



The customer must make their own evaluation as to the suitability of using this propeller blade and / or hub components and **take full responsibility** for the appropriate use, care and safety of themselves and all persons who may be in the vicinity of this propeller.

A propeller in use is dangerous – so please take care.

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 so could result in improper assembly or improper use and in turn cause damage to the propeller, aircraft or user.

CONGRATULATIONS

And thank you for purchasing your AERO PROP 59. You are (arguably) using the best value, best performing propeller on the market for your Aerochute. Your propeller will give you many years of enjoyable and safe flying. Peter and Craig



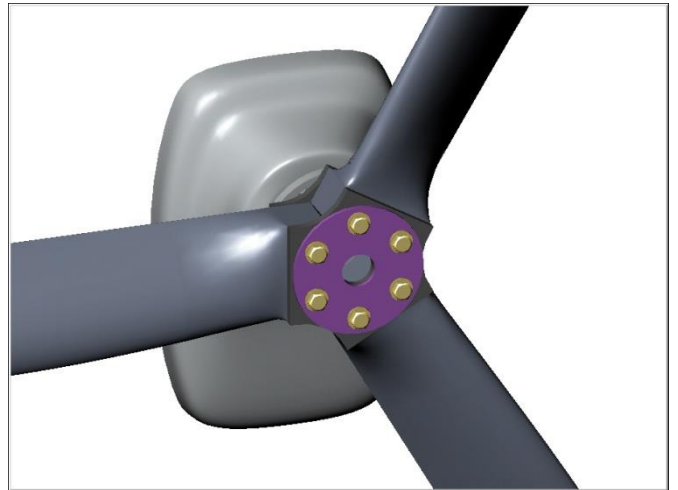


Propeller Craftmen for over 25 years

AERO PROP 59

This Propeller was developed by Bolly Aviation and Aerochute Industries. Using computer design, CNC machining and is manufactured from top quality raw materials, mainly Fibre Glass (of several weaves) and Epoxy Resin. There are also glass Rovings (for extra leading edge protection), Aramid (kevlar) fibres (for tear resistance at the hub). This combination of materials and blade shape delivers optimum strength for weight. The use of a medium density core material helps reduce noise and vibration / resonate levels.

The blades will fit a 6 bolt - 75mm PCD hub pattern using 8mm bolts, (ie Rotax, Hirth etc) For this application we supply the **<AEROCHUTE 59-DIRECT HUB ASSEMBLY >** which incorporates a set of front and back hub plates (in 1/4" black anodised 6061T6 aluminium), front **<AEROCHUTE 59-WASHER PLATE>** (in 1/8" anodised 6061T6 aluminium) plus **<BOLTSET875>**, a set of 6 @ M8 bolts, washers and nylock nuts.



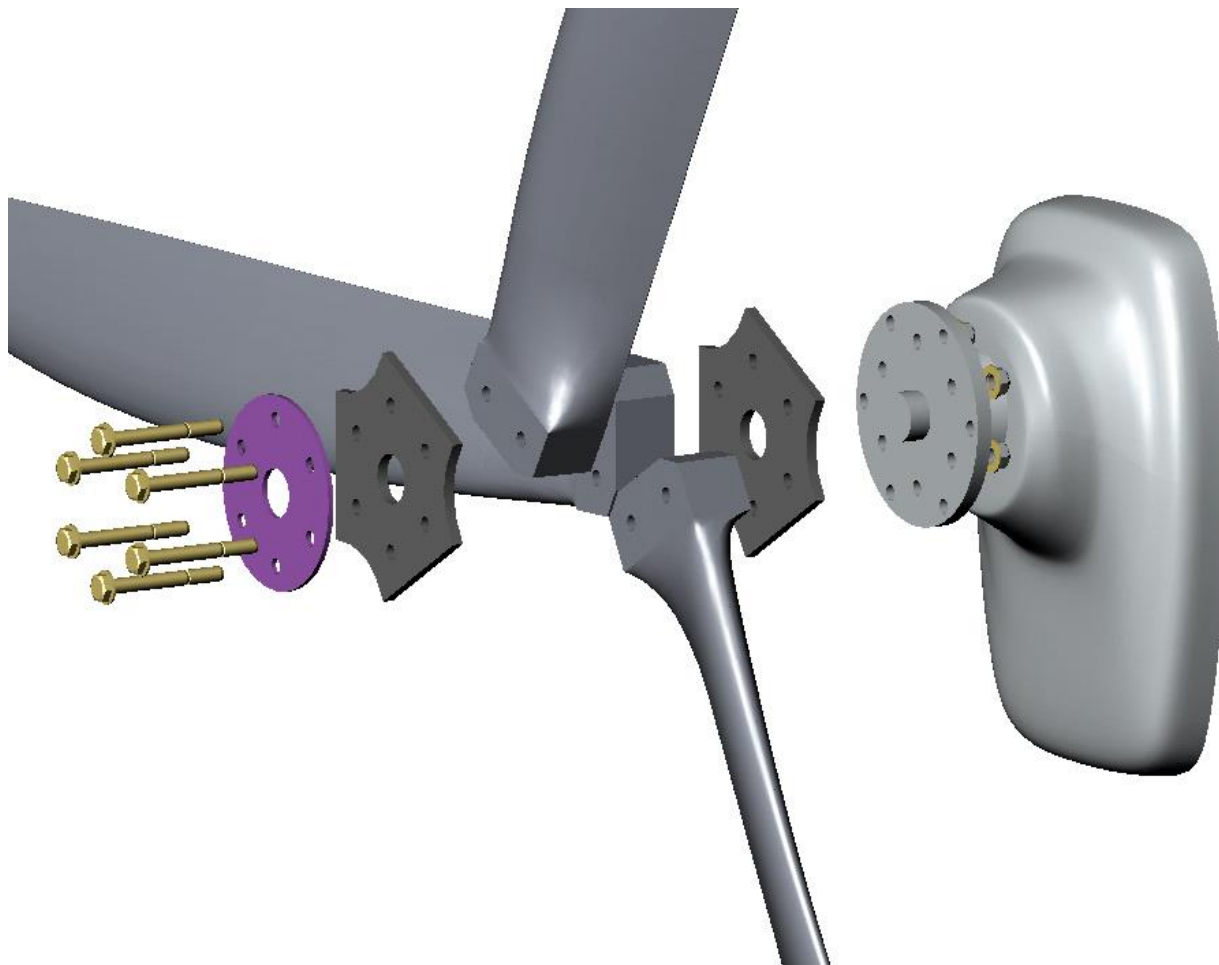


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ASSEMBLY INSTRUCTIONS

Your Aero Prop 59 propeller is fully factory balanced and ready to go, and **MUST** be assembled to the following tolerance levels.

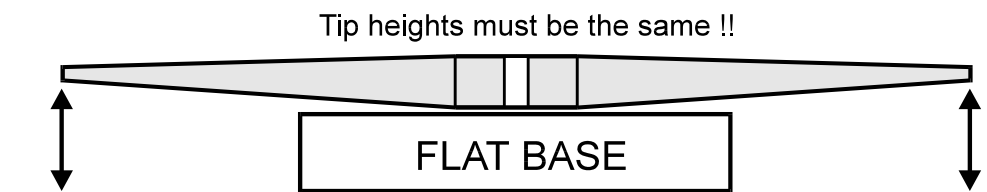
- 1) All blades and components are shipped with full QA paperwork – this is only of use if you keep this filed – preferably along with these instructions. Find and confirm all components.
- 2) All blades should be within tolerance levels of our digital balance. (this information is found on the QA sheet supplied with each blade / blade set.
- 3) The diagram below shows the exploded view of all components, they are from RH to LH:
 - 6 @ M8 - grade 8.8 bolts to mount the complete assembly to the powerplant / gearbox.
 - 6 @ <AN960-516> washers
 - 1 @ <WP-75 > anodised 1/8" aluminium 'washer plate'.
 - 1 @ <AEROCHUTE HUB PLATE> Black anodised 1/4 " 6061 aluminium
 - 3 @ <AEROCHUTE PROP BLADES>
 - 1 @ <AEROCHUTE HUB PLATE> Black anodised 1/4 " 6061 aluminium
 - 6 @ AN960-516> washers
 - 6 @ <M8 NYLOCK NUTS>.



TRACKING

- 1) Whilst assembling the propeller, blade alignment checks must be carried out. Firstly tighten all fittings to half torque settings. The following should then be checked and adjusted until correct.

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



Small variations in mounting plates / shaft holes, bolt tensions and hub squareness may cause these alignment variations. (see below tolerances). Make sure all is correct before and after the final torque settings for the nuts has been achieved. (see below '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 Blades) – maximum, ideally identical.
- From tip to tip = 3mm maximum, ideally identical distances.
- Runout / height = 3mm maximum, ideally identical distances.

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.



TORQUE SETTINGS

TORQUE SETTINGS & ENGINE INSTALLATION

All bolts, washers and Nylock nuts used to attach the blades to hub plates, and propeller assembly to engine should be assembled dry, without oil or moisture. This is **IMPORTANT**.

For all blade attachment options, evenly torque at **16 Nm, 11.8 ft-pounds or 142 inch-pounds**. Use a calibrated wrench and apply the torque to the nut and not the bolt. Take care to evenly tighten the nuts in a sequence acceptable to mechanical engineering practices.

To attach the assembly to the engine, (unless otherwise recommended via the engine manufacturer) - the bolts should be tightened firmly and evenly at the above torque setting, (assuming the drive plate is threaded) and backed up by Nylock nuts at the same. Take care to evenly tighten the bolts and nuts in a sequence **< bolt 1 – bolt 4 – bolt 2 – bolt 5 – bolt 6 – bolt 3 >**.

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

After the propeller has been mounted to the engine, check again the blade runout. It should be no different to the 'off engine' assembly. Investigate any change carefully as it is a sign of incorrect mounting, bent crankshaft etc.



BALANCING

DIGITAL WEIGHT : - Weight Matching of Bolly/Aeroprop 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 **387A1** (blade and mould number) and **X-562** (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.



INSPECTION, CARE, REPAIR & MAINTENANCE

Assembly QA

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.

Care & Clean

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 cleaner. **Do not polish** the blades as some polishes can cause problems with the surface.

A Prop cleaning kit is available from Bolly Aviation.



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. 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.
- 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.



Propeller Craftsmen for over 25 years

DURA-TUFF LEADING EDGE

General : 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.

Technical : 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.

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 (as applied to the standard Bolly prop blades) is not necessary.

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.

Care : There are no special care instructions beyond that applicable to a normal prop as per our existing instructions.

Pre flight : Every pre flight inspection should check a prop's integrity

BOLLY "DuraTuff" Leading Edge...
Available as a retro fit to all older blades... (Now standard on all new blades)
"FULL BLADE RECONDITIONING SERVICE ALSO NOW AVAILABLE"



"TESTED TO MACH 1+" "MADE FROM TUFF POLYURETHANE" "Before After BLADE RECONDITIONING SERVICE"

DuraTuff Leading Edge — Durable - In-situ Moulded - Tuff

RETRO FIT JUST \$99.00 PER BLADE

FULL BLADE RECONDITIONING SERVICE ALSO AVAILABLE

 Call Peter on (08) 8255 9688  **www.bollyaviation.com.au**

Building Props for over 25 years



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PRE FLIGHT & INSPECTIONS

Before the first flight

- 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.

Daily (before the first flight of the day). < **Make sure the ignition is not active.** >

- 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.

At the 2nd & 10th flights

- Check the bolt & nut torque levels. If retightening is needed (rare), check the tip runout.

Every 75 hours





- Perform all the above checks thoroughly, including the torque levels – and check that alignment tolerance levels have remained the same. If any changes are detected – investigate and correct reasons.

At 450 hours

- Perform a full strip down and inspection.
- Replace all Nylock nuts.
- The rebuilt prop needs to go through the appropriate inspections from the first flight to 450hrs.

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



Propeller Craftmen for over 25 years

OPERATION LIMITS

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.
- Please 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.

OPERATION LIMITS:

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

- *we advise **DO NOT** use this prop 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.

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.

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