

Jabiru Service Letter: Engine Overhauling Issues			JABIRU AIRCRAFT PTY LTD P.O. Box 5792 Bundaberg West Queensland, Australia. Phone:+61 7 4155 1778 Fax:+61 7 4155 2669 Web: www.jabiru.net.au Email: info@jabiru.net.au		
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2 Revision history

Table 1 below provides the revision history for this service letter.

Table 1 - Table of revisions

Issue	Changes	Date
1	Original issue - Released	July 2019
2	Expand 5.1 Clearances – Piston to bore to include non-scheduled maintenance and a Strong Recommendation to replace pistons with Heavy Duty pistons with current piston to barrel clearances in overhauled engines.	May 2020
3	Change description of pistons from Heavy duty pistons to current pistons, 5.1 Reduce piston hours to 200 hrs	Oct 2020

3 General

- This service letter has been written to emphasise some points of overhauling and non-scheduled maintenance.

NOTE

Incomplete review of all the information in this document can cause errors. Read the entire Service Letter to make sure you have a complete understanding of the requirements.

3.1 Recurrence

Ongoing.

4 Applicability

- This applies to all overhauled engines and non-scheduled maintenance as described at 5.1 below.

4.1 Applicability process

This is aimed at all Jabiru Engines, but particularly Gen 1, 2 and 3 engines that have been overhauled and non-scheduled maintenance as described at 5.1 below.

Time of Compliance

- The effective date of this Service Letter JSL 023-2 is 21st Oct 2020.
- All requirements prescribed in Section 5 & 7 are **strongly recommended** to be performed at the next scheduled maintenance.
- All current maintenance requirements including those revised in section 5 must be practiced at the time intervals prescribed in the relevant Engine manuals.

5 Top end overhaul.

It is most important to make sure you have the latest version of the appropriate maintenance manual for your engine, and ensure that you follow it. The latest version is available on the Jabiru website (<https://jabiru.net.au/service/manuals/>) under Support in the header menu.

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5.1 Clearances – Piston to bore.

When conducting an engine overhaul or cylinder replacement or replacing piston rings and or the piston itself during scheduled or non-scheduled maintenance, it is of the highest importance that the **piston to barrel clearance** be checked and recorded. This means accurately measuring **both** the piston and cylinder bore with a calibrated micrometre and bore gauge respectively. It must never be assumed that just because the piston(s) are new and the barrel measurements are within recommended dimensions, that the clearance will be within specifications. The clearance tolerances require an accuracy of 0.01mm (0.0004”) so each have to be measured.

- Pistons and cylinder bores must be measured and clearance calculated.
- Clearances are provided in Table 12 of the 2200 and 3300 overhaul manuals. (JEM0001 for Gen 1, 2 & 3)

If barrels have been reused at overhaul or during non-scheduled maintenance such as listed above and piston to barrel measurements at the time were above the clearances listed in Table 12 of the **current** Overhaul manual JEM0001 (<https://jabiru.net.au/service/manuals/>), OR clearances are not recorded, it is **strongly recommended** that pistons should be replaced with current pistons within **200 hours** of service of the pistons, particularly for heavy duty operations such as flight training.

5.2 Cylinder barrel bore roundness

Cylinder Barrels must be measured for size before installing; however, the measurements should be confirmed once the barrel has been installed. Small things such as the o-ring being pinched can pull the barrel out of round after installation and torqued. Measuring the bore of the cylinder, after installation is an important check. **This requires a bore gauge calibrated against a micrometre (the micrometre itself must also be calibrated).** See the overhaul manual (JEM0001 – always use the latest issue).

5.3 Piston orientation

The current pistons in Jabiru engines are handed (i.e. The Left and Right cylinders of the engine use different piston respectively). Overhaulers must ensure pistons are installed in the correct location. Pistons installed in the incorrect location (Left side pistons installed in a Right side cylinder or vice versa) can fail in less than 300hrs.

Detailed instructions on installing the pistons correctly are contained in Section 7.3 of the Overhaul Manual (JEM0001 – always use the latest issue).

5.4 Build clearances

Forms are provided in the back of the Overhaul Manual for recording overhaul details. It is strongly recommended that the build clearances are retained by the overhauler.

5.5 Gudgeon pin circlips

There is a correct and incorrect method of installing gudgeon pin circlips in Jabiru engines. If the circlip is not installed with the correct orientation or **not quite seated properly**, the chance of a

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circlip becoming unseated is increased. If the circlip becomes unseated, the result is engine failure. See Jabiru Overhaul Manual for details on the correct installation of circlips.

Tip – when installing circlips in pistons orientate all circlips in one direction. Then on subsequent disassembly it can be determined if the circlip has moved during service.

6 Maintenance

6.1 Leak-down tests

The **only** acceptable method of assessing the health of a Jabiru cylinder is with a leak-down test. Any other types of compression testing do not give a true indication of the condition of rings and valve seats. Jabiru recommends the use of the standard aviation leak-down tester (2 gauges and 40 thousandths of an inch orifice). Leak-down test should be done at least every 50 hourly maintenance intervals. See maintenance manual for details - JEM0002 (Gen 1, 2 & 3).



Figure 1: Leak Down Tester

If any parts, especially pistons or cylinder barrels are replaced as part of line maintenance, the appropriate section of the top end overhaul procedures and record keeping should be followed.

7 Action to take.

7.1 Leak-downs

If you have not been conducting leak-down tests in accordance with the Jabiru maintenance manual, do so at the next service and make sure leak-down testing is performed regularly at

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service intervals. If pre-flight pull throughs of the propeller indicate a low compression, refer to the engine maintenance manual.

7.2 Piston to Barrel Clearances

Piston and barrel measurements and piston to barrel clearances require an accuracy of 0.01mm (0.0004"). This accuracy requires a micrometre and a bore gauge used as per the overhaul manual. **If pistons have been replaced without these gauges for measuring, it is strongly recommended that a cylinder and piston inspection be performed**, checking piston to barrel clearances accurately and recording measurements using the form in the Overhaul Manual.

7.3 Non-Jabiru Specified Oils and Lubricants and Fuel additives and Oil Additives

If there has been **any possibility** that non-specified oils such as automotive oils, fuel additives or oil additives have been used at any time during the operating life of the engine, it is strongly recommended that a cylinder and piston inspection be performed, checking piston to barrel clearances accurately and recording measurements using the form in the Overhaul Manual. Subsequently, the engine must return to using only aviation type oils as specified in the relevant manuals to prevent failures.

7.4 Time in Service and Top End overhauls

The Time in Service of an engine can only be zeroed or renewed if a complete top end overhaul or complete overhaul is performed as described in the Jabiru Overhaul Manual. Carrying out any one part of an overhaul, such as an engine repair, bulk strip or piston change **does not affect any change to the original time/hrs remaining before overhaul is required**.

Before recording the engine at zero time in the log book, operators should confirm that the maintenance performed actually was a Complete Overhaul replacing components that have a life limit as per the Jabiru manuals.

Overhaul can to be a very loosely used term and engines can consequently be time expired due to mis-recording in log books resulting in failures.

8 Jabiru engine manuals

The Engine Manuals as referenced by this Service Letter are:

- i. JEM0001 (Jabiru Engine Overhaul Manual Gen 3 and earlier)
- ii. JEM0004 (Jabiru Engine Overhaul Manual Gen 4)
- iii. JEM0002 (Jabiru Engine Maintenance Manual Gen 3 and earlier)
- iv. JEM0005 (Jabiru Engine Maintenance Manual Gen 4)

Always use the latest issue of any manual. Check regularly for manual updates on the Jabiru Aircraft website, especially before conducting maintenance.

9 General Engine Maintenance Notes

The work detailed in this Letter requires extensive skills, experience and training in engine maintenance – as well as special tools and equipment. Unskilled personnel or those lacking the

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correct tools and training **must not attempt this work**. Refer to the current Jabiru Engine Overhaul Manual, (always use latest issue) for personnel, tool & equipment requirements.

10 Reminder of current practices

This section promotes the practices current (at the time of writing) for Jabiru Engine Maintenance as they relate to the components of the cylinder head. Refer to the latest approved revisions of Jabiru Manuals for details.

- i. Ensure the engine oil and oil filter are changed at every **25 hourly inspection** (as prescribed by the Engine Maintenance Manual – JEM0002 or JEM0005 for Gen4 engines). Frequent oil changes reduce the amount of contaminant build up in the oil. In addition, there now exists the requirement for the oil and oil filter to be changed every **6 months** if this time elapses before the engine reaches the next 25 hourly.
- ii. If an engine is prepared for long term storage, ensure that the current practice (as prescribed in JEM0002 / JEM0005).
- iii. Ensure the engine carburation system is updated to current jetting configuration as prescribed in the current Engine Overhaul and Maintenance Manuals (JEM0001 and JEM0002 or JEM0004 and JEM0005 for Gen4 engines).
- iv. Owners and Operators should also familiarise themselves with the Jabiru Service Letter JSL007 (use most current issue) which gives guidance with regards to different fuels and how they affect the engine, particularly the deposits produced in the combustion chamber.

Warning:

Several engine failures have been attributed to operating with fuel mixtures containing both AVGAS and MOGAS

- v. The requirement for **50 hourly** cleaning and inspection of the carburettor air filter must be adhered to (and mandatory replacement at every **100 hourly or annual inspections**). This minimizes the amount of contaminant inducted into the engine.
- vi. It is recommended that when operating in dusty conditions a more regular air filter servicing schedule is used. Also remember crankcase breathers are not filtered and, for some earlier aircraft models, neither is intake air with carburettor heat ON.
- vii. **DO NOT** make any unapproved modifications to the valve guide (**such as replacement with K-liners**) or any other modifications to the componentry of the cylinder heads and the cylinder heads themselves.
- viii. **DO NOT** use top end cylinder lubricants or fuel or oil additives.
- ix. **DO NOT** fit water cooled heads.

10.1 Notes of operation

- i. The oil must be changed every 6 months if the engine has done less than 25 hours in that time period. This is necessary because engines that are largely inactive will accumulate contaminants including moisture, acids and sludge. These

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contaminants are expunged from an engine when it is operated regularly. After long periods of inactivity, short ground runs should be avoided as this will not allow enough time for the engine to remove these contaminants.

10.2 Continued Operations

Operators are encouraged to contact Jabiru Aircraft with details where issues are found. It is important to have details of engine serial number and detailed history of time in service since new.

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11 Continued Operating Safety Reporting Form

The owner/operator of a LSA is responsible for notifying the manufacturer of any safety of flight issue or significant service difficulty upon discovery.

Date:	
Owner/Operator	
Aircraft Model	
Aircraft Registration	
Aircraft S/No.	
Engine S/No.	
Propeller Model / Serial Number	
Fuel Type & Brand	
Operation eg. Training / Private	
Accumulated Engine Hours	
Accumulated Airframe Hours	
Details of item:	Please return any relevant parts to Jabiru Aircraft Pty Ltd or their Dealer.
Name of Reporter:	
Preferred Contact Details of Reporter	

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LSA Service Notification: JSN 023

Issue: 3

Effective Date: 21st Oct 2020

**Subject: Jabiru Engine Overhauling
Important Build Issues**

Applicability:

- This Notification is applicable to all LSA products which fall within the Applicability ranges given in Jabiru Service Letter JSL023 Issue 3.

Requirement:

- Operators of aircraft within Light Sport Aircraft categories should be aware of the information of Jabiru Service Letter JSL023 Issue 3.

Compliance:

- The compliance details given in Jabiru Service Letter JSL023 Issue 3 should be met.

Background:

- This LSA Service Notification is an informational letter in line with JSL023 Issue 3 for Jabiru aircraft, engines and propellers operating within Light Sport Aircraft Categories.