

# JABA CHAT



**Jabiru Aircraft Pty Ltd**

**March 2015**

Hello Readers,

It's a little hard to believe Easter is upon us already and the months tick over so quickly....time certainly does fly!! February saw the first new Jabiru for 2015 fly from the nest to it's new home. Next to leave us is a brand new J230-D at the end of this month. Pictured here below getting a final buff at the production line before test flying starts, this Jabiru will call Emerald here in Queensland home very soon.



The production line has also started on the next order which is for another new J230-D. I thought our readers might be interested to see the first stage of production on a Jabiru so here it is below in the first stage jig where the engine, doors,

undercarriage, tail fin and stabiliser will all be fitted. This J230-D will be ready for delivery to it's new owner at the beginning of May.



The research & development work here at Jabiru never stops. We are always working to improve and develop our product and our communication with our customer base to keep you all up to date with developments and information as much as possible. This issue has lots of information for you all so I hope you enjoy the read and as always "Happy Flying"

Leigh

# Engines

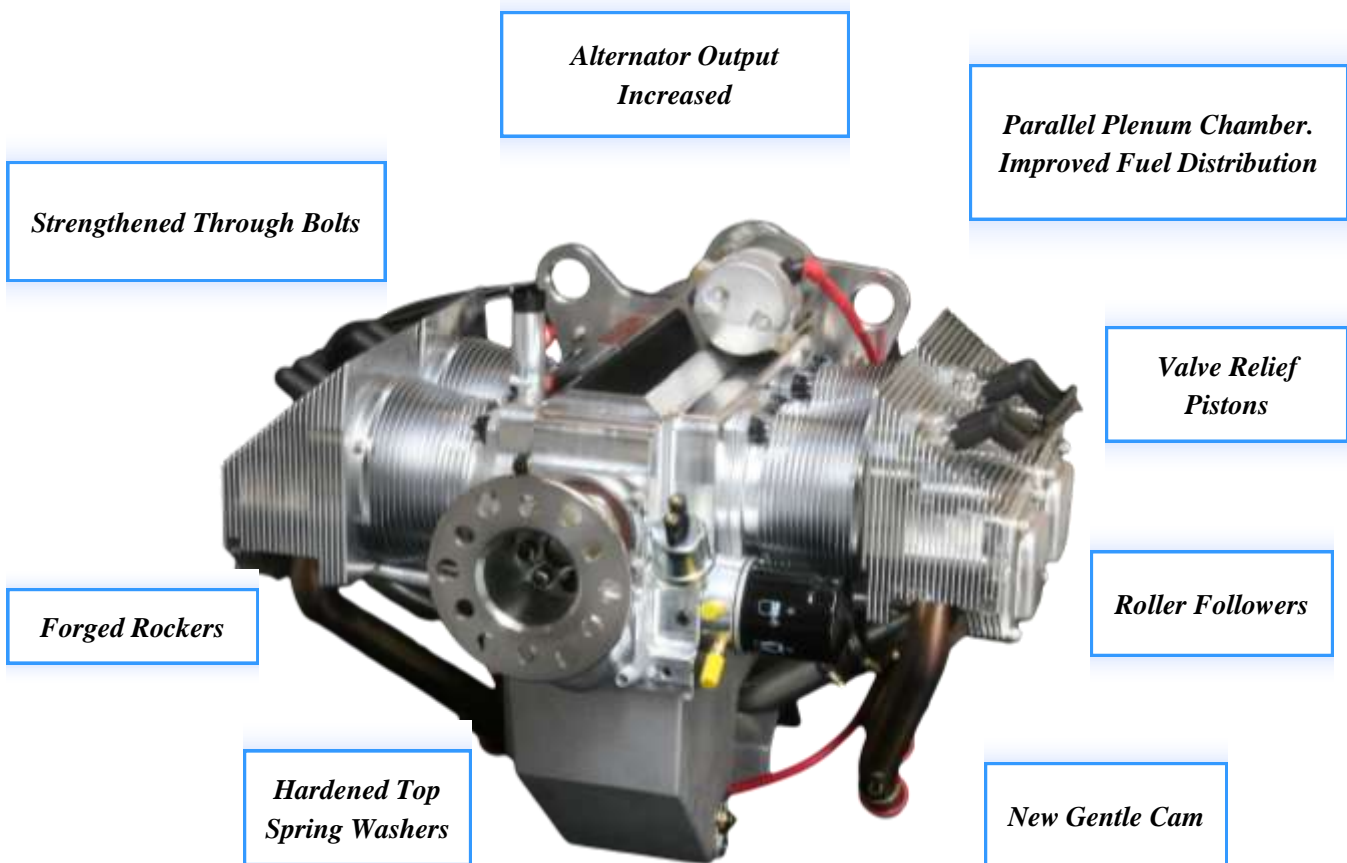


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Jabiru 2200 and 3300 Engines.....



To date there have been over **6,500** Jabiru engine units sold worldwide.

This is quite an achievement for a small Australian manufacturer. As we said earlier the research and development and desire to improve on our product never ceases. Our latest look at statistics show that strengthened through bolts now have over 30,000 hours in service, valve relief pistons have over 10,000 hours in service and the forged rockers have over 100,000 hours in service. The roller followers which give reduced friction for a longer camshaft life now have over 15,000 hours in service. To continually build a robust engine there is no substitute for large amounts of hours flown in all kinds of environments worldwide to test the durability and robustness of any engine. The large amounts of hours being flown are certainly encouraging.

On the following pages you will find a table that lists the history of updates to the Jabiru Engine. Please note that the information contained in these tables is at the time of new build and may have been changed with service work. This information is a guide only and not a complete list of configuration changes.

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Component	2200 S/No.	3300 S/No.	Details
Cylinders	01 – 106		Head gasket type.
	107 – 127		Spigot type, 105.5mm long
	128 – 831	01 – 153	Spigot type, 106.5mm long
	832 – 3442	154 – 2289	Spigot type, 107mm long
	3443 - Current	2290 – Current	Spigot type, 107.5mm long
	3498 – Current	2391 - Current	Base holes sized to suit 7/16" bolts
Pistons	01 – 436		Suits alloy rods.
	437 – 1003	01 – 223	Suits steel rod. Crown height 64.0mm
	1003 - Current	224 – Current	Suits steel rod. Crown height 65.5mm
Cylinder Heads	01 – 106		Head gasket type
	107 – 224		Spigot type
	225 – 644	01 – 47	Symmetric spigot type
	645 – 657	48 – 52	Fin area enlarged
	659 – 709	53 – 118	Fin area enlarged more, valve seats widened
	710 – 1003	119 – 223	Fin area enlarged more
	1004 - Current	224 – Current	Combustion chamber geometry changed, more fins added beside exhaust port.
	2068 – 2439	-	Rocker cavity venting required
	2553 - Current	961 - Current	Fine finned heads. Altered oil feed tube shape to heads.
	3358 – Current	2210 – Current	Oil feed moved to hollow pushrods
Valve Rockers	01 – 188		10/12mm wide, 7mm lift, 5/16" adjusters
	189 – 307		12mm wide, 3/8" adjusters, 9mm lift
	308 – 658	01 – 52	15mm wide, 3/8" adjusters 9mm lift
	659 – 2552	53 – 960	15mm wide, 3/8" adjusters, 9mm lift offset tips.
	2553 - Current	961 - Current	Increased offset to suit narrow finned heads, Hollow.
Valve Adjusters	01 – 188		5/16" allen key adjuster
	189 – 502	01 – 33	3/8" allen key
	503 - Current	34 – Current	3/8 slotted
Valve Springs	01 – 153		Small type
	154 - Current	01 – Current	Heavier type
Rocker Blocks	01 – 188		Std block, small valves, 1:1 ratio
	189 – 224		Std block, large valves
	225-Current	01– Current	Block machined as part of head

<b>Oil Pick Ups</b>	01 – 042		Part of crank case
	43 – 307		Pick up from oil pump face
	308 – 325		Same geometry but fitted to sump with a pin
	326 – 793	01 - 150	Pick up part of oil pump face
	794 - Current	151 – Current	Same as above but with strainer added
<b>Oil Feed to Cylinder Heads</b>	01 – 053		Feed rockers from the top of the case at each side
	053 – 069		1 line from oil gallery with above
	070 – 261		Oil feed from oil gallery both sides with restrictor fitting
	262 – 473	01 – 38	Oil feed by machined restrictor (requires oil feeds connected to the heads)
	541 – 3357	38 – 2209	Rubber “T” piece used in feed line.
	3358 – Current	2210 – Current	Pushrod oil feed used.
<b>Connecting Rod</b>	01 – 436		Alloy rods
	437 - Current	01 – Current	Steel rods
<b>Crankshaft</b>	01 – 042		Short crank, ¼” flywheel screws
	043 – 436		Long crank, ¼” flywheel screws
	437 – 2057	01 – 836	Long crank, 5/16” flywheel screws
	2058 – 2731	837 – 1521	Dowels added between flywheel & crank
	2732 – 3533	1522 – 2465	“Starfish” attachment
	3534 – Current	2466 – Current	3/8” flywheel screws
	3499 – Current	2446 – Current	Dowels added ‘tween prop flange & crank
<b>Camshaft</b>	01 – 377		Cast cam, 21mm between profiles
	378 – 603		Cast cam, 23mm between profiles
	604 – 2849	01 – 1683	Machined billet steel cam, hardened
	2850 – 3049	1684 – 1900	285 Single Ring Cam
	3050 – 3595	1901 – 2538	260 Two-Ring Cam
	3596 – Current	2539 - Current	Roller lifter & Cam.
<b>Through-Bolts &amp; Studs</b>	0 – 3467	0 – 2370	3/8” MS21042-type nuts
	3468 – 3498	2371 – 2390	3/8” 12-Point nuts, extended studs
	3498 – Current	2391 - Current	7/16” nuts
<b>Tacho Pick Up</b>	01 – 1003	01 – 219	Long post, senses starter ring gear teeth
	1003 - Current	220 – Current	Short post, senses 2 tags on rear of fly-wheel
<b>Flywheel</b>	01 – 340		Resin keyed magnets, ¼ screws to crank
	341 – 436		Steel keyed magnets, ¼ screws to crank
	437 - 2102	01 – 856	Steel keyed magnets, 5/16 screws to crank
	2103 - Current	857 -	Flywheel screws torque to 24 instead of 18 lb.ft
	0 – 2731	0 – 1521	Aluminium flywheel centre
	2732 – 3498	1522 – 2445	“Starfish” flywheel centre, 20mm dowels.
	3499 - Current	2446 – Current	“Starfish” flywheel centre, 24mm dowels.
		2436 – 2573	20° BTDC Ignition timing
		2574 – Current	23° BTDC Ignition timing
		See Crankshaft for intro of 3/8 screws	
<b>Oil Pump</b>	01 – 238	01 – 794 – All	12mm wide rotors
	239 – 1957	20mm wide	14mm wide rotors
	1958 - Current	795 - Current	Oil port plate adjusted to reduce pressure spikes
<b>Push Rods</b>	01 – 352		198 / 200mm hollow type
	353 – 3357	01 – 960	Machined from solid.
	3358 – 3595	2210 – 2539	Hollow type
	3596 – Current	2539 – Current	Hollow, shorter to suit Roller lifter & Cam.
<b>Starter Motors</b>	01 – 728	01 – 58	Reworked gold end type
	729 – 1467	59 – 509	Bosch type
	1468 - Current	510 - Current	Nippon Denso type

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<b>Induction Passage</b>	01 – 728	01 – 67	Plenum chamber integral with sump
	729 - Current	68 – 2330	Separate "Swept" plenum
		2331 - Current	Series III Induction Body
<b>Carburettors</b>	01 – 698		Bin 32mm
	699 – 1883	01 – 722	Bing 40mm
	1884 – 2849	723 – 913	Bing 40mm with economy tuning
	2850 – 2919	914 – Current	Tuning per JSB018 (richer economy kit)
	2920 - Current	914 – 1419	Modified carby needle fitted, tuning unchanged
	-	1420 - Current	Fuel float needle seat port increased to 2.4mm
<b>Alternators</b>	01 – 2661 10-pole alternator Low output	01 – 163	10 pole. Single phase
	2662 - Current	164 - Current	12 pole Single phase high output
<b>Engine Mount Plate</b>		01 – 47	Std mount plate (common with 2200)
		48 – 856	Top mount holes raised 15mm
	01 – 2086	48 - 856	Plates suit 99 tooth ring gear
	2087 - Current	857 - Current	Plates suit 101 tooth ring gear
<b>Distributor Rotors</b>		01 – 139	Red rotors
		140 - Current	Black rotors (GB73)
<b>Distributor Plates</b>		01 – 208	Std type posts
		209 - Current	Shortened posts
<b>Exhaust Manifold</b>		01 – 117	Std exhaust system
		118 – 561	Manifolds lengthened by 15mm
	1597 – Current	562 – 756	Gasket-less exhaust introduced
		757 – Current	Extractor type exhaust introduced
<b>Valve Lifters</b>	0 – 2067	0 – 960	Solid lifters
	2068 – 2849	961 – 1683	Hydraulic high-leak lifters, 0-ring cam
	2850 – 3094	1684 – 1900	Hydraulic slow-leak lifters, 1-ring cam
	3095 - 3595	1901 – 2538	Hydraulic slow-leak lifters, 2-ring cam
	3596 – Current	2539 - Current	Roller lifter & Cam.
<b>Sump</b>	01 – 1399		Original finned sump
	1400 –	792 -	Extra cap screws under gearbox cover holding sump to engine mount plate
	2553 - Current	-	Deep sump fitted. Rocker chamber venting not needed with this sump
<b>Starter Ring Gear</b>	01 – 2086	01 – 856	99 Tooth
	2087 - Current	857 - Current	101 Tooth
<b>Ignition Leads</b>	2552 - Current	1206 - Current	Black, spiral wound type
<b>Slimline Bridging Washer</b>	1669 - Current	572 - Current	New washer for cylinder head screws
<b>Intake Gaskets</b>	01 – 2146	01 – 876	3 hole type
	2147 - Current	877 - Current	2 hole type
<b>Vacuum Pump Drive</b>	01 – 2731	01 – 1521	Inbuilt
	2732 - Current	1522 - Current	Push-in type

# Props



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## Propellers

**“What propeller can I use on my Jabiru Engine?”** is a question we’re regularly asked. Well, Jabiru Aircraft recommend a 2-bladed prop. This is because the engine performs most efficiently with a 2-bladed propeller. 3-bladed designs have too much blade area for a Jabiru engine.

**“Yes, I understand that, but I want to fit a different propeller anyhow – can I?”** The answer to that can be complicated: Factory-built Jabiru Aircraft in Australia must use an approved propeller. Jabiru propellers (2-bladed wooden or 2-bladed scimitar composite) are approved on all factory-built models and specific models of Sensenich 2BFPW (2 bladed fixed pitch wooden) propellers can be used on models in the LSA category

The Sensenich 2-bladed ground adjustable carbon propellers are approved worldwide for Amateur-built aircraft in the “Experimental” category or its local equivalent and in some countries may also be used on models in the Light Sport Aircraft category. Finally, MT-Propeller make an in-flight adjustable 3 bladed propeller – with blades made out of high-tech timber – which is approved worldwide for Amateur-built aircraft.

But those are the only propellers with the approval of Jabiru Australia – no other models or brands are approved. That’s mainly because the approval process is a complicated, expensive one – the Sensenich and MT props are approved because those companies did a lot of testing to make sure their propellers matched the engine properly. To date, no other propeller has completed this testing and so no others are approved by us for use on our engines.

Ultimately, if your engine is going to be operating in an “Experimental” or equivalent category then you can choose to use a different type of propeller if you wish – but please think carefully before doing this. A bad engine/propeller combination can self-destruct in hours or can insidiously ruin an engine over a period of 10, 50 or 200 hours. Compared to what can happen if there is a serious failure, things like warranty are almost an afterthought, but there’s also the consideration that using a non-approved propeller can void Jabiru’s Limited, Express warranty.

**“So... what’re these snags? They sound ominous...”** And they can be! As we’ve said, it’s essential that a propeller be matched well to the engine – a badly matched propeller can over-heat the engine, glaze cylinders and in extremes can even break drive pins, flywheel bolts, the propeller or the crankshaft itself.

For any prop there are 2 areas to consider: First getting the propeller sized correctly and then installing and maintaining it properly. Essentially it’s a matter of getting the right RPM during a ground run-up to full power and – more importantly – a full power straight and level run in the air. Getting these two points right usually means that the engine will be in a happy power zone no matter what it is doing and is never over-loaded by the propeller. Installation and maintenance should not be difficult – just follow the manufacturer’s instructions to the letter and remember that wooden propellers change with the seasons and will need maintenance to suit.



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## Propellers Cont.....

With a ground-adjustable propeller the same things need to be considered, but here both are trickier and need more care, skill and tools to deal with. When you set up a ground adjustable propeller you have to work the same criteria as a 2BFPW prop, but the person doing the setting up has to decide on the



compromise between cruise and climb performance. Many owners tend to err a little on the side of cruise performance, giving their aircraft a higher cruise speed for a given RPM. This is fine within reason but taken too far will overload the engine. It's also important to realise that the propeller blade area will have an effect on how good the propeller will be at compromising between cruise and climb – more blade area equates to less compromise. So, for fixed pitch or ground adjustable propellers, a skinny 2-bladed prop is more of a jack-of-all-trades than a fat 2-bladed prop and a 3-bladed prop will accept very little compromise at all – it will climb well or cruise well but won't do both well. Remember that, as a rule, Jabiru Engines prefer to “rev” rather than “lug” so we prefer ground adjustable props err towards having less pitch and running with more RPM.

In terms of installation and maintenance of a ground adjustable prop, it's worth spending as much time as is needed in the initial setup to make sure that the blades are matched in balance and tracking – and that they have exactly the same pitch. Dynamic balancing should also be considered if the propeller is significantly heavier than a wooden prop. Getting these things right will give less vibration and less stress on the engine. Finally, adjustable props usually have more critical installation and maintenance requirements than a 2BFPW prop and these have to be followed carefully to remain airworthy.

**“Now that I've fitted my non-approved propeller, what extra maintenance should I do”** is the final question. Unfortunately it's also one which is very hard for us to answer because usually we have never even seen one of these propellers, let alone monitored one in service. For a start, we recommend that you follow religiously our engine maintenance requirements and the propeller manufacturer's propeller maintenance requirements. But while our maintenance programs are designed to catch problems before they get too serious, they are also intended to be used with an approved propeller. So, we recommend that the operator of a non-approved propeller regularly check the propeller, propeller flange and flywheel bolts as well as generally keeping a sharp eye on the engine. The engine manuals give more details on this.



## Seasons.....

Well Autumn is here again and the temperatures are starting to drop a little and soon enough winter will be upon us. I know many of you would scoff at a Bundaberg winter but everything is relative and, to us, temperatures below 25°C are decidedly nippy!!

We've heard it all before, but it really is good practice for owners and operators to take the change of seasons as an excuse to look harder in some areas and think beyond the normal routine. Are the fuel lines still soft and pliable now it's cooler? Are we flying often enough to prevent rust in the cylinders now that the air contains more moisture? How long have those spark plugs, the fuel, oil and filter been on the aircraft (in terms of calendar time as well as time flown)? Have we re-checked the propeller bolt torques (as required for wooden props at change of seasons)? If we're flying less, might this be the right time for a little make-and-mend: re-cut that valve to improve the leak-down on #4, change the brake pads or chase that creak in the undercarriage? How old is the mogas in the tank? If it's more than 2 weeks, drain it out

Ignition issues also can arise in the cooler climates. Cold start kits are available from the spares department.

## Distributors.....

In the Jabiru engine all the voltage generation to drive the spark is done in the ignition coils and the only job left for the distributor is to share that spark with the appropriate plug. Even timing is fixed and essentially controlled by the relationship of the flywheel to the coil... plus there are 2 of them in case 1 fails. So, a low risk item then?

Well, not really. Despite all the above, they're an electro-mechanical device and so they bear watching. Remember, for each distributor there is a drive gear, an oil supply, an oil seal and a bush for the shaft to rotate in. The caps must be sealed and clean while the button must be located correctly relative to the cap and glued in place. The wear points – the metal poles on the cap and the button as well as the carbon brush in the cap – all need regular checking. Externally, all of the leads (plug leads and coil leads) must be secure in the housing and in good condition; it's very easy for a HT lead to rub against something, wear away the insulation and produce an intermittent short that will have you tearing your hair out, searching for that miss in the engine.

The engine maintenance manuals for the engines call for the ignition harnesses and rotors to be checked during 50-hour services. So the caps will come off, the distributor will be checked for condition and the shaft fit in the housing tested (can it be turned by hand or is it seized in the bush?). The seal is checked for leaks and all the parts are checked for security, condition and wear before being re-assembled (or replaced as scheduled). Given a little bit of attention they're very reliable – but like anything on an aero engine they don't like being taken for granted!





### Maintenance Courses...

The monthly maintenance courses we are running for 2015 have now been fully booked out for the whole year. They are proving very popular and we have been getting great feedback.

We are now taking the names and details of people that are still wanting to attend as spots may possibly become available due to cancellations from time to time. Please contact us here at Jabiru if you would like to be added to the cancellations list.



*CQ Uni Aviation Students at the Jabiru Factory*

### Fly-Ins & Events

If you are planning or holding a Fly-In or aviation related event and would like some promotion send us in the details and we will be only too happy to feature it in the Jaba Chat.

Colin McKay kindly sent us a couple more "When I Grow Up" photos below taken at Longreach.....If you have any photos you would like to share in the Jaba Chat, email them through to me at [info@jabiru.net.au](mailto:info@jabiru.net.au) Thanks Colin...great photos!

### CQ University Aviation Students

The Bundaberg Campus of CQ University has many students undertaking aviation studies. Aviation Senior Lecturer Mr Ron Bishop and his students are regular visitors to the Jabiru Factory here for tours and it's great to see so many dedicated aspiring pilots coming through. More information on the aviation courses offered can be found at the following link:-

<https://www.cqu.edu.au/cquninews/stories/general-category/2014/early-starters-at-cquni-can-also-be-high-flyers>

