

Airworthiness Approval Note: LAA-999-413 supplement 5

Aircraft Type: All LAA aircraft (subject to engine type)

Issue 1	initial issue	16 th Nov 2011
Issue 2	Continental C75 added to Appendix 1	23rd Nov 2011
Issue 3	High compression Lycoming 0-235 models deleted from Appendix 1	24th Nov 2011
Issue 4	Alternative criteria 3 in section 5 of this AAN added and resulting additional models of -360 Lycoming engines added to Appendix 1. Also, for clarity, suitable Lycoming -320 models listed in Appendix 1.	2 nd Dec 2011
Issue 5	Additional Lycoming models added following issue of Lycoming Service Instruction 1070R. Briggs and Stratton engine included in Appendix A. Jabiru 2200 and 3300 compression ratio and combustion chamber options expanded in Appendix A.	23 rd April 2012
Issue 6	References to Cirrus Major, JPX 4TX75/A and Potez 4E20 added, document reformatted.	10 th December 2012
Issue 7	Additional text included to add appropriate Superior Air Parts engines into eligibility list, to include latest issue R2 of EASA SB 2011-01, Lycoming SI 1070S and to include additional Lycoming engines and advice about oil choice introduced therein.	29 th April 2013
Issue 8	Text altered to include UL 91 fuel from any approved supplier rather than specifically from Total.	10 th March 2014

Approved:



Dated: 10th March 2014

For the Light Aircraft Association
CAA Approval DAI/1148/72

1. Summary

This Airworthiness Approval Note has been raised to approve the use of Avgas UL 91 fuel in applicable UK registered aircraft operating on a Permit to Fly, where the Permit to Fly has been issued on LAA recommendation.

2. Description

Avgas UL 91 fuel is a new type of unleaded aviation fuel which is essentially the same as 100 LL fuel but without the addition of any tetraethyl lead (TEL). This results in an anti-knock rating which is lower than that of 100LL fuel but broadly equivalent to EN228 unleaded Mogas, but without potentially problematical octane-boosting additives such as ethanol or ETBE commonly found in Mogas being present. The anti-knock characteristics are superior to those of 80/87 Avgas.

Originally, UL 91 fuel was introduced to the UK by Total in 2011. In 2013, Warter Aviation entered the market with a fuel of the same UL 91 specification. In response, at issue 8 this AAN was altered to include the approval of UL91 fuel supplied by refiners/suppliers other than Total.

3. Basis for Approval

The approval of this fuel is based on a comparison of its properties with those of UL 95 and 80/87 fuel, and compliance with applicable quality standards for aviation fuel. Both engine and airframe/fuel system issues have been considered in making this assessment.

It should be noted that UL 91 fuel is a different specification to 91/96 aviation fuel and has not been shown to be equivalent at this stage in the investigation. Approvals to use 91/96 fuel must not be taken to mean approval to use UL 91 fuel.

4. Investigation

The LAA has been in extensive contact with representatives of Total during the development of this fuel, which has been developed in close consultation with engine manufacturers Rotax and seeks to address the problems with lead fouling experienced

when 100LL fuel is used in Rotax and other modern engines. As an aviation fuel manufactured and supplied to the applicable aviation standards, the uncertainties of quality as delivered to the aircraft fuel tank associated with Mogas fuel are also avoided. Materials compatibility problems associated with the additives in Mogas are also avoided.

Material Safety Data Sheet 38042 and EASA Safety Information Bulletin 2011 01R2 refer.

According to the manufacturer's specifications, the (MON+RON)/2 value for UL91 fuel is 93.5.

5. Approval

The LAA accepts the use of UL 91 fuel for use in any LAA aircraft which meets one or more of the following criteria:

1. The engine type is one of the specific models of Continental, Hirth two-stroke, Jabiru, Rotax two-stroke, Rotax four stroke or VW based engines accepted by the LAA for use with UL 95 Mogas to EN 228, in accordance with the requirements specified on the LAA website, including the specific requirements identified for the particular models of engine identified (eg reduced compression ratio)
2. The engine type is accepted by the LAA as suitable for use with UL 95 Mogas but individual airframe/fuel system/ fuel system requirements have not been identified as such on the LAA website, including
 - Briggs and Stratton 0114-E1 (Colomban conversion)
 - Potez 4E20
 - JPX 4TX75/A
3. The engine type is approved by the engine manufacturer for use with 80/87 Avgas. (For Lycoming engines satisfying this criteria, see 4. below)
4. The engine type is a Lycoming engine of a type approved by Lycoming for use with UL 91 fuel in Lycoming Service Instruction 1070S. In that case note Lycoming additional advice contained therein that Lycoming oil additive p/n LW16702, which contains an anti-scuffing agent to reduce

wear on start-up, or an equivalent finished product such as Aeroshell 15W50, Aeroshell W100 Plus, Aeroshell W80 Plus oil must be used.

5. The engine type is a Superior Air Parts Lycoming 'clone' engine approved by Superior Air Parts for use with unleaded Mogas and having a compression ratio of 8.5:1 or less.

Appendix 1 lists popular engine types established to satisfy these criteria but is not a complete list.

This approval does not extend to engines that have been modified from the basic type in any manner that affects the effective compression ratio. In that case, individual approval must be sought from LAA Engineering.

Due to the lower vapour pressure of UL91 fuel compared with that of UL 95 Mogas, the special operational limitations in terms of operating altitude and fuel temperature normally applicable to engines operating on unleaded Mogas do not apply when UL 91 fuel is used.

6. Recommendations

It is recommended that having established that the individual aircraft concerned is suitable for use with UL 91 fuel in accordance with the criteria in this AAN, suitable placards should be fitted adjacent to the fuel filler cap identifying that UL 91 fuel may be used, and that in the case of aircraft with a POH or flight manual, a note is added to this effect in the appropriate section.

APPENDIX ONE

Engine types that satisfy the criteria in Section 5 of this AAN include the following:

ADC, Blackburn	Cirrus, Cirrus Hermes, Cirrus Minor, Cirrus Major (all models)
Briggs & Stratton	0114-E1 (Colomban conversion)
Continental	A40, A50, A65, A75, C75, C85, C90, 0-200, 0-300, C-125
ENMA	Tigre GIV, GIVA, GIVB
DH	Gipsy I, II, III, Major, Minor
Jabiru	Only those 2200A and 3300A engines with compression ratios not exceeding 8.0:1 with the original wedge type combustion chamber or 8.3:1 with the later 'high octane' type combustion chamber or modified high octane combustion chamber. Jabiru Service Letter JSL 007-4 refers.
JAP	J99
JPX	4TX75/A
Kinner	R-540
Lycoming	O-145 O-235 'C', 'E' 'H' 'K' 'L' 'M' 'N' and 'P' series models only. Other O-235 series including 'F', 'G', 'J' series not acceptable. O-290-D, -D2 O-320- 'A', 'B' 'C' 'D' and 'E' series IO-320- 'A' 'B', 'D' and 'E' series,

Lycoming (cont)	AIO-320 'A', 'B' and 'C' LIO-320 'B' only AEIO-320 'E' series. O-340-B O-360- 'A', 'B', 'C', 'D', 'F', 'G' and 'J' series HO-360 'C' series only IO-360 'B', 'E', 'L' and 'M' series HIO-360 'B' and 'G' series, LIO-360 'M' series, LO-360 'A' series IVO-360 'A' series O-435 'A' and 'C' series GO-435-C and 'C2' (C2 only if fitted with carb settings 10-3391-1 or PS-5BD) GO-480 'B', 'D' and 'F' series O-540 'A' 'B' 'E' 'F' 'G' 'H' and 'J' series IO-540 'C' 'D' 'N' 'T' 'V' 'W' 'AB' and 'AF' series VO-540 'A' and 'B' series
Pobjoy	R, Niagara, Cataract
Potez	4E20
Renault	4PO5
Rotax	912-UL, 912-ULS, 914-UL, 447, 503, 582, 618
Siemens	SH14A

Superior	XP-320 carburetted or fuel injected models with compression ratios not exceeding 8.5:1 XP-360 carburetted or fuel injected models with compression ratios not exceeding 8.5:1
VW	conversions with compression ratio not exceeding 8.0:1.
Walter	Micron II, III
Warner	145, 165, 185

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