British Microlighting

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MICROLIGHT DIFFERENCES TRAINING

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DIFFERENCES TRAINING – A BMAA Guide for Microlight Pilots and Instructors

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1. Introduction - What is meant by Differences Training?

The term Differences Training is one used within the Air Navigation Order (ANO) to describe circumstances when training is REQUIRED BY LAW to be taken by an already licensed pilot when they choose to fly an aircraft with certain equipment or characteristics that the pilot has had no previous experience of. For example, a microlight pilot who has only been trained and flown in weightshift controlled aircraft MUST undertake differences training in an aircraft with three-axis controls if wanting to fly that type of aircraft. It is quite easy to see that such training is a sensible course of action if the pilot is to reduce the chances of an accident that might occur if they chose just to "hop in, and give it a go!".

There are other situations for which differences training is specified, which will be detailed further below.

2. Who can conduct Differences Training?

Where the ANO specifically requires that differences training is carried out it must be conducted by an instructor entitled to give training in the aircraft to be used. It may seem obvious, but worth pointing out at this point, that the instructor must also comply with the ANO regulation; that is if asked to conduct control type differences training to our weightshift pilot above, they must be entitled, not just able, to give instruction in the three-axis aircraft.

3. How much training is required?

Unlike training for an initial pilot's licence there are no minimum required times set for differences training. You will see from the different situations detailed further below that some may take several hours and others less. Of course, as with initial training pilots undertaking the instruction will learn at different rates, so some will be quicker than others. Speed is not the focus when converting, but a thorough understanding of the new aircraft and its systems.

Completion of differences training is decided by the instructor. When confident that the "student" pilot has achieved sufficient understanding, knowledge and skill to operate the difference competently and safely they will sign such a declaration in the pilot's log book and the differences training process is complete. There is no need to inform the Civil Aviation Authority (CAA) or have any changes made to a licence. Completion is by a simple instructor signature.

4. Do I need Differences Training?

As the name suggests differences training is conducted to familiarise pilots with differences between aircraft and/or systems that they have experience of and those which they don't. The aim is to become familiar with the difference and achieve sufficient understanding, knowledge and skill to operate the difference competently and safely.

The ANO legislation says for each circumstance detailed below that it is required only if the pilot has no previous training or experience of the difference. So, in our example above the weightshift pilot has no experience in flying three-axis microlights and therefore is legally required to undertake differences training to the satisfaction of the instructor who will then sign it as completed in the pilot's log book, thereby adding the privilege to fly three-axis microlights.

Note that differences training requirements also apply to instructors. Before an instructor can fly such an aircraft, they must have completed the conversion sign-off.

5. 2021 Changes to Differences Training Requirements

There has been a requirement for some differences training published within the ANO for several years. Following the change in the UK microlight aircraft definition in 2021 several more circumstances were added taking into account likely new features on heavier microlights as well as aligning with some requirements for the NPPL (A) SSEA Class Rating.

During discussion and negotiation in the development of the change to the microlight definition, which was completed in 2021, the BMAA's view that microlight licence holders only needed to be made aware of differences before flying heavier and possibly more complex aircraft, rather than be required to undertake training for an additional licence or be required to undertake a minimum number of prescribed hours, was accepted. This premise ensures that pilots are only required to demonstrate that they have reached a standard without having additional expense of further training to meet an arbitrary requirement.

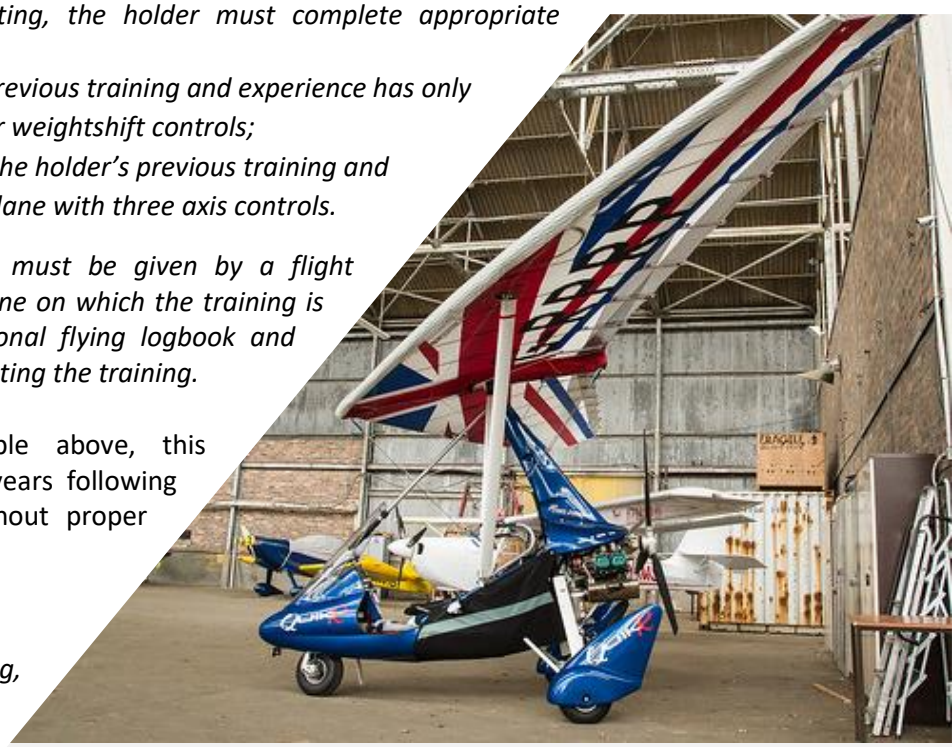
6. What particular Differences Training are mandated for Microlight Pilots?

6.1 The Differences as described in the ANO

6.2 Control Types

Before exercising the privileges of the rating, the holder must complete appropriate differences training, if the aeroplane has—

- *three axis controls and the holder's previous training and experience has only been in an aeroplane with flexwing or weightshift controls;*
- *flexwing or weightshift controls and the holder's previous training and experience has only been in an aeroplane with three axis controls.*



The differences training mentioned above must be given by a flight instructor entitled to instruct on the aeroplane on which the training is being given, recorded in the holder's personal flying logbook and endorsed and signed by the instructor conducting the training.

Comment: As described in our example above, this requirement has been in law for several years following attempts by a few pilots to convert without proper training.

6.3 Multi Engine

Before exercising the privileges of the rating, the holder must complete appropriate differences training, if the aeroplane has—

- *more than one engine.*

The differences training mentioned above must be given by a flight instructor entitled to instruct on the aeroplane on which the training is being given, recorded in the holder's personal flying logbook and endorsed and signed by the instructor conducting the training.

Comment: This requirement has been in law for several years. Currently there are very few microlights in the UK with more than one engine, but with the 2021 definition change we may see more developed. The critical difference, other than engine management is likely to be the effect of a single engine failure on both performance and control authority. Twin engine training is available at light aircraft flying schools.

6.4 Operation from Water

Where the aeroplane is to be operated from water during take-off and landing, before exercising the privileges of the rating the holder must—

- *complete appropriate differences training; and*
- *attain a pass in the Private or Professional Seamanship examination.*

The differences training mentioned above must be given by a flight instructor entitled to instruct on the aeroplane on which the training is being given, recorded in the holder's personal flying logbook and endorsed and signed by the instructor conducting the training.

Comment: This requirement has been in law for several years. There are very few microlight aircraft in the UK capable of operating from water, but with the 2021 definition change we may see more developed. There have been no UK microlight instructors capable of giving this training for some time. The CAA has accepted, by prior arrangement, flight

instruction by certain French and Italian microlight instructors as an alternative. The Seamanship examination must be taken in the UK.

6.5 600 kg – Light Sport Microlights (LSM)

In 2021 the UK CAA took the option of opting-out of EASA regulation, creating a new opportunity for manufacturers to build aircraft under national rules for a Permit to Fly that would otherwise have been under EASA regulation and required to hold a Certificate of Airworthiness. Subsequently, a new UK Microlight definition was brought into UK law via the UK Air Navigation Order on the 19th of August 2021.

A UK Microlight Aeroplane is one designed to carry not more than two persons which has a Maximum Total Weight Authorised (MTWA) not exceeding:

- 600 kg for a single seat and two seat landplane (Permit to Fly).
- 650 kg for a single seat and two seat amphibian or floatplane (Permit to Fly).
- Stalling speed at the maximum weight authorised not exceeding 45 knots (Calibrated Airspeed).

Designs certified or started certification/build prior to 19th August 2021:

- 300 kg for a single seat landplane (Single Seat DeRegulated - SSDR).
- 315 kg for a single seat landplane equipped with an airframe mounted total recovery parachute system
- 330 kg for a single seat amphibian or floatplane
- 390 kg for an amateur built single seat landplane for which a UK Permit to Fly or Certificate of Airworthiness was in force prior to 1 January 2003
- 450 kg for a two seat landplane
- 472.5 kg for a two-seat landplane equipped with an airframe mounted total recovery parachute system
- 495 kg for a two-seat amphibian or floatplane
- Stalling speed at the maximum weight authorised not exceeding 35 knots (Calibrated Airspeed).

The previous definition still exists for those aircraft types built before the definition change.

The ANO specifies a requirement for differences training to fly the heavier microlights in the following circumstances:
The aircraft has a maximum take-off mass of more than 475kg (or more than 495kg if the aeroplane is an amphibian or floatplane) and the holder's previous training and experience has only been in a microlight aeroplane with a maximum take-off mass of 475kg or less (or 495kg or less if the aeroplane is an amphibian or floatplane);".
The differences training mentioned above must be given by a flight instructor entitled to instruct on the aeroplane on which the training is being given, recorded in the holder's personal flying logbook and endorsed and signed by the instructor conducting the training.

Comment: It is not possible to say what each pilot will need to do to complete the differences training as each pilot's previous experience will differ. However, in the extreme case of a pilot only used to flying an older type, such as a Thruster, with low speed and a low stalling speed and simple handling characteristics, wanting to fly a 600kg composite high performance Light Sport Microlight (LSM) with a higher stall speed and likely less benign handling, one can imagine that there will be significant differences to address. At the other end of the scale a pilot of a 450kg type moving to a 500kg example of the same basic type (i.e. 450kg SkyRanger to a 500kg SkyRanger) will have less differences to consider. Ultimately it will be up to the instructor to determine each pilot's needs in each circumstance. As a starter in all cases, performance differences, take-off and landing considerations and Centre of Gravity calculations should be included. It is also up to each pilot to use common sense and undertake training even if it is not legally required (i.e. converting between different examples of the same class).

6.6 Nosewheel and Tailwheel

Before exercising the privileges of the rating, the holder must complete appropriate differences training, if the aeroplane is fitted with—

- *a tricycle undercarriage;*
- *a tailwheel*

and the holder does not have training or experience in aeroplanes with such fitted features.
The differences training mentioned above must be given by a flight instructor entitled to instruct on the aeroplane on which the training is being given, recorded in the holder's personal flying logbook and endorsed and signed by the instructor conducting the training.

Comment: This is a new, 2021, requirement for microlight pilots. Until the change there was no legal requirement for such training, although basic common sense has in almost all cases dictated that when converting from one undercarriage configuration to the other it is sensible to take instruction. The change aligns the requirement with the NPPL (A) SSEA requirements and is seen as a sensible change, long overdue.

6.7 Supercharger or Turbo-charger;

Before exercising the privileges of the rating, the holder must complete appropriate differences training, if the aeroplane is fitted with—

- *a supercharger or turbo-charger;*

and the holder does not have training or experience in aeroplanes with such fitted features.

The differences training mentioned above must be given by a flight instructor entitled to instruct on the aeroplane on which the training is being given, recorded in the holder's personal flying logbook and endorsed and signed by the instructor conducting the training.

Comment: With the increased maximum take-off mass (MTOM) now allowed for microlights it is very likely that higher performance types will be fitted with such power enhancers. Repeated mishandling will lead to engine failure with the safety risk that it brings and to extremely expensive repair bills. The differences training will consist of ground training

to understand the workings of such devices and flight training to practice the practical use of such systems, failure modes and emergency procedures.

6.8 Variable Pitch Propeller (VPP)

Before exercising the privileges of the rating, the holder must complete appropriate differences training, if the aeroplane is fitted with—

- *a variable pitch propeller*

and the holder does not have training or experience in aeroplanes with such fitted features.

The differences training mentioned above must be given by a flight instructor entitled to instruct on the aeroplane on which the training is being given, recorded in the holder's personal flying logbook and endorsed and signed by the instructor conducting the training.

Comment: For clarification, a variable pitch propellor (VPP) is one whose angle of attack can be adjusted in flight. Many microlights have ground adjustable propellors whose angle of attack can only be adjusted on the ground; these are not included within this differences training requirement.

Mishandling of a VPP will likely lead to engine damage with the safety risk that it brings and to extremely expensive repair bills. The differences training will consist of ground training to understand the workings of such devices and flight training to practice the practical use of such systems, failure modes and emergency procedures.

6.9 Electronic Flight Information Systems

Before exercising the privileges of the rating, the holder must complete appropriate differences training, if the aeroplane is fitted with—

- *one or more Electronic Flight Information Systems*

and the holder does not have training or experience in aeroplanes with such fitted features.

The differences training mentioned above must be given by a flight instructor entitled to instruct on the aeroplane on which the training is being given, recorded in the holder's personal flying logbook and endorsed and signed by the instructor conducting the training.

Comment: Electronic Flight Information Systems (EFIS) are becoming more common as they develop their capabilities replacing traditional instruments. Often with increasing capability comes further complexity. It is in the pilot's own

interest to ensure that they are fully familiar with the EFIS, and any other device such as a GPS or radio, before flying with it. Ideally you would become as familiar with it as a TV remote control or smart phone before trying to use it in the already complex situation of piloting an aircraft. It is likely that the differences training will consist of ground training to understand the workings of such devices and flight training to practice the practical use of.

6.10 Autopilot System

Before exercising the privileges of the rating, the holder must complete appropriate differences training, if the aeroplane is fitted with—

- *Autopilot System*

and the holder does not have training or experience in aeroplanes with such fitted features. The differences training mentioned above must be given by a flight instructor entitled to instruct on the aeroplane on which the training is being given, recorded in the holder's personal flying logbook and endorsed and signed by the instructor conducting the training.

Comment: Autopilots in microlights are becoming more common. It is in the pilot's own interest to ensure that they are fully familiar with the autopilot before flying with it. It is likely that the differences training will consist of ground training to understand the workings of such devices and flight training to practice the practical use of. Training is likely to include practical operation of the autopilot and failure modes.

6.11 Electric Engine

Before exercising the privileges of the rating, the holder must complete appropriate differences training, if the aeroplane is fitted with—

- *an Electric Engine*

and the holder does not have training or experience in aeroplanes with such fitted features.

The differences training mentioned above must be given by a flight instructor entitled to instruct on the aeroplane on which the training is being given, recorded in the holder's personal flying logbook and endorsed and signed by the instructor conducting the training.

Comment: With a general worldwide concern over climate change the development of electric powered aircraft has been progressing and has now reached a point where practical to seat aircraft are flying with electric power. The requirement for differences training is to ensure that the pilot is fully conversant with any engine management and effects of electric power characteristics that the aircraft might display that are different to conventional piston engines. The differences training will consist of ground training to understand the workings of such devices and flight training to practice the practical use of such systems, failure modes and emergency procedures.

6.12 Faster than 140 knots (Cruise)

Before exercising the privileges of the rating, the holder must complete appropriate differences training if the aircraft

- *has a maximum continuous cruising speed in excess of 140 knots indicated airspeed and the holder does not have experience in aeroplanes capable of that speed.*

The differences training mentioned above must be given by a flight instructor entitled to instruct on the aeroplane on which the training is being given, recorded in the holder's personal flying logbook and endorsed and signed by the instructor conducting the training.

Comment: With the change of microlight definition, it is likely that aircraft will be designed which can exceed 140 knots in the cruise. Previously 140 knots was a design limit for UK microlights. With higher speeds it is important that the pilot is familiar with the handling characteristics and design limitations. In airmanship terms the pilot must be planning well in advance and also integrate with slower circuit traffic. The differences training will consist of ground training to understand and appreciate such points as well as workings of all aircraft systems, then flight training to practice the practical use of such systems, failure modes and emergency procedures.

6.13 Reference: Air Navigation Order

https://www.legislation.gov.uk/uksi/2021/879/pdfs/uksi_20210879_en.pdf

7. Advisory Differences Training

Although the cases above are those specified within law, pilots should consider taking training whenever they chose to fly an aircraft with different characteristics, systems, controls or equipment. There have been many mishaps as the result of incorrect pilot reaction or input that could have been avoided if specific training had been taken.

Each pilot should use common sense, it is highly recommended to always undertake training even if it is not legally required.

7.1 Retractable Undercarriage

Although not specified in the August 2021 ANO update as requiring differences training by law, landing with the undercarriage retracted is one of the most common accidents in complex light aircraft. Light aircraft training typically includes a "gear down" check as standard in circuit and before landing checks. All precautions should be taken to avoid this sort of accident; several broken aircraft each year demonstrate the importance of this training.

Spending a little time and money with a competent instructor getting used to the added workload during take-off and landing can save dangerous and costly accidents. Although not legally mandated training is strongly recommended. Other reasons include gear limiting speeds, change of centre of gravity between retracted or down, circuit procedures/planning and most critically emergency procedures and checklists. Note they could be significantly different depending on actuation method (i.e., hydraulically, electronically or manually). It is no good switching the master off if you haven't put the gear down yet. All such scenarios should be covered, briefed and even rehearsed in the classroom.

Please note BMAA expects CAA to address this ANO omission shortly.

8. Further Guidance

For some further guidance of what may be included in some of the circumstances above instructors and pilots can refer to the document linked here or by using the QR code:

SCAN ME

BMAA recommends, where appropriate, to consult light aircraft differences training material and syllabi. EASA has many detailed and useful modules on these sorts of differences training modules discussed in this document. In most cases they include detailed descriptions of flight training and diagrams of equipment and systems. This material is invaluable to the process.