NIGHT AND INSTRUMENT FLIGHT RULES ON LAA PERMIT TO FLY AIRCRAFT

By Steve Slater

The granting of an agreement from the Civil Aviation Authority to allow certain Permit to Fly aircraft to fly at night and/or under instrument Flight Rules is a breakthrough in many ways for the LAA. Not only does it represent the culmination of more than nine years of work by LAA volunteers and the Association's Engineering staff, it is another very significant example of the new atmosphere of increased delegation from the CAA under the terms of our A8-26 engineering approval arrangements.

It is also a classic example of what we can achieve thanks to member power. It all began when Mike Barnard, at the time an LAA Board Director and Chairman of LAA's Safety and Environment Committee, initiated the project back in 2007. Special thanks are due to Mike and to Mike Jackson, Steve Noujaim, Pete Pengilly and Nick Sibley, who have driven this project from the outset, as well as to the LAA Engineering Team who all combined their expertise to bring this to fruition.

Until now, the Air Navigation Order has limited national Permit to Fly aircraft to Day/VFR operation unless endowed with the special individual agreement of the CAA (which I think was only ever extended to the mighty Vulcan!). The CAA has now agreed that under LAA's BCAR A8-26 Approval, that "subject to additional design and assessment criteria and continuing airworthiness provisions", they will allow the LAA to clear individual Permit to Fly aeroplanes for flight at night and/or under IFR in UK airspace.

In terms of risk assessment, 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 more difficult to deal with. 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.

In order to be approved, each aircraft must be individually assessed and must demonstrate and be maintained to meet an agreed set of criteria. The CAA has naturally been cautious about extending these clearances to such a diverse fleet as the LAA's, and a great deal of work has been involved in the complexities of developing appropriate criteria and processes, and demonstrating that they are fit for purpose. The acceptance of the Night IFR criteria by the CAA follows a detailed review of the LAA's risk-based safety case and a successful trial period on four representative aircraft which have been evaluated using the LAA's newly-developed procedures.

SO, WHAT DO I DO NEXT?

Around 50 members have so far indicated a wish to have their aircraft reviewed for potential Night IFR use, and an initial batch of ten aircraft are currently under assessment. For anyone thinking about applying for their aircraft to be assessed, the first step should be to download and read the two Technical Leaflets on the subject, TL 2.27 and TL 2.28, which can be found on the LAA website (*www.laa.uk.com* Aircraft and Technical/data library).

TL 2.27 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 Operating Limitations document and the rules developed to ensure that such an aircraft has the appropriate handling qualities and is suitably equipped. Technical Leaflet TL 2.28 details what equipment is required to be installed and the rules ensuring the robustness and reliability of the installation. It also includes guidance and advice on how the documentation should be completed.

In general, owners of previously type certificated aeroplanes, that is aeroplanes that have previously held a Certificate of Airworthiness and were previously cleared for night IFR use, are likely to find this process straight forward, as long as their aeroplanes have not been modified too far from the original certified configuration. Owners of amateur-built aircraft may find compliance a little more challenging, but work on the four trial aircraft which demonstrated the process to the CAA, clearly showed both home-built and former certificated aircraft can equally comply, with the trials being carried out on a Van's RV-6A,

(Above) **Aircraft such as this Bristell have too low a wing-loading to qualify... for now.**

(Above) **Van's RV-7 is expected to be OK, with a CofG restriction.**

TYPES APPROVED OR LIKELY TO BE APPROVED

AIrcr Af T Typ ES 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
- Vans RV-6, -6A, -7, -7A. With a restricted aft cg limit
- Vans RV-9, -9A
- Vans RV-10
- Glasair i. With a restricted aft cg limit and modification to enhance lateral stability.

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
- Europa, Xs & Liberty XL-2
- 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
- Piel CP301, CP 301s, CP328 Super-Emeraude
- s cintex CP1310, 1315, 301
- Tecnam P2002 s ierra, P92-EA Echo
- Vans RV-4, -8/-8A Likely to require restricted aft cg limit

(Left) **The stunning range of equipment and avionics available to LAA aircraft makes IFR flight more than possible.**

and RV-7, a Glasair 1 and a SAL Bulldog. All passed the tests although some required modifications or restrictions on their centre of gravity ranges, perhaps demonstrating that safe Night-IFR capability is about much more than the instrument fit.

Acceptance of an aircraft type depends on it having been assessed as having suitable flight handling qualities, adequate panel space for an IFR fit, and a defined minimum wing loading of 60kg/sq m. Any 'new' first example of a type being assessed for Night IFR operation will require a detailed flight test by one of LAA's qualified test pilots to re-examine its flying qualities. Former certified types that have previously been approved for night and/or IFR operation might not need a handling qualities evaluation, depending on whether any modifications have been made since moving to a permit.

App Ly ING f Or AN Ifr pEr MIT TO f Ly

This is a four stage process:

1 Assessment of the suitability of the aircraft type

2 Application for approval

3 Assessment of the data provided and the aircraft

4 Final approval and potential re-issue of the Operating Limitations document.

Stage 1 Assess type suitability

Taking into account a number of factors such as design strength, stability, performance, wing-loading and powerplant type, LAA considers the types in the adjacent list (sidebar 1) to be potentially suitable for Night-IFR, subject to individual application and assessment. This list will be reviewed and updated from time to time, but it is unlikely that LAA would support a recommendation for approval of a type which has a wing loading less than 60kg/sq m due to concerns regarding pilot workload in conditions of turbulence. Clearly any aircraft not on this list will take significantly longer to approve than a previously-approved type. It is recognised that many LAA types have a lighter wing loading than 60kg/sq m, including some previously Type Certificated aircraft, so this limit may be reviewed as more experience is gained in assessing aircraft.

Stage 2 Owner applies for approval

The process starts with the aircraft owner completing an application form (downloadable from the LAA website) and returning it to LAA Engineering. This will describe the build and modification history of the aircraft and should initially include information that is easily available to the owner. LAA Engineering will appoint a technical assessor to review the aircraft and agree with the owner where further detail is required. Owners should not go to any great expense before this initial assessment is carried out. Payment for this assessment will be agreed between the assessor and the applicant on a similar basis to the arrangements you make with your regular LAA inspector.

If your aircraft type is one the LAA has not yet assessed, your aircraft will be required to undergo a flight evaluation to assess whether the type's flying qualities make it suitable for IMC/IFR/Night approval. If your aircraft is a type not already equipped for IFR, don't undertake the costly business of equipping it for IFR operation until the type has successfully completed the First of Type evaluation process. Some LAA aircraft types might not satisfy the

NIGHT IFR: TOP TEN QUESTIONS

1 IS MY AIRCRAFT ELIGIBLE FOR NIGHT IFR FLYING?

Not automatically. First, we need to find out if your aircraft type is suitable, then look at your aeroplane in particular. If the aircraft type has already been found suitable for Night IFR flying by the LAA, then the assessment of your individual aircraft consists of first reviewing its compliance with the type design standard, to make sure that its modification state has not impacted on its generic 'type' acceptance, and then to check the level of equipment fitted and the robustness of the instrumentation and power supplies, and finally a special inspection of its systems for function and quality of installation. The aircraft will also need to have accumulated at least a year's flying and 50 hours flight time to prove its reliability.

2 WHAT ARE THE CRITERIA FOR A TYPE TO QUALIFY?

Acceptance of an aircraft type depends on it having been assessed as having suitable flight handling qualities, adequate panel space for an IFR fit, and a defined minimum wing loading not to be inordinately affected by gusts (the current limit being 60 Kg/sq m). Each new type being assessed for Night IFR use will require a detailed flight test by one of LAA's qualified test pilots to examine its flying qualities. Former certified types that have previously been approved for night or IFR operation might not need a handling qualities evaluation, depending on the modifications fitted since moving to a permit.

More information can be found in LAA Technical Leaflet TL 2.27 which can be downloaded from the LAA website.

3 HOW DO I FIND OUT IF MY AIRCRAFT IS LIKELY TO QUALIFY?

Information on the required levels of equipment and approved types can be found in LAA Technical Leaflet TL 2.28. It's important to remember that the equipment is only as good as the installation, so the architecture of the systems design will also need to be assessed – for the electrical system the starting point is the aircraft's wiring diagram.

4 I AM CURRENTLY BUILDING AN AIRCRAFT. WHAT EQUIPMENT SHOULD I FIT?

Details of specific requirements and equipment for Night/IFR clearance can be found in LAA Technical Leaflet TL 2.28.

5 WILL MY AIRCRAFT NEED A SPECIALIST FLIGHT TEST?

If the type is one that LAA has already cleared for Night/IFR, and your aircraft is a fairly standard example – all home- or kit-built aircraft are inevitably different to a degree - then it will only need a simple check flight by a suitably qualified pilot to make sure the installed systems work properly when airborne.

6 MY AIRCRAFT WAS ORIGINALLY CERTIFIED FOR NIGHT/IFR. WHY CAN'T I FLY SIMILARLY ON A PERMIT RIGHT NOW?

The LAA needs to ensure that the aircraft, now being operated outside a certified maintenance regime, still has the appropriate equipment and that it is in a suitable condition for safe operation. Most former certified aircraft are heritage types which (unless they have been upgraded), may have aging equipment and electrical systems which will need particularly careful checks to see if they remain fit for purpose under Night/IFR operation.

7 WILL THERE BE SPECIAL MAINTENANCE OR CONTINUED AIRWORTHINESS REQUIREMENTS?

Yes. These will need to be included in your Tailored Maintenance Schedules and Inspection procedures. As many appropriate aircraft are by their nature more complex types, this will include areas such as engine and propeller overhaul schedules, instrument and electrical systems inspections.

8 I'M NOT INTERESTED IN IFR, BUT I'D STILL LIKE TO BE ABLE TO FLY AT NIGHT. IS THAT POSSIBLE?

Yes. The procedures include provisions for Night VFR-only.

9 HOW MUCH IS IT GOING TO COST?

We want to keep administrative costs as low as possible for the process, which we believe will significantly enhance flight safety. Therefore the initial cost will be the assessment fee, which will be agreed between the applicant and the volunteer assessor, based on the likely complexity of the review process, in a similar manner to the agreement you reach with your Inspector. Once the assessment is processed, the LAA will charge an administrative fee of £250 at the time the revised Operating Limitations is issued. This covers both HQ admin and review time, plus a contribution to the costs incurred over the years as this project was brought to fruition.

10 WHY HAS IT TAKEN THE LAA SO LONG TO OFFER THESE APPROVALS?

The CAA has naturally been cautious about extending these clearances to such a potentially diverse fleet, and a great deal of work has been involved in the complexities of developing appropriate criteria and processes, and justifying to the CAA (and ourselves) that these are valid and fit for purpose. In addition, most of the work in developing this has been carried out by LAA volunteers, to minimise the impact on LAA staff resources. Credit should be given both to these volunteers and to the CAA's GA Unit, who have worked with the LAA at a very detailed level to create a successful final outcome.

requirements of the assessment because of their handling qualities or other features.

Stage 3 Assessment of Data and Aircraft

Once the required data has been provided, the assessor will evaluate the aircraft and is likely to need to visit to the aircraft. Main areas of study will be the equipment fitted, the design of the electrical system and the standard of its installation. A flight test may be required: this should be within the current Permit operating envelope so will not require a specific flight test authorisation. The assessor will make a report to LAA Engineering on the suitability of the aircraft.

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 flight test authorisation, issued by LAA Engineering.

Where an aircraft is found to be unsuitable 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 and LAA Engineering 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.

Stage 4 Documentation and Final Approval

Once all of the required data is provided, it will be forwarded to LAA Engineering in the form of an 'IFR Checklist' and supporting documents, including a systems wiring diagram, and an electrical load analysis. The aim is to collect all the data required to enable the final approval to take place.

In addition to the technical data, we would also expect to see an approved Flight Manual or Pilot's Operating Handbook (POH) for former certificated aircraft. Owners of amateur-builts will be required to present a POH including data on systems operations and emergency procedures, for the immediate reference of the pilot. For those types that aren't already provided with a POH by the manufacturers, a generic LAA template is available.

On receipt of the IFR Checklist and supporting material, LAA Engineering will determine if the aircraft can be cleared for IMC/IFR/Night operation. An administrative charge will be made at the end of the approval process.

continued Airworthiness

Scheduled maintenance and Permit revalidation requirements for IFR-approved Permit aircraft are somewhat more involved than for day-VFR and will involve suitably qualified LAA inspectors, reflecting the greater operational risk and inspection requirements.

Unless a specific schedule is otherwise mandated, aircraft cleared for IMC/IFR/Night will have to be maintained to the LAA Generic Maintenance Schedule. This schedule will have to be tailored to the needs of the individual aircraft in discussion with the aircraft's inspector. A copy of the Tailored Maintenance Schedule will be required to be submitted with the IFR Checklist.

If at any time equipment issues or modifications to the aircraft mean that it no longer meets the Night-IFR criteria, the aircraft would automatically revert to Day VFR clearance. ■