OPERATING DEREGULATED MICROLIGHTS

In 2007, the CAA responded to industry requests to reduce the regulatory burden on very light aircraft. This resulted in a sub-group of single-seat microlights of very low weight (empty weight less than 115 kg) and low wing loading (not more than 10 Kg/sq m based on its empty weight without pilot or fuel) known as 'sub-115'. These aircraft were 'deregulated' from an airworthiness point of view, meaning they could be flown without a Permit to Fly or any of the associated official design investigation, formal flight testing, maintenance schedules, annual inspections or permit paperwork. These aircraft are not eligible to hold a Permit to Fly and Certificates of Validity ("Permit renewals") may not be issued.

In 2013, the CAA proposed to increase the scope of this category to include all single-seat microlights, this change process was negotiated with BMAA/LAA and in May 2014 CAA issued an exemption allowing any single-seat microlight to be 'deregulated', if the owner applied to do so. In August 2016 the Air Navigation Order (ANO) was changed at which point all single seat microlights became deregulated by default ie there is no longer the option of a Permit to Fly for a single seat microlight.

A single seat microlight (SSDR) is now defined as an aircraft which:

a) Is designed to carry one person;
b) Has a maximum take-off mass of no more than:
    i. 300 kg for a single seat landplane (or 390 kg for a single seat landplane of which 51% was built by an amateur, or non-profit making association of amateurs, for their own purposes and without any commercial objective, in respect of which a Permit to Fly issued by the CAA was in force prior to 1 January 2003*); or
    ii. 315 kg for a single seat landplane equipped with an airframe mounted total recovering parachute system; or
    iii. 330 kg for a single seat amphibian or floatplane; **and**
c) Has a stall speed or minimum steady flight speed in the landing configuration not exceeding 35 knots calibrated airspeed.

* The intent is that if this clause is used to allow a microlight of between 300/315/330 kg and 390 kg max gross weight to be an SSDR, the Permit to Fly that was in force prior to 1.1.03 must have been for the aircraft as a single seat microlight not as a two seat microlight or as an SEP Aeroplane, i.e. to 'grandfather' pre-existing 'heavy' single seat microlights into the SSDR category.

Converting a two-seat microlight into an SSDR:

If the aircraft has a 450 kg MTWA then it's unlikely to be eligible to convert to a single seat SSDR because the empty weight will most likely be too high to allow an adequate payload at 300/315/330 kg gross weight. If the MTWA is less than 450 kg (for example one of the old 390 Kg class) and there will be sufficient payload available as a single seater at 300 Kg max gross weight, a transfer may be possible but you will need to modify the aircraft to render the second seat unusable. Be careful not to remove the seat if it is designed to form part of the aircraft's structure or if it is designed to prevent loose objects getting jammed in the control system. CAA will seek a letter (or e-mail) of 'no technical objection' to the change from either the LAA or BMAA as appropriate to the aircraft type. To obtain this you will need to liaise with the technical department of the LAA or BMAA giving details of how you have converted the aircraft into a single seater.

Can a single seat aircraft that is not a microlight be converted into an SSDR?

If an aircraft is presently cleared as an SEP 'Group A' aircraft then it is probably not eligible to be a microlight and hence not eligible to be deregulated, even if the gross weight falls within the limits above. Airspeed indicators frequently under-read by several knots at low speeds, giving the impression that the stall speed is lower than it actually is. Transferring an existing

'group A' LAA aircraft to the microlight category in order to become classified as a deregulated aircraft will involve first getting a change in classification agreed by LAA Engineering, which is put in train by submitting a category change mod application (form MOD10).

For the guidance of members who own single-seat 'Group A' aircraft, from the LAA's knowledge, the following aircraft are unlikely to be eligible for deregulation because they exceed the 35 knot calibrated stall speed and/or the weight requirement:

- Tipsy Nipper
- Clutton Fred
- Brugger Colibri MB2
- Druine Turbulent
- Luton Minor
- Jodel D9/D92
- Taylor Monoplane
- QAC Quickie
- Colomban MC-15 Cri-Cri
- Corby Starlet
- Monnett Moni
- Wolf WII Boredom Fighter
- Whittaker MW7
- Star-Lite SL-1
- Rans S9
- Staaken Flitzer
- Chiltern DW.1/1A

For the guidance of members thinking of designing their own SSDR, or looking to buy or build an existing design to operate in this category, the table below provides guidance on the minimum wing area likely to be needed to meet the 35 knot calibrated stall speed requirement, for different max gross weights and wing/flap configurations.

The table is based on the results of many true stall speed tests carried out over the years on microlights. Naturally the stall speed is affected by many things as well as the wing loading, configuration, elevator authority, cg position, wing section, aspect ratio and twist to name but a few, but the table below is intended to show a reasonable typical value of minimum wing area needed to stall at 35 knots true airspeed or less, as a starting point for design or a guideline in assessing whether an existing design might fit the category.

	Monoplane without flaps, or biplane without flaps	**Monoplane with simple plain flaps of half span, or full span flapperon**	**Monoplane with moderately powerful flap of ¾ span**	**Monoplane with powerful double slotted Fowler flap of ¾ span**
Max wing loading	**25 Kg/sq m**	**35 Kg/sq m**	**45 Kg/sq m**	**55 Kg/sq m**
Max gross weight	**Minimum wing area sq m**	**Minimum wing area sq m**	**Minimum wing area sq m**	**Minimum wing area sq m**
225 Kg	**9**	**6.4**	**5**	**4.1**
250 kg	**10**	**7.1**	**5.5**	**4.5**
275 Kg	**11**	**7.8**	**6.1**	**5**
300 Kg	**12**	**8.6**	**6.6**	**5.4**

Gyroplane: gyroplanes are not covered by these deregulation rules.

Glider: gliders are not covered by these deregulation rules.

Unmanned aircraft: unmanned aircraft including models and UAVs are not covered by these regulations. Interestingly, the deregulated microlight with its single seat is less regulated than large UAV's or large pilotless radio-controlled model aircraft for both of which the regulations require a simple design review.

GENERAL INFORMATION

Aircraft which are deemed 'deregulated' no longer hold Permits to Fly or Certificates of Validity and no longer get an annual inspection signed off by an LAA inspector. In these categories the onus is entirely on the owner/pilot to establish that the aircraft is in a fit state to fly, and they are responsible for maintaining the aircraft in an airworthy condition and determining if any modifications and repairs are safe.

The aircraft must continue to comply with other requirements in the Air Navigation Order, in particular it must:

- Be registered with the CAA
- Display its G-???? registration markings in the normal way
- Be covered by third party insurance (minimum of 750,000 SDRs, approximately £600,000 of cover)
- Be flown in accordance with the rules of the air
- Be flown by a pilot in possession of an appropriate and current pilot's licence to fly a microlight
- Have airframe and engine logbooks of CAA-approved format that must be kept up to date in the normal way
- Have a fireproof identification plate engraved with the registration letters
- Have a weight schedule
- Comply with the noise limitations for microlights (contained in "The Air Navigation (Environmental Standards For Non-EASA Aircraft) 2008"): however, at the current time (July 2014) these aircraft are exempted from having to hold a certificate to show compliance with these regulations. If suspected of being non-compliant CAA may insist on a particular aircraft being noise tested
- Only be flown if it is in a condition for safe flight

Although the published limitations (incorporated in the 'operating limitations document' of the Permit to Fly for LAA types, or in the TADS for the type) no longer apply to these aircraft, the pilot should be aware that exceeding these limitations could cause serious hazards due to the effect on aircraft performance and handling characteristics, and eroded structural safety margins established for that type and are likely to lead to both higher risk of immediate distortion/breakage and a much accelerated accumulation of fatigue damage which particularly in an old, abused, corroded or high-time airframe is likely to cause a disastrous premature structural failure.

DEFINITIONS

'Aeroplane' means an aircraft supported in flight by fixed wings (as opposed to rotating wings) and therefore includes conventional rigid wings, flex wings and powered parachutes, with wheels or foot-launched, and controlled by any method including control surfaces or weight shift or a mixture of the two. It does not include gyroplanes or helicopters. It can be powered

by any form of motor including reciprocating, rotary, jet, rocket, electric, steam, etc, although it would need to comply with the noise regulations for microlights (see above).

'Empty weight' is the weight of the aircraft without pilot or fuel, and need not include items carried at the discretion of the pilot on a flight-by-flight basis e.g. hand-held radios, extra seat cushions, etc.

'Maximum gross weight' is the maximum weight of the aircraft including fuel, pilot and all other items carried.

'Empty wing loading' is the empty weight in kilograms (see above) divided by the wing area in square metres. For a conventional aircraft, the lifting area is taken as the area of the wings, including wing flaps (if fitted) and ailerons. Where the wing panels attach to the fuselage sides, it is normal to include the 'virtual' portion of wing buried in the fuselage. So with a typical parallel-chord wing with square tips, the wing area becomes simply the wing span multiplied by wing chord. If the wing is tapered, multiply the wing span by the mean chord to get the wing area. The mean chord is the chord measured at one quarter of the wing span outboard from the aircraft centreline. In the case of a canard aeroplane it is acceptable to include the canard area with the wing area. With a biplane, add the areas of the upper and lower wings, upper wing centre section and the 'virtual' centre section linking the two lower wings.

'Registered with the CAA' means you must apply to the CAA Registrations Department for a unique G-???? registration, using a form CA1 which you can download from the CAA's website. There is a registration fee to be paid, but this is a one-off fee.

'Display of G-???? registration letters' means that the registration must be clearly displayed under the port wing, on both sides of the fuselage sides or fin, and indelibly marked on an engraved fireproof metal plate attached to the fuselage. The details of the required sizes of the letters, letter style, colouring, and orientation of the lettering on the surfaces are provided in the CAA booklet CAP 523 which can be downloaded from the CAA website. You will be sent one of these automatically when your G-???? registration letters are allocated.

'Single seater' means the aircraft may only carry one person. This is not as obvious as it sounds, as some microlights do not have seats as such – the pilot of a foot-launched flex-wing for example commonly flies in the prone position supported by a bag.

'Stall speed' is the minimum flying speed in the landing configuration, as marked by a 'classic' nose drop or by the pitch control reaching its backstop. The stall is approached at a deceleration of approximately 1 knot/second. For the purposes of establishing whether an aircraft is a microlight, the *calibrated* stall speed must be no more than 35 knots. A tool is available on the website to help establish calibrated ASI data (Aircraft & Technical – Flight testing aircraft).

A FEW WORDS OF WARNING

Just because there are very few formal requirements surrounding this new breed of deregulated microlight, it does not mean they are toys. Like any aircraft, they will kill or injure you given half a chance, especially so as most will offer very little by way of pilot protection in a crash. The deregulated microlight has been freed from the burden of airworthiness regulation not because they are inherently safe for the pilot, but only because they have been judged to cause a negligible risk to third parties. As with any other deregulated hazardous sport such as mountaineering and ocean racing, the responsibility for your safety will lie entirely in your own hands. There is nothing in the new rules to stop you making your wing spars from knotty pine, just as there's nothing to stop you making a rowing boat from blotting-paper – and each will have a similar chance of success. The fact that there is no legal requirement for design evaluation, maintenance or flight testing does not mean that none of these are required: it

means that it is entirely up to the owner to decide on his or her own approach to these activities. Based on what happens in other countries where there are similar deregulated forms of aviation, the best safety net is for the owners to be part of a group of like-minded people with the benefit of one or two experienced souls able to act as mentors, giving guidance to those who may be moving unwittingly into particularly dangerous territory. If you are thinking of building your own deregulated microlight then joining your local LAA Strut would be a good first step, and the local LAA inspectors will be able to give advice although for deregulated aircraft, for liability reasons, they will always have to qualify their advice with a statement that their advice is their own opinion only, and that it is entirely up to the owner/pilot to research the situation and form his own opinion before deciding what to do. The LAA inspector has no formal responsibility towards a deregulated microlight owner but will nevertheless probably be only too happy to give you the benefit of his advice and experience.

WHAT'S THAT OLD THING HANGING UP IN THE BACK OF THE HANGAR?

A word of caution about resurrecting old single-seat microlights from the early 1980s era which might fall into the SSDR category, many of which can be found hung up in the roof of hangers, festooned in cobwebs, or even 'slung out back' in a heap of aluminium tubing and flapping Dacron, having been long-grounded after the introduction of the dreaded 'Section S' in 1984. Before thinking of getting one of these prehistoric microlights airborne again, look very carefully. Was the design a safe one? Much has been learnt about microlight safety since those days, and things like elevator control cables made of nylon cord have long ago passed from favour – many people died in the early days of microlighting proving that some of the features of these old designs were unsatisfactory. And has the aircraft been properly looked after during its life? Probably not, as its value will have sunk to nothing for many years and it will most likely have been left to corrode away in peace, out of sight and out of mind. The fabric is almost certainly ruined by exposure to ultra-violet light, and will rip to shreds in your hands with way below the original strength. Airframe tubing might look serviceable – but how do you know if it is the original bit? In the early days, when tubing got bent in mishaps it was not uncommon to substitute material from other crashed machines, or whatever was lying around – like electrical conduit for example, even though its strength might be way down on what is needed for the job. To fly any aircraft with suspect materials in the primary structure is like playing Russian Roulette.

DESIGNING YOUR OWN?

If you are thinking of coming up with your own design in the deregulated category, as long as you are a LAA member we will be happy to give general advice and guidance from LAA HQ, but as with our inspectors, will caution you that this is our opinion only and that it is entirely up to you to research matters and make your own decision. We can point you in the direction of the many aircraft design books available from LAA bookshop, such as Hiscocks 'Design of Light Aircraft', and standard works of reference like Stinton's 'Design of the Aeroplane'. The LAA website is also a ready source of help and in particular, see Technical Leaflet TL 1.15 'example microlight aircraft loading calculations' which leads you step by step through how to work out the loads on the aircraft prior to stress analysis when sizing the structural components, or sand bag testing your completed airframe.

We would recommend you design the airframe to cope with all the main load cases of BCAR Section S even though this is not mandatory in this deregulated class. Appendix A and B of CS-VLA also provide a very helpful simplified approach to working out aircraft loads, which is especially useful for the deregulated microlight designer without too much previous aircraft design experience.

MODIFYING AN EXISTING DESIGN

Several designs of single-seat microlight in the USA appear to fall within the SSDR category. Be careful on three counts – firstly, are they really as light as claimed, and secondly, do they have enough wing area, and thirdly, are they safe? You may find that you have to pare every bit of extra weight out of the aircraft to get it to squeak into the 300 kg limit - one LAA'er recently found he had to fit a lighter, much less powerful engine for example – there seems to be very little checking of such things in other countries, so don't take any weight figures from manufacturers as gospel truth – weigh it yourself and see! If you find that the design is short of wing area at the finalised empty weight, be particularly wary of suggestions that the wing area can easily be increased by adding a little extra wing span or chord, or a little of both. This would fall into the category of a serious change needing proper engineering investigation. An extra foot or two of span on each wing can drastically increase the stresses in the wing spars, struts and carry-through structures, not to mention increasing tail loads and fuselage loads - and so it goes on. Increasing the wing chord may similarly alter the distribution of load between the spars or cause serious stability problems. Carrying out such changes on an ad hoc basis will be fraught with danger.

CONCLUSION

Not since the early 1980s has there been the freedom to design and build simple microlights in the UK without needing a permit to fly. Back then, a number of fatal accidents caused questions to be asked in Parliament and legislation to be hurried into place to close the loophole. Now, thirty years later, the microlight industry has matured, microlight pilot training and licensing are closely controlled and so there is a reasonable chance that history will not repeat itself and this time we can be left to get on the building and flying these very simple, lightweight aircraft without the need for official interference. It is up to all those participating to observe the highest safety standards, avoid an upsurge in the accident rate and so preserve and nurture this new found freedom to build and fly.

The LAA continues to support members who own single seat microlights, even though they are now deregulated. Our Engineering team has a wealth of knowledge on these aircraft, both generically and on specific types, and advice is there for the asking. We want the aircraft which our members fly to be safe, whether deregulated or not, and consider that the LAA's well-proven safety culture, advice and information-sharing service are the best means to promote this.

Please report any errors or omissions to LAA Engineering: engineering@laa.uk.com