

Airspace Infringement Prevention

Shoreham – 20 June 2022



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CAA Airspace Infringement Lead



Background



- What is an infringement:
 - An airspace infringement is the unauthorised entry of an aircraft into notified airspace.
 - controlled airspace,
 - prohibited and restricted airspace (permanent and temporary),
 - active danger areas (permanent and temporary),
 - aerodrome traffic zones,
 - radio mandatory zones and transponder mandatory zones.
- All infringements are reportable by ANSP in accordance with EU376/2014 and EU2015/1018.
- Pilots of UK Part 21 aircraft are required to report via an MOR.
- Pilots of non UK Part 21 aircraft are encouraged to submit MOR.
- All airspace infringement MOR are reviewed under a Just Culture

Background - Factors Contributing to Airspace Infringements



- Pilot action/inaction
- ATM action/inaction
- Airspace
- Aeronautical Information (regulated)
 - Charts
 - NOTAM
 - AIP
- Aeronautical Information (unregulated)

Background - Causal/Human Factors




- Ineffective/lapses in Threat and Error Management (TEM):
 - Distraction.
 - Weather ('press-on-itis').
- Lapses Pre-flight planning/preparation:
 - Route planned too close to CAS.
 - Insufficient knowledge of sources of correct briefing material.
- Skill fade leads to:
 - Pilot overload.
 - Degraded aircraft handling.
 - Loss of essential theoretical knowledge.
- Incorrect use of VFR Moving Maps:
 - Insufficient training.
 - Overreliance on/incorrect use of them.
 - Specific Threat and Error Management.

Prevention Measures 1

Threat and Error Management



- **Threats** are events or things that occur outside your control which require your attention if safety is to be maintained. They are beyond the influence of you as the pilot and they increase the complexity of the flight e.g:
 - Distraction
 - Airspace
 - Student performance
 - Weather
 - Fatigue/stress
- **Errors** are actions or inactions that lead to the unwanted or unsafe deviation from the plan e.g:
 - Insufficient planning
 - Incorrect altimeter setting
 - Unsynchronised Direction Indicator
 - Insufficient student monitoring
 - Decision not to operate with a VFR Moving Map

 Avoiding airspace infringements using
Threat & Error Management

Airmanship is the art of applying your skill and knowledge to flying. A practical and easy way of doing this is to apply Threat and Error Management (TEM) to manage risk. Factors likely to be encountered on the ground and in the air. In this card we look at how TEM can be used to prevent airspace infringements.

TEM is the process of being alert to potential threats and identifying and managing any that occur. Understanding TEM will enable a pilot to think and plan, in advance, for the eventualities that can lead to airspace infringement. By spending time on the ground, on flight, to consider these factors you will be better prepared for many of the things that can wrong in the air.

THREAT → **AIRSPACE INFRINGEMENT** ← **ERROR**

What is a THREAT?
Events or things that occur outside your control which require your attention if safety is to be maintained. Threats are beyond the influence of you as the pilot and they increase the complexity of the flight.

Examples of Threats that may lead to airspace infringements include:

- Distraction caused by task or workload
- Airspace boundary not clearly defined
- Weather or limited visibility
- Fatigue
- Inflight malfunctions
- Lack of recent experience (skill fade) or Complacency

What is an ERROR?
Actions or reactions that lead to the unwanted or unsafe deviation from the plan, as with threats. Errors have the potential to occur within regions which could lead to additional errors or an airspace infringement. Examples of Errors that may lead to airspace infringements include:

- Navigation errors leading to 'local' or lateral deviations
- Misinterpretation of chart
- Incorrect altimeter setting
- Missed calls / incorrect phraseology
- Misinterpretation of instructions or clearance
- Unsynchronised Direction Indicator


How do I MANAGE IT?
Pilot must, in the absence of a safe and correct plan (flight and in-flight actions), manage threats and errors to prevent airspace infringements. Examples of management techniques include full and comprehensive planning and accurate briefing, training, managing distractions and applying all available tools to prevent airspace infringements.

Prevention Measures 1

Threat and Error Management



- Underpins every aspect of the flight and needs to be incorporated in every aspect of every flight from planning to personal factors.
- It is not a new phrase for Airmanship.

 **Avoiding airspace infringements using Threat & Error Management**

Airmanship is the art of applying your skill and knowledge to flying. A practical and easy way of doing this is to apply Threat and Error Management (TEM) to manage risk. Factors likely to be encountered on the ground and in the air. In this card we look at how TEM can be used to prevent airspace infringements.

TEM is the process of being alert to potential threats and identifying threats and managing any that occur. Understanding TEM will enable a pilot to track and plan, in advance, for the eventualities that can lead to airspace infringement. By spending time on the ground, on flight, to consider these factors you will be better prepared for many of the things that can wrong in the air.

THREAT **AIRSPACE INFRINGEMENT** **ERROR**

What is a THREAT?
Events or things that occur outside your control which require your attention if safety is to be maintained. Threats are beyond the influence of you on the air and they increase the complexity of the flight.

Examples of Threats that may lead to airspace infringements include:

- Distraction caused by task or workload
- Airspace complexity
- Weather or terrain activity
- Radar threat
- Inflight malfunctions
- Lack of recent experience (skill fade) or Complacency

What is an ERROR?
Actions or reactions that lead to the uncontrolled or unsafe deviation from the plan, as with threats. Errors have the potential to reduce safety margins which could lead to additional errors or an airspace infringement. Examples of Errors that may lead to airspace infringements include:

- Navigation errors leading to 'local' or lateral deviations
- Misinterpretation of chart
- Incorrect altitude setting
- Missed calls / incorrect phraseology
- Misrepresentation of intentions or clearance
- Unsynchronised Direction Indicator

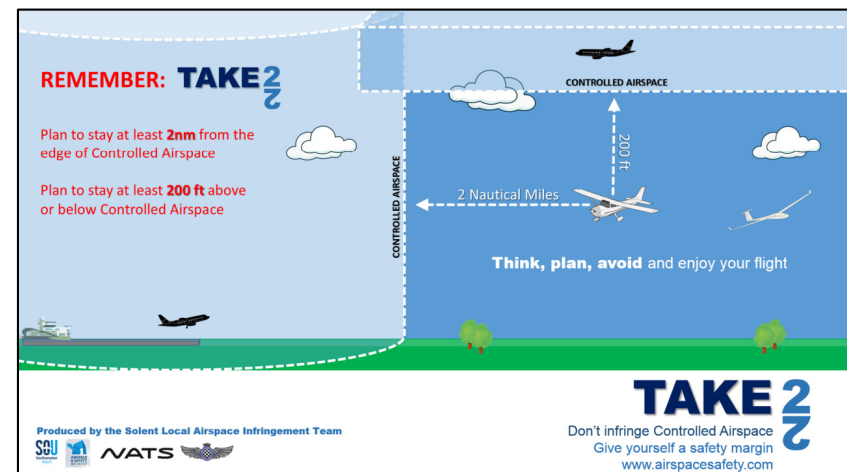
How do I MANAGE IT?
Being alert, in the presence of risks and correct plan flight and in-flight actions, manage threats and errors to prevent airspace infringements. Examples of management techniques include full and comprehensive planning and accurate briefing, training, managing distractions and applying all available tools to prevent airspace infringements.

Prevention Measures 2

“Take 2”



- Guidance is to, where able, plan to remain at least 2NM from the edge or 200 feet below the base (or above the ceiling) of the subject airspace.
- To prevent inadvertent climbs into controlled airspace the 200 feet distance may need to be increased:
 - In turbulent or thermic conditions;
 - Following periods of skill fade;
 - Student inexperience;
 - Air exercises where recovery from stalls etc risk excessive ‘handling’ .

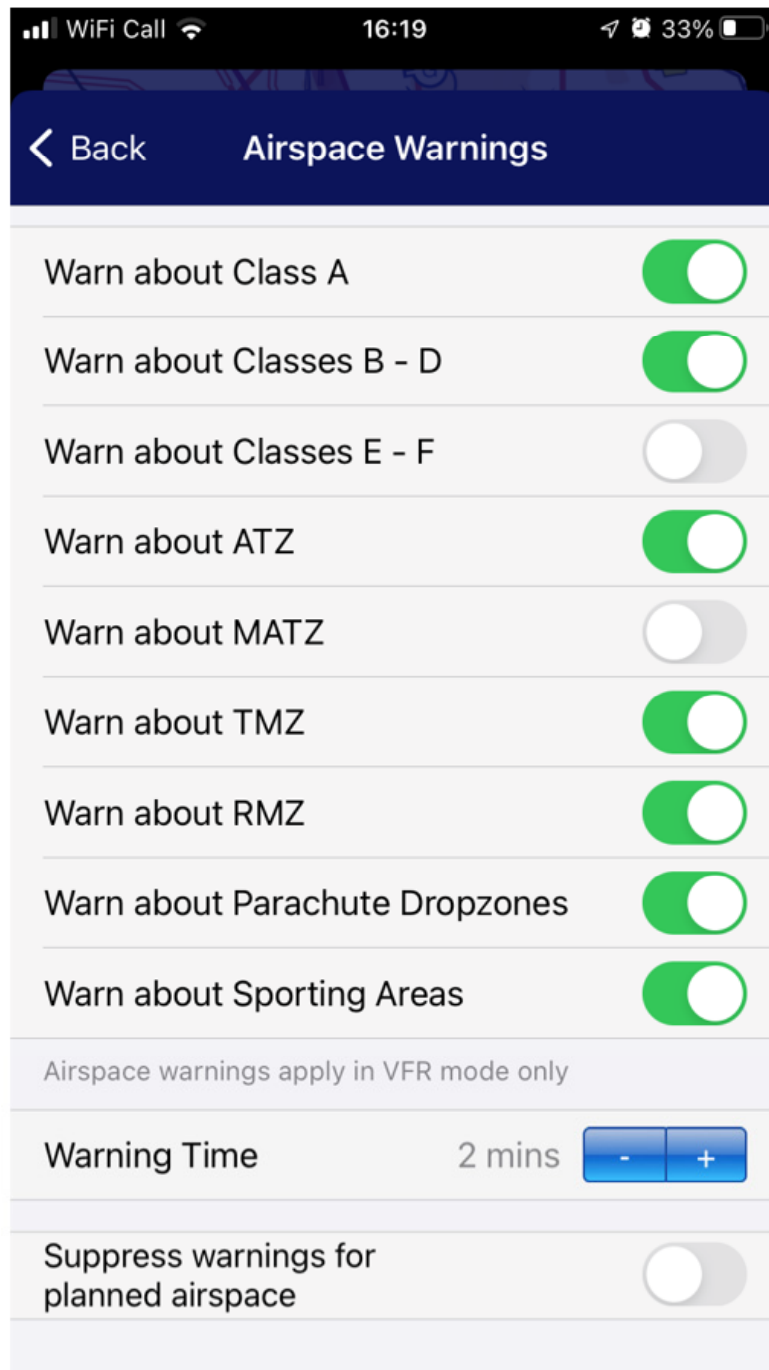


Prevention Measures 3

VFR Moving Maps



- The CAA actively encourage pilots to use VFR Moving Maps in flight and as part of their pre-flight planning and preparation.
 - Increase situational awareness.
 - Provide warnings (when configured correctly).
 - Can reduce confirmation bias.
 - Good for post-flight analysis – but use them in flight.
 - **Avoid Overreliance**
 - **Ensure you know the correct set-up/configuration**
- Be aware of Threats and Errors e.g.
 - Overheating
 - Positioning in cockpit
 - Magenta line following
 - Ensure connection to Wi-Fi during planning/briefing
- Not regulated by the CAA
 - Depiction of aeronautical information on VFR Moving Maps may be different to the UK Aeronautical Information products



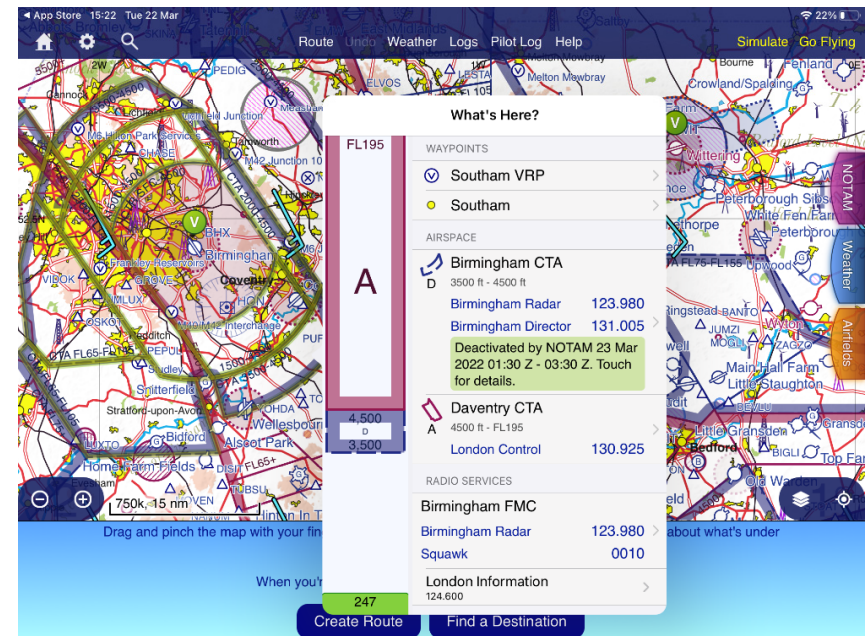
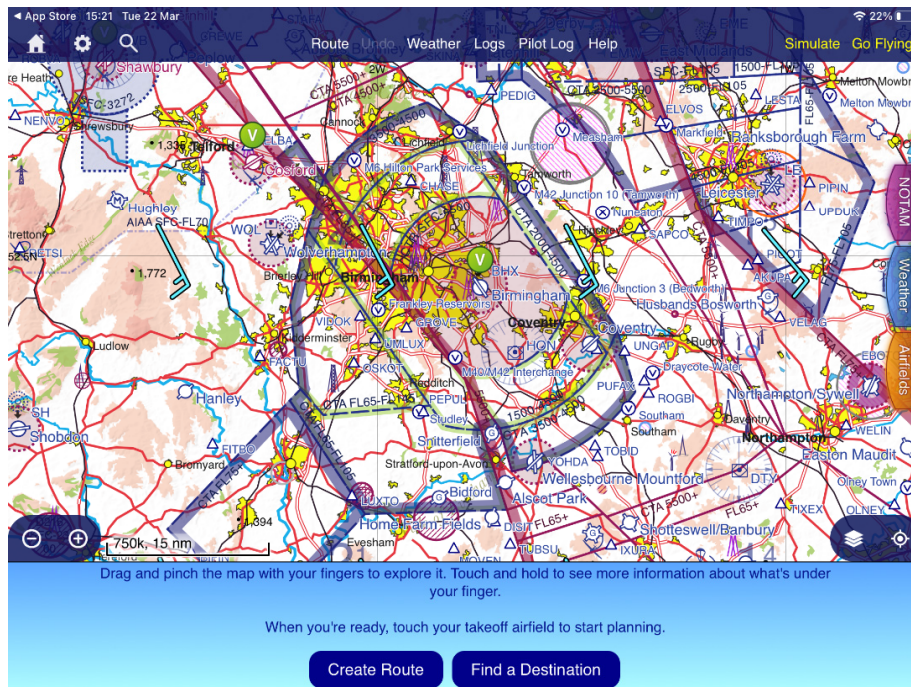
VFR Moving Maps Airspace de-activation



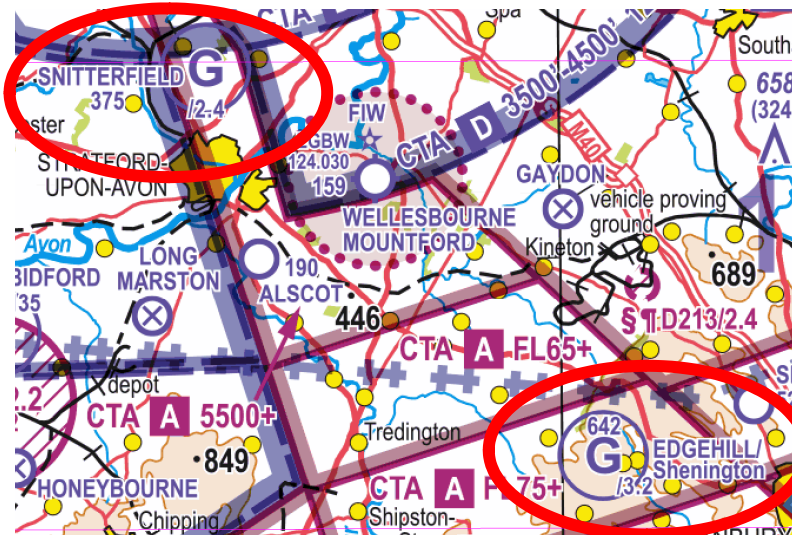
Q) EGTG/QAEC/IV/NBO/AE/000/145/5225N00152W020
B) 2203230130 C) 2203230330
E) BIRMINGHAM CTA AND CTR DEACTIVATED AND REVERT TO CLASS G AIRSPACE. ATC CLOSED. AD CLOSED. PILOTS ARE TO MAKE BLIND TRANSMISSIONS WHEN LEAVING THE LATERAL CONFINES OF THE CTR/CTA. CLOSURE DUE TO STAFF SICKNESS.

C1378/22

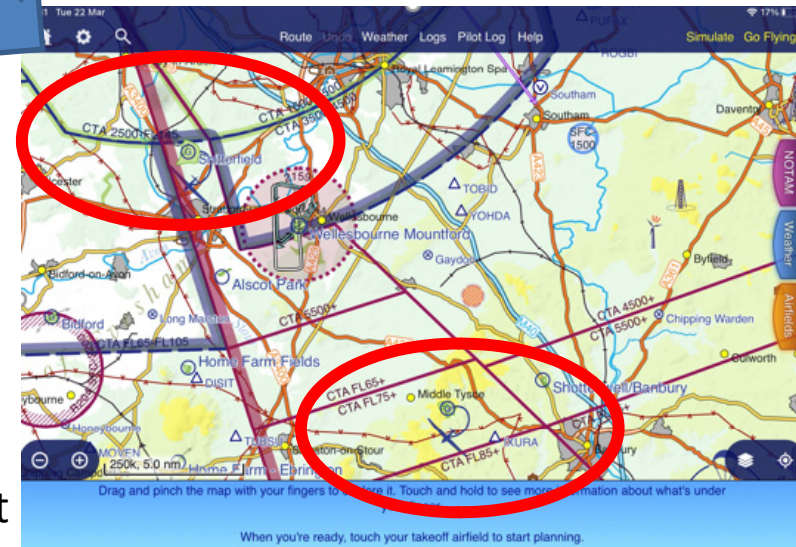
Notified times of deactivation: 0130 -0330 hrs on 23/3/22
Showing green (deactivated) at 1522 hrs on 22/3/22
Be aware how/when Moving Map APPs show deactivation



VFR Moving Maps Aerial Sporting Sites



Regulated VFR chart



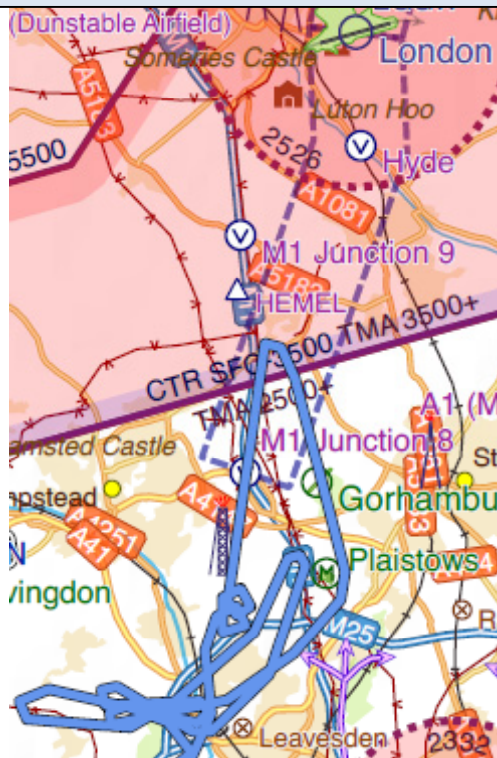
Unregulated VFR Moving Map chart

Prevention Measures 3

VFR Moving Maps

Case 1

but (the pilot) had (sic VFR Moving Map) panel mounted centrally in the panel so had the best chance of maintaining situational awareness.



Case 2

“On the day of the infringement, (the pilot) did have a moving map in (their) possession, but did not feel the need to look at it as (they) felt it would be cheating and wanted to demonstrate (their) navigation techniques taught in the PPL syllabus.”

Case 3

“I have 1950 hours of instructor experience and have always taught the basics of Map and Compass navigation. Following my recent FI seminar I had adopted the use of (sic VFR Moving Map) on my iPhone so that I had a record of the flight. I was not using the device to facilitate navigation since I was trying to teach the student the basics.”

Case 4

“however due to the (sic VFR Moving Map) layout being different to the CAA 1:500,000 chart, missed the Farnborough CTA at 2,500’..”

Case 5

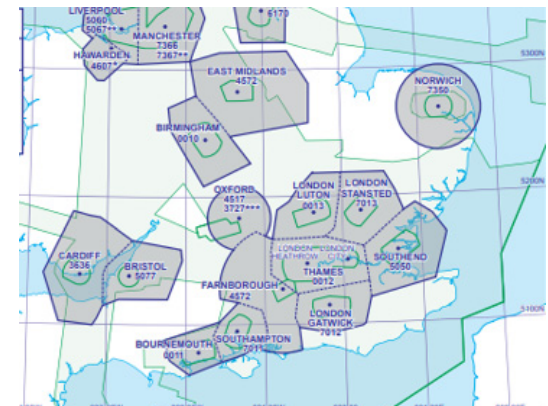
“I would normally use (sic VFR Moving Map) on my phone for flights in poor weather or near sensitive airspace, but my routine had been disrupted the night before the flight and I had not charged my phone as usual.”

Prevention Measures 4

Frequency Monitoring Codes



- 27 FMC in use across the UK.
- Details in UK AIP, AIC Y085/2020 (soon to be updated) and Airspace and Safety Initiative website
- Rather than squawking 7000/2000 use an FMC:
 - select the radar controller's radio frequency BEFORE selecting the appropriate FMC;
 - Ensure the radio volume is turned up and audible;
 - select the FMC using ALT (Mode C) if the transponder is so equipped;
 - listen out for any transmissions with the aircraft's callsign/position;
 - Consider line of sight. Can you hear the controller?





Prevention Measures 5

Planning



- Lack of detailed planning is a factor in many Airspace Infringements.
- Consider how you will depart the aerodrome, the en-route phase and correct procedures to be flown at the destination aerodrome.
- Use a VFR Moving Map and paper chart backup; you see more by drawing a line on a paper chart than 'rubber-banding' on a VFR Moving Map
- Plan your route/exercise area to remain clear of airspace – TAKE 2
 - Select area based on other aerodromes/traffic to mitigate MAC
 - Apply TEM for each part of the route
 - Make a Plan B
- Climb and descent points – incorporate TAKE 2
 - Mark them on paper chart and create waypoint on VFR Moving Map
- Air Traffic Service
 - What service do I want/will I need and from which unit?
 - PLOG – write one/print it off – incorporate FMC.



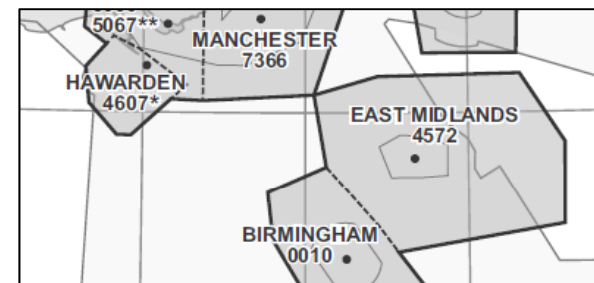
Prevention Measures 5 Planning



“Arrived at aircraft at 15:57. Found out that visitors had to leave by 16:00. Was told by FISO that we had to leave immediately or would not be allowed to leave. Took off straight away with no planning. Used reverse track and estimated wind for heading..”

“I was at the time listening to East Midlands and squawking 4572”

The above quote relates to a pilot who infringed the Hawarden RMZ (over 40NM WNW of the edge of the East Midlands FMC area





Prevention Measures 5 Planning

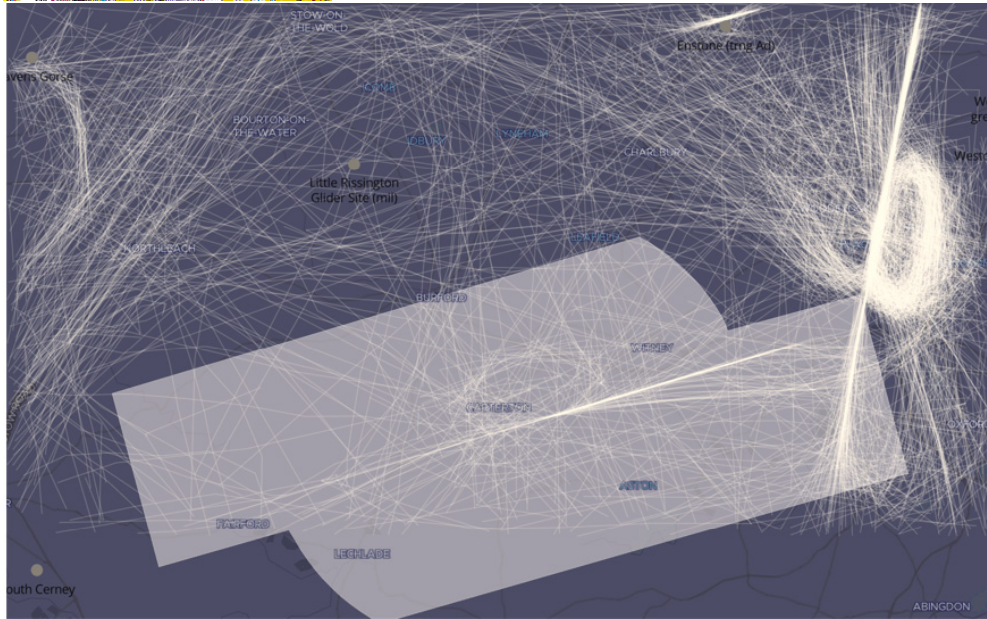
Know the airspace in which you are flying



<p>LITTLE RISSINGTON ATZ A circle, 2 NM radius, centred at 515202N 0014139W on longest notified runway (04/22) Upper limit: 2000 FT Lower limit: SFC Class: G</p>	<p>LITTLE RISSINGTON (MOD)</p>	<p>LITTLE RISSINGTON English Sat-Sun & PH 0900-1700 (0800-1600). Other times by NOTAM.</p>	<p>120.775 MHz</p>	<p>Elevation: 731 FT. Runway Length: 1311 M. Government Aerodrome.</p> <p>Note 1: Mil AGCS available during notified hours. Further details available on 01400- 264520.</p> <p>Note 2: ATZ will be activated for no more than 135 days within calendar year.</p>
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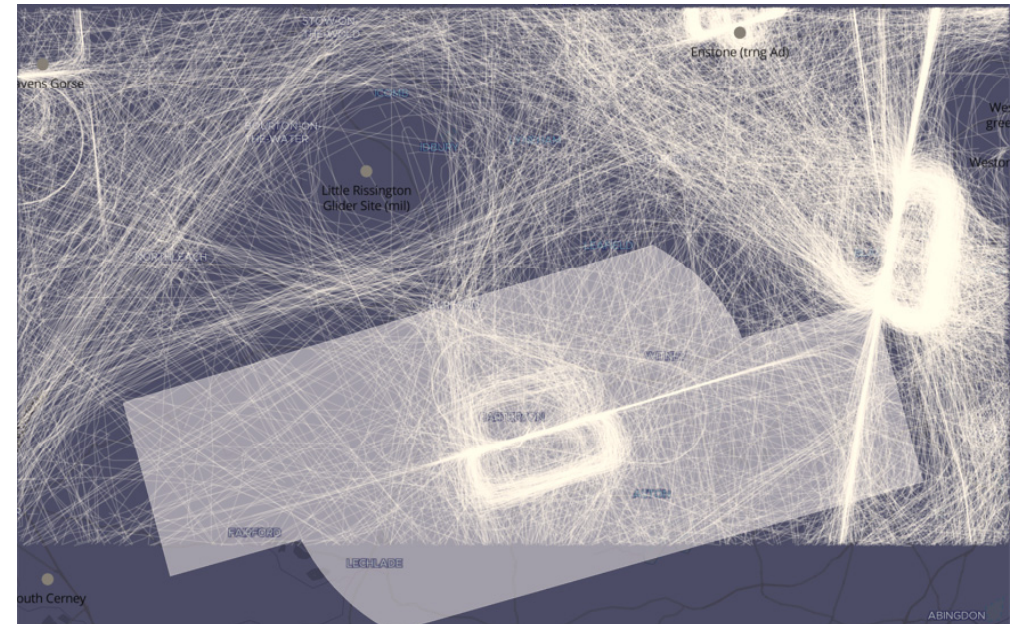
An airspace change implemented an ATZ at Little Rissington in August 2021

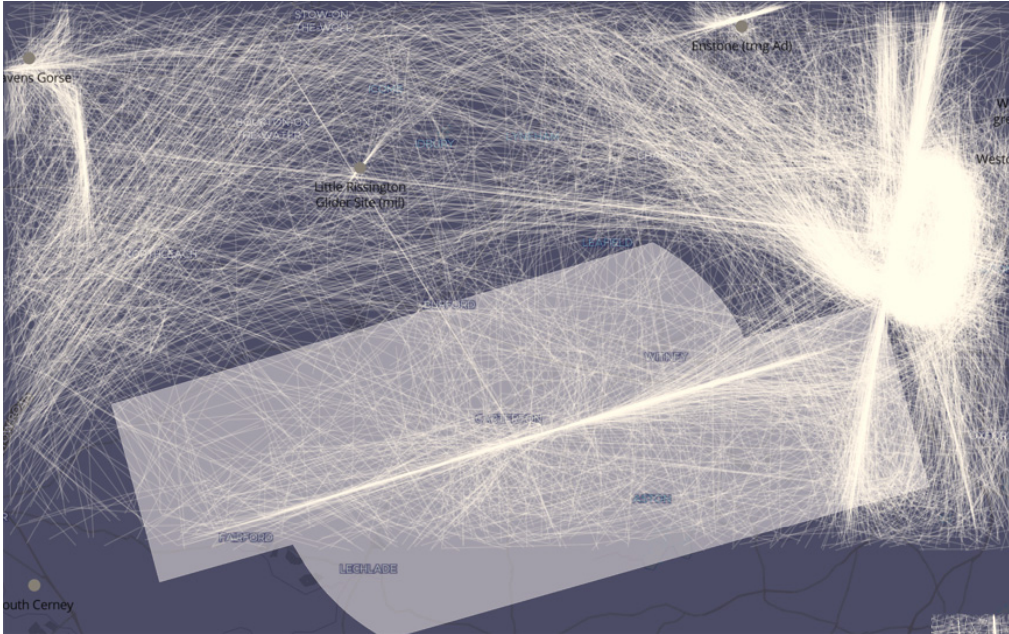




Weekend traces of non-glider traffic at and below 3,000 feet before ATZ was implemented

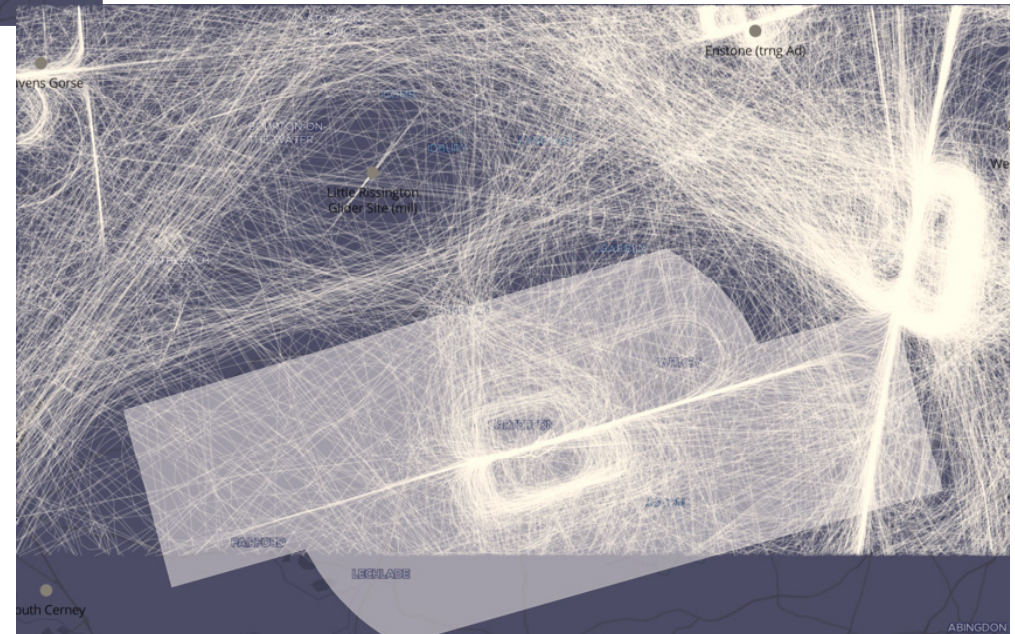
Weekend traces of non-glider traffic at and below 3,000 feet after ATZ was implemented show pilots are maintaining outside the ATZ.





Weekday traces of non-glider traffic at and below 3,000 feet before ATZ was implemented

Weekday traces of non-glider traffic at and below 3,000 feet after ATZ was implemented show pilot are avoiding a non-activated ATZ causing funnelling/increased mid-air collision risk





Prevention Measures 6

Altimetry/Transponders



- Prior to departure:
 - Set QNH and cross check against altimeter to ensure accurate elevation is displayed.
 - Set 1013 hPa and cross check transponder to ensure that transponder is within permitted limits.
 - RESET either QNH or QFE depending on nature of flight.
 - Recheck altimeter/altimeter setting at hold prior to departure.
- RPS – During their notified hours of operation, CTRs and within/below all TMAs and all other CTAs **do not** form part of the ASRs.
- SERA.13001:
 - When an aircraft carries a serviceable SSR transponder, the pilot shall operate the transponder at all times during flight, regardless of whether the aircraft is within or outside airspace where SSR is used for ATS purposes.
- SERA.13010:
 - When the aircraft carries serviceable Mode C equipment, the pilot shall continuously operate this mode unless otherwise dictated by ATC.

https://airspacesafety.com/wp-content/uploads/2020/10/Using_Transponders_AIWG.pdf

Airspace Safety Centre
Using Transponders

Transponders are a vital tool for safety. They are not only used for the Traffic Collision Avoidance System (TCAS) system in large aircraft but also with the advent of electronic computer technology, space and enhanced General Aviation aircraft are now incorporating the systems such as DEDS, that can give the pilot greater situational awareness and may prevent a major accident.

Equally this applies for controller's situational awareness and the ability for them to help aircraft participate if needs be they are going to enter the controlled airspace. This has been further enhanced with the advent of Mode S technology and ADS-B.

The benefits of using transponders are now effectively the same for both sides of the air traffic management equation:

- MODE C** – the aircraft's position and altitude can be monitored from the air or the ground.
- MODE S** – information about the aircraft can be acquired by many different users. Once acquired the system or controller can identify if there is a threat to safe operations.
- MODE A** – information is used to advise separation of aircraft from each other.
- MODE R** – the information supplied can allow pilots to identify themselves to other aircraft or air traffic units to aid the progress of the flight or to coordinate separation.

Practical steps

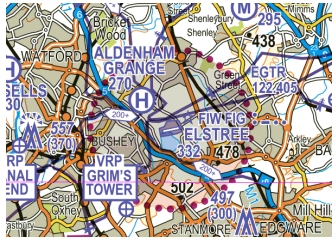
Always ensure your transponder is correctly set up and, if it is able to give altitude information that the function is selected. Standard European Rules of the Air (SERAs), Section 13 refers to SSR Transponder use and outlines the legal requirements, a summary of the key operating requirements is included at the end of this manual.

Transponders should also be regularly maintained, this ensures they are giving the correct altitude information to controllers and other aircraft. Air Traffic Units equipped with surveillance equipment are able to provide further transponder checks.

Pilots of non-powered aircraft are also encouraged to operate the transponder during flight outside airspace where compliance and operation of SSR transponder is mandatory.

Whilst there is a safety risk associated with an engine interruption, there is also the issue of major disruption. Controllers must try and avoid the interrupting aircraft by 5 miles or 5,000 feet!

Don't forget the MASC!
airspacesafety.com



Prevention Measures 7

Rule 11 for ATZ



- ATZ are established for the safety of aircraft operating in or to/from the aerodrome pattern.
- Rule 11 applies during the **notified hours of watch**:
 - UK AIP AD 2.17/18 for all licenced aerodromes
 - UK AIP ENR 2.2 for all government/military aerodromes
 - NOTAM.
- Rule 11(3) – (5) to be applied as follows to enable the flight to be conducted safely within the ATZ:
 - 11(3) – For ATC units, permission is required to enter the ATZ;
 - 11(4) – For FISO units, information required from FISO to enter the ATZ;
 - 11(5) – For AGCS units, information required from AGCS to enter the ATZ.
- 11(6) outlines requirements for comms watch, non-RT flight and additional calls to facilitate Situational Awareness for all airspace users.
 - Compliance is good airmanship and reduces mid-air collision risk

Aerodrome Traffic Zones

Aerodrome Traffic Zones (ATZ) are established to give protection to aircraft at the critical stages of flight when departing, arriving and flying in the vicinity of an aerodrome.

Where the longest runway is greater than 1800 metres in length
The zone will normally extend from the surface to 2000 feet above ground level (agl) with a radius of 2.5 NM around the midpoint of the longest runway.

Where the longest runway is 1800 metres or shorter in length
The zone will normally extend from the surface to 2000 feet agl with a radius of 2.0 NM around the midpoint of the longest runway for aerodromes. (Also see AAO 2016 article 5C(b)).

Around an offshore installation
The zone will normally extend from the sea level up to 2000 feet above mean sea level with a radius of 1.5 NM.

ATZ with non-standard dimensions
Dugby Hill (Boscombe Down), Farnborough, Leeds East, Lee-on-Solent, Manchester (Barton), Old Sarum, Redhill, Sherburn-in-Elmet

Refer to the United Kingdom Aeronautical Information Publication for details.
ATZ marked as a circle of dots with the aerodrome name and elevation (in feet) next.

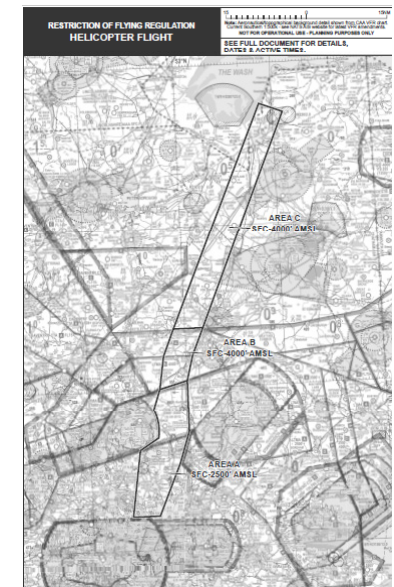
Rule 11 of The Rules of the Air Regulations 2015
Know the rules and apply them correctly – it's a UK requirement
www.airspaceatzy.com

Prevention Measures 8

Restricted Areas (Temporary) – RA(T)



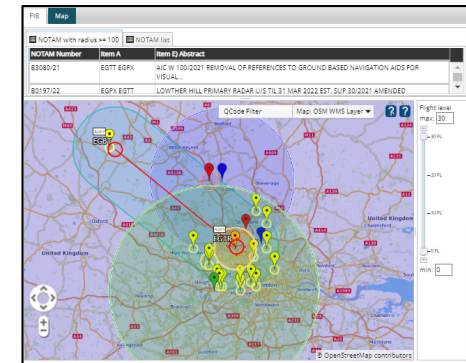
- A RA(T) is a pre-planned restriction of flying established under article 239 of the Air Navigation Order 2016 notified by:
 - NOTAM; and
 - Mauve Aeronautical Information Circular or a Briefing Sheet
 - Issued on the NATS AIS website.
- Emergency Restrictions of Flying (ERF) for an emergency situation will be notified by:
 - NOTAM; and
 - A broadcast on 121.5 MHz (and 243.0 MHz); and
 - Blind transmissions by relevant ATSU (consider using an ATS or FMC at all times).
- Both RA(T) and ERF details will be available on the NATS AIS Information Line on **08085 354802 or +44(0)1489 887515.**
- **Check NOTAM and AIS Info Line prior to EVERY flight.**



Use of Aeronautical Information Package



- NATS AIS is the authorised source of UK aeronautical information provided on behalf of, and regulated by, the CAA
 - Aeronautical Information Publication
 - NOTAM briefing site (Narrow Route Briefs best)
 - NOTAM list (Pre-flight Information Bulletin - PIB)
 - Map
 - Charts
 - Aeronautical Information Circulars
- <https://www.nats.aero/do-it-online/ais/>



- General lack of knowledge of Aeronautical Information Package
 - Limited attention to it/its use in groundschool
 - Limited understanding of UK Aeronautical Information Publication
 - Overreliance on VFR Moving Maps as sole source of briefing info

Aeronautical Information	
Aeronautical Information	
Aeronautical (departure) - EGTT (LUXWESTON)	
Aeronautical (destination) - EGTT (LUXWESTON)	
En-Route Information	
EGTT: LONDON FIR	
EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001701
EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001702
EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001703
EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001704
EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001705
EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001706
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EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001708
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EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001711
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EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001713
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EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001716
EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001717
EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001718
EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001719
EGTT: LONDON FIR (EGTT) (LUXWESTON)	4001720

Tips/Suggestions



- Review Airspace and Safety Initiative Website
- <https://airspacesafety.com/>

Guidance and resources online:
airspacesafety.com

A joint CAA, NATS, AOA, GA and MoD initiative to tackle major safety risks in UK airspace.



- Sign-up for SkyWise alerts
- <http://skywise.caa.co.uk/>



Tips/Suggestions



- Do I need to take this flight?
- **‘The standard you walk past is the standard you accept’**
 - Inform
 - Demonstrate
 - Challenge
- If in doubt about any Airspace Infringement issues/matters as the CAA Airspace Infringement Team via infringements@caa.co.uk

Questions?

