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Approval for Operation of LAA Permit Aircraft in IMC, Under IFR or at Night

INTRODUCTION

Each individual LAA Permit aircraft has an Operating Limitations document issued by the LAA which forms part of the Permit to Fly. At initial issue, all Permit aircraft are limited to Day VFR operation. For some types these limitations are disproportionate to their potential capabilities. For suitable types the LAA will consider, on a case-by-case basis, removing the Day VFR limitation subject to appropriate airworthiness, maintenance and equipment requirements being met.

This Technical leaflet explains the philosophy behind LAA aircraft operation at night and/or in IMC conditions, how to apply for the Day VFR limitation to be removed from your aircraft's LAA Permit to Fly and the process that will be followed to assess the aircraft. TL2.28 provides details of the standards that aircraft must meet and should be read in conjunction with this TL. Form MOD15 is the application form to use to start the process.

BACKGROUND

In the early days of amateur built aircraft in the UK, it was reasonable to limit amateur-built aircraft to day/VMC operations as such aircraft were generally very basic types with minimal equipment.

In recent years much more capable aircraft have become available to the amateur constructor and many builders have chosen to install instrument fits that provide the capability to fly in non-Visual Meteorological Conditions (VMC). At the same time many factory-built, ex-certified aircraft which were previously night/IMC approved have transferred to a Permit to Fly but have automatically lost that facility due to the change to a Permit regime.

Day/VFR aircraft are cleared by the LAA using a variety of approaches, in which formal compliance with a design code is often not fully demonstrated. To be granted permission for more demanding IMC/IFR and night operations, the CAA has determined that LAA permit aeroplanes must be individually re-investigated and comply with the applicable ANO requirements for night and/or IMC/IFR flight and as far as is practicable with the relevant requirements of EASA's CS23 design code, this being the least prescriptive EASA certification standard that allows instrument flight.

LAA aircraft are operated for non-commercial, private purposes only, and are typically flown by their owners. On this basis it's reasonable to assume the people flying in the aircraft are informed participants and have an awareness of the risks involved. In these circumstances it is appropriate to allow some latitude in the strict interpretation of the rules that apply to Type Certified aircraft.

The LAA has developed the rules described in TL2.28 to ensure that aircraft seeking the removal of the Day VMC limitation are appropriately equipped. Several in depth analyses have been carried out to derive standards that are appropriate for the LAA fleet, which have been agreed with the CAA. The standards to be applied are appropriate and proportionate to the privileges granted and the non-commercial private nature of the permitted operations and have been derived from detailed analyses of the risks that must be mitigated.

However, flying single engined aircraft in IMC or at night is a higher risk activity than flying those same aircraft during the day in VMC, as the consequences of any failure, especially engine failure,

are less predictable. Each individual owner seeking night or IMC/IFR clearance should understand the risks and ensure the aircraft is equipped to as far as possible mitigate these additional risks, and that the pilot is qualified and appropriately experienced. Whatever equipment is installed, flight in known or forecast icing conditions or areas of thunderstorm activity will be forbidden.

Not all LAA types are suitable for night or IMC/IFR flight. Types listed in Table 1 have already been evaluated and found to be suitable. Further examples should be straight forward, depending on individual configurations. For those types listed in Table 2 a more involved process is required. In either case you will need to show that your individual aircraft's systems and chosen instrumentation fit are suitable for night or IFR operation, and that a level of system failure can be tolerated without the loss of flight critical information.

In this TL flight that is not under VFR will be referred to as IFR, whether that is in IMC or VMC. Night has the same meaning as in the ANO. Aircraft types that have been operated on a Certificate of Airworthiness will be referred to as 'Previously Type Certified' (PTC) aircraft.

PHILOSOPHY FOR LAA AIRCRAFT REMOVAL OF LIMITATION TO DAY VFR

Where an aircraft can be shown to meet a broadly similar level of safety to a certificated aircraft, then a case will be considered for the Operating Limitations to be amended. This will require the following areas to be shown to meet a broadly similar level of safety (and hence reliability):-

1. Powerplant and propeller
2. Instrumentation power supply duplication and effects of failure
3. Flight guidance instrumentation
4. Communications and navigation equipment for role sought
5. Aircraft handling
6. Cockpit and external illumination (night only)
7. Guidance for pilots on operation of the aircraft and its systems
8. Continued airworthiness of systems proportionate to the more rigorous operation intended by this change to the permit limitation

While this is not meant to preclude any novel or new approach, clearly it will be easier for the LAA to assess any system if it is either similar to one that is certificated or has a long history of reliable use. Any LAA member wishing to achieve this approval must gather sufficient information to show the areas above meet the rules. TL 2.28 describes the information required. In order to help applicants through the process, one of a team of regionally based LAA nominated 'assessors' will liaise with the applicant locally, and validate the submission before it is passed to LAA HQ.

The privilege to approve certain individual LAA Permit aircraft for IMC/IFR/Night operation should not be taken for granted. Unlike other countries which operate an 'Experimental' airworthiness category and whose statutes do not prohibit such aircraft from IFR operation, UK legislation gives the CAA power to issue a national Permit to Fly 'subject to such conditions relating to the airworthiness, operation or maintenance of the aircraft as it thinks fit' and is under 'no obligation to do so unless that application is supported by reports from approved persons'. In other words, it is in everyone's interests that UK LAA Permit aircraft not limited to Day VMC are operated to the highest levels of safety. While LAA will have satisfied itself that the initial and continued airworthiness of each IFR-approved aircraft is acceptably safe, it is up to the pilot to ensure the aircraft is operated and maintained in such a manner as to maximise that safety especially during IMC/IFR/Night operation. This privilege has been hard won; we must do all we can to safeguard it for the future.

COMMON LIMITATIONS

No matter how the aircraft is equipped all Permit aircraft will have the following limitations applied,

1. Flight in known or forecast icing conditions is prohibited.
2. Operation in IMC in areas of known or forecast thunderstorm activity is prohibited.
3. Take-off and landing in visibility less than 1500m is prohibited.
4. The aircraft may not be operated in IMC below 500ft agl for a precision approach, or 600ft for a non-precision approach or approach system limits, whichever is the greater.
5. Autopilot engagement below 1000ft is prohibited.

It is possible that 4 may be relaxed if an owner were to carry out a series of trials to demonstrate his altimetry system is sufficiently accurate, however an acceptable trials programme has not been determined.

THE APPLICATION PROCESS

The application process is different for Previous Type Certified (PTC) aircraft and for homebuilts. The application and approval process is designed around the needs of homebuilts. As PTC aircraft have largely already gone through a much more rigorous certification process many of the activities required for a homebuilt can often be bypassed if the aircraft remains close to its certified configuration.

POTENTIAL COSTS AND TIMESCALES

LAA will publish the cost of this approval separately, assessors may also may a charge for their time and expertise (to be agreed between the owner and the assessor). If the owner is unable to provide the data requested in a coherent form, or a very in depth investigation is required, the owner may be asked to fund the additional work. Also there is no guarantee of a successful outcome from any assessment. The payment of the fee is no guarantee that an IMC/IFR/Night clearance will be provided.

The potential timescale for approval is dependent on several factors. At the time of writing there are many more owners who have applied for a clearance than assessors available. Some assessors will look at aircraft for only a minimal charge, but owners will have to fit in with the assessor's schedule. For those owners who are looking for a more speedy clearance other assessors may be available for a fee.

It is suggested that if there is any unusual feature that an initial assessment is carried out before any significant time or money has been expended to minimise the potential for disappointment later on.

PREVIOUSLY TYPE CERTIFIED AIRCRAFT

The process described in the majority of this Technical Leaflet has been designed to address the needs of amateur-built aircraft. PTC aircraft that have been certified for night and/or IMC flight, and that remain similar to the type-certified configuration, will be able to use an abbreviated process managed entirely by LAA Engineering.

The process for a Previous Type Certified aircraft is:

1. Owner complete MOD15 and submits to LAA Engineering.
2. LAA Engineering will assess the application, and in particular the similarity of the aircraft to the type certified standard.
3. If the aircraft is too far removed from the type certified standard the owner will have to follow the homebuilt process below.

4. If the aircraft is suitable LAA Engineering will invite the owner to provide,
 - a. A completed Aircraft Equipment List,
 - b. The certification from a recent 'avionics annual' and pitot-static check,
 - c. A maintenance schedule,
 - d. A TC POH or Flight Manual updated for any additional equipment fitted,
 - e. A photo of the instrument panel
 - f. A permit IFR 'special inspection' signed by an approved inspector,
 - g. The appropriate fee.
5. LAA Engineering will assess the data provided and if suitable will update the aircraft's Operating Limitations.

HOME BUILT AIRCRAFT

The owner initiates the process by submitting form MOD15 to LAA Engineering as the aircraft approaches its first birthday after receiving its initial Permit to Fly, or at any time afterwards. Engineering will review the application looking at if the aircraft type has been approved previously, any problems encountered during approval and the suitability of the installed equipment and reply to the owner. If the aircraft is broadly suitable the application will be passed to the Permit IFR team for assessment. Where the aircraft is the first of a particular type to apply a more in-depth assessment is required, see below.

EXAMPLE OF TYPE PROCESS

Assuming the owner decides to proceed with his application the Permit IFR team will assign an assessor to the aircraft and invite the owner to submit (as a minimum),

1. A draft Aircraft Equipment List
2. A first pass of the information described in TL2.28, including
3. A sketch of the layouts of the aircraft's electrical and vacuum systems (if fitted)
4. Photo of panel and external lights
5. A Fee payable to the LAA (to cover LAA costs only)

The Permit IFR Team Assessor will review the information provided and give an indication of the likely timescale of the approval process. Any notable features of the aircraft will be discussed with the owner. The potential costs or fees will be notified at this point. The assessor will also arrange to view the aircraft and arrange for a flight evaluation.

Assuming the assessment is broadly positive any additional information required or deficiencies with the aircraft will be discussed with the owner. Once these have been corrected the owner will be invited to provide,

1. Final equipment list
2. TL2.28 data
3. Electrical load analysis iaw TL2.28
4. Electrical & Instrument power redundancy argument
5. Pilot's Operating Handbook
6. Maintenance schedule

Once these have been provided the assessor will be able to complete his report and ask the owner to have an 'avionics annual', pitot-static test and Permit IFR inspection carried out. The report, along with a draft AAN (airworthiness Approval Note) will be forwarded to LAA Engineering for their

consideration. When satisfied with the data and reports provided LAA Engineering will re-issue the aircraft's Permit-to-Fly with Operating Limitations suitably amended.

Where approval for night operation is requested a night lighting evaluation will be required, which may include an evaluation flight. Any evaluation flight will be outside the current permit operating limitations and will require a specific permit to test.

If the aircraft is found to be un-suitable for IFR approval the LAA assessor will report that to LAA Engineering and the owner. The assessor may be able to work with the owner to modify the aircraft's equipment or behaviour, but also may report the deficiencies that require correction and leave those activities to the owner using the normal LAA modification processes.

Please note that the process described here appears to be entirely sequential. The assessor nominated by the LAA may choose to carry out the stages in a different order or may combine stages. The aim is to collect all the data required to enable the final approval to take place.

FIRST OF TYPE CLEARANCE

A number of factors such as design strength, stability, performance, wing-loading and powerplant type influence the suitability of any type for an IMC clearance. The LAA consider the types in the table below to be potentially suitable for removal of Day VFR limitations, subject to individual application. This table will be reviewed and updated from time to time, however in general the LAA would support a recommendation for removal of Day VFR limitations for a type which has a wing loading less than 60 kg/m². Clearly any aircraft not on the list will take significantly longer than a previously approved type. It is recognised that many LAA types have a lighter wing loading than 60kg/m², including some PTC aircraft. This limit may be reviewed as more experience is gained in assessing aircraft.

Before an aircraft type can be assessed as suitable for Night / IFR operation it will be evaluated both technically and in flight, broadly against requirements of CS23, known as the 'First-of-Type' evaluation. The intention is this evaluation will be required only once for each type, but for types that show some variation between examples it may be required for each aircraft. A significant part of this process is the assessment of the aircraft's handling qualities by a professional test pilot who is suitably approved by the LAA. This assessment will inevitably be more costly than an individual aircraft approval. If your aircraft type is one the LAA has not yet assessed be sure you are prepared to fund the clearance process at the outset.

It is suggested that no great expense on new equipment is incurred until the aircraft type has successfully completed the FOT assessment. If your aircraft is a type not already equipped for IFR, LAA strongly recommends the type successfully complete the FOT evaluation process before proceeding with the costly business of equipping it for IFR operation.

Where the FOT assessment is not successful LAA will not be able to progress further applications for that type. LAA will assist wherever possible with IFR applications, however owners should realise at the outset that this is not a 'rubber-stamping' exercise and that not all types and not all examples of each type are suitable candidates for IFR operation.

Appendix 1 – TYPES APPROVED / LIKELY TO BE APPROVED

Table 1 – Aircraft types examples of which are expected to be able to be cleared for IMC and/or night operation, subject to assessment of individual examples:

All ex CofA types that have been previously certified for IMC or night operation	Jodel aircraft will be expected to install a heated pitot tube. Aircraft with venturi powered instruments are likely to be limited to temperatures of +5°C unless a venturi heating system is fitted.
Vans RV-6, -6A, -7, -7A	With a restricted aft cg limit
Vans RV-8, -8A	
Vans RV-9, -9A	
Vans RV-10	
Glasair I	With a restricted aft cg limit and modification to enhance lateral stability
Europa, XS & Liberty XL-2	

Table 2 – Aircraft types that are likely to be suitable for night/IMC clearance subject to further investigation of the type and assessment of individual examples:

Cozy MkIV	
Falco F8L	
Glasair II & IIS (RG, FT & TD)	Likely to require restricted aft cg limit
Glastar	
Harmon Rocket II	
Lancair 320	
Linnet 2	
Long-Ez & Varieze	
MCR-01 Club	
Lambert Mission M-108	
Piel CP301, CP 301S, CP328 Super-Emeraude	
Scintex CP1310, 1315, 301	
Tecnam P2002 Sierra, P92-EA Echo	
Vans RV- 4	Likely to require restricted aft cg limit

Note that it is likely that the list of eligible aircraft types will be expanded over time as more types are evaluated, and these tables will be moved to the LAA website once this process is fully established.