SERVICE LETTER: JSL021

Issue: 2

Release Date: 10th June 2019

Effective Date: 10th June 2019

Subject: Charging system operation procedures.

Affected Models: All Jabiru Airframes.

1 Applicability

This document is an **informational letter** applicable to all Jabiru Aircraft.

2 Background

This Service letter has been released to address potential issues relating to the operation of the aircraft and the effect on the charging system. The first procedural issue relates to flying an aircraft that has been started with a flat or very low battery. The second procedural issue relates to the action that should be taken in the event of a charge system malfunction that causes over voltage.

2.1 General

2.1.1 Low battery over current charge.

The alternator is a permanent magnet device which generates AC electricity, this is used to charge the battery via a regulator which both rectifies and regulates the voltage. There is no current limiting component to the regulator. The alternator by its nature is limited to the amount of power it can generate at a given rpm. Generally, this power is well below what would be

required to generate enough heat to damage the alternator. However, with the combination of high rpm (e.g. take off) and low battery voltage it is possible to obtain and sustain currents that are sufficient to generate enough heat to overheat the alternator stator, causing its failure. This is primarily an operational issue as the alternator is designed to operate at a system voltage matched to that of the lead acid battery (12 to 15V DC).

Note: Engines produced after April 2019 come with an overcurrent limiting device fitted to the alternator. This should protect from an overcurrent situation however it doesn't preclude it and the recommendation contained in this Service letter should be followed. This device is available for retrofit.

2.1.2 Overvoltage situation

The issue with an uncontrolled charge voltage situation is that it could cause damage to other parts of the aircraft electrical system. In the short term this may include damage to instruments such as radio, transponder and glass cockpit. For example, the Microair radio has a maximum operating voltage 16V. In the longer term, it could damage the battery and the alternator stator.

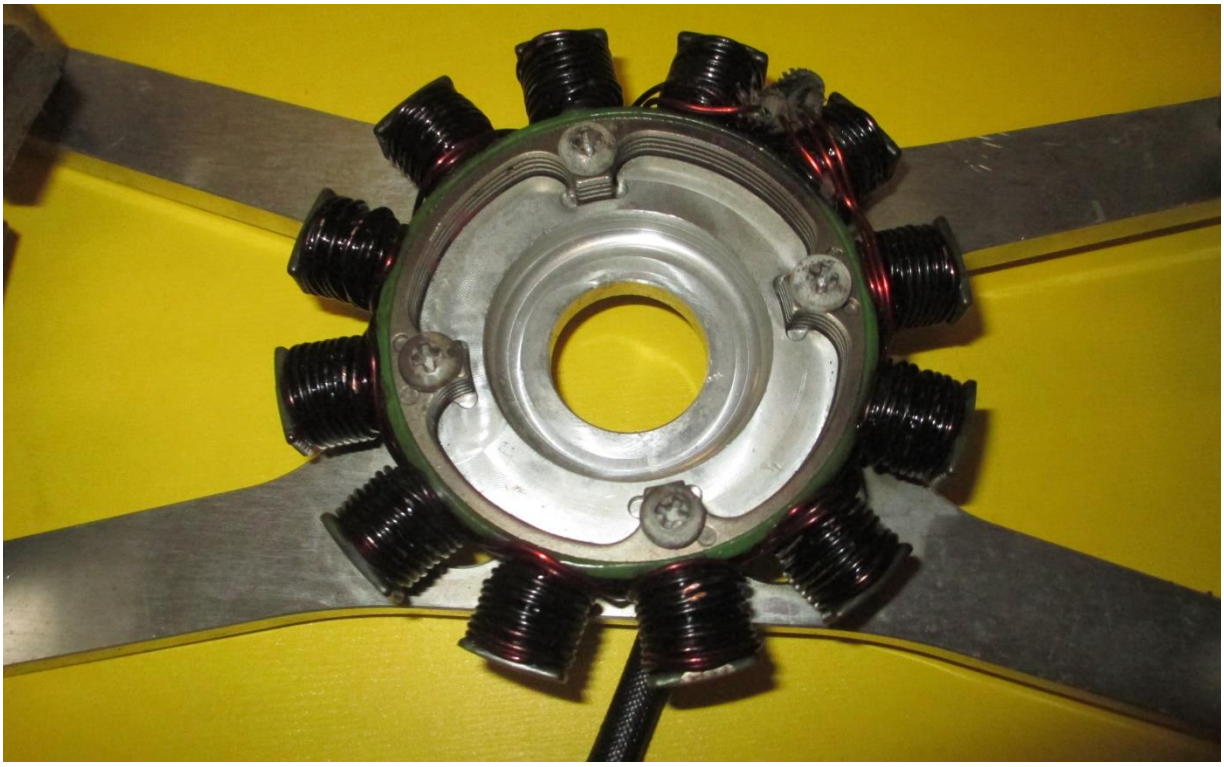

Figure 1 – Inside overheated Alternator stator (not visible when shrouded by the alternator magnet ring)

Figure 2 - Back of overheated Alternator Stator

3 Procedures

3.1 Before starting with a flat battery

It is advisable to charge the battery before attempting to start the aircraft. This helps avoid the scenario where the battery has failed but flight is undertaken anyway.

Note: The consequence of flying with a 'dead' battery (one that has no charge capacity left) is that there will be no electrical power for the avionics. The alternator may fail due to trying to feed excess current into a battery that doesn't hold charge.

3.2 Aircraft Storage or Infrequent use

If the aircraft is used infrequently or in storage it is recommended that some steps are taken to preserve charge in the battery. Discharge to low voltages, less than 10v, can damage the battery. See the attached Odyessy battery recharge procedure for deep discharge in Appendix 1.

Some ways of retaining charge are as follows;

- Disconnect the negative leads from the battery. This lets the battery remain isolated while it is not used. Even though there is no measurable drain on the battery, tiny currents reduce charge over a long period. The table below illustrates a lead acid batteries self-discharge characteristics.

Temperature	**Lead acid** at full charge
0°C **25°C** **40°C** **60°C**	97% 90% 62% 38% (after 6 months)

- Use a trickle charger specifically designed for this purpose. (Solar power may be an option.)

3.3 Inflight overvoltage situation

If there is a malfunction of the charging system that causes an overvoltage situation there are steps that can be taken to minimise risks of damage to instruments and charging system.
An overvoltage situation does not affect continued operation or the performance of the engine.

1. Reduce rpm until voltage reduces to within limits. Maintain for 5 minutes or as long as possible before increasing power again.
   (The alternator is a permanent magnet device and its absolute voltage output is proportional to rpm.)

2. Proceed to nearest safe landing area. Manage voltage using rpm as much as possible.

4 Compliance

- This Service letter does not prescribe any special maintenance actions.
- This letter has been produced as **informative material** for operators and maintainers of Jabiru Aircraft.

Jabiru Service Notification: Charging system operation procedures. Appendix			JABIRU AIRCRAFT PTY LTD P.O. Box 5792 Phone:+61 7 4155 1778 Bundaberg West Fax:+61 7 4155 2669 Queensland, Web: www.jabiru.net.au Australia. Email: info@jabiru.net.au		
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LSA Service Notification: JSN021

Issue: **2**

Release Date: **10th June 2019**

Effective Date: **10th June 2019**

Subject: **Charging system operation procedures**

Affected Models: **All Jabiru Airframes.**

Applicability:

- This Notification is applicable to all LSA products which fall within the Applicability ranges given in Jabiru Service Letter JSL021 Issue 2.

Requirement:

- Operators of aircraft within Light Sport Aircraft categories must comply with any requirements of Jabiru Service Letter JSL021 Issue 2.

Compliance:

- Any compliance details given in JSL021 Issue 2 must be met.

Background:

- This LSA Service Notification is advice of JSL021 Issue 2 for Jabiru engines operating within Light Sport Aircraft Categories.

5 Appendix 1.

ODYSSEY
THE EXTREME BATTERY

Procedure to recover deeply discharged ODYSSEY® batteries

For safety reasons many 6V/12V automotive/commercial type chargers will not turn on when an attempt is made to charge any style 12V battery that has a very low open circuit voltage (OCV). For example, a charger set for 12V charging connected to a 12V battery that has an OCV less than 4-5V, the charger senses it is connected to a 6V battery (which it is not) and therefore will not initiate a charge because it is set for 12V charging.

Your ODYSSEY battery has very high recharge efficiency and is robust enough to accept a charge even when its OCV is less than 5.0V. As long as the charger's output voltage does not rise above 15.0V the following procedure should allow you to bypass the charger's safety circuit and safely attempt to recover (charge) the ODYSSEY Battery. One note; ODYSSEY batteries that have been operated over a prolonged period of time and have not routinely been charged back to near or full charge will have developed sulfated oxide and can be more difficult to recover. In some cases, if the sulfation condition is well developed especially over time, it may not be possible to achieve full capacity. This condition is not a warrantable claim as it is not the result of a factory manufacturing defect but abuse or neglect in the application.

With the charger connected and even though the battery has a low OCV and the charger does start up, then a full recharge should be attempted. Monitor the battery temperature and if it should get hot to the touch (125+°F, 51°C), then stop charging and allow the battery to cool. Once at room temperature, reengage charging and allow to fully charge. Test for capacity and if still low, discharge to 10.0V and recharge again and retest.

If the charger will not engage, the following procedure can be used –

1. Using jumper cables connect the positive terminal of a healthy battery to the positive terminal of the dead ODYSSEY battery; then connect the negative terminal of the healthy battery to the negative terminal of

the ODYSSEY battery. If you are using the battery in a car, do not run the engine during this operation.

2. Monitor the voltage of the ODYSSEY battery with a good quality voltmeter until it reads 11.5-11.8V.
3. Disconnect the jumper cables on the ODYSSEY battery, then quickly connect the positive cable of the charger to the positive terminal of the ODYSSEY battery; then connect the negative cable to the negative terminal of the ODYSSEY battery.
4. The charger needs to be of a minimum charge current capability per the chart below.
5. Plug the charger into standard wall AC power and start monitoring the battery voltage.
6. Make sure the charge voltage at the battery terminals does not exceed 15.0V and continue charging for approximately 8 hours.
7. Disconnect the charger and allow the battery to sit open circuit with no connections for 12 hours or install the battery and turn the headlights on for 2 minutes to remove the charging surface charge voltage. Turn the headlights off, allow the battery to rest for a few minutes and read its voltage. A fully charged ODYSSEY battery will read 12.84V verifying a full charge.

Battery Models	Minimum Charging Amperage
PC310 – PC680	6 amps*
PC925 - PC1200	12 amps*
PC1220 – PC1750	25 amps*
PC1800-PC2250	50 amps*

* Recommended charging amperages are for single (boost) recovery charge cycles, not for repetitive deep cycle charging.