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## SERVICE BULLETIN: JSB 022-2

Issue: 2

Date: 28<sup>th</sup> July 2008

Subject: Propeller Flange Attachment

Issue	Reason for Issue	Issue Status
1	Original Issue	CANCELLED
2	Add life for flange screws of some engines, add new maintenance notes	CURRENT

1	APPLICABILITY .....	1
2	BACKGROUND:.....	1
3	COMPLIANCE – IMPLEMENTATION SCHEDULE .....	2
4	PROCEDURE: .....	3
5	AIRWORTHINESS NOTE: .....	5

### 1 Applicability

- The content of this bulletin is applicable to all Jabiru 2200 and 3300 engines.

#### Notes:

- For aircraft in Light Sport Aircraft categories this Bulletin is equivalent to a Manufacturer's Safety Direction.
- This bulletin has not been mandated (as an AD or similar) by any National Airworthiness Authority at the time of writing.

### 2 Background:

#### 2.1 JSB022 Issue 2

- Issue 1 of this bulletin was released in 2008 and focused on the details of installing the propeller flange. Recently however there has been a case where an engine which had been fitted with a non-approved propeller suffered the loss of the propeller flange and propeller in flight. The new Issue of this Bulletin adds additional maintenance requirements for engines when operated using a non-approved propeller in addition to the existing installation guidance.
- JSB022-1 (Issue 1) is **cancelled** and must not be referred to.

#### 2.2 General

- This Bulletin is in two parts – the first is intended to raise operator awareness of the correct method of fitting the propeller flange while the second provides additional maintenance recommendations when operating an engine with a non-approved propeller.

# Jabiru Service Bulletin: Propeller Flange Attachment

JSB 022-

28th July 2008

## 2.3 Propeller Flange Installation

- In the past several years there have been a small number of cases where propeller flanges have separated from the crankshaft of the engine due to improper installation. These have occurred on Jabiru 2200, 3300 and 5100 engines. In some cases the wrong grade of retaining compound was used, in others the wrong bolt length was used and in one case the screws were not tightened when the flange was installed.

## 2.4 Non-Approved Propeller / Flange Maintenance

- In the past several years there have been a small number of cases where engine damage has been caused by the use of a non-approved propeller. This damage ranged from the loss of the propeller only through to breakages of the crankshaft.
- An Approved propeller is one which has been approved by Jabiru Aircraft Australia for use on our engines. These are designs which we are satisfied will not damage the engine, provided they are operated and maintained properly. Full details of how propellers are approved, which are approved (and which are not) are available from Jabiru Aircraft or our local representative. Jabiru Service Bulletin JSB 014 also gives details on propeller installation and maintenance requirements. Finally, the engine Instruction & Maintenance Manual and the Installation manual provide guidance for propeller selection. These manuals are updated periodically and the latest versions are available from our website – [www.jabiru.net.au](http://www.jabiru.net.au)
- Operators who use a non-approved propeller do so at their own risk. Jabiru accepts no responsibility for the airworthiness or safety of engines with non-approved propeller installations.
- This Bulletin gives additional maintenance procedures which are recommended for operators who choose to use a non-approved propeller. However, as we cannot know every possible failure mode for an unsuitable installation this information is not definitive. Maintaining the engine to these requirements does not guarantee the airworthiness of the installation or change the fact that operators are flying at their own risk.

## 3 Compliance – Implementation Schedule

### 3.1 Factory Complete Aircraft Built By Jabiru Aircraft Australia:

No new maintenance or inspection requirements are required by this Bulletin.

### 3.2 Other:

Operators who have fitted propeller flanges using a procedure other than that detailed below:

- Re-fit the propeller flange following the procedure detailed below at the next scheduled maintenance or within the next 50 hours, whichever is the sooner.

## Jabiru Service Bulletin: Propeller Flange Attachment

JSB 022-

28th July 2008

### 4 Procedure:

#### 4.1 Propeller Flange Installation:

Due to the importance of this work, owners who are not confident are strongly recommended to have an aircraft maintainer (such as a LAME, RA-Aus Level 2 or equivalent) carry out the work.

- b) With the flange removed, fit the attachment screws through the propeller flange and check the amount of thread which will screw into the crankshaft. There must be no less than 9mm (0.0.354") of **full** thread engagement – which generally equates to a total of around 11-12mm (0.433-0.472") measured from the tip of the screw to the flange mating face. If a Belleville (cone or spring washer) is used, the compressed thickness of the washer must be accounted for – the numbers given here assume a std Jabiru Belleville washer is fitted (and compressed) while measuring.
- c) Hold the propeller flange to the front face of the crankshaft. Ensure that the flange fits cleanly. Note that the socket of Jabiru propeller flanges are not designed to be a high-tolerance tight fit onto the end of the crankshaft – a small amount of clearance is normal here.
- d) Visually inspect the front face of the crankshaft and the mating face of the propeller flange. Ensure both faces are clean, free from rust and defects.
- e) The screws used to fit the original flange may be re-used provided they are the correct length and are not visibly damaged. If the screws are replaced then high-strength cap screws must be used – “Unbrako 1960” type or equivalent.
- f) If the screws are to be re-used their threads must be cleaned with a wire brush or similar.
- g) Clean the threads of the screws using Loctite 7471 activator (primer) & allow to air dry. After priming, ensure the threads stay clean – contamination with oil (even skin oils from fingers) can reduce the strength of the bond of the retaining compound.
- h) If a flange has been removed to allow a different type to be fitted then the screw threads in the crankshaft must carefully be cleaned using a 3/8" UNF tap – this removes leftover retaining compound from the threads and gives a better bond. Care must be taken to not cross-thread the tap or otherwise damage the thread in the crankshaft. Blow out the holes using dry compressed air.
- i) Clean the threads in the crankshaft using Loctite 7471 activator (primer) & air dry.
- j) Apply a small amount – approximately the size of a large match head – of Loctite 620 retaining compound to the flange screws.
- k) Apply the same amount (approximately the size of a large match head) of Loctite 620 to the threads in the crankshaft.
- l) Fit the flange to the crankshaft & fit the screws by hand, then tension the screws using a calibrated torque wrench **immediately**.

## Jabiru Service Bulletin: Propeller Flange Attachment

JSB 022-

28th July 2008

- m) Tension the screws in a standard diagonal tightening pattern. Torque all screws first to 20 lb.ft, then all to 25 lb.ft, and finally all to 30 lb.ft.
- n) Lock-wire may be applied. If it is used the screws should be wired in pairs.
- o) Allow the retaining compound time to cure (refer to manufacturer specifications) before starting the engine.

### 4.2 General Notes:

- This job must be done in one session. In one case the operator screwed the flange on to the crank by hand and then went on with other jobs – the screws were never tightened above “finger tight” and the flange separated from the engine on the aircraft’s first flight approximately 300’ above the ground.
- Jabiru Aircraft have no objection to lock-wire being used; the standard flange fitted to Jabiru Engines is lock-wired at the factory. However, lock-wire on it’s own has proven to be insufficient restraint for the screws. Loctite 620 *MUST* be used – all other restraints are optional. Jabiru Aircraft Australia does not use lock-wire on all it’s factory-built aircraft.
- Torque wrenches are a precision instrument which must be periodically calibrated to ensure they are accurate. A wrench which is within it’s calibration period must be used for this job.
- Loctite 620 is used because of it’s high temperature tolerance. The crankshaft runs at approximately oil temperature – around 80°C – 90°C and other retaining compounds have lost significant strength at this temperature.
- Before removing a screw which has been installed with Loctite 620 the part should be gently heated using an electric hot air gun to carefully warm the parts. Care must be taken so that the front seal of the engine is not heated too much – a damp rag can be used to block the hot air & keep it cool. If this is not done there is a chance that the screw will fail before the retaining compound bond is broken & the thread will be left embedded in the crank.
- Dowel holes are drilled in the crankshaft for use by aftermarket propeller manufacturers (Ø8.00mm x 12 deep, PCD 41.5mm).
- Only propeller flanges made by Jabiru Aircraft or other approved manufacturers must be used. High quality machining with close tolerances is required to ensure the flange fits properly and the propeller runs true.

## Jabiru Service Bulletin: Propeller Flange Attachment

JSB 022-

28th July 2008



Figure 1 – Flange & Crankshaft

### 5 Airworthiness Note:

- Operating an engine with a loose propeller flange is potentially extremely damaging for the engine. The increased vibration can cause severe engine damage including crankshaft failure. If the flange is found to be loose please contact your local Jabiru representative for information on what inspections are required for safe continued operation.
- Where required, any work called for by this Bulletin must be carried out by authorised personnel. For the aircraft detailed herein this may mean the owner, an RA-Aus Level 2 holder, a Licensed Aircraft Maintenance Engineer (LAME) or equivalent – as appropriate to the aircraft's registration and use (Private or Air Work operations).
- On completion of the work, the authorised person must note the completion of the actions required by this bulletin in the aircraft's maintenance logbook. This note should include the date of the work and the identity (including licence number where appropriate) of the person carrying out the work.