and mental state.
- ☐ **Passengers** briefed.



AIRCRAFT

- ☐ **Airworthy** condition.
- ☐ **Certificate of Airworthiness** or **Permit to Fly** valid, supported by a valid **Airworthiness Review Certificate** or **Certificate of Validity**.
- ☐ **Equipment** (including survival) appropriate and operative.
- ☐ **Fuel and oil** adequate for the flight and any foreseeable diversion.
- ☐ **Mass, balance and performance** within limits for aircraft and aerodromes.
- ☐ **Documents** required onboard.
- ☐ **Insurance** valid.
- ☐ **Pre-flight inspection** complete.

PRE-FLIGHT CHECKLIST

PRE-FLIGHT
PLANNING

- ☐ **NOTAMs** checked for route, destination and alternate aerodromes.
- ☐ **Weather conditions** checked and suitable.
- ☐ **Charts** current and reviewed.
- ☐ **GPS** map current and route programmed.
- ☐ **Destination** and **alternate aerodromes** planned and adequate.
- ☐ **Prior Permission** obtained for aerodromes (if applicable).
- ☐ **Border Force** and/or **Special Branch** notified (if applicable).
- ☐ **Overnight weather** checked for high winds, frost or snow (if aircraft to be left outside).
- ☐ **Flight plan** filed (required for international flight).

! Have you assessed the risks of the flight?
Use the **PAVE** checklist.

Pilot, Aircraft, enVironment, External pressures – [see p.120](#) for more details.



Chart updates, AIP, AICs and NOTAMs are available at
www.ais.org.uk



UK Airspace restrictions are available on
08085 354802



Download the **SkyWise App** for the
latest regulatory news and alerts
skywise.caa.co.uk



UK FIR – USEFUL COMMS INFO

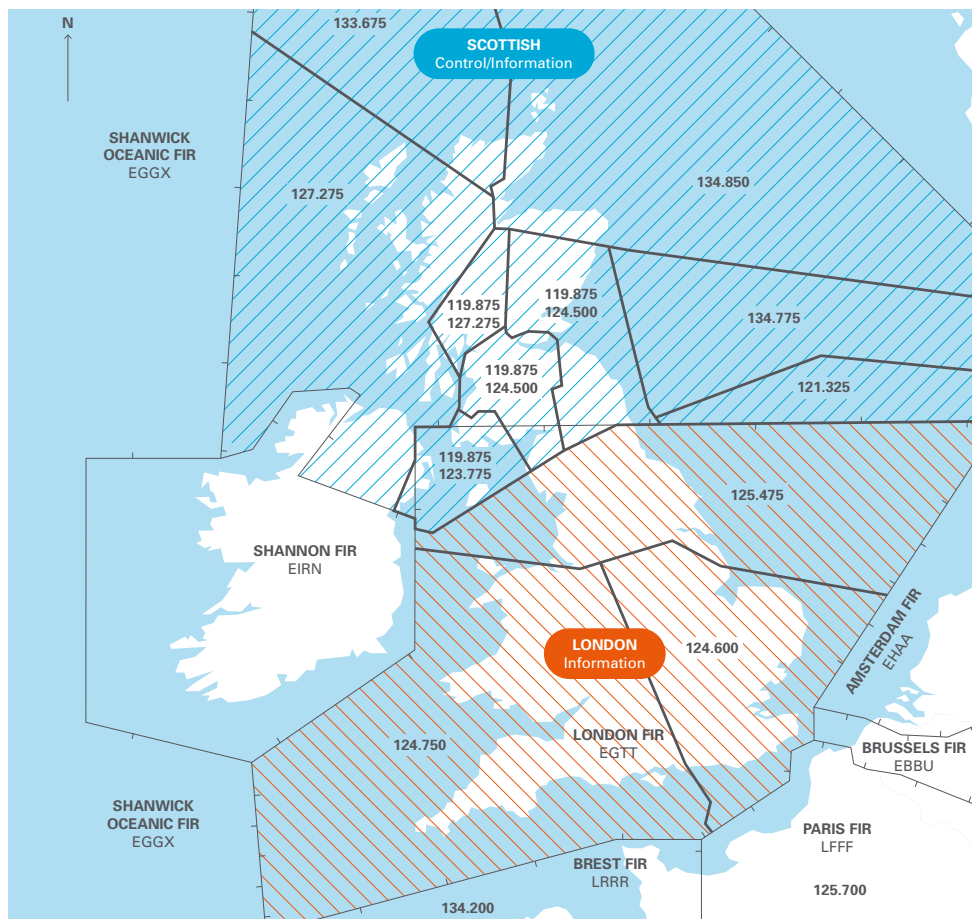
<i>Including:</i>	10	Flight Information Service Regions	>
	11	Lower Airspace Radar Services	>
	12	Frequency monitoring codes	>
	13	UK VOLMET Frequencies	>
	13	Frequency Reference Cards	>

UK FIR – USEFUL COMMS INFO

The following pages give a selection of communications information taken from the UK AIP that you may find useful during your flying. Full details can be found in the [ENR section](#) of the AIP at www.ais.org.uk. Follow links to 'UK AIP' and then 'ENR Index'.

Flight Information Service Regions

London and Scottish Information are able to provide a 'Basic Service' to all aircraft in the UK FIR. Subject to capacity, other services such as opening flight plans or weather information are also available. For more details of air traffic services outside controlled airspace, [see p.72](#).



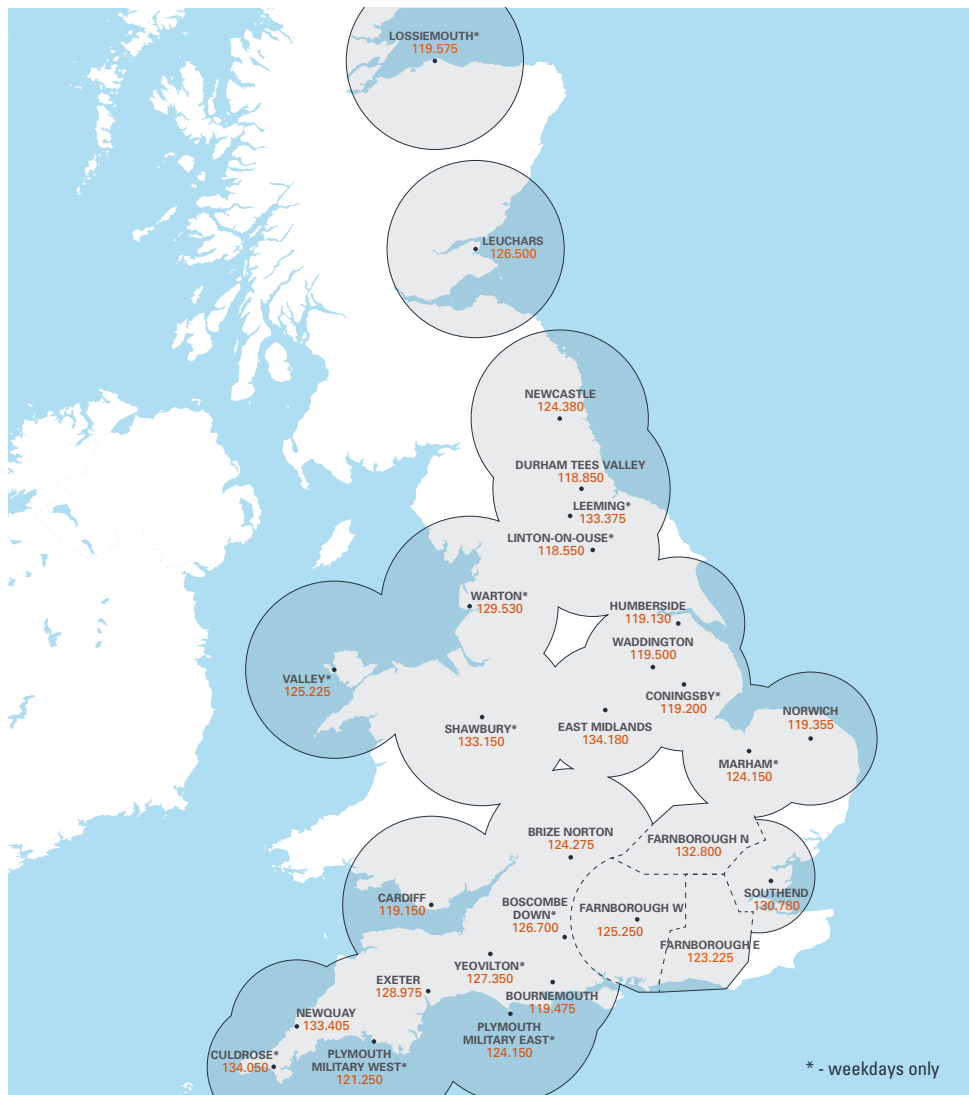
London FIS – all frequencies H24, SFC-FL195

Scottish FIS – all frequencies H24, SFC-FL245 except 119.875 available 0800-2000 local time SFC-FL55

UK FIR – USEFUL COMMS INFO

Lower Airspace Radar Services

These units provide air traffic services to aircraft outside controlled airspace up to and including FL100. Hours of operation will vary and military units are normally only available during the week. For more details of air traffic services outside controlled airspace, [see p.72](#). All services are subject to capacity. Full details are in [ENR 1.6](#) of the AIP – search for ‘Lower Airspace Radar Service’ within the ENR 1.6 document.



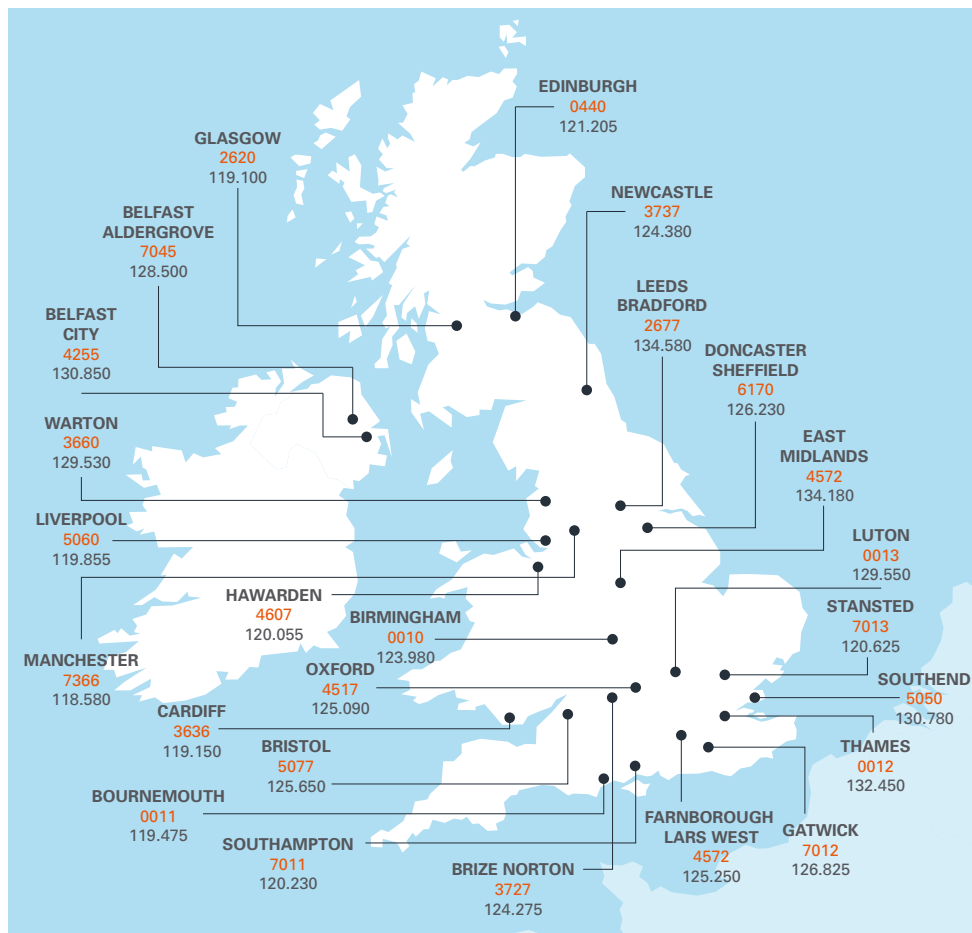
UK FIR – USEFUL COMMS INFO

Frequency monitoring codes

Frequency monitoring codes (also known as listening squawks) are for use by aircraft 'listening in' on the radio frequency of nearby airspace, without having established contact on it. They might be used if a frequency is very busy or if you do not feel the need to request a service.

They allow air traffic units to see who is listening to which frequencies and therefore enable contact to be made if necessary – for example if you are about to infringe someone's airspace. Remember to return it to **7000** or another appropriate code when changing frequency.

Full details of the circumstances in which they should be used are in the AIP – search for 'frequency monitoring codes' within the [ENR 1.6](#) document, or alternatively you look them up along in each specific aerodrome under [AD 2.22](#).



UK FIR – USEFUL COMMS INFO

UK VOLMET Frequencies

VOLMET is a continuous radio broadcast of aerodrome METAR reports. This can be useful for in-flight weather updates.

Main 135.375	South 128.6	North 126.6	Scottish 125.725
Amsterdam	Birmingham	Durham Tees Valley	Aberdeen
Brussels	Bournemouth	East Midlands	Belfast Aldergrove
Dublin	Bristol	Humberside	Edinburgh
Glasgow	Cardiff	Isle of Man	Glasgow
London Gatwick	Exeter	Leeds Bradford	Inverness
London Heathrow	Jersey	Liverpool	London Heathrow
London Stansted	London Luton	London Gatwick	Prestwick
Manchester	Norwich	Manchester	Stornoway
Paris Charles de Gaulle	Southampton	Newcastle	Sumburgh
	Southend		

Frequency reference cards

These are designed to accompany the VFR charts. They include aerodrome frequencies as well as many useful enroute ones. There is one for each of the three chart areas of the UK. They can be downloaded from the [VFR Charts](#) page of the AIS website - www.ais.org.uk.

Key info

8.33 Channel Spacing

Please verify the frequencies of intended use before departure as ATSU frequencies have changed since the introduction of 8.33 channel spacing, which may not be reflected in the current charts for that aerodrome or enroute areas.

You should refer to www.ais.org.uk, or alternatively directly contact the ATSU.



UK FIR - Useful...



REQUIREMENTS FOR THE PIC

<i>Including:</i>	15	Introduction to regulations	>
	18	Essential operating and licensing rules	>
	23	Specialised Operations	>

REQUIREMENTS FOR THE PIC

Introduction to regulations

WHAT APPLIES TO MY FLIGHT?

Key info



You should have a good working knowledge of the following regulations that apply to your flying:

All Aircraft

- > The Standardised European Rules of the Air (SERA)¹; and
- > UK Rules of the Air 2015.

Non-EASA aircraft and national pilot licences



- > Chapter 2 of Part 5 and Schedule 5 of the UK Air Navigation Order 2016 (ANO) for operating regulations; and
- > Schedule 8 of the ANO for privileges and requirements relevant to your licence and ratings.

EASA aircraft and pilot licences



- > Annex VII (Part-NCO) of the EASA Air Operations Regulation²; and
- > Part-FCL of the Aircrew Regulation³ for privileges and requirements relevant to your licence and ratings.

WHAT ARE EASA AND NON-EASA AIRCRAFT AND LICENCES?

- > An **EASA aircraft** is one that is required by the EASA Basic Regulation⁴ to have an EASA certificate of airworthiness or permit to fly. The aircraft's certificate or permit will indicate whether it is issued under the EASA requirements. Most certificated factory built aircraft (other than some microlights and gyroplanes) have an EASA certificate of airworthiness or permit to fly.
- > An **EASA licence** is issued under Part-FCL of the Aircrew Regulation³ and is required to fly an EASA aircraft. An EASA licence may also be used to fly a UK registered non-EASA aircraft of an equivalent class, although if a non-EASA aircraft requires a specific type rating, it can only be endorsed on a UK licence.
- > A **non-EASA aircraft** is one that falls outside the scope of European regulations. Vintage and ex-military aircraft, amateur builds, gyroplanes and microlights are usually non-EASA aircraft. They are required to have a national permit to fly or certificate of airworthiness issued under the ANO. Foot launched aircraft, such as hang gliders, paragliders and paramotors are also non-EASA.
- > A **UK licence** (sometimes known as a national licence) is issued under the ANO and can only be used to fly non-EASA aircraft. There are some exceptions to this, which are detailed [on p.17](#).

¹Commission Implementing Regulation (EU) No 923/2012 (as amended)

²Commission Regulation (EU) No 965/2012 (as amended)

³Commission Regulation (EU) No 1178/2011 (as amended)

⁴Regulation (EC) No 2018/1139 (as amended)



REQUIREMENTS FOR THE PIC

Introduction to regulations

WHAT IS PART-NCO?

Part-NCO is the Annex of the EASA Air Operations Regulation¹ applicable to non-commercial (formally known as ‘private’ under the ANO) or flight training operations with ‘other-than-complex motor-powered aircraft’; so it covers any EASA aircraft on those operations that is not ‘complex’. It came into force on 25th August 2016. Non-EASA aircraft comply with similar requirements in the ANO 2016. Full details of the operational regulations start [on p.20](#).

‘Complex motor-powered aircraft’ comply with more extensive requirements that are outside the scope of the Code. The EASA Basic Regulation² defines ‘complex’ as an aircraft with one or more of the following features:

Aeroplanes 	Helicopters 
Maximum certificated take-off mass exceeding 5700 kg	Maximum certificated take-off mass exceeding 3175 kg
Certificated for a maximum passenger seating configuration of more than 19	Certificated for a maximum passenger seating configuration of more than 9
Certificated for operation with a minimum crew of at least two pilots	For operation with a minimum crew of at least two pilots
Equipped with at least one turbojet engine or more than one turboprop engine	-
The definition of ‘complex’ used in this context is unrelated to the term sometimes used to describe light aircraft with certain features such as retractable undercarriage or a variable pitch propeller. Such aircraft are known as ‘variants’ with the applicable class ratings. See p.19 for more details.	

FOREIGN REGISTERED AIRCRAFT

An EASA licence may be used to fly an EASA aircraft registered in any EASA member state.

To fly an aircraft registered outside an EASA member state, you generally require a licence from the state in which it is registered, although some also allow a licence from the state in which the aircraft is flown to be used. Check the rules of the state of registry.

If you are a resident of an EASA member state and operate aircraft not registered in an EASA member state (often known as ‘third country aircraft’), you are required to hold an EASA licence or validation for the aircraft.

This only applies to aircraft that are EASA types and is in addition to the licence required by the state of registry.

Such third country aircraft must also be operated in accordance with the applicable EASA operating rules, for example Part-NCO/ SERA.

There is currently a derogation from the EASA licensing requirement for private pilots flying aircraft registered in the USA. Check the CAA website for more details and the FAA **FAR 61.75**.

¹Commission Regulation (EU) No 965/2012 (as amended)
²Regulation (EC) No 2018/1139 (as amended)

REQUIREMENTS FOR THE PIC

Introduction to regulations

CURRENT APPLICABILITY

European operational and licensing rules for EASA gliders and balloons have not yet been fully applied in the UK. This means that despite being required to hold an EASA certificate of airworthiness, some gliders and balloons are still able to operate under the ANO for operational and licences purposes. National licences may therefore be used. If you have already gained an EASA glider or balloon licence it is also considered a valid licence under the ANO.

There is currently a temporary alleviation in the format of an exemption in place until 7th April 2020 or unless revoked beforehand that allows a UK aeroplane or helicopter licence to be used to fly on non-commercial VFR operations, an EASA aircraft with a maximum takeoff mass of not more than 2000 kg and with no more than three passengers on board.

Aircraft		Licensing	Operational
 	EASA aeroplanes and helicopters	Part-FCL	Part-NCO
  	Non-EASA aeroplanes, helicopters and gyroplanes	ANO 2016	ANO 2016
	Non-EASA gliders*	BGA Cert	ANO 2016
	EASA gliders	Part-FCL/ BGA Cert	Sailplane Regulation (EU) 2018/1976**
	Non-EASA balloons	ANO 2016	ANO 2016
	EASA balloons	Part-FCL/ ANO 2016	Balloon Regulation (EU) 2018/395

Notes: *Under the ANO, non-EASA gliders (and EASA at the time of writing) do not require a statutory pilot's licence, although pilots are encouraged to hold a qualification from the relevant association. The British Gliding Association (BGA) issues glider pilot certificates in the UK. Foot-launched paramotors, despite being powered, comply with the ANO rules applicable to non-EASA gliders. **Implementation into UK law 9th July 2019.

FINDING REGULATIONS



UK-derived regulations like the Air Navigation Order and UK Rules of the Air can be found either at www.legislation.gov.uk or in the CAA's consolidation, CAP 393 – www.caa.co.uk/cap393.



European-derived regulations like the Aircrew Regulation or Air Operations Regulation can be found on the EASA website under 'Regulations' – www.easa.europa.eu/regulations. Look for links to the most recent consolidations or 'Easy Access' editions produced by EASA.

REQUIREMENTS FOR THE PIC

Essential operating and licensing rules

The following sections give a practical overview of the requirements to remember for normal GA flying. They are based on the relevant EASA and UK regulations. You should assume they apply equally to EASA and non-EASA aircraft (or licences), unless marked with a flag indicating that they only apply to one or the other.

Key:



Only applicable to non-EASA aircraft



Only applicable to EASA aircraft

PILOT QUALIFICATIONS

Key info



For licensed flying activities, such as powered fixed or rotary wing flying, you are required to have a valid:

- > Licence;
- > Rating; and
- > Medical certificate or declaration.

For types of flying that do not require a statutory pilot's licence, for example most gliding or hang gliding activities, you should refer to the guidance on qualifications from the relevant governing body or association such as the British Gliding Association or British Hang Gliding and Paragliding Association.

Licences and ratings

The following applies to both EASA and UK licences:

- > **Licences** are now 'non-expiring'. There is no periodic administrative process to gain a new one as there was for some licences in the past.
- > However changes to details such as name or address do need to be notified to the CAA, so that an updated licence can be issued.

- > **Ratings** endorsed on the licence for a particular aircraft must remain valid in order to fly. They are either assigned by class, such as single engine piston (SEP) or for helicopters or larger aeroplanes, by type, such as PA46. Ratings are issued with a validity period: in order to keep a rating valid it must be revalidated or renewed. The only exception to this is the EASA Light Aircraft Pilot's Licence (LAPL) which has a system of endorsements and 'rolling validity' rather than ratings. There are also ratings that add additional privileges to that of the basic licence, such as a night or instrument rating.
- > **Certificate** of Revalidation and Renewal, the examiner or authorised instructor must sign the Certificate of Revalidation into the licence. The examiner or authorised instructor must also notify the CAA of the revalidation or renewal by completing and submitting the appropriate form.
- > **Revalidation** of a rating refers to the action taken to further extend its validity while within the existing validity period. Depending on the rating, this is normally achieved by an examiner (or in some cases a specially authorised instructor) either reviewing whether the appropriate flying experience has been obtained within the validity period, or conducting a proficiency check flight.

REQUIREMENTS FOR THE PIC > PILOT QUALIFICATIONS

Essential operating and licensing rules

- > **Renewal** refers to the reactivation of a rating after it has expired. For renewal of EASA ratings you may have to receive some training at an approved training Organisation (ATO) or Declared Training Organisation (DTO) before conducting a proficiency check flight with an examiner.
- > **Differences and familiarisation training** refers to training that must be undertaken to fly different variants of aircraft within the same class or type. A variant may be an aircraft within a class (for example SEP) with additional features such as retractable undercarriage or variable pitch propeller, or it can mean different models of aircraft within a class or type that are sufficiently different from each other to require training. Differences training requires practical training on the aircraft, whereas familiarisation can just be gaining additional theoretical knowledge.

Medical and fitness to fly

You are required to hold a valid medical certificate, or in the case of flying non-EASA aircraft within the UK, a medical declaration. More details of medical options for private pilots can be found at www.caa.co.uk/ga.

- > To fly **EASA aircraft** you need an EASA compliant medical certificate. The PPL requires a class 2 medical and the LAPL requires a LAPL medical, which is a less demanding standard.
- > To fly **non-EASA aircraft** there is also the option to declare your medical fitness to fly. This is normally possible if you are medically fit to drive and not suffering from any medical conditions that would prevent you from flying safely. This is generally only valid within the UK.

- > You must also be **fit to fly** on a particular flight. You must not be suffering from any illness or fatigue that might endanger the safety of the flight. [See p.116](#) for guidance on pilot fitness.

Carrying passengers

- > **90 day rule.** In order to carry passengers, you must have completed within the previous 90 days, three take-offs and landings as sole manipulator of the controls in the same type or class to be used on the flight. If carrying passengers at night, one of those takeoffs and landings must also have been at night, unless you hold an instrument rating.
- > If flying on a UK PPL or NPPL, you may fly with one other person who is also a pilot qualified on class or type, without having met the requirements of the 90 day rule. They must be informed of the fact that you are not current to carry passengers and you must also make it clear you are the pilot in command. This is known in the ANO as the 'recent experience exception'.



Note: Balloons have alternative passenger currency requirements.

Flight at night or under Instrument Flight Rules

- > Unless you have a night rating, you are not permitted to fly at night. In the UK, night is considered the period from 30 minutes after sunset to 30 minutes before sunrise.
- > Unless you have an instrument or instrument meteorological conditions (IMC) rating, you are not permitted to fly under instrument flight rules (IFR). You must remain within the VFR or Special VFR (as applicable) minima for the airspace you are flying in.

REQUIREMENTS FOR THE PIC

Essential operating and licensing rules

OPERATING RULES AND RESPONSIBILITIES

Key info



The following is based on:

- > Part-NCO for EASA aircraft; and
- > Chapter 2 of Part 5 and Schedule 5 of the ANO 2016 for non-EASA aircraft.

The two regulations are generally similar, however there are a few differences highlighted where applicable.

As **pilot in command** it is your responsibility to ensure the relevant requirements are met before and during the flight.

General responsibilities and conduct of the flight

- > The general safety of the flight and those onboard;
- > Complying with the regulations applicable to the flight, both of the state of registry and the state being flown in (as they apply to foreign aircraft);
- > Deciding whether to initiate, continue or terminate the flight, taking into account its ongoing safety;
- > Determining whether you are fit to fly and not suffering from any illness, fatigue or other condition that will impair your performance and might render you unsafe to fly; and
- > Defining the roles and duties of the aircraft's crew, including who is the PIC.

Prior to a flight you must be satisfied that:

- > The flight can be safely made, taking into account the available information about the intended route and aerodromes to be used; and
- > That all facilities, including operating sites and navigation aids that are required for the flight, are adequate for the intended operation.

Before making any take-off, approach or landing you must be satisfied that:

- > The weather at the operating site and general condition of the take-off, approach or landing area would not prevent a safe departure or arrival.

Procedures

- > You must operate the aircraft in accordance with its aircraft flight manual (AFM) and/or conditions of its permit to fly (as applicable); and
- > Procedures must be in place for any reasonably foreseeable emergency.


Weather conditions

- > You must only commence or continue a VFR flight if the information available indicates that at the place of departure, along the route and at the intended destination, conditions will be at or above VFR minima; and
- > There is an alternative course of action available should the weather conditions prevent the completion of the flight as planned.

REQUIREMENTS FOR THE PIC > OPERATING RULES AND RESPONSIBILITIES

Essential operating and licensing rules

Fuel

- > You must ensure sufficient fuel, oil, coolant or ballast (depending on the type of aircraft) is carried for the intended flight and a safe margin for contingencies.
- > For EASA aeroplanes and helicopters under Part-NCO, minimum fuel reserves are also required for VFR flight. 



Aeroplanes:

- > By day, if remaining within sight of the aerodrome and returning to that aerodrome – 10 mins
- > By day – 30 mins
- > At night – 45 mins




Helicopters:

- > 20 mins


Aircraft and equipment

- > You must ensure the aircraft is airworthy;
- > Equipment required for the flight is fitted and serviceable;
- > Any load is properly secured and would not prevent an emergency evacuation of the aircraft; and
- > The aircraft's mass and balance will remain within the permitted range for the entirety of the flight.

Use of Oxygen

- > You and other members of the crew must use oxygen continuously whenever the cabin altitude exceeds 10,000 ft for more than 30 minutes or any time above 13,000 ft.
- > Passengers are recommended to use oxygen any time above 13,000 ft.
- > Notwithstanding the above, Part-NCO gives the PIC flexibility to determine oxygen needs depending on how a lack of oxygen may affect the crew and/or passengers. This may allow flight above 10,000 ft without oxygen; however such a determination could also result in oxygen being used below 10,000 ft. 

Survival equipment

- > You must determine what survival equipment would be necessary to facilitate the survival of those in the aircraft, should a forced landing on either land or water occur; and
- > Whether it is necessary for occupants to wear life jackets. If you are flying outside of gliding distance of land, you are required to carry one for each occupant.
- > EASA aeroplanes and helicopters are required to have an Emergency Locator Transmitter (ELT). In aircraft up to six seats, a Personal Locator Beacon (PLB) may be carried instead. 



Info: Aircraft equipment

For full aircraft equipment requirements refer to either:

Part-NCO (IDE) for EASA aircraft; or

Schedule 5 of the ANO for non-EASA.






REQUIREMENTS FOR THE PIC > OPERATING RULES AND RESPONSIBILITIES

Essential operating and licensing rules

Seating

- > You must ensure at all times while in flight, at least one pilot is at the controls of the aircraft with their seatbelt fastened; and
- > Except in the case of balloons, all passengers are seated with their seatbelts fastened during taxi, take-off, landing and any other time when necessary for their safety.

Carriage of documents

- > For non-EASA aircraft flying within the UK, there are no document carriage requirements other than charts for navigation. 
- > When exercising the privileges of an EASA licence you must carry the licence document and photo ID with you at all times. 
- > For EASA aircraft under Part-NCO, you must always carry: 
 - > Aircraft flight manual;
 - > Current charts;
 - > Interception procedures;
 - > Flight plan details (if one has been filed); and
 - > Minimum Equipment List (if you operate with one).
- > For international flight there are more extensive requirements, the details of which can found in the 'International Flight' chapter [on p.158](#).

Passenger briefing

- > You must ensure passengers are briefed on the emergency equipment and procedures for the flight; and
- > If required for the flight, the use of oxygen equipment.

Guidance ?

The recommended contents of a passenger briefing are:

- > Safety when airside, especially propellers;
- > Operation of the seatbelts;
- > Operation of doors/canopy;
- > Location of any emergency exits;
- > Operation of life jackets, raft and ELT/PLB;
- > Operation of the oxygen system;
- > Instructions on what to do in an emergency;
- > Communicating during the flight, including when to keep quiet; and
- > Comfort on the flight, including cabin temperature, pressure changes and the location of sick bags.

For more guidance on the care of passengers see the relevant safety sense leaflet at www.caa.co.uk/safetysense.

REQUIREMENTS FOR THE PIC

Specialised Operations

EASA REGULATIONS

On 21st April 2017 rules for EASA aircraft on 'specialised operations' came into force. These rules are part of the EASA Air Operations Regulation and only apply to EASA aircraft.



EASA includes operations such as aerobatic flights, parachuting and glider towing within the definition of 'specialised operations'. These attract a few additional requirements over and above normal flights.

'NCO.SPEC' is a subpart of Part-NCO which includes requirements for non-commercial and flight training flights of a specialised nature. Commercial specialised operations and those with 'complex motor-powered aircraft' ([see p.16](#)) must comply with Part-SPO. Pilots and operators should also familiarise themselves with the factors that determine whether an operation would be considered commercial or not.

The majority of specialised operations are outside the scope of the Code, however some common GA activities, such as aerobatic flights, are included. If conducting an aerobatic flight, or any operation that may be considered 'specialised' you must familiarise yourself with the requirements.

In summary, NCO.SPEC requires you as **pilot in command** to:

- > Conduct and document a risk assessment. This must assess the complexity of the activity to determine the hazards and associated risks of the operation and establish mitigating measures;
- > On the basis of the risk assessment, develop a checklist appropriate for the intended operation; and

- > Conduct a safety briefing with any crew or task specialists on board the aircraft covering operational procedures and emergencies. This may be accomplished by a suitable briefing at the commencement of the activity's operating season.

Full details of the requirements can be found in Part-NCO (or Part-SPO for commercial) of the EASA Air Operations Regulation¹. There is also guidance included on the conduct of risk assessments and development of checklists.



Info: Look for the 'Easy Access' edition of the Air Operations Regulation on the EASA website that includes the Acceptable Means of Compliance (AMC) and Guidance Material (GM) to the regulations. www.easa.europa.eu/regulations CAA guidance on Part-SPO can be found at www.caa.co.uk/spo

GLIDER TOWING GUIDANCE

Guidance on the safe conduct of glider towing can be found on the British Gliding Association (BGA) website at www.gliding.co.uk/safeaerotowing. Glider towing with EASA aircraft must also comply with the requirements of NCO.SPEC.

There are no specific items required for a glider towing checklist under NCO.SPEC, although it must be based on a risk assessment of the activity and specify the duties of the pilot in command and any other crew members involved in the operation.

¹Commission Regulation (EU) No 965/2012 (as amended)

REQUIREMENTS FOR THE PIC

Specialised Operations

AEROBATIC GUIDANCE

Aerobatics are an interesting area of flying that offer the opportunity for pilots to learn new skills and improve their aircraft handling. Well executed aerobatics are also very satisfying to fly. However, they do bring additional risks that need to be considered and mitigated.

Find a suitable instructor who is familiar with your chosen aircraft. They will likely cover most of what you need to know. Some basics to remember:

Aircraft suitability

- > The aircraft must be cleared for aerobatic flight. Read all information in the AFM (or equivalent document) relevant to aerobatics. Know specifically what aerobatic manoeuvres are permitted.
- > Know the applicable limitations for aerobatic flight. These include 'g' limitations, the V_A speed range (the maximum speed at which controls can be fully deflected under normal circumstances) and the permitted mass and balance range for aerobatic flight.

Training

- > For aerobatics conducted in an EASA aircraft the pilot requires an aerobatic rating.
- > For aerobatics conducted in a Non-EASA aircraft there is no aerobatic rating, but you are strongly recommended to receive good training from an instructor with aerobatic instruction privileges prior to attempting to fly aerobatics.
- > Only conduct manoeuvres that you have been instructed on and demonstrated the safe execution of.

- > Be familiar with spin recoveries initiated from different parts of manoeuvres, the applicable escape actions should a manoeuvre not go to plan and start/recovery heights. Initially aerobatic instruction should be started around 5000 ft above ground level (AGL), with all manoeuvres complete by 3000 ft.
- > Proficiency will decay without regular practice, especially when experience is low. Take refresher training if you are out of practice.

Equipment

- > Part-NCO for EASA aircraft allows the fire extinguisher, first aid kit and personal locator beacon (PLB) to be left behind for aerobatic flights.
- > Wearing a flying suit will allow you to carry pens and small charts without the risk of them coming loose in the cockpit.
- > Sick bags are a good idea for early instructional flights and always take them if carrying passengers.
- > It is not a legal requirement to carry a parachute, although it is recommended. Be familiar with its use and exit procedures from the aircraft.

Checks

For EASA aircraft, NCO.SPEC requires the development of a checklist for use on the operation. Specifically the checklist for **aerobatic flights** must include:

- > Normal, abnormal and emergency procedures;
- > Relevant performance data;
- > Required equipment;

REQUIREMENTS FOR THE PIC > AEROBATIC GUIDANCE

Specialised Operations

- > Any limitations; and
- > Responsibilities and duties of the pilot in command and if applicable, those of crew members and task specialists.

It is also strongly recommended to use a check list (airborne items should be memorised) relevant to the aircraft and operation for non-EASA aircraft as well.

When developing a checklist, the following practical items should be covered:

- > Ensure you are strapped in securely and there are no loose articles in the cockpit.
- > Control checks are very important. Check you have full rudder authority as part of your 'full and free' checks.
- > '**HASELL**' is a useful mnemonic for remembering checks and must be carried out prior to commencement of aerobatic manoeuvres. They should be adapted to the aircraft you are flying. The following list gives some considerations you should cover:
 - > **Height** – commence at the height agreed with your instructor;
 - > **Airframe** – ensure landing gear up, flaps up, brakes off (sometimes having the brakes on can restrict rudder travel) and any other configuration requirements for your aircraft;
 - > **Security** – ensure all harnesses, doors and canopies secure. No loose articles;
 - > **Engine** – ensure engine configured correctly, for example mixture set, carb heat as required, correct fuel tank selected and fuel pump on if required;
- > **Location** – clear of airfields, congested areas, cloud and controlled airspace; and
- > **Look-out** – perform clearing turns in both directions and check above and below. Repeat look-out checks at regular intervals between manoeuvres.

Fitness for flight

- > '**IM SAFE**' can be used as for any flight, adapted as required. [See p.116](#) for more details.
- > You must be in good physical and mental condition for aerobatic flight – rapid changes in altitude and 'g' will make the flight even more unpleasant than a normal one if you are feeling unwell.
- > Make sure you are well fed and hydrated, although do not have a large meal shortly before flying.
- > G-tolerance will increase with practice – build tolerance over time. 4g or more will feel quite uncomfortable at first. Tensing stomach and leg muscles will help resist the forcing of blood to the lower body during positive 'g'. Seek advice from an AME if you are unsure of the effect of aerobatics on any medical conditions you may have.
- > Under NCO.SPEC you are allowed to take passengers on aerobatic flights, this can be exciting, but ensure they are fit enough to withstand such flying. Take account of their likely resilience to manoeuvres with increased 'g' and regularly check they are not feeling unwell.



PRE-FLIGHT PREPARATION

<i>Including:</i>	27 Pre-flight information	»
	29 Meteorology	»
	36 The route or area of operation	»
	41 Aerodrome planning	»
	42 Aircraft mass, balance and performance	»
	49 Fuel	»
	50 Flight plans	»

PRE-FLIGHT PREPARATION

The previous chapter focused on the legal requirements that you must ensure are complied with prior to and during your flying. This chapter will address some of the practical considerations for meeting these obligations and managing risks when planning your flight.

Guidance ?

NOTAMs and weather are the first items on the pre-flight planning element of the checklist. This is because they are two of the main factors that set the parameters of your flying. It is no good spending hours planning a route only to discover that the destination aerodrome is in fact closed for an event that day or that the weather is obviously not going to be suitable.

If using GPS or flight planning software, you should keep them up to date, since airspace boundaries and critical flight information can change frequently.

You should also give yourself time before flying to adequately prepare, particularly if you have not flown for a while or are planning a more ambitious flight than normal. Take 40 minutes or so over a cup of tea in the clubhouse to review the intended flight and any speeds or procedures for the aircraft you may need to refresh your memory of.

You should also consider reviewing the sections on managing GA risks ([p.116](#)) and Emergencies ([p.129](#)) to ensure you are fully prepared.

Pre-flight information

You should review a range of aeronautical information as part of your flight planning activities.

Key info !

The official source of aeronautical information is the State Aeronautical Information Service (AIS). You must check AIP & AIP Supplements as part of your flight planning process.

AERONAUTICAL INFORMATION PUBLICATION

AIS publishes the **Aeronautical Information Publication (AIP)**. This contains information of a permanent nature that is relevant to air navigation. The AIP conforms to international standards and is updated every 28 days.

- > The UK AIP is available at www.ais.org.uk.
- > Most European AIPs can be found in the European Aeronautical Database (EAD) database – search for this online.

The AIP is split into:

- > [GEN](#) – General operational, legal and administrative information;
- > [ENR](#) – Enroute airspace; and
- > [AD](#) – Aerodromes, with entries for all licensed or certificated ones in the UK.






There are also **AIP supplements** which contain temporary changes to the AIP, normally of a long duration. These are available alongside the AIP.

PRE-FLIGHT PREPARATION

Pre-flight information

AERONAUTICAL INFORMATION CIRCULARS

AICs are notices relating to safety, navigation, technical, administrative or legal matters not included in the permanent information found in the AIP. AICs can be obtained from the same website as the AIP and are organised into five categories depending on the subject:

-  White – Administrative;
-  Yellow – Operational, including ATS facilities and requirements;
-  Pink – Safety topics;
-  Mauve – UK Airspace Restrictions; and
-  Green – Maps and charts.

Yellow and Mauve are most relevant for pre-flight planning.

NOTAMS

Key info



You must check NOTAMS before every flight.

NOTAMs are notifications of temporary information (usually of less than 90 days duration), or permanent information not yet included in the AIP.

- > The AIS site is the official source of NOTAMS in the UK. Use of the 'aerodrome brief', 'narrow route brief' and/or 'point brief' functions will help reduce the number of irrelevant NOTAMS displayed.
- > As an aid to flight preparation and situational awareness, you are recommended to also use applications that allow NOTAMS to be overlaid on a graphical chart.

- > You should always carefully check the dates and times (which will be in UTC) of the AIP and AIC/NOTAMs to determine whether they are relevant to the time at which you are flying.
- > It can be helpful to check NOTAMs a few days in advance of a flight to see if there is any information relevant to your destination or area of operation that may influence your planned route. However, this must not replace checking them on the day of the flight as well – sometimes NOTAMs come out at very short notice or only appear on the day they are valid for.

RESTRICTED AIRSPACE (TEMPORARY)

Temporary restricted airspace ([see p.67 for graphic](#)) may be established around large air displays or other significant public gatherings. Under the Restriction of Flying Regulations, entry to such airspace may be prohibited or restricted. This will normally be detailed in a 'Mauve' AIC. Read these AICs carefully to make sure you understand the nature of the restriction.

- > Unfortunately, every year a few aircraft infringe RA (T)s that are there to protect major air displays or other public events, including performances by the Red Arrows. This normally results in the performance having to be curtailed. As well as potentially endangering aircraft, it also causes disappointment for thousands of spectators.
- > Relevant RA (T)s will be listed in NOTAMS. If an RA (T) looks like it may impact on your intended flight, look it up in the relevant AIC which will give more detail.
- > Another way of checking for RA (T)s is to call AIS information on **08085 354802** – this provides recorded information on the airspace restrictions in effect on the day.

PRE-FLIGHT PREPARATION

Meteorology

Guidance ?

You should have a good working knowledge of the conditions associated with common weather features, including:

- > Warm and cold fronts;
- > High and low pressure systems; and
- > Thunderstorms.

AVAILABLE INFORMATION

For planning more than a few days in advance of the flight, normal weather forecasts are the main source of information. Nearer the time, aviation weather forecasts should be consulted.

The Met Office is the main source of aviation weather information in the UK. The Met Office's free weather products include:

- > Surface pressure charts;
- > UK charts F214 (Winds aloft) and F215 (Significant weather);
- > Near Europe charts F414 (Winds aloft) and F415 (Significant weather);
- > TAFs and METARs;
- > Satellite and rainfall imagery;
- > AIRMETs; and
- > UK SIGMETs.





i **Info:** You can register to access weather forecasts for free at www.metoffice.gov.uk/aviation/ga. You can also download the guide to GA forecasts known as 'GetMet'.

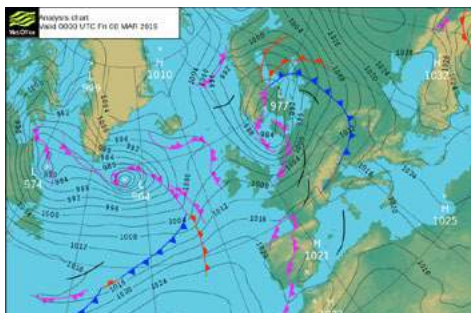
As well as the forecasts and reports there is a useful guide to weather information available for download, known as 'GetMet'. It is produced in association with the CAA and can be found on the Met Office website.

Surface pressure charts

These become useful approximately four days in advance of the flight. They give indications of where fronts and their associated areas of high or low pressure are and where they are likely to move to. You should know which conditions are associated with the different directions from which air masses approach the UK. For example during the summer, air from Europe tends to be dry but hazy, whereas air from the Atlantic tends to bring rain and low cloud.

Chart Key

H	Centre of high pressure area
1030	
L	Centre of low pressure area
980	
	Warm front
	Cold front
	Stationary front
	Occluded front



PRE-FLIGHT PREPARATION > AVAILABLE INFORMATION

Meteorology

Metform 215

Metform 215 (F215) provides a forecast of in-flight weather conditions below 10,000 ft. It covers the British Isles for a 9-hour period centred on a fixed time. It is designed for use as either an area or route forecast. F415 is the version for near Europe.

The chart shows the forecast position, direction and speed of surface fronts and pressure centres at the fixed time shown in the chart's title box. Abbreviations used can be found in the Tables and Codes chapter (see p.148).

Zones of distinct weather are enclosed by continuous scalloped lines, each zone being identified by a letter.

Validity period = 0800 to 1700 UTC on 2nd day of the month (February 2017). Time of front/zone positions = 1200 UTC.

Cloud cover, type and level above mean sea level. In this case there are two sets of clouds reported, one on each line. On the second line 020-030/040 indicates a base of between 2000 ft and 3000 ft with tops of 4000 ft. XXX denotes tops above 10,000 ft. Symbols for associated ice or turbulence are also included.

Forecast Weather below 10000 FT

Met Office Valid 020800 to 021700 Z FEB 17 Fronts/zones valid at 021200 Z

AREA	SURFACE VIS AND WX	CLOUD	0 C
A	30KM VIL ISOL IFRO FRONT 17 KM SHIRAZ SPRAY ISOL 2000M+SHIRAZ+TSRA A: NOCN A1 ISOL ILLI FG	OCLN BKN OVC AC + A: 030/XXX FRONT OCLN SCT BKN CU SC ~ A: 015-030/040-XXX ISOL IFMBT: FRONTIC B015-025/XXX ISO. SCT BKN ST 003-017/015	050
B	20KM VIL OCLN 7 KM RADZ ISOL 3000M RADZ+HRA KAN NY COLD FRONT MTW MAX VSP 500 FT M AT 050 A: ISOL A B1 OCLN ILLI FG	BKN OVC AC AS ~ A: 080/XXX BKN N CA FWSCT IET MONICU SC ~ A: 015-075/040-080 OCLN ISOL IET MONICU SCT BKN ST 004-008/015	060-030
C	25KM VIL ISOL 7 KM SHIRAZ ISO. A ISO. ILLI FG	OCLN BKN SC AC ~ A: 040-060/XXX ISOL SCT BKN CU SC A: 070-030/040	060-030
D	15KM VIL ISOL NOCN FRONT 7 KM RADZ+HRA KAN NY OF FRONT ISOL 3000M RADZ+HRA KAN NY ... ISOL 3000M SHIRAZ NORWAY ISOL 2000M FINEZ FG A: NE OF FRONT A: ISOL A FAANIN OCLN ILLI FG	AHLAS BKN AC + A: 080/XXX MAIN V FRONT BKN OVC CU SC ~ A: ... NORWAY A 015-075/060-080 AHLAS BKN ST 003-006/015 BASEF 000 FG AT 700	040 NE 10A SUB 70 003 015 NE OF FRONT ... 040 SW
E	20KM VIL ISOL 3000M BRILAN KAN NY FAR ... ISOL 2000M FG AN FAR ... OCLN A ISO. ILLI FG	ISOL SCT SC AC + A: 040-080/XXX ISOL OCLN FAR O SCT BKN ST 005-010/015 BASEF 000 FG	060-030

Outlook Until 022359 Z: SIMILAR

All heights in 100s of feet above mean sea level

XXX means above chart upper limit

Speed of movement in KT Cloud amount (Oktas)

Hill FG implies VIS <200 M

MOD / SEV ICE /W/

MOD / SEV TURB /A/

TS / CB implies GR /W/A/

FZ precipitation implies W

FEW: 1-2 SCT: 3-4 BKN: 5-7 OVC: 8

This forecast may be amended at any time.

Issued by Met Office Exeter

Contact telephone 0370 900 0100

Forecaster: Duty Forecaster

at 020250 Z

F215

© Crown copyright 2017

Key

Time of issue = 2nd day of month at 0250 UTC

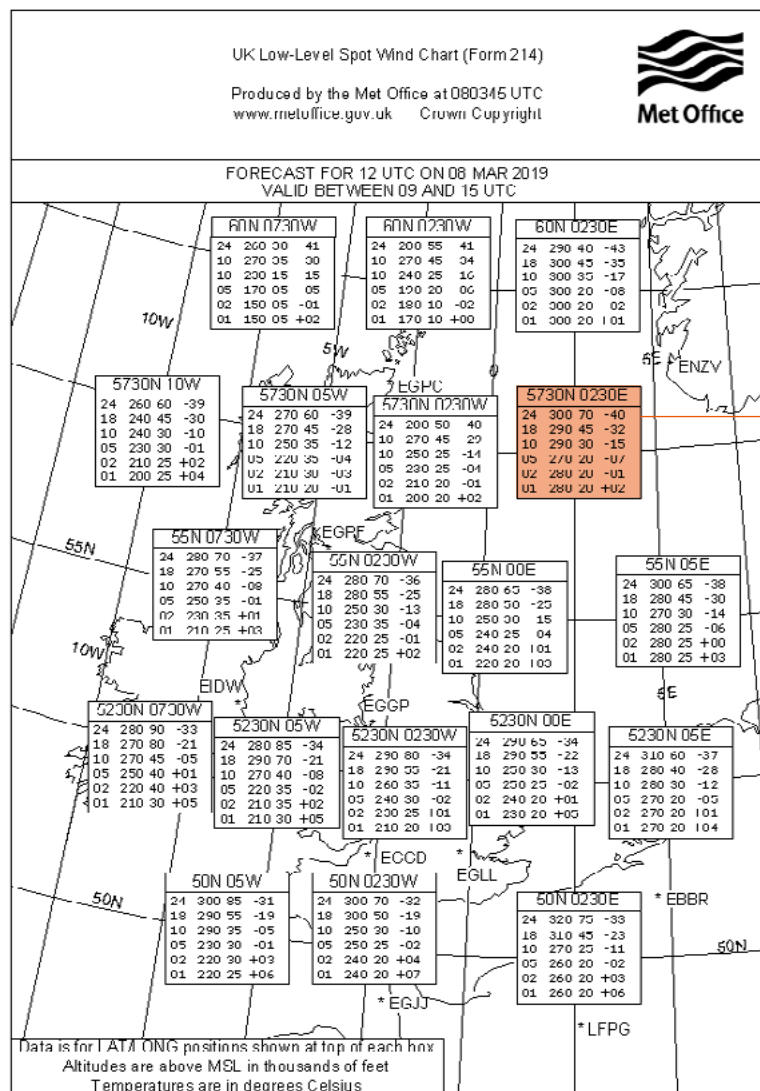
Visibility and weather.

0 degree isotherm; in this case 6000 ft - 8000 ft.

Meteorology

Metform 214

This provides forecast upper winds and temperatures. F414 does the same for near Europe.



PRE-FLIGHT PREPARATION > AVAILABLE INFORMATION

Meteorology

TAFs and METARs

You should be able to decode these, although increasingly they are available online in plain language as well. Full details of abbreviations used in TAFs and METARs are available in the Tables and Codes chapter ([see p.148](#)).

- > TAFs are forecasts; METARs are reports of the actual weather.
- > Larger aerodromes often produce 24 or 30 hour TAFs. These will give a good indication as to when particular weather will be passing through and when it is expected to change. By looking at several over a given area you will see a pattern of weather.
- > If there is uncertainty in the forecasts, for example if the time of a change in the weather is not precisely forecast or there are periods where 'PROB30' or 'PROB40' are used, delve a bit deeper into the wider weather picture.
- > Remember TAFs/METARs give the cloud base in relation to the ground level at the reporting aerodrome – take account of that when comparing them to the planned altitude of your route.
- > Looking at TAFs/METARs on a map presentation rather than a list will make it easier to build a weather picture. The Met Office website has this feature.

A typical TAF might look like:

EGHI 121954Z 1221/1223 34008KT 9999 SCT025
TEMPO 1221/1223 8000 PROB30 1221/1223 3000
BR MIFG

- > **121954Z** refers to the time of issue – 1954 UTC on 12th day of the month;
- > **1221/1223** refers to period of the forecast – 2100 UTC to 2300 UTC on 12th day of the month;
- > **340/08KT** is the wind – coming from 340° at 8 kts;

- > **9999** is the visibility – when visibility is quoted as 10 km or more, it is reported as '9999'. When lower than 10 km, it will be reported as the actual visibility in metres.
- > **SCT025** is the cloud cover. In this case 'SCT' means coverage of 3 to 4 oktas (eighths) of the sky. Unless the cloud is cumulonimbus or towering cumulus, the type is not normally reported.
- > **TEMPO** means (within the given time period) a condition of a temporary nature. So in this case the visibility is expected to temporarily reduce to 8000 m at some point between 2100 UTC and 2300 UTC.
- > **PROB30** means 30% probability of the following conditions occurring. Only PROB30 and PROB40 are used in the UK. So in this case there is a 30% probability that between 2100 UTC and 2300 UTC the visibility might in fact be 3000 m in mist (BR) and shallow fog (MIFG).

A METAR will be similar, except that there will be a time of report at the beginning rather than a validity period. METARs are normally updated every half an hour although weather reports on ATIS will be updated more often if the weather is changing frequently.

SIGMETs and AIRMETS

SIGMET – 'Significant Meteorological Information' is a special weather advisory of severe weather phenomena that might affect the safety of all aircraft in the area, such as severe thunderstorms or mountain waves.

AIRMET – 'Airmen's Meteorological Information' is a textual description of weather phenomena that will likely be encountered in a given area, such as fronts, turbulence or winds. In the UK, AIRMETS are split up into eight regions, with additional ones covering upper winds and an overall outlook for the UK.

PRE-FLIGHT PREPARATION

Meteorology

AIRFRAME ICING

For VFR flight, airframe icing should not be an issue, although you must always remove any ice or frost on the wings, static ports and pitot tube before flight. If you enter visible moisture when the outside air temperature is 0°C or less, ice may start to form on the aircraft. Ice has a very detrimental effect on aircraft performance, so must be avoided, unless the aircraft is approved for flight in icing conditions. The worst airframe icing will normally occur between 0°C and -15°C.

ENGINE ICING

The most significant icing risk to GA aircraft equipped with carburettor engines is 'carb icing'.

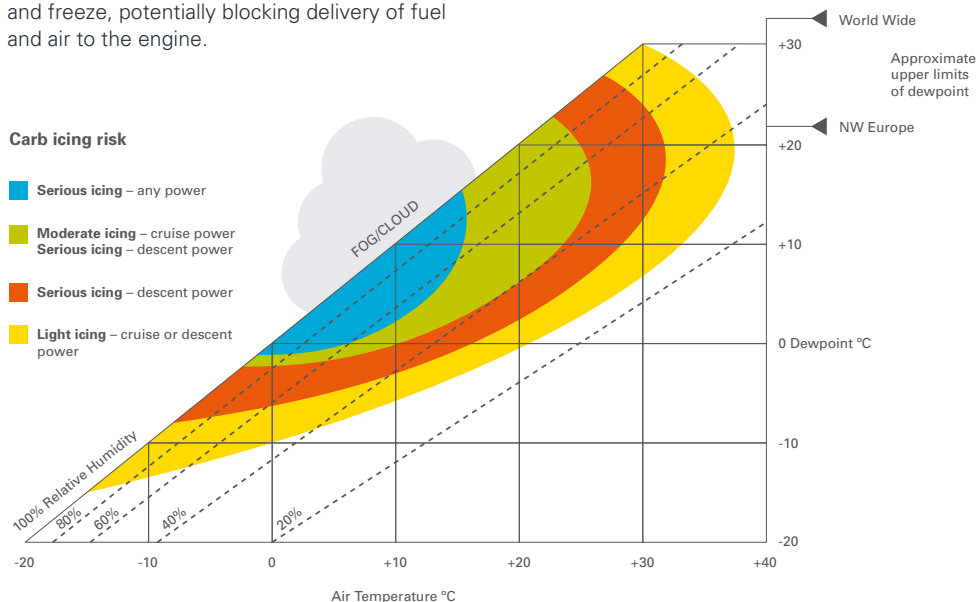
It is caused by the lowering of the pressure (and therefore temperature) in the aircraft's carburettor as the fuel air mixture is sucked in for combustion. As the temperature lowers, the water vapour in the fuel air mixture will condense and freeze, potentially blocking delivery of fuel and air to the engine.

Carb icing frequently forms outside visible moisture, particularly when the relative humidity is high. It is more likely to occur at lower power settings, although under some conditions it can occur at any power setting.

You should refer to the Aircraft Flight Manual (AFM) for your aircraft for specific details of carb icing and the use of the carb heat function to prevent it.

Fuel injected engines do not suffer in the same way, although it is possible to get ice forming around air intakes, potentially restricting air flow into the engine. Use of the 'alternate air' function may be necessary to ensure sufficient air flow to the engine.

For more guidance on piston engine icing, read the relevant safety sense leaflet available at www.caa.co.uk/safetysense.



PRE-FLIGHT PREPARATION

Meteorology

MAKING THE WEATHER CALL

Guidance ?

Even for local flights, you should have a good understanding of the general weather conditions before you go flying, particularly how the weather may evolve during the flight.

This should include both an overall appreciation of the weather conditions on the day, as well as the forecast for your specific destination and any alternate aerodromes. This will ultimately inform your decision as to whether it is safe to fly or not. Below are some of the factors you should consider.

VFR minima

For operations in class G airspace the legal VFR minima allow flight in potentially very poor conditions. Clear of cloud and visibility of 1500 m is all that is required if below 3000 ft AMSL and flying at less than 140 kts within sight of the surface.

In reality, the limiting factor is usually cloud rather than in-flight visibility – in conditions approaching 1500 m visibility, the cloud ceiling would likely mean flying dangerously low. The legal minima are not a good reference point for decision making because safe VFR flight normally ceases to be possible long before the visibility is that poor. They are limits not targets.

Cloud base and ceiling

- > 'Cloud ceiling' refers to the lowest cloud that covers more than half the sky – so broken (BKN) or overcast (OVC) cover constitutes a cloud ceiling.
- > 'Cloud base' refers to the lowest visible cloud, so includes few (FEW) or scattered (SCT) cloud.

From your review of the weather you should have established what the likely cloud base and ceiling will be at different points of the flight. When considering your ability to remain in visual conditions at a given altitude, consider what the cloud cover is reported as and whether it may lower during the flight.

Guidance ?

Remember to compare the cloud height figures at aerodromes with nearby terrain. TAFs and METARs give cloud levels in height above aerodrome elevation. A 1500 ft cloud ceiling could be shrouding the tops of nearby hills.

How low is too low?

This depends on a number of factors:

- > What sort of flight are you going for?
- > What are the terrain and obstacles like along the route?
- > Is the weather getting better or worse in the direction you are going?
- > What will it be like at your destination?

Guidance ?

Generally, VFR flight with a cloud ceiling of **1500 ft** above ground level (AGL) or less warrants special attention to terrain and obstacles.

PRE-FLIGHT PREPARATION > MAKING THE WEATHER CALL

Meteorology

Guidance ?

VFR flight below **1000 ft AGL** is generally only suitable for circuits or very local flying in areas you are familiar with.

Actually going anywhere of distance, even with reasonable visibility below cloud, is likely to involve close encounters with hills, radio masts, wind turbines and other low level hazards. You may also meet military aircraft practicing their low level flying – for which they (unlike most GA pilots) are specially trained. You must also ensure you do not breach the low flying rules ([see p.53](#)).

There are circumstances in which VFR flight out of sight of the surface is permitted above 3000 ft AMSL. However, if you do not hold an instrument rating or IMC rating you must not enter the clouds and you must be certain of being able to descend visually at your destination.

Visibility

Even if the cloud ceiling is high enough, you still need sufficient in-flight visibility to control the aircraft visually, navigate and avoid other aircraft. The F215 chart and TAFs/METARs will give an indication of surface visibility, but actual in-flight visibility can only be judged while in the air.

Guidance ?

In practice, VFR flight when the surface visibility is being reported as less than **5 km** is not recommended. You are unlikely to have a clear horizon to control the aircraft by and navigating visually will be difficult.

Watch out for warm high pressure days in the summer when the visibility is often surprisingly poor due to haze, especially into the sun. During the winter, low sun can also dramatically reduce forward visibility when flying towards it.

Wind

You should consider how current you are in crosswind landings if such conditions are forecast. Crosswind landings, particularly in tailwheel aircraft, are one of the more perishable piloting skills. The best advice is to find a good instructor to practice them with – you may have to go somewhere with a suitable runway orientation or use the crosswind runway if your airfield has one.

High winds aloft are not in of themselves hazardous, but winds above 35 kts or so are often indicative of bumpy conditions – maintaining accurate height and heading may be challenging. It is also important to take account of strong headwinds when calculating fuel requirements.

PRE-FLIGHT PREPARATION

The route or area of operation

Guidance ?

You need to identify all the hazards and considerations along your route or area of operation.

You should calculate (or review the calculations that your flight planning application has done for you) headings and leg times for trips that involve going somewhere much outside the local 'bimbling area'. Give them a general sense check to ensure you have not made any obvious errors.

Online and tablet-based flight planning applications have revolutionised the ease of flight planning – they remove the need for complex manual calculations for which a 'whiz wheel' may have been used in the past. They should be used as an aid to flight planning and situational awareness and not as the sole source of navigational information and guidance during the flight.

HAZARDS AND AIRSPACE

- > Plan which radio frequencies to use, whether for receiving a service outside controlled airspace or requesting a transit of controlled airspace.
- > Note potential hazards such as aerodromes, danger areas, parachute zones or glider sites.



- > Note the altitudes to which the relevant hazards are applicable, such as the altitude to which glider cable launches are made.

- > Do not assume that because an aerodrome does not have an ATZ it is not busy and can be over flown safely – some of the busiest aerodromes in the UK do not have ATZs.
- > Busy aerodromes (without an ATZ) are often denoted on the chart with an outer circle around the aerodrome symbol and a letter 'T' – this indicates they are used intensively for training flights. A 'U' symbol means unusual activity such as aerobatics or formation flying takes place. It is best to avoid directly overflying these.



- > Look up details of danger areas in the notes of the VFR charts – there may be a crossing service or information line available on their activity. Generally more danger areas are active during the week.
- > More details of airspace hazards can be found in the Airspace chapter ([see p.63-71](#)) and in the ENR section of the AIP website – www.ais.org.uk.
- > Traffic tends to congregate around prominent visual landmarks, Visual Reference Points (VRPs) or navigation beacons creating a collision hazard. Planning to fly around them can reduce the risk, although watch out for nearby airspace.

PRE-FLIGHT PREPARATION

The route or area of operation

ALTITUDE SELECTION

Guidance ?

Plan to fly as high as possible.
The advantages include:

- > Better view for navigation;
- > More time in the event of an engine failure;
- > Traffic density tends to drop with altitude;
- > Air tends to be smoother;
- > Better true airspeed and more efficient fuel burn; and
- > Better radio range.

Flying at different or cruising levels can also help reduce traffic conflicts, so rather than flying at whole numbers such as 3000 ft, use others such as 4200 ft or 5400 ft.

Safety altitude

On the VFR chart the large digits in each box created by the lat/long lines, known as the **‘maximum elevation altitude’ (MEA)**, represent the higher altitude of:

- > The highest obstacle in the box; or
- > The highest terrain +300 ft.

$$3^2 = 3200 \text{ ft}$$

Guidance ?

Note safety altitudes below which you will not descend due to weather without turning around or diverting.

The reason for this derivation of the MEA figure is that obstacles less than 300 ft above ground level are not always captured in aeronautical data. So a terrain spot height could have an obstacle on it that was 299 ft – hence the addition of 300 ft if there are no other obstacles in the box 300 ft or higher. If there are obstacles of more than 300 ft these will be captured and they can be assumed to be the highest points in that area. They do not have any additional margin for error included.

These figures should alert you to the highest obstacle in the vicinity of your route, although you should also study the area at least 5 NM either side of your planned track to find the most relevant terrain and obstacles. The appropriate safety margin to add will be context-specific, although 500 ft or 1,000 ft is sensible.

If you hold an instrument qualification and can fly under IFR, it is recommended that if you are in any doubt as to whether a flight can be safely completed under VFR, you should plan to fly IFR from the outset. This is safer than being forced to make an ad hoc decision at a later point to enter IMC without having fully considered the terrain and obstacle implications of doing so.

The route or area of operation

VFR cruising levels

Under the standardised European Rules of the Air (SERA), there are VFR cruising altitudes specified for flight above 3000 ft AGL – the idea being you fly at a particular altitude depending on the direction you are flying. These are not mandatory in the UK; indeed randomisation of cruising levels is encouraged.

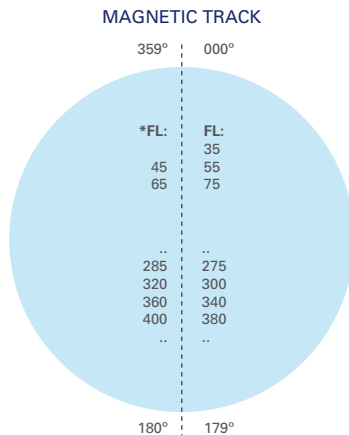
In some European states they are mandatory, so if planning a flight in Europe you should plan to use them. The reason they start at FL35/3,500 ft and escalate every 1000 ft thereafter is due to IFR levels being assigned to the whole thousands of feet. This is important when flying in class E airspace in Europe because it is the means by which enroute VFR and IFR traffic are separated.

Descent planning

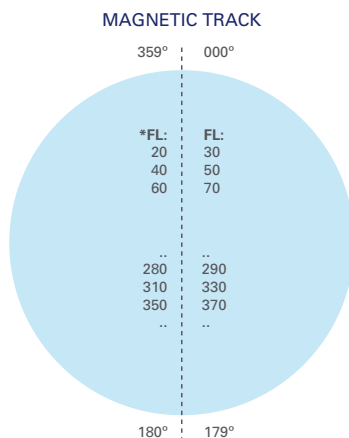
A good rule of thumb is allow 3 NM for every 1000 ft of height you need to lose. So a descent from 10,000 ft would take approximately 30 NM.

This assumes ground speed x five = approximate required rate of descent. So if travelling at 100 kts ground speed, around 500 ft/min is the required rate of descent. This equates to a roughly three degree descent angle.

VFR CRUISING LEVELS



IFR CRUISING LEVELS



*If below the transition altitude ([see p.84](#)), the levels should be flown as altitudes, such as 3500 ft, 4500 ft and so on.

PRE-FLIGHT PREPARATION

The route or area of operation

PLAN TO AVOID INFRINGEMENTS

Guidance ?

When flying a route close to controlled airspace, there are a number of steps you can take to avoid becoming one of the hundreds of pilots that infringe controlled airspace every year:

- > Study your route and options carefully, particularly noting the vertical limits of controlled airspace. They often vary over a short distance and are not as obvious as the horizontal ones.
- > If you plan to request a transit of controlled airspace, have a plan B that takes you clear of it, in case the desired transit is not available.
- > If planning to avoid controlled airspace, mark a route on your chart or electronic flight planning device that clearly avoids it – ad hoc navigation around edges and corners of controlled airspace using GPS will result in too much attention being focused inside the cockpit or on the ground, at the expense of your lookout scan.
- > Avoid routes where a minor divergence from course or altitude could lead to an infringement – for example keep a reasonable separation from controlled airspace above you and look for obvious ground features that will help you verify your position. It may be easier to request a transit of the nearby airspace instead, which could remove the risk.
- > Where possible Plan to stay at least 2 NM from the edge of controlled airspace and plan to stay 200 ft above/below controlled airspace. If flying close to controlled airspace, contact the air traffic service unit (ATSU) responsible and request a service. This will make them aware of your presence and if you do infringe, will make it much easier to deal with. It will also allow you to ask for assistance if you become unsure of your position.
- > Alternatively, if you do not need an air traffic service, or if the frequency is congested, just listen out and use the applicable frequency monitoring code ([see p.12](#)). This will allow ATC to contact you if they need to – for example if you are about to infringe. Remember to change your squawk as appropriate when you leave the frequency.
- > Plan to obtain the most relevant and current QNH. The regional pressure setting (RPS) will tend to under-read compared to nearby aerodrome QNH settings, on which airspace dimensions are predicated. Using an accurate QNH reduces the risk of vertical infringements.
- > Learn how to use any airspace awareness tools that are available. Both pre-flight and inflight tools can be configured to warn of controlled airspace proximity. However, it is important that you learn how to use such devices beforehand and understand their limitations.

If conducting some general handling in the local area you may not always be focused on your position. If controlled airspace is nearby there may be a risk of infringing. To mitigate this:

- > Determine altitudes that you must not go above (or below, as the case may be) to avoid infringing;
- > Pick prominent ground features to orientate yourself around or mark points beyond which you must not go; and
- > Always include 'airspace' in any 'HASELL' or similar checks before conducting manoeuvres.

PRE-FLIGHT PREPARATION > PLAN TO AVOID INFRINGEMENTS

The route or area of operation

Do plan to request a transit of controlled airspace if it is advantageous to do so. Consider routes/altitudes that look likely to be acceptable to ATC, for example close to right angles and high above the arrival track. Airliners tend to descend more gradually than they climb, particularly when near the ground.

- > Anticipate when you need to request a transit, so that you give the controller enough time to assess your request. 10 minutes prior to the boundary is reasonable.
- > Crossing 90 degrees either overhead or a few miles either side of the landing runway sometimes works well; or
- > On the extremities of the zone which are unlikely to interfere with the traffic patterns.
- > Be prepared to be given a different route to the one you requested.
- > Have a plan B that covers the eventuality of being denied a transit.



Know the hazards and features of your plan B – for example towns or landmarks near the boundaries of controlled airspace or ATZs that you may have to cross or avoid.

PRE-FLIGHT PREPARATION

Aerodrome planning

Key info



You can look up the destination and alternate aerodromes in a commercially available flight guide or the **AD** section of the AIP.

In general, all of the information needed to operate at a particular aerodrome can be found in the relevant AIP entry, including details of runway characteristics, air traffic services and opening hours. The AIP only includes licensed or certificated aerodromes.

A number of unlicensed aerodromes that are available for public use can be found in commercially available guides. The information available for unlicensed sites, particularly for take-off, landing distances and obstacles, will generally be less detailed than for licensed ones.

Due to the requirements associated with being a licensed/certificated aerodrome, it can normally be assumed that it will not have any hazardous obstacles in the approach or departure paths. However this cannot be assumed for unlicensed aerodromes. Particularly for smaller strips, a briefing from the aerodrome owner or operator is essential.

LOCAL HAZARDS AND PROCEDURES

There is considerable variation in the local rules and procedures for different aerodromes. This is often due to the necessity for aerodromes to limit their local environmental impact and/or accommodate a variety of different aircraft operations in the same place.

Guidance



Common differences include circuit height and direction, noise abatement procedures and the level of air traffic service provided. A mix of traffic, for example helicopters, gliders or parachuting will also tend to require specific local procedures for safe operation. Planning and review of local information is essential to staying safe.

When visiting an unfamiliar aerodrome, particularly an unlicensed one, you should consider/enquire about:

- > Is prior permission by telephone required to operate there?
- > Are there any specific local operating procedures that should be followed? For example, if the aerodrome is inside the control zone of a larger one, there will normally be a specific joining procedure to follow.
- > Surface type and condition. If grass, is it long, wet and/or soft?
- > How much useable length is there for take-off and landing?
- > Are there any obstacles around the runway that might require consideration to ensure they can be cleared? Power cables, winch launching or trees are the most common ones. At some sites take-off and/or landing is only possible in one direction due to obstacles or terrain.
- > What is the prevailing wind like and are there any buildings or obstructions that might create unusual turbulence on approach?
- > Are there any noise abatement procedures or noise sensitive areas to be avoided?
- > Are there any other hazards that you need to be aware of? For example, surfaces near the runway that may be unsuitable for aircraft movement.

For more information flying into small airstrips, see the 'Strip Sense' safety sense leaflet at www.caa.co.uk/safetysense.

You should also conduct a similar exercise for any alternate aerodromes you may need. It is tempting to only give this cursory thought on the basis that diversions rarely happen. However, doing so could save a lot of aggravation and will give you the confidence to divert if circumstances such as the weather dictate.

PRE-FLIGHT PREPARATION

Aircraft mass, balance and performance

MASS AND BALANCE

Guidance ?

It is not only illegal to operate an aircraft outside its permitted mass and balance range, but doing so also risks poor performance and control difficulties. The mass of the aircraft must also be known for performance calculations.

There are different types of tables or graphs used for the calculations, but they will all involve the concept of different loading positions for the aircraft, for example ‘front seats’, ‘rear seats’ or ‘baggage compartment’.

In the AFM or equivalent document for your aircraft there will be tables and/or graphs for calculating the total mass of the aircraft and its centre of gravity position. They must contain the figures for your specific airframe rather than generic ones for the aircraft type.

In order to convert the volume of fuel on board into mass, you need to know the fuel’s specific gravity. Avgas is typically 0.72 kg/litre and Jet A-1 0.82 kg /litre.

Item	Mass (kg)	Arm (metres aft of datum)	Moment (kg metres)
Empty aircraft	700	2.22	1,554
Front seats	160	2.05	328
Rear seats	70	2.98	208.6
Baggage compartment	15	3.63	54.45
Fuel	100	2.41	241
Totals	1045		2386.05

The table above is a typical example for a light aircraft. To complete the calculation use the following process:

- > Multiply the mass of each loading point (including the empty mass) in the ‘Mass’ column by its distance from the datum in the ‘Arm’ column. Place the result in the ‘Moment’ column;

- > Add together all of the masses and add together all of the moments;
- > Divide the total moments by the total mass. This generates a centre of gravity position.

Moment (2386.05)

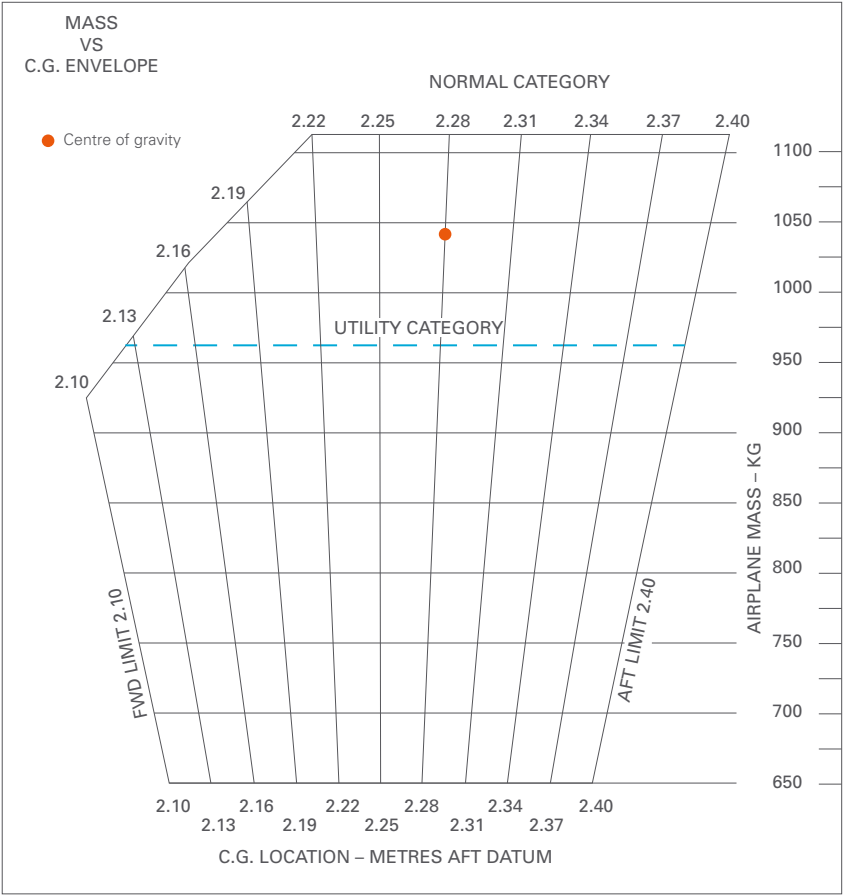
Mass (1045)

= C of G (2.28)

Aircraft mass, balance and performance

To determine that the centre of gravity and mass combination is within limits, place it on the envelope graph – it will likely look something like the one below.

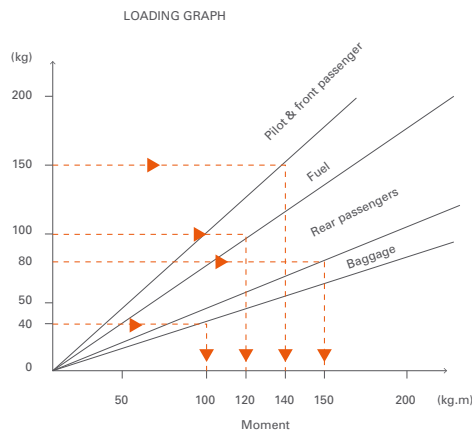
In this case, the mass and centre of gravity is well within the permitted range. However, note that the mass is not within the utility category area of the graph, so certain manoeuvres may not be permitted. Check the AFM for more details.



PRE-FLIGHT PREPARATION > MASS AND BALANCE

Aircraft mass, balance and performance

Some AFMs use a 'loading graph' type arrangement which avoids having to multiply the individual masses and distances together. Be familiar with the details in your aircraft.



General guidance

When considering the mass and balance of your aircraft, make sure you take account of the following factors:

- > Good working knowledge – you should know roughly what your aircraft can carry and the trade-offs required to keep it within limits. With full seats and fuel, very few aircraft will be within limits. If you are in any doubt, perform a calculation.
- > Sense-check calculations. Electronic flight planning applications make the process of calculating mass and balance very quick, but they are only as good as the information entered. Be suspicious if you seem to be able to load more than normal.
- > Account for everything – when adding up the mass of the aircraft make sure you account for all items onboard. Miscellaneous things such as bags should be included in whichever loading point they are closest to.
- > Passenger mass – ensure you know the mass of your passengers, including clothing and other accessories they may be carrying.
- > Stay within limits throughout the flight – on some aircraft it is possible to go outside of limits by burning fuel, for example if you start with a very forward centre of gravity. Run calculations for both takeoff and landing. Note any differences between maximum take-off mass and landing mass.
- > Permitted manoeuvres – some aircraft are only permitted to carry out certain manoeuvres when within a narrower range of mass and centre of gravity positions. For example, an aircraft might have separate limits for aerobatic and normal flight. Be familiar with your AFM.

Guidance



Electronic flight planning software can normally be programmed with this information for your aircraft, however it must have the correct parameters entered for it initially. Run a few practice calculations against the AFM before using them for real.

PRE-FLIGHT PREPARATION

Aircraft mass, balance and performance

USEABLE RUNWAY LENGTHS

Declared runway lengths for the purpose of performance calculations and can be found in an aerodrome's AIP entry.

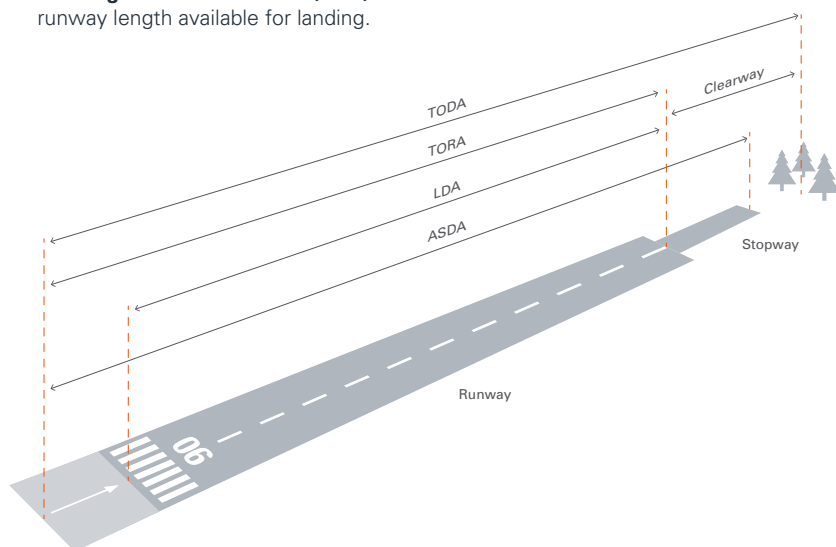
- > **Take-off run available (TORA)** is the length of the runway surface that the aircraft can use during the ground run of the take-off.
- > **Take-off distance available (TODA)** includes the take-off run, as well as any 'clearway' distance within the aerodrome boundary within which the aircraft may safely climb to at least 50 ft.
- > **Accelerate stop distance available (ASDA)** is the length of the runway surface available for the take-off run, plus any 'stopway' the runway may have. The stopway is not normally designed to regularly support the movement of aircraft; however it may be used to bring the aircraft to a stop in the event of an aborted take-off.
- > **Landing distance available (LDA)** is the runway length available for landing.

Unlicensed aerodromes usually just publish the total length of the runway surface, not all of which will necessarily be usable, especially for landing. You will need to make an informed judgement on the basis of local assessment as to what the usable lengths of the runway surface will be for your aircraft.

Guidance



Use the AFM for your aircraft to determine performance requirements. The calculated figures from the AFM should never be greater than the distances known to be available. You are also recommended to also use the safety factors specified [on p.48](#).



PRE-FLIGHT PREPARATION

Aircraft mass, balance and performance

TAKE-OFF AND LANDING PERFORMANCE

Guidance ?

It is generally safe to operate with a good working knowledge of your aircraft's takeoff and landing performance without conducting a full weight and balance and/or performance calculation for every flight.

However, you should complete one if there are any changes to factors such as:

- > Extra weight such as extra fuel, another person or baggage;
- > Higher temperature;
- > Lower pressure;
- > Higher aerodrome elevation;
- > In the case of landing, the surface is wet and/or slippery; or
- > Shorter runway and/or different surface from the one you are familiar with.

The AFM should be consulted for determining the take-off and landing performance figures. The figures will normally have been achieved using a new aircraft and very proficient pilot. In practice you should anticipate the aircraft underperforming slightly.

Careful note should be made of any criteria used in the figures. For example, if it quotes the distances being achieved with 'maximum braking' or 'full power prior to brake release' you should take account of the fact that you may not do so under normal circumstances.

For a given day you should take the relevant conditions and apply them using the aircraft's AFM graphs. The table below gives a rough indication as to the changes to performance you should expect for the different variables. They can be used to sense check your calculations. These could also be used if very minimal performance data was available for the aircraft.

Performance changes		
For every	Take-off distances	Landing distances
10% weight increase	x 1.2	x 1.1
1,000 ft increase in elevation	x 1.1	x 1.1
10°C increase in temperature	x 1.1	x 1.1
Tailwind component 10% of lift-off speed	x 1.2	x 1.2
2% of Slope (uphill)	x 1.1	-
2% of Slope (downhill)	-	x 1.1

PRE-FLIGHT PREPARATION > TAKEOFF AND LANDING PERFORMANCE

Aircraft mass, balance and performance

Most take-off, climb and landing graphs use a 'reference line' system to reach a performance figure for the given conditions. You must be familiar with the graphs applicable to your aircraft.

These normally work right to left and commence with a vertical line that starts at the outside air temperature for the day in question:

- 1 Draw the line up from the relevant temperature until it meets the reference line for the pressure altitude. In the UK this will invariably be between 0 ft and 1000 ft, so interpolate as necessary between the lines.
- 2 Remember pressure altitude refers to the altitude displayed with 1013 hPa set on the altimeter. You must translate the aerodrome elevation into a pressure altitude by calculating what the altimeter would read if it were set to 1013 hPa on the day in question. For example if the elevation is 500 ft and the QNH is 1000 hPa, it would display 851 ft with 1013 hPa set – (assuming 27 ft per hPa). It is this figure that must be used for the calculation.

- 3 Once at the correct pressure altitude, draw a line horizontally from that point, across to the next section of the graph (usually mass). Draw another vertical line originating from the relevant take-off mass.
- 4 Follow the relevant reference line (interpolate between the lines if necessary) until it intersects with the vertical line originating from the relevant take-off mass. This sets the correct point from which to draw the next horizontal line towards the last section of the graph, usually the wind component.
- 5 Using the same method as before, follow the reference lines to the correct wind component.
- 6 On the example graph, both takeoff run and distance are indicated. Some AFMs separate this out into separate graphs. Either way it is important to understand the difference between the two.

Take-Off – Normal Procedure

ASSOCIATED CONDITIONS

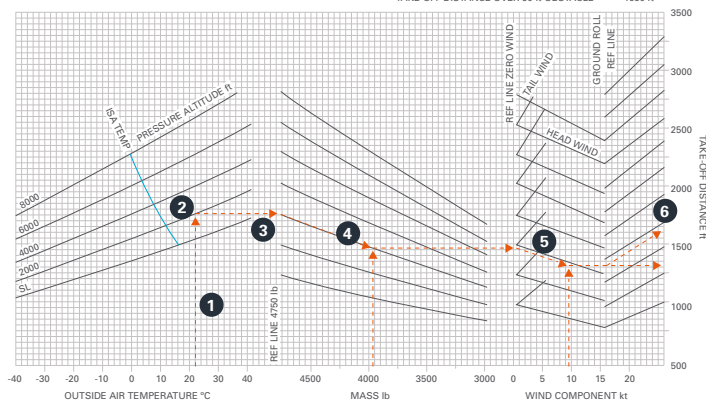
POWER 2800 rpm 40 IN MAP
FLAPS UP
RUNWAY PAVED, LEVEL DRY SURFACE
LIFT-OFF 79 kt IAS
OBSTACLE AT 79 kt IAS
COWL FLAPS HALF OPEN

EXAMPLE

OAT 21°C
PRESSURE ALTITUDE 2000 ft
TAKE-OFF MASS 3969 lb
HEAD WIND COMPONENT 9 kt

TAKE-OFF GROUND ROLL 1350 ft

TAKE-OFF DISTANCE OVER 50 ft OBSTACLE 1650 ft



PRE-FLIGHT PREPARATION > TAKEOFF AND LANDING PERFORMANCE

Aircraft mass, balance and performance

Once you have calculated the aircraft’s take-off and landing performance we recommend you add the following safety margins to cover any degraded performance, imperfections in take-off surface condition or pilot technique. Some of these factors (for example grass) may already be stated in the aircraft’s AFM, in which case use the ones for your aircraft. The general safety factors are similar to those that are required to be applied by commercial air transport operators. It is not recommended to operate if the factored distances exceed those available.

Safety factors		
Condition	Take-off	Landing
Dry grass (up to 20cm)	x 1.2	x 1.15
Wet grass (up to 20cm)	x 1.3	x 1.35
Wet paved surface	-	x 1.15
Soft ground or snow	x 1.25	x 1.25
General safety factors*	x 1.33	x 1.43
*Note: You should apply this after the application of the other applicable factors.		

CLIMB PERFORMANCE

Even if an aircraft is within its mass and balance limits and the runway is long enough to become airborne, if climb performance is very limited it may not be safe to fly.

Generally it is not recommended to fly if under the conditions of the day the aircraft will climb at less than:

- > 500 ft/m for a typical single piston engine aircraft; or
- > 150 ft/m in the event of engine failure in a twin.

If an aircraft is barely able to make 500 ft/m at take-off, it will (for a normally aspirated engine at least) be managing even less than that after several thousand feet. It would only take a bit of turbulence and imperfections in technique to reduce it even further – risking stall and loss of control.

It can sometimes be helpful to know your climb gradient as well as your rate of climb. This can be calculated approximately by:

Rate of climb (ft/m)

Ground speed (kts)

=

Climb gradient (%)

Guidance

?

Remember ‘Vy’ speed gives best rate of climb. ‘Vx’ gives best angle of climb, it is slower than Vy and gives a better climb gradient for obstacle clearance.

PRE-FLIGHT PREPARATION

Fuel

Guidance



You should have a good working knowledge of your aircraft's fuel burn at different power settings. Leaning is also an important element of engine and fuel management. You should be familiar with the procedure for your aircraft's engine.

- > Fuel burn and range figures can be found in the AFM.
- > The amount of fuel reserve carried should be proportionate to the nature of the intended flight. For example, if not leaving the circuit it is acceptable to land with less fuel than when flying to another aerodrome further away.
- > EASA aircraft are required to have certain fuel reserves ([see p.21](#)). There are none specified for non-EASA aircraft other than 'sufficient', although you are not recommended to land with less than 30 minutes fuel for a VFR flight.
- > On a longer flight or if fuel reserves may be marginal, you should pay much more attention than you might for a local flight to factors such as:
 - > Fuel burn during the climb under the anticipated conditions. For example, if heavy and in conditions of a high density altitude, climbs will take longer and burn more fuel;
 - > Selection of cruising altitude and resultant TAS;
 - > Winds aloft and ground speed; and
 - > Consideration of diversion options if fuel burn is higher than anticipated.
- > It is a common misconception that leaning should only be done at high altitude. Most conventional piston engines can be leaned for the cruise at any attitude. Read the AFM relevant to your aircraft.
- > Fuel gauges in most GA aircraft are not very accurate and should not be considered a reliable indicator of fuel level. You should physically check fuel levels on the ground by dipping the fuel tanks.
- > A fuel totaliser, if fitted, is a good indicator of fuel burn. However for the purpose of counting fuel remaining it is completely dependent on the initial fuel level being correct. It only measures fuel consumed by the engine rather than the content of the fuel tanks.

PRE-FLIGHT PREPARATION

Flight plans

Key info



A flight plan is essentially the transmission of information to air traffic service units regarding the intended route of a particular flight or portion of a flight.

Flight plans are generally either:

- > Full flight plans, which are filed through the Aeronautical Fixed Telecommunication Network (AFTN); or
- > Abbreviated flight plans, which may be passed by radio or telephone.

Full flight plan

Details of how to file a full VFR flight plan using the AFPEX system are contained in the 'International Flying' chapter ([see p.155](#)). A full flight plan may be filed for any flight, but it is a requirement for flying internationally. It is also recommended to file one if:

- > Flying over water, more than 10 NM from the UK coastline;
- > When flying to the Scottish Highlands and Islands aerodromes; and
- > Over other sparsely populated areas where search and rescue might be difficult.

Abbreviated flight plan

An abbreviated flight plan is essentially the passing of information to an air traffic service unit (ATSU) for a particular portion of your flight either by telephone or over the radio. This might be phoning through the details of your planned departure to the aerodrome control tower, or passing your details by radio for the purpose of receiving an air traffic service and/or clearance through a particular piece of airspace.

Unlike a full flight plan it will not be transmitted to any other ATSU other than the one you are in contact with.

Requirement for a flight plan

You are required to file a flight plan in the following circumstances:

- > Any flight across international borders, unless otherwise prescribed by the relevant states;
- > Any flight that is subject to an air traffic control service – for example entering controlled airspace or departing from a controlled aerodrome; and
- > When leaving the vicinity of an aerodrome at night.

The practice commonly known as 'booking out'¹ would fulfil the requirement to submit an abbreviated flight plan for the purposes of leaving the vicinity of the aerodrome at night. If there is no ATSU to give your details to, you should file a full flight plan.

For the purposes of transiting controlled airspace an abbreviated flight plan is normally acceptable, however international flight normally requires a full flight plan.

¹**Note:** Prior to the European Rules of the Air (SERA) coming into force, there used to be a requirement under the UK Rules of the Air 2007 to 'give notice' of a landing or departure to the relevant aerodrome authorities. This was commonly known as 'booking in/out'. This rule no longer exists as such, however it is still the common convention at aerodromes in the UK to report such details such as number onboard and fuel endurance to aerodrome authorities prior to departure.



AIRSPACE

<i>Including:</i>	52 Essential Rules of the Air	>
	58 Visual and instrument flight rules	>
	62 Airspace classifications	>
	63 Airspace hazards and restrictions	>
	72 Air Traffic services outside of controlled airspace	>
	77 Controlled airspace operations	>
	82 Transponder use	>
	83 Altimeter setting procedures	>

AIRSPACE

Essential Rules of the Air

The 'Rules of the Air' are the basic rules that all aircraft must follow when in flight. They are additional to the operational rules outlined earlier and represent the foundation of the safe interaction between different airspace users and the protection of third parties on the ground.

Key info



As **pilot in command** you are responsible for ensuring your aircraft remains in compliance with The Rules of the Air. If compelled to deviate from them by immediate danger, you may do so without fear of retribution.

They are set out in ICAO Annex 2 and legally applied in the UK through a combination of:

- > The Standardised European Rules of the Air¹ (SERA);
- > The UK Rules of the Air 2015; and
- > General permissions issued by the UK where SERA permits national discretion over certain requirements.

They apply equally to EASA and non-EASA aircraft while flying in the UK. In Europe SERA rules will generally apply, although there may be slight variations where national discretion is permitted.

State-specific variations can normally be found in the ENR section of the relevant AIP – for example ENR 1.2 covers the VFR, ENR 1.7 altimeter setting procedures and ENR 1.8 Regional Supplementary Procedures.

For ease of understanding, we have drawn the relevant regulations and permissions together and presented them in a consolidated format that covers the basics relevant to VFR flight. While the source regulation is always definitive, compliance with the guidance on the following pages should ensure both the letter and spirit of the law are observed.

FINDING REGULATIONS



The UK Rules of the Air 2015 can be found either at www.legislation.gov.uk or in the CAA's consolidation, CAP 393 – www.caa.co.uk/cap393.

UK specific general permissions or exemptions relevant to SERA can be found in ORS4 – www.caa.co.uk/ors4.

For more information about the UK's implementation of SERA see www.caa.co.uk/sera.



SERA and other European regulations can be found at www.easa.europa.eu/regulations. Look for the most recent consolidations.

The European AIS Database (EAD) is the best place to look up European AIPs.

AIRSPACE

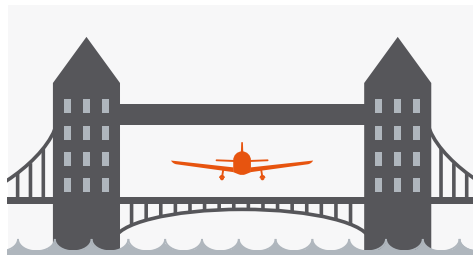
Essential Rules of the Air

RULES FOR THE PROTECTION OF THIRD PARTIES

Adherence to these rules is primarily to protect people or property on the ground from aircraft operations.

Negligent or reckless operation

- > Do not fly in a manner that would endanger either people or property.

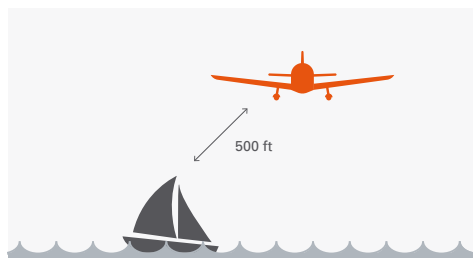
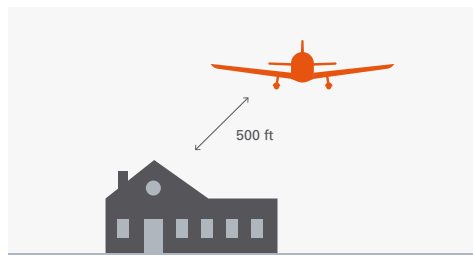


Low flying and congested areas

- > Unless necessary for taking off or landing, do not fly closer than 500 ft to any person, vessel, vehicle or structure.¹

There are some **UK-specific** exceptions to the above that permit certain manoeuvres (other than take-off or landing) to be conducted closer than permitted under the general 500 ft rule. These include:

- > Practising approaches at an aerodrome, but without intending to land;
- > Helicopters practising manoeuvres within the boundaries of an aerodrome, provided they do not come within 60 meters of a person, vessel, vehicle or structure that is outside the aerodrome boundary;
- > Picking up or dropping of towing apparatus at an aerodrome;
- > Gliders hill soaring; or
- > If permission has been issued by the CAA for specific circumstances or events – such as for an air display.



Full details can be found in the ORS4 section within the CAA website www.caa.co.uk/ors4.

AIRSPACE > RULES FOR PROTECTING THIRD PARTIES

Essential Rules of the Air

- > Unless necessary for taking off or landing, do not overfly congested areas or open-air assemblies of people below a height that in the event of an emergency occurring, would permit a landing to be made without causing a hazard to people or property on the ground.
- > Unless necessary for taking off or landing, when flying over congested areas or open air assemblies of people, you must not fly lower than 1000 ft above the highest obstacle within 600 m of the aircraft.

There are some **UK-specific** general permissions that allow aircraft to fly below 1000 ft above the highest obstacle within 600 m of the aircraft:

- > If following a specific route published in the AIP (for example the low level VFR routes near Manchester and Liverpool's airspace) and complying with the specific conditions associated with that route;
- > Flying under a Special VFR clearance; or
- > A balloon that becomes becalmed while over a congested area and is compelled to land as a result.

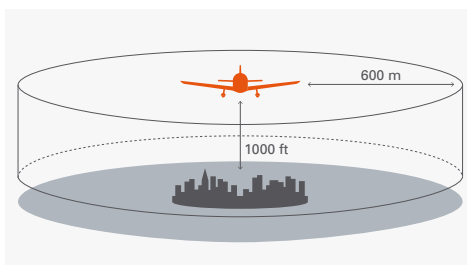
You must still be able to land in the event of an emergency without causing hazard to people or property on the ground.

Full details can be found in the ORS4 section within the CAA website www.caa.co.uk/ors4.

The UK Rules of the Air 2015 also specify that you must not:

- > Take-off or land within a congested area, unless either at an aerodrome and in accordance with procedures in the AIP, or at a site other than an aerodrome with the specific permission of the CAA;
- > Take-off or land within 1,000 m of an open air assembly of more than 1,000 people, unless in accordance with procedures in the AIP (some large events will have specific procedures for the takeoff and landing of helicopters) and with the written permission of the organiser of the assembly;
- > Carry out aerobatic flights over congested areas; or
- > Carry out test or experimental flying over congested areas in an aircraft that does not have a valid certificate of airworthiness.

There are specific procedures for balloons taking off and landing in congested areas. Full details can be found in the ORS4 section within the CAA website www.caa.co.uk/ors4.



Guidance ?

In the event of an engine failure, single engine aircraft should be able to glide clear of any congested areas. You should not rely on being able to land in parks or other open spaces within congested areas, since there may be people on them.

Note: Aircraft on a national permit to fly may be additionally restricted from flying over congested areas by the conditions of their permit. Generally this is not the case for most light aircraft up to about 1500 kgs; however the conditions of the permit should always be checked.

Note: 'Congested area' in relation to a city, town or settlement, is any area which is substantially used for residential, industrial, commercial or recreational purposes.

AIRSPACE

Essential Rules of the Air

RULES FOR THE PREVENTION OF COLLISIONS

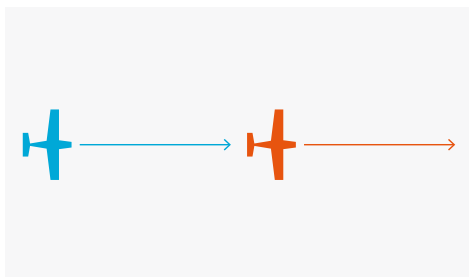
The following rules are primarily to avoid collisions between aircraft. They represent the standard actions and priorities that you should adhere to. If a situation dictates that avoiding immediate danger would be better achieved by an alternative course of action, you may do so without fear of retribution.

Proximity of aircraft

- > Do not intentionally fly close to other aircraft so as to cause a collision hazard.

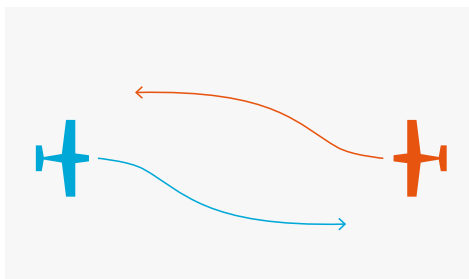
This does not preclude formation flying agreed between the PIC of each aircraft prior to flight.

SERA does contain specific rules regarding formation flying, but they are considered too specialised to reproduce here.



Rights of way in the air

- > If approaching another aircraft head on, such that there is a risk of collision, both aircraft shall turn right to avoid each other; and
- > If converging with another aircraft, the aircraft that has the *other* on its right must give way.

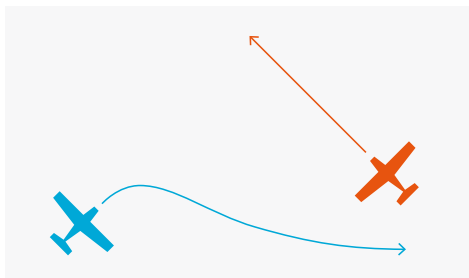


Head-on: Alter course to right

Guidance



If imagining the situation viewed from above, this could be thought of as "on the right, in the right".



Converging: On the right, in the right

AIRSPACE > RULES FOR THE PREVENTION OF COLLISIONS

Essential Rules of the Air

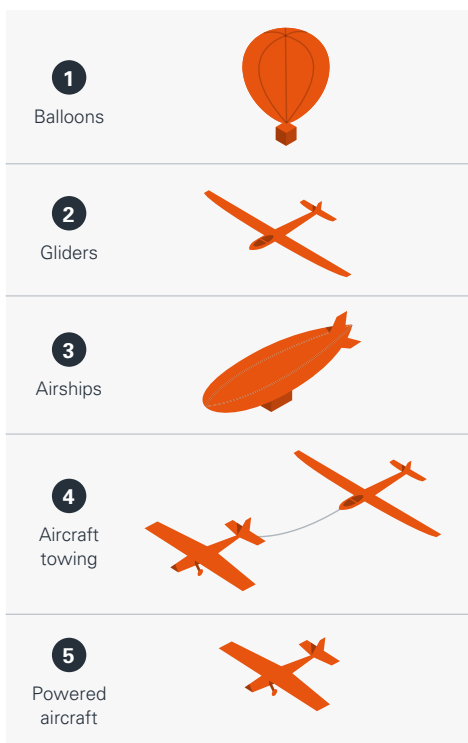
The exception to this is when aircraft of different categories are converging, and priority should be afforded in the following order:

- > Powered, heavier-than-air, aircraft (for example aeroplanes or helicopters), must give way to airships, gliders and balloons;
- > Airships must give way to gliders and balloons;
- > Gliders must give way to balloons; and
- > Powered aircraft must give way to aircraft that are towing other aircraft or objects.

Guidance ?

There used to be a rule in the UK Rules of the Air that stated aircraft following a line feature such as a road, railway or coastline, must fly to the right of that feature.

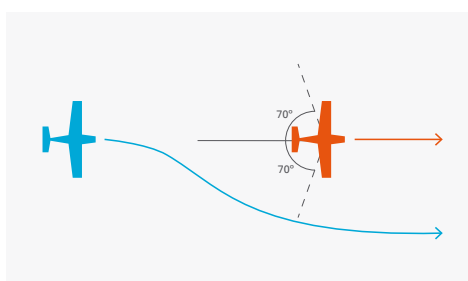
This is no longer a mandatory rule, however it is still considered good practice, particularly if following the coast.



- > When one aircraft is overtaking another, the aircraft *being overtaken* has right of way. Overtaking aircraft shall pass to the right, and keep clear of the other aircraft until the manoeuvre is complete.

An overtaking situation exists when an aircraft is approaching from behind another aircraft, and is within an angle of 70° from either side of its extended centre line.

Sailplanes may pass to either the left or right, but the principle that the aircraft *being overtaken* has right of way remains the same.



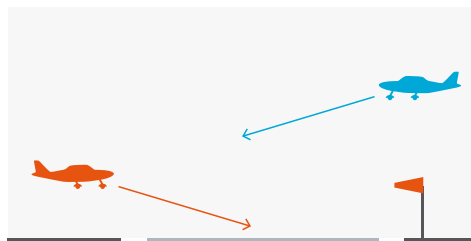
Overtaking: Overtake to right

AIRSPACE > RULES FOR THE PREVENTION OF COLLISIONS

Essential Rules of the Air

- > An aircraft in flight, or operating on the ground or water, shall give way to aircraft that are landing or in the final stages of an approach to land.

When two aircraft are approaching an aerodrome for landing, the one at a lower height shall have priority. This rule should not be used to cut in front of another aircraft that is already established on final approach. Powered aircraft shall give way to gliders when landing.

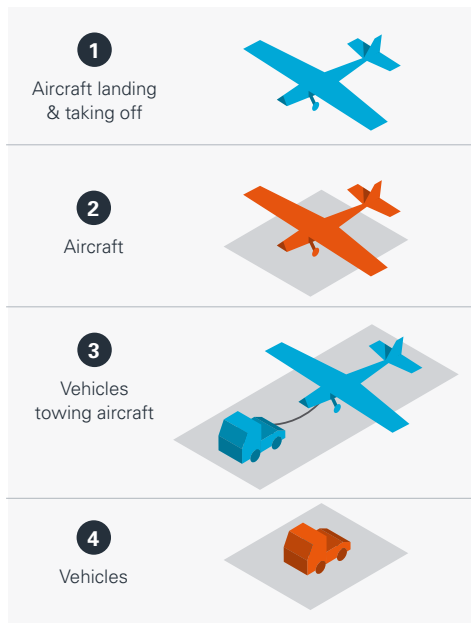


Landing: Blue aircraft gives way

- > If an aircraft is compelled to land due to an emergency, other aircraft must give way to it.
- > An aircraft taxiing on the manoeuvring area of an aerodrome shall give way to aircraft taking off or about to take off.

Rights of way on the ground

- > If approaching another aircraft head on, such that there is a risk of collision, both aircraft shall stop and turn right to avoid each other.
- > If converging with another aircraft, the aircraft that has the *other* on its right must give way. 'On the right, in the right.'
- > When one aircraft is overtaking another, the aircraft *being overtaken* has right of way. On the ground, overtaking aircraft may pass to the left or right.
- > Emergency vehicles proceeding to the assistance of an aircraft in distress have priority over all other surface traffic.
- > Vehicles and vehicles towing aircraft must give way to aircraft.
- > Vehicles must give way to vehicles that are towing aircraft.



AIRSPACE

Visual and instrument flight rules

Key info



Under SERA, all flying is conducted in accordance with either the:

- > Visual Flight Rules (VFR); or
- > Instrument Flight Rules (IFR).

VFR

You may fly under visual flight rules when in 'visual meteorological conditions' (VMC). Flying under VFR essentially means you may fly and manoeuvre as you wish, subject to the terms of any clearances to enter controlled airspace that may be required and compliance with the rules for the protection of third parties and prevention of collisions.

The presumption of VFR flight is that you have enough visibility to control the aircraft by visual references and avoid collisions with other aircraft.

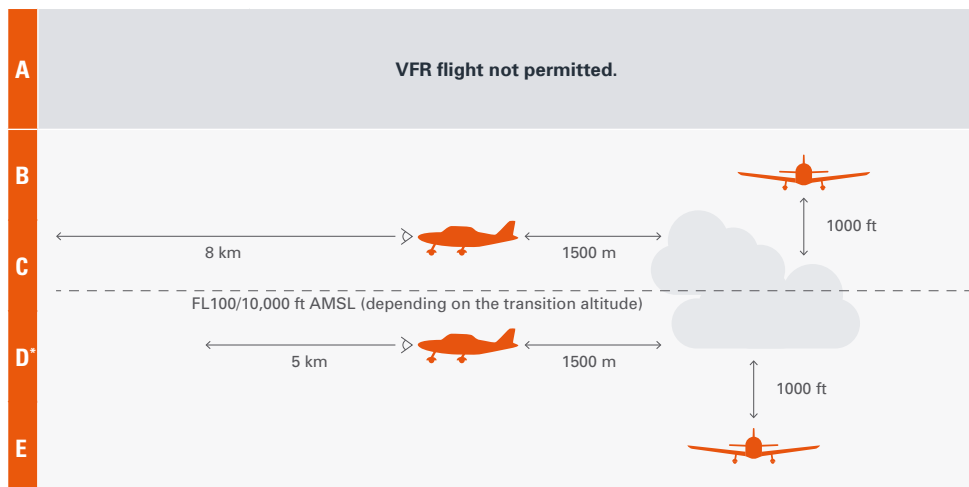
Generally the VMC minima correspond to the amount of visibility and clearance from cloud required to avoid other traffic in the different classifications of airspace. For example in Class E airspace, the cloud separation requirements are designed to prevent IFR traffic encountering VFR traffic very close to clouds.

Full details of the airspace classifications used in the UK can be found [on p.62](#). The table below details the SERA VMC minima.



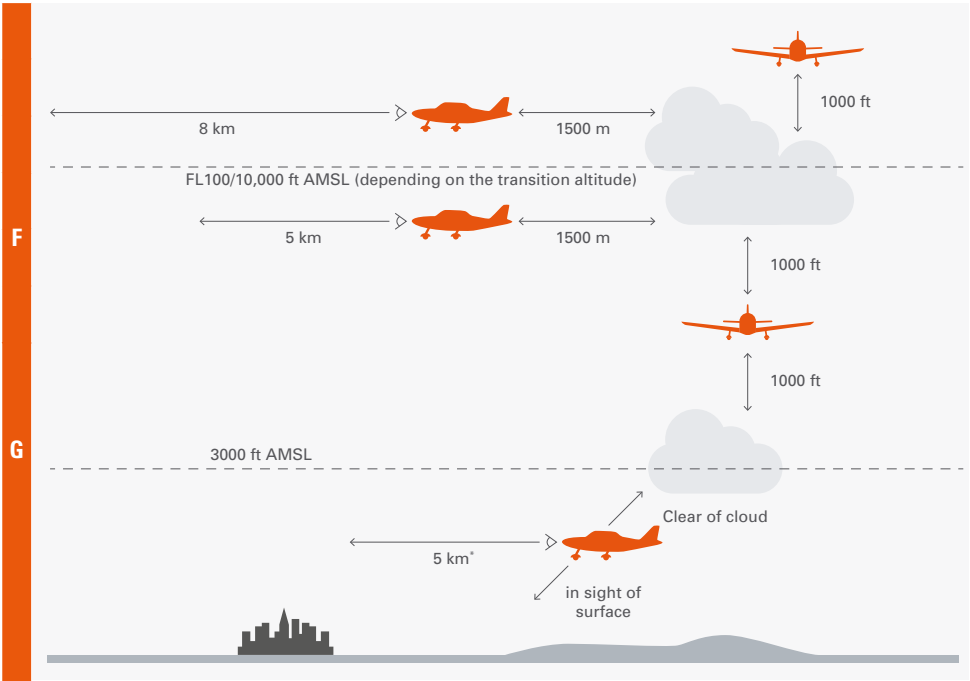
ENR 1.2 of the AIP contains more details on the VFR and IFR. ENR 1.7 and 1.8 should also be checked for state specific variations.

SERA VMC MINIMA



***Class D exemption:** There is an exemption in the UK to SERA which allows aircraft to fly 'clear of cloud' in class D airspace rather than complying with the specified cloud separation distances. This only applies if flying by day and at or below 3000 ft AMSL, in sight of the surface and at 140 kts IAS or less. 5 km visibility is still required, except for helicopters for which 1500 m is required. For full details see www.caa.co.uk/sera. The legal exemption can be found in the ORS4 section within the CAA website www.caa.co.uk/ors4.

Visual and instrument flight rules



Altitude band	Airspace class	Flight visibility	Distance from cloud
At and above 10,000 ft AMSL/FL100	A B C D E F G	8 km	1,500 m horizontally 1,000 ft vertically
Below 10,000 ft AMSL/FL100 and above 3,000 ft AMSL, or above 1,000 ft above terrain, whichever is the higher	A B C D E F G	5 km	1,500 m horizontally 1,000 ft vertically
At and below 3,000 ft AMSL, or 1,000 ft above terrain, whichever is the higher	A B C D** E	5 km	1,500 m horizontally 1,000 ft vertically
	F G	5 km*	Clear of cloud and with the surface in sight

***5 km:** Where permitted by a Member State, this may be reduced to 1500 m if flying by day, in sight of the surface and at 140 kts IAS or less. In the UK, this is permitted in class G airspace.

****Class D exemption:** There is an exemption in the UK to SERA which allows aircraft to fly 'clear of cloud' in class D airspace rather than complying with the specified cloud separation distances. This only applies if flying by day at or below 3000 ft AMSL, in sight of the surface and at 140 kts IAS or less. 5 km visibility is still required, except for helicopters for which 1500 m is required. For full details see www.caa.co.uk/sera. The legal exemption can be found in the ORS4 section within the CAA website www.caa.co.uk/ors4.

AIRSPACE > VFR

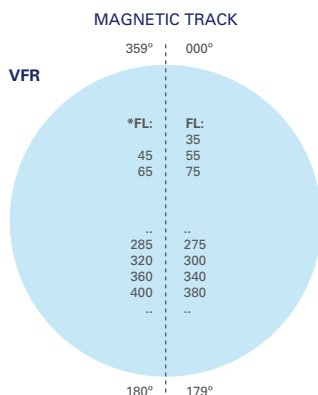
Visual and instrument flight rules

In addition to the VMC minima, VFR flights must also comply with the following:

- > A VFR flight may not take-off or land at an aerodrome within a control zone (CTR), or enter the aerodrome traffic zone or circuit when the reported conditions at that aerodrome are less than:
 - > cloud ceiling of 1500 ft; or
 - > ground visibility of 5 km.

This applies regardless of the CTR's airspace classification. If these conditions are not met, you may request a Special VFR clearance instead ([see p.61](#)).

- > Unless authorised, VFR flights may not operate above FL195 or at transonic or supersonic speeds.
- > In the UK, there is no requirement for VFR flights to fly at a particular altitude dependent on the aircraft's magnetic track. However in SERA, there are specified cruising levels for VFR flights more than 3000 ft above ground level (AGL). These may apply in other European states. For reference, these levels are set out here:



*If below the transition altitude, the levels should be flown as altitudes, such as 3500 ft, 4500 ft and so on.

VFR at night

Under SERA, VFR flights at night are subject to additional requirements over those for day.

They must also be authorised by the relevant state. Normally details of this can be found in [ENR 1.2](#) of the AIP. The UK allows VFR at night in accordance with a general permission. Full details can be found in the ORS4 section within the CAA website www.caa.co.uk/ors4.

For VFR flights at night:

- > The in-flight visibility and cloud separation requirements are the same as by day, except that the reduced visibility minima of 1500 m in class G airspace is not permitted.
- > The cloud ceiling must be 1500 ft or more.
- > When at or below 3000 ft AMSL, or 1,000 ft above terrain, whichever is the higher, you must be in sight of the surface, in all airspace classifications.
- > You must fly at a level not less than 1000 ft above the highest obstacle within 8 km (5 NM) of the aircraft's position, except that under the UK permission, when at or below 3000 ft AMSL, you may fly:
 - > In sight of the surface;
 - > At a height of not less than 500 ft above the ground or water, or 500 ft above the highest obstacle within a radius of 500 ft from the aircraft; and
 - > At a height not less than 1,000 ft above the highest obstacle within a radius of 600 m from the aircraft when over the congested areas of cities, towns or settlements or over an open-air assembly of persons.

Guidance ?

Enroute obstacles that are 150 m (490 ft) above ground level or higher must be lit at night. This is normally by a steady red light on the highest point.

AIRSPACE > VFR

Visual and instrument flight rules

- > If leaving the vicinity of the aerodrome, a flight plan must be submitted. This may be an abbreviated plan submitted to an ATSU.
- > If an ATS is available, you must make use of it.

Special VFR

Special VFR (SVFR) is a provision that allows flight in a control zone (CTR) when conditions are below VMC minima, but without having to comply with the IFR. SVFR clearances are subject to airspace capacity – due to the reduced visibility, ATC usually have to apply separation between SVFR and other traffic.

The minimum permitted weather conditions for a pilot to accept a SVFR clearance from ATC are:

- > Clear of cloud and in sight of the surface;
- > In flight visibility of not less than 1500 m, or 800 m in the case of a helicopter; and
- > 140 kts or less indicated airspeed.

Additionally, in order for ATC to issue a clearance to take off or land at an aerodrome within the control zone, the reported conditions at that aerodrome must not be less than:

- > Ground visibility of 1500 m, or 800 m in the case of a helicopter; or
- > Cloud ceiling of 600 ft.

Guidance ?

If you wish to obtain a SVFR clearance to arrive or depart at a secondary aerodrome within a CTR, that does not have meteorological reporting capability, you may assess the above minima and request a SVFR clearance if you reasonably believe they are met. When assessing the conditions, you should take in account the conditions reported at the CTR's parent aerodrome.

*If below the transition altitude, the levels should be flown as altitudes, such as 3000 ft, 4000 ft and so on.

Special VFR at night

Under SERA, Special VFR at night must be specifically permitted by individual member states. Special VFR at night is permitted in the UK.

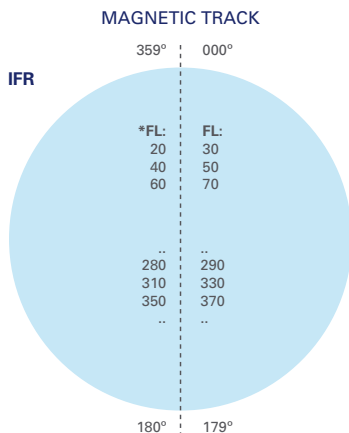
For other states, ENR 1.2 of the relevant AIP should be checked.

INSTRUMENT FLIGHT RULES

You must fly under IFR if conditions are below the VMC minima for the airspace being flown in (unless in a CTR and in receipt of a SVFR clearance). In the case of class A airspace, flight must always be conducted under IFR. In order to fly under IFR you must hold a valid instrument rating enroute instrument rating, restricted instrument rating or IMC rating.

The IFR require you to:

- > Except when necessary for take-off or landing, fly at a level at least 1000 ft (2000 ft in mountainous areas) above the highest obstacle located within 8 km (5 NM) of the aircraft.
- > When flying outside controlled airspace, fly in accordance with the IFR cruising levels. In the UK these only apply above 3000 ft AMSL:



AIRSPACE

Airspace classifications

Airspace is organised into different classifications A-G. The characteristics of these, including the applicable VMC minima, are set by the International Civil Aviation Organisation (ICAO) and applied in Europe under SERA. In the UK, classifications A, C, D, E and G are used. The vast majority of the UK is class G, with the other controlled airspace classifications used for terminal and enroute airspace.

CONTROLLED AIRSPACE

CTR A FL45+ A	Where	Most airways; London/Manchester TMAs.
	VFR Flight	VFR flight not permitted.
	Clearance	ATC clearance required.
	Radio	Radio required.
	ATC Services	Air Traffic Control service.
CTR C 2000-FL195 C	Where	Mostly above FL195 and some airways.
	VFR Flight	Generally not permitted above FL195. Specific arrangements for glider operations in TRAs apply.
	Clearance	ATC clearance required.
	Radio	Radio required.
	ATC Services for VFR traffic	Air Traffic Control service.
CTR D 2000-2500 D	Where	Most aerodrome CTRs and CTAs. Some TMAs and lower levels of selected airways.
	VFR Flight	VFR flight permitted. SVFR permissible in CTRs.
	Clearance	ATC clearance required.
	Radio	Radio required.
	ATC Services for VFR traffic	Air Traffic Control service.
TMA E 2000-4000 E	Where	Scottish airways.
	VFR Flight	VFR flight permitted.
	Clearance	ATC clearance not required for VFR flight, pilots encouraged to contact ATC.
	Radio	Radio not required for VFR flight.
	ATC Services for VFR traffic	Basic and Traffic services.
	VFR Separation	Traffic information provided for VFR flights if in receipt of a Traffic Information Service.

OUTSIDE CONTROLLED AIRSPACE

FL55-FL255 G	Where	'Open FIR'.
	VFR Flight	VFR flight permitted.
	Clearance	ATC clearance not required.
	Radio	Radio not required.
	ATC services for VFR traffic	Basic and Traffic services.
	VFR Separation	Traffic information provided for VFR flights if in receipt of a Traffic Information Service.

AIRSPACE

Airspace hazards and restrictions

Guidance ?

Other than compliance with the Rules of the Air, VFR operation in class G and E airspace is almost entirely unencumbered by restriction. However, the freedom to manoeuvre and navigate at will also brings the responsibility to fly in a manner that minimises hazard and inconvenience to others.

There are many different users of uncontrolled airspace, powered or unpowered, civil or military, GA or commercial air transport. They all have different operational needs, but share a common interest of flying safely.

The following section describes some of the main airspace hazards and restrictions GA pilots should be aware of and how they are depicted on VFR charts. It is by no means exhaustive, and for details of particular sites or hazards, reference should be made to the information on the VFR chart and in the [ENR](#) section of the AIP.

Aerodrome traffic zones

An ATZ is normally a cylindrical block of airspace, established around an aerodrome, for which there will be an assigned radio communication frequency. An ATZ extends 2000 ft above the ground level of the aerodrome and has a radius of:

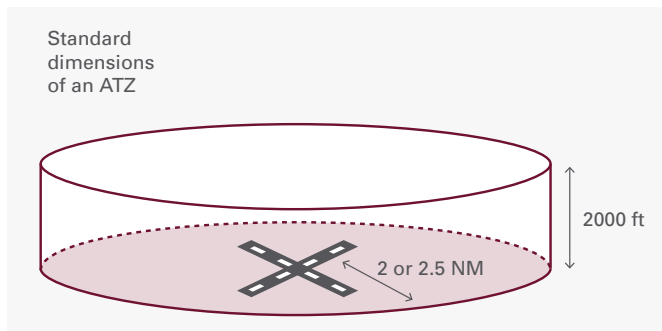
- > 2 NM when the longest runway is 1850 m or less;

- > 2.5 NM when the longest runway is more than 1850 m.

The details of how to operate correctly within an ATZ when landing or departing at an aerodrome are addressed in the 'Aerodrome Operations' chapter ([see p.90](#)).

Sometimes you may wish to cross an ATZ during enroute flight (for example the cloud base may prevent flight above the vertical limit of the ATZ). It is perfectly acceptable to cross an ATZ provided you announce your intentions or gain permission (if there is an air traffic control service provided within it) and do not cut across circuit traffic. Ideally, any transit should be done above circuit height. If you are unsure as to whether you can avoid traffic already in the ATZ, fly around instead.

- > The Rules of the Air 2015 require aircraft to announce their entry and exit of an ATZ during the hours of watch of the relevant A/G or AFIS unit station, and obtain information for the safe operation of the flight within the ATZ.
- > Flight within an ATZ for which an aerodrome control service is active requires permission from the relevant ATSU.



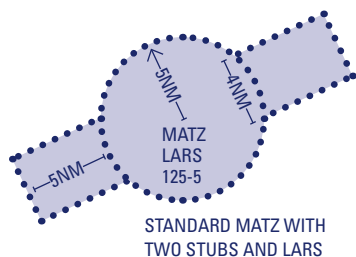
2 NM ATZ shown with aerodrome symbol

AIRSPACE

Airspace hazards and restrictions

MILITARY AIR TRAFFIC ZONES

A MATZ is not controlled airspace but an area established around a military aerodrome designed to protect traffic flying in the vicinity. It is not actually a requirement to be “cleared” into a MATZ as such; but it is good airmanship to contact the relevant ATSU if intending to enter. A MATZ will contain an ATZ within it, for which the normal rules for an ATZ apply.

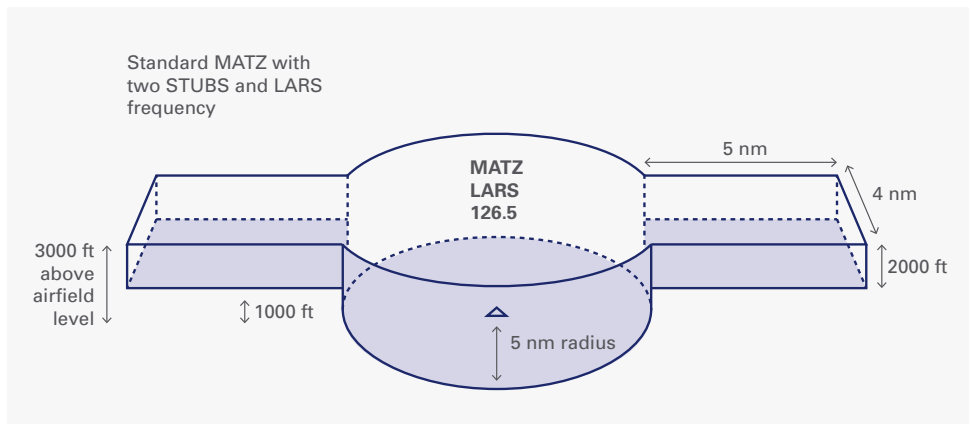


Aircraft operating near military aerodromes are not confined to the MATZ. This could include aircraft approaching to land or operating in what is known as the ‘radar training circuit’ (RTC). The RTC is a relatively standard pattern flown by aircraft around the aerodrome for the purpose of practising radar approaches.

The standard RTC sequence is:

- > Take off and climb to a height of between 1500 ft and 2500 ft;
- > Vectoring around the pattern;
- > Alignment and descent with the final approach track and glidepath; and
- > Landing or low approach and go-around.

This could take place either as a left or right hand pattern. It is primarily the downwind and base leg elements of which protrude beyond the extremities of the MATZ, so it is a good idea to contact the relevant MATZ frequency if transiting these areas, even if you are not penetrating the MATZ itself.



AIRSPACE > MILITARY AIR TRAFFIC ZONES

Airspace hazards and restrictions

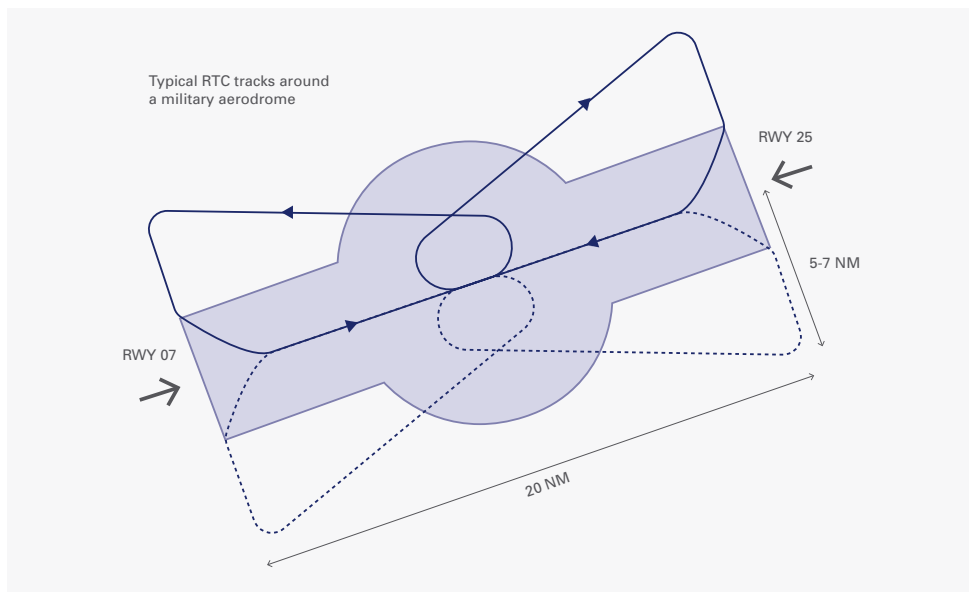
In addition to traffic in the RTC, arriving aircraft joining the final approach track may come from any direction, but similar to the RTC pattern, will likely be vectored onto a 90° base leg and then a 40° intercept angle to join the final approach track.

Fast jet traffic will often approach aerodromes at high speed and therefore need a large turn radius to line up with the runway. The final approach may therefore commence outside of the MATZ. This is then followed by a 'run and break' manoeuvre to lose speed and a close-in circuit within the MATZ to land.

Crossing a MATZ

If you wish to cross a MATZ you should contact the assigned frequency prior to entry and request a "MATZ penetration service" with your proposed route. The controller may ask if you can adopt a different route or altitude that would enable better separation with other activity in the MATZ. You should accommodate if possible. The most important thing is that the controller is now aware of you and your intentions. Use the standard 'freecall' ([see p.73](#)) format for initiating contact, adapted as required.

MATZ are often inactive at weekends, although you should always attempt a call to check the status. If there is no response from the assigned frequency after two attempts you may enter with caution, however you should never enter the ATZ within the MATZ without a positive clearance since there may be traffic within it on a different frequency.



AIRSPACE > MILITARY AIR TRAFFIC ZONES




Airspace hazards and restrictions

MATZ crossing exchange

The following gives an outline of a typical radio exchange for a MATZ penetration. For more details of radiotelephony (RT) procedures please see CAP 413 – www.caa.co.uk/cap413, which is the authoritative guide to RT procedures in the UK.

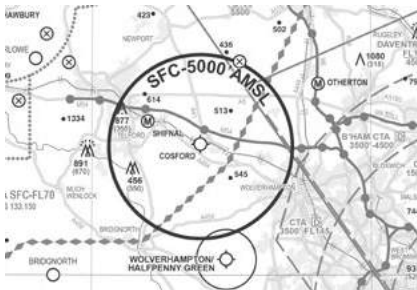
Explanation	Example exchange
<p>Commencing the call with the request gives the controller the opportunity to consider whether they can immediately respond to it or whether to instruct the caller to “standby”.</p> <p>It also allows them to consider what information will need to be passed back to the aircraft before having to process the entire message – for example most stations will have a particular series of squawk codes to be given out depending on what service is being provided to the aircraft.</p>	 <p>“Boscombe Zone, G-DOME, request MATZ penetration.”</p>
<p>Assuming the controller is ready to process your request, they will likely respond by asking to “pass message”.</p> <p>If they reply “standby” there is no need to acknowledge this, they will try and call you when they are able. It does not imply a rejection of your request; it just means they are not able to immediately respond to it.</p>	 <p>“G-DOME, Boscombe Zone, pass your message.”</p>
<p>Use the standard “freecall” format to tell the controller what you are doing.</p>	 <p>“G-DOME, PA28 from Old Sarum to Bristol overhead Alderbury, altitude 2200 ft, QNH 1009, VFR, direct track Bristol.”</p>
<p>Note that the giving of a squawk code does not necessarily mean that you have been identified. It may be a generic squawk for all traffic receiving a ‘Basic Service’ on that frequency.</p>	 <p>“G-ME, roger, squawk 2650, Basic Service.”</p>
<p>Service level and squawk codes must always be read back by the aircraft.</p>	 <p>“Squawk 2650, Basic Service, G-ME.”</p>
<p>When crossing a MATZ you will normally be given the aerodrome QFE to set, since the vertical dimensions of the MATZ are defined relative to the aerodrome elevation.</p>	 <p>“G-ME, MATZ penetration approved at 1800 ft on Boscombe QFE 997 hectopascals, report entering the MATZ.”</p>

Airspace hazards and restrictions

MATZ crossing exchange	
Explanation	Example exchange
Crossing altitude and QFE must be read back, however requests to report at certain places can simply be acknowledged with ‘wilco’.	 “MATZ penetration approved at 1800 ft on Boscombe QFE 997 hectopascals, wilco, G-ME.”
Remember to report as requested.	 “G-ME entering the MATZ.”
	 “G-ME roger, report leaving.”

RESTRICTED AIRSPACE (TEMPORARY)

- > Restricted airspace (temporary) is often established around large air displays, significant public gatherings or a major incident or accident. The details of these are published in Aeronautical Information Circulars (AICs) and activated by NOTAM.



- > In the UK TMZs generally require a mode S transponder ([see p.82](#)) to operate autonomously. Aircraft not equipped with mode S must request the permission of the relevant ATSU before entering.
- > Details of individual TMZs can be found in [GEN](#) 1.5 and [ENR](#) 2.2 of the AIP.



RADIO MANDATORY ZONE

- > An RMZ is an area established within which all aircraft must establish two-way communication or monitor (as determined for the individual RMZ) between the relevant ATSU. Use the freecall ([see p.73](#)) format to do this.
- > Details of individual RMZs can be found in [GEN](#) 1.5 and [ENR](#) 2.2 of the AIP.



TRANSPONDER MANDATORY ZONE

- > A TMZ is an area established within which all aircraft must be equipped with the type of transponder specified for a particular zone, and operate in accordance with any required instructions.

AIRSPACE

Airspace hazards and restrictions

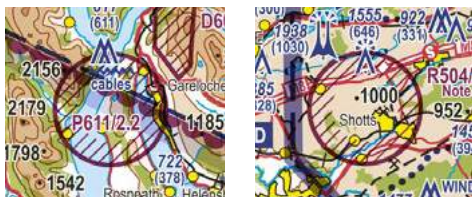
DANGER AREA

- > A danger area is a published area within which activity hazardous to aviation may be encountered. Flight within danger areas may be prohibited by local bylaws.
- > Danger areas normally have periods within which they are active – details of activity periods can normally be found in [ENR 5.1](#) of the AIP. There is often a frequency and/or telephone number in the notes of the VFR chart from which the status of the danger area may be obtained. The status can sometimes also be obtained from either a local ATC unit or London/Scottish Information, as applicable to the region.
- > If unauthorised entry to a danger, restricted or prohibited area is detected, red and green pyrotechnic may be fired from the ground to warn the aircraft.
- > Some also offer a 'danger area crossing service', which may allow a tactical crossing clearance to be issued. Details can be found in the AIP or on the notes of the VFR chart.
- > If it can be established that the DA is 'cold' or a crossing service is available, then this can avoid unnecessary diversions around large DAs. If in doubt, remain outside. Danger areas with a broken boundary are activated by NOTAM.



PROHIBITED OR RESTRICTED AREAS

- > A prohibited area is an area within which flight is entirely prohibited.
- > A restricted area is an area within which some flying is restricted – for example, sometimes they only apply to certain categories of aircraft. These conditions can be found in the notes of the VFR chart and in [ENR 5.1](#) of the AIP.
- > The altitude to which they extend is stated in thousands of feet AMSL. '2.2' is therefore 2200 ft.



WIND TURBINES

- > Careful consideration must be taken when operating near wind turbines and wind farms as turbines erected before CAP764 policy and guidelines on wind turbines was published may be unlit.
- > Some LED obstacle lights fall outside the spectrum of night-vision goggles, therefore pilots using goggles should use extra caution when flying in the vicinity of obstacles to ensure that the required obstacle clearance is provided.
- > Remember the numerals in italics indicate elevation of top of obstacle above means sea level. Numerals in brackets indicate height of top of obstacle above local ground level.



AIRSPACE

Airspace hazards and restrictions

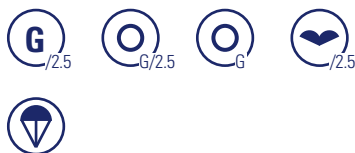
GLIDER AND PARACHUTE SITES

Guidance ?

You should never overfly a glider site below the specified winch launch altitude. You may encounter a vertical winch cable.

- > Winch launching involves the glider being launched by a cable from the ground. The cable tows the glider to flying speed along the ground and continues to pull it forward once airborne, giving a very steep climb angle. The winch cable is then released when the glider has reached sufficient altitude.
- > Glider sites with winch launching activities are marked on charts with a maximum altitude to which winch launches take place in thousands of feet. '2.5' indicates 2500 ft AMSL.
- > Where there is gliding without winch launching, there is no altitude displayed. In these cases the gliders are most likely launched by aero tow, meaning you may encounter aeroplanes towing gliders near the site. Aerotowing and winch launching activities often take place at the same site.
- > Pilots of powered aircraft should also be aware that gliders often congregate at locations well away from the launching site. On good 'thermaling' days they may do so in quite concentrated areas. If you can see one, there will likely be others about. Remember that under the Rules of the Air, powered aircraft must give way to gliders and other powered aircraft towing gliders.

- > Parachuting sites may be active up to FL150. You should give them a wide berth unless you are able to confirm they are inactive through contact with the relevant ATSUs or drop zone frequency. Details of drop zone contact details can be found in [ENR 5.5](#) of the UK AIP.



AREAS OF INTENSE AERIAL ACTIVITY

- > Within these areas very high levels of both civil and military aviation activity may take place. This might include low flying military aircraft and/or aircraft performing high energy manoeuvres. There is normally a radar service available in these areas, which pilots are strongly encouraged to make use of.
- > Aerial Tactics Areas (ATAs) are also marked in the same way. The same principles apply, although the traffic encountered is more likely to be manoeuvring military aircraft.



AIRSPACE

Airspace hazards and restrictions

INSTRUMENT APPROACHES

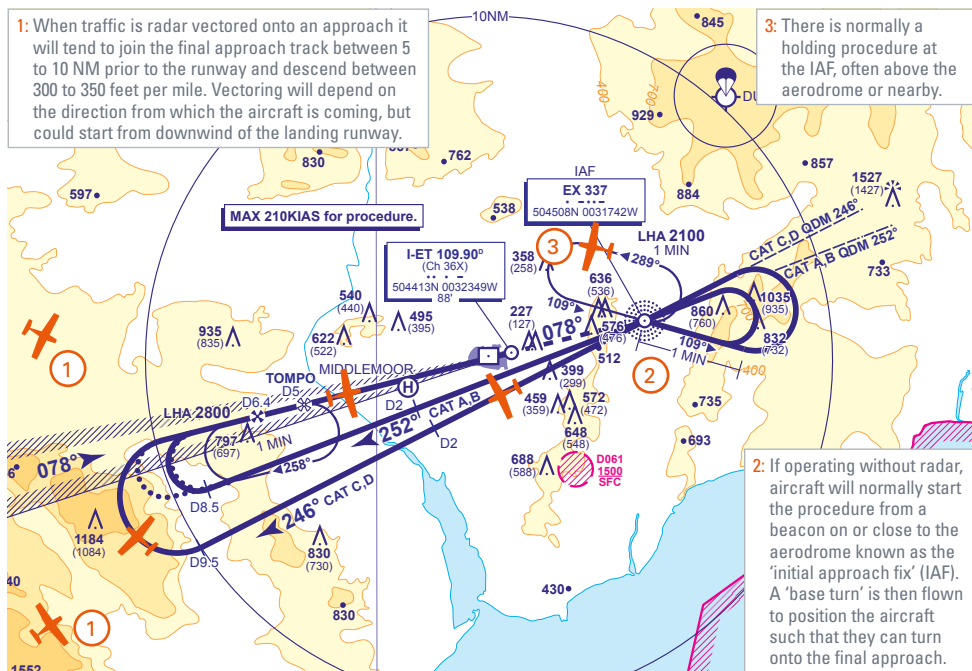
Some aerodromes outside controlled airspace have instrument approach procedures (IAPs). These are defined sequences of waypoints that guide aircraft to the final approach track. Details of IAPs can be found in entries for individual aerodromes in **AD** of the AIP.

They are often used in VMC, especially by commercial air transport aircraft and those conducting instrument training.

Larger commercial air transport traffic will have reduced capability to 'see and avoid' due to the limitations of visibility from the cockpit. Aircraft also tend to descend further away from the aerodrome and make larger radius turns when conducting IAPs than they would when making a visual approach.

VFR traffic operating near aerodromes outside controlled airspace should be aware that there may be instrument traffic using IAPs and should avoid crossing them at similar altitudes to that of the procedure, unless talking to the relevant ATSU.

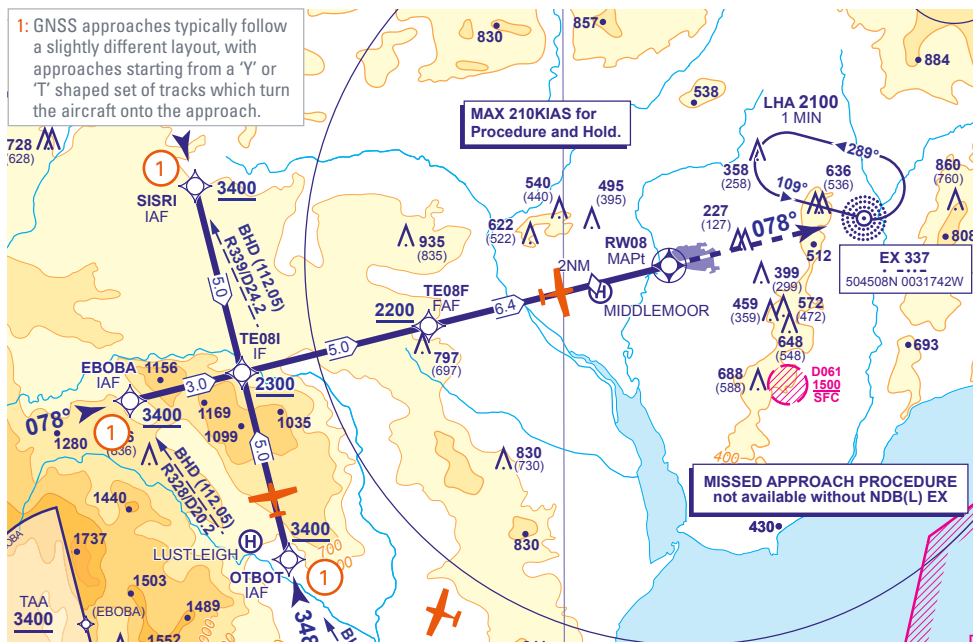
IAPs outside controlled airspace are indicated by 'feathered arrows'. Note they only align with the main instrument runway. There may also be approaches to other runways as well.



A typical Instrument Landing System (ILS) approach established outside controlled airspace. In this case Exeter airport.

AIRSPACE > INSTRUMENT APPROACHES

Airspace hazards and restrictions



A typical RNAV (GNSS) approach established outside controlled airspace. In this case Exeter airport.

MILITARY LOW FLYING SYSTEM

Military low flying takes place across most of the UK, often as low as 50 ft AGL for helicopters and 250 ft AGL for fixed wing traffic. There is an increased likelihood of encountering military aircraft in areas of intense aerial activity or aerial tactics areas, although low flying aircraft are not confined to these areas.

The highest concentrations tend to be below 1000 ft AGL, so GA pilots are strongly recommended to remain above this height during enroute flight.

The ministry of Defense (MOD) publishes a monthly low flying tactical training area timetable which can be found on-line.

www.gov.uk/guidance/military-low-flying.

AIRSPACE

Air Traffic services outside controlled airspace

Pilots are encouraged to talk to appropriate ATSUs when flying outside controlled airspace. Situational awareness and safety may be enhanced by use of an air traffic service. In the UK, services may be available from:

- > Lower Airspace Radar Services (LARS);
- > Other ATSUs; and
- > Area Control Centre FIS – London or Scottish Information (Basic Service only).

Scottish and London Information do not have radar; the squawk code they give you is so that other radar units who may observe you know that you are talking to London or Scottish Information. They can therefore contact you via either London or Scottish – if for example you are about to infringe controlled airspace.

Collectively the air traffic services available outside controlled airspace are known as the UK Flight Information Services (FIS). Within the UK FIS there are three distinct levels of service available to aircraft.

Terrain avoidance remains the responsibility of the pilot

Basic Service



A Basic Service is intended to offer the pilot maximum autonomy and is available to IFR flights in Class G airspace, or VFR flights in Class E and Class G airspace. If the ATCO or FISO are aware of airspace activity that may affect your flight they will tell you; however, this is subject to their workload and the avoidance of other traffic is solely the pilot's responsibility. **Maintain a good lookout.**

Traffic Service



Under a Traffic Service, an ATCO will use radar to provide you with detailed traffic information on specific conflicting aircraft; they will not provide you with deconfliction advice, regardless of your meteorological conditions. A Traffic Service is available to IFR flights in Class G airspace, or VFR flights in Class E and Class G airspace.

Deconfliction Service



Only available to IFR flights in Class G airspace. An ATCO will use radar to provide you with detailed traffic information on specific conflicting aircraft and advice on how to avoid that aircraft. However, the pilot retains responsibility for collision avoidance; you can opt not to follow the ATCO's advice.

More details of the UK FIS can be found in CAP 1434 – www.caa.co.uk/cap1434 and CAP 774 – www.caa.co.uk/cap774.

AIRSPACE

Air Traffic services outside controlled airspace

WHAT SERVICE TO ASK FOR?

- > It is common practice for GA pilots to request a Basic Service if operating in good VMC and a traffic service if in reduced visibility or entering IMC.
- > In fact, there can sometimes be a greater collision risk on good weather days since there is more traffic around. If you do not have any traffic awareness equipment on board the aircraft, you should consider requesting a traffic information service, as see-and-avoid alone is known to be an imperfect means of detecting other aircraft.

REQUESTING A SERVICE


When operating under VFR you will generally be calling enroute radio stations unannounced. This is known as a 'freecall'. There is a standard template for a freecall that can be varied for almost all requests that you will likely wish to make:

- > **Who you are and what you want** – call sign, aircraft type and request;
- > **What you are doing** – point of departure and destination, route or area of operation and/or intentions;
- > **Where you are** – position and altitude/level. Use a reference point such as a major town or aerodrome, that the controller will be able to identify; and
- > **What you want** – for example a 'Basic Service' or a controlled airspace transit.¹

¹Simple requests such as 'Basic Service' should be placed in the initial call, although you may need to give more information after the controller has asked you to 'pass your message'.

Requesting and receiving a 'Basic Service'

The following gives an outline of a typical radio exchange for requesting a Basic Service. For more details of radiotelephony (RT) procedures please see CAP 413 – www.caa.co.uk/cap413, which is the authoritative guide to RT procedures in the UK.

Explanation	Example exchange
Commencing the call with the request gives the controller the opportunity to consider whether they can immediately respond to it or whether to instruct the caller to "standby". It also allows them to consider what information will need to be passed back to the aircraft before having to process the entire message – for example most stations will have a particular series of squawk codes to be given out depending on what service is being provided to the aircraft.	<div>"Boscombe Zone, G-DOME request Basic Service."</div>






Air Traffic services outside controlled airspace

Requesting and receiving a ‘Basic Service’	
Explanation	Example exchange
<p>Assuming the controller is ready to process your request, they will likely respond by asking to “pass message”.</p> <p>If they reply “standby” there is no need to acknowledge this: they will try and call you when they are able. It does not imply a rejection of your request; it just means they are not able to immediately respond to it.</p>	<div><p>“G-DOME, Boscombe Zone, pass your message.”</p></div>
<p>Use the standard “freecall” format, setting out more details of your flight. There is no need to repeat the original service request (e.g. for Basic Service).</p>	<div><p>“G-DOME, PA28, from Thruxton returning to Thruxton, intending to carry out general handling between Andover and Newbury. 2 NM north of Andover, altitude 2,300 ft, QNH 1023, VFR.”</p></div>
<p>Note that the controller has not identified the aircraft – this is not a requirement of providing a Basic Service. The code may be generic to all aircraft on a Basic Service from that unit, such that other units can identify who the aircraft is in contact with. Crucially it means that the controller will generally not be in a position to provide traffic information.</p> <p>Outside controlled airspace it is standard practice to give the regional pressure setting (RPS) (see p.83) when providing a service. You are not obliged to use this, and particularly if there is a risk of vertically infringing nearby airspace, you should ask for and set the relevant local QNH. The RPS will be lower and therefore under-read your actual altitude.</p>	<div><div></div><p>“G-ME roger, squawk 2650, Basic Service, Portland 1019, report general handling complete.”</p></div>

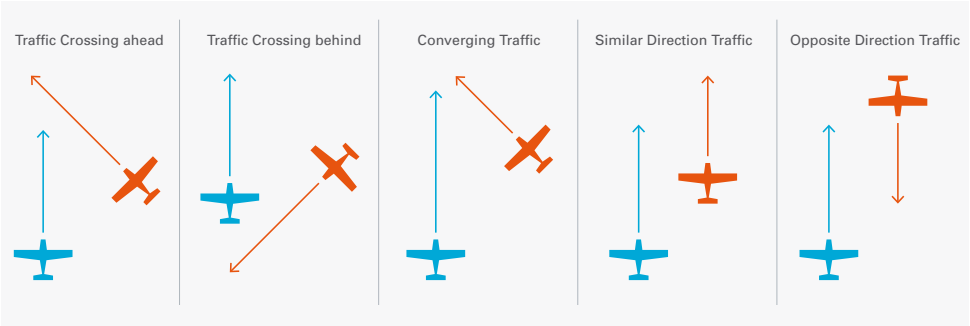
Air Traffic services outside controlled airspace

Requesting and receiving a ‘Basic Service’	
Explanation	Example exchange
<p>The type of service, pressure setting (even if you do not plan to use it) and squawk should be read back. Instructions to report at a particular point in the future can be acknowledged with “wilco” – meaning you will comply.</p> <p>Service, pressure setting, squawk and reporting instruction all in one call can be a mouthful – the controller may break this into two calls. If you do not catch everything, reply (for example) “say again squawk” or “say again all after pressure setting”, depending on what you did not hear the first time.</p> <p>You may abbreviate your callsign once the controller has done so.</p>	<div><p>“Squawk 2650, Basic service, Portland 1019, wilco, G-ME.”</p></div>
<p>When under a Basic Service the controller may pass information pertinent to the safe conduct of the flight. This is NOT specific traffic information; it is simply general information taking into account the area you have declared you are operating in and is subject to controller workload.</p>	<div><div></div><p>“G-ME, be aware there is a glider competition around Rivar Hill, large concentrations of gliders in the area up to 4000 ft.”</p></div>
<p>This can just be acknowledged.</p>	<div><div></div><p>“Roger, G-ME.”</p></div>
<p>Report as instructed.</p>	<div><div></div><p>“G-ME is general handling complete, returning to Thruxton.”</p></div>
<p>The controller will normally state the termination of the service and remind you to revert to squawking 7000, the standard VFR conspicuity code.</p>	<div><div></div><p>“G-ME roger, service terminated, squawk 7000.”</p></div>

Air Traffic services outside controlled airspace

Traffic service	
The request for the service will be similar to that of the Basic, following the standard 'freecall' format – however you will be 'radar identified' and given traffic information in the following format.	
The standard format for calling traffic is position, range, relative movement and (if available) altitude. If the traffic is not transponding its altitude then the controller will not be able to pass this information.	 <p>"G-ME, traffic one o'clock, 4 miles, crossing right to left ahead, indicating 400 ft above."</p>
You may respond by saying "roger" while you look for the traffic.	 <p>"Roger, G-ME."</p>
It helps the controller if you report the traffic in sight and then they know they can prioritise calling other traffic. If after a period of looking you cannot see the traffic tell the controller "traffic not sighted".	 <p>"Traffic in sight, G-ME."</p>
If you lose sight of previously identified traffic, or simply want an update on the position of it, ask the controller for this.	 <p>"Traffic no longer in sight, G-ME."</p>
	 <p>"G-ME, previously reported traffic now 10 o'clock, 2 miles, indicating 300 ft above."</p>

When passing traffic information the controller will use the following terms to describe the relevant movement:

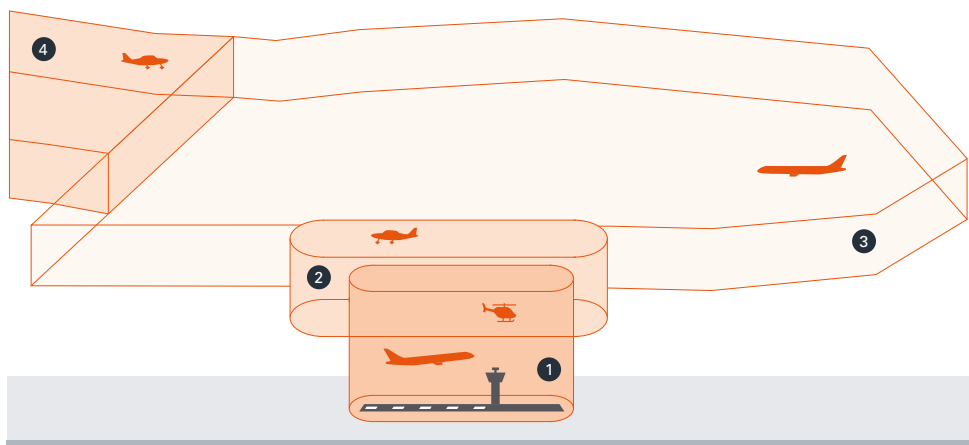


AIRSPACE

Controlled airspace operations

The [table on p.62](#) set out the clearance requirements for the different classifications of airspace. The vast majority of controlled airspace that GA pilots will encounter is class D. This is used in almost all control zones (CTRs) and control areas (CTAs) around aerodromes in the UK.

As well as the different classifications described earlier, controlled airspace is made up of different structures.



1 Control zone (CTR)

These are established around aerodromes, with the shape orientated around the length of the most commonly used runway. In the UK they are normally class D airspace and extend from the surface to around 2000 ft, although often higher.



AIRSPACE

Controlled airspace operations

2 Control area (CTA)

These normally overlay CTRs and extend further beyond the aerodrome. They normally start around 1500 ft. They are normally class D, however some higher or larger ones are class A.



3 Terminal control area (TMA)

These cover areas where there may be several busy aerodromes close together; for example the London, Manchester or Scottish TMAs. They are normally class A, although the Scottish TMA is an exception to this.



4 Airways

These link different parts of the airspace structure together, in which mostly IFR traffic transits. They have designations consisting of letters and numbers. They are normally class A. Some airways in Scotland are class E combined with a transponder mandatory zone (TMZ), allowing VFR access.



AIRSPACE

Controlled airspace operations

REQUESTING TRANSITS

Guidance

GA pilots sometimes end up flying convoluted routes in an effort to avoid controlled airspace, when in fact it would be safer and more efficient to obtain a transit through it.

The key message on controlled airspace is that if it appears advantageous and sensible to do so, confidently request a transit. If not, plan a route that minimises the risk of infringement.

Controllers should make every effort to accommodate requests that are consistent with the safe and orderly flow of traffic.

The advantage of obtaining a controlled airspace transit:

- > Reduces the likely distance of the flight;
- > May reduce the risk of airborne conflict;
- > May reduce the risk of infringement:
 - > There is now a shared understanding of the intended route that will enable the controller to plan interactions with other traffic; and
 - > While it is still incumbent on the pilot to fly the route as cleared, the risk of infringement caused by distraction is reduced – rather than skirting around the edges, the aircraft is now positively cleared to enter along a defined area and/or route.

The chances of successfully obtaining a transit can be increased by:

- > Giving the controller reasonable time to respond to your request. 10 minutes flying time from the intended entry point is ideal.
- > Sounding professional on the radio by clearly and concisely articulating your request. Use the standard 'freecall' ([see p.73](#)) format (adapted for the relevant request). This will give the controller the confidence that you can be relied on to comply with the conditions of the clearance.
- > Plan for a transit that seems likely – if an aerodrome is busy it is unlikely that a transit that would be given that crosses the final approach track at a similar altitude to that of arriving aircraft. However a transit high above the traffic flow at right angles is much more likely to work. Crossing through the aerodrome overhead or just downwind of the arrival threshold can often be accommodated.

AIRSPACE > REQUESTING TRANSITS

Controlled airspace operations

Request to transit controlled airspace

The following gives an outline of a typical radio exchange for a transit of controlled airspace. For more details of radiotelephony (RT) procedures please see CAP 413 – www.caa.co.uk/cap413, which is the authoritative guide to RT procedures in the UK.

Explanation	Example exchange
<p>Commencing the call with the request gives the controller the opportunity to consider whether they can immediately respond to it or whether to instruct the caller to “standby”.</p> <p>It also allows them to consider what information will need to be passed back to the aircraft before having to process the entire message – for example most stations will have particular a series of squawk codes to be given out depending on what service is being provided to the aircraft.</p>	 <p>“Solent Radar, G-DOME, request Basic Service and zone transit.”</p>
<p>Assuming the controller is ready to process your request, they will likely respond by asking to you to “pass your message”.</p> <p>If they reply “standby” there is no need to acknowledge this: they will try and call you when they are able. It does not imply a rejection of your request; it just means they are not able to immediately respond to it.</p>	 <p>“G-DOME, Solent Radar, pass your message.”</p>
<p>Use the standard “freecall” format, spelling out more detail on your desired zone transit. There is no need to repeat the original service request (e.g. for Basic Service) but give more detail on your zone transit request if appropriate.</p>	 <p>“G-DOME, PA28, from Compton Abbas to Shoreham. 2 NM south of Alderbury, altitude 2,300 ft, QNH 1022. Request transit via Romsey and Bishop’s Waltham.”</p>
<p>Depending on what service you have requested and/or whether the controller anticipates giving you a clearance, they may simply reply by giving you a squawk code.</p> <p>They may ask you to “ident”, which means after selecting the squawk, press the ident key on the transponder. This draws their attention to you on the radar screen.</p>	 <p>“G-DOME, roger, Basic Service, squawk 3646 with ident.”</p>

Controlled airspace operations

Request to transit controlled airspace	
Explanation	Example exchange
The type of service and squawk code must be read back.	 "Basic Service, squawk 3646 with ident, G-DOME."
<p>If the transit request is straightforward then the clearance will likely be given shortly after identification, although do not always expect this and remain clear until given a clearance.</p> <p>If you are approaching the zone boundary and you still have not heard anything, a gentle request for clarification of whether a clearance can be expected does not go amiss.</p> <p>Otherwise, start to consider your alternative route (that you considered earlier of course) – the controller may have suddenly become busy dealing with another aircraft that needs more urgent attention.</p> <p>If a transit is not forthcoming, positively alter course away from the airspace and monitor your GPS to ensure that you remain clear of the airspace.</p>	 "G-ME, identified 10 NM west of Southampton, cleared to cross the zone VFR, not above altitude 2000 ft, Southampton QNH 1024. Report entering the zone at Romsey."
<p>Read back the clearance with any altitude limits or other conditions as received. Instructions, such as to report at certain points in the future may be acknowledged with the word "wilco".</p> <p>If ATC abbreviate your callsign you may reply in the same manner.</p>	 "Cleared to cross the zone, VFR, not above altitude 2000 ft, QNH 1024, wilco, G-ME."
Reporting as instructed will give ATC further confidence that you are a proficient pilot.	 "G-ME, entering the zone at Romsey."
Unless they have any further instructions, ATC will likely just acknowledge.	 "G-ME roger, report leaving the zone at Bishop's Waltham."
Instructions to report at a particular point in the future can be acknowledged with "wilco" – meaning you will comply.	 "Wilco, G-ME."

AIRSPACE

Transponder use

MODES AND CODES

Key info



In general, transponder-equipped aircraft in the UK should:

- > Squawk 7000 as a general conspicuity code;
- > Select mode 'C' at all times so that your altitude is displayed; and
- > If 'listening in' on a frequency, use a relevant frequency monitoring code ([see p.12](#)).

It may be tempting to switch off mode 'C' if you fear you have infringed controlled airspace, however this is dangerous, illegal and very poor airmanship.

If you infringe and turn off your transponder, the penalty for the infringement will be higher.

In addition to squawk codes you may be given by ATSU's, the following general codes apply:

- > **7700** – General emergency code. Should be selected as soon as practical if the aircraft is suffering an emergency.
- > **7600** – Radio failure.
- > **7500** – Unlawful interference.

More details on transponder procedures can be found at Section 2 of [ENR](#) 1.6 of the AIP.

MODE S REQUIREMENTS

Generally, all aircraft in the following circumstances must be equipped with Mode S 'Elementary Surveillance' capabilities:

- > Within class A or C airspace;
- > Above FL100; or
- > Within transponder mandatory zones (TMZ).

Aircraft without Mode S may enter a TMZ with the approval of the relevant ATSU. Additional Mode S requirements also apply for aircraft above 5700 kgs MTOM or flying under IFR.

There are some areas in which gliders may fly above FL100 without Mode S – details of these can be found in [ENR](#) 1.1 and 5.2 of the AIP.

Full details of Mode S carriage requirements can be found in [GEN](#) 1.5 of the AIP.



Key info



SERA .13001 states that It is a mandatory legal requirement to use a transponder if fitted.

AIRSPACE

Altimeter setting procedures

PRESSURE SETTINGS

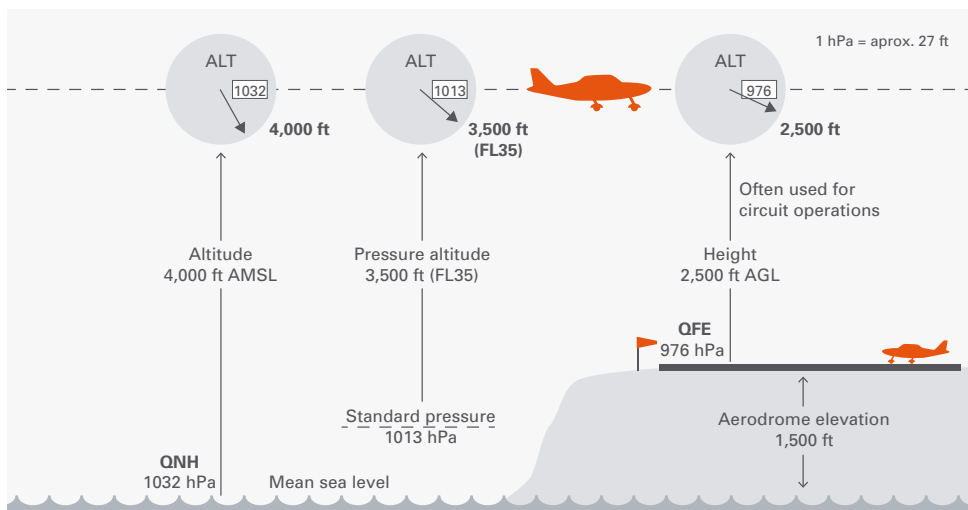
There are four types of altimeter settings used in the UK. They are all measured in hectopascals (hPa):

- > **QNH** – this will read altitude above mean sea level (AMSL). When on the ground at an aerodrome, it should indicate the known elevation above mean sea level.



- > **Regional pressure settings (RPS)** – this is the lowest forecast pressure in a particular altimeter setting region. The regions are given names such as 'Portland' or 'Cotswold'. Using the RPS will tend to indicate a lower altitude than you actually are, since unless you are at the specific point of lowest pressure, the actual pressure at your position is likely to be higher. Full details of the UK's altimeter setting regions can be found in [ENR 6](#) of the AIP.
- > **QFE** – this will read height above aerodrome level, so when on the ground at an aerodrome, the QFE is simply the pressure setting when the altimeter is at zero.
- > **Standard** – the 'standard' pressure setting is 1013 hPa. It is used above the transition altitude. When 1013 hPa is set above the transition altitude you should refer to your vertical position in terms of 'flight level' (FL). This also shows your 'pressure altitude'.

Altimeter settings example:



AIRSPACE

Altimeter setting procedures

TRANSITION ALTITUDE

The transition altitude is the altitude above which the vertical position of an aircraft is expressed in terms of flight level (FL) rather than altitude. It is not mandatory in the UK for VFR flights (it is for IFR) to change to FLs above the transition altitude, however it is in some states.

- > Outside controlled airspace, the transition altitude in the UK is generally 3000 ft.
- > Within and below areas of controlled airspace, it varies between 4000 ft and 6000 ft. The AIP contains details of transition altitudes for particular aerodromes.

Once at the transition altitude, to convert to FLs for the cruise, set 1013 hPa. You must then climb to at least the lowest available FL that is appropriate to your magnetic track ([see p.60](#)). You always climb to lowest available FL, never descend.

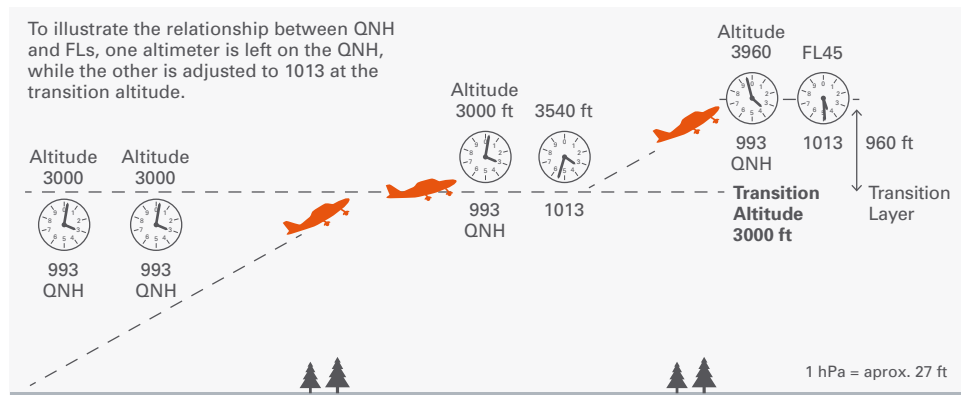
Under SERA, the lowest FL available to VFR traffic is normally FL35, although depending on the local QNH and transition altitude, this may be higher. The lowest available FL is known as the 'transition level'.

RECOMMENDED PROCEDURES

- > You should generally use the most current and relevant QNH to your flight. Only use the RPS if there is no other accurate QNH available.
- > When transiting immediately below or in the vicinity of controlled airspace boundaries that are expressed in terms of altitudes, you should use the QNH setting from the nearest relevant aerodrome.
- > When transiting immediately below or in the vicinity of controlled airspace expressed in terms of flight levels, you should use 1013 hPa.
- > Larger aerodromes generally use QNH for both take-off and landing.
- > GA aerodromes and the military often use QFE for landing.

Key info

Full details of UK altimeter setting procedures can be found in [ENR 1.7](#) of the UK AIP.



On this day the QNH is 993 hPa. When the aircraft reaches the transition altitude (3000 ft AMSL in this example) and 1013 hPa is set, the altimeter will read 3540 ft. Assuming the aircraft is traveling westbound, the lowest available VFR FL is 45.



AERODROME OPERATIONS

<i>Including:</i>	86 Aerodrome communications	>
	90 Arrival and departure procedures	>
	103 Visual communications and signage	>
	109 Marshalling signals	>

AERODROME OPERATIONS

Correct understanding and use of procedures is important for safe aerodrome operations. Most GA aerodromes are ‘uncontrolled’, meaning pilots must operate safely amongst other airspace users, without direction from air traffic control.

Aerodrome communications

RADIO COMMUNICATIONS

There are different levels of service provision for radio communications at aerodromes, ranging from SafetyCom, which relies on self-announcement and separation by pilots, to an aerodrome control service provided by an air traffic controller. It is important that pilots understand the different levels of provision and the associated procedures and responsibilities.

SafetyCom – callsign ‘Traffic’

SafetyCom is a common traffic advisory frequency for use at aerodromes that do not have an assigned frequency. It is currently **135.480 MHz** and may be used within 10 NM and/or up to 1000 ft above the traffic circuit at an aerodrome. Aircraft should announce their position and intentions at the normal points using the callsign “traffic” after stating the name of the aerodrome they are operating at. Additionally, repeating the name of the aerodrome at the end of the transmission further mitigates the risk of confusion when aerodromes are in close proximity to each other.

Air/Ground radio – callsign ‘Radio’

Air/Ground (A/G) radio is the most basic form of radio ground station you will encounter at an aerodrome. Depending on the individual station, the operator of an air/ground radio may provide traffic and weather information to pilots operating on and in the vicinity of the aerodrome. Such traffic information is based primarily on reports made by other pilots. While information provided by the radio operator may be used to assist a pilot in making a decision, the safe conduct of the flight remains the pilot’s responsibility.

The radio operator has no power to issue clearances or instruct aircraft either in the air or on the ground. In the A/G radio environment you should not request a “clearance” to do anything, nor should you expect to receive one.

The normal callsign is “Radio” after the station name. When operating in the A/G environment, the basic principle is that aircraft announce their position and separate themselves from other aircraft in accordance with the Rules of the Air and any published aerodrome procedures. Only carry out a manoeuvre (such as taxiing, take-off or landing) if you are satisfied it is safe to do so and will not conflict with other traffic.

Aerodrome communications

Aerodrome flight information service – callsign ‘Information’

The Aerodrome Flight Information Service (AFIS) is essentially a Flight Information Service provided at an aerodrome. It is a higher level of service than A/G radio; however it remains fundamentally a source of information rather than control. In the UK, AFIS do issue mandatory instructions to aircraft and vehicles on the ground, up until aircraft pass a runway holding point. AFIS units do not issue instructions to aircraft in the air, however they may request position reports that are consistent with the aerodrome’s published traffic procedures. Generally, they will pass more comprehensive information on traffic than an A/G station would.

The normal callsign is “Information” after the station name, for example “Duxford Information”. It is still your responsibility to be satisfied that every action is safe and to announce your position and intentions while operating at the aerodrome.

Aerodrome control service – callsign ‘Tower’

Some aerodromes have an Aerodrome Control Service within the ATZ, provided by an air traffic control tower. Within the ATZ, compliance with their instructions both on the ground and in the air is mandatory. The normal callsign is “Tower” after the station name, for example “Wycombe Tower”. When arriving at such an aerodrome you should call 5-10 minutes prior to the ATZ and request joining instructions – this will give the controller time to plan your arrival.

Larger aerodromes also often have a ground control frequency – callsign “Ground”.

Aerodrome approach control service – callsign ‘Approach’

Approach Control Service may be provided at an aerodrome either inside or outside controlled airspace. If the aerodrome has approach control, you should make contact at least 10 minutes prior to your intended arrival. If outside controlled airspace instructions are discretionary until you enter the ATZ, however you should follow them to ensure your arrival is as safe and efficient as possible.

While aerodrome approach control will endeavour to make you aware of any relevant traffic in the process of your arrival, if you are outside controlled airspace (especially if they do not have radar) there may be unknown traffic in the vicinity of the aerodrome that poses a collision risk.

As you get closer to the aerodrome the approach controller will normally pass you to the aerodrome control (callsign ‘Tower’) for landing.

The normal callsign is ‘Approach’ or ‘Radar’ (if a radar approach unit) after the station name. For example ‘Shoreham Approach’ or ‘Bournemouth Radar’.

If operating outside controlled airspace near an aerodrome with approach control, you are strongly recommended to contact them for a service, even if you are not planning to land there, and let them know you are remaining clear of their approach. This will assist the approach controller in keeping you clear of any arriving traffic.

Aerodrome communications

ATIS

Automatic Terminal Information Service (ATIS) is a continuous recorded information message usually found at larger aerodromes. It is updated regularly and gives aerodrome information such as:

- > Runway in use
- > Type of instrument approach to expect (if applicable)
- > Weather conditions
- > QNH
- > Any other pertinent information or hazards such as closed taxiways.

Each update will be allocated an alphabetic reference, such as 'Information Alpha'.

On initial contact with the aerodrome control tower the pilot must include the reference of the information copied.


Aerodrome communications

AERODROME LIGHT SIGNALS

The suite of light signals date from a time when aircraft would be controlled by light signals during normal operations. Today it would be very unusual for an aircraft to operate non-radio at a controlled aerodrome, unless a radio failure had occurred.

If you experience radio failure, look out for light signals that may be used to communicate between the ground (for example from the control tower) and aircraft.

Aerodrome to aircraft communication				
Light signal displayed		Meaning if in flight	Meaning if on the ground	
	Steady red	Give way to other aircraft and continue circling	Stop	
	Steady green	Clear to land	Clear for take-off	
	Red flashes	Do not land: aerodrome not available for landing	Move clear of landing area	
	Green flashes	Return for landing. Clearance to land will be given in due course	Clear to taxi	
	White flashes	Land at this aerodrome and proceed to apron, clearance to land will be given in due course	Return to starting point on the aerodrome	
	Red pyrotechnic	Notwithstanding any previous instructions, do not land for the time being	-	

Acknowledgment of light signals by aircraft			
Time of day	In flight	On ground	
Day time	Rocking aircraft's wings, except if on base or final approach	Moving the aircraft's ailerons or rudder	
Night time	Flashing on and off twice the landing lights or navigation lights	Flashing on and off twice the aircraft's landing lights or navigation lights	

AERODROME OPERATIONS

Arrival and departure procedures

OPERATING RULES

The following rules apply to operating at aerodromes. Those relating to landing and take-off, flight within the ATZ and movement on uncontrolled aerodromes are based on Rules 10, 11 and 12 respectively of the UK Rules of the Air 2015. The source regulations can be found by following the links [on p.52](#).

SERA

SERA sets down the following rules for operating near all aerodromes. They apply regardless of whether there is an ATZ in place. You must:

- > observe other traffic for the purpose of avoiding collision;
- > conform with or avoid the pattern of traffic formed by other aircraft (more commonly known as the 'circuit' in the UK);
- > except for balloons, make all turns to the left when approaching for a landing or taking off, unless otherwise indicated by the aerodrome; and
- > except for balloons, land and take off into the wind, unless safety or other operational considerations determine otherwise.

Landing and take-off

- > You may not land on a runway that is occupied by another aircraft, unless authorised by an air traffic control unit; and
- > In the case of a powered aircraft, after landing, you must move clear of the landing area as soon as possible.
- > If take-offs and landings are not confined to runways, you must:
 - > when landing, leave clear to your left any other aircraft that is in the process of landing, has already landed or is about to takeoff;
 - > make turns to the left, provided you do not interfere with other traffic; and

- > in the case of a powered aircraft, when taking up position for take-off, leave clear on your left any aircraft which has already taken off or is about to take off.

- > Rule 10 does not apply to balloons.

Rules for the ATZ

These rules only apply during the notified hours of watch of the radio ground station, however the same principles of obtaining information and transmitting position should be adhered to, regardless of whether there is an ATZ in force at the time.

During the notified hours of watch of the radio ground station, an aircraft must not operate within an ATZ unless:

- > If there is an aerodrome control service, permission has been given for the flight to be conducted safely; or
- > If there is an AFIS or A/G, appropriate information has been obtained to allow the flight to be conducted safely.
- > A continuous watch must be kept on the appropriate radio frequency or for visual signals.
- > If equipped with a radio, information on the aircraft's position and height must be transmitted upon entering or leaving the ATZ.

Movement on uncontrolled aerodromes

You must not taxi on the manoeuvring area of an uncontrolled aerodrome without the permission of either:

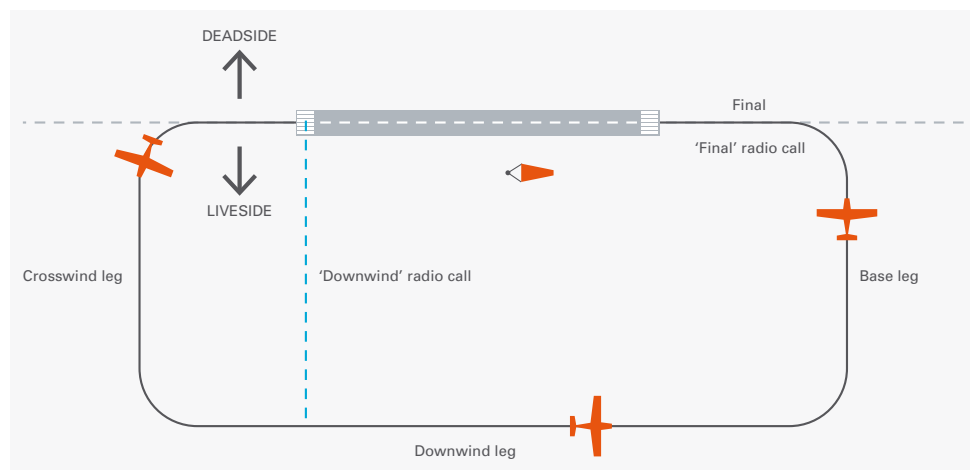
- > The person in charge of that aerodrome (generally this is obtained in accordance with the aerodrome's published operating procedures); or
- > The AFIS unit, if one is in operation.

AERODROME OPERATIONS

Arrival and departure procedures

THE CIRCUIT

The 'circuit' consists of the flight path pattern that aircraft make around the aerodrome when taking off or landing. This guidance focuses on the uncontrolled aerodrome environment.



General circuit guidance

The following principles are most relevant when operating in the circuit at uncontrolled aerodromes:

- > As a general rule, joining traffic must always give way to traffic already established in the circuit.
- > Keep a good look out, knowing the conflict areas for the particular join you are conducting. Be flexible in responding to changes in the traffic situation.
- > Conform to the standard pattern, which will be aided by understanding the visual picture of how the runway should look relative to the structure of your aircraft.
- > Announce your position at the standard points and whenever you feel it will enhance the situational awareness of others.
- > Even if you do not believe there to be any other traffic around, continue to announce your position and intentions as 'blind calls' – you never know when another aircraft might appear.
- > If you believe the circuit is clear but are not sure, there is no harm in asking over the radio whether there is any other traffic – it is not unknown for pilots to stop making position calls if they believe there is no one else around to hear them.
- > If, despite your best efforts in planning and briefing, you are in doubt about the local procedures when approaching an aerodrome, do not be afraid to ask over the radio.

AERODROME OPERATIONS > THE CIRCUIT

Arrival and departure procedures

Maintaining separation

- > Control your speed – slowing down is often necessary to integrate with other traffic, deploy flaps and landing gear early if necessary. On the other hand, if flying a particularly slow aircraft you may need to keep your speed up so as to avoid faster aircraft bunching behind you.
- > Manoeuvre to keep a safe distance from others. A combination of adjusting the width of your circuit, rates of turn and relative speed can normally achieve this
- > Avoid getting close to other aircraft and having to take sudden avoidance manoeuvres that might disrupt the traffic flow. Do not orbit for spacing.
- > If you simply cannot maintain adequate separation from others, break off from the circuit and rejoin from the dead side.
- > If forced to go around on final due to traffic ahead or on the runway, make the decision in good time. Cross to the dead side as you climb away and rejoin the circuit on the cross wind leg or as appropriate.
- > It is important that you maintain a stable approach, including:
 - > Rate of Descent
 - > Speed
 - > Direction

PROCEDURES FOR DEPARTING TRAFFIC

Key info



At an aerodrome with a ground radio station you should call for airfield information prior to taxiing to the runway. At its most basic this will be the:

- > Runway in use;
- > Circuit direction; and
- > QNH or QFE.

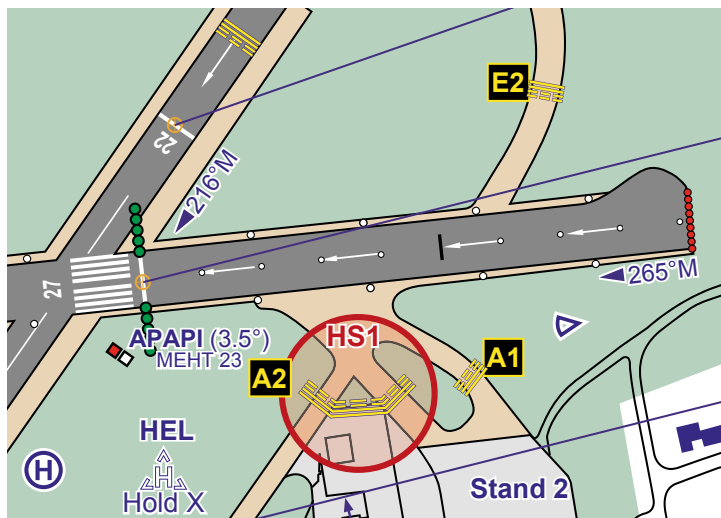
At larger aerodromes, there may be an ATIS frequency, on which information for operating at the aerodrome will be included. The letter reference of the ATIS information should be given on first contact with ATC.

- > At aerodromes with an A/G only, it is entirely the pilot's responsibility to determine whether they can taxi safely on the aerodrome. Having reviewed the aerodrome chart you should announce your intentions to taxi, giving details of the route and holding points as necessary.
- > Although you will not request a taxi clearance at an uncontrolled aerodrome, you must have the permission of the person in charge of the aerodrome to taxi. This is normally implicit if operating within the terms and conditions of the aerodrome detailed in their AIP entry.
- > At an aerodrome with a FISO unit you must request taxi instructions before taxiing. FISO only give instructions to aircraft on the ground and the pilot must still ensure it is safe to comply with them.
- > At a controlled aerodrome you must request taxi instructions before taxiing. Larger controlled aerodromes may have a dedicated ground frequency – for example 'Bournemouth Ground'. Otherwise the initial call should be made to the tower.
- > At larger aerodromes the taxiways are often confusing, so taxi slowly, carry an up to date chart and do not be afraid to stop and ask for clarification if necessary.

AERODROME OPERATIONS > PROCEDURES FOR DEPARTING TRAFFIC

Arrival and departure procedures

- > Some more advanced GPS systems or tablet computer-based applications include georeferenced aerodrome charts – these can be very helpful for situational awareness.
- > Once at the runway holding point, complete all necessary power and/or pre-take off checks before reporting “ready for departure”. At a FISO aerodrome this is the point at which the service reverts to information only – it is the pilot’s responsibility to ensure it is safe to enter the runway and take off.
- > Particularly in a high wing aircraft, manoeuvre so that you have a good view of the approach path, particularly if the circuit is behind you. This may require you to angle the aircraft at the holding point in the direction from which the traffic is coming.
- > At an aerodrome with a control service, you must not enter the runway without a clearance. This will either be take-off clearance or an instruction to ‘line up and wait’, with the expectation of the take-off clearance coming later.
- > On departure, you must report leaving the ATZ.



Holding points that are particularly vulnerable to runway incursion are marked on aerodrome charts as ‘hot spots’ and circled in red. The layout of taxiways at these points may be confusing and therefore pilots may be more prone to unintentionally entering the runway environment without clearance.

Arrival and departure procedures

Sample exchange at a aerodrome with an A/G radio station involving a Piper PA28 carrying out some circuits of the aerodrome.

The following gives an outline of a typical radio exchange at an aerodrome with an A/G unit. For more details of radiotelephony (RT) procedures please see CAP 413 – www.caa.co.uk/cap413, which is the authoritative guide to RT procedures in the UK.

Explanation	Exchange
On first call use both your full callsign and that of the station you are talking to. If there is more than one apron, giving your position will help the radio operator identify where you are.	 "Thruxton radio, G-DOME, PA28 on the main apron, request taxi information for circuits."
The radio operator should then give you the relevant aerodrome information.	 "G-DOME, Thruxton radio, runway in use 07, left hand circuit, QNH 1024."
Information such as runway in use, circuit direction and QNH requires read-back.	 "Runway in use 07, left hand circuit, QNH 1024, G-DOME."
Once having received the appropriate information and determined that it is safe to carry out the intended action, you must always announce what you are doing before doing it.	 "G-DOME, taxiing holding point Whiskey for runway 07."
The radio operator will likely just acknowledge this. If there is any conflicting traffic they may draw your attention to it. However, this should not be expected – they may not even be in a position to observe the aerodrome when operating the radio.	 "G-ME roger."
Once you have completed all pre-take off checks and are ready to depart, announce this on the radio. Note that it is NOT correct to report "ready for take-off" since you are not yet announcing your actual intention to do so.	 "G-ME, holding point Whiskey, ready for departure."

Arrival and departure procedures


Sample exchange at a typical aerodrome with a A/G radio station involving a PA28 carrying out some circuits of the aerodrome.	
Explanation	Exchange
If the radio operator knows of traffic that may affect your flight then they may pass it to you. However, it is still your responsibility to check that the runway and final approach are clear before entering the runway.	<div><div>"G-ME roger. Traffic believed to be a PA28 on 2 mile final, wind 090°/14 kts."</div></div>
The decision to take off (or not) is purely the pilot's, taking into account any traffic that may be a factor. Priority should be given to those aircraft in the air and already established on final approach.	<div><div>"Roger, taking off, G-ME."</div></div>
Once established in the circuit, make standard position calls. If conducting 'touch and goes' say so after reporting 'downwind' and 'final' to remind other traffic of what you are doing. Once finished it is a good idea to suffix the calls with 'to land' so that other aircraft know that you will be making a full stop landing.	<div><div>" G-ME downwind 07, touch and go (or to land)."</div></div>
	<div><div>"G-ME roger."</div></div>
	<div><div>"G-ME final, touch and go (or to land)."</div></div>
	<div><div>"G-ME roger."</div></div>
Once on the ground, report when you have vacated the runway and continue to announce your taxi intentions.	<div><div>"G-ME, runway vacated at Whiskey, taxiing to the main apron."</div></div>
-	<div><div>"G-ME roger."</div></div>

AERODROME OPERATIONS > PROCEDURES FOR DEPARTING TRAFFIC

Arrival and departure procedures

Exchange covering the start, taxi and departure from an aerodrome with a AFIS.

The following gives an outline of a typical radio exchange at an aerodrome with an AFIS unit. For more details of radiotelephony (RT) procedures please see CAP 413 – www.caa.co.uk/cap413, which is the authoritative guide to RT procedures in the UK.

Explanation	Exchange
On first call use both your full callsign and that of the station you are talking to.	 <p>"Duxford Information, G-DOME, PA28 on the eastern apron, request taxi for VFR flight to Old Sarum."</p>
This will trigger the FISO to give you the QNH, runway in use and taxi instructions.	 <p>"G-DOME, Duxford Information, taxi holding point Echo for runway 24L. Left hand circuit, QNH 1024."</p>
This all requires read-back. Provided you execute the taxi instruction in a timely manner, there is no need to announce that you are carrying it out in addition to reading back the original instruction. If you are delayed from moving for any reason, advise the FISO of this such that they can replan any other movements accordingly.	 <p>"Taxi holding point Echo for runway 24L. Left hand circuit, QNH 1024. G-DOME."</p>
Once at the hold and any necessary checks complete, report "ready for departure". Note that it is NOT correct to report "ready for take-off" since you are not yet announcing your intention to do so.	 <p>"G-DOME, holding at Echo, ready for departure."</p>
The phrase "take-off at your discretion" signals the point at which the FISO is no longer giving you instructions. You are now solely responsible for determining whether it is safe to take off.	 <p>"G-ME roger, no reported traffic, surface wind 260°/14 kts, take-off at your discretion."</p>
You should carefully check that the approach and runway are clear before entering.	

Arrival and departure procedures

Exchange covering the start, taxi and departure from an aerodrome with a AFIS.	
Explanation	Exchange
Once you have determined it is safe to do so, simply announce that you are taking off. The term ‘take-off’ should ONLY ever be used to announce that you are about to take-off (in an A/G or AFISO environment) or reading back of a take-off clearance from an aerodrome controller.	 “Taking-off runway 24L, G-ME.”
Once airborne and transitioning to enroute flight, you should report leaving the frequency/ ATZ at the appropriate time. It is a good idea to let the current station know which frequency you are intending to change to.	 “G-ME, now leaving the ATZ to the south west, changing to Luton Approach 129.55.”

AERODROME OPERATIONS

Arrival and departure procedures

PROCEDURES FOR ARRIVING TRAFFIC

If there are any specific procedures for the aerodrome noted during your planning they should be followed. For example, some aerodromes will nominate a Visual Reference Point (VRP) that they request traffic passes and/or reports abeam when arriving.



In general, contact should be made around 10 minutes prior to the intended arrival. Unless the aerodrome has an ATIS which you have already copied, expect to be passed at least the following information:

- > Runway in use;
- > Circuit direction; and
- > QNH or QFE.

At controlled aerodromes you will likely be instructed to join in a particular manner, such as 'join overhead' or 'join downwind'.

At uncontrolled aerodromes you will have decide for yourself which join is most appropriate, given the circumstances. Once you have done so, announce your intentions as you approach the ATZ.

If the aerodrome has an ATIS, give the letter of the ATIS information you have copied and read back the QNH from this to the controller on first contact.

Guidance ?

When you plan your arrival ensure you have:

- > Identified the runway in use;
- > Determined the circuit direction and how you will join;
- > Confirmed the circuit height;
- > Confirm you have correct QNH/QFE set; and
- > Switched on landing lights, even during daylight.

If operating outside the normal hours of the radio communication service at the aerodrome, announce your position and intentions so that any other aircraft on frequency can hear what you are doing. You must always do this, even if you are fairly certain the airfield is otherwise deserted. In the absence of an assigned frequency at the aerodrome, use Safetycom.

AERODROME OPERATIONS > PROCEDURES FOR ARRIVING TRAFFIC

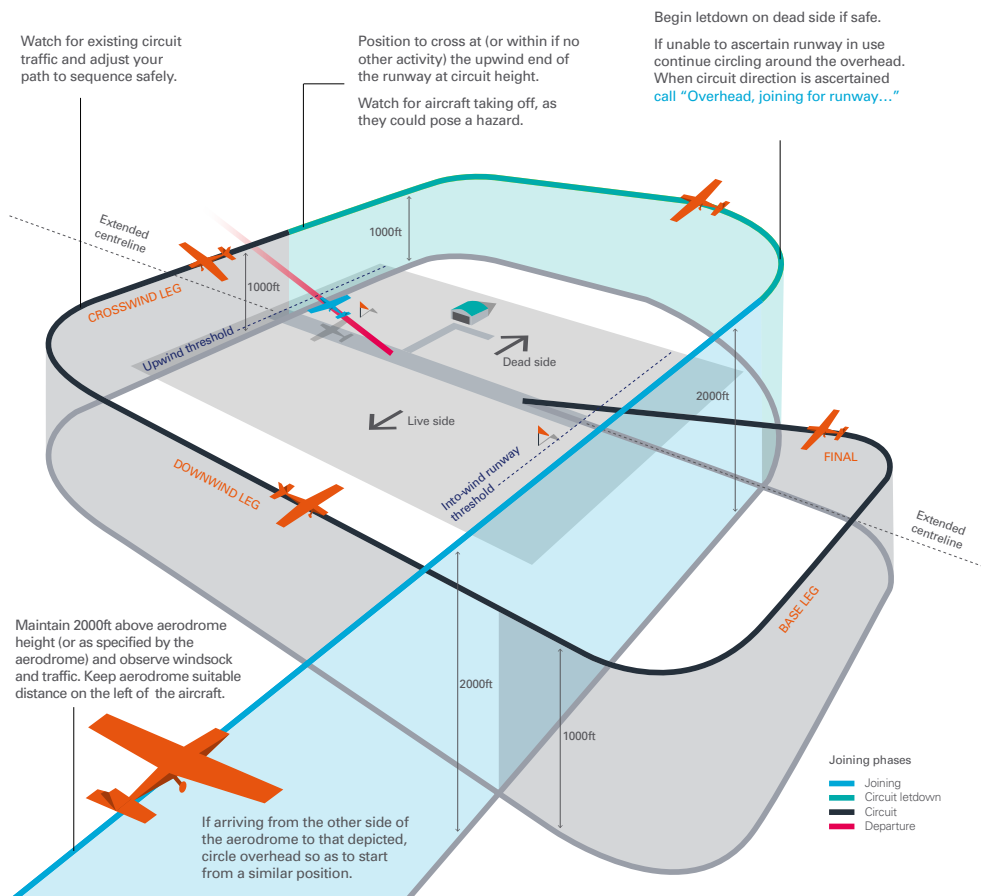
Arrival and departure procedures

Joining procedures

Guidance ?

The most common and recommended type of join is the 'overhead', the advantage of which is that it allows you to observe the traffic circuit below without being in conflict with it. When turning downwind, watch for any traffic already on the downwind leg.

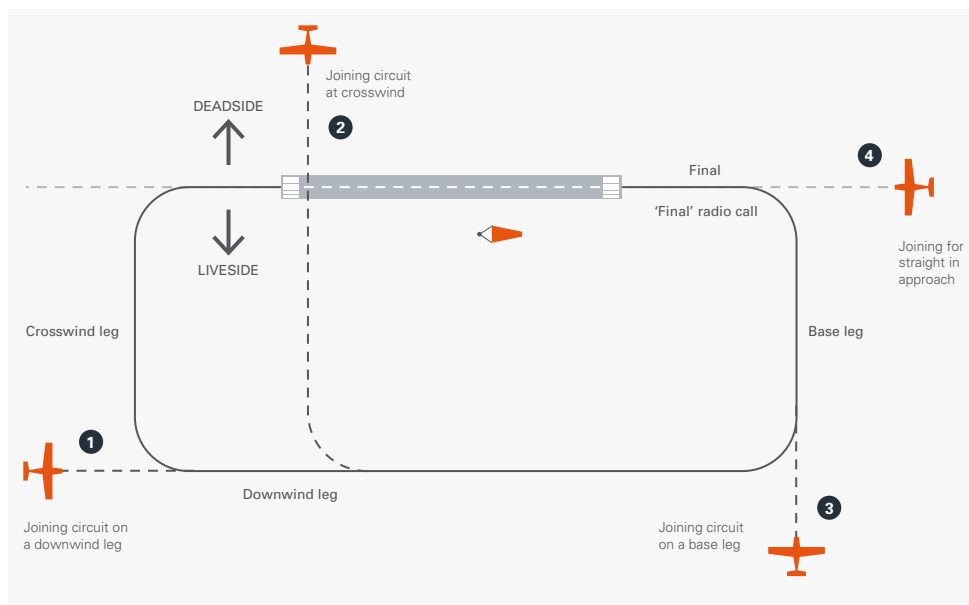
Overhead joins are sometimes precluded or varied by airspace or traffic constraints. You must check the local procedures for the aerodrome you are visiting.



AERODROME OPERATIONS > PROCEDURES FOR ARRIVING TRAFFIC

Arrival and departure procedures

As well as the overhead join there are other options for joining the circuit if traffic conditions allow. Aerodromes will sometimes publish different ones. Always check local procedures.



- 1 Downwind join** involves directly joining the circuit parallel to the runway in the downwind direction. It is important to observe the direction of the crosswind leg, since that is where potentially conflicting circuit traffic will come from. If in doubt about cutting in front of another aircraft, slow down and/or manoeuvre to fit in behind.

There may also be aircraft already on the downwind leg that are directly ahead of you and therefore difficult to see. The danger is that you join closer in to the runway and then turn base inside them or that you simply start to catch up without realising they are there.

- 2 Crosswind (midfield) join** involves joining at circuit height from the dead side, at 90° to the runway, then turning downwind to join the circuit direction. It is essentially the 'second half' of an overhead join but lacks the opportunity to observe the traffic pattern from above. Watch out for traffic already established on the downwind leg and fast climbing traffic from below.

- 3 Base leg join** involves joining directly to the base leg of the circuit. Watch the downwind leg carefully and ensure that you have not joined on the inside of any traffic that is already on the base leg.

- 4 Straight in approaches** are not recommended because they do not give much opportunity to observe potentially conflicting circuit traffic.

Arrival and departure procedures

Sample exchange for arriving aircraft at an aerodrome with an AFIS

The following gives an outline of a typical radio exchange at an aerodrome with an AFIS unit. For more details of radiotelephony (RT) procedures please see CAP 413 – www.caa.co.uk/cap413, which is the authoritative guide to RT procedures in the UK.

Explanation	Exchange
As per contacting an enroute ATSU, including the request in the initial call will help the FISO respond appropriately.	 "Duxford Information, G-DOME, 10 NM south of Duxford, request join."
They will likely respond the relevant aerodrome information to allow you to plan your arrival.	 "G-DOME, Duxford Information, runway 24L in use, left hand circuit, QFE 1019."
This all requires read-back.	 "Runway 24L, left hand circuit, QFE 1019, G-DOME."
<p>The request to report downwind is not a formal instruction as you would receive from an air traffic controller. It is merely a reporting request that is consistent with local procedures.</p> <p>They may give you traffic information in the circuit. If not, you may ask for this, although it should be treated as advisory only.</p>	 "G-ME, report joining downwind."
<p>While you should conform with such requests if possible, it is your decision as PIC whether or not you do. Either way, you should announce what you are doing.</p> <p>Assuming the reporting request is acceptable; this can be responded to with 'wilco' – meaning you will comply.</p>	 "Wilco, G-ME."
-	 "G-ME joining downwind."
-	 "G-ME roger, currently one on final. Report final runway 24L."

Arrival and departure procedures

Sample exchange for arrival aircraft	
Explanation	Exchange
-	 "Wilco, G-ME."
	 "G-ME final 24L."
The term "land at your discretion" is used by AFISOs to aircraft on final. It emphasises that it is the aircraft's decision as to whether to land or not. It is not a landing clearance as you would receive from an aerodrome controller. You should ensure the runway is indeed clear before landing.	 "G-ME roger, land at your discretion, wind 280°/9 kts."
-	 "Roger, G-ME."
Once on the ground, AFISOs in the UK issue taxiing instructions.	 "G-ME taxi to the end of the runway, vacate at Delta and then to the western apron."
You should ensure they are safe to carry out. If you are unsure of the assigned route, stop and ask for clarification, although do not stop on the runway.	 "Vacate at Delta and taxi to the western apron, G-ME."
Depending on how familiar you are with an aerodrome you may need clarification about where to park. While not a pressing matter of flight safety, you should ensure you are not stealing someone's parking space.	 "G-ME request parking."
-	 "G-ME park between the brown PA28 and the yellow Super Cub."
-	 "Roger between the PA28 and the Cub, G-ME."

AERODROME OPERATIONS

Visual communications and signage

Aerodromes are places of many visual signals, both directed at aircraft in the air and signs to aircraft on the ground.

RUNWAY MARKINGS

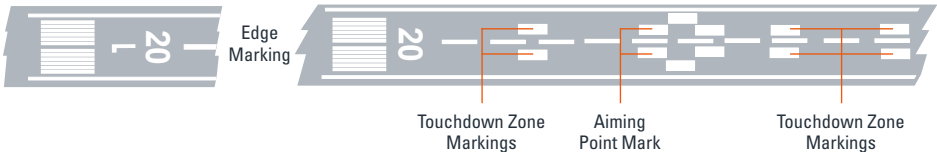
Visual Runways
– LDA < 1200 m



Non Precision Approach Runways, Visual Runways of LDA
>1200 m and where Threshold requires emphasis



Precision Approach Runways



Permanently Displaced Threshold Pre-Threshold Markings



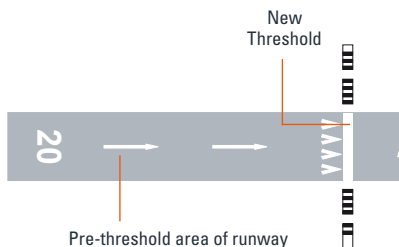
AERODROME OPERATIONS > RUNWAY MARKINGS

Visual communications and signage

Temporarily Displaced Threshold and Pre-Threshold Markings



Pre-threshold area of runway unfit for the movement of aircraft and unsuitable as stopway



Pre-threshold area of runway fit for movement of aircraft and available as starter extension for take-off but not available for landing

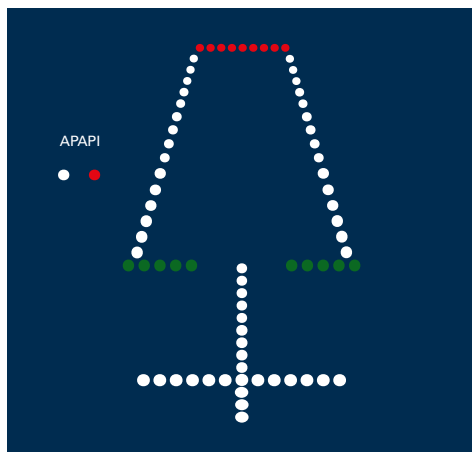
LIGHTING

Runway lighting

If they have lighting at all, most GA aerodromes will have a simple runway lighting layout that marks the:

- > Threshold with green;
- > Edge with white; and
- > End with red.

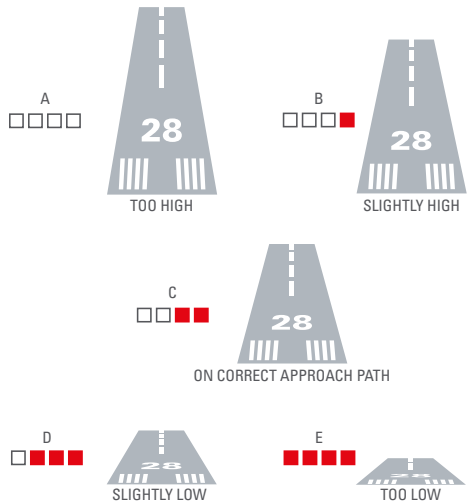
There may also be a simple approach lighting system that begins a few hundred metres from the threshold and aids acquisition of the runway in poorer visibility.



Visual communications and signage

Precision Approach Path Indicators (PAPIs)

These are lights which indicate whether you are on the correct approach angle to the runway. They are normally set at between 3° and 4°. Most GA aerodromes will have a two light system, which shows one red and one white when on the correct slope. Larger aerodromes typically have a four light system.



TAXIWAY SIGNS AND MARKINGS

Location and destination signs

These signs allow specific locations or directions to be identified. Taxiways are normally identified by a letter, for example 'Alpha' or 'Bravo'. Specific locations such as holding points are then indicated with a letter and number combination.



Visual communications and signage

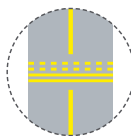
Mandatory signs and holding points

Mandatory instruction signs consist of white letters on a red background. Common examples include runway entry points. Entry points at either end of a runway will refer to the end of the runway (for example 27) at which the entry is located. At intermediate points of entry both runway directions are indicated.

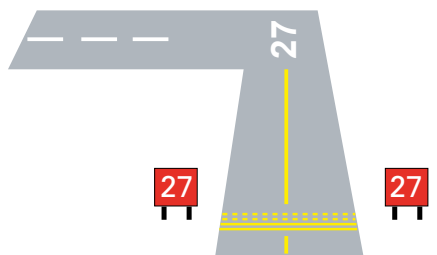
You must not pass these without permission from ATC (in the case of a controlled aerodrome) or at an uncontrolled aerodrome without having checked the runway and final approach is clear and announced your intentions to enter the runway.

Accompanying the sign will also be ground markings which indicate the holding point. These will be two solid yellow lines followed by two dashed lines on the runway side of the markings.

Larger aerodromes may also have 'guard lights' – normally these are placed in pairs either side of a runway holding point and alternately flash yellow.



Runway Taxi-Holding Position marking pattern 'A' identifying the last holding position prior to entering runway

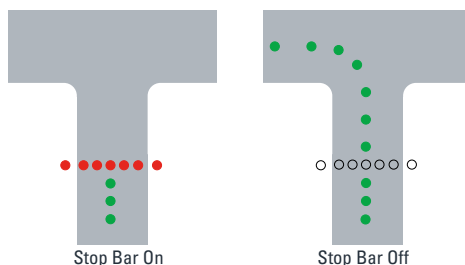


AERODROME OPERATIONS > TAXIWAY SIGNS AND MARKINGS

Visual communications and signage

Stop bars

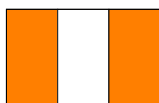
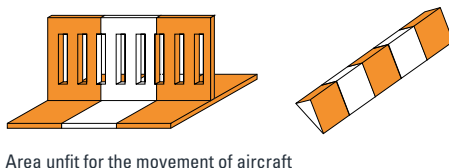
At larger controlled aerodromes you may encounter 'stop bars'. These are red lights that are positioned across the taxiway, normally prior to entering a runway. When illuminated red, you must not cross them. ATC will switch them off after giving a clearance to cross or enter the associated holding point. The red bar should then be replaced with a green centreline marking that leads past it.



ATC should not normally ask you to cross an illuminated red bar. If ATC do not switch it off after clearing you to cross, or appear to have given you an instruction that requires you to cross an illuminated red bar, you must seek clarification.

Boundary markers

Orange and white markers are also sometimes used to mark the boundary of areas unfit for the movement of aircraft and/or the boundary of the aerodrome itself.



Aerodrome boundary

AERODROME GROUND SIGNALS

Less relevant perhaps today than they once were, ground to air visual symbols date from the time of many aircraft not having radios. Ground signals therefore had to be read from the air to ascertain things like the direction of the landing runway.

The 'signal square' is still found at many GA aerodromes. It will normally be visible on the ground close to the control tower. If you are flying non-radio, look out for this when commencing an overhead join. Some signals may also be found on other parts of the aerodrome, such as near to the runway or on the control tower.

AERODROME OPERATIONS > AERODROME GROUND SIGNALS

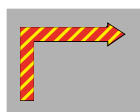
Visual communications and signage



A horizontal white or orange landing T in the signal square indicates the direction to be used by aircraft for landing and taking off, which shall be in a direction parallel to the shaft of the T towards the cross arm.



The landing direction/runway in use may also be displayed in a prominent place on the control tower using black digits on a yellow background.



A right hand arrow of conspicuous colour in the signal square indicates that turns are to be made to the right before landing and after take-off. This means adopt a right hand circuit pattern. In the absence of a signal or other information to the contrary, a left hand circuit pattern is the norm.



A red square with one yellow diagonal displayed in the signal square indicates that special precautions must be observed in approaching to land or in landing, for example due to the poor state of the manoeuvring area.



A red square with two yellow diagonal displayed in the signal square indicates that landings are prohibited.



A horizontal white dumb-bell displayed in the signal square indicates that aircraft are required to land, take-off and taxi on runways and taxiways only.



A horizontal white dumb-bell with black stripes indicates that while take-offs and landings are confined to runways only, other manoeuvres need not be confined to runways or taxiways.



A double white cross displayed in the signal square indicates that gliding operations are taking place at the aerodrome.



A cross on the surface of a runway (white) or taxiway (yellow) indicates an area unfit for the movement of aircraft.



A letter C displayed vertically in black against a yellow background indicates the location of the air traffic services reporting office. In the case of smaller GA aerodromes, this is also where the landing fees are usually paid.

AERODROME OPERATIONS

Arrival and departure procedures

MARSHALLING SIGNALS

When visiting large aerodromes you may well find yourself being marshalled. The following cover most of the ones likely to be used during operations with light aircraft. Full details of all signals can be found in Appendix 1 of SERA.

Meaning of Marshalling Signals



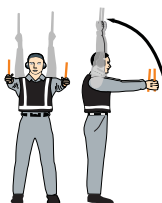
Description: Raise right hand above head level with wand pointing up; move left-hand wand pointing down toward body.

Meaning: Wingwalker/guide - This signal provides an indication by a person positioned at the aircraft wing tip, to the pilot/marshaller/ push-back operator, that the aircraft movement on/off a parking position would be unobstructed.



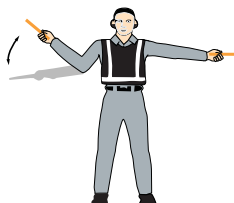
Description: With right arm and wand extended at a 90-degree angle to body, make "come ahead" signal with left hand. The rate of signal motion indicates to pilot the rate of aircraft turn.

Meaning: Turn left (from pilot's point of view).



Description: Raise fully extended arms straight above head with wands pointing up.

Meaning: Identify gate.



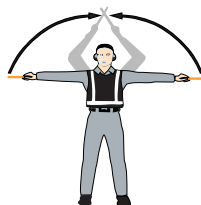
Description: With left arm and wand extended at a 90-degree angle to body, make "come ahead" signal with right hand. The rate of signal motion indicates to pilot the rate of aircraft turn.

Meaning: Turn right (from pilot's point of view).



Description: Point both arms upward, move and extend arms outward to sides of body and point with wands to direction of next signalman or taxi area.

Meaning: Proceed to next signalman or as directed by tower/ground control.



Description: Fully extend arms and wands at a 90-degree angle to sides and slowly move to above head until wands cross.

Meaning: Normal stop.



Description: Bend extended arms at elbows and move wands up and down from chest height to head.

Meaning: Straight ahead.



Description: Abruptly extend arms and wands to top of head, crossing wands.

Meaning: Emergency stop.

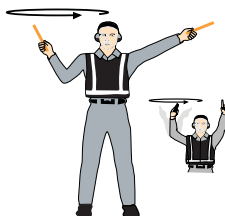
AERODROME OPERATIONS > MARSHALLING SIGNALS

Arrival and departure procedures



Description: Raise hand just above shoulder height with open palm. Ensuring eye contact with flight crew, close hand into a fist. Do Not move until receipt of “thumbs up” acknowledgement from flight crew.

Meaning: Set brakes.



Description: Raise right arm to head level with wand pointing up and start a circular motion with hand; at the same time, with left arm raised above head level, point to engine to be started.

Meaning: Start engine(s).



Description: Raise hand just above shoulder height with hand closed in a fist. Ensuring eye contact with flight crew, open palm. Do not move until receipt of “thumbs up” acknowledgement from crew.

Meaning: Release brakes.



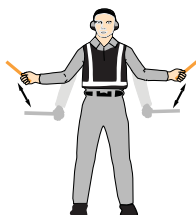
Description: Extend arm with wand forward of body at shoulder level; move hand and wand to top of left shoulder and draw wand to top of right shoulder in a slicing motion across throat.

Meaning: Cut engine(s).



Description: With arms and wands fully extending above head, move wands inwards in a “jabbing” motion until wands touch. Ensure acknowledgement is received from flight crew.

Meaning: Chocks inserted.



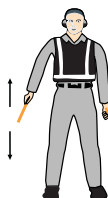
Description: Move extended arms downwards in a “patting” gesture, moving wands up and down from waist to knees.

Meaning: Slow down.



Description: With arms and wands fully extended above head, move wands outward in “jabbing” motion. Do not remove chocks until authorised by crew.

Meaning: Chocks removed.



Description: With arms down and wands toward ground, wave either right or left wand up and down indicating engine(s) on left or right side respectively should be slowed down.

Meaning: Slow down engine(s) on indicated side.

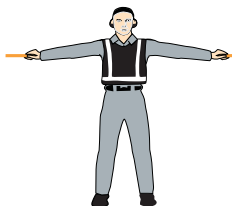
AERODROME OPERATIONS > MARSHALLING SIGNALS

Arrival and departure procedures



Description: With arms in front of body at waist height, rotate arms in a forward motion. To stop rearward movement, use signal 6(a) or 6(b).

Meaning: Move Back.



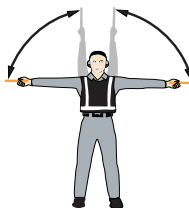
Description: Fully extend arms and wands at a 90-degree angle to sides.

Meaning: Hover.



Description: Point left arm with wand down and bring right arm from overhead vertical position to horizontal forward position, repeating right-arm movement.

Meaning: Turns while backing (for tail to starboard).



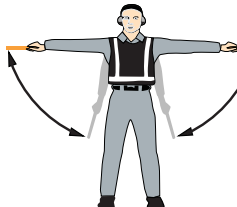
Description: Fully extend arms and wands at a 90-degree angle to sides and, with palms turned up, move hands upwards. Speed of movement indicates rate of ascent.

Meaning: Move upwards.



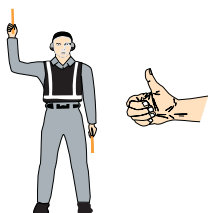
Description: Point right arm with wand down and bring left arm from overhead vertical position to horizontal position, repeating left-arm movement.

Meaning: Turns while backing (for tail to port).



Description: Fully extend arms and wands at a 90-degree angle to sides and, with palms turned down, move hands downwards. Speed of movement indicates rate of descent.

Meaning: Move downwards.



Description: Raise right arm to head level with wand pointing up or display hand with "thumbs up"; left arm remains at side by knee.

Meaning: Affirmative/all clear—This signal is also used as a technical/servicing communication signal.



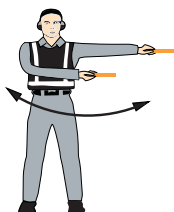
Description: Extend arm horizontally at a 90-degree angle to right side of body. Move other arm in same direction in a sweeping motion.

Meaning: Move horizontally left (from pilot's point of view).



AERODROME OPERATIONS > MARSHALLING SIGNALS

Arrival and departure procedures



Description: Extend arm horizontally at a 90-degree angle to left side of body. Move other arm in same direction in a sweeping motion.

Meaning: Move horizontally right (from pilot's point of view).



Description: Perform a standard salute with right hand and/or wand to dispatch the aircraft. Maintain eye contact with flight crew until aircraft has begun to taxi.

Meaning: Dispatch aircraft.



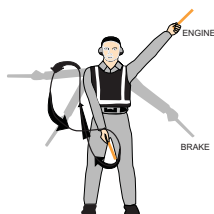
Description: Cross arms with wands downwards and in front of body.

Meaning: Land.



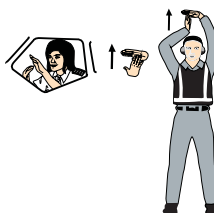
Description: Extend right arm fully above head and close fist or hold wand in horizontal position; left arm remains at side by knee.

Meaning: Do not touch controls (technical/servicing communication signal).



Description: Move right-hand wand in a "fanning" motion from shoulder to knee, while at the same time pointing with left-hand wand to area of fire.

Meaning: Fire.



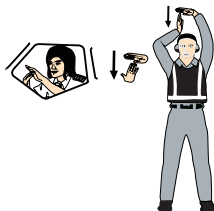
Description: Hold arms fully extended above head, open left hand horizontally and move finger tips of right hand into a touch open palm of left hand (forming a "T"). At night, illuminated wands can also be used to form the "T" above head.

Meaning: Connect ground power (technical/servicing communication signal).



Description: Fully extend arms and wands downwards at a 45-degree angle to sides. Hold position until aircraft is clear for next manoeuvre.

Meaning: Hold position/stand by.

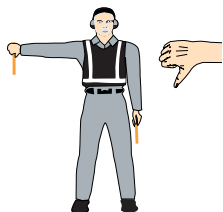


Description: Hold arms fully extended above head with finger tips of right hand touching open horizontal palm of left hand (forming a "T"); then move right hand away from the left. Do not disconnect power until authorised by flight crew. At night illuminated wands can also be used to form the "T" above head.

Meaning: Disconnect power (technical/servicing communication signal).

AERODROME OPERATIONS > MARSHALLING SIGNALS

Arrival and departure procedures



Description: Hold right arm straight out at 90 degrees from shoulder and point wand down to ground or display hand with "thumbs down"; left hand remains at side by knee.

Meaning: Negative (technical/servicing communication signal).



Description: With right arm at side and left arm raised above head at 45 degree angle, move right arm in a sweeping motion towards top left shoulder.

Meaning: Open/close stairs (technical/servicing communication signal). This signal is intended mainly for aircraft with the set of integral stairs at the front.



Description: Extend both arms at 90 degrees from body and move hands to cup both ears.

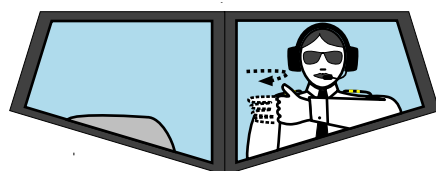
Meaning: Establish communication via interphone (technical/ servicing communication signal).

Meaning of Signals made by Pilot to Marshaller



Description: Raise arm and hand with fingers extended horizontally in front of face, then clench fist.

Meaning: Brakes engaged.



Description: Raise arm with fist clenched horizontally in front of face, then extend fingers.

Meaning: Brakes released.

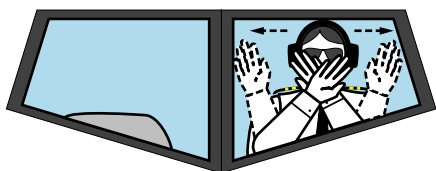
AERODROME OPERATIONS > MARSHALLING SIGNALS

Arrival and departure procedures



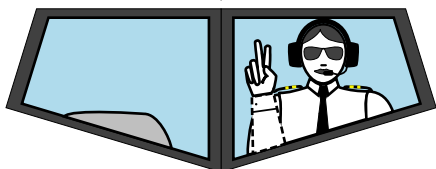
Description: Arms extended palms facing outwards, move hands inwards to cross in front of face.

Meaning: Insert chocks.



Description: Hands crossed in front of face, palms facing outwards, move arms outwards.

Meaning: Remove chocks.



Description: Raise the number of fingers on one hand indicating the number of the engine to be started. For this purpose the aircraft engines shall be numbered as follows, No. 1 engine shall be the port outer engine, No. 2, the port inner engine, No. 3, the starboard inner engine and No. 4, the starboard outer engine.

Meaning: Ready to start engine indicated.



GA RISKS

<i>Including:</i>	116 Pilot fitness	>
	118 Pilot competence	>
	120 Decision making	>
	123 Staying in control	>
	124 Avoiding the ground	>
	125 Avoiding collisions	>

GA RISKS

The following chapter is not a comprehensive guide to risk mitigation in GA; it simply highlights some common risks that pilots should be aware of and how to think about mitigating them.

Key info



Some of the top causes of fatal GA accidents include:

- > Loss of control;
- > Controlled flight into terrain; and
- > Mid air collision.

Behind many GA accidents also appear the themes of pilot:

- > Fitness;
- > Competence; and
- > Attitudes and Decision making.

Pilot fitness

A large number of aviation accidents identify pilot fatigue or medical factors as contributory. Pilots often get away with flying in a less than optimal physical and mental condition, but it can have a critical impact in the event of an emergency or a more insidious issue that an alert pilot would stand more chance of surviving.

Guidance



'IM SAFE' is a common mnemonic for self-assessing fitness before flight:

- > **Illness** – are you suffering from any?
- > **Medication** – are you taking any?
- > **Stress** – are you suffering from any?
- > **Alcohol** – when did you last drink?
- > **Fatigue** – are you well rested?
- > **Eating** – have you eaten recently?

GA RISKS

Pilot fitness

PRACTICAL CONSIDERATIONS

Before Flight

- > Even common ailments such as colds or medication for common issues such as hayfever can have an effect on your fitness to fly – check with an AME if you are unsure. They may be able to give you advice on which medications are considered safe for flying.
- > While flying is often a good way to get away from the stress of modern day life, this is best done on a calm summer's day with plenty of time to enjoy yourself – not on a flight that might itself create stress, such as a long cross country in marginal weather with passengers.
- > If you are fatigued due to work or other issues, give yourself plenty of time to rest before flying – an early start after a late night working should be avoided. Also be aware of the cumulative effect of fatigue – a long period of poor sleep will not be overcome in a single night.
- > Sometimes the excitement of a challenging flight can make it difficult to sleep the night before, especially if you are uncertain of the weather. Taking as many decisions as possible the night before about the destination and weather may help you sleep better.
- > It is important to eat well before flying. This will keep up your blood sugar level up and help you concentrate.
- > You should not fly within at least 8 hours of consuming any alcohol and must not fly with more than 20 milligrams per 100 ml of blood. The legal alcohol limit in the UK for aviation is a quarter of that for driving in England and Wales.

While Flying

- > During a long day's flying it is often easy to neglect lunch – remember to take something with you to eat and drink if you will not be able to have a sit down meal. Staying hydrated is important.
- > Oxygen should be used above 10,000 ft. Be aware that the effects of hypoxia can occur at lower altitudes, especially for smokers. At night use of oxygen above 5,000 ft can improve night vision.
- > Dress appropriately for the aircraft and time of year. Heater failures in GA aircraft are not unknown and during the winter this will be very unpleasant if you do not have suitable clothing.

GA RISKS

Pilot competence

MAINTAINING SKILLS

Guidance ?

The average GA pilot only flies about 30 hours per year. Most would admit to not always finding this enough to maintain proficiency in their chosen aircraft.

While it may be sufficient for a simple flight in good conditions, you may be surprised at how quickly handling skills and recollection of operating procedures fade, particularly if overall experience is low.

Throw in some high winds, unfamiliar aerodromes or airspace and quickly the lack of currency may become more apparent.

- > Be realistic about your current skill level – while you should not be afraid of taking on more challenging flights, some refresher training with an instructor may be necessary before doing so in more challenging conditions.
- > Often it is pilots with some experience that have accidents, rather than those who have just gained their licence. As you build experience, but with the memory of the training environment fading, be wary of allowing bad habits to creep in. Pursuing further training towards additional ratings and refresher training with an instructor is a good way to guard against this.
- > If you have an SEP (or similar) rating you will be required to have had an hour's flying with an instructor every two years. Use this time to revise areas you may be rusty on, such as short field landings, steep turns or practice forced landings.
- > If undertaking a proficiency check, do not be afraid to use the time to go over subjects you are unsure of after the check is complete – a good examiner should be more than happy to do so.
- > If you have had a long period with your mind away from flying, set aside an amount of time to review the speeds and procedures for your aircraft, local operating procedures or any other pertinent subjects. Ease yourself back into it and wait until you are fully up to speed before taking passengers.
- > If flying a new aircraft, even if differences training is not legally required, spend lots of time reading the AFM and find a knowledgeable instructor who can properly convert you onto type. Research any idiosyncrasies the type may have.
- > Doing something new like aerobatics or converting onto a new type of aircraft can also be rewarding and is a good way to improve your skills.
- > The General Aviation Safety Council (GASCo) produce a 'personal currency chart' which can be downloaded from their website – www.gasco.org.uk.

Guidance ?

Many GA Associations have pilot proficiency schemes approved under the CAA's Pilot Recognition for Operational Up-skilling and Development 'PROUD' framework. They are a good way to challenge yourself to improve your flying. Search for "CAA PROUD" online to find a scheme that suits you.

GA RISKS > ATTITUDES

Pilot competence

ATTITUDES

Guidance ?

Attitudes to risk will always vary, especially in the broad church of general aviation. Overall an attitude that is thoughtful and cautious will stand you in good stead for GA flying.

There are a few specific attitudes that have been consistently identified as being factors in poor decision making and the cause of accidents:

- > **Anti-authority** – aviation regulations sometimes have a reputation for being ineffective or irrelevant. However, for the most part the basic operating rules for GA have developed from harsh experience. Following the rules will not guarantee safety; however breaking them will likely expose you to additional risks.

Remember: The rules are there for a reason.

- > **Impulsiveness** – accidents often seem to involve actions that are inexplicable or out of character for the individuals involved. Pilots who are 'usually so careful' occasionally seem to do things that appear to be quite reckless. One explanation is that situational pressures overcome peoples' ability to make rational judgements and the impulse to 'just do something' takes over.

Remember: You must always think before you act, regardless of how much pressure there is to act on impulse.

- > **Complacency** – people often believe bad things only happen to others. One of the most enduring truths about aviation is that the hazards within it treat all who enter equally.

It can be tempting to abridge the pre-flight check or not bother to check NOTAMs, on the basis that there is rarely anything critical.

Remember: It could happen to you.

- > **Macho** – thankfully perhaps less common today than it once was, a macho attitude is essentially one that sees risk-taking as a positive thing and a challenge to rise to. For example, pushing on into poor weather in the belief that you are tough enough to handle it or taking risks to impress others.

Remember: Taking unnecessary risks is foolish.

- > **Resignation** – with so many different factors to contend with when flying, it is sometimes tempting to believe that you have no influence on outcomes and that fate will run its course regardless of how you act. While some accidents appear to betray the hand of fate in a way no one could have foreseen, these are generally the exception. Many GA accidents would not have happened had better decisions been made before or during the flight.

Remember: You are the master of your own destiny. Take decisive action to achieve a safe outcome.

Guidance ?

Everyone at one point or another will likely display elements of a risky attitude. The trick is to remember that all humans are vulnerable to this and remember what the 'antidote' attitudes are.

GA RISKS

Decision making

Good decision making is one of the first lines of defence against risk since it allows for risks to be avoided or mitigated, rather than relying purely on skill or luck to manage them.

There is a large amount of material available about aeronautical decision making and how human factors influence it; far more than can reproduced here. Fundamentally, good decision making is about assessing the risks associated with different decision making options and then acting on it appropriately.

ASSESSING THE FLIGHT

The pre-flight check ([see p.07](#)) list at the start is designed as an aid to remembering most of the common things that need to be considered before flight, however it is also important to assess the overall risks of a flight and pick up on particular ones that need to be considered, mitigated or eliminated.

The **'PAVE'** checklist is a more thematic way of assessing this.

The items listed below are just examples that might fit into the themes; consider all possible factors around a flight:

- **Pilot** – things like currency, fitness
- **Aircraft** – airworthiness, capabilities, limitations
- **EnVironment** – weather, facilities, terrain, airspace
- **External pressures** – time pressure, delays, passengers

MAKING DECISIONS

There are some key principles to follow and factors to consider as part of good decision making practice:

Knowledge and information

- > Review all the appropriate information relating to the flight such as weather, NOTAMs, the route and aerodromes. Without this you will not have the appropriate information to base your decisions on. Develop a routine that involves your chosen sources. Use a planning checklist to ensure you do not miss any.
- > Know the regulations relevant to your flight – regulatory compliance does not guarantee safety but is an essential baseline for decision making.
- > Know your aircraft's capabilities, performance and limitations.
- > Know the procedures for aerodrome operations, air traffic service and airspace relevant to your flight.
- > Understand the characteristics of different weather systems and what the implications are for your flying.
- > Consideration of alternative options to your plan, early planning of possible diversion could remove problems with planning while airborne.

GA RISKS > MAKING DECISIONS

Decision making

Attitudes

- > Have a realistic understanding of your skills and capabilities.
- > Adopt a cautious attitude to decision making, always checking information and carefully considering the different factors.
- > Adopt a risk-based approach – identify risks such as weather or lack of currency. If you identify a number of risks on a particular flight, question whether it is sensible to proceed. Consider modifying your plans to reduce some of the risk factors.
- > Always ask the ‘what if?’ question – for example, if the weather is worse than forecast or you are unexpectedly delayed.
- > Take positive decisions to respond to information and manage risks – do not proceed on the basis of “waiting to see what happens” or “hoping it will be OK”.
- > Re-evaluate situations when you have new information or when new factors emerge – do they require you to adopt a different course of action? Take a balanced view of information – be wary of discounting it just because it contradicts your existing understanding of a situation.
- > Be wary of the so called ‘hazardous attitudes’ and recognise them if they start to influence your thinking.

External influences

- > Ensure you are fit to fly – you may not take good decisions if you are distracted, fatigued or unwell. Even being hungry or dehydrated might cause you to lose concentration.
- > Avoid exposing yourself to pressure to complete a flight – for example, planning one such that delays due to weather or aircraft serviceability would place you in a difficult situation such as needing to return for an important work meeting.
- > Never put yourself in a position where you would not feel able to cancel a flight or turn back after starting one.
- > Manage the expectations of others. Explain the limitations of flying in light aircraft to passengers and why it is sometimes not safe to fly due to weather or aircraft serviceability issues.

Time and capacity

- > When making pre-flight decisions, give yourself time to review information free from distractions. Give extra time to account for things such as passengers or potential aerodrome-related delays. Do not place yourself under time pressure.
- > Make decisions in good time. Be wary of delaying decisions such as whether to divert due to weather on the basis that you can “wait and see” what happens. You may miss the window of opportunity to ensure a safe outcome.
- > In the air, think ahead of the aircraft so that you can anticipate what decisions will have to be made, such as what type of circuit join to conduct at your destination or whether to ask for a transit of controlled airspace.
- > Anticipate and control developments in the flight rather than simply reacting to them. For example, use time in the cruise to the next phase of flight, when you might have less mental capacity.

GA RISKS > MAKING DECISIONS

Decision making

- > Be competent in the management of the aircraft and its systems. This helps decision making insofar as it relieves mental capacity to make decisions, rather than having to focus unduly on controlling the aircraft or operating its systems such as avionics.

Experience

- > Experience should broaden your understanding of how to interpret situations. Take on more challenging flights but balance this with an appropriately cautious attitude and take advice if you are unsure of something.
- > Avoid the traps of experience such as complacency or the reinforcement of risky behaviour – do not start to believe things like ‘the weather is never as bad as forecast’ as a rationale for taking less conservative decisions.
- > If you have a close call, for example, with bad weather or using a short runway, reflect on the fact that you may not be so lucky next time, rather than learning the lesson that such risks are acceptable.
- > Learn from the experiences and mistakes of others. Many GA magazines reproduce accident reports or feature articles on decision making scenarios. Maintain an interest in current thinking on GA safety issues. The CAA’s [Clued up](#) magazine (available for free on the CAA website – search online at www.caa.co.uk) contains a wealth of information in this area.

Threat and error management TEM

- > TEM is the practical summation of threat and error management for pilots. It’s a way of thinking in advance what could go wrong on any particular flight just in case it does.
- > It has three elements relevant to pilots; threats, errors and undesired aircraft states. Threats and errors have the potential to cause undesired aircraft states, and when they do so, those states must be managed. A foundation of TEM is the acceptance that threats will occur and errors will be made. Hence TEM is not an attempt to eliminate threats and errors, but is concerned with the management of them.
- > More details can be found in CAP 737.

GA RISKS

Staying in control

Key info



Many loss of control accidents occur during the take-off or approach phases of flight, often resulting in departure from the runway surface and in worst cases, low level stalls and/or spins that cannot be recovered from.

It is difficult to generalise as to why these accidents happen, although some recurring themes appear to be:

- > Distraction;
- > Poor handling technique;
- > Turbulence and/or crosswinds;
- > Challenging operating sites; and
- > Continued VFR into IMC.

Distraction comes from a variety of sources, but a common one is being distracted by an issue during a critical phase of flight that leads the pilot to neglect controlling the aircraft:

- > Manoeuvring in the circuit while preparing to land;
- > Attempting to shut open doors or canopies while close to the ground;
- > Attempting to diagnose cockpit warnings or other system issues; or
- > Engine failures, or in the case of gliders, winch launch failures.

The most important message is to fly the aircraft. Even an engine failure is unlikely to be fatal if the aircraft arrives at the ground under control in a level attitude. Issues such as open doors or warning lights can normally wait until the aircraft is at a safe altitude when your attention can be given to resolving them.

Guidance



Specifically:

- > Know the correct speeds for your aircraft in all phases of flight, including stall (clean and with flap) and best glide.
- > Remember that an aircraft stalls at a particular angle of attack, which as g-loading increases, will occur at a higher airspeed. In a 2g manoeuvre the stall angle of attack is reached at a 41% higher airspeed.
- > Be proficient in slow flight and stall recognition/recovery techniques.
- > Landing in crosswinds and/or turbulent conditions requires an extra degree of proficiency with the aircraft that is very perishable – training with an instructor is the best way to mitigate this.

Challenging aerodromes (particularly small strips) often feature in loss of control accidents, underlining the need to apply extra caution:

- > Have you calculated your performance requirements?
- > Are there obstacles that might need avoiding on approach or climb out?
- > Runways tend to be shorter and narrower, how precise is your touch down technique?
- > Even small amounts of turbulence or crosswind can make speed control and touchdown precision much more challenging. How current are you at these?
- > Low sun can often make judging height and distance to touch down challenging. Is that likely to be an issue on arrival?

GA RISKS

Avoiding the ground

Key info



Controlled flight into terrain and loss of control in IMC continue to be factors of many GA accidents. Attempting or continuing VFR flight in poor weather is a common cause of this.

To a large extent, following the pre-flight planning procedures outlined [on p.37](#) will mitigate these risks. Pay particular attention to the following:

- > Check the weather for all flights – pilots normally pay special attention to long and complex flights, but many recent accidents in poor weather were actually relatively local ones. Avoid the false sense of security that may come from short flights in familiar airspace.
- > When there is either frontal convective or foggy weather around, it can be hard to predict exactly what conditions at a certain point will be. Study the weather carefully and consider options in different scenarios should the weather be worse than anticipated – calculate altitudes that if forced below by weather, you will turn back or divert.
- > Do not succumb to the belief that the ‘weather is never as bad as forecast’ – while that is sometimes the case, it is very often the exception that breaks the rule and causes the accident.
- > Decision making is generally easier on the ground away from the additional pressure of flying the aircraft – it is tempting to get airborne to ‘have a look’, but this could suck you into commencing a flight when it is not safe to do so.
- > If faced with a decision to be made in the air, do so within the parameters you set for yourself at the start of the flight – it is no good calculating a safety altitude if once in flight you think ‘oh I’m sure descending a few hundred feet further will be OK’.
- > Handheld and tablet based GPS systems have reduced the risk of CFIT, particularly if lost. However, they should not be used to fly in poorer weather than you otherwise would. Always consider:
 - > They are not designed for low level navigation and may not have the detail required to avoid masts or other obstructions.
 - > In poor weather and turbulence you may not have the mental capacity to use them properly – you will be too focused on controlling the aircraft.
 - > Would you still be able to navigate confidently if they failed?

GA RISKS

Avoiding collisions

Key info



Unfortunately, there is at least one mid-air collision in the UK most years. More than 100 'airproxes' are reported to the UK Airprox Board every year.

Almost all mid-air collisions occur in good VMC at relatively low level, reflecting the areas in which the chances of aircraft being in close proximity to each other are highest. Around half of mid-air collisions in the UK happen near aerodromes, with many in the circuit.

It is a common observation that separation in uncontrolled airspace is achieved as much by the 'big sky' (i.e. by chance) as it is by 'see-and-avoid'. It is now well understood that even when operating a very effective visual scan, most pilots will not achieve a 100% detection rate, especially if the conflicting aircraft is outside the area normally visible from the cockpit. The risk of collisions can never be mitigated entirely; however by taking a number of precautions you can stack the odds of survival in your favour.

GENERAL MITIGATIONS

Many GA pilots will have had close calls when flying in congested uncontrolled airspace – for example on a busy summer's day in the south east of England. Sometimes it is best to simply avoid busy areas and fly elsewhere.

There are some precautions you can take:

- > Avoid obvious 'choke points' around VORs or other significant features commonly used for navigation – Bovingdon is a common one in the London area. By all means load them into your GPS for planning purposes, but avoid directly overflying them and keep a very good look out when nearby.
- > Avoid aerodromes or other hazardous airspace reservations like glider sites. Note the cable launch heights on your chart. Be aware gliders do not confine themselves to the overhead of their operating sites or the immediate vicinity of it. Gliders will often congregate around an area of thermals – if you see one, there will likely be others.
- > Hang gliders and para gliders often launch from, and congregate around, hill sites facing into wind, often in large numbers. These sites are not shown on charts, but some can be activated by NOTAM. An active site may contain tens of gliders circling in 'gaggles' and they are likely to depart on cross country routes, normally in a downwind direction.
- > Randomise your cruising levels. There is no requirement in the UK for VFR flights to follow 'semi-circular' rules (although there may be in other states), so sometimes fly at different altitudes like 2200 ft instead of round figures like 2000 ft.
- > Avoid crossing the final approach tracks of aerodromes outside controlled airspace, even if outside their ATZ. The feathered arrows on charts indicate the instrument approach paths of larger aerodromes – aircraft will generally descend at around 300 ft per NM along these.
- > When operating at an aerodrome, be familiar with local procedures, particularly at uncontrolled ones.
- > Be clear about your position and intentions – many airproxes at uncontrolled aerodromes result from a lack of clear communication as to the position and intentions of aircraft – do not be afraid to seek clarification on another aircraft's position or intentions.

For more information on collision avoidance, see the relevant safety sense leaflet at www.caa.co.uk/safetysense.

GA RISKS

Avoiding collisions

THE VISUAL SCAN

Despite the recognition of its flaws, an effective 'look out' will go a long way to mitigating the risk of collision. Ensuring the windscreen is clean and clear of dead insects which might obscure the dot of a conflicting aircraft is also important. It is usually easier to remove dead insects immediately after a flight, which also saves time for when you (or someone else) next go flying.

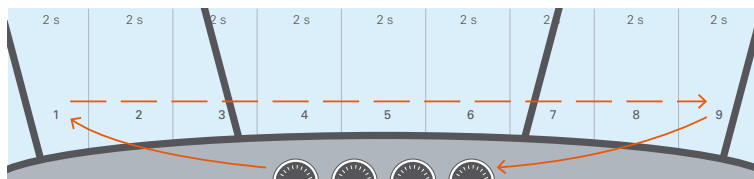
For VFR operations, you should aim to have your eyes inside the cockpit no more than ¼ of the time. The rest of the time you should be looking outside. Provided you hold a steady visual attitude, there is no reason why the aircraft should climb or descend while you are looking outside. Adopting a systematic approach to scanning the view outside the cockpit will help you maintain an effective look out as well as giving you time to check direction and altitude on your instruments.

- > In general you should move your eyes (and head as necessary) in short and regularly spaced movements that bring successive areas of the sky into the central visual field. You should pause for at least a second to refocus on the new area and detect any aircraft. The centre of focus

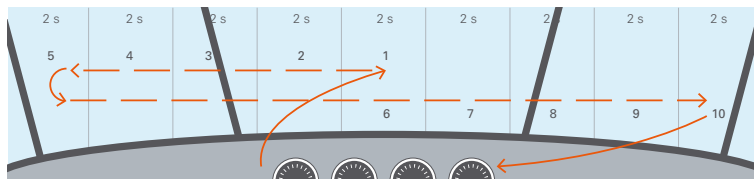
should shift by about 10° per movement. 15° is around the normal width within which the eyes can focus on a particular area, so 10° allows for some overlap.

There is no single correct way to maintain an effective look out scan. There are however two methods that have been identified as being effective techniques:

- > **Side to side scanning method:** Start at the far left of your visual area and make a methodical sweep to the right, pausing for a couple of seconds in each 'block' of the viewing area to focus your eyes. At the end of the scan, return to and scan the instrument panel and then repeat the external scan.
- > **Front-to-side scanning method:** Start in the centre block of your visual field, move to the left, focusing very briefly on each 'block', then swing quickly back to the centre block after reaching the last block on the left and repeat the action to the right. Then, after scanning the instrument panel, repeat the external scan.



Side-to-side scanning method



Front-to-side scanning method

Avoiding collisions

- > 'Block' means an area that can be focused on at one time in the normal field of view.
- > Inevitably there will be times in which you will have to keep your eyes in the cockpit for longer than is ideal – for example, to change a radio frequency or if an engine gauge is causing concern. Try not to get fixated on this, and look back outside every few seconds. Consciously re-establish the scan once the interruption has passed.
- > If you are flying with another pilot, or a passenger you have educated on 'looking out', tell them you are going 'eyes down' so that they know to keep an extra keen look out.
- > Peripheral vision can be good at detecting movement, but the greatest collision risk often comes from aircraft that do not appear to move relative to you. If you detect an aircraft that does not appear to be moving but is getting larger, a collision may be imminent – alter course immediately in accordance with the Rules of the Air ([see p.55](#)).
- > You should not turn or otherwise alter direction without looking in the relevant direction. In a high wing aircraft the wing should be lifted prior to turning to ensure there is no hidden traffic. Similarly, while climbing you should periodically 'weave' the nose of the aircraft to reveal any traffic hidden behind the raised nose attitude.

USE OF ATS

Talking to ATC and obtaining a Traffic Information Service will also reduce the risks. Remember that a Basic Service does not include guaranteed traffic information.

You should always consider which of the nearby ATSUs will provide the best mitigation against other traffic – for example, if passing close to an aerodrome, it may be best to contact them.

GA RISKS

Avoiding collisions

ELECTRONIC CONSPICUITY (EC)

Guidance ?

It is a legal requirement that if your aircraft is equipped with a transponder, you should use it to its full capabilities. This allows ATC to get more information than via a primary contact, and also allows the Traffic Collision Avoidance Systems (TCAS) on larger aircraft to detect you.

Transponders work on the principle of transmitting a signal (including altitude in the case of mode C or S) after being 'interrogated' by a signal from a secondary radar station on the ground.

More recently, technologies such as ADS-B (Automatic Dependent Surveillance – Broadcast) have emerged that have the potential to bring forms of EC to a much wider audience than available with traditional transponder technologies, since they require less electrical power. ADS-B works on the principle of taking the aircraft's position from a navigation source (for example the aircraft's GPS) and then broadcasting it (known as ADS-B 'Out') for ADS-B receivers (known as ADS-B 'In') to detect.

For light aircraft a variety of traffic awareness systems are available to enhance your electronic conspicuity and the detection of other aircraft. They are available with different levels of sophistication. The following provides a very brief summary of what is an exciting area of developing technology:

- > Traffic advisory systems – these work on a similar principle to TCAS systems found on larger aircraft. They interrogate the transponders of other aircraft, thereby determining their position and relative movement. They require other aircraft to have at least a Mode C transponder.

More recently they often also incorporate ADS-B In and Out functions, broadcasting the aircraft's position and detecting other ADS-B signals.

- > FLARM – was originally developed for gliders. Early versions were essentially proprietary since they transmitted and received the position of other FLARM users on their own (non-aeronautical band) frequency. Later versions can also receive ADS-B and transponder signals.
- > Other ADS-B based EC – these broadcast the aircraft's position and/or receive the position of other equipped aircraft (depending on the device) via ADS-B.

Note: ADS-B systems that are designed for use in aircraft that do not have a transponder and use downlink format (DF) 18 are not visible to airborne traffic advisory/collision avoidance systems. See the CAA's publication on EC devices at www.caa.co.uk/cap1391 for more details.

VISUAL CONSPICUITY

Use of lights and aircraft colour can have an influence on how effectively you can be seen by other aircraft. Strobes and anti-collision beacons should be on at all times after entering the runway environment. Landing lights should be on once approaching an airfield and at all times when in areas of high traffic density.

Colours like black are actually more likely to show up against the ground or sky, whereas white or patterns that break up the outline of the aircraft will tend to visually merge into a predominantly grey background. If you are based in an area of high traffic density, consider what impact the colour of your aircraft might be having on your visibility to other aircraft.



EMERGENCIES

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EMERGENCIES

The following information is intended to be a general guide to emergency considerations. It is not intended to replace the specific procedures for particular aircraft, which you should be familiar with. Take time, for example when the weather is poor, to review the emergency procedures that you need to memorise for your aircraft.

General principles

- > **Know your aircraft** – be familiar with the speeds and actions listed in the AFM for particular emergencies.
- > **Fly the aircraft** – many accidents happen when faults that should not have been fatal, distract from the task of keeping the aircraft flying.
- > **Assess the situation** – once the aircraft is under control, take a moment to assess the situation; do not jump to conclusions about what the problem is.
- > **Declare an emergency** – if in doubt, declare an emergency in good time. It is easier to cancel a distress call if the situation is later resolved than wait until it may be too late. If not talking to an ATSU at the time, call **121.5**.

Mayday or Pan call format

- > **Distress: “Mayday, Mayday, Mayday”**
- > **Urgency: “Pan Pan, Pan Pan, Pan Pan”**
- > **Position, Altitude, Heading**
- > **Any other relevant information, such as pilot qualifications or persons on board**

Followed by:

- > **Name of station being addressed**
- > **Aircraft call sign**
- > **Aircraft type**
- > **Nature of emergency**
- > **Intentions**

EMERGENCIES

Distress and Diversion Cell (D&D)

- > The distress and Diversion Cell (D&D) is the emergency centre based at the London area control centre. D&D have the unique ability to provide accurate position fixes using Direction finding.
- > The service is available continuously to pilots flying within UK airspace who are in distress, in urgent need of assistance, or experiencing difficulties (i.e. temporarily unsure of position) which could lead to a state of emergency. The service is also available for practices provided that no actual emergency is in progress on the UHF or VHF distress frequencies.
- > D&D are always looking to train their controllers and welcome calls from aircraft that want to practice urgency calls or training fixes.
- > The D&D Area of Responsibility covers the entire UK out to the FIR boundary. The D&D cell is open 24hrs a day every day, monitoring 121.500. D&D will respond to any emergencies that occur.
- > Position fixes can be obtained instantaneously on transmission when:
 - > Within the London TMA down to and including 2000'.
 - > Outside of the London TMA down to 3000'.
- > (Below these altitudes DF coverage may still be available depending on obstacles / atmospheric conditions / distance from DF receivers).
- > Please use them in a real emergency or lost, it will get their immediate attention and aid your identification. Call as early as possible, pride can be a killer.
- > Please practice as much as you want. It is free and one day it may save your or another person's life.
- > If you file a flight plan IFR or VFR and deviate from it, please tell someone as tracing action will be taken in order to confirm your safety.

EMERGENCIES

Distress and Diversion Cell (D&D)

Sample exchange calling D&D for a Practice Pan	
Explanation	Exchange
Commencing the call with the PRACTICE request gives the controller the opportunity to understand that this is not a real urgency situation.	 "London Centre G-DOME request <u>practice</u> Pan."
Assuming the controller is ready to process your practice request, they will likely respond by asking to "continue or pass details when ready".	 "G-DOME London Centre Practice PAN acknowledged, Pass details when ready."
Repeating the Practice pan three times ensure that all on frequency and the controllers again know this is not a real-world urgency situation.	 "Practice Pan Practice Pan Practice Pan, nature of Practice emergency and assistance required."
Sample exchange calling D&D for a Training Fix	
Explanation	Exchange
Commencing the call with the Training Fix request gives the controller the opportunity to understand that this is not a real urgency situation, but also gives them time to triangulate your position.	 "Training fix Training Fix Training Fix G-DOME request Training Fix."
The controller display uses Ordnance Survey mapping to enable position reports with reference to towns/villages/geographical features.	 "G-DOME, London Centre, your position is.... Do you require further assistance?"

EMERGENCIES

Lost

With the widespread use of GPS systems, cases of being completely lost are thankfully rarer than they once were. However, such systems are not universally carried, and even if they are (which is recommended), they can be misinterpreted or fail.

- > If in contact with an ATSU that has radar, ask them to clarify your position.
- > If not in contact with an ATSU, call Distress and Diversion on **121.5** and ask for assistance.
- > Prior to establishing contact with either an ATSU or D&D, squawk **0030** – this will alert other ATSUs that there is a lost aircraft.
- > Orbit near any prominent landmarks that could be described to ATC. Do not continue to fly aimlessly.

Loss of communications

- > Many apparent communication failures are caused by incorrect setting of the radios – check basic issues like volume, squelch, frequency and audio selector panel settings before concluding you have actually experienced a radio failure.
- > If you really have lost communications, set 7600 on the transponder, maintain VMC and proceed to the nearest suitable aerodrome. A quiet one outside controlled airspace is best.
- > Once overhead an aerodrome, observe the signal square and circuit. Watch for other traffic and any light signals from the ground. Land once you believe it is safe to do so and report your landing to the relevant ATSU as soon as possible.
- > A good mitigation against loss of communications is to carry a handheld radio and suitable headset adaptor. However, these often have short range, particularly at low level.

Electrical failure

- > Alternator failure is a common cause of electrical failure. Depending on condition, you might have power for a limited period (perhaps 20 minutes) from the battery but this will drain quickly.
- > Minimise use of anything that uses electrical power (for example lights) to prolong battery life. Try to maintain VMC and proceed to the nearest suitable aerodrome.
- > Expect to lose radio communications once the battery fails.
- > Know which systems in your aircraft are electrical, for example flaps, and be prepared to land without them.

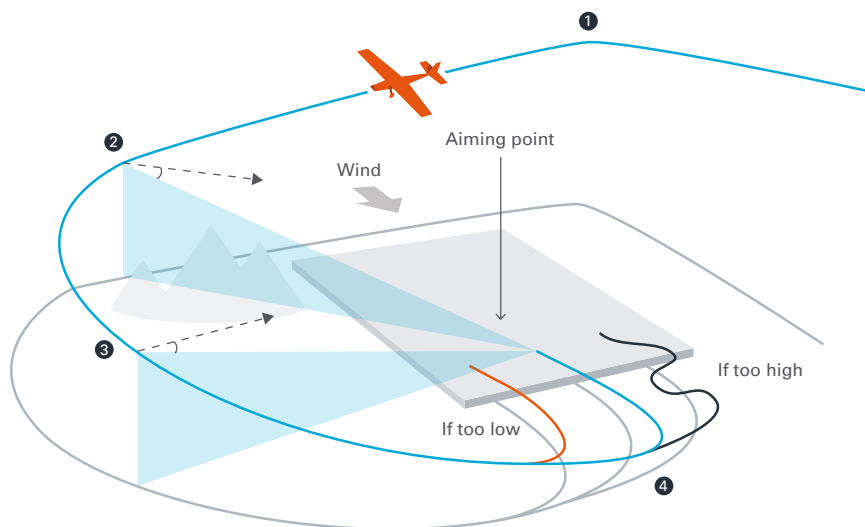
EMERGENCIES

Engine failure

- > Know your best glide speed and procedures for your aircraft.
- > Particularly at low level, focus on maintaining speed and control. Provided you keep the aircraft at flying speed and under control, engine failures are unlikely to be fatal.
- > If a failure happens shortly after take-off, landing ahead is safer than attempting to turn back. Assess the area immediately in front of you and pick the place that is likely to cause the least damage.
- > If you have some height, check for common causes of failure such as fuel tank selection or carb icing – know the specific drill for your aircraft.
- > Partial engine failures can confuse the decision making process. Assess whether the failure is likely to become worse – for example if rapidly losing oil pressure, the engine may not run for much longer. Take a positive decision to either put down in a field or continue to an aerodrome, depending on your judgement of the problem.
- > The Australian ATSB have published useful advice on partial engine failures in single engine aircraft titled: Managing partial power loss after takeoff in single-engine aircraft. www.caa.co.uk/General-aviation/Safety-information/Safety-information/.
- > If faced with prospect of landing in a field, assess:
 - > **Wind direction** – try to land into wind;
 - > **Size** – the bigger the better;
 - > **Surroundings** – avoid power lines or other obstructions;
 - > **Shape** – square gives the best range of touch down options;
 - > **Surface** – grass is one of the better surfaces, ploughed fields or crops are less desirable since they may flip the aircraft; and
 - > **Slope** – avoid significant slopes.
- > You should consider what would happen in the event of a forced landing – for example if planning to fly over the Scottish mountains in the winter, it would be prudent to have warm clothing and appropriate provisions in the aircraft, including cooking apparatus.

EMERGENCIES

Engine failure



A commonly taught forced landing technique is that of the 'constant aspect'. The full pattern assumes a height of around 2000 ft or more, although the main principle of it applies at any height. Assuming you are sitting on the left, it is much easier to compete in a left hand direction.

- 1 Enter the pattern at a point appropriate to your height, adjusting the horizontal distance from the field as required. If you are at 2500 ft AGL or above, you should be able to arrive abeam the field with enough height to effectively fly a circuit around it.
- 2 At around 45° to the intended landing spot, assess the visual angle to it. The aim is to keep that visual angle (the 'constant aspect') the same until touch down. As you are turning around the landing site, if the angle starts to shallow, move closer. If it steepens, widen the turn to take you further away.
- 3 Fly an arc around the edge of the field, tightening or widening the turn to keep the visual angle constant. If you intend to land with full flap or lower the landing gear, aim further into the field to account for the extra drag once you deploy them.
- 4 As you approach the field adjust the turn as necessary and side slip or S-turn if too high. Once configured for landing (flaps etc) ensure as much as possible (magnetos, master switch, fuel etc) is switched off.

EMERGENCIES

Fire

ON THE GROUND

- > Every aircraft has a checklist, which includes what to do in the event of emergency's including fire. This must take priority over anything and it's always good to know these checklists by heart.
- > The most likely time is when starting the engine. Be prepared to cut the mixture, turn off the fuel and vacate the aircraft.
- > It is often recommended that you keep cranking the engine and (once the mixture and fuel is at cut-off) open the throttle fully. This should draw the fire back into the engine. However, if the fire has not stopped shortly after cutting the mixture, vacate the aircraft and move upwind.

IN THE AIR

- > The engine or electrical system are the most likely sources of fire.
- > In the case of an engine fire in a single engine aircraft, shut down and perform a forced landing as soon as possible. If the fire does not go out, lowering landing gear, flap and/or slide slipping are potential ways to lose altitude faster.
- > Electrical fires can sometimes be prevented by early detection and isolation of the source – for example if a circuit breakers pops, be wary of resetting it and never reset more than once – it may cause a fire.
- > If a burning smell is detected, try to determine if it is coming from a particular source and if electrical, isolate by pulling the relevant circuit breaker.
- > If it gets worse, turn off the master switch and land as soon as possible.

Ditching

Ditching characteristics vary between aircraft – know the procedures for your aircraft.

- > If you have determined that the carriage of lifejackets is required and/ or desirable, it is strongly recommended that in a single engine aircraft, these are worn at all times un-inflated.
- > It is strong recommended that you carry a liferaft if crossing any significant body of water – such as the English Channel. Especially during the winter months, you are unlikely to survive for more than an hour immersed in the water unless wearing a survival suit.
- > For more details on surviving ditching, see GA Safety Leaflet on ditching. www.caa.co.uk/safety sense.

EMERGENCIES

Incident and accident reporting

If you are unlucky enough to suffer an incident of some sort, you may be legally obliged to report it. In all cases the information shared with the relevant organisations will be treated as confidential (not anonymous), although accidents, serious incidents and Airproxes will be subject to publicly available reports.

AIR ACCIDENT INVESTIGATION BRANCH

Accidents or serious incidents must be reported as soon as practicable to the Air Accident Investigation Branch (AAIB) in Farnborough on **01252 512299**. Accidents must also be reported to the Police. For more information see www.aaib.gov.uk.

In the event of the death or incapacitation of the pilot in command, the responsibility to report passes to the operator. In many GA accidents, the pilot is also the operator, in which case it would likely fall to others involved in and/or aware of the aircraft's flight, for example aerodrome or air traffic control staff.

As much of the following information as possible must be passed to the AAIB:

- > the type, model, nationality and registration marks of the aircraft;
- > the names of the owner, operator and hirer (if any) of the aircraft;
- > the name of the commander of the aircraft;
- > the date and time (UTC) of the accident or serious incident;
- > the last point of departure and the next point of intended landing of the aircraft;
- > the position of the aircraft in relation to some easily defined geographical location;

- > the number of:
 - > crew on board and the number killed or seriously injured;
 - > passengers on board and the number killed or seriously injured; and
 - > other persons killed or seriously injured as a result of the accident.
- > the nature of the accident or serious incident and the extent of damage as far as is known.

Definition of an accident

"Accident" means an occurrence associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight and such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

- > a person is fatally or seriously injured as a result of:
 - > being in the aircraft;
 - > direct contact with any part of the aircraft, including parts which have become detached from the aircraft; or
 - > direct exposure to jet blast;

EMERGENCIES > AIR ACCIDENT INVESTIGATION BRANCH

Incident and accident reporting

except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or

- > the aircraft sustains damage or structural failure which adversely affects the structural strength, performance or flight characteristics of the aircraft, and would normally require major repair or replacement of the affected component;

except for engine failure or damage, when the damage is limited to a single engine, (including its cowlings or accessories), to propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreens, the aircraft skin (such as small dents or puncture holes) or minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike, (including holes in the radome); or

- > the aircraft is missing or is completely inaccessible.

Definition of serious injury

“Serious injury” means an injury which is sustained by a person in an accident and which involves one of the following:

- > hospitalisation for more than 48 hours, commencing within 7 days from the date the injury was received;
- > a fracture of any bone (except simple fractures of fingers, toes, or nose);
- > lacerations which cause haemorrhage, nerve, muscle or tendon damage;
- > injury to any internal organ;

- > second or third degree burns, or any burns affecting more than 5% of the body surface; or
- > verified exposure to infectious substances or harmful radiation.

Definition of serious incident

“Serious Incident” means an incident involving circumstances indicating that there was a high probability of an accident and is associated with the operation of an aircraft, which in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time it comes to rest at the end of the flight and the primary propulsion system is shut down.

The incidents listed below are typical examples of serious incidents. The list is not exhaustive and only serves as a guide to the definition of ‘serious incident’:

- > A near collision requiring an avoidance manoeuvre or when an avoiding manoeuvre would have been appropriate to avoid a collision or an unsafe situation;
- > Controlled flight into terrain (CFIT) only marginally avoided;
- > An aborted takeoff or a takeoff using a closed or engaged runway, a taxiway or unassigned runway;
- > A landing or attempted landing on a closed or engaged runway, a taxiway or unassigned runway; or
- > Gross failure to achieve predicted performance during takeoff or initial climb.

EMERGENCIES > AIR ACCIDENT INVESTIGATION BRANCH

Incident and accident reporting

- > All fires and/or smoke in the cockpit, in the passenger compartment, in cargo compartments or engine fires, even though such fires were extinguished with extinguishing agents.
- > Any events which require the emergency use of oxygen by the flight crew.
- > Aircraft structural failure or engine disintegration, including uncontained turbine engine failure, which is not classified as an accident.
- > Multiple malfunctions of one or more aircraft systems that seriously affect the operation of the aircraft.
- > Any case of flight crew incapacitation in flight.
- > Any fuel state which would require the declaration of an emergency by the pilot.
- > Runway incursions classified with severity A. The 'Manual on the Prevention of Runway Incursions' (ICAO Doc 9870) contains information on the severity classifications.
- > Take-off or landing incidents, such as undershooting, overrunning or running off the side of runways.
- > System failures, weather phenomena, operation outside the approved flight envelope or other occurrences which caused or could have caused difficulties controlling the aircraft.
- > Failure of more than one system in a redundancy system which is mandatory for flight guidance and navigation.
- > The unintentional or, as an emergency measure, the intentional release of a slung load or any other load carried external to the aircraft.

EUROPEAN AVIATION REPORTING

Even if the incident is not serious enough to be reported to the AAIB, it may still be required to be reported under European incident reporting regulations⁶. This is often known as 'Mandatory Occurrence Reporting' (MOR). More information on this can be found at www.caa.co.uk/mor and www.aviationreporting.eu.

These reporting requirements are only mandatory for EASA aircraft, however pilots of non-EASA aircraft are strongly encouraged to report similar incidents via the same portal.

The reporting website should be consulted if there is any doubt as to whether an incident is required to be reported. The following non-exhaustive list is to give a general indication of some types of incidents that must be by the pilot in command:

- > Airspace infringement;
- > Declaration of emergency;
- > Fire or fume events;
- > Loss of control;
- > Collision or near collision on the ground or in the air with another aircraft, the ground or obstacle;
- > Runway incursion or excursion;
- > Engine failure;
- > Unintended entry into IMC;
- > Bird or other wildlife strike;
- > Lighting strike that damaged the aircraft;

⁶Commission Implementing Regulation (EU) 2015/1018

EMERGENCIES > EUROPEAN AVIATION REPORTING

Incident and accident reporting

- > Icing (including carb icing) which could have endangered the aircraft; and
- > Severe turbulence which caused injuries or required the aircraft to be checked for damage.

There are also some that are specific to balloon and glider incidents, for example ejection of occupants from the basket or winch launch related incidents. See the website for more details.

Glider pilots who are members of the BGA should use the organisation's incident and accident reporting system and guidance. Its use complies with the European reporting requirements.

Note: There is sometimes overlap between reporting requirements for the different organisations and regulations – the AAIB and European reporting requirements are mandated by regulation and you must report in accordance with both (as applicable) for a particular incident.

AIRPROX BOARD

An Airprox is a situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised.

The Airprox Board is a joint CAA and Military Aviation Authority (MAA) organisation responsible for receiving, analysing and publishing reports of Airproxes.

More information on reporting an Airprox or reviewing Airprox Board reports can be found at www.airproxboard.org.uk.

CHIRP

The Confidential Human Factors Incident Reporting Programme (CHIRP) is an independent flight safety reporting programme, the aim of which is to contribute to the enhancement of flight safety in the UK's commercial and general aviation industries. It can be used by engineers and technical staff involved with design and manufacturing processes, flight and cabin crew members, air traffic controllers, maintenance/engineering personnel and individual aircraft owners/operators.

It is designed to compliment other mandatory reporting requirements by providing a means by which individuals are able to raise safety-related issues of concern without being identified to their peer group, management, or the regulatory authorities.

CHIRP publishes regular compilations of reports submitted, so that the issues identified and lessons learnt can be shared with all those interested in reading them. Any names, dates, locations and aircraft registrations are removed from the published reports.

More information and to submit a report can be found at www.chirp.co.uk.

EMERGENCIES

Interception procedures

Interception is a very unusual event to occur to a GA aircraft; however it is a requirement for EASA aircraft flying under Part-NCO and for all aircraft flying internationally to carry the interception procedures specified in ICAO Annex 2 (Rules of the Air) and the SERA. These are reproduced below.

SERA.11015 Interception

- > **(a)** Except for intercept and escort service provided on request to an aircraft, interception of civil aircraft shall be governed by appropriate regulations and administrative directives issued by Member States in compliance with the Convention on International Civil Aviation, and in particular Article 3(d) under which ICAO Contracting States undertake, when issuing regulations for their State aircraft, to have due regard for the safety of navigation of civil aircraft.
- > **(b)** The pilot in command of a civil aircraft, when intercepted, shall:
 - > **(1)** immediately follow the instructions given by the intercepting aircraft, interpreting and responding to visual signals in accordance with the specifications in Tables S11-1 and S11-2;
 - > **(2)** notify, if possible, the appropriate air traffic services unit;
 - > **(3)** attempt to establish radio-communication with the intercepting aircraft or with the appropriate intercept control unit, by making a general call on the emergency frequency 121,5 MHz, giving the identity of the intercepted aircraft and the nature of the flight; and if no contact has been established and if practicable, repeating this call on the emergency frequency 243 MHz;
 - > **(4)** if equipped with SSR transponder, select Mode A, Code 7700, unless otherwise instructed by the appropriate air traffic services unit;
 - > **(5)** if equipped with ADS-B or ADS-C, select the appropriate emergency functionality, if available, unless otherwise instructed by the appropriate air traffic services unit.

EMERGENCIES

Interception procedures

Table S11-1: Signals initiated by intercepting aircraft and responses by intercepted aircraft

Series	INTERCEPTING Aircraft Signals	Meaning	INTERCEPTED Aircraft Responds	Meaning
1	<p>DAY or NIGHT — Rocking aircraft and flashing navigational lights at irregular intervals (and landing lights in the case of a helicopter) from a position slightly above and ahead of, and normally to the left of, the intercepted aircraft (or to the right if the intercepted aircraft is a helicopter) and, after acknowledgement, a slow level turn, normally to the left (or to the right in the case of a helicopter) on the desired heading.</p> <p>Note 1 Meteorological conditions or terrain may require the intercepting aircraft to reverse the positions and direction of turn given above in Series 1.</p> <p>Note 2 If the intercepted aircraft is not able to keep pace with the intercepting aircraft, the latter is expected to fly a series of race-track patterns and to rock the aircraft each time it passes the intercepted aircraft.</p>	<p>You have been intercepted. Follow me.</p>	<p>DAY or NIGHT — Rocking aircraft, flashing navigational lights at irregular intervals and following.</p>	<p>Understood, will comply.</p>
2	<p>DAY or NIGHT — An abrupt breakaway manoeuvre from the intercepted aircraft consisting of a climbing turn of 90 degrees or more without crossing the line of flight of the intercepted aircraft.</p>	<p>You may proceed.</p>	<p>DAY or NIGHT — Rocking the aircraft.</p>	<p>Understood, will comply.</p>
3	<p>DAY or NIGHT — Lowering landing gear (if fitted), showing steady landing lights and overflying runway in use or, if the intercepted aircraft is a helicopter, overflying the helicopter landing area. In the case of helicopters, the intercepting helicopter makes a landing approach, coming to hover near to the landing area.</p>	<p>Land at this aerodrome.</p>	<p>DAY or NIGHT — Lowering landing gear, (if fitted), showing steady landing lights and following the intercepting aircraft and, if, after overflying the runway in use or helicopter landing area, landing is considered safe, proceeding to land.</p>	<p>Understood, will comply.</p>

EMERGENCIES

Interception procedures

Table S11-2: Signals initiated by intercepting aircraft and responses by intercepted aircraft

Series	INTERCEPTING Aircraft Signals	Meaning	INTERCEPTED Aircraft Responds	Meaning
4	DAY or NIGHT — Raising landing gear (if fitted) and flashing landing lights while passing over runway in use or helicopter landing area at a height exceeding 300 m (1 000 ft) but not exceeding 600 m (2 000 ft) (in the case of a helicopter, at a height exceeding 50 m (170 ft) but not exceeding 100 m (330 ft)) above the aerodrome level, and continuing to circle runway in use or helicopter landing area. If unable to flash landing lights, flash any other lights available.	Aerodrome you have designated is inadequate.	DAY or NIGHT — If it is desired that the intercepted aircraft follow the intercepting aircraft to an alternate aerodrome, the intercepting aircraft raises its landing gear (if fitted) and uses the Series 1 signals prescribed for intercepting aircraft. If it is decided to release the intercepted aircraft, the intercepting aircraft uses the Series 2 signals prescribed for intercepting aircraft.	Understood, follow me. Understood, you may proceed.
5	DAY or NIGHT — Regular switching on and off of all available lights but in such a manner as to be distinct from flashing lights.	Cannot comply.	DAY or NIGHT — Use Series 2 signals prescribed for intercepting aircraft.	Understood.
6	DAY or NIGHT — Irregular flashing of all available lights.	In distress.	DAY or NIGHT — Use Series 2 signals prescribed for intercepting aircraft.	Understood.

- > **(c)** If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by visual signals, the intercepted aircraft shall request immediate clarification while continuing to comply with the visual instructions given by the intercepting aircraft.

> **(d)** If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by radio, the intercepted aircraft shall request immediate clarification while continuing to comply with the radio instructions given by the intercepting aircraft.
- > **(e)** If radio contact is established during interception but communication in a common language is not possible, attempts shall be made to convey instructions, acknowledgement of instructions and essential information by using the phrases and pronunciations in Table S11-3 and transmitting each phrase twice:

EMERGENCIES

Interception procedures

Table S11-3

Phrases for use by INTERCEPTING aircraft			Phrases for use by INTERCEPTED aircraft		
Phrase	Pronunciation ¹	Meaning	Phrase	Pronunciation ¹	Meaning
CALL SIGN	<u>KOL</u> SA-IN	What is your call sign?	CALL SIGN (call sign) ²	<u>KOL</u> SA-IN (call sign)	My call sign is (call sign)
FOLLOW	<u>FOL</u> -LO	Follow me	WILCO	<u>VILL</u> -KO	Understood, will comply
DESCEND	DEE- <u>SEND</u>	Descend for landing			
			CAN NOT	<u>KANN</u> NOTT	Unable to comply
YOU LAND	<u>YOU</u> LAAND	Land at this aerodrome	REPEAT	REE- <u>PEET</u>	Repeat your instruction
			AM LOST	<u>AM</u> LOSST	Position unknown
PROCEED	PRO- <u>SEED</u>	You may proceed			
			MAYDAY	MAYDAY	I am in distress
			HIJACK ³	<u>HI</u> -JACK	I have been hijacked
			LAND (place name)	LAAND (place name)	I request to land at (place name)
			DESCEND	DEE-SEND	I require descent

1 In the second column, syllables to be emphasised are underlined.
2 The call sign required to be given is that used in radiotelephony communications with air traffic services units and corresponding to the aircraft identification in the flight plan.
3 Circumstances may not always permit, nor make desirable, the use of the phrase 'HIJACK'.

- > **(f)** As soon as an air traffic services unit learns that an aircraft is being intercepted in its area of responsibility, it shall take such of the following steps as are appropriate in the circumstances:

 - > **(1)** attempt to establish two-way communication with the intercepted aircraft via any means available, including the emergency radio frequency 121,5 MHz, unless such communication already exists;
 - > **(2)** inform the pilot of the intercepted aircraft of the interception;
- > **(3)** establish contact with the intercept control unit maintaining two-way communication with the intercepting aircraft and provide it with available information concerning the aircraft;
 - > **(4)** relay messages between the intercepting aircraft or the intercept control unit and the intercepted aircraft, as necessary;
 - > **(5)** in close coordination with the intercept control unit take all necessary steps to ensure the safety of the intercepted aircraft;

EMERGENCIES

Interception procedures

- > **(g)** As soon as an air traffic services unit learns that an aircraft is being intercepted outside its area of responsibility, it shall take such of the following steps as are appropriate in the circumstances:
 - > **(1)** inform the air traffic services unit serving the airspace in which the interception is taking place, providing this unit with available information that will assist in identifying the aircraft and requesting it to take action in accordance with (f);
 - > **(2)** relay messages between the intercepted aircraft and the appropriate air traffic services unit, the intercept control unit or the intercepting aircraft.

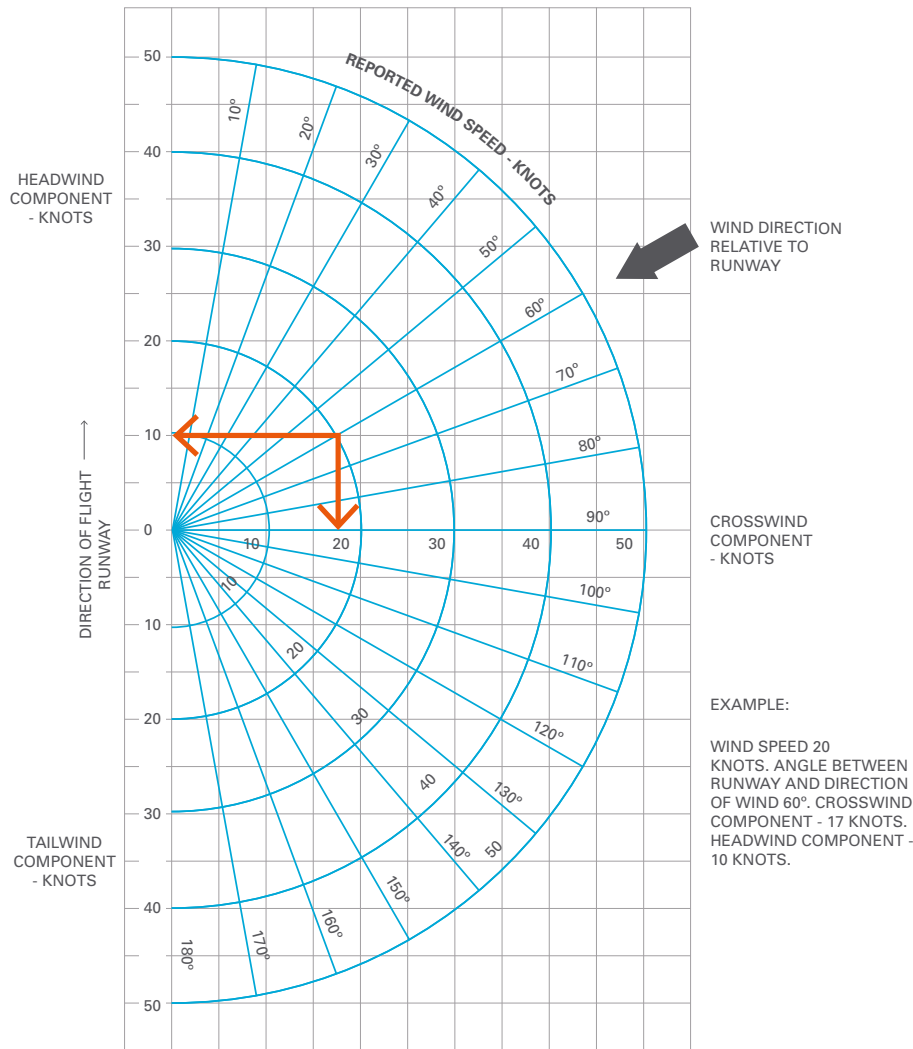


TABLES AND CODES

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TABLES AND CODES

Crosswind component



TABLES AND CODES

Distance, weight and volume

Conversion Table			
1 kg	= 2.205 lb	1 lb	= 0.454 kg
1 inch	= 2.54 cm	1 cm	= 0.394 in
1 foot	= 0.305 m	1 metre	= 3.28 ft
1 Imp gal	= 4.546 litres	1 litre	= 0.22 Imp gal
1 US gal	= 3.785 litres	1 litre	= 0.264 US gal
1 Imp gal	= 1.205 US gal	1 US gal	= 0.83 Imp gal

Weather abbreviations

These are relevant to TAFs, METARs and Metform 215.

AT At	CAT Clear air turbulence	CS Cirrostratus	FEW Few clouds (1-2 oktas)
AUTO Automated report	CAVOK Ceiling and visibility OK	CU Cumulus	FC Funnel cloud
BC Patches	CB Cumulonimbus	DEG Degrees	FG Fog
BECMG Becoming	CC Cirrocumulus	DP Dew point	FM From
BKN Broken clouds (5-7 oktas)	CI Cirrus	DR Drifting	FPM Feet per minute
BL Blowing	CLD Cloud	DS Dust storm	FRQ Frequent
BLW Below	CLR Clear	DU Widespread dust	FU Smoke
BR Mist	COR Correction	DZ Drizzle	FZ Freezing
BTN Between	COT At the coast	EMBD Embedded	G Gust

TABLES AND CODES

Weather abbreviations

GEN Generally	LSQ Line squall	MTW Mountain wave	PO Dust devils
GND Ground	LTG Lightning	NAT North Atlantic	PRFG Fog banks
GR Hail	LV Light and variable	NC No change	PROB Probability
GS Small hail/snow pellets	LYR Layer(s) layered	NCD No cloud detected (auto reports only)	PS Plus
H High pressure centre	M Less than 0° (temperature)	NDV No directional variation	PSYS Pressure system
HPA Hectopascals	M Less than lowest reportable RVR	NIL None	PY Spray
HZ Haze	M Metres	NM Nautical miles	RA Rain
IC Ice crystals	MAX Maximum	NOSIG No significant change	RMK Remarks
INTSF Intensifying	MI Shallow (for example mist or fog)	NS Nimbostratus	RVR Runway visual range
ISOL Isolated	MMN Minimum	NSC No significant cloud	RWY Runway
JTST Jet stream	MOD Moderate	N, S, E, W, NE, SW, SSW etc North, South, East, West, North East etc	SA Sand
KM Kilometres	MON Above or covering mountains	NSW No significant weather	SC Stratocumulus
KT Knots	MPS Metres per second	OCNL Occasional	SCT Scattered (3-4 oktas)
L Low pressure centre	MS Minus	OVC Overcast (8 oktas)	SEA At sea
LAN Inland (or over land)	MSL Mean sea level	PL Ice pellets	SEV Severe
LCA Locally			SFC Surface

TABLES AND CODES

Weather abbreviations

SG Snow grains	TROP Tropopause	WSPD Wind speed
SH Showers	TS Thunderstorm	WX Weather
SIG Significant	TURB Turbulence	Z Zulu Time (UTC/GMT)
SKC Sky clear	U Upward (tendency in RVR)	
SN Snow	UP Unidentified precipitation (auto reports only)	
SP Snow pellets	VA Volcanic ash	
SPECI Special report	VAL In valleys	
SQ Squalls	VC In the vicinity (of the aerodrome)	
SS Sandstorm	VIS Visibility	
ST Stratus	VRB Variable	
STNR Stationary	VSP Vertical speed	
T Temperature	VV Vertical visibility	
TCU Towering cumulus	WDSRP Widespread	
TEMPO Temporarily	WRNG Warning	
TL Until	WS Wind shear	
TOP Cloud top		

TABLES AND CODES

Morse code

Phonetic alphabet and Morse code			
Letter	Code	Word	Pronunciation
A	• –	Alfa	<u>AL</u> FAH
B	– •••	Bravo	<u>BRAH</u> VOH
C	– • – •	Charlie	<u>CHAR</u> LEE or <u>SHAR</u> LEE
D	– ••	Delta	<u>DELL</u> TAH
E	•	Echo	<u>ECK</u> OH
F	•• – •	Foxtrot	<u>FOKS</u> TROT
G	– – •	Golf	GOLF
H	••••	Hotel	HOH <u>TEL</u>
I	••	India	<u>IN</u> DEE AH
J	• – – –	Juliett	<u>JEW</u> LEE ETT
K	– • –	Kilo	<u>KEY</u> LOH
L	• – ••	Lima	<u>LEE</u> MAH
M	– –	Mike	MIKE
N	– •	November	NO <u>VEM</u> BER
O	– – –	Oscar	<u>OSS</u> CAH
P	• – – •	Papa	PAH <u>PAH</u>
Q	– – • –	Quebec	KEH <u>BECK</u>
R	• – •	Romeo	<u>ROW</u> ME OH
S	•••	Sierra	SEE <u>AIR</u> RAH
T	–	Tango	<u>TANG</u> GO
U	•• –	Uniform	<u>YOU</u> NEE FORM or <u>OO</u> NEE FORM
V	••• –	Victor	<u>VIK</u> TAH
W	• – –	Whiskey	<u>WISS</u> KEY
X	– •• –	X-ray	<u>ECKS</u> RAY
Y	– • – –	Yankee	<u>YANG</u> KEY
Z	– – ••	Zulu	ZOO LOO

TABLES AND CODES

Morse code

Phonetic alphabet and Morse code		
Numeral or numeral element	Code	Pronunciation
1	• - - - -	WUN
2	• • - - -	TOO
3	• • • - -	TREE
4	• • • • -	FOW-er
5	• • • • •	FIFE
6	- • • • •	SIX
7	- - • • •	SEV-en
8	- - - • •	AIT
9	- - - - •	NIN-er
0	- - - - -	ZE-RO
Decimal Thousand		DAY-SEE-MAL TOU-SAND



INTERNATIONAL FLIGHT

<i>Including:</i>	154 Foreign regulations and requirements	>
	155 Safety equipment and considerations	>
	155 Flight plans	>
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INTERNATIONAL FLIGHT

Venturing outside the UK will require knowledge of the requirements and considerations applicable to flying abroad.

It is worth doing a bit of general research into your intended destination and the experiences of others who have flown there. An up-to-date flight guide for the state will also contain a lot of useful information.

- > Many flying clubs or schools offer a so called 'cross-channel check flight' which will be a valuable exercise for understanding the additional considerations for flying abroad.
- > In general, the principles of pre-flight planning remain the same when flying abroad, although you should pay additional attention to NOTAMs and carefully read the AIP entries of the foreign aerodromes you are visiting.

Foreign regulations and requirements

Despite the general harmonisation of rules through ICAO and EASA, there are still some local variations. Some common ones to look out for include:

- > The European Aeronautical Database (EAD) is the common source of European AIPs – www.ead.eurocontrol.int.
- > Airspace equipage requirements, particularly for things like transponders, vary across Europe. GEN 1.5 of the relevant AIP is normally the best source of information for a particular state's requirements.
- > Throughout Europe the SERA should apply, however some national variations still exist. Check the subsections of ENR 1 of the relevant AIP for things like cruising levels and VFR at night.
- > Unlike the UK, many states make extensive use of class E airspace. The visibility and cloud separation minima for VFR flight are higher than in class G ([see p.58](#)). Know which airspace class you will be flying in.
- > Be familiar with the charts you are using and the meaning of the different symbols and airspace – fines for infringing danger areas can be very high.
- > The standard radio service to ask for enroute is normally the 'Flight Information Service' (FIS) – look for 'Information' frequencies on the charts to contact. Unlike the UK, most other states do not have subcategories of FIS such as 'Basic' or 'Traffic'.
- > VFR flight plans will normally need to be closed in most states. If landing at an aerodrome where this will not necessarily be done for you, know the number to call to close.

INTERNATIONAL FLIGHT

Safety equipment and considerations

> At smaller aerodromes the radio communications will likely be conducted in the local language. The aerodrome's AIP entry should indicate the languages used. Know the correct radio calls in the relevant language and only use these aerodromes if you are confident using and understanding the calls.

Flying abroad from the UK invariably involves crossing water. As a result you should consider the following:

- > Fly as high as possible when crossing water;
- > Wear lifejackets when crossing water;

- > Carry a life raft and be familiar with the procedures for using it;
- > For longer crossings and/or during times of lower sea temperatures, consider an immersion suit – it will increase your chances of survival in a ditching; and
- > It is a requirement for all EASA powered aircraft and balloons to carry an ELT or PLB, regardless of whether the flight is international or not. Other states may also apply this requirement to non-EASA aircraft.

More information on ditching considerations can be found in the CAA's safety sense leaflet on ditching. www.caa.co.uk/safetysense.

Flight plans

As was described in the Pre-flight planning chapter ([see p.50](#)), it is a requirement to file a flight plan for international flights. For more information on UK flight planning procedures, see [ENR 1.10](#) of the UK AIP. If using the flight planning facilities of another state, ENR 1.10 of the relevant AIP should be consulted.

FILING

Most flight plan filing is now done online, either using the Assisted Flight Planning Exchange Service (AFPEX) or other online and tablet computer-based flight planning services. These systems interface with the Aeronautical Fixed Telecommunication Network (AFTN). It is worth doing some research into which online platform you find easiest to use.

- > More information on AFPEX and registering to use the system is available at www.flightplanningonline.co.uk. There is a helpdesk service available for AFPEX through the Civil Aviation Communications Centre (CACC) at Swanwick on **01489 612792** or **0845 6010483**.

- > If for some reason you are unable to access the internet and are not at an airfield with an ATSU capable of submitting your FPL, you may fax it to the CACC at Swanwick on **01489 612793**.
- > A flight plan should be filed 60 minutes or more prior to the estimated off-blocks time.
- > If filing a plan prior to the day of the flight you should include the date of the flight in item 18 of the FPL form – for example DOF/070922 would be 22nd September 2007.

INTERNATIONAL FLIGHT > FILING

Flight plans

- > If you are delayed by more than 30 minutes from the filed departure time, you must submit a delay message, either through the ATSU, AFPEX or failing that, to the AFPEX helpdesk.
- > It is possible to file a full flight plan in-flight through London or Scottish Information, but this is best avoided due to the amount of information needed to transmit. 'I wish to file an airborne flight plan' is the correct way of phrasing the initial request.

ADDRESSING

Addressing is the mechanism by which the relevant FIR authorities and ATSUs for your flight receive your flight plan. It is done by entering certain addressing codes at the top of the flight plan form.

It is recommended that you follow the guidance available for addressing in AFPEX at www.flightplanningonline.co.uk and in the online flight plan form itself. This will aid addressing the flight plan correctly to those units connected to the AFTN. As a general rule, flight plans should be addressed to:

- > Departure, destination and alternate aerodromes – ICAO code followed by ZTZ (for example EGKKZTZ would be Gatwick);
- > In the UK, the London FIR – EGZVFR and/or Scottish FIR – EGZVFRP;
- > For certain UK destinations, specific additional addressees listed in [ENR 1.11](#) of the UK AIP;
- > Any other ATSUs en-route you wish to make aware of your flight; and
- > Any foreign FIRs that you are passing through.

Further specific addressing details can be found in section ENR 1.11 of the AIP for the relevant state.

FORM COMPLETION AND ROUTING

There is further guidance available on the AFPEX website for completion of the FPL form. Follow links to help and training at www.flightplanningonline.co.uk. In general, the flight plan routes should be described using:

- > Waypoints, VORs or bearings and distances from them – e.g. DVR16010, which indicates a position 160° and 10 NM from DVR VOR; or
- > Lat/Long positions such as 5114N00122W.

These points should generally be not more than 30 minutes flying time apart. Do not use aerodrome designators.

In the case of crossing the FIR boundary into/ from French airspace, the crossing point (for example ORTAC is a common one) should be included in the route, and the elapsed flight time to the FIR boundary included in Item 18 of the FPL form. For example, EET/LFFF0145 would indicate you planned to cross into the relevant Paris FIR 01:45 minutes into the flight.

INTERNATIONAL FLIGHT

Flight plans

ACTIVATION AND CLOSURE

Flight plan messages are distributed via the AFTN. Assuming the destination aerodrome is connected to it, filing a flight plan makes the relevant ATSU aware of an inbound aircraft.

After filing, a VFR flight plan needs activating on departure. If departing from an aerodrome with an operating ATSU, they should be able to activate it for you, assuming they are connected to the AFTN; if in doubt simply ask before departure. If not you may:

- > Ask another ATSU to do so over the radio (subject to their capacity), for example London or Scottish Information; or
- > Nominate someone to activate it after you have departed by phoning the AFPEX Helpdesk.

Once the departure message has been received, the destination aerodrome calculates the aircraft's estimated time of arrival (ETA).

Procedures relating to flight plan closure vary depending on where you are landing:

- > In the UK, if you land as planned at your destination, the ATSU at the aerodrome should close the flight plan for you.
- > If you fail to arrive or make communication, the ATSU will start overdue action after 30 minutes beyond the ETA. If you land at another aerodrome you must inform your original destination otherwise they may commence overdue action.

- > In the UK, if arriving outside the hours of operation of the destination aerodrome's ATSU, or if there is no ATSU connected to the AFTN, then overdue action will **not** be initiated in the event of failure to arrive. It is therefore strongly recommended to nominate someone who will phone the AFPEX Helpdesk in the event of you failing to arrive when planned – this is sometimes referred to as nominating a 'responsible person'.
- > Outside the UK, if arriving at an aerodrome without an active ATSU, it is usually a requirement for the pilot to close the flight plan with the parent ATSU or regional flight planning office. Unlike in the UK, overdue action may be initiated if this has not been done. Contact details can normally be found in ENR section 1.10 of the AIP for the relevant state, or in commercially available VFR flight guides.

INTERNATIONAL FLIGHT

Documents

Depending on the type of aircraft you are flying, the requirements may vary. The following list will generally cover everything that would be required under EASA or ICAO regulations:

- > Approved Flight Manual;
- > Original Certificate of Registration;
- > Original Certificate of Airworthiness (or permit to fly);
- > Noise certificate;
- > Aircraft radio licence;
- > Insurance certificate;
- > Journey log;
- > Flight plan details;
- > Current charts;
- > Interception procedures;
- > Minimum Equipment List (if you operate with one);
- > Operating permission (if applicable);
- > Flight crew licences; and
- > Passports for all onboard.

Particularly if flying an aircraft based in Europe, but not on the registry of a European state, you are recommended to also carry details of the aircraft being in 'free circulation' with all taxes such as VAT appropriately paid.

INTERNATIONAL FLIGHT

Customs, immigration and police

UK REQUIREMENTS

If making an international flight to or from the UK, or within the Common Travel Area, you will likely have to notify the Border Force and/or police (often referred to as 'Special Branch'). This is done using the General Aviation Report (GAR) form, either via the online portal or by emailing it to: ncu@hmrc.gsi.gov.uk (National Co-ordination Unit).

The GAR form includes details of the aircraft, flight and those onboard. It satisfies customs, immigration and police (when applicable) requirements.

Full details of the requirements, GAR form submission and the associated guidance can be found at www.gov.uk/government/publications/general-aviation-operators-and-pilots-notification-of-flights.

For planning purposes you should anticipate having to submit a GAR form:

- > Four hours in advance of arrival into the UK from an EU state;
- > 12 hours in advance of an arrival or departure of a flight between the UK and the Republic of Ireland, Channel Islands or Isle of Man. Flights between Northern Ireland and the UK mainland must also be notified. These are requirements under the Terrorism Act 2000; and
- > 24 hours for any arrival from or departure to a non-EU country.

For flights to and from the EU, there are generally no restrictions on where you can arrive and depart from the UK. For other destinations you will need to use an aerodrome that has at least a 'Certificate of Agreement' for customs and immigration purposes. Full details of this can be found in the general aviation report guidance linked above.

There is a phone number (+44 (0) 845 723 1110) to contact the Border Force in the event of certain flights or changes to flights outside the GAR reporting periods:

- > Medical emergency of a pilot or passenger;
- > Air Ambulance with critical passengers;
- > Other emergency requiring a change to information contained within a previously submitted GAR; or
- > Last minute changes to a previously submitted GAR, when changes to online version are not possible.

The number is not for use by flights subject to the Terrorism Act 2000.

FOREIGN REQUIREMENTS**

When arriving into a foreign state from the UK, you will normally have to use an aerodrome that is designated for customs and/or immigration purposes. Details of this can be found in the AIP entry for the relevant foreign aerodrome. At smaller aerodromes they are often available with a minimum prior notification period.

When travelling within the Schengen area in Europe there is generally no requirement to land at designated aerodromes, however member states do have the right to implement border controls in response to specific events or threats, so check the current situation before planning a flight.

It is also a requirement when leaving most states, including the Schengen area, to depart from a designated aerodrome and give any prior notice of your departure that may be required at that aerodrome.

****subject to agreements in place with other country's this information may not be valid post March 29th 2019. Please ensure you check with the relevant authority.**

INTERNATIONAL FLIGHT

Non-ICAO compliant aircraft or pilot licenses

If you are flying an aircraft that does not have an ICAO-compliant certificate of airworthiness, you may need to seek the permission of the relevant states before flying outside the UK. This normally includes microlights (sometimes known as ultralights in other states), amateur builds or aircraft that formally held an ICAO certificate but now fly on a national permit to fly. In the UK these often collectively known as 'permit aircraft'.

Many amateur built aircraft may be flown internationally within Europe under the relevant European Civil Aviation Conference (ECAC) agreement. However, implementation of this is not consistent throughout Europe and some states still require individual permissions. You must check the requirements of the relevant state before flight. The following GA associations compile information on flying permit aircraft internationally, although it cannot be guaranteed that the information is completely accurate or up to date:

- > European Microlight Federation
– www.emf.aero;
- > British Microlight Aeroplane Association – www.bmaa.org; and
- > Light Aircraft Association – www.lightaircraftassociation.co.uk.

If flying on a non-ICAO compliant pilot's licence or medical declaration, you will also likely need the permission of the relevant state before flying outside the UK. For example, an ICAO medical certificate is required to fly most powered aircraft outside the UK.

Many states have a validation process for ICAO compliant pilot licensing when operating aircraft registered within an EU member state.

An EASA permit to fly is valid in any EASA member state, as is an EASA LAPL and associated medical. However, if flying outside of an EASA member state they will not be automatically recognised, since they do not meet ICAO standards.

If required by the state being overflown or visited, you must carry the permission with you at all times.



FINDING OUT MORE

<i>Including:</i>	162 Airspace	>
	163 Safety	>
	164 Regulatory	>

INFORMATION

Finding out more

The Skyway Code was never going to be able to cover everything a GA pilot might need to know. In addition to the information it contains, there is a huge amount of additional material produced either by the CAA or other aviation organisations. Some of the main ones are listed below.

AIRSPACE

Airspace & Safety Initiative (ASI) – airspacesafety.com

The Airspace & Safety Initiative (ASI) is a joint CAA, NATS, Airport Operators Association (AOA), GA and MoD project to investigate and tackle the major safety risks in UK airspace.

The initiative aims to encourage good practice for all pilots, to help reduce airspace incidents such as infringements of controlled airspace.

Fly on Track – www.flyontrack.co.uk

Fly on Track is an independent website for private pilots, covering airspace infringement issues. The site is run on behalf of GASCo and is part of the Airspace & Safety Initiative.

Airspace for All – www.airspace4all.org

Airspace for All was originally launched under the name Future Airspace Strategy VFR Implementation Group (FAVFIG) in 2011 with its initial focus on improving the efficiency of CAT in CAS through an industry Implementation Group (FASIIG). To deliver the vision of the FAS to other airspace users a FAS VFR Implementation Group (FASVIG) was formed in 2012. Its objective is to develop a FAS VFR Deployment Plan to deliver tangible benefits for VFR users from 2015 to 2020 and to establish a sustainable future for VFR operations.

The CAA is also increasingly moving towards the use of electronic communication and publications. For the latest news and regulatory updates, download the SkyWise App (skywise.caa.co.uk); this provides notifications of things like airspace restrictions, new regulations or publications and can be tailored to your particular type of flying.

Radiotelephony Manual – www.caa.co.uk/cap413

The UK Radiotelephony Manual (CAP 413) aims to provide pilots, Air Traffic Services personnel and aerodrome drivers with a compendium of clear, concise, standard phraseology and associated guidance for radiotelephony communication in United Kingdom airspace.

UK Flight Information Services – www.caa.co.uk/cap774

The UK Flight Information Services (CAP 774) details the suite of air traffic services (ATS) which (excluding aerodrome services) are the only services provided in Class G airspace within the UK Flight Information Region (where notified, elements of the UK FIS are also provided to aircraft operating in Class E airspace). Therefore, this document is equally applicable to civilian and military pilots, air traffic controllers, and Flight Information Service Officers. There is a supplementary leaflet – www.caa.co.uk/cap1434.

Airspace infringements: Review and remedial actions process – www.caa.co.uk/cap1404

If you do end up infringing airspace, the approach for the CAA dealing with this is set out in CAP 1404. The process is designed to focus on lessons learnt and apply proportionate and appropriate remedial action.

INFORMATION

Finding out more

Electronic conspicuity devices

– www.caa.co.uk/cap1391

The Electronic Conspicuity (EC) CAP explains the benefits of EC in terms of reducing the safety risk of airborne conflict between GA in UK uncontrolled airspace. It sets out the required minimum technical specification and explains the regulatory approach manufacturers need to follow for portable EC devices to be legally used on board aircraft in uncontrolled UK airspace.

SAFETY

General Aviation Safety Council

(GASCo) – www.gasco.org.uk

GASCo was originally formed in 1965 and aims to:

- > Collect, collate and disseminate flight safety information among users of UK registered general aviation aircraft; and
- > Study all matters affecting, or which might affect, flight safety in UK general aviation and to make recommendations to interested parties, as necessary.

Some of GASCo's activities involve the conduct of Safety Evenings on behalf of the CAA, the publication of safety information and a quarterly magazine devoted to GA flight safety issues.

Air Accident Investigations

Branch – www.aaib.gov.uk

The Air Accidents Investigation Branch (AAIB) investigates civil aircraft accidents and serious incidents within the UK, its overseas territories and crown dependencies. The results of investigations are published and available on the AAIB's website.

CHIRP – www.chirp.co.uk

Confidential Human Factors Incident Reporting Programme (CHIRP) is an independent flight safety reporting programme, the aim of which is to contribute to the enhancement of flight safety in the UK's commercial and general aviation industries.

CHIRP publish 'GA Feedback' on their website which contains reports submitted by personnel involved in aviation that highlight safety issues encountered during operations.

Clued Up – www.caa.co.uk/ga

Clued Up magazine is produced on behalf of the CAA and brings you the latest news in aviation safety, topical issues, advice and contribution from pilots, air traffic controllers and safety experts from the across the UK's General Aviation community. From the CAA's GA homepage, click on 'Safety guidance and resources'.

CAA Safety Sense

– www.caa.co.uk/safetysense

CAA Safety Sense leaflets cover a wide variety of safety and operational topics, many to a level of detail beyond that covered in the Code.

GetMet – www.metoffice.gov.uk/aviation/ga

Produced in association between the Met Office and the CAA, this free booklet provides essential information on where to get your met data to safely enjoy low-level flying, both in the UK and near Europe.

INFORMATION

Finding out more

REGULATORY

CAA useful links

- > GA Unit – www.caa.co.uk/ga – contains a wealth of regulatory information, including current ‘hot topics’ of interest.
- > For particular topics, specific URLs will be set up, such as www.caa.co.uk/nco for the introduction of Part-NCO.
- > CAA consultations – www.caa.co.uk/consultations
- > CAA publications – www.caa.co.uk/publications
- > ‘CAPs’ can be found by entering the URL as www.caa.co.uk, forward slash the number of the CAP you are looking for. For example: www.caa.co.uk/capXXXX
- > Air Navigation Order (CAA consolidation) – CAP 393 – www.caa.co.uk/cap393
- > Official Record Series 4 – www.caa.co.uk/ors4 – ORS4 contains all general (not individual) permissions and exemptions that are made either against or pursuant to the ANO or European regulations. An example of this are the ‘SERA permissions’, which set out areas in which the UK has exercised national discretion under SERA.

EASA regulations and documents

- > EASA regulations – www.easa.europa.eu/regulations – EASA organise regulations by functional area, such as airworthiness or flight crew licensing. Look for the ‘Easy Access’ consolidations that include amendments, Acceptable Means of Compliance (AMC) and Guidance Material (GM).
- > EASA rulemaking documents – www.easa.europa.eu/document-library – EASA places rulemaking documents such as ‘notices of proposed amendments’ (NPAs – essentially consultation documents) and ‘Opinions’ (draft regulations post consultation but prior to enactment) under the ‘document library’ section of their website.

Aeronautical Information Service – www.ais.org.uk

AIS is the main source of information relevant to air navigation in the UK, containing the Aeronautical Information Publication (AIP), Aeronautical Information Circulars (AIC) and NOTAMs. Airspace details and procedures can generally be found in the ENR section, with aerodromes in the AD section.

European AIS Database
 – www.ead.eurocontrol.int

Contains online versions of European AIPs. Requires a login to be created.