BRITISH GLIDING ASSOCIATION

Briefing

Use of Unleaded Aviation Gasoline (Avgas) UL91

This guidance material is designed to assist owners and operators who are considering the use of Unleaded Avgas UL91 as a result of the gradual withdrawal of Leaded Avgas 100LL.

Definitive information is provided in the following publications:

EASA Aircraft
EASA Safety Information Bulletin SIB 2011-01R2 (http://ad.easa.europa.eu/ad/2011-01R2).

Annex II Aircraft
Please refer to CAA Official Record 947 General Exemption E3395 (http://www.caa.co.uk/docs/33/ORS4_947.pdf) supported by Generic Concession GC No 7 published in CAP 747 (http://www.caa.co.uk/cap747).

APPROVAL
No further approval is required to operate an aircraft on Unleaded Avgas UL91 if:

- the aircraft and its fuel systems are approved for Avgas **and** the engine is approved for Avgas UL91 **or:**
- the aircraft is approved for Unleaded Mogas 95 RON

To verify if your aircraft is approved, check the approved flight manual for the fuel specification in conjunction with engine and airframe manufacturers' bulletins or technical notes.

Below is a summary of aircraft types that are able to operate on Avgas UL91:

Motor Gliders
Rotax 912 A, F and 914 S, F equipped motor gliders
Limbach L2400 equipped motor gliders (EN228 specified)
Limbach L1700 & L2000 equipped motor gliders provided TB 42 is embodied (EN228 specified)
DG powered sailplanes (confirmed by UK agents)
Schempp-Hirth powered sailplanes (confirmed by UK agents)

Tugs/Engine types:
Chipmunk with Gipsy Major engines
Pawnee with 0-540-B series engines
Rallye with 0-360 series engines
Robin with 0-360 series engines
Super Cub with 0-320-A, -C, -E engines
Super Cub with 0-360 series engines

Super Chipmunk with 0-360 series engines

For more information and other types please refer to your Flight Manual, Technical Notes/ Service Bulletins or refer to the type certificate holder. Care should be taken if replacement fuel hoses or other components have been fitted to ensure they are compatible with Unleaded Avgas.

ADVANTAGES OF UNLEADED AVGAS UL91
As with any radical change, operators should be aware of improvements and potential issues. Tetraethyl lead is added to fuel for two main reasons: to lubricate and help reduce valve seat regression and to improve anti-knock properties and delay detonation by increasing the octane rating.

Some of the most significant improvements resulting from the use of Unleaded Avgas UL91 will be a reduction in the tendency for spark-plug lead fouling on lower plugs, a

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reduction in lead build-up in the cylinders and reduced valve guide sticking.

As excess lead is transferred to and carried in the engine oil, Rotax engines will benefit from the elimination of the lead build-up that can cause slippage and premature failure occur in the gearbox one-way clutches. Shorter oil change intervals were introduced to negate this; standard oil change intervals may be resumed when using unleaded fuel.

Currently, unleaded MOGAS can contain up to 10% bio-ethanol without requiring any warning on the pump (if 10% or over, the pump must be labelled 'E10'). Fuels containing more than 1% bio-ethanol are not allowed for aviation use. The amount of bio-ethanol in Unleaded Avgas UL91 is strictly controlled and is below 1%.

It is believed that there will be some cost savings as Unleaded Avgas is less expensive to produce than leaded. However, the latest information suggests that any cost savings are being eroded by the increasing cost of UL91. This situation may improve as more suppliers start offering the unleaded product.

DISADVANTAGES

Operators should be aware of any fuel system problems and signs of leaks or rubber component degradation due to the changes in the formulation of the fuel. Remember that UL91 is clear and, unlike 100LL, there will be no blue tell-tale stains to indicate evaporated fuel from a leak or weep.

Because lead acts as a lubricant, preventing valve-seat regression, it will be necessary to use hardened valve seats. Engines with adjustable tappets should be monitored for any reduction in clearances, indicating possible seat regression. Normal servicing intervals should be observed, including the valve regression checks typically at 500 hours.

Lycoming specifies that, unless tug engines are running on multigrade oil (Aeroshell W15-50 or equivalent finished product), an oil additive must be used. See Lycoming SI 1070 for further details.

If the aircraft is converted to UL91 fuel, a log book entry should be made and the fuel grade placard adjacent to the filler point suitably amended.

At time of publication the following aircraft/ engines are **not** approved for UL91:

Not approved
Stamo engines (no type support)
Rollason engines (no type support)
Hirth engines (no type support)
Grob G2500 (Grob G109B) SB817-46/2 requires a minimum of 96 RON

Awaiting further research or information:
Lycoming 0-320-B, -D
Lycoming 0-540-A,-D, -E, -F, G, -H
Alexander Schleicher powered sailplanes
HPH 304MS
LAK 17AT

Some of the Lycoming engines are approved for HJECMCO 91/96 UL fuel. Unfortunately, this is not currently available in the UK.

FUEL INSTALLATIONS

We recommend that you check with your fuel supplier and/or delivery equipment manufacturer to ensure that your fuel installation, tank, pump, and metering equipment is compatible with Unleaded Avgas UL91. Remember that you must re-identify the pump and tank filler point and delivery nozzle with the new grade. Check your fuel license to ensure the new grade is covered.

Note that while UL91, unlike 100LL, may be safe for use in vehicles fitted with catalytic converters, its use on public roads is illegal as the correct fuel duty has not been paid.

The BGA has produced this guidance based on information received and as published by EASA, CAA and engine manufacturers where available. The BGA does not accept any responsibility for damage or loss caused by the use of incorrect or incompatible fuels. Always refer to type certificate holder's information.

REFERENCES

Lycoming Service Instruction 1070
http://www.lycoming.textron.com/support/publications/index.html
Rotax Service Instruction 912-016/914-019
http://www.flyrotax.com/portaldata/5/dokus/d05289.pdf
TOTAL flyer
http://www.d4multimedia.com/transfer/Avgas%20UL91%20info%20sheet.pdf
CAA Information Notice IN-2012/179
http://www.caa.co.uk/application.aspx?catid=33&pagetype=65&appid=11&mode=detail&id=5277