TECHNICAL MANUAL

FOR

BOLLY PROPS AUSTRALIA MODEL BOS3

DOCUMENT No. T013

Issue No. 1

Date: 22nd November 2014

Issue	Details of Change
1	Original Issue

This Manual has been prepared as a guide to correctly install, maintain and overhaul the Bolly Props Australia BOS3 Propeller.

It is the owner's responsibility to regularly check the Bolly web site at www.bollyaviation.com.au for applicable Service information such as bulletins or updates to manuals. Failure to maintain the propeller with current service information may render the propeller un-airworthy.

This document is controlled while it remains on the Bolly server. Once this no longer applies the documentation becomes uncontrolled.

Should you have any questions or doubts about the contents of this manual, please contact Bolly Props Australia.

Propeller Craftmen for over 25 years

And thank you for purchasing your Bolly Prop. You are (arguably) using the best value, best performing propeller on the market for light aircraft. Your propeller will give you many years of enjoyable and safe flying. Peter and Craig.

Table of Contents

1 GENERAL

WE DO NOT / CAN NOT ACCEPT RESPONSIBILITY FOR PROPERTY DAMAGE, INJURY OR DEATH RELATING TO THE USE OF THIS PRODUCT, AS THE ASSEMBLY, MOUNTING AND USE OF THIS PRODUCT ARE BEYOND OUR CONTROL.

WARNING !

These instructions must be read and understood before proceeding to assemble or use this propeller. Failure to do say could result in improper assembly or improper use and in turn cause damage to the propeller, aircraft or user.

1.1 ABOUT THIS MANUAL

This manual has been prepared to guide LAME's, RA-Aus Level 2 maintainers and other authorised personnel on the correct operation, maintenance, care and repair of the Bolly BOS3 propeller. It assumes a degree of familiarity with aircraft systems and regulations. It is NOT intended for use by personnel without this background.

2 DESCRIPTION & SPECIFICATIONS

2.1 BOS3 BLADES

The Design:

- Latest in Prop & CAD Technology. Using true Airfoils
- Designed for maximum efficiency and safety

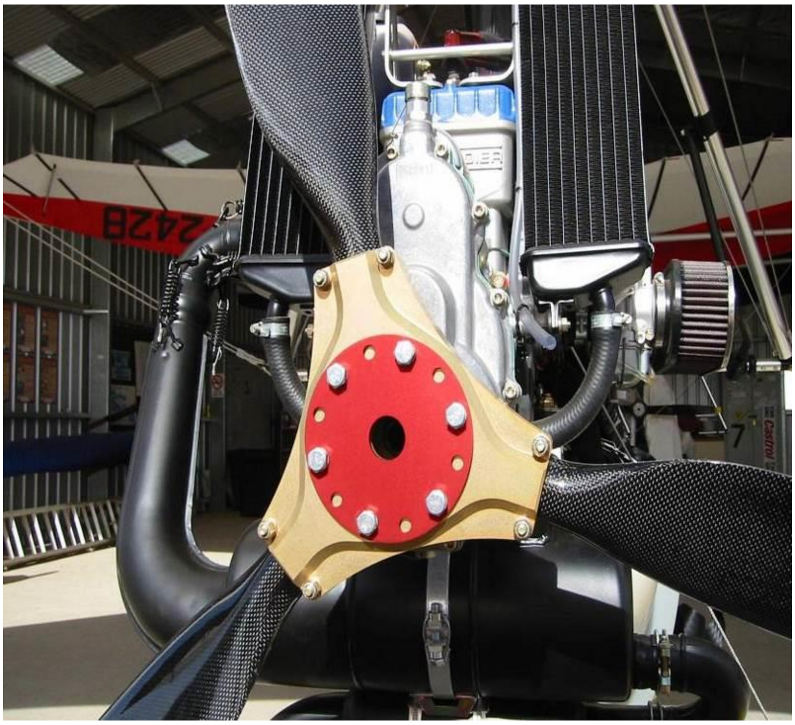
The Construction:

- CNC milled tooling for optimal accuracy
- Genuine carbon fibre composite
- Unbelievably light and strong

The Flying:

- Incredibly Smooooth
- Incredibly Powerful
- Incredibly Efficient
- Incredibly Quiet

The **Propeller Blade** was developed using computer design, CNC machining and is manufactured from top quality raw materials, mainly Carbon Fibres (of several weaves) and Epoxy Resin. There are also glass fibres (for extra leading edge protection) and Aramid (Kevlar) fibres (for tear resistance). This combination of materials and blade shape delivers optimum strength for weight. The use of a low density core material helps reduce noise and vibration / resonance levels.



2.2 BOS3 HUB

The BOS3 hubs are a quality product designed to bring out the best of our BOS3 propeller blades. We do not approve of our hub being used with other blades.

The Hub Design:

- Designed for maximum simplicity, strength and safety
- Using CAD Technology for best shape
- Will fit most spinners easily
- Choice of 2, 3 or 4 blades.

The Hub Construction:

- CNC milled tooling for optimal accuracy
- Corrosion resistant treatment
- High strength alloy

The Hub In Use:

- Very Positive blade gripping
- Very Accurate assembly
- Very Smooth running

The **BOS3 Alloy hub** was developed using computer (CAD) design, CNC machining and is manufactured from certified, aircraft grade aluminium, namely 6061-T6. The machined hub halves are treated for optimum corrosion resistance, to a quality gold appearance. Full QA is maintained throughout the manufacturing process to assure exceptional accuracy. The hubs are provided with certified AN hardware (bolts, nuts and washers). Such an accurate and solid hub helps reduce noise and vibration / resonance levels.

2.2.1 Other Hub Options

Each BOS3 blade must be used with a suitable hub which allows for adjusting blade pitch angles. Whilst we only approve and recommend our own brand of hubs, we recognise that there are 2 other common options which purchasers of our blades will use regardless of our recommendations. It is the **users** ABSOLUTE RESPONSIBILITY to determine the suitability of any hub used.

2.3 DURA-TUFF LEADING EDGE

The Dura-tuff material is a high density / toughened urethane. It is not an inlay nor is it an add on – it is a genuine moulded insitu part of the propeller. The toughness of the urethane used is just 1 step below that used for most roller blade wheels. This provides exceptional wear resistance without being fragile.

The Bolly Dura-tuff propeller leading edge has been developed to provide additional protection against water, gravel, stones and other foreign bodies that are occasionally ingested into and damaging to propellers. It is great value for money product, in effect eliminating LE repair and the servicing of urethane LE tapes.

2.3.1 Use

The Dura-tuff LE will take all normal wear and tear. Constant abrasion (ie dust etc) will dull the surface in time. Hits from gravel and stones will sometimes leave a small mark. If in time a blades has been sufficiently marked as to require replacement - it can be redone.

Using a conventional urethane leading edge tape is not necessary.

2.3.2 Damage

An object such as a large stone (when do you call it a rock?) or a passenger's dropped camera can be expected to do significant damage. We would suggest that if a hit is big enough to badly damage the dura-tuff edge then the complete blade is likely to be damaged and should be scrapped or returned to Bolly for inspection.

3 OPERATING INSTRUCTIONS

3.1 INSTALLATION, OPERATION & MAINTENANCE

Propellers must be fitted as detailed in Section 4.

As the BOS3 is an adjustable propeller it must be adjusted so that the powerplant installation – including Engine, propeller etc – meets both the operating limitations of the engine and those of the propeller.

Before each flight the propeller must be inspected to ensure it is in a condition for safe operation – Section 6 refers. The BOS3 propeller must be maintained in accordance with the details given in this manual.

3.2 STORAGE

The BOS3 propeller is manufactured from UV resistant materials, however Bolly recommend storing (whether on the aircraft or off) the propeller away from direct sunlight. Similarly extreme variations in temperature and humidity should be avoided if possible.

3.3 MAINTAINER QUALIFICATIONS

Maintainers must be LAME, RA-Aus Level 2 maintainer or other authorised personnel.

Maintainers must have suitable premises and sufficient suitable & calibrated tools & equipment.

3.4 TOOLS

- A good quality set of imperial spanners
- A good quality set of imperial ratchet / sockets
- A good quality set of screwdrivers (Philips and Flat)
- A good quality, calibrated torque wrench. Must be able to be accurately set to the torques detailed in Section 4.3.
- An accurate and calibrated digital protractor is recommended.

3.5 CARE & CLEANING

As per the rest of your airframe, the propeller will benefit from being kept dry and out of the sun. If you wish to use blade covers, it must be a cotton fabric in contact with the blade. To remove bugs, dust and exhaust residues etc – use a **mild** household detergent / spray on / wipe off clean-er. **Do not polish** the blades as some polishes can cause problems with the surface. If more aggressive cleaning is required Auto Solve may be used.

4 INSTALLATION INSTRUCTIONS

4.1 GENERAL:

All blade sets leave the factory as matched sets with full QA paperwork, incorporating our "digital weight" system which takes into account the blades weights and C of G's. Find and file the QA sheet and confirm all components are enclosed.

To begin, inspect the blades, hubs and hardware components to make sure no damage has occurred in transit. Also check that all parts are formed correctly and there are no sharp edges which could damage other components.

The bolts / nylock nuts should be accessible for maintenance and checks. This will vary from application to application, and may vary from blade bolts to engine attachment bolts. Make sure you have the correct orientation of the blades. All above diagrams are for right hand rotation 'tractor'. The 'top' curved airfoil side of the blade is always facing forwards in the direction of flight no matter the orientation of tractor or pusher. Check the mounting hardware for correct tread lengths etc – (the use of spacers and spinners can lead to all sorts of problems).

The assembly of blades into a hub should be with AN hardware. See hub manufacturer diagrams and assembly instructions. This assembly must be attached the engine / gearbox via appropriate bolts as per the instructions of the engine manufacturer, but rarely more than 13 Nm torque.

It is very important the correct, (and even) torque settings be used.

BOS3 Propellers must be assembled to the specified tolerance levels. Normally the supplied components will easily meet these tolerances, however we must write these instructions to provide guidance for those who are repairing, mixing or replacing blades which may not be a perfect match. If in doubt, always consult your local LAME (licensed aircraft maintenance engineer).

4.2 ALIGNMENT & TOLERANCE (TRACKING)

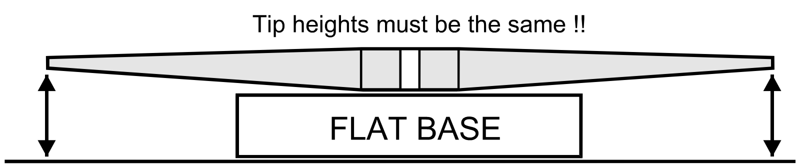
4.2.1 Assembly

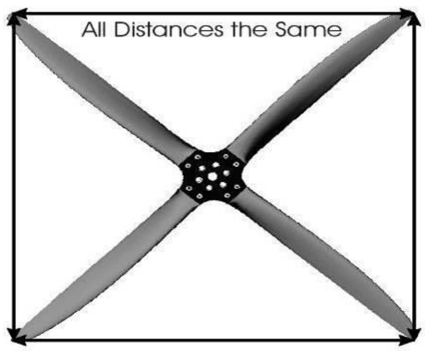
Whilst assembling the propeller, blade alignment and pitch checks must be carried out. After setting the pitch *(see following section re pitch adjustment)* - tighten all fittings to half torque settings. The following should then be checked and readjusted until correct.

Pitch Angles – this can affect all other measurements, so make sure the pitch angles are correct before the other checks.

Distance from tip to tip of each blade as per the diagram.

The tracking 'height' or runout of each blade as per the blade. This can be checked flat *(as shown)* or by ***comparing each tip to a fixed point on the airframe.***





Small variations in mounting plates / shaft holes, bolt tensions and drive flange squareness may cause these alignment variations. Make sure all is correct before and after the final torque settings for the nuts has been achieved. (see 'Torque Settings & Engine installation).

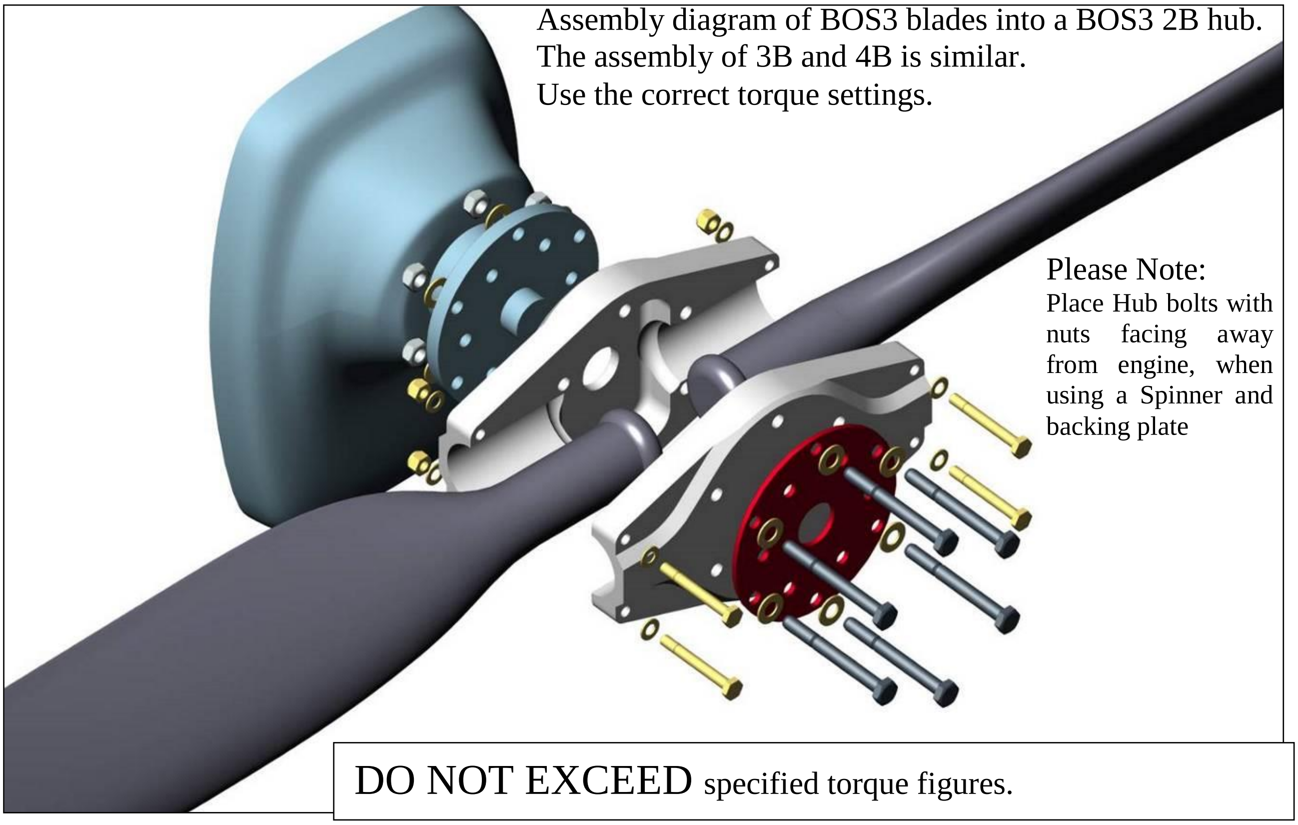
TOLERANCE LEVELS : for the blade accuracy : < **RULE OF 3** >

3% on torque settings – preferably under not over the maximum, ideally identical settings.
Blade weights = 3 grams (and 3gm between pairs in a 4B prop) – maximum, ideally identical.
From tip to tip = 3mm maximum, ideally identical distances.
Runout / height = 3mm maximum, ideally identical distances.
Pitch = as close as possible, ideally within 1/3 of a degree.

A perfectly aligned and balanced prop is definitely a bonus to smooth running and reduced vibration. It is well worth taking the time to achieve the best tolerance levels possible.

When assembling the propeller use the outer pair of bolts at the base of each blade to hole the hub and blade assembly together. Only tighten enough to prevent movement of the blade.

4.3 INSTALLATION & REMOVAL



All bolts, washers and Nylock nuts used to clamp the hub plates, and attach propeller assembly to the engine should be assembled dry, without oil or moisture. Always double check you have the correct amount of threads exiting the nuts / no bottoming of threads etc. These are IMPORTANT.

Always use a calibrated torque wrench, and evenly (side to side) tighten grip bolts, and evenly tighten the engine bolts / nuts in an acceptable sequence, ie < bolt 1 – bolt 4 – bolt 2 – bolt 5 – bolt 6 – bolt 3 >. Apply the torque to the nuts – not the bolts.

First torque the ¼” blade grip bolts to approx 8Nm. Then tighten the engine mounting bolts to the same before returning to finish the **blade grip** bolts at a **maximum** setting of **11 Nm (8 ft-pounds / 95 inch-pounds)**. Do a quick check for pitch and runout etc before (and after) final torque settings.

The final tightening of the **engine** bolts should be at a **maximum** setting of **13 Nm (9.5 ft-pounds / 115 inch-pounds).** This is assuming the engine’s prop flange is threaded M8 and backed up by Nylock nuts. Props mounted via AN5 hardware (usually without a threaded prop flange) can also use 13 Nm. *For ¼” hardware, use 12 Nm and for 3/8” use 15 Nm (or as specified in other instructions).*

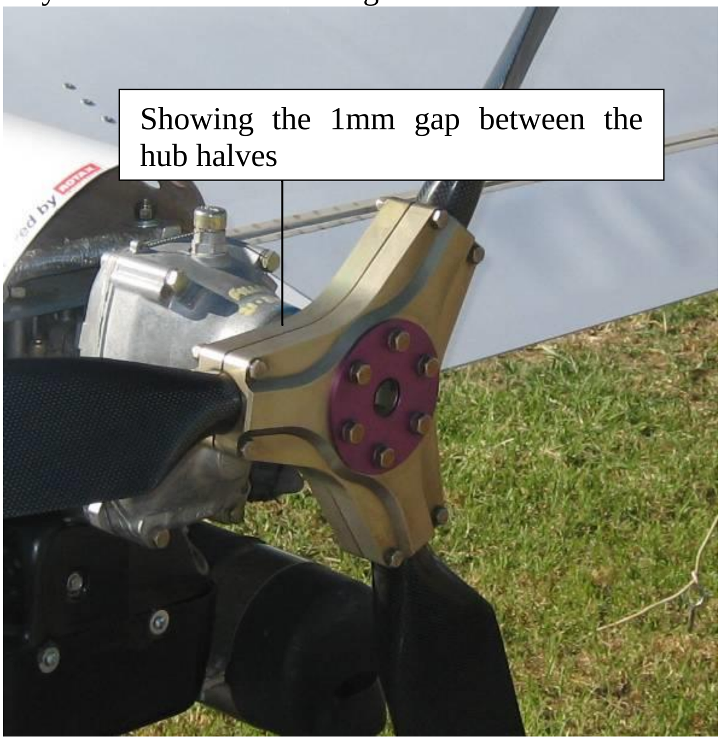
Nylock nuts should **not** be reused after the final (full torque) check has been completed.

Please note, the standard propeller assembly **does not** include engine washer / crush plate or engine mounting bolt hardware (too many choices). However, as separate products, we do have available a range of washer plates in 1/8” (3.2mm), 3/16” (4.8mm), or ¼” (6mm) from 6061 alloy.

Also available are M8 x 75mm bolts, washers and Nylock nuts. This is the most common bolt application. In applications where the engine flange is not threaded, the use of just a Nylock is insufficient, & our drilled head M8 x 75mm bolt + **lock wire** should be used. We also stock Socket Head M8 x 80mm bolts and a range of suitable AN5 & AN6 bolts, nuts & washers.

4.4 GAP BETWEEN HUB HALVES

It will be noted that when the hub is bolted together, there is a gap between the halves of nearly 1mm. This is quite deliberate, and will vary slightly as the blade grips are not perfectly circular – generally .6mm higher than wide. This eccentricity will at times cause a slight mismatch on the outside of the



hub walls. It must be noted this extra thickness can cause warpage in Brand X,Y, Z hubs if excessive torque is applied or blade angles are extreme.

The advantage of this gap is that at 13Nm torque settings, the gap will not close. The hub in effect becomes a spring washer, further enhancing mounting assurance. At 13Nm there is a good balance between engine and grip bolt torque settings (which are on the high side for AN4 bolts).

It is for these reasons TORQUE SETTINGS MUST NOT BE EXCEEDED

4.5 POST ASSEMBLY CHECKS

Once the propeller is assembled and performing as expected, carefully mark all components (including the prop's position against the engine's drive flange with a waterproof pen. If for any reason the hub is disassembled, it can be (and should be) reassembled back the way it came apart.

4.5.1 TRACKING

As a final check once the propeller is installed and torqued up, the tracking and pitch should be checked.

4.6 ADJUSTING PITCH - GENERAL

First some notes on pitch …

As this is an adjustable pitch propeller, the user needs to have an understanding of pitch angles. On page 7 there is a chart of blade angles at various radiuses which will give different geometric pitch readings. Please note that same angle at different diameters will have a different pitch.

As the number of blades and blade shape are fixed, the only way of adjusting engine load is pitch. The more pitch (via a higher blade angle), the more engine load hence lower maximum rpm – the reverse is of course applies (lower angle, lower pitch, less load and more rpm).

The pitch also affect aircraft speed – it is impossible to go any faster than pitch x rpm, as the quoted geometric pitch is the distance a prop will advance per revolution. The normal practice is to set pitch at an angle to enable maximum allowed engine rpm in straight flight at full power. This will lead to slightly less rpm on climb, and cruise at say 75% power. All aircraft are different.

BOS3 blades have been optimised for adjustable pitch adjustments. The best setting is at the quoted pitch at 75% radius of the blade. The best visual clue for this is the mould separation line on the blade – it should be horizontal (within the gap between the hub halves) at the quoted pitch. The blade can be adjusted + /- 5 degrees from this optimum setting and still perform very well. *A change of more than 7 degrees is not recommended*, but will still perform adequately.

The diagram shows the correct method of checking pitch angle, ie through the chord line.

4.7 ADJUSTING PITCH

Unfortunately most pitch angle checking equipment is not very useful at finding the centre of the LE radius – however this is not a problem as the exact angle is not as important as making sure all blades are set at the same angle. Therefore the flat back (bottom side) of the airfoil is what is commonly used to make pitch angle measurements - (normally 1 degree less than exactly correct). Trial and error (in operational use) will determine the final position.

Adjusting pitch angles needs to be done carefully and checked several times before the final bolt torque settings have been achieved. Each different prop will have its own "Supplementary Product Instructions" which outlines the correct pitch angle for that blade. Several companies sell pitch gauges which come with their own instructions. Here are a few more methods to use …

4.7.1 Method 1 – Via Digital Spirit Level :

Our favourite tool is the 6" digital "spirit" level. A spirit level is also very handy for setting the engine thrust line at zero – which makes it easier to be checking blade angles.

1. Measure from centre of the hub to the tip of the blade, divide by 4 = X.
2. Measure X distance from the tip and place a mark as Figure 1 (Left).
3. Use a square and draw a line across the blade as Figure 1 (Middle).
4. Place the digital spirit level on the line to get the pitch reading as Figure 1 (Right)

Figure 1 – Setting Blade Pitch

4.7.2 Method 2 – On The Workbench:

The blade angles can be set without elaborate equipment in the workshop by making a template at the desired angle for a given radius, and then working to this template. It may require a spacer block under the hub to lift the blade high enough to enable sufficient twist on the blade.

4.7.3 Method 3 – using the 1 in 60 STICK :

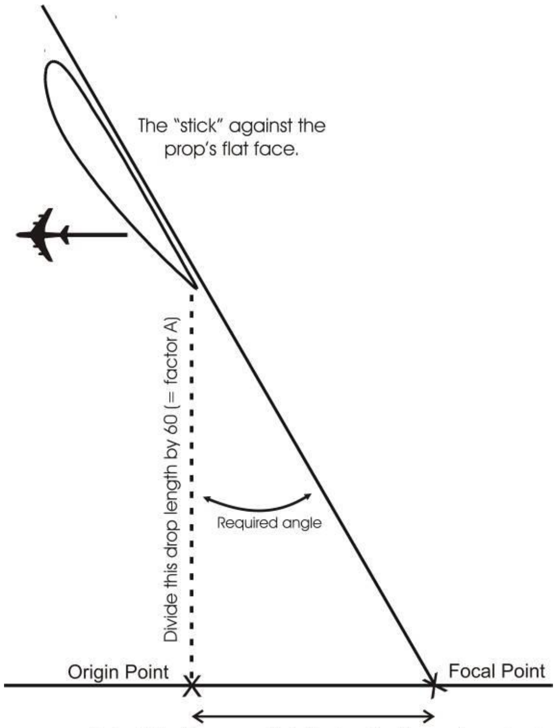
The cheapest method of all is a straight stick and remembering that 1 degree is One in Sixty.

This basic navigation rule that all pilots should know also works for propellers.

You need a nice straight edge / stick / rod / bar etc, a ruler and a calculator (these days most mobile phones will do it). Our favourite stick is a nice straight piece of wood at 10mm x 30mm. Mark a nice straight (chordwise) line on the blade at the desired radius at which you want to check the prop's pitch – we use either a wax pencil or masking tape.

A nice flat (ground) surface helps – but quite often a simple comparison from blade to blade is all that counts. This method uses such big lengths any small discrepancies are less important. To explain …

If your propeller is sitting square to the ground (ie you have lifted the tail or nose so that the prop flange is at 90 degrees to the world, then the blade will be sitting at an angle to the ground. Call it an angle of attack if you want! See diagram ➔



Now find the Origin Point on the ground immediately below the prop – from either the LE or TE, it doesn't really matter which. If the propeller had zero pitch (at the point / radius along the blade at which you were measuring), then a straight edge aligned with the flat face of the blade will meet this point on the ground.

Set the first blade horizontal. Make a mark on the stick so the next blade can be set the same.
Now measure the height of the prop, at the desired radius above the point on the ground. Either leading edge or trailing edge will do. Let's assume the TE at the desired radius is 1200mm above the ground.

- 15 = 300. Make a mark on the ground 300mm away from the Origin point. We call it the Focal Point. Make sure it is the in the correct direction.
- Take the "stick" and place one end on the ground at the 300mm (focal) point, and lean the stick towards the prop. When the face of the stick is resting flat and evenly (chordwise) on the blade, then that blade is at 15 degrees. We would use the narrower edge of the stick as Divide this height by 60 – to work out how many units of 60 we have. In this example 1200 / 60 = 20 units (of 60) height.
- If we wanted 15 degrees of prop pitch, then using the 1 in 60 rule, then we have 20 units x it gives fewer problems with the twist of the prop.
- Nip up the bolts and turn the prop to the next blade and repeat the last step.

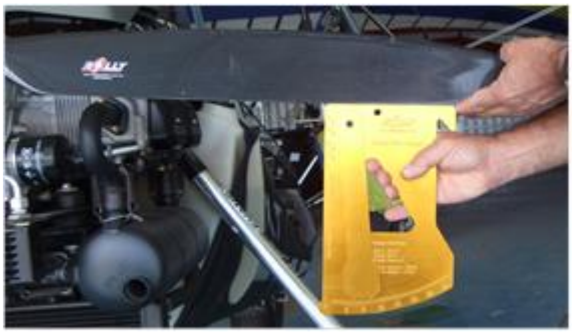
This method is so simple, no one thinks it is good enough. In the field one is normally simply trying to slightly increase or decrease the pitch and to make all blades the same. In this case use the stick placed against the angled blade to find the focal point on the ground and use this as your comparison – or move it (focal point) slightly for any new setting of less or more pitch. In our above example, if I wanted 1 degree more pitch then I would move the focal point 20mm away from the origin, and so forth.

Once you understand the concept, it can't be any easier or cheaper.

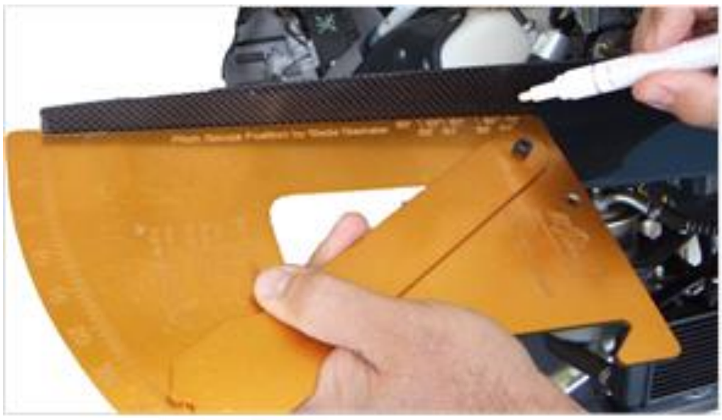
4.7.4 Method 4 using the Bolly All In One Pitch Gauge.

Step 1: level the Prop on the Aircraft

Step 2: level the Prop Blade



Step 3: Gauge indicates where the pitch is to be taken



Step 4: Read the pitch from the gauge

Bolly Multi-Function Pitch Gauge with Full colour instruction book and carry bag available from Bolly Aviation.

4.8 PITCH ANGLE MEASUREMENTS

Common convention is that prop pitch should be measured at 75% of radius. It is only useful for comparison work. A better picture is obtained by checking at 50%, 70% and 90% of radius.

Pitch in inches	Radius in inches - result in degrees of angle at a given pitch & radius										
	16	18	20	22	24	26	28	30	32	34	36
33	18.17	16.27	14.71	13.43	12.34	11.42	10.62	9.93	9.32	8.78	8.30
36	19.70	17.66	15.99	14.60	13.43	12.43	11.56	10.81	10.15	9.57	9.04
39	21.20	19.03	17.24	15.76	14.50	13.43	12.50	11.69	10.98	10.35	9.78
42	22.67	20.37	18.48	16.90	15.56	14.42	13.43	12.56	11.80	11.12	10.52
45	24.11	21.70	19.70	18.03	16.62	15.40	14.35	13.43	12.62	11.90	11.25
48	25.52	23.00	20.91	19.15	17.66	16.37	15.26	14.29	13.43	12.66	11.98
51	26.90	24.27	22.09	20.25	18.69	17.34	16.17	15.14	14.23	13.43	12.71
54	28.24	25.52	23.25	21.34	19.70	18.29	17.06	15.99	15.03	14.19	13.43
57	29.55	26.75	24.40	22.41	20.71	19.23	17.95	16.83	15.83	14.94	14.14
60	30.83	27.95	25.52	23.46	21.70	20.17	18.83	17.66	16.62	15.69	14.86
63	32.07	29.12	26.63	24.50	22.67	21.09	19.70	18.48	17.40	16.43	15.56
66	33.29	30.27	27.71	25.52	23.64	22.00	20.56	19.30	18.17	17.17	16.27
69	34.46	31.39	28.77	26.53	24.59	22.90	21.42	20.11	18.94	17.90	16.96
72	35.61	32.48	29.81	27.51	25.52	23.78	22.26	20.91	19.70	18.63	17.66
75	36.72	33.55	30.83	28.48	26.44	24.66	23.09	21.70	20.46	19.35	18.34

Pro Angle Available from Bolly Aviation. Using the Pro Angle allows the

Figure 2 – Pitch Setting Tools

4.9 BALANCING

4.9.1 Digital Weight: Weight Matching Of Blade Sets

All Bolly props feature a blade number , weight number & digital weight number.

Our weight matching apparatus gives a reading which combines the weight and centre of gravity of any individual propeller blade. It can easily detect a ¼ gram added to the prop tip.

The blade number is engraved on the hub end and a sticker recording the digital weight. For example **067-B** (blade and mould number) and **X-772** (digital weight - balance number).

With this system we can match a new blade to any set at any time. If a customer replaces a damaged blade or adds another blade (to make a 3B from a 2B etc), then they only need tell us the number (blade or balance) and we can supply a near perfect match.

All sets of blades we ship are matched to within a tolerance level – and our maximum tolerance is comparable to 1.5grams of tip weight – *comparable to 1gm per metre.* The digital number will not show this directly – so do not be alarmed if the digital weight numbers are say 5 points apart (ie X-772 and X-777). The tolerance is noted on most QA sheets supplied with props.

As black props (visually) disappear when operating at elevated rpm, it is highly recommended (as a safety feature) that not less than the last 220mm of each blade be painted a contrasting colour such as yellow, white or orange. The polyurethane leading edge tape as applied to some props can be painted, but be careful to not get a build up on the edges.

The painted tips can be done as a part of the final balancing process. Use a paint which is not degraded by the fuels and oils used by the engine and has some resilience to impact damage. This would ideally be one of the special urethane or epoxy paints – but a good quality enamel will also do the job. To paint the props, the surface must be cleaned, lightly scuffed with fine steel wool or abrasive paper and painted in accordance to instructions pertinent to the paint you are using. Again see an appropriate Level 2 / LAME.

4.10 RE-BALANCING

Normally the propeller balance remains stable in service; the blades are made from durable, non-porous materials which normally do not vary significantly over time.

Where blades require re-balancing we recommend that you return ALL the blades of your propeller and we will re-balance them to new tolerances. We have found that this is the best and most accurate method of balancing blades and so we do not recommend other balancing methods.

5 REPAIR & DAMAGE LIMITS

5.1 BLADE DAMAGE & REPAIR

All propellers will eventually suffer damage from a variety of causes and in differing degrees of damage. Common causes are : Water damage inc hail, stones inc gravel & sand, bugs & birds plus loose objects – plus of course contact with terra firma. Such variety makes it very difficult to specify maximum damage levels before the blade should be discarded rather than repaired. For a guide see the FAA Advisory Circular AC 43.13-1B Par 8-71 through 8-109.

The design and construction (unlike wood, metal and many other composite props) is to progressively increase strength from tip to root. As such a solid tip strike is not likely to destroy the hub or root of the blade, (leading to a catastrophic failure), indeed it is even possible to loose the tip (say last 35mm) in a solid ground strike and keep flying (until a safe landing can be accomplished). It might just save you (or the engine's crankshaft) one day.

Damage is far more likely at the tip (as tip speed is much higher) but less critical at the tip as it has less forces acting upon it (compared to the root / hub). As all forces are focused on the root and hub sections – these areas are not to be damaged.

Be especially wary of any deep scratches that run across the blade. Whilst in places the fibres are 9+ layers deep, deep scratches are bad stress points. The final 30% of blade can be dinged, dented, holed & scratched within the dent tolerance level AND REPAIRED without unduly affecting safety. Multiple damage at the max allowed levels is not acceptable to be repaired.

If in doubt, return to BOLLY AVIATION for evaluation and possible repair or replacement.

5.2 Damage Limits:

The inner 200mm of the prop should not be damaged any further than minor nicks and scratches. Maximum allowed leading edge dent varies from 4mm within 250mm of the root to 12mm at the tip.

6 INSPECTION SCHEDULES

6.1 GENERAL

- The following are intended to guide operators for safe operation of their BOS3 propeller. All circumstances cannot be foreseen: the person carrying out the inspections must be vigilant for unusual conditions and, if in doubt, contact Bolly for guidance before continuing to operate the propeller.

WARNING - Ensure the ignition(s) are turned OFF.

6.2 BALANCING

- Bolly blade sets are digitally balanced to great accuracy during manufacture.
- Normally in service the propeller will retain its balance and so recurring balance checks are not required as a part of the normal maintenance schedule. If the operator wishes to check the balance of the propeller it is recommended to send ALL blades to Bolly to be checked to new tolerances.

6.3 BEFORE THE FIRST FLIGHT

- Install according to Section 4.3
- Set pitch as detailed in Section 4
- Check propeller blade tracking as detailed in Section 4.2
- Run up the engine to check and assure that all is well. Take the engine through the full range of throttle settings etc.
- Re check bolt / nut torque levels to the values detailed in Section 4.3.

6.4 DAILY INSPECTION

- Before the first flight of the day
- Check (visually) for any signs of wear, cracks or corrosion in the hub components or blades. Take note of any sharp nicks, cuts or scratches as these are stress points from which further problems may occur. Act on them if required. Replace the LE Tape if damaged.
- Check that all blades are firmly mounted. This is best done by holding 2 blades at the same time whilst pulling the tips towards each other. If any movement is detected – immediately check for a problem and rectify. Also check the overall propeller assembly is firmly attached.
- Check the 2 faces of the hub / grip MUST have a gap between them. The hub / grip must be in contact with the blade shank, not each other.

6.5 AT THE 2ND & 10TH FLIGHTS

- Check the bolt & nut torque levels per Section 4.3.
- If retightening is needed (rare), check the tip tracking per Section 4.2.

6.6 EVERY 75 HOURS

- Repeat each of the above checks thoroughly
- Check hardware torque levels per Section 4.3.
- Check blade tracking per Section 4.2.
- If any changes are detected – investigate and correct root causes (if an out-of-tolerance condition has occurred consider why and take corrective action).

6.7 AT 450 HOURS

- Remove the propeller from the aircraft per Section 4.3
- Fully Disassemble propeller assembly per Section 4.3
- Perform a detailed inspection of all parts.
- Replace all Nylock nuts.
- Re-Assemble the propeller and re-fit to the aircraft per Sections 4.2 and 4.3.
- The rebuilt prop needs to go through the appropriate inspections (Sections 6.2 through to 6.7 as appropriate) from the first flight to 450hrs.

6.8 LIFE LIMITATIONS

- Replace all Nylock nuts at or before 450 hours TTIS

6.9 DOCUMENTATION / RECORDING

- A maintenance sheet / record should be kept in your aircraft log book.
- If nothing else, at least keep some records below …

☐ check, date & initial	Work performed
☐ check, date & initial	Work performed

☐ check, date & initial	Work performed
☐ check, date & initial	Work performed

7 SPECIFICATIONS & LIMITATIONS

Table 1 – Specifications and Limitations

Propeller Model	BOS3
Diameter	52 to 72”
Minimum Pitch	33”
Maximum Pitch	75”
Number of Blades	2, 3 and 4
Blades	Carbon Fibre / Fibreglass / Aramid Epoxy Composite
Hub	6000-Series Aluminium
Application	Rotax 912 ULS /S, Rotax 912 UL /A /F, Rotax 912 iS, Rotax 914, 447 503 and 582.
Maximum Power	125bhp
Maximum RPM	2400
Blade Serial Numbers	Blades marked D or E Specification are compliant with ASTM F2506-10
Rear Hub Serial Numbers	ID numbers starting with “AA” are compliant with ASTM F2506-10
Front Hub Serial Numbers	ID numbers starting with “AA” are compliant with ASTM F2506-10
Mass Moment of Inertia	2 blade: 0.13kgm (nominal) 3 blade: 0.17kgm (nominal) 4 Blade: 0.21kgm (nominal)
Maintenance / Adjustment	Authorised RA-Aus Level 2 Maintainers, CASA LAME & Equivalent
Overhaul	Bolly Props Australia

7.1 SAFETY / OPERATIONAL ISSUES:

- The biggest enemy of propellers is use in high humidity / wet / rain environments. Please keep a close check on leading edge wear in these conditions. Water can be forced between tape and blade via any small nicks in the tape (or along the LE from one end) to form a blister. If a water (or dust) blister occurs, puncture the blister at the rearmost edge to remove the water / dust.
- Do not operate with a damaged propeller, or a propeller that is loose in the hub / on the engine.
- Avoid ground operations over long grass or stony / gravel surfaces. You never know what is hiding in the grass - a small rock (gravel) at 475mph (tip speed) can do a lot of damage.
- Obey all regulations relating to aircraft (and propeller) usage.
- Be especially careful of people moving around the aircraft – prop tips are not nice to run into at any time (stationary or moving).
- Do not hand start unless wearing a suitable glove – the trailing edge is sharp.

7.2 OPERATION LIMITS:

The most practical limitation to apply to this propeller / system is via tip speed.

This propeller is NOT APPROVED for use in a direct drive application (ie Jabiru 2200 etc).
we advise this prop has not been tested for, nor approved for Aerobatics.

We have several golden rules of propeller use.

For optimum (low) noise and durability - tip speed should be below 450 mph at cruise

OK, but not ideal - tip speed should not exceed **525 mph** at cruise.

The propeller should **NEVER** be operated in conditions where the propeller tip speed can **exceed 600mph**. Above this speed, noise levels are extreme and structural failure is possible.

7.3 LIGHT SPORT AIRCRAFT CATEGORIES

BOS3 propellers which fall within the ASTM compliant serial number ranges given in Table 1 meet the requirements of ASTM F2506-10. These propellers are eligible for use on factory built (Special Category) and experimental (LSA-Experimental) aircraft operating within the Light Sport Aircraft categories of Australia.

Certain aircraft manufacturers approve the BOS3 propeller for use on their Light Sport Category Aircraft.

While the BOS3 propeller is eligible for use on Light Sport Aircraft the installation of the propeller must also be approved by the airframe manufacturer before it can be fitted. An operator wishing to replace another propeller type with a BOS3 propeller must receive written approval for the change from the airframe manufacturer before fitting.

Where the approval of the airframe manufacturer is not available the propeller may still be used, however in most cases the aircraft must then be operated in the LSA-Experimental category.

Bolly recommend operators contact their local airworthiness authority for clarification of the local rules before making any alterations to their aircraft.

7.4 DISCLAIMER:

As with all things, follow the instructions of your engine, airframe and propeller manufacturers. Follow all aviation rules and regulations pertaining to your flying. The BOS3 Propellers are a great product, and like most products this is subject to being correctly used. Any decision to vary from instructions / proven usage is your responsibility.