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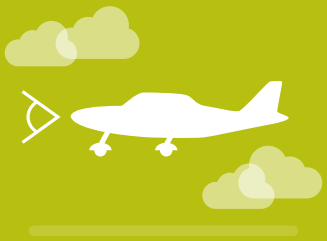
UK Civil Aviation Authority



FLIGHT UNDER VFR

VISUAL FLIGHT RULES

SAFETY SENSE

SS05

YOUR SAFETY SENSE LEAFLET FOR:
FLIGHT UNDER VFR

This Safety Sense Leaflet is intended to provide guidance to General Aviation pilots planning and flying under Visual Flight Rules (VFR). It is primarily written for the aeroplane and helicopter audience, but pilots of all GA aircraft will find it useful.

It should be read in conjunction with the CAA's *Skyway Code* and other SSLs.

FLIGHT UNDER VFR

Before the Flight

Under Part-NCO and the Air Navigation Order[1], pilots have legal obligations to ensure that the flight can be safely conducted.

You should develop a process for pre-flight planning that includes items such as checking personal licence validity, aircraft serviceability, weather and NOTAMs. The *Skyway Code* includes a suggested checklist and pilots are encouraged to use and adapt this for their own requirements.

As pilot in command, you must also consider whether you are 'Fit to Fly'. This includes factors such as physical and mental wellbeing and how proficient or current you are for the planned flight.

Before conducting detailed planning for a particular destination, it is recommended to conduct an initial check of the weather and NOTAMs for any obvious issues such as a poor weather, air show activity or aerodrome closures. If planning a flight to another aerodrome, check for prior permission required (PPR).

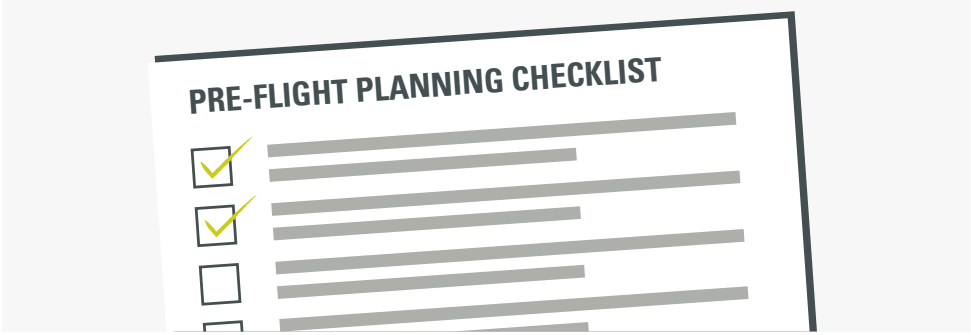
Flight planning should be done in a quiet environment that is free from distraction. If it has been a while since you last flew, you may need extra time to remind yourself of certain procedures or items to be checked.

Even for local flights avoid the temptation to 'just get airborne' – particularly in the summer factors such as temporary restricted areas (RA(T)) or afternoon thunderstorms can be a threat if not anticipated in advance.

Threat and Error Management

The CAA advocate a 'Threat and Error Management' (TEM) approach to flight planning and execution. TEM is about the timely detection of threats, errors or an undesired aircraft state and an appropriate response that maintains safe flight.

Threats might be uncertain weather or complex airspace, so think about how to mitigate them. Possible errors in the execution of the flight, such as aircraft configuration or navigation, should also be considered. A systematic approach to the different stages of the flight and the use of checklists will reduce the likelihood of errors.



[1] Part-NCO of the UK Air Operations Regulation applies to Part 21 aircraft. The Air Navigation Order applies to non-Part 21 aircraft.

FLIGHT UNDER VFR

Before the Flight

Weather

You must determine that the cloud base and visibility are suitable for the intended flight. The safe minimum will vary depending on factors such as terrain or obstacle elevation. Enroute flight below 1,500 ft AGL is not recommended, since it will make visual navigation challenging and you may encounter low flying military aircraft. It also reduces terrain clearance and increases the risk of obstacles such as high masts.

Review the departure and destination weather, but also build a picture of the weather enroute. The **'Metform 215'** chart is a good source for the wider weather picture. It depicts different weather systems and their associated conditions across the UK. The Met Office aviation briefing service is available online.

Review a selection of TAFs and METARs for aerodromes along the route and remember to account for elevation differences when considering the reported cloud levels. If using third party weather data, it is important to understand the source of the information and how any forecasts have been derived. Often weather data will be repackaged from elsewhere or may be derived from interpolations and models that have not been verified by a human forecaster.

A basic understanding of the conditions associated with different weather systems, such as cold and warm fronts, will be helpful. If flying towards a warm front, you will likely encounter a lowering cloud base. A cold front will bring unsettled and showery weather with good visibility, but the location and development of showers will be unpredictable.

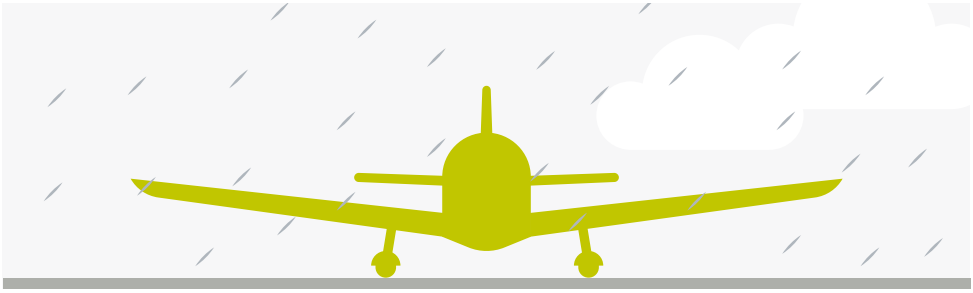
NOTAMs

You must check NOTAMs before flight. Further details of temporary changes can be found in AIP supplements.

When using the NATS Internet Briefing Service it is recommended to use the 'narrow route', 'point' and/or 'aerodrome' brief functions (as appropriate to the flight profile) to focus in on relevant information. If using a graphical software NOTAM brief, ensure it is updated and understand any 'layers' within the information presented to ensure you do not miss important detail.

Carefully review items such as times, altitudes and operational information in NOTAMS. There may be contact phone numbers for more tactical information on the activity.

! Calling **08085 354802** provides a useful check on short term airspace restrictions or reclassifications.



FLIGHT UNDER VFR

Before the Flight

Fuel

For Part-21 aircraft, Part-NCO specifies minimum fuel reserves above the amount required to fly the intended route:

- Aeroplanes:
  - Day, if remaining within sight of the aerodrome and returning to that aerodrome – 10 mins
  - Day – 30 mins
  - Night – 45 mins

- Helicopters:
  - 20 minutes

Aeroplane reserves are computed at 'normal cruising altitude' and for helicopters 'best range speed'. These should be regarded as minimums for fuel carriage. It is important to know your anticipated fuel burn at different cruise power settings.

For non-Part 21 aircraft, the Air Navigation Order does not specify reserves, only that all quantities of fluids required, such as fuel and oil are sufficient for the flight and any reasonable contingencies.

W&B and Performance

It is a legal requirement that the aircraft remains within its specified weight and balance envelope throughout the flight. Know how to calculate W&B for your aircraft and accurately determine the weight of people and other items onboard.

You should also check your takeoff and landing performance. For example, have you accounted for factors such as extra weight, a possible wet runway or a high density altitude? The *Skyway Code* and SSLs 7 - 'Aeroplane Performance' and 9 - 'Weight & Balance' contain more information.

Planning the route

It is a legal requirement to carry suitable and current charts for navigation. While these may be electronic, the CAA recommend you carry a paper chart as a backup.

The CAA strongly recommend pilots make effective use of moving map devices when flying VFR. These must have current aeronautical data and be integrated into the planning and execution of the flight. For more information see SSL 29 - 'VFR Moving Map Devices'.

It is also recommended to review and mark the route on a paper 1:500,000 or 1:250,000 scale VFR chart, to act as a backup and additional source of information for planning the flight.

When reviewing the route, you should look for airspace hazards, high ground and obstacles. Take account of the hazards in your planning, for example if the cloud base may be lower than forecast, a route further away from high ground will be preferable.

A formal 'minimum safe' altitude is not a legal requirement for VFR flight, but you should establish altitudes for the intended route or area of operation, below which you will not continue the flight. You should have alternatives planned should the weather prove unsuitable to continue.

Note that the 'Maximum Elevation Figures' (MEF) on VFR charts are just the highest terrain or obstruction thought to be present within the specified area. The MEF does not include a margin and is not a minimum safe altitude.

FLIGHT UNDER VFR

Before the Flight

Even if using a moving map display, you should still identify prominent ground features along the route and/or 'visual reference points' (VRPs), which may be needed for ATC co-ordination when transiting controlled airspace or arriving at an aerodrome.

Plan to fly as high as practical, subject to airspace and performance limitations. Also consider flying at randomised altitudes rather than always picking round numbers for cruise. Note that when flying outside the UK, adherence to the ICAO VFR cruising levels may be a requirement, especially if flying in class E airspace.

Pilot's Log

The production of a Pilot's Log ('PLOG'), either electronically or on paper, for the flight is recommended. A PLOG should consist of:

- Timings and headings for each leg
- Details of radio frequencies
- Planned altitudes
- Safety altitudes
- Fuel plan

If using a moving map device and/or electronic flight planning software, the format may differ from a traditional PLOG, however the basic information should be similar and readily available in flight. All calculations should be sense checked for any obvious mistakes, such as confusion of headings to fly (for example 030° vs 300° or similar).

Airspace Features and Hazards

The *Skyway Code* contains information on most airspace features and hazards likely to be encountered under VFR flight. You must ensure you are familiar with the applicable operating rules for controlled airspace and other airspace reservations.

Some common ones to be aware of:

- Class D airspace 

- Danger areas 
- Restricted/Prohibited areas 
- Glider sites 

- Parachuting 
- Radio or Transponder Mandatory Zones (RMZ/TMZ) 
- Military Air Traffic Zones 
- Instrument approaches outside of controlled airspace 

Features such as glider launch sites should be avoided, but for others it may be possible to transit with the appropriate clearance or information. For controlled airspace or other areas requiring a clearance to enter, you should always have a 'plan B' route in case a clearance is not available.

When planning routes around airspace hazards, consider both vertical and lateral options, including any ground features that will assist visual avoidance.

If reviewing hazards on a VFR moving map device, ensure that all available information is reviewed – for example vertical dimensions or hours of operation may be hidden in 'layers' of information.

FLIGHT UNDER VFR

Visual Flight Rules

Know your Rules of the Air. See the *Skyway Code* for more details – the Rules of the Air are derived from the 'Standardised European Rules of the Air' (SERA, as in force in the UK) and the Rules of the Air Regulations 2015.

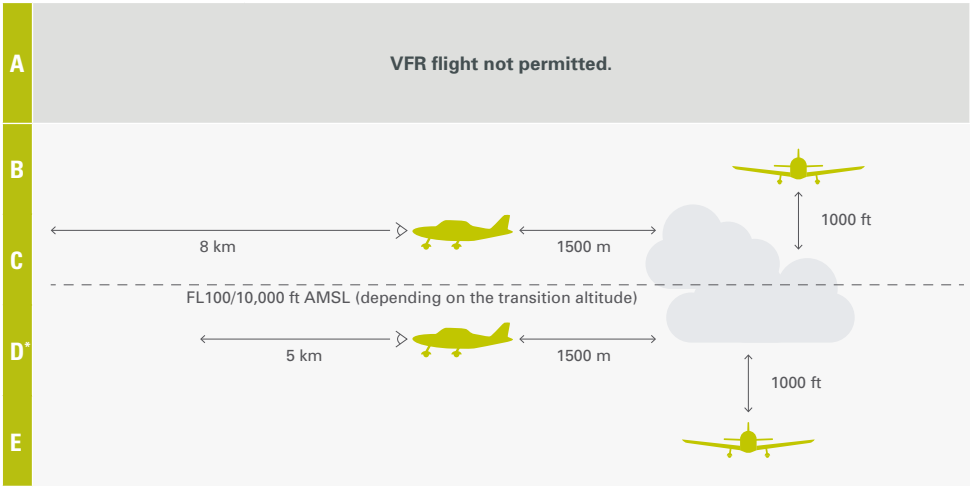
Part-NCO and the Air Navigation Order specify that you must only commence a VFR flight if the available weather information indicates that conditions will be at or above the applicable VFR minima for departure, enroute and the intended destination.

VFR flight requires that you remain in 'Visual Meteorological Conditions' at all times. The assumption of VFR flight is that you have enough visibility to control the aircraft by visual references and avoid collisions with terrain and other aircraft.

You may only fly under Instrument Flight Rules (IFR) or in 'Instrument Meteorological Conditions' if appropriately qualified with an Instrument Rating or IMC Rating. The aircraft must also be approved for flight under IFR.

Special VFR is available in some circumstances if you wish to operate below normal VFR minima in controlled airspace, see the 'Airspace' section of the *Skyway Code* for more details.

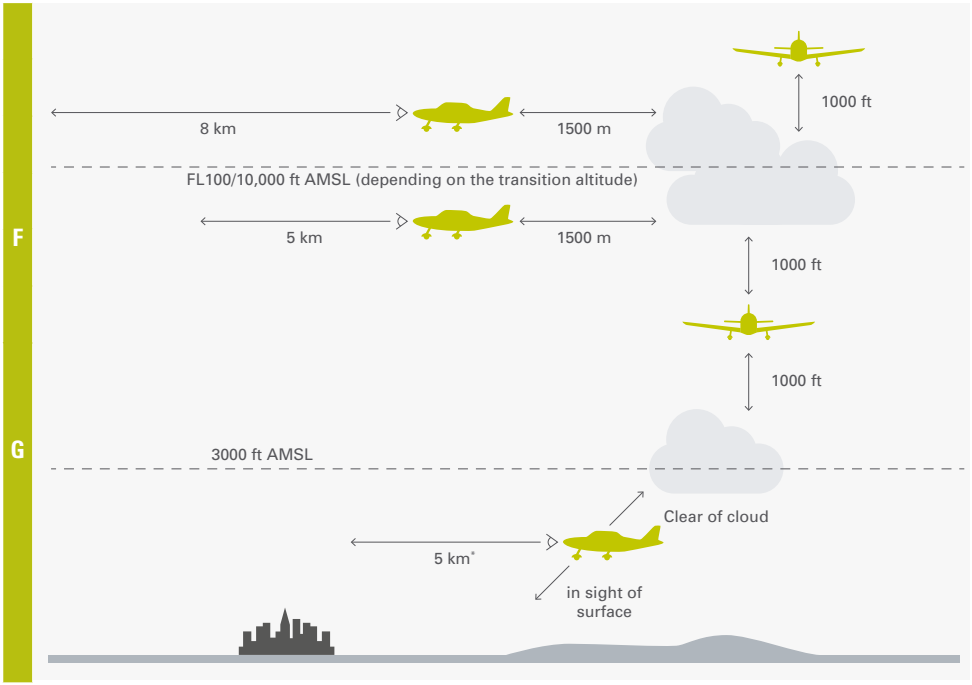
SERA VMC MINIMA



***Class D exemption:** Under the following circumstances you may fly 'clear of cloud' in class D airspace, without complying with the specific cloud separation distances: 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. Note this is a UK difference from Part-SERA as applies within the EU.

FLIGHT UNDER VFR

Visual 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

VFR is not permitted in class A airspace, inclusion of VMC minima is for reference only.

***5 km:** In the UK this may be reduced to 1500 m if flying by day, in sight of the surface and at 140 kts IAS or less. This may vary in other states.

****Class D exception:** Under the following circumstances you may fly 'clear of cloud' in class D airspace, without complying with the specific cloud separation distances: 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. Note this is a UK difference from Part-SERA as applies in the EU.

FLIGHT UNDER VFR

During the Flight

Around 80% of the time you should be looking outside the cockpit, particularly scanning for other aircraft. Guidance on conduct of the visual scan can be found in SSL 13 - Collision Avoidance and the *Skyway Code*.

The CAA encourage the use of 'Electronic Conspicuity' (EC) devices to assist with the visual identification of potentially conflicting traffic. Users must understand how to configure the devices correctly and the individual functions and limitations.

You should be setting the aircraft's flight attitude visually, without constantly referring to the instruments. Before changing altitude or turning, visually scan the sky in the direction you are going. In the climb you should periodically make small turns from side to side to check for traffic hidden by the nose. In a high wing aircraft, raise the wing and check for traffic to the side or above you, before initiating a turn.

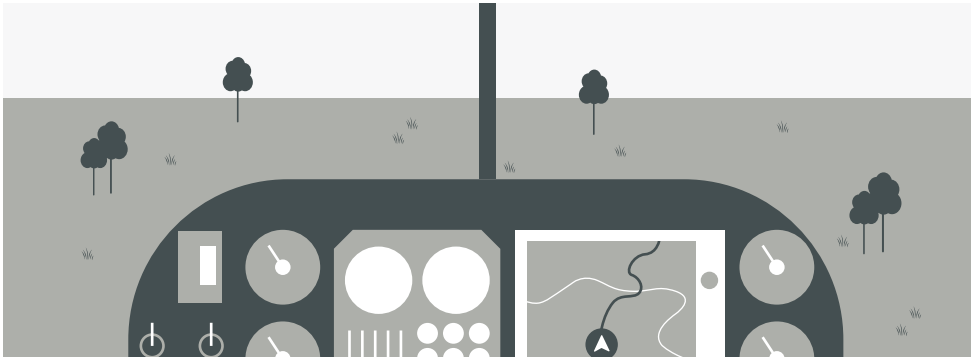
Monitor your position on your VFR moving map device but do not become fixated inside the cockpit. Avoid track crawling or 'chasing the magenta line' – adopt a steady heading and monitor your track from time to time. If you need to correct your track, select a new heading as required.

FREDA checks

'FREDA' is a useful acronym for periodically checking the status of the flight and aircraft. Conduct the check at significant turning points of the route or approximately every 10 minutes:

- **Fuel:** check fuel consumption against plan, do you need to change tank selection?
- **Radio:** are you still on the most appropriate frequency, is the transponder set correctly?
- **Engine:** check temperatures and pressures, apply carb heat as required.
- **Direction:** is the Direction Indicator synchronised, is your heading correct?
- **Altimeter:** are you still at the correct altitude and using the most appropriate altimeter setting?

You should normally fly on the most relevant QNH figure available, particularly if transiting close to the vertical limits of controlled airspace. Exercise caution when below areas of controlled airspace defined by a flight level (FL) - there is risk of vertical airspace infringement when the QNH is low. Only use the 'Regional Pressure Setting' (RPS) if no other relevant setting is available. The RPS is the lowest likely pressure in the setting region, so your altimeter will normally underread when set to the RPS.



During the Flight

UK Flight Information Services

Make use of the UK Flight Information Services where appropriate.

A review of the 'Lower Airspace Radar Service' (LARS) coverage will indicate which units to contact when outside of controlled airspace. Other air traffic units may be able to provide a service, subject to capacity. Details are available in the AIP, the *Skyway Code* and commercial fight guides.

Know the differences between a 'Basic' and 'Traffic' service.

- **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.

For more guidance on radio telephony and Air Traffic Services outside controlled airspace, see CAP 413, CAP 774, CAP 1434 and the *Skyway Code*.

Frequency Monitoring Codes

If not in contact with an ATS unit, it is recommended to monitor an appropriate frequency and set the applicable 'Frequency Monitoring Code'. Details can be found in the AIP (ENR 1.6), via the Airspace & Safety Initiative and the *Skyway Code*.

Controlled Airspace

Controlled airspace (CAS) should not be seen as something to automatically avoid. If advantageous to do so, request an appropriate transit.

The most common category of controlled airspace in the UK is class D, although you may also encounter some class C and E. Know the applicable rules and procedures.

Always have a 'plan B' should a transit not be available. If not intending to transit CAS, fly an appropriate margin from the edge – the CAA recommend 'Take 2' (2 NM horizontally or 200 ft vertically). The margin will reduce the risk of infringement should you be distracted or encounter turbulence.

For guidance on correct radio telephony for transiting controlled airspace under VFR, see SSL 22 - Radio Telephony, CAP 413 and the *Skyway Code*.

If you are denied access to airspace and/or the requested air traffic service is not available, you may fill out the FCS 1522 – UK Airspace Access or Refusal of ATS Report. The CAA use information to review whether airspace is being serviced appropriately.

FLIGHT UNDER VFR

During the Flight

Destination Aerodrome

Follow any local arrival procedures. Make radio contact in good time (around 10 minutes in advance) and obtain the local weather and information such as runway in use and traffic circuit direction.

If no local joining procedure is published, use the standard overhead join, although other joins are acceptable if traffic conditions permit.

See SSL 6 - Aerodrome Sense and the *Skyway Code* for more guidance on aerodrome operations.

Post Flight

Review what went well on the flight and what could have been improved – consider making notes for future reference. If your VFR Moving Map device or aircraft avionics have a flight recording function, consider using this to assist the review. If there were any surprises or errors made, are there ways to avoid these in the future? Was your flight planning effective? If anything occurred that was unexpected and threatened safe flight, could it have been anticipated?

SUMMARY

- ☐ Check weather and NOTAMs
- ☐ Are you fit to fly?
- ☐ Consider threats and errors
- ☐ Be aware of airspace hazards
- ☐ Use Air Traffic Services as appropriate
- ☐ React to changing weather conditions
- ☐ Follow published arrival procedures