

**MAINTENANCE MANUAL  
FOR  
JABIRU 2200 Gen 4 AIRCRAFT ENGINE  
JABIRU 3300 Gen 4 AIRCRAFT ENGINE**

**DOCUMENT No. JEM0005-1**

**DATED: 16<sup>th</sup> October 2017**




This Manual has been prepared as a guide to correctly operate, maintain and service Jabiru 2200 Gen 4 & 3300 Gen 4 engines.

**It is the owner's responsibility to regularly check the Jabiru web site at [www.jabiru.net.au](http://www.jabiru.net.au) for applicable Service Bulletins and have them implemented as soon as possible. Failure to do this may render the aircraft un-airworthy and void Jabiru's Limited, Express Warranty.**

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## 2 GENERAL INFORMATION

**WARNING:**

Jabiru Aircraft Pty Ltd has devoted significant resources and testing to develop the Jabiru 2200 and 3300 Generation 4 aircraft engines. The 2200 and 3300 Gen 4 engine are considered to be latest configuration of the 2200 and 3300 series engine, having the same rated performance, general design layout and installation.

These engines are intended to be installed in accordance with the details given in the “INSTALLATION MANUAL FOR 4<sup>th</sup> GENERATION JABIRU 2200 and 3300 AIRCRAFT ENGINES”, document No. JEM0008. Any other uses or applications may be extremely hazardous, leading to property damage, or injury or death of persons on or in the vicinity of the vehicle. Jabiru Aircraft Pty Ltd does not support the use of this engine in any applications which do not meet the requirements of the appropriate installation manual. Any non-compliant installation may render the aircraft un-airworthy and will void any warranty issued by Jabiru.

The Jabiru 2200 and 3300 Gen 4 aircraft engines are designed to be operated and maintained only in strict accordance with this engine maintenance manual. Any variation of any kind, including alteration to any component at all, whether replacement, relocation, modification or otherwise which is not strictly in accordance with this manual may lead to dramatic changes in the performance of the engine and may cause unexpected engine stoppage, engine damage or harm to other parts of the aircraft to which it may be fitted and may lead to injury or death. Jabiru Aircraft Pty Ltd does not support any modifications to the engine, its parts, or components. Any such actions may render the aircraft un-airworthy and will void any warranty issued by Jabiru.

**Maintenance and modification cannot be supervised by the manufacturer. Maintenance requires extreme cleanliness, exact parts, precise workmanship and proper consumables. It is your responsibility to ensure absolute attention to detail no matter who may become involved in work on this engine. Your safety, your life and your passengers' lives rely on precise and accurate following of instructions in this manual.**


In exchange for the engine manual provided by Jabiru Aircraft Pty. Ltd. ("Jabiru") I hereby agree to waive, release, and hold Jabiru harmless from any injury, loss, damage, or mishap that I, my spouse, heirs, or next of kin may suffer as a result of my use of any Jabiru product, except to the extent due to gross negligence or wilful misconduct by Jabiru. I understand that proper skills and training are essential to minimize the unavoidable risks of property damage, serious bodily injury and death that arise from the use of Jabiru products. All information in this manual has been carefully researched and compiled. It is possible that the information contained in this manual has changed in the intervening time. Information may be missing, contain errors or be translated incorrectly. As a result, Jabiru Aircraft Pty Ltd does not provide any guarantee not accept any legal liability for the accuracy, completeness, currency or quality of the information provided. We hereby waive liability for any damages, whether direct or indirect in nature and whether tangible or intangible, resulting from the use or misuse of information or from incomplete or incorrect information in this manual. Likewise, we shall not be liable for damage arising should the owner and/or maintainer not have the necessary technical expertise, the required knowledge of and/ or experience required. The extent to which the information and technical methods described here will apply to future generations of Jabiru products cannot be predicted and must be verified in individual cases.









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## 3 Specifications

### 3.1 Design Details

- 4 Stroke
- 4 (2200) or 6 (3300) Cylinder Horizontally Opposed
- 1 Central Camshaft
- Push Rods
- Over Head Valves (OHV)
- Hydraulic lifter with roller followers
- Ram Air Cooled
- Wet Sump Lubrication
- Direct Propeller Drive
- Dual Transistorised Magneto Ignition
- Integrated AC Generator
- Electric Starter
- Mechanical Fuel Pump
- Naturally Aspirated – 1 Pressure Compensating Carburettor
- 6 Bearing Crankshaft for 2200 models, 8 bearing for 3300.


### 3.2 General Specifications & Equipment

- Displacement : 2200: 2200 cc  
3300: 3300 cc
- Bore : 97.5 mm
- Stroke : 74 mm
- Compression Ratio : 8 : 1
- Direction of Rotation : Clockwise – Pilot's view – Tractor Applications
- Ramp Weight : 2200: 61 kg (134 lbs)  
3300: 81kg (178lb)  
Weights include Exhaust, Carburettor, Starter Motor, Alternator & Ignition System.
- Ignition Unit : Jabiru dual ignition - breakerless transistorized.  
Battery independent  
Ignition coil / flywheel magnet gap: 0.01" (0.254mm)
- Ignition Timing : 2200 and 3300: 23° Before TCD
- Firing Order : 2200: 1 – 3 – 2 – 4  
3300: 1 – 4 – 5 – 2 – 3 – 6
- Fuel Consumption : 2200: 13 - 15 l/hr (3.5 – 4.0 US gal/hr)  
@ 75% Power : 3300: 23 – 25 l/hr (6.1 – 6.6 US gal/hr)
- Fuel : AVGAS 100/130 or 100LL.  
MOGAS, RON 95+ may be used if AVGAS is not available.  
**Ref Service Letter JSL007:** S/No. & configuration limits apply
- Oil : W100, W100 Plus, Multigrade 15W-50, or equivalent  
Lubricant complying with SAE-J-1899, or  
Lycoming Spec. 301F, or  
Teledyne – Continental Spec MHF-24B
- Oil Capacity : 2200 Gen 4: 2.3 L (2.4 quarts)  
3300 Gen 4: 3.5 L (3.7 quarts)
- Spark Plugs : NGK D9EA – Automotive  
Electrode Gap: 0.55 - 0.6mm (0.022" - 0.024")
- Generator : Jabiru, permanently excited single phase  
AC generator with rectifier/regulator
- DC Output : 12 pole series alternator stator
- Carburettor : BING constant depression 94/40
- Air Intake Filter : folded paper cartridge type
- Fuel Filtration : 0.1 mm (100 Micron) maximum particle size.
- Fuel Pump : Camshaft driven diaphragm type
- Starting System : Electric 12 V / 1.5 kW
- Oil Filter : RYCO Z 386 or equivalent

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### 3.5.2 Fuel Consumption:

**Table 5 – Fuel Consumption VS RPM**

RPM	2200 Gen 4 Models	3300 Gen 4 Models
	Fuel Flow (litre/hr)	Fuel Flow (litre/hr)
2600	13.4	18.5
2700	14.7	20
2800	16.5	23.5
2850	17.0	25.6
2900	17.4	27.6
3000	24.5	32.1
3100	26.8	35.6
Full Power	28 – 30	38 – 40

**Note:** Fuel and oil consumption figures are based on a typical installation in a Jabiru Aircraft. Values will differ for other installations or configurations; refer to the Jabiru Engine Installation Manual for additional details.

## 3.6 Lubricant

- The following chart is intended to assist in choosing the correct grade of oil and must be considered as a guide only. Multiviscosity grades can also be used.
- Oil should be of SAE standard J-1899

**Note:** Do not use any type of automotive oil. Aviation oils have been blended specifically for the operating conditions found in an air cooled aero engine operations. Using automotive oils has been found to be detrimental to the operation of the Jabiru Engine

**Table 6 – Recommended Oil Grade VS Ambient Temperature – NORMAL OPERATIONS**

Average Ambient Temperature	Mineral Grades	Ashless Dispersant Grades
Above 35° C (95°F)	SAE 60	SAE 60
15° C to 35°C (59° to 95°F)	SAE 50	SAE 50
-17°C to 25°C (1° to 77°F)	SAE 40	SAE 40

**Table 7 – Recommended Oil Grade VS Ambient Temperature – RUN-IN PERIOD**

Average Ambient Temperature	Mineral Grades
Above 35° C (95°F)	120
15° C to 35°C (59° to 95°F)	100
-17°C to 25°C (1° to 77°F)	80

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Table 8 – Oil SAE VS Commercial Designations

Equivalence of SAE and commonly used Commercial Grade designations:					
SAE:	20	30	40	50	60
Commercial:	55	35	80	100	120

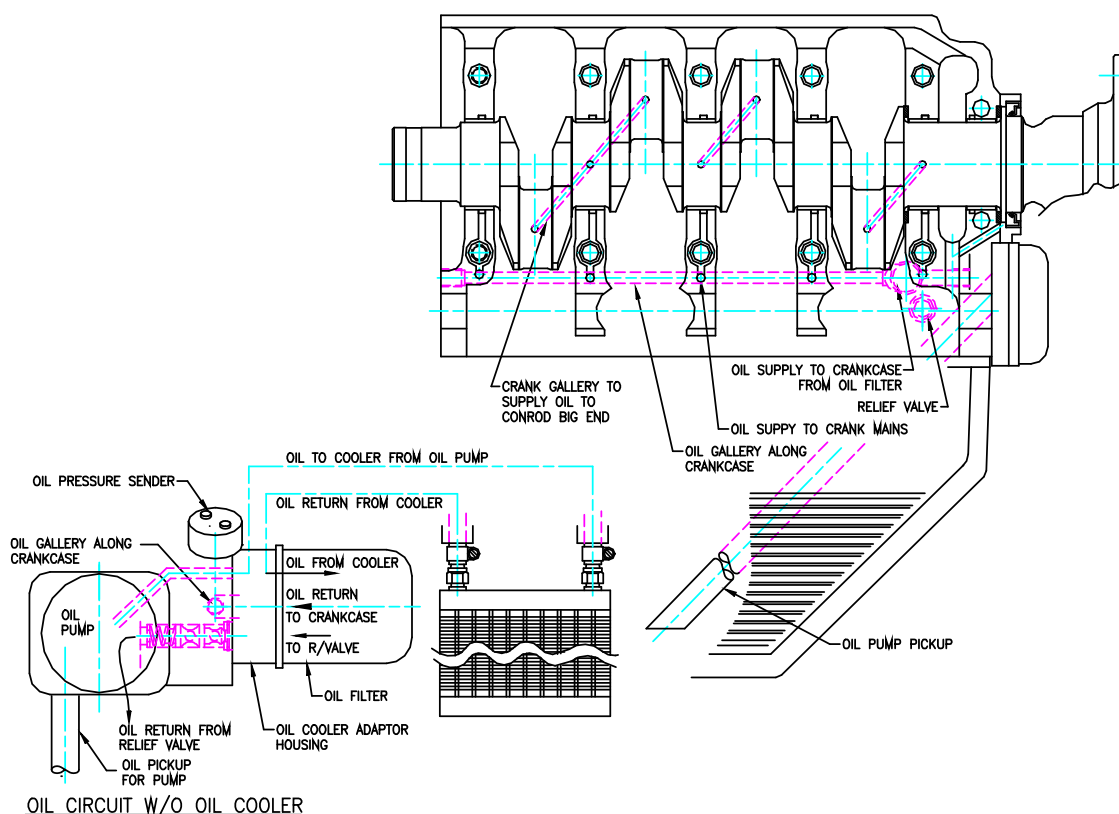



Figure 1 – Oil System Schematic

### 3.7 Cooling System

Type: Free air cooled.

Pressure: The required pressure drop across the cylinders at 1.3  $V_s$  (clean stall speed) is 4.3 cm (1.7") water gauge, minimum. A minimum of 6cm (2.4") is recommended at cruise speed.

**Note:** Proper cooling is vital for engine operation. Values given are for a typical Jabiru Aircraft. Values will differ for other installations or configurations; refer to the Jabiru Engine Installation Manual for additional details.

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## 3.8 Operating Speeds and Limits

### 3.8.1 Ground Operating Limits

Table 9 – Ground Operating Limitations


	All 2200 Variants	All 3300 Variants	Notes
Idle Speed	900 RPM	800-850	set while engine is hot
Oil Pressure – Idle	Min: 80 kPa (11 psi)	Min: 80 kPa (11 psi)	
	Max: 525 kPa (76 psi)	Max: 525 kPa (76 psi)	
	Optimal: 350 kPa (51 psi)	Optimal: 350 kPa (51 psi)	
Oil Temperature	Max. 100°C (212°F)	Max. 100°C (212°F)	
Max. CHT	180°C (356°F)	180°C (356°F)	

**Note:** If ground temperature limits are reached, shut the engine down or cool it by pointing the aircraft into wind.

### 3.8.2 In-Flight Operating Limits

Model:	All 2200 Gen 4 Variants	All 3300 Gen 4 Models
Maximum Speed	3300 RPM	3300 RPM
Maximum Continuous Speed	3300 RPM	3300 RPM
Recommended Cruise	2800 – 3000 RPM	2800 – 3000 RPM
Oil Pressure – Normal Operations	Min 220 kPa (31 psi)	Min 220 kPa (31 psi)
	Max: 525 kPa (76 psi)	Max: 525 kPa (76 psi)
	Optimal: 350 kPa (51psi)	Optimal: 350 kPa (51 psi)
– Idle	Min 80 kPa (11 psi)	Min 80 kPa (11 psi)
– Starting & Warm up	Max: 525 kPa (76 psi)	Max: 525 kPa (76 psi)
	Optimal: 350 kPa (51 psi)	Optimal: 350 kPa (51 psi)
Oil Temperature:	Min 15°C (59°F) Max. 118 °C (244°F)	Min 15°C (59°F) Max. 118°C (244°F)
Oil Continuous Temperature	80 - 100°C (176° - 212°F)	80 - 100°C (176° - 212°F)
Fuel pressure to carburettor	5-20kPa (0.5-3 psi)	5-20kPa (0.5-3 psi)
Max. CHT (Climb)	200°C (392°F)	200°C (392°F)
Max Continuous CHT (Cruise)	180°C (356°F)	180°C (356°F)
EGT (Mid-Range / Cruise)	600° - 720°C (1112° - 1328°F)	600° - 720°C (1112° - 1328°F)
EGT (Above 70% Power)	600° - 700°C (1112° - 1292°F)	600° - 700°C (1112° - 1292°F)

- Time with CHT at between 180°C and 200°C is not to exceed 5 Minutes
- Cylinder Head Temperature:
  - It is highly recommended that all Cylinder head are monitored (not just one).
  - The cylinder head temperature probe mounts onto a tapped holes located between the two spark plugs.
- Exhaust Gas temperature:
  - It is highly recommended that EGT probes be fitted to all cylinders as means of monitoring mixture distribution between cylinders.
  - Constant monitoring is critical to the continued health and performance of the engine.

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### 3.9 Torque Specifications

For all Torque settings refer to the Gen 4 2200/3300 Engine Overhaul Manual (JEM0004). Always use the latest issue.

### 3.10 Build Tolerances and Clearances

For all Build Tolerances and Clearances refer to the Gen 4 2200/3300 Engine Overhaul Manual (JEM0004). Always use the latest issue.

### 3.11 Propeller Selection & Specifications

#### WARNING:

**Correct propeller selection, tuning and maintenance are vital for the safe operation of this engine. The guidance given herein and in the Engine Installation Manual must be adhered to for safe operation.**

- Many propeller brands and models **are not approved by Jabiru Aircraft**. In certain categories operators, may choose to use these propellers, **however they do so at their own risk**. For information on which propellers are approved, please contact Jabiru P/L or our local representative.
- Propeller selection is discussed in detail in the Jabiru Engine Installation Manual.
- All propellers must be maintained in accordance to the propeller manufacturer's requirements in conjunction with Jabiru Aircraft P/L requirements.

### 3.12 Electrical System Specifications

**Table 10 – Ignition System**

	<b>Honda Coil mk1 (PI0524N)</b>	<b>Jabiru Coil (CPI4A023A0D)</b>	<b>Jabiru Coil (NEGCOIL6ASSY)</b>
<b>Primary Resistance</b>	0.8Ω to 1.2Ω	1.6Ω to 2.5Ω	1.6Ω to 2.5Ω
<b>Secondary Resistance</b>	5.9kΩ to 7.1kΩ	5.0kΩ to 7.0kΩ	5.0kΩ to 7.0kΩ
<b>Ignition Harness Resistance</b>	6-18kΩ per 300mm of length	6-18kΩ per 300mm of length	6-18kΩ per 300mm of length
	<b>Honda Coil mk2 (PI0525N)</b>		
<b>Primary Resistance</b>	1.9Ω to 2.1Ω		
<b>Secondary Resistance</b>	6.0kΩ to 7.0kΩ		
<b>Ignition Harness Resistance</b>	6-18kΩ per 300mm of length		

- Maximum RPM drop when running on 1 ignition: 100 RPM

**Table 11 - Alternator**

<b>Alternator type</b>	<b>AC output</b>	<b>Maximum rated Load</b>	<b>Resistance</b>
<b>12 pole series wound</b>	35.0 VAC at 3000rpm	17Amp Continuous	0.4Ω to 1.1Ω.

#### WARNING

**Continuous electrical load exceeding the maximum rated load for the alternator will cause the stator windings to overheat and the alternator stator to fail. DO NOT overload the alternator.**

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### 3.13 Engine dimensions and layout

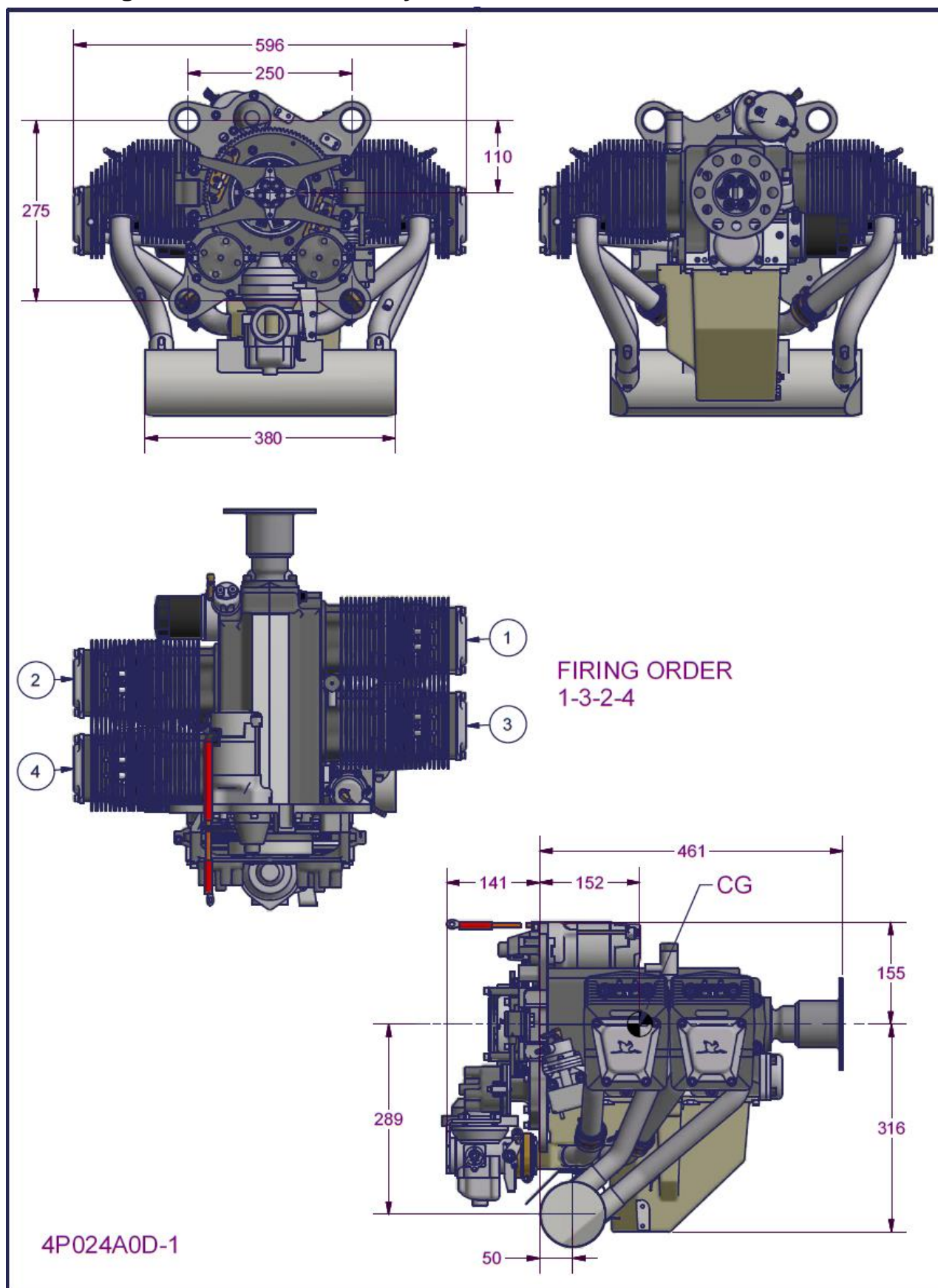


Figure 2 – 2200 Gen 4 Engine dimensions and layout

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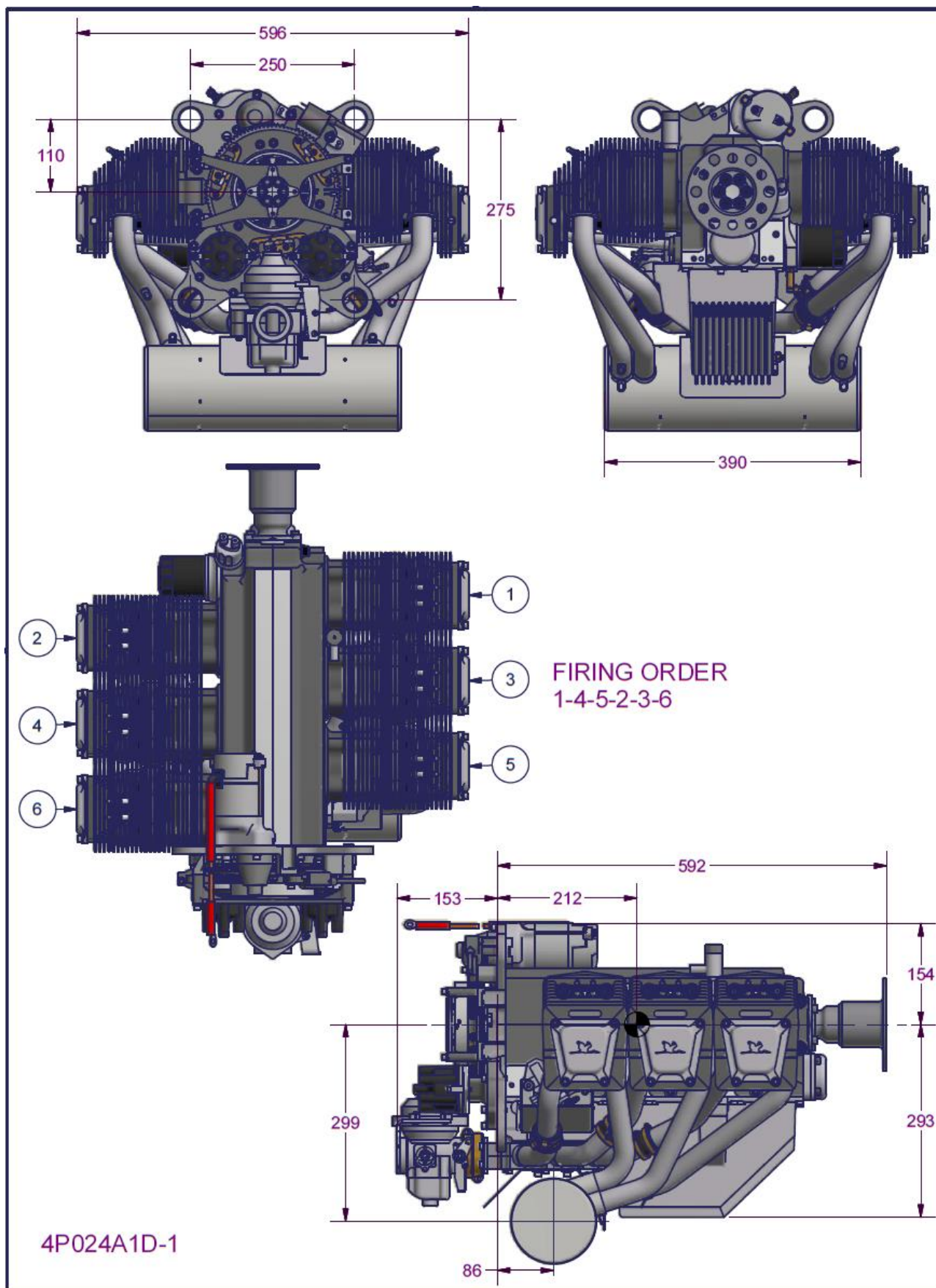


Figure 3 - 3300 Gen 4 Engine dimensions and layout

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### 3.14 Distributor Cylinder Map

For the distributor map refer to the Gen 4 2200/3300 Engine Overhaul Manual (JEM0004). Always use the latest issue.

### 3.15 2200 Gen 4 – Power Curve

- Multiply Kilowatts (kW) by 1.341 to get Horsepower (hp). i.e. 60 kW x 1.341 = 80 hp.

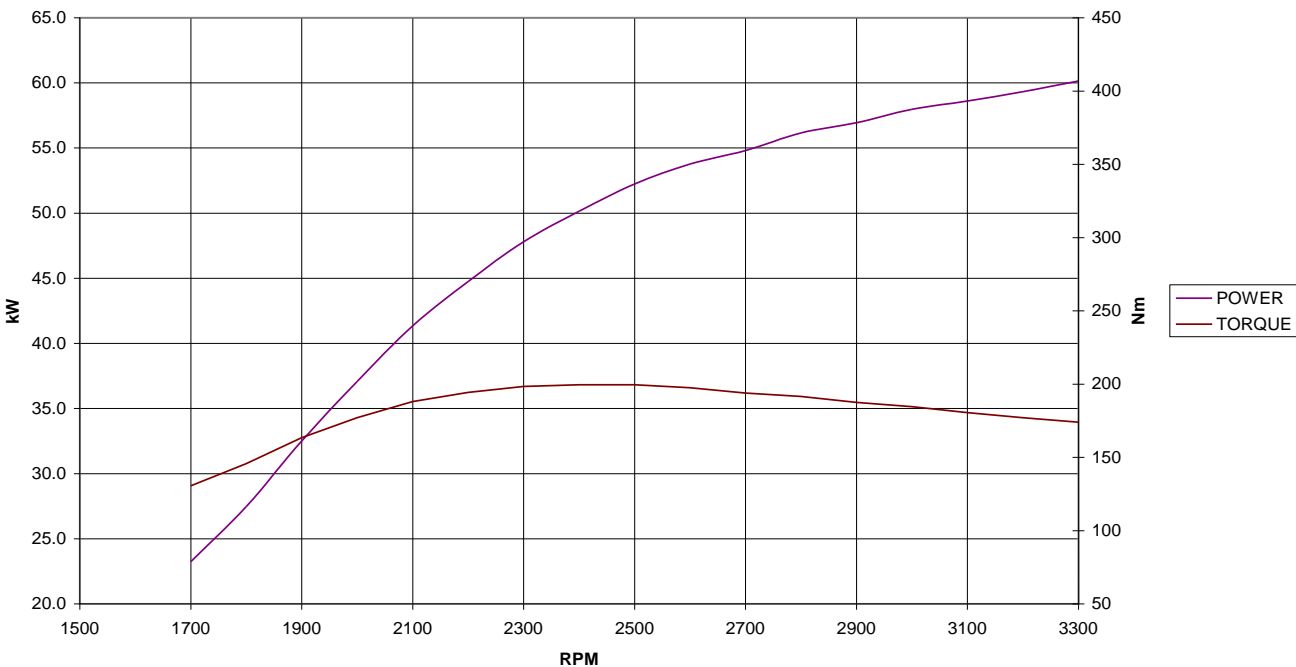


Figure 4 – Power / Torque Curves - Typical 2200 Gen 4 engine

### 3.16 3300 Gen 4 – Power Curve

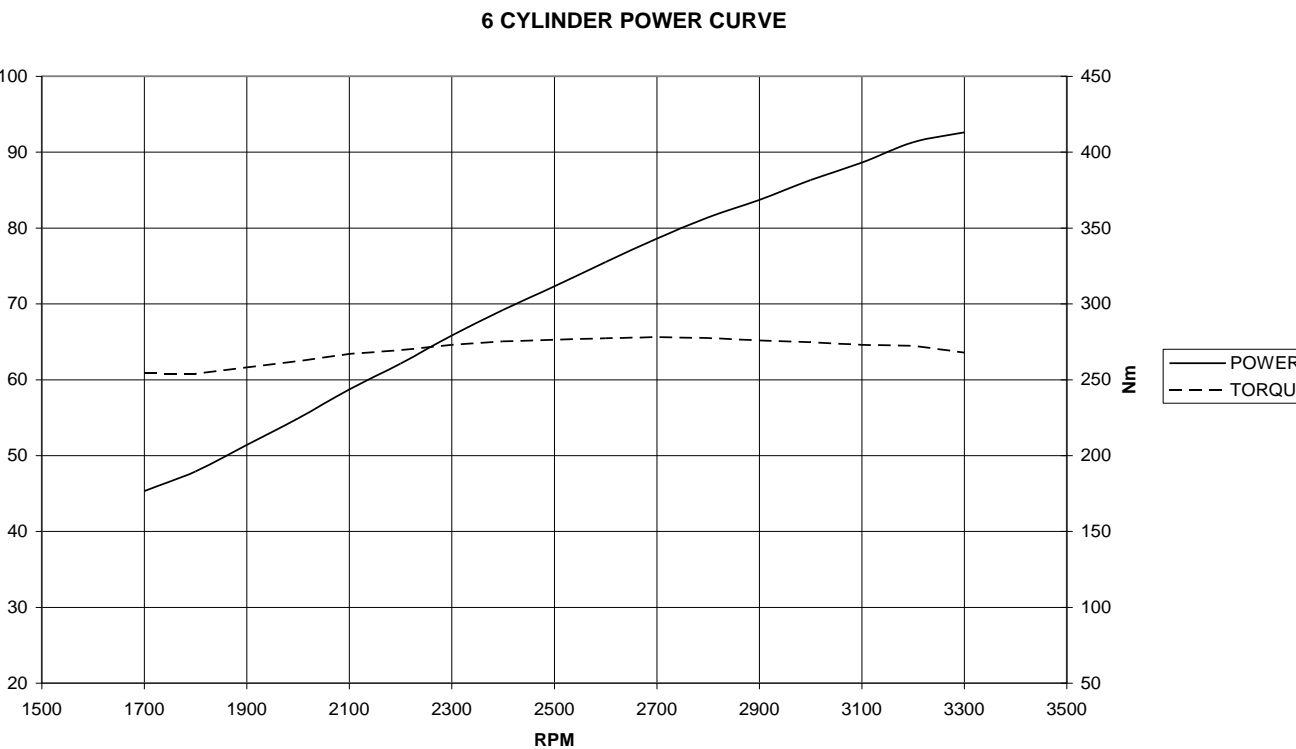



Figure 5 – Power / Torque Curves – Typical 3300 Gen 4 engine

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## 4 OPERATING INSTRUCTIONS

- To ensure that the engine operates reliably, carefully observe all of the operating & maintenance instructions.

### 4.1 Daily Checks

**Note:** The checks given below are the basic requirements for safe operation of the engine. Any additional inspections required by the aircraft operating instructions (such as the Pilot Operating Handbook) must also be carried out.

- Ensure free movement of throttle, choke & carburettor heat cables. Return throttle to idle before attempting to start engine.
- Check Oil Level, replenish if necessary.
  - Check oil level by screwing in cap fully before withdrawing
  - The Oil dipstick features three holes. The oil level should be between the TOP and BOTTOM holes - and must never be below the bottom of the dipstick.
  - Before long periods of operation, ensure that the level is at least at the MIDDLE hole.
  - Difference in the oil quantity between TOP and BOTTOM mark is 300 mL (0.317 US Quarts). Note: overfilling is detrimental to the engine; it will usually result in elevated engine temperatures and rapid oil use.
  - Also see Section 4.10 for special operating procedures for the first 25 hours of operation or after an overhaul.
- Check lubrication & fuel system for leaks.
  - Visually inspect for signs of leakage on the ground where the aircraft was parked overnight
  - Inspect the oil cooler for leaks through the cowl opening
  - Visually inspect the underside of the aircraft for fresh oil or fuel residue.
- Check exhaust system for security.
  - Wriggle the exhaust tail pipes by hand, checking for excessive movement, rubbing on cowls or unusual noises.
- With Ignition & Master OFF, and throttle closed, turn propeller by hand & observe engine for odd noises or heavy movements. Check for regular compression. If irregular, refer to Trouble Shooting section of this Manual for corrective action.

#### CAUTION:

**Prior to pulling through the propeller by hand, both ignition circuits & the Master Switch must be switched OFF, the brakes applied and the throttle closed.**

**A common cause of low compression is poorly sealing valves. Continued operation in this condition will result in damage to valves, valve seats, valve guides & overhead gear.**

#### WARNING


**A hot engine may fire even with the ignition/s switched OFF.  
DO NOT TURN OVER A HOT ENGINE BY HAND**

### 4.2 Starting Procedure

- Activate Starter for a maximum of 20 seconds, followed by a cooling period of 1 minute.
- When engine runs, adjust the throttle to achieve smooth running at approximately 1200 RPM. Deactivate Choke. Check Oil Pressure has risen within 5 seconds - if not, shut down.

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- Starting procedure is the same as ground starting: without choke for a warm engine & with choke for a cold engine. As the engine cools quickly when stopped in flight the choke will normally be needed to restart.

#### **WARNING**

**DO NOT apply the starter motor if the propeller is windmilling.**

### **4.8 Operation in Winter**

- It is recommended to carry out an engine service prior to the start of the cold season. For selection of oil to suit colder weather consult the table of lubricants given in the Engine Specifications above.
- Refer to Section 11.15 for the Troubleshooting Cold Start Checklist if the engine becomes difficult to start.

### **4.9 Carburettor Icing**

- It is important to distinguish between two kinds of icing:
  - Icing due to water in fuel, and
  - Icing due to high air humidity.

#### **4.9.1 Icing Due to Water in fuel**

- Water in fuel will accumulate at the lower parts of the fuel system & can lead to freezing of fuel lines, filters or jets. Remedies are:
  - Drain, using fuel tank water drain.
  - Ensure fuelling without traces of water. If in doubt, use a chamois as a filter.
  - Install a generously sized water separator.
  - Ensure that fuel lines do not permit the accumulation of water.
  - Prevent condensation of humidity, i.e. avoid temperature differences between the aircraft & fuel.

#### **CAUTION:**

**Do not add any form of alcohol (including automotive fuels with Ethanol or similar additives) to a Jabiru Aircraft fiberglass fuel tank unless directed otherwise by the aircraft operating manual. The sealant used in some (older) tanks will be damaged if it comes into contact with alcohol, leading to leaks.**

#### **4.9.2 Icing Due to High Air Humidity.**

- Carburettor icing due to humidity may occur in the carburettor venturi & leads to performance loss due to changes in the mixture.
- The only effective remedy is to preheat the intake air by use of the Carburettor Heat Control.

### **4.10 New Engine Operation**

- This engine has been ground run to a specific run in program and is ready for flight when delivered.
- Before initial start add oil to engine (2.3 litres with cooler for 2200 engine, 3.5L with cooler for 3300 engine).
- The engine has been INHIBITED before dispatch from the factory. It is recommended that this is removed before the first engine start: remove 1 spark plug from each cylinder and apply the starter motor for around 10 seconds: inhibitor oil will be ejected from the cylinders. Re-fit spark plugs & re-assemble engine.
- During storage and transport it is common for some inhibitor oil to run into the carburettor. Remove the carburettor bowl and inspect it for oil before running. Open the throttle butterfly and, using a light, inspect the induction manifold for excess inhibitor oil accumulation. Remove carburettor and clean manifold if required.

#### **WARNING**

**Failure to remove all inhibitor from carburettor bowl may lead to engine stoppage. Ensure bowl is clean before first flight.**

- Remove ALL plastic bungs on engine before starting. Bungs are fitted to the exhaust, carburettor, crankcase oil vent and fuel pump.
- The engine idle speed cannot be set accurately at the factory as the engine is run on a Dynamometer only. Therefore it is necessary to adjust the throttle idle stop(s) to obtain the appropriate RPM (Section 3.8.1) when engine is warm before first flight.

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Then:

1. Clean engine thoroughly.
2. Seal or cover all openings.
3. Remove battery and store in a cool dry place. Service the battery periodically and charge as required.

**NOTE: It is recommended that batteries not being used should be charged every 30 days.**

4. Remove the rocker covers from each cylinder head and spray corrosion inhibiting oil into the rocker chambers and reinstall rocker covers.

**NOTE: Use SHELL Aero fluid 2UN (MIL-C-6529C Type 1) or similar engine corrosion inhibitor.**

5. Seal exhaust pipes. Attach a red streamer to each.
6. The fuel tank breather must be covered but MUST NOT be sealed – the expansion of gases within the tank can severely damage it if there is no escape path.
7. Attach a warning placard to the instrument panel stating that vents and breathers have been sealed and that the engine must not be started with the seals in place.
8. Every 7 days the propeller should be rotated through 5 revolutions without running the engine – leave propeller in the horizontal position.

### CAUTION

**Ensure that the Master and Ignition Switches are OFF before turning motor!**

#### 6.2.4 Inspection During Storage

1. Generally inspect engine and clean as necessary.
2. If, at the end of the **60 day period**, the engine is to be continued in non-operational storage – repeat Steps above (most will only need to be checked).

#### 6.2.5 Returning Engine to Service After Temporary / Indefinite Storage

After temporary storage, the procedures for returning the aircraft to service are as follows:

1. Check battery and install.
2. Check carburettor air filter and service if necessary.
3. Remove warning placard from instrument panel.
4. Remove materials used to cover openings.

### CAUTION

**Ensure that the Master and Ignition Switches are OFF before turning motor!**

5. Check fuel filter – replace if necessary.
6. If returning to service after indefinite storage, fill fuel tanks with correct grade of fuel.
7. Check fuel tank and fuel lines for moisture and sediment. Drain enough fuel to eliminate any moisture and sediment.
8. Check that the fuel tank breathers are clear.
9. Perform a thorough pre-flight inspection.
10. Start and warm engine.

#### 6.2.6 New Engine Storage


- In many cases new or overhauled engines may be stored for some months or years before being installed in an aircraft. All engines are treated with corrosion inhibitor by Jabiru Aircraft Australia before shipping from the factory however this treatment is roughly equivalent to that described in Section 6.2.3 above. It is intended for a maximum life of approximately 60 days – though the exact effective life of the treatment depends on the ambient temperature, humidity etc.
- If an engine is to be stored before use the owner must:
  - i) Install the engine within 60 days (nominally) of the engine leaving the factory, or
  - ii) Repeat the Temporary Storage procedures given in Section 6.2.3 at a suitable interval (60 days nominally, depending on ambient temperature, humidity etc) and periodically inspect the engine in accordance with Section 6.2.4
- When the engine is to be run the storage measures must be reversed as detailed in the appropriate sections above.

### 6.3 CLEANING ENGINE AND ENGINE COMPARTMENT

- The engine should be kept clean since dirty cooling fins and baffles can cause overheating of the engine. Also, cleaning is essential to minimise any danger of fire and provide easy inspection of components.

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**DO NOT hose engine. Electrical components may be damaged by moisture. Ensure electrical components are protected against moisture. Caustic cleaning solutions should not be used.**

- Recommended cleaning procedure is lightly spray with degreasing fluid – after sealing coils and starter motor. WIPE clean with brush and cloth.
- Ensure the inside of the engine cowlings are also cleaned.
- Whenever possible, run engine after cleaning. This will warm it and encourage evaporation of excess moisture while the propeller wash will also blow away residual moisture.
- In some cases it may be necessary to also clean the firewall.

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### 8.3 Engine cowlings

Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (Owner, A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (Owner, A&P or LSA Repairman / Maintenance)

- Remove camloc fittings, countersunk screws and hinge pins, remove top and bottom cowls
- Inspect cowls for damage or wear. In particular inspect the attachment holes checking for excessive elongation
- Inspect the inside of the cowl for signs of rubbing from the engine. Rubbing will cause excess vibrations transmitted into the airframe
- Inspect the cowl attachment hardware and replace any as needed.

### 8.4 Inspection of engine – Before cleaning

Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- The engine should be inspected before cleaning the engine compartment.
- Inspect engine for oil leaks:

### 8.5 Cleaning the Engine

Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Refer to Section 6.3

### 8.6 Inspection of engine – After Cleaning


Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- With the engine clean further inspections can be made without dirt build-up obscuring the engine.
- Thoroughly inspect the engine for missing or loose bolts, nuts, pins etc.

### 8.7 Induction air filter

Required Tools:	Screwdrivers Air compressor with airgun
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Remove the hot air mixer box cover.
- Remove air filter and inspect checking for tears or holes.
- Clean the air filter with compressed air being careful not to blow holes in the filter
- At the intervals specified the air filter must be replaced regardless of apparent condition.
- Reinstall air filter with cover, ensuring the cover seals correctly on the filter.
- For operation in heavy dust conditions, clean air filter at shorter intervals than recommended for normal conditions.

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## 8.8 Induction air SCAT hose

Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Check the condition of the scat hoses both into and out of the hot air mixer box
- Check the SCAT hose retaining hose clamps are secure
- Check the installation of the SCAT hose running into the carburettor; make sure it does not bunch up before the carburettor inlet pipe.

## 8.9 Carburettor heat system

Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Check the smooth function of the carburettor heat system by cycling the carburettor heat pull cable in and out a few times.
- Check the flap seals on the cold air and warm air inlets.
- Check the condition and security of the warm air muff around the exhaust muffler
- Check the condition and security of the warm air SCAT hose

## 8.10 Ram air cooling ducts

Required Tools:	3/16" Allen wrench
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

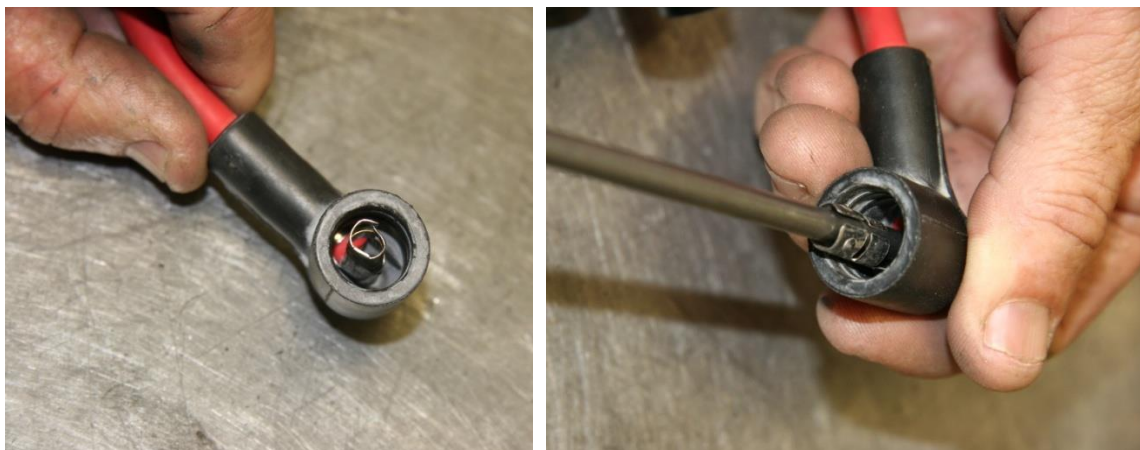
- Remove the ram air cooling ducts from on top the cylinder heads (it is not necessary to remove the ignition leads from the duct
- Inspect the ram air duct check the condition of the baffles and rubber skirting,
- Check that the steel attachment tags are secure to the duct
- Check for signs of abrasion between ducts and engine or ducts and cowl.

## 8.11 Ignition lead inspection

Required Tools:	Screw drivers
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)

- Inspect the length of each lead, checking for cracked or damaged insulation. Particularly check areas where the lead may have been rubbing against other items in the engine bay.
- Check the fit of the high-tension lead caps onto the distributor and spark plugs.
- Remove the leads from the spark plugs and distributor caps (including the ignition coil lead) and inspect the contacts.
- If the fit is loose or if the contact is visibly damaged as shown in Figure 6 then a screwdriver or similar must be used to re-shape the contact (it should be round) and to re-size it for a better fit – for a spark plug the diameter of the contact needs to be reduced to tighten while for a distributor cap it needs to be expanded. Each cap should fit with a clear “click” as it connects to the distributor cap or spark plug. Take care not to over-bend and contact and replace any which are damaged.





**Figure 6 – Adjusting High Tension Lead Caps**

## 8.12 Pressure differential (leak-down) test

Required Tools:	Leak-down Tester
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)

- Pressure differential (Leak down) tests are a very good test of the condition of rings, bore, head sealing and valves. This is the normal test used in aviation and is a requirement during scheduled maintenance. It requires specific test equipment.
- For 2200 Gen 4 and 3300 Gen 4 configuration engines a leak down test can be conducted with the engine either hot or cold
- Remove 1 spark plug from the cylinder to be tested and fit the leak-down tester in its place.
- Pressure input is set to 80 PSI; a second gauge reads the differential. This is done with piston on TDC on the compression stroke. Maximum allowable pressure loss is 25% - therefore a differential of lower than 60/80 indicates a problem which must be addressed and corrected before an aircraft can be brought back into service.

### **CAUTION**


**The propeller must be restrained by a second person as the air pressure applied will tend to rotate the crank. Ensure this person has firm hold of the propeller. Injury can occur if the propeller is allowed to go loose.**

- Poor compression can be an indication of a serious problem. For example, continued operation with poor compression due to a poorly-sealing valve can lead to valve failure and heavy damage to the rest of the engine
- After testing, note the results in the maintenance worksheet.

### 8.12.1 Identifying Compression Leaks

- Problems can be better identified using the leak down:
  - i) Remove the dipstick and listen at the opening. Air leaking through here can indicate worn pistons rings or a worn cylinder bore
  - ii) Listen at the opening of the air mixer box. Air leaking from here indicates a poor intake valve seal.
  - iii) Listen at the exhaust outlets – air leaking from exhaust indicates a poor exhaust valve seal.
  - iv) Apply a small amount of soapy water to the base of the head, where it mounts to the cylinder. A head seal leak will be indicated by blowing bubbles in the soap mixture.
- Alternative to listening, a rubber glove or similar can be stretched over the opening being checked (Air mixer box inlet, exhaust outlet, crankcase vent); if the glove inflates this indicates the location and rate of the leak.
- With the problem narrowed down, correction work can more easily be carried out.

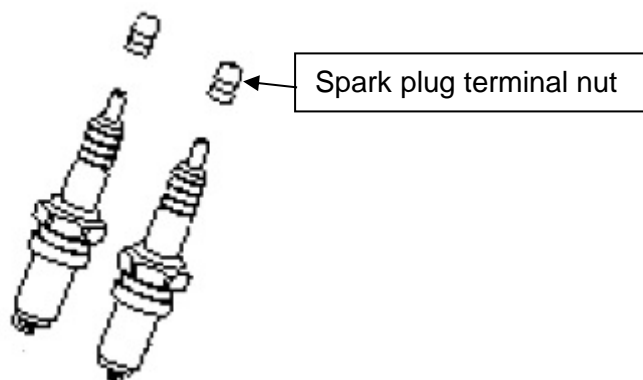


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### 8.13 Spark Plugs

Required Tools:	Plastic Brush Fine nosed pliers Torque wrench, Spark plug spanner
Parts and Material:	Solvent Anti-seize compound Replacement spark plugs
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- After conducting a leak down test remove the remaining spark plugs
- Do not use steel or brass brushes for cleaning & never sandblast plugs.
- Clean with plastic brush in a solvent.
- Check the terminal nuts are securely fitted to the spark plugs
- Check electrode gap & if necessary, adjust the gap to the limits required. Refer to JEM0004 for gap tolerances.
- Reinstall spark plugs, refer to JEM0004 from installation procedure.
- At the intervals prescribed the spark plugs must be replaced regardless of apparent condition. The spark plug terminal nuts may be reused on new spark plugs.



**Figure 7 – Spark Plug Terminal Nut**

### 8.14 Cylinder inspection

Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Inspect the base of each cylinder, checking for oil leaks or signs of fretting (cylinder base fretting would normally also be indicated by loss of through bolt tension).
- Inspect the cylinder head to cylinder barrel connection, checking for signs of combustion gas leakage.

### 8.15 Inspect through bolts / stud bolts


Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Inspect the through bolt and stud bolt nuts, checking the torque seal anti-tamper compound is present and intact.
  - Missing or broken torque seal can indicate a loss of tension or it may simply have occurred due to vibrations. If broken torque seal is found a through bolt torque check must be conducted (see section 9.2).
  - If all through bolt torque seals are found intact no torque check is necessary.

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- Remove dipstick and fill the engine with oil. (approx. 2.3 litres for 2200 Gen 4 engine, 3.5 litres for 3300 Gen 4 engine)
- Check the oil level using the dipstick. It should lie within the minimum and maximum marks.
- Clean any oil residue from the oil / filter change before returning to service.

#### NOTE

**Use only registered brand oils meeting the specification detailed in Section 3.6.  
(NEVER USE AUTOMOTIVE OIL!)**

## 8.22 Empty oil collection bottle

Required Tools:	Screw drivers Volumetric measuring flask or similar
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (Owner, A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (Owner, A&P or LSA Repairman / Maintenance)

- The oil collection bottle should always be emptied when the oil is changed
- Disconnect and remove the oil collection bottle from the firewall.
- Measure the quantity of oil in the collection bottle, record this measurement in the engine maintenance worksheet and discard the oil.
- Replace the oil collection bottle on the firewall and reconnect the engine vent hose.

## 8.23 Flexible oil lines

Required Tools:	N/A
Parts and Material:	Replacement oil hoses (if required)
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Inspect flexible oil lines running between the engine and oil cooler, check for fraying, cracking or general degradation. Replace on condition if required.
- Replace flexible oil lines at the mandatory replacement intervals regardless of apparent condition.

## 8.24 Distributor inspection

Required Tools:	Allen wrench
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)

- Remove the distributor cap clamps. Remove the distributor cap.
- Inspect inside the distributor cap, checking the condition of the electrodes.
- Inspect the rotor button, check the rotor is secure on the shaft and the brass contact is in serviceable condition.
- Inspect the rotor shaft seal for oil leaks.
- Reinstall the distributor cap (refer to JEM0004).
- Reinstall the distributor leads on caps and spark plugs (again refer to JEM0004).
- Reinstall ram air ducts (refer to JEM0004 for the rocker cover screw torque setting).


## 8.25 Electric boost pump fuel flow

Required Tools:	Screwdrivers Container with accurate volume marks Clock or stopwatch
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Disconnect the fuel line from the mechanical fuel pump in the engine compartment.

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- Have a second person stand by to catch any fuel that flows out of the line in a container with accurate volume marks. Ensure the free end of the fuel hose is held level with the carburettor fuel inlet.
- Turn electric fuel pump on and pump fuel through the lines into container. The fuel flow rate should be 50 – 60 litres per hour. A significant deficit from this target may indicate a worn pump or kinked fuel lines.
- Re-connect the fuel line to the mechanical fuel pump.

## 8.26 Mechanical fuel pump

Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Inspect the mechanical fuel pump, checking for signs of oil leaks around the gaskets and retaining bolt security.
- Check for fuel leaks around the fuel pump and in the fuel pump drip tray.
- Check the condition of the fuel pump drip tube outlet and drip tray outlet hoses.
- Check the security of the inlet and outlet brass fuel fitting by tugging firmly on each, any movement in these connections must be corrected.

## 8.27 Flexible fuel lines, fittings and fuel filter

Required Tools:	Screwdrivers
Parts and Material:	Replacement flexible lines (if required) Replacement fuel filter
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Inspect the condition and security of the fuel lines running forward of the firewall. Check for fraying, cracking and other degradation. Replace on condition as required.
- Replace flexible fuel lines at the mandatory replacement intervals regardless of apparent condition.
- Inspect the condition of the fireproof sleeves. Check the security of the sleeves over the fuel hoses.
- Check the security of fit of fuel lines into and out of the firewall, carburettor and mechanical fuel pump.
- Check condition of fuel taps and all fuel fittings.
- Replace the fuel filter at the required interval.

## 8.28 Engine control linkages

Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)


- Check for the correct function of the throttle control.
  - Cycle the throttle from idle to full power several times, feeling for roughness or excessive resistance.
  - Inspect the carburettor while cycling the throttle linkage to check the carburettor throttle linkage arm rotates smoothly about the throttle cable link without jamming.
  - Check the full range from the idle stop to full power stop is accessed by the throttle.
- Check for the correct function of the choke control.
  - Cycle the choke control several times, feeling for excessive resistance.
  - Check the fully open and fully closed choke positions are accessed by the choke control.

## 8.29 Carburettor

Required Tools:	N/A
Parts and Material:	Replacement carburettor rubber mount
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

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- Carburettor: Inspect for damage or wear. Remove the bowl and check for contamination. Inspect the carburettor mount / coupling to check for cracking or degradation.
- Inspect rubber carburettor mount, checking for cracks or rubber perishing. Replace if required.
  - Replace the carburettor mount rubber at the mandatory replacement intervals, regardless of apparent condition.
- **Rubber mount must be clean dry. DO NOT LUBRICATE.**

### 8.30 Engine mount points

Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Inspect the engine mount points on the engine back plate:
  - Check for fastener security and condition
  - Inspect the condition of the mount rubbers, check for cracks or degradation of the rubber, check the mount rubbers are not relaxed causing the engine to sag.
- Inspect the engine mount:
  - Check for corrosion dents or other damage
  - Check fastener security on the firewall mount points
  - Check welded intersections for cracks

### 8.31 Electrical wiring

Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Check wires for damage and wear, including chaffing, burning, dirty or loose connections.
- In particular, the connectors for the voltage regulator and the alternator must be inspected for corrosion, loose connections or damage.
- Ensure electrical wiring is mounted on the engine mount using insulating spacers (i.e. not mounted directly onto the steel engine mount). In the event of a wire becoming chaffed, contact with the bare engine mount can cause an electrical short circuit.

### 8.32 Starter motor and solenoid


Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L1, L2 or LAME (A&P or LSA Repairman / Maintenance)

- Inspect the general condition of the starter motor. Checking for discoloration which may indicate overheating.
- Check security of the starter motor retaining screws.
- Check the condition of the high tension leads (both the live and earth leads going to the starter motor).
- Inspect the start Bendix with aid of a torch checking the condition of the gear teeth.
- Inspect the flywheel starter ring gear, checking for chipped or broken teeth.
- Inspect the start solenoid. Check the high tension leads and electrical connectors are in good condition

#### WARNING

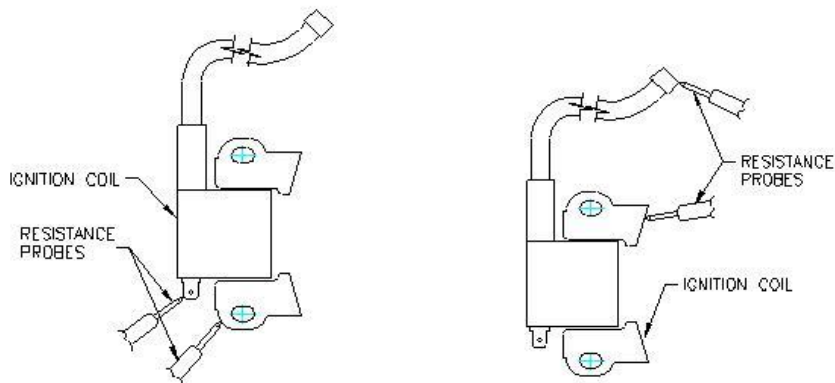
**Be mindful when working around the starter solenoid, that hands or tools do not bridge the two contacts completing the circuit. Electrical shock will result and the starter motor will be activated.**



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### 8.33 Ignition Coil

Required Tools:	Multimeter, feeler gauge
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)



Drawing 9439064/1 IGNITION PRIMARY RESISTANCE Drawing 9439064/1 IGNITION SECONDARY RESISTANCE

**Figure 8 – Ignition coil electrical tests**

- Use a multimeter to measure the primary resistance (from the earth terminal to the iron core as shown above). Refer to section 3.12 for the allowable range.
- Use a multimeter to measure the secondary resistance (from the high tension lead to the iron core as shown above) Refer to section 3.12 for the allowable range.




**Figure 9 – Different Ignition Coil Models (Honda on Left, Jabiru on Right).**

- For best performance the gap between the ignition coil and the flywheel magnets must be set to the specified gap (refer to JEM0004)
- Follow the procedure described in JEM0004 for setting ignition coil gaps.

#### **CAUTION**

**When working at the rear of the engine care must be taken to ensure no metallic materials are captured by the ignition or alternator magnets.**

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### 8.34 Alternator inspection

Required Tools:	N/A
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)

- Visually inspect the alternator stator from the rear of the engine (generally there is no need to remove the alternator stator for this inspection.
  - Visually check the colour of the stator windings and for signs of burning or overheating.
- Use a multimeter to measure the resistance of the windings, refer to section 3.12 for the allowable range. Resistance to ground should be infinite.



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## 9 Special maintenance tasks

The following section describes some of the special inspection conducted during maintenance of the engine. These special inspections are only to be conducted whereby previous inspections indicate that it is necessary. Any special inspections conducted and corrective action taken as a result must be recorded in the engine maintenance log.

### 9.1 Flywheel screw torque check

Required Tools:	Torque wrench
Parts and Material:	Replacement Flywheel Screws and Nordloc washers (if required)
Type of Maintenance:	Line Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)

- A flywheel torque check is only required if the visual inspection conducted in section 8.17 indicated the need for further investigation.
- The alternator stator need not be removed since the access hole through the stator mount provided is sufficient for tool access.
- All 2200 Gen 4 / 3300 Gen 4 engine use Nordloc washers under the retaining capscrews. Set a torque wrench to the installation torque setting for flywheel capscrews (refer to JEM0004).
- 'Click' each screw off at the prescribed torque setting (in the tightening direction).
- If any screws rotate at this torque setting then ALL flywheel screws and washers must be removed and replaced with new, approved, screws. The procedure for replacing these screws must be followed precisely (refer to JEM0004).


#### WARNING

Ensure the torque wrench used is serviceable and calibrated. An uncalibrated torque wrench may give false indication of flywheel screw torque



Figure 10 – Flywheel fitted with Nordloc washers


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## 9.2 Through bolt and stud bolt torque check

Required Tools:	Torque wrench
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)

- A through bolt torque check is only required if the previous visual inspection conducted in section 8.15 indicated that they may have moved or lost tension.
- Set a torque wrench to the prescribed through bolt / stud bolt installation torque setting (refer to JEM0004).
- Click off each through bolt nut at this torque setting in the tightening direction.
- If through bolts click off at the required torque setting without movement it indicates no loss of bolt tension, renew any broken or missing torque seal to these bolts.
  - Some though bolts may relax slightly, particularly during the initial life of the engine (within the first 100 hours or so) as the cylinder heads, and barrels settle slightly. This would be indicated by slight movement of the nut no more than 1/8<sup>th</sup> of a turn. This is not abnormal.
  - The location and degree of movement of any through bolts should be noted in the maintenance log. At the next scheduled maintenance interval a through bolt torque check should be repeated on all bolts to verify that the bolts have stabilised or if a further issue exists.
  - If bolt movement is excessive and occurs on most bolts in the engine it may indicate that the crankcase is fretting (or it may indicate the torque wrench being used is not calibrated correctly). If fretting is suspected a crankshaft friction test should be conducted (refer to JEM0004).

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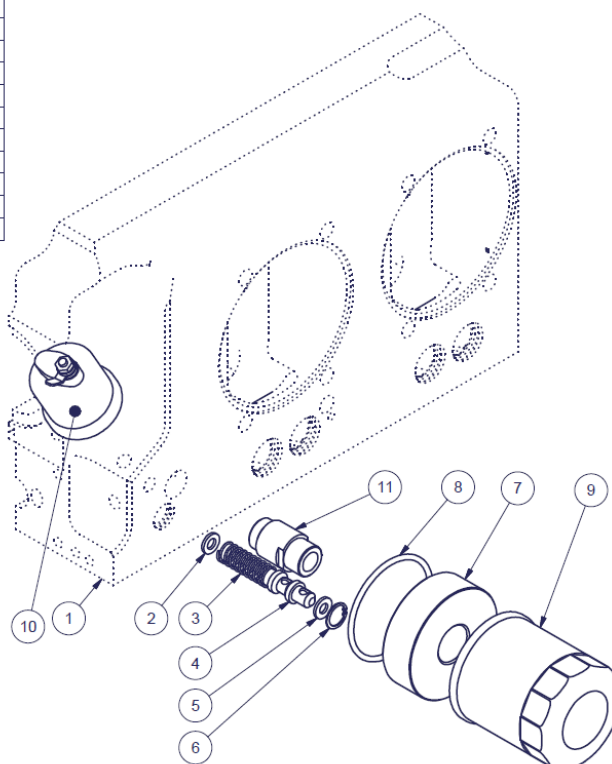
### 9.3 Oil Pressure Relief Valve Adjustment

Required Tools:	Circlip pliers
Parts and Material:	Replacement relief valve plunger (if required) Additional 1/4" flat washers (if required)
Type of Maintenance:	Line Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)

- If during engine running the oil pressure is found to be non-optimal the oil pressure can be adjusted by adjusting the oil pressure relief valve using the following procedure.
- Remove the oil filter.
- Remove the oil cooler adaptor. Note that to gain sufficient slack in the oil lines it may be necessary to remove the oil cooler from its mounting.
- Remove the circlip and draw the valve assembly out of the case.
- Inspect the sealing face of the relief valve plunger. If there are visible nicks or damage then it must be replaced. If a new plunger is to be installed it must be lapped to the front restraining washer.
- If the pressure of the engine needs to be increased another washer can be added behind the spring (item 2 in Figure 11 below). If the pressure needs to be reduced then a washer can be removed.
- Re-assemble the valve, a new circlip must be used.
- Ensure that the spring is not coil-bound: press on the tip of the oil valve plunger and ensure there is a minimum of 1mm movement.

ITEM	PART No.	DESCRIPTION	QTY
1	REF ONLY	CRANKCASE LS	1
2	AN960-416	1/4" FLAT WASHER	1
3	PX4A002D-2	SPRING OIL PRESSURE RELIEF 3.5 BAR	1
4	4536064-7	PLUNGER OIL PUMP RELIEF VALVE (2.2L)	1
5	PH06864-2	WASHER OIL PUMP RELIEF	1
6	PH10142N	CIRCLIP. INT DIA 16	1
7	4581064-13	OIL COOLER ADAPTOR	1
8	PG4A038N	ORING BS229 (NOTE: NOT VITON)	1
9	PG10162N	FILTER	1
10	PI10182N	OIL PRESSURE SENDER	1
11	4A490A0D-1	THREADED ADAPTOR M/M OIL FILTER-OIL COOLER	1


ISS 4: OIL PRESSURE RELIEF SPRING CHANGED



OIL RELIEF VALVE FILTER & ADAPTOR

4A163A0D-4

**Figure 11 – Oil Pressure Relief Valve Assembly**

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## 9.4 Tachometer and Sender

Required Tools:	Calibrated tachometer instrument Thickness gauge
Parts and Material:	N/A
Type of Maintenance:	Line Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)

- Many apparent engine problems can be caused through inaccurate tachometers. Where engine performance is observed to be outside limits, the tachometer should be checked against a calibrated instrument before other troubleshooting is attempted.
- The gap between the tip of the sender and the tags on the flywheel is 0.4mm (0.016"). The sender must have at least 60% covered by the tags fitted to the gearbox side of the flywheel. Ensure both tags are equal distance from sender.

### CAUTION

The tip of the sender is delicate and easily damaged. Care must be taken when adjusting the sender gap to ensure the tag does not hit the sender.

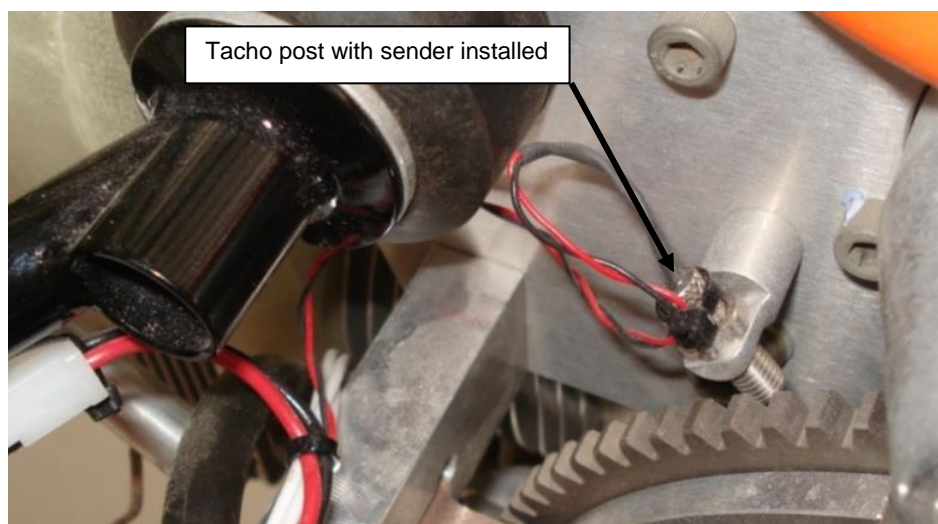



Figure 12 – Tacho Sender

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## 9.5 Carburettor Adjustment

Required Tools:	Screwdrivers Ruler or other measuring instrument
Parts and Material:	N/A
Type of Maintenance:	Heavy Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)

- This section provides additional details on the carburettor installation in addition to the standard maintenance inspection prescribed in 8.29.
- The carburettor automatically adjusts the mixture to account for altitude – there is no provision for in-flight mixture adjustment as standard.
- Ensure that the carburettor sense tube is connected from the carburettor to a fitting on the filtered side of the hot air mixer box.
- Idle stop screw is a 7mm screw against throttle lever. Adjust its position to adjust engine idle speed. Note that the throttle idle stops inside the cabin may also need to be adjusted.
- Standard idle mixture screw position is 1-1/4 turns out. Fine adjustment may be necessary to give a smooth idle.
- Remove the spring clip and detach the bowl from the carburettor. Measure the distance from the fuel surface to the top of the bowl – it should be approximately 12mm.
- Inspect the bowl for dirt or contamination and clean if required. Inspect the visible jets of the carburettor and clean if required.
- Gently lift the floats of the carburettor with the bowl removed until the float needle touches its seat. The floats should be approximately level when the needle touches the seat. If necessary the float assembly can be removed by pressing out the pivot pin and the float height adjusted by gently bending the arm which connects to the float needle.
- Inspect the condition of the seal between carburettor and bowl.
- Re-fit the bowl and snap the clip back in place.

### CAUTION

**Ensure clip is properly on: pressed up against the stopper cast into the bowl.**

### 9.5.1 Tuning

- The mixture is set by selecting jet sizes. As supplied, the engine has jets to suit a majority of installations. However, the mixture may be affected by many variables and in some cases adjustment will be necessary.
- It is strongly recommended that for any new installation a thorough assessment of the engine's fuel/air mixture is carried out. This may be done by EGT sensors or Lambda type sensors.

### CAUTION

**Do not change carburettor settings without consulting with Jabiru Aircraft or our local authorised representative. If EGT readings fall outside the range given above, contact Jabiru Aircraft or our local authorised representative.**

- Spark plug colour can be used as an indicator of the health the suitability of the fuel/air mixture:
  - Brown to Dark Brown :-* Plug & calibration is correct.
  - Velvet Black:-* Mixture too rich. Check choke. Insufficient air intake. Check for clogged air filter.
  - Oily, Glossy Coating:-* Misfiring. Too much oil in combustion chamber. Worn cylinder piston rings.
  - Whitish with Melt Droplets:-* Mixture too lean. Leaking valves.

### CAUTION

**This guide is only relevant when running the engine on AVGAS. Unleaded fuels give different plug colours which are generally unsuitable for use in evaluating engine tuning.**  
**The plug colour reflects the most recent running of the engine – if the engine has run at idle for some time the plug colour will reflect the mixture at idle.**

### WARNING

**Spark plug colour is a very general guide only. Tuning adjustments must ONLY be made on the basis of EGT or Lambda sensor results.**

**DO NOT ADJUST ENGINE TUNING BASED ON SPARK PLUG COLOURS ALONE**

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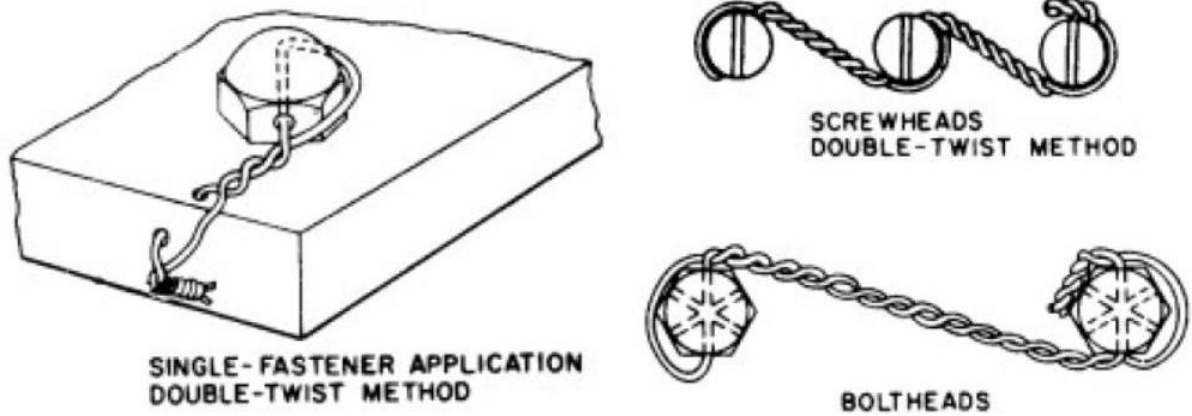


Figure 13 – Safety Wire Details

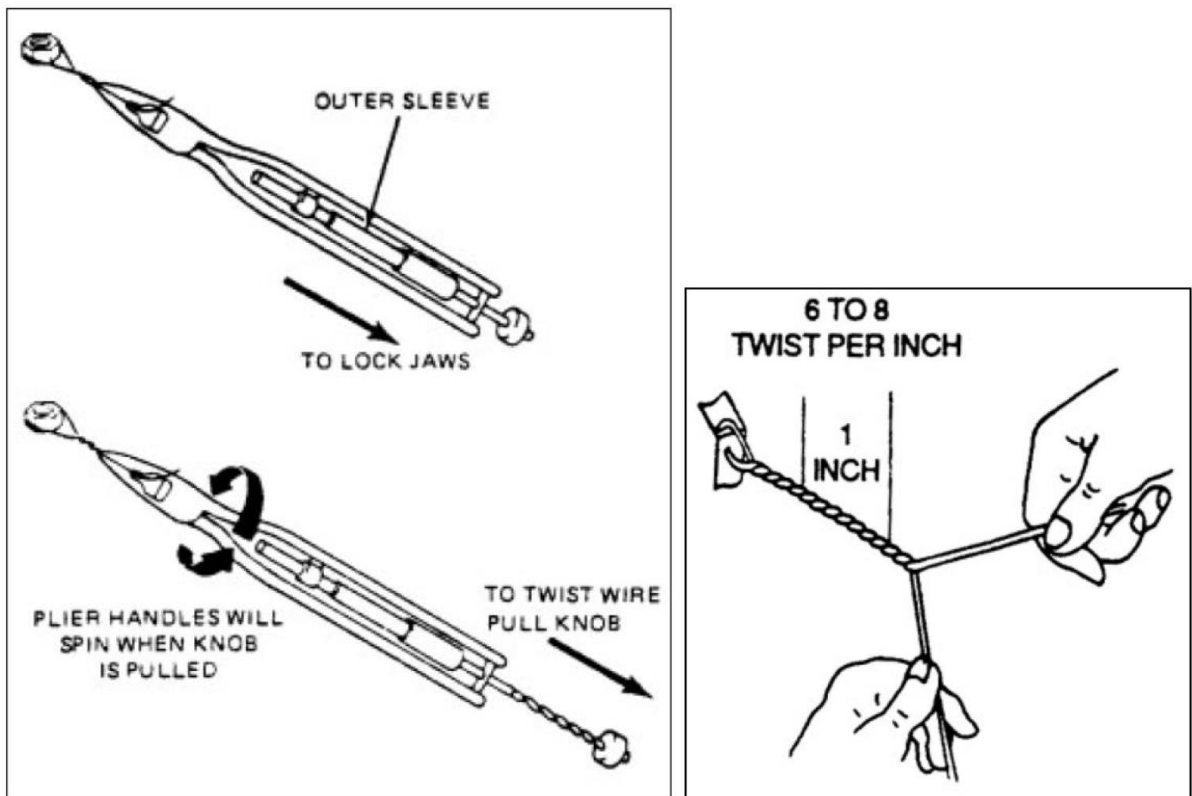



Figure 14 – Safety Wire Installation Using a Twister/Pliers & By Hand



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## 9.7 Non-approved Propellers

- As noted, operators who choose to fit a non-approved propeller to their Jabiru engine do so at their own risk and a system of additional maintenance is recommended to monitor the engine for possible detrimental effects.
- This section has been added to the manual to help guide such maintenance. However, as Jabiru cannot anticipate every combination of engine, airframe and propeller this is strictly of an informational basis. It is not a complete or inclusive maintenance schedule, rather an overall guide directing which areas are likely to need additional attention.

### WARNING

**Using a non-approved propeller may lead to unforeseen operational, airworthiness, safety, financial or legal problems. Jabiru Aircraft accept no responsibility for such issues.**


- The following are recommended IN ADDITION to the normal engine maintenance program.
- Where the maintenance requirements listed below differ from those of a third-party propeller supplier the lesser time interval should be used. i.e. if the table below calls for the propeller to be re-balanced annually but the propeller manufacturer recommends balancing every 100 hours or 6 months then the propeller manufacturer's recommendations should be used.
- Visual inspections of the propeller and propeller flange installation should check for excess metal oxide (appears as rust) or black chaffing dust originating from the flange. This is often an early indication of movement between the parts and potential failure. Oil leaks etc in this area and around the flywheel must be addressed quickly as they can both cause and mask other problems.
- Oil leaks from the front crankshaft seal have also been found to be an indicator of unacceptable propeller vibrations in some cases.

**Table 12 – Special Maintenance Recommendations – Non-Approved Propellers**

Annual Inspection				
Each 500 Hours				
Each 100 Hours				
Each 50 Hours				
1.	Spinner, spinner flange & hardware – Check condition.		*	*
2.	Propeller general condition – visual/hand check	*	*	*
3.	Propeller blade pitch, tracking		*	*
4.	Propeller mounting hardware (bolts, nuts, bushes etc) tension & condition check		*	*
5.	Propeller balance			*
6.	Propeller flange installation – visual inspection (no disassembly required)	*	*	*
7.	Propeller flange capscrew screws – <b>REPLACE</b> Refer to engine overhaul manual for guidance			*
8.	Propeller flange run-out check (per prop strike inspection detailed below)			*
9.	Crank run-out check (per prop strike inspection detailed below)			*
10.	Flywheel capscrews – <b>REPLACE</b> Refer to engine overhaul manual for guidance		*	

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## 10 Engine Overhaul Intervals

- These are carried out only by the manufacturer, Jabiru Aircraft Pty Ltd or by a specifically approved Jabiru Engine Service Centre (contact Jabiru for details).
- The engine must be sent in a complete state, with logbook, to Jabiru (or the Approved Service Centre) after reaching the TBO limit. In some cases a questionnaire may be supplied regarding the service life of the engine so far. In these cases the questionnaire must be filled out as completely as possible & returned with the engine.
- Changes to TBO due to operational experience will be advised by Jabiru via Service Bulletin
- The Jabiru 2200 Gen 4 / 3300 Gen 4 configuration engine use the following basic overhaul intervals
  - Top end overhaul conducted at 1000 hours total time in service (hobbs time)
  - Full overhaul conducted at 2000 hours total time in service (hobbs time)


### 10.1 Full Overhaul

- Full overhauls must be carried out as detailed in the latest approved revision of the 2200 Gen 4 / 3300 Gen 4 Engine Overhaul assembly and Parts book (JEM0004).
- During a full overhaul all parts are cleaned, measured, inspected and recorded in the prescribed build sheets in the manual. JEM0004 details the parts which are mandatorily replaced and those considered serviceable upon inspection.
- JEM0004 also details the procedure for running in overhauled engines in order to make them flight ready.

### 10.2 Top End Overhaul

- Top End Overhauls must be carried out as detailed in the latest approved revision of the 2200 Gen 4 / 3300 Gen 4 Engine Overhaul assembly and Parts book (JEM0004).
- During a top end overhaul all parts are cleaned, measured, inspected and recorded in the prescribed build sheets in the manual. JEM0004 details the parts which are mandatorily replaced and those considered serviceable upon inspection.
- JEM0004 also details the procedure for running in overhauled engines in order to make them flight ready.

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### 10.3 Engine Removal Procedure


Type of Maintenance:	Heavy Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)

**Table 13 – Engine Removal**

No.	Operation	Tools Required
1	Remove Spinner and Propeller	Phillips Screwdriver 7/16" Socket 7/16" Spanner
2	Remove Carby Heat hose from hot-air muff on muffler	Flat-bladed Screwdriver
3	Remove Air Inlet Hose from Carburettor and blank off Carburettor and Air Cleaner	Flat-bladed Screwdriver 2 Plugs
4	Disconnect Throttle Cable	Long Nose Pliers
5	Disconnect Choke Lever	Long Nose Pliers
6	Remove Oil Breather Line	Flat-bladed Screwdriver
7	Remove Fuel Line from Fuel Pump and plug Fuel Line and Fuel Pump	Flat-bladed Screwdriver 1/4" Plugs
8	Remove starter Motor Cable from Solenoid	7/16" R/OE spanner
9	Disconnect Earth at Battery	10mm R/OE
10	Remove Oil Pressure Gauge Lead	-
11	Remove Oil Temperature Gauge Lead	-
12	Remove Hourmeter Lead (if fitted)	Screwdriver
13	Remove Cylinder Head Temperature Gauge Lead	- (disconnect at cold junction)
14	Remove Exhaust Gas temperature Gauge Lead	-
15	Remove Tacho Lead	-
16	Remove Left and Right Ignition Coil Leads	-
17	Remove Muffler Assy	3/16" Ball End Allen Key
18	Undo Engine Mount Bolts	7/16" Tube Socket 7/16" Spanner
19	Remove Engine from Engine Mount Frame	-

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## 10.4 Engine Installation


Type of Maintenance:	Heavy Maintenance
Level of Certification:	L2 or LAME (A&P or LSA Repairman / Maintenance)
Return to Service:	L2 or LAME (A&P or LSA Repairman / Maintenance)

**Table 14 – Engine Installation**

No.	Operation	Tools Required
1	Fit engine to engine mount	-
2	Torque engine mount bolts	7/16 Tube Socket 7/16 Ring Open End      Spanner
3	Fit muffler (if not already fitted) and fit carburettor heat muff and hose	3/16 Ball End Allen Key
4	Connect left and right ignition coils leads	-
5	Connect Tacho sender	-
6	Connect exhaust gas temp (if fitted)	-
7	Connect cylinder head sender	18mm Spark Plug socket
8	Connect hourmeter	Screw Driver
9	Connect oil temp gauge sender	
10	Connect oil pressure gauge sender	
11	Connect starter	7/16 Ring Open End      Spanner
12	Connect Battery (Earth lead first)	10mm Ring Open End Spanner
13	Connect fuel line	Screw Driver
14	Connect Oil Breather	Screw Driver
15	Connect Choke Cable	Long Nose Pliers
16	Connect Throttle Cable	Long Nose Pliers
17	Connect Air Inlet	Screw Driver
18	Fit Propeller and spinner	7/16 Ring Open End      Spanner 7/16 Torque Wrench Phillips Screw Driver
19	Fit Cooling Ducts	3/16 Allen Key
20	Prime Fuel system with electric pump and inspect for leaks	-
21	Check for oil. Fill if needed.	2200: 2.3L oil (2.43 US quarts) 3300: 3.5L oil (3.7 US quarts)
22	Wind over to get oil pressure	-
23	Start and inspect for leaks	-
24	Test Fly <i>Note: First flight is a test flight: fly conservatively!</i>	-
25	Remove Cowls and inspect for anything loose, rubbing or leaking.	-
27	Carry out checks for first 5, 10 & 25 hours as noted above (Section 7)	-
28	If oil consumption is stable fill with W100 (W80 in cold conditions and W120 in very hot conditions). If still using oil remain on run in oil or seek advice from Jabiru Aircraft or local authorized representative	-

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## 11 Trouble Shooting

### 11.1 Engine Won't Start

	Possible Cause	Remedy
1)	Ignition OFF	Switch ON (Note spark will be produced when the primary coil is <b>NOT</b> earthed – i.e. ignitions are ON when switches are OPEN).
2)	Spark plug gap too large	Adjust gap and/or or renew plugs
3)	Closed fuel tap or clogged filter	Open tap, renew filter, check fuel system for leaks
4)	No fuel in tank	Refuel
5)	Wrongly connected high tension leads	Connect as shown on leads
6)	Starting Speed too low, faulty or discharged battery	Recharge or replace battery
7)	Coil to Magnet gap too wide	Adjust
8)	High tension leads loose or damaged	Check or renew connections
9)	Dampness in distributors	Thoroughly dry internally
10)	Spark plugs damp due to condensation	Thoroughly dry both inside and outside of plugs
11)	Plug face wet by fuel due to excessive actuation of choke or overflow of carb	Dry spark plugs, trace possible faults in fuel system or over flow of carb.
12)	Float valve dirty or jammed	Clean or renew float valve
13)	Jets in carb. clogged	Clean jets
14)	Water in carb.	Drain & clean carb., fuel line & filter. Water drain fuel tank
15)	Insufficient compression	Trace pressure loss & repair if necessary
16)	Engine damage	Inspect oil strainer filter & oil filter for metallic particles. If present, an engine overhaul may be necessary.

### 11.2 Engine Idles Unsteadily After Warm-Up Period: Smoky Exhaust

	Possible Cause	Remedy
1)	Choke activated	Close choke
2)	Float valve dirty, jammed or worn	Clean or renew float valve
3)	Intake manifold leak	Tighten all connections, renew faulty items

### 11.3 Engine Runs Erratically or Misfires Occasionally


	Possible Cause	Remedy
1)	Spark plug failure	Check plugs, clean inside & outside, adjust electrode gap. If necessary, renew plugs
2)	Faulty HT leads	Dry damp leads, renew damaged leads
3)	Faulty ignition unit	Renew ignition unit
4)	Clogged fuel filter	Renew fuel filter
5)	Carburettor sense tube not connected	The Bing carburettor has a sense port which helps it control the fuel mixture. This is a small nipple on the carburettor which must be connected via a small tube to a fitting in the filtered side of the carburettor heat box.

### 11.4 Full Power Static RPM Below Specifications

	Possible Cause	Remedy
1)	Low engine power	See Section 11.7
2)	Unsatisfactory propeller	Refer to engine installation manual for prop requirements
3)		

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## 11.5 Engine Runs Too Hot - Oil Temperature Above 110°C (230°F)

	Possible Cause	Remedy
1)	Too much oil in crankcase	Check oil level & adjust if necessary
2)	Low oil level	Check oil level & add oil if necessary
3)	Poor quality oil	Oil change, use specified oil
4)	Clogged oil filter	Change filter
5)	Excessive piston blow by	Common reason: worn or sticking piston rings, complete engine overhaul necessary
6)	Faulty bearings	If metallic particles are present in oil, complete engine overhaul necessary
7)	Faulty oil temperature gauge	Exchange gauge

## 11.6 CHT Reading Error

	Possible Cause	Remedy
1)	Faulty gauge, sender or connection	Check gauge & sender – replace with known good items if possible. Reverse polarity between gauge and sender & re-test.
2)	Improper temperatures	Verify original reading using a second thermometer – such as a hand-held infrared thermometer.
3)	Cold junction temperature	The standard gauges used in Jabiru Aircraft assume that the cold junction (where the thick thermocouple wire connects to the standard wire leading to the instrument) is at around 25°C. Ensure the junction is not exposed to excessively hot or cold air for best results.


## 11.7 Unsatisfactory Power Output

	Possible Cause	Remedy
1)	Ignition failure	Check ignition circuits; check wiring and pick-ups; replace ignition units.
2)	Too much oil in crankcase	Check oil level & adjust if necessary
3)	Insufficient fuel supply	Check fuel supply system
4)	Fuel not according to specifications	Re-fuel with specified fuel
5)	Incorrect throttle adjustment	Re-adjust throttle fitting
6)	Leak in air intake	Check and tighten all connections, check carburettor sockets.
7)	Carburettor diaphragm damage	renew diaphragm
8)	Hydraulic Lifter stuck / collapsed	Replace lifter(s)
9)	Tachometer Reading Error	Check RPM with calibrated gauge (such as hand-held optical gauge).
10)	Carburettor heat not turning off	Check / adjust carburettor heat mechanism
11)	Choke not turning fully off	Check / adjust choke mechanism.
12)	Unsatisfactory induction system	Check induction system for sharp edges, rough corners etc. Refer to engine installation manual.

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## 11.8 Low Oil Pressure

	Possible Cause	Remedy
1)	Insufficient oil in sump	Check oil level & replenish as necessary
2)	High oil temperature	Check engine is not over-full with oil Check installation: improper gaps or insufficient pressure head produce low airflow which can lead to elevated temperatures.
3)	Faulty pressure gauge, sender or wiring	Check gauge, sender & wiring. Renew as necessary.
4)	Faulty crankshaft bearings	Engine overhaul
5)	Relief valve not sealing	Inspect, replace back after cleaning. Foreign matter stuck in the valve will produce low pressure.

## 11.9 Oil Pressure Varying

	Possible Cause	Remedy
1)	Low oil level	Check oil level & replenish as necessary
2)	Sender, gauge or connection fault	Check continuity of sender wire. Check sender body is earthed to engine Check gauge – replace with known good gauge if possible. Adjust oil pressure relief valve

## 11.10 Engine Keeps Running with Ignition Off

	Possible Cause	Remedy
1)	Idle speed too high	Adjust to proper idle speed (900 RPM)
2)	Faulty ignition switch	Check switch & cables. Repair/replace as necessary
3)	Overheated engine	Conduct cooling run at 900 RPM

## 11.11 Excessive Oil Consumption


	Possible Cause	Remedy
1)	Worn, broken or wrongly fitted piston rings	Repair/engine overhaul necessary
2)	Poor oil quality	Oil change, use specified oil
3)	Worn valve guides	Repair of cylinder head necessary
4)	Oil leaks	Seal leaks

## 11.12 Oil Collector Bottle on Firewall Fills Quickly

	Possible Cause	Remedy
4)	Worn, broken or wrongly fitted piston rings	Repair/engine overhaul necessary
5)	Incorrect oil grade	Oil change, use specified oil
6)	Worn or distorted cylinders	Repair/engine overhaul necessary
7)	Over-filling sump	Reduce oil level in sump
8)	Negative-g	The Jabiru Engine is not approved for deliberate negative G operations. Strong turbulence in flight can have a similar effect: reduced RPM /speed is recommended when operating in strong turbulence.

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### 11.13 Excessive Vibration


	<b>Possible Cause</b>	<b>Remedy</b>
1)	Propeller out of balance	Balance to propeller manufacturer's instructions
2)	Propeller tip tracking out of tolerance	Check / adjust tracking
3)	Uneven propeller blade pitch	Check / adjust blade pitch
4)	Spinner out of balance	Check / adjust spinner balance
5)	Unsuitable propeller	Replace propeller. Quality 2-bladed fixed pitch wooden types recommended.
6)	Incorrect Tuning	Check / adjust carburettor
7)	Engine rubbing	Check engine, air ducts, exhaust, oil cooler etc are not rubbing on cowls, fuselage etc.

### 11.14 Knocking Under Load

	<b>Possible Cause</b>	<b>Remedy</b>
1)	Octane rating too low. Fuel old or stale.	Use fuel with higher octane rating
2)	Spark plug fitted without sealing washer	Ensure one sealing washer on each plug
3)	Heavy carbon deposits	Remove cylinder heads & in combustion chamber remove deposits. Determine oil consumption.

#### Notes:

- Running this engine on low octane fuel will cause piston damage and in extreme cases failure of the top ring gland or holed piston due to detonation.
- Changing the engine tuning to a leaner air fuel mix can cause piston damage.


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### 11.15 Engine Hard to Start at Low Temperature – Cold Start Checklist

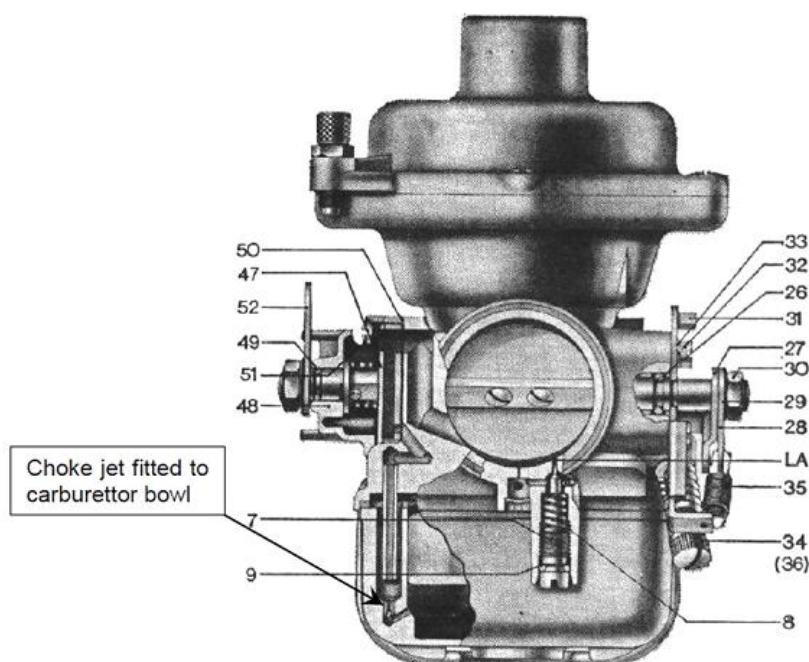
	Possible Cause	Remedy
1)	Starter motor condition	Check that the bushes in the starter motor bendix drive housing are in good condition. Ensure the brushes are not worn out, that the commutator is clean and all electrical connections are clean. This may require removing the heat shrink from the soldered connection on the starter motor and checking for corrosion.
2)	Spark plugs	Spark plugs must be within the set life and be gapped correctly. In winter spark plug gaps can be reduced as low as 0.020" to allow the plugs to fire more easily
3)	High tension leads	High tension leads must be in good condition. Ensure all end terminals are tight and fitting to the distributor & spark plugs correctly. If necessary adjust per Section 8.11. Don't forget to check the plug where the ignition coils connect to the distributor cap. Note that running the engine at night with the cowls removed will make the bright arcs caused by faulty insulation, bad connections etc much more visible.
4)	Distributor assembly	Check that the distributor & rotor are in good condition. Check that there is no moisture inside the cap and that all the electrical terminals are clean
5)	Ignition coil gaps	Check that the coils have been set with the correct air gap from the flywheel magnets.
6)	Air filter	Check that the air filter is clean
7)	Fuel filter	Check that the fuel filter is clean
8)	Carburettor	Check that the carburettor float level is set correctly and that the carburettor is clean and in good condition. Ensure there is no debris blocking jets (including the choke jet) etc
9)	Low battery charge	Fit fully charged battery. The life of a Battery varies but is generally less than 4 years.
10)	Operation	Minimise the time spent at low RPM with high-powered devices running. At low RPM the alternator produce virtually no power – certainly not enough to run landing lights, strobe lights and avionics suites. The deficit between the power draw of these systems and the alternator output must be drawn from the battery. Excessive operation like this will drain the battery and significantly reduce the output available for cold starting the next day
11)	Fly regularly	Any vehicle will be harder to start if it goes a long time between outings. If the aircraft has not been flown for a few weeks then charging the battery before attempting a start is recommended. Standing also affects the quality of the fuel in the carburettor and fuel system – volatile elements in the fuel can evaporate, making it harder for the carburettor to atomise it properly
12)	Starting method	The recommended procedure is to hold the choke fully ON and the throttle fully OFF. The Bing carburettor uses an enrichment-type choke system (as opposed to a butterfly-type choke) which will only work properly if the throttle is fully closed. When the throttle butterfly is closed it creates a vacuum which is then used to suck fuel through the choke jet – if the throttle is not closed there is less vacuum and the choke does not work as designed. Also note that there is a tendency for the choke to spring back slightly from the ON position if the knob is released – operators are recommended to hold the knob fully ON when starting to make sure it stays properly on.
13)	Idle speed	Ensure that the idle RPM is set correctly. If the idle is too high the throttle butterfly will be open slightly – which will prevent the choke from working properly, as described above. Idle RPM limits are given in the engine manuals
14)	Choke Jet	The choke jet needs to have a bore of about 1.2mm. This gives the engine more fuel when the choke is applied, making it easier to start. New engines and aircraft have been set at this size since around February 2011, however older units will need to be checked and, if necessary, enlarged. See Figure 15

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	<b>Possible Cause</b>	<b>Remedy</b>
15)	High oil pressure	At very low temperatures, a pressure reading of up to around 500 kpa doesn't necessarily indicate a malfunction.
16)	Starting speed too low	Preheat engine



**Figure 15 – Choke Schematic**

### 11.16 Irregular / Low Compressions

	<b>Symptoms</b>	<b>Possible Cause</b>	<b>Remedy</b>
1)	Compression on 1 or more cylinders low	Debris on valve seat	Blow debris off seat
		Hydraulic lifters locked	Excess oil pressure can cause lifters to hold valves partially open. Adjust engine oil pressure. Jammed or defective hydraulic lifter: replace.
		Worn cylinder / piston / rings.	Overhaul engine.
		Burnt or worn valve or seat	Replace Valve &/or head. Refer to Engine Overhaul Manual.


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### 11.17 Hydraulic Valve Lifters

	Symptoms	Possible Cause	Remedy
1)	Engine noisy, "tapping" at idle	"Soft" lifter(s) due to lifter fault	Replace lifter(s)
		"Soft" lifter(s) due to low oil pressure	See Low Oil Pressure section above.
		"Soft" lifter(s) due to air in lifter	Run engine. Up to 15 minutes running may be required to completely expel air from the lifter. <b>OR</b> Remove lifter and manually fill with oil.
2)	Reduced engine power	Soft or stuck hydraulic lifter(s)	Replace lifter(s)
		"Soft" lifter(s) due to low oil pressure	See Low Oil Pressure section above.
		Lifters "pumping up" holding valves open	Reduce operating oil pressure (within limits) Replace lifter(s)
3)	Excess metal in oil filter	Cam / Lifter damage	Inspect lifter and cam working surfaces. Replace if damaged.

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## 12 Engine Maintenance Worksheets

### 12.1 Initial 5 hours inspection

This worksheet provided covers all inspection tasks required after the first 5 hours' time in service inspections and servicing. 'P' indicates pass, 'F' indicates fail, the 'Comments' column should be used to note condition, parts replaced, corrective action etc.

**IMPORTANT:**  
**READ ALL INSPECTION AND MAINTAINANCE REQUIREMENTS IN THIS**  
**MANUAL (JEM0005) BEFORE USING THESE CHARTS / WORKSHEETS**

OWNER NAME.....  
AIRCRAFT MAKE/MODEL.....REGO.....S/N.....  
ENGINE MAKE/MODEL.....S/N.....  
TT AIRFRAME.....TT ENGINE.....  
CARRIED OUT BY (print name).....(signature).....(date).....

1) Remove and inspect engine cowls (refer to section 8.3)

<b>P</b>	<b>F</b>	Comments:	<b>First 5 hours</b>

2) Inspect engine mount attachment points (refer to section 8.30)

<b>P</b>	<b>F</b>	Comments:	<b>First 5 hours</b>

3) Thoroughly check engine for missing or loose bolts, nut, pins etc.

<b>P</b>	<b>F</b>	Comments:	<b>First 5 hours</b>

4) Check the fit of ram air cooling ducts (refer to section 8.10)

<b>P</b>	<b>F</b>	Comments:	<b>First 5 hours</b>

5) Perform visual inspection of flywheel screws (refer to section 8.17)

<b>P</b>	<b>F</b>	Comments:	<b>First 5 hours</b>

6) Perform visual inspection of through bolt / stud bolt torque seal (refer to section 8.15)

<b>P</b>	<b>F</b>	Comments:	<b>First 5 hours</b>

7) Check induction and exhaust pipes attachments (refer to section 8.18)

<b>P</b>	<b>F</b>	Comments:	<b>First 5 hours</b>


8) Check mechanical fuel pump and fuel system for leaks (refer to section 8.26 and 8.27)

<b>P</b>	<b>F</b>	Comments:	<b>First 5 hours</b>

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9) Check security of ignition leads and ignition coil wiring


<b>P</b>	<b>F</b>	Comments:	<b>First 5 hours</b>

10) Perform general electrical wiring inspection (refer to section 8.31)

<b>P</b>	<b>F</b>	Comments:	<b>First 5 hours</b>

11) Check the security of safety wiring on the sump plug

<b>P</b>	<b>F</b>	Comments:	<b>First 5 hours</b>

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## 12.2 25-Hour Oil and filter change

This worksheet covers all inspection tasks required for 25 hourly engine inspections and servicing. 'P' indicates pass, 'F' indicates fail, the 'Comments' column should be used to note conditions, parts replaced, etc.

### IMPORTANT:

**READ ALL INSPECTION AND MAINTAINANCE REQUIREMENTS IN THIS MANUAL (JEM0005) BEFORE USING THESE CHARTS / WORKSHEETS**

OWNER NAME.....  
AIRCRAFT MAKE/MODEL.....REGO.....S/N.....  
ENGINE MAKE/MODEL.....S/N.....  
TT AIRFRAME.....TT ENGINE.....  
CARRIED OUT BY (print name).....(signature).....(date).....

#### 1) Remove engine cowlings (refer to section 8.3)


P	F	Comments:	25 hourly

#### 2) Change oil and oil filter, note oil type used (refer to section 8.21)

P	F	Comments:	25 hourly

#### 3) Empty oil collection bottle, note amount emptied (refer to section 8.22)

P	F	Comments:	25 hourly

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## 12.3 50 hour, 100 hour and Annual Inspection Worksheet

This worksheet provided covers all inspection tasks required for 50 hour, 100 hour and Annual inspections. A '•' in the box indicates a task should be conducted at the relevant inspection interval 'P' indicates pass, 'F' indicates fail, the 'Comments' column should be used to note condition, parts replaced, etc.

**IMPORTANT:**  
**READ ALL INSPECTION AND MAINTAINANCE REQUIREMENTS IN THIS**  
**MANUAL (JEM0005) BEFORE USING THESE CHARTS / WORKSHEETS**

AIRCRAFT MAKE/MODEL.....REGO.....S/N.....  
ENGINE MAKE/MODEL.....S/N.....  
TT AIRFRAME.....TT ENGINE.....  
INSPECTION TYPE (circle).....50 hourly.....100 hourly.....Annual  
CARRIED OUT BY (print name)..... (Signature)..... (Date).....

### 1) Remove and inspect engine cowling (refer to section 8.3)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

### 2) Basic inspection before cleaning (refer to section 8.4)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

### 3) Clean engine (refer to section 6.3)

P	F	Comments:	50 hrly	100 hrly	Annual
				•	•

### 4) Basic inspection after cleaning (refer to section 8.6)

P	F	Comments:	50 hrly	100 hrly	Annual
				•	•

### 5) Induction air filter clean and reinstall (refer to section 8.7)

P	F	Comments:	50 hrly	100 hrly	Annual
			•		

### 6) **Replace** induction air filter (refer to section 8.7)

P	F	Comments:	50 hrly	100 hrly	Annual
				•	•

### 7) Induction air SCAT hose inspection (refer to section 8.8)


P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

### 8) Carburetor heat system (refer to section 8.9)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

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9) Ram air cooling ducts (refer to section 8.10)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

10) Ignition lead inspection (refer to section 8.11)

P	F	Comments:	50 hrly	100 hrly	Annual
				•	•

11) Pressure differential leak-down test, record leak-down results (refer to section 8.12)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•
		<div> <div>#1</div> <div>80</div> </div> <div> <div>#2</div> <div>80</div> </div> <div> <div>#3</div> <div>80</div> </div> <div> <div>#4</div> <div>80</div> </div> <div> <div>#5</div> <div>80</div> </div> <div> <div>#6</div> <div>80</div> </div>			

12) Spark plugs inspection and cleaning (refer to section 8.13)

P	F	Comments:	50 hrly	100 hrly	Annual
			•		

13) Replace spark plugs (refer to section 8.13)

P	F	Comments:	50 hrly	100 hrly	Annual
				•	•

14) Cylinder inspection (refer to section 8.14)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

15) Through bolt and stud bolt visual inspection (refer to section 8.15)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

16) Inspect crankcase seals (refer to section 8.16)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

17) Flywheel screw visual inspection (refer to section 8.17)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

18) Induction and exhaust system inspection (refer to section 8.18)


P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

19) Rocker chamber inspection (refer to section 8.19)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

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20) Hydraulic lifter maintenance (refer to section 8.20)

P	F	Comments:	50 hrly	100 hrly	Annual
				•	•

21) Oil and filter change (refer to section 8.21)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

22) Empty oil collection bottle, record volume (refer to section 8.22)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

23) Inspect flexible oil lines (refer to section 8.23)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

24) Distributor inspection (refer to section 8.24)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

25) Mechanical fuel pump inspection (refer to section 8.26)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

26) Flexible fuel lines and fittings (refer to section 8.27)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

27) Replace fuel filter

P	F	Comments:	50 hrly	100 hrly	Annual
				•	•

28) Engine control linkages (refer to section 8.28)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

29) Carburettor inspection (refer to section 8.29)


P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

30) Engine mount points (refer to section 8.30)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

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31) Electrical wiring (refer to section 8.31)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

32) Starter motor and solenoid (refer to section 8.32)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

33) Ignition coils (refer to section 8.33)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

34) Alternator inspection (refer to section 8.34)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•


35) Engine ground test run (refer to section 8.2)

P	F	Comments:	50 hrly	100 hrly	Annual
			•	•	•

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## 13 New Engine – Jabiru’s Limited, Express Warranty

### Jabiru Aircraft Pty Ltd

New Jabiru Aircraft Engines (“the engine”) are covered by Jabiru’s Limited, Express Warranty (“the Warranty”) as set forth below.

#### I. Parties to Whom this Warranty is Given

This Limited, Express Warranty is given to the person who is entitled to possession of the engine whether as owner, lessee or otherwise (“owner”). This Warranty is given in addition to all rights conferred on that person by law of the governing state, and/or in place of any laws or regulations on the terms set forth below.

#### II. Scope of the Warranty

Jabiru Aircraft Pty Ltd. (“JABIRU”) warrants that its new and unused engine has no defects in material and/or workmanship for the period and under the conditions described in this Warranty. The owner of the engine agrees that the terms and conditions of this Warranty are exclusive and expressly disclosed, and that the owner accepted them at the time of purchase of the engine.

#### III. Coverage Period and Conditions of Coverage

JABIRU warrants that it will make good without charge, any defect (except as provided for in Section IV, Exclusions, below), which appears in the engine, provided that:

1. Notice of the defect has been provided in writing to JABIRU:
  - (a) Before the engine has operated a total of 200 hours, or
  - (b) Within twelve (12) months of the date of delivery of the engine to the first retail purchaser.
 Whichever comes first; and,
2. The owner must register the engine by mailing a warranty registration card to JABIRU or its authorized JABIRU Distributor/Dealer, within 30 days of purchase (an engine registration card is included with each engine; contact JABIRU Distributor/Dealer with any questions); and,
3. The engine has been delivered to JABIRU, its authorized Distributor/Dealer, or such other service facility as advised in writing by JABIRU; and,
4. The engine has been installed in an aircraft type in accordance with a JABIRU approved installation system; and,
5. The engine has been updated in accordance with JABIRU Service Bulletins before operation;
6. The engine has been stored in accordance with the Engine Preservation instructions in the JABIRU Engine Maintenance manual; and,
7. For any and all engines installed in airframes other than the airframes manufactured by JABIRU, the owner has provided JABIRU with: a) evidence that the cooling system of the cowling produces pressure differential test results consistent with the requirements of the JABIRU installation manual; and, b) delivery of the log book that reflects engine parameters during any and all initial flights.

This Warranty applies only to engines which have been inspected and maintained in accordance with the instructions for continued airworthiness, including compliance with all applicable service documents issued by JABIRU. Performance of required inspections and maintenance must be documented by appropriate logbook entries and the logbook must accompany any engine being submitted for warranty consideration. JABIRU reserves the right to make warranty coverage contingent upon proof of proper inspection and maintenance.

Warranty repairs do not extend the original Limited, Express Warranty.


The duration and any other terms of this Warranty are subject to the governing law of the owner’s state. JABIRU reserves the right to improve or modify its engines from time to time without assuming any obligation to modify its engines manufactured previously.

The owner must comply fully with all conditions of this Section III for the Warranty coverage to have full force and effect. Non-compliance with the conditions of this Section III constitutes a waiver of any and all benefits of this Limited, Express Warranty.

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Australia) and JABIRU itself performs the repairs. For JABIRU to cover labor costs in connection with the repair or replacement of parts that belong to non-Australian international owners, said parts must be delivered to JABIRU official Dealers/Distributors as directed in writing by JABIRU. JABIRU will compensate International JABIRU Dealers/Distributors for the allowed labor costs at the rate that JABIRU charges for any similar job.

## **IX. Troubleshooting Costs**

For the first TWELVE (12) CONSECUTIVE MONTHS of the coverage or the coverage period set forth in Section III of this Warranty above, whichever is shorter, JABIRU will pay for certain troubleshooting costs in connection with determining the need for any repair or replacement covered by this Warranty, when performed by, or coordinated through, JABIRU or an authorized JABIRU Distributor/Dealer, and where a defect is identified that results in a warranty claim. The amount of troubleshooting costs allowed will be in accordance with the latest revision of JABIRU's limited warranty labor allowance for any applicable part or component, which is made available to JABIRU or its authorized Distributor/Dealer. In no event will the Trouble Shooting Costs exceed fifteen percent (15%) of the Labor Costs allowed by JABIRU for such repairs or replacements.

No Troubleshooting Costs will be covered where the need for repair or replacement under warranty is identified in the course of overhaul, routine maintenance, or on the basis of an obvious nonconformity, or if the damage is not one covered by this limited Warranty. No Troubleshooting Costs will be reimbursed if the need for a repair covered by this warranty was identified by someone other than a person or entity approved in writing by JABIRU.

For any engine to be delivered to JABIRU (Australia), it is the owner's sole responsibility to clean the engine from including, but not limited to, soil, debris, sand, gravel, plant matter, seeds, and/or any other foreign matter. It is also the owner's sole responsibility to completely drain the engine from oil, fuel, and/or any other liquids. Further, for any engine to be delivered to JABIRU (Australia), it is the owner's sole responsibility to comply with any and all cleaning requirements imposed by Australian Customs and Border Protection Services ("Australian Customs") and Australian Quarantine and Inspection

Services ("AQIS"). JABIRU will not be responsible for costs of cleaning the engine, any other related fines, penalties, and/or any other costs that result from the owner's failure to comply with the requirements imposed by the Australian Customs and/or AQIS. It is the owner's sole responsibility to pay any such costs, fines, and/or penalties imposed by the Australian Customs and/or AQIS.


For any engine to be delivered to a JABIRU Dealer/Distributor located outside Australia, it is the owner's sole responsibility to clean the engine from including, but not limited to, soil, debris, sand, gravel, plant matter, seeds, and/or any other foreign matter. It is also the owner's sole responsibility to completely drain the engine from oil, fuel, and/or any other liquids. Further, for any engine to be delivered to a JABIRU Dealer/Distributor located outside Australia, it is the owner's sole responsibility to comply with any and all cleaning requirements imposed by Customs, Border Protection, Quarantine and Inspection Authorities of the state where the JABIRU Dealer/Distributor is located. Neither JABIRU nor its Dealer/Distributor will be responsible for costs of cleaning the engine, any other related fines, penalties, and/or any other costs that result from the owner's failure to comply with the requirements imposed by Customs, Border Protection, Quarantine and Inspection Authorities of the state where the JABIRU Dealer/Distributor is located. It is the owner's sole responsibility to pay any such costs, fines, and/or penalties.

## **X. Additional Conditions – Owners' Actions to Obtain Coverage**

The Owner must notify JABIRU or its authorized Distributor/Dealer, in writing, within fourteen (14) days from discovery of a condition that the owner believes is resulting from a defect in material or workmanship. Any defects which are not reported within fourteen (14) days shall not qualify for any claims under this Warranty. Failure to do so will result in denial of coverage under this Warranty. Note that the notification period is subject to the applicable national or local legislation.

The owner must provide reasonable access to the engine, its parts and accessories, and a reasonable opportunity for JABIRU or its authorized Distributor/Dealer to repair it. Also, if requested, the owner must also present proof of purchase.

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If you cannot locate a JABIRU Distributor/Dealer or if you have any additional questions regarding this Warranty, please visit our website at <http://www.jabiru.net.au/>.

#### **XI. No Defect Found**

If a duly reported alleged defect cannot be confirmed as such by JABIRU or its authorized distributors and/or dealers and therefore no repair or replacement will be necessary, the owner shall bear all costs accrued in connection with the examination and transportation of the alleged defective item.

#### **XII. Availability of Service and Parts after Warranty**

JABIRU maintains a substantial stock of spare parts and operates a Service Exchange Programme in respect to some components. Every endeavour is made to ensure that JABIRU carries adequate stocks of service parts and is equipped to provide satisfactory service, but JABIRU does not make any promise that after the expiration of the Limited, Express Warranty such parts or service will be available, or available at any specific location or at any particular time.

#### **XIII. Changes and modification of this Warranty**

JABIRU reserves the right to modify this warranty at any time in writing. However, any such modification will not change the terms of the warranty applicable to the engines sold while this warranty is in effect.

#### **XIV. Engine Transfer**


If the ownership of the engine is transferred during the warranty coverage period, this Warranty and limitations of liability and disclaimers shall also be transferred and will be valid for the remaining coverage period, provided that: a) JABIRU or its authorized Distributor/Dealer promptly receives proof that the former owner agreed to the ownership transfer; b) JABIRU or its authorized Distributor/Dealer promptly receives the new owner's name and contact details; and, c) the conditions set forth in Section III above have been fully complied with.

Signed By: \_\_\_\_\_ Date: \_\_\_\_\_

Name (Printed): \_\_\_\_\_

Address (Printed): \_\_\_\_\_

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## 14 Jabiru's Limited, Express Warranty: Claim Form

FROM: \_\_\_\_\_ DATE: \_\_\_\_\_

ENGINE PARTS:

AIRFRAME PARTS:

ENGINE NUMBER: \_\_\_\_\_ AIRFRAME KIT NUMBER: \_\_\_\_\_

PART NUMBER: \_\_\_\_\_ TOTAL HOURS: \_\_\_\_\_

OWNER: \_\_\_\_\_ PREVIOUS OWNER: \_\_\_\_\_

PART DESCRIPTION: \_\_\_\_\_

CLAIM: \_\_\_\_\_

FAULTY GOODS RETURNED: YES    COURIER Co. REF NO: \_\_\_\_\_

NO

ALL GOODS THAT ARE BOXED AND HAVE TO PASS THROUGH CUSTOMS HAVE TO BE CLEANED AND FREE FROM CONTAMINATION WITH A STATEMENT ATTACHED SPECIFYING HOW THEY WERE CLEANED AND THAT THEY ARE FREE OF DIRT AND GRASS SEEDS. IF THEY ARE NOT CLEANED TO CUSTOMS SATISFACTION AN EXTRA CLEANING CHARGE WILL APPLY.

IF THIS CLAIM FORM IS NOT COMPLETELY AND CORRECTLY COMPLETED WARRANTY MAY BE REFUSED.

### OFFICE USE ONLY

APPROVED

NOT APPROVED


REASON

\_\_\_\_\_  
\_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

SIGNED: \_\_\_\_\_ DATED: \_\_\_\_\_


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## 15 Revisions

Issue	List of Changes	Issued By	Date
1	Initial Issue	AS	16/10/17




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## 16 Feedback and Reporting

Any issues or corrections required of Jabiru publications are requested to be passed on to Jabiru in writing for incorporation in subsequent revisions. Emails to [info@jabiru.net.au](mailto:info@jabiru.net.au) are recommended.

The following form template may be used if desired.

Name of Reporter:	
Date:	
Email:	
Phone:	
Issue / Correction(s) (please list and provide details e.g. section numbers, page numbers, nature of concern)	

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### 16.1.1 Continued Operational Safety Reporting

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

Date:	
Aircraft Model	
Aircraft Registration	
Aircraft S/No.	
Propeller Model:	
Propeller S/No.	
Engine Model:	
Engine S/No	
Details of item:	
Name of Reporter:	
Preferred Contact Details of Reporter	

### 16.1.2 Owner Change of Address Notice

Each owner/operator of a LSA is responsible for providing the manufacturer with current contact information where the manufacturer may send the owner/operator supplemental notification bulletins. The following proforma may be used & sent to Jabiru Aircraft at [info@jabiru.net.au](mailto:info@jabiru.net.au) or the contact details given in Section 2.6

Aircraft Model	
Aircraft Registration	
Propeller Model:	
Propeller S/No.	
Aircraft S/No	
Engine Model:	
Engine S/No	
Previous Owner:	
New Owner:	
Contact Details of New Owner	

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