

WHIRL WIND PROPELLERS GROUND
ADJUSTABLE (GA) AIRCRAFT PROPELLER
INSTALLATION AND INSTRUCTIONS

GA200L - 816



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WHIRL WIND GROUND ADJUSTABLE (GA) AIRCRAFT PROPELLER INSTALLATION -- LYCOMING

CAUTION: Failure to follow these instructions will void all warranties, expressed and implied. Mounting difficulties and increased vibration will result with improper assembly of the propeller blades and hub parts.

PACKING LIST

2 - Propeller Blades

1 - Blade Pitch Paddle

1- Hub, Front & Rear halves

Mounting Bolts & Washers, for mounting hub on engine

QTY

4 - Bolts 1/2" (4½" Long)

4 - Nord Lock Washers 1/2"

2 - Bolts 1/2" (1¾" Long)

2 - Wedge Lock Washers 1/2" (1.0625 OD)

Clamping Bolts, for clamping hub halves together

QTY

4 – AN 6-16A (3/8")

4 - Nord Lock Washers (3/8")

Torque Values

<u>Bolt size</u>	<u>Torque</u>
3/8"	20 ft-lbs
1/2"	45 ft-lbs

SECTION 1: PROPELLER INSTALLATION

GA200L PROPELLER INSTALLATION NOTES

1. Be certain that the magneto switch is “OFF” and that both magnetos are grounded.
2. Chock the aircraft wheels to prevent movement.
3. Clean dirt and oil residue from the engine flange.
4. See Figure 1 for installation sequence.
5. Each blade has a camber, round side (decal) and a flat side. With the round side facing forward, and the hub in the vertical position, insert one blade at a time into the hub mounting half. You may need to hold the upper blade with one hand.
6. When hand tightening the bolts into the threaded bushings, take care to maintain an even gap between hub halves on all sides.
7. Using a calibrated torque wrench and following a symmetrical (star) pattern. Tighten the bolts in 1/8 to 1/4-turn increments (this will take several passes) until the proper torque (see Data Sheet) is reached. It is important to maintain an even gap between the hub halves.
8. **IMPORTANT: After first 5 hours of operation, or any blade angle change, re-check all hub mounting bolt and blade clamp bolt torque values.**
9. **Wedge-lock washers are good for several torque cycles.**

GA200L DRIVEBUG CONFIGURATION for 12" - 13" WHIRLWIND SPINNER

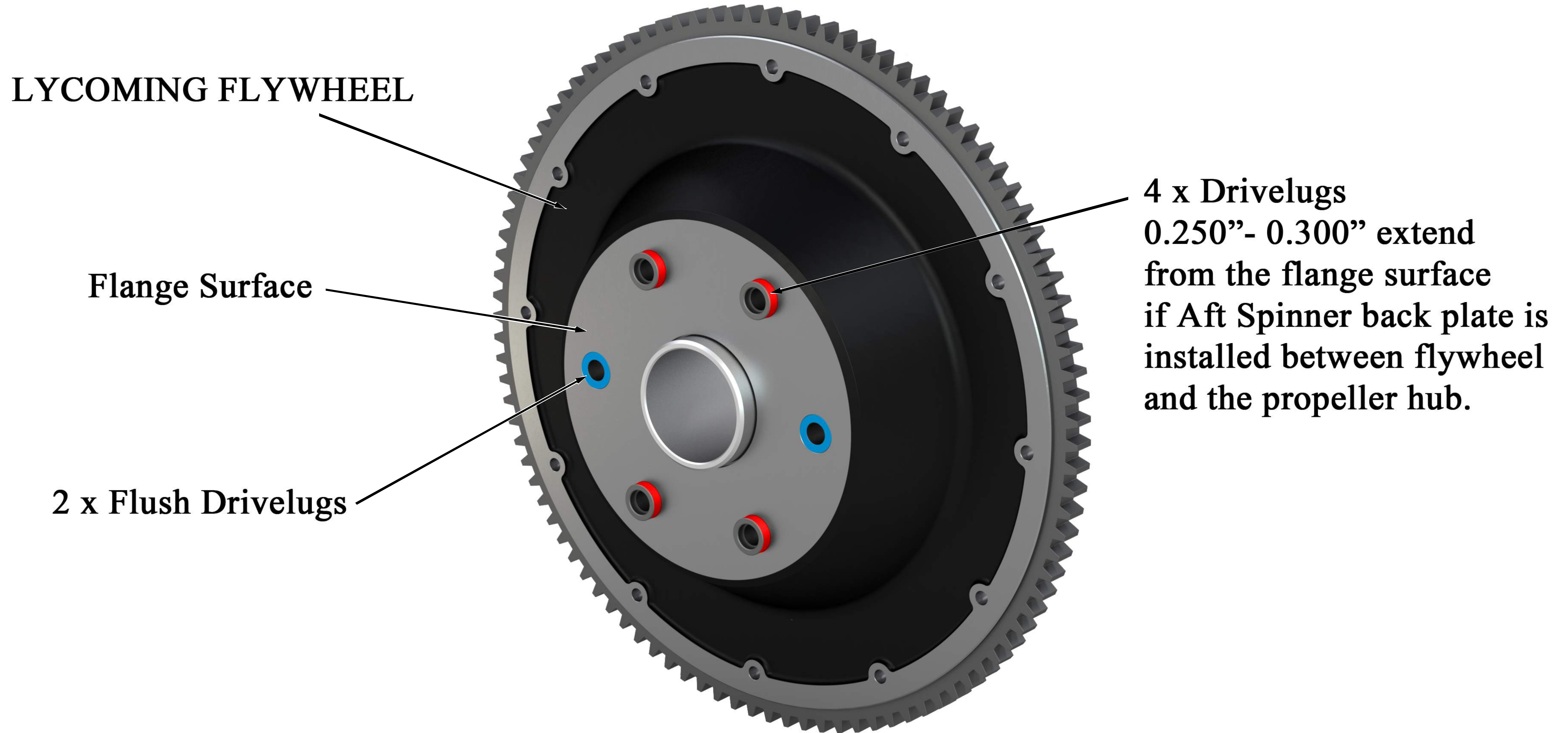


Figure 1

GA200L-816 PROPELLER INSTALLATION INSTRUCTIONS

TOOLS REQUIRED

- Torque Wrench 10-50 ft-lb
- Sockets 1/2" (12 point), 9/16"
- Phillips Screw Driver
- 242 or 262 Loctite
- Digital Level

1. Install Aft Spinner back plate.
Align blade cutouts with Hub.
2. Install Aft Hub-half using the two supplied 1/2" bolts and nord-lock washers (1.0625 OD).
Apply Loctite 242 or 262. Torque bolts to 45 ft-lb.
3. Install blades (blades omitted for clarity).
4. Install Fwd Hub-half and secure by lightly snugging 1/2" bolts with nord-lock washers.
5. Install and lightly snug Fwd Hub-half's 3/8" bolts with corresponding nord-lock washers.
6. Set Blade pitch (Refer to Section #2).
7. On Fwd Hub-half, torque 1/2" bolts to 45 ft-lb and 3/8" bolts to 20 ft-lb.
8. Install and secure Spinner Dome using the supplied #8 screws (screws omitted for clarity).

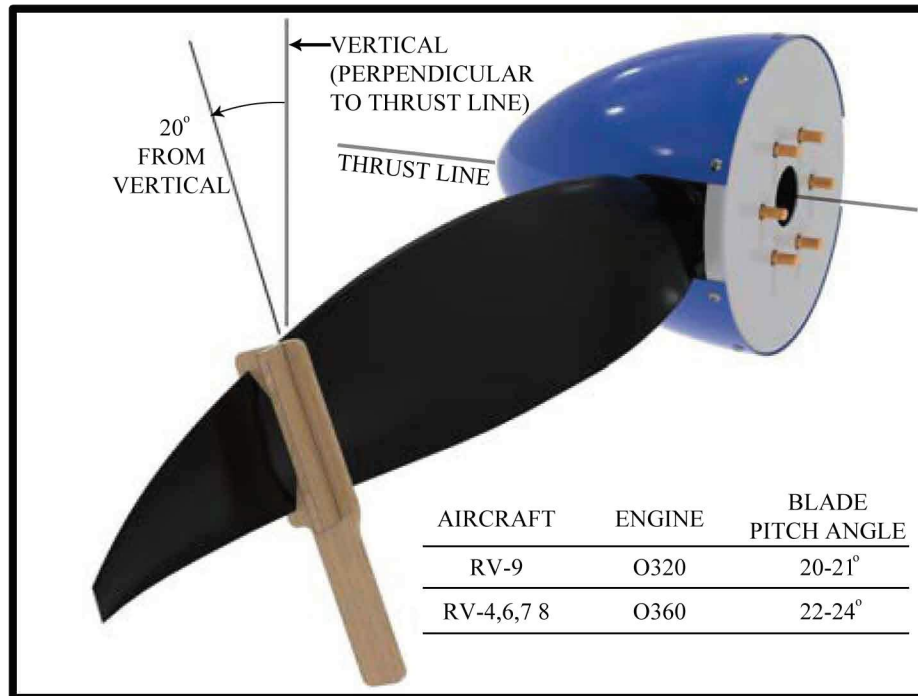
12" Spinner

Figure 2

SECTION 2: SETTING BLADE PITCH ANGLE

Once the propeller is mounted on the prop flange, you are ready to set the initial blade pitch.

1. Rotate the propeller so the blades are horizontal
2. Adjust Fwd hub bolts so the blades can smoothly rotate in the hub.
3. Slide the pitch paddle on the blade.
4. Place the protractor on the pitch-paddle and rotate the blade to the desired pitch angle. Verify the blade pitch angle (20 degrees) adjust as needed (Note 20-24 degrees of pitch is from vertical; vertical=0° horizontal=90°).
5. Snug the AN6 hub clamp bolts.
6. Rotate the propeller 180 degrees to adjust the other blade.
7. Repeat step 3.
8. Blade pitch should be within 0.20 degrees of one another.
9. After blade pitch is set, tighten then torque hub bolts by 1/8 to 1/4-turn increments in a symmetrical cross pattern to avoid blade pitch from changing. Torque bolts as per Figure 1: GA200L Propeller Installation Instructions.



SETTING STATIC RPM

NOTE: Have your tachometer calibrated by a professional before performing this next operation.

CAUTION: NEVER EXCEED THE MAXIMUM RPM RATING FOR YOUR ENGINE.

If you are not seeing your correct static RPM, be certain the tach was properly calibrated.

CAUTION: YOU SHOULD NEVER MASK AN ENGINE PROBLEM WITH A PITCH CHANGE.

If you are unsure, please contact the factory.

1. With the brakes on, run the engine full throttle to verify your desired static RPM
 - a. Static full throttle rpm should be 2200-2300 for RV, 2500-2600 for CUB type of aircraft.
 - b. Static RPM should be 400 to 500 less than Max engine RPM.
 - c. The ideal pitch setting will allow the propeller to reach maximum RPM at full throttle in level flight.
 - i. Increase pitch to lower RPM,
 - ii. Decrease pitch to increase RPM.

CAUTION: Do Not Overspeed the Propeller – Max RPM 2700

2. After the desired static RPM is achieved, re-check hub bolt torque as per Figure 1: GA200 Propeller Installation Instructions.
3. The final correct pitch setting for best all around performance is at level flight with full throttle, the engine RPM should be stable at 2700

CAUTION: Do Not Overspeed the Propeller – Max RPM 2700

4. **IMPORTANT:** After first 5 hours of operation, or any blade angle change, re-check all hub mounting bolt and blade clamp bolt torque values.

TACHOMETER INSPECTION

Owing to the exceptionally high stresses that may be generated by particular propeller/engine combinations at certain operating ranges, many propeller and aircraft manufacturers have established revolutions per minute (RPM) restrictions and maximum RPM limits for some models. An improperly operating tachometer can cause an engine to exceed the maximum RPM limits or allow operation unknowingly within a restricted RPM band.

Since there are no post-manufacture accuracy requirements for engine tachometers, tachometer inaccuracy could be a direct cause of propeller failure, excessive vibration, or unscheduled maintenance. Proper tachometer operation and accuracy should always be checked (using the manufacturer's procedure, if available) during normal maintenance intervals. One means of checking the tachometer's accuracy is with a commercial strobe unit through which the rotating propeller is viewed.

SECTION 3: INSPECTIONS

1. PRE-FLIGHT INSPECTION

2. 50-HOUR INSPECTION

3. ANNUAL INSPECTION

4. INSPECTION FOR LIGHTNING STRIKE ON COMPOSITE BLADES

5. INSPECTION AFTER SUSPECTED IMPACT

NOTE: There is no specified overhaul time. The propeller parts are removed from service when they can no longer meet the Continued Airworthiness Requirements.

1. PRE-FLIGHT INSPECTION

To be performed before every flight.

Before each flight, carefully examine the propeller blades and hub for looseness, any signs of damage, excessive wear or any other condition that would make the propeller unsafe to operate. The pre-flight walk-around is an important element of the process of airworthiness maintenance. It should not be merely a superficial look, but a studied review of the condition of everything that might give trouble during the forthcoming flight.

- Carefully examine the propeller assembly for looseness, any signs of damage, excessive wear or any other condition that would make the propeller unsafe to operate.
- Check the leading edge for cracks and debonds.
- Externally check the spinner and bulkhead for security, missing fasteners, damage, and cracks. Cracks typically originate from the attachment screws.
- Check for looseness of the bulkhead. This could be an indication that the mounting bolts are loose and need to be torqued again.
- Note any indications in the logbook for future reference to determine whether an acceptable condition is getting worse.

2. 50-HOUR INSPECTION

In addition to the recommendations for the pre-flight walk-around, the propeller and spinner should be visually examined in detail after the first 50 hours. This will require the removal of the spinner for a detailed examination.

- Ensure the interior of the spinner is free of any cracks or other defects
- Check propeller hub bolt torque to spec.
- Carefully examine the propeller assembly for looseness, any signs of damage, excessive wear or any other condition that would make the propeller unsafe to operate.
- Check the leading edge for cracks and debonds.
- Externally check the spinner and bulkhead for security, missing fasteners, damage, and cracks. Cracks typically originate from the attachment screws.
- Check for looseness of the bulkhead. This could be an indication that the mounting bolts are loose and need to be torqued again.
- Note any indications in the logbook for future reference to determine whether an acceptable condition is getting worse.

3. ANNUAL INSPECTION

To be accomplished by an A&P or IA.

1. Remove Spinner Dome and examine it for damage, and cracks. If necessary, replace the spinner dome.
2. Remove Clamp Bolts. -- The bolts should be dimensionally checked against one another. Any bolts that exhibit stretching, corrosion or damage such as cracks or nicks are to be replaced.
3. Remove the Hub Clamp Half and set aside.
4. Remove each blade and inspect blade shanks for any wear. A thorough visual inspection is recommended together with a coin tap inspection of each composite blade, including the metal erosion shield on the leading edge (see AC 43-5). No dents in the metal erosion shield should be deeper than 1/8". No dents should puncture the metal erosion shield. There should be no excessive wear on the leading edge. (If further inspection is required, return the blades to the factory or an approved propeller shop for further examination.)
5. Conditions requiring blade replacement:
 - a) Any hole in hollow blade shell (doesn't apply if a replacement metal erosion shield will cover hole)
 - b) Any crack deeper than .025"
 - c) Any solid tip damage that can't be trimmed off completely
6. Remove the Mounting Bolts -- The bolts should be dimensionally checked against one another. Any bolts that exhibit corrosion or damage such as cracks or nicks are to be replaced.
7. Remove the Hub Mount Half . Inspect both hub halves for corrosion.
8. Remove the rear spinner bulkhead and examine for missing fasteners, damage, and cracks. If damaged, replace the spinner bulkhead.
9. REPLACE the special lock washers if needed.
10. Reinstall the assembly per the above installation instructions.

NOTE: There is no specified overhaul time. The propeller parts are removed from service when they can no longer meet the Continued Airworthiness Requirements.

4. INSPECTION FOR LIGHTNING STRIKE ON COMPOSITE BLADES

Any Whirl Wind composite blade suspected of lightning strike should be inspected and may require repair or replacement. Lightning strikes usually enter a composite blade through the metal erosion shield. If a lightning strike is present, a darkened area and possible pitting, usually in the proximity of the tip, will be noticeable. If a lightning strike is suspected or detected, consider the blade un-airworthy. Return the blade to the factory or an approved propeller shop for further examination.

5. INSPECTION AFTER SUSPECTED IMPACT

Propellers that have been involved in a known or suspected static or rotating impact with relatively solid objects (e.g., ground, maintenance stands, runway lights, birds, etc.) or relatively yielding objects (e.g., snow banks, puddles of water, heavy accumulation of slush, etc.) should be inspected for damage before further flight. If the inspection reveals one or more of the following listed indications, the propeller should be removed and sent to Whirl Wind Propellers for evaluation.

- (1) A blade that tracks out of limits or out of edge alignment.
- (2) Loose blades in the hub.
- (3) Any diameter reduction (tip damage).
- (4) Visible major damage to the hub that cannot meet the Minor Hub Repairs criteria.
- (5) Visible major damage to a blade that cannot meet the Minor Blade Repairs criteria.
- (6) Operating changes, such as vibration or abnormal RPM.

NOTE: The bolts should be magnetic particle inspected per STM E 1444 or replaced after any propeller strike.

SECTION 4: CONTINUED AIRWORTHINESS REQUIREMENTS

The following will help you operate your propeller safely, keep it looking good and help it to last

NOTE: There is no specified overhaul time. The propeller parts are removed from service when they can no longer meet the Continued Airworthiness Requirements.

- Never install a propeller on an aircraft unless it is a model approved for the aircraft and the engine. The service history must be properly documented, and a pre-installation inspection must indicate that the propeller is airworthy.
- Paint loss off the Nickel leading edge is a normal wear item and is dependent on the amount of operation in rain and grit.
- A visual inspection is the primary defense against early failure of propellers. When inspecting propellers, it is necessary to use touch and hearing, as well as visual clues. Changes in surface roughness, unusual free play, and odd sounds give hints as to conditions that may affect airworthiness. Feel for roughness and look for texture changes, waviness, and changes in reflection that may signal the removal of protective coatings. Some areas may require the use of a 10x magnifying glass to identify small features or find cracking.
- Do not use the propeller as a tow-bar to move your aircraft. Apply a good quality automotive paste wax to the blades at least once a year.
- Avoid running-up in areas containing loose stones, sand, and gravel, to reduce erosion and/or damage to the leading edges and blades.
- Whenever there is evidence of roughness on operation, check bolt torque on both the clamping and mounting bolts, and check the propeller blades for track. The blades should track within 1/8" of each other at the tip. For new installations, rotating the propeller 180 degrees and reinstalling may help.
- Do not paint over areas of corrosion on hub parts.

- Do not operate your propeller above the recommended engine RPM. If your propeller has been subjected to an over speed condition of 10% over the maximum rating (example $2750 \times 1.1 = 3025$) for more then 2 minutes, you must perform the Inspection After Suspected Impact. listed below. **A 20% overspeed or higher, the propeller must be removed from service.**
- Do not operate any aircraft after a propeller has been subjected to an impact without a thorough inspection. See Inspection After Suspected Impact below
- If the bolts are ever over-torqued, they should be replaced immediately.
- If your propeller part begins to show any of the following damage, it must be repaired by an approved propeller shop or retired from service:
 - (a) Cracks in the metal hub or bolts,
 - (b) Loose metal leading edge,
 - (c) Any crack across the blade,
 - (d) Any crack along the blade length,
 - (e) Blade impact damage with missing composite material larger than 0.5 square inches and/or deeper than 0.025"
 - (f) Obvious damage or wear beyond economical repair.

PAINT WEAR ON BLADE

NOTE, wear is inevitable on the metal erosion shield and painted back side of blade. The wear rate depends on several factors, including high operating RPM's in rain or sandy areas, FOD on taxiways and runways, etc.

LIMITED WARRANTY

We hope you enjoy your new composite propeller. We have worked hard to ensure that your propeller will meet or exceed your expectations for years to come. We offer a one year limited warranty on any defect in materials and workmanship.

In the event a unit does not conform to this express warranty, Whirl Wind Propellers Corporation will repair or replace the defective material at its place of business in El Cajon, CA, USA. Whirl Wind Propellers Corporation will decide which remedy, repair, or replacement it will provide. Any replacement of a unit or a part of a unit during the warranty period will not extend the warranty beyond the original duration. The remedy of repair or replacement is exclusive and does not include the cost of shipping, removal, or installation, all of which are the customer's responsibility.

Procedure For Obtaining Warranty Service

Units or parts that are defective must be shipped prepaid to Whirl Wind Propellers Corporation at the address listed below:

Whirl Wind Propellers
1800-C Joe Crosson Dr
El Cajon, CA 92020

The unit must be accompanied by a copy of the original (Distributor or Dealer) invoice, a Return Authorization Number (which can be obtained by phoning or emailing wwpc@whirlwindpropellers.com), and a brief description of the defect.

Conditions, Exclusions, and Disclaimers

This limited warranty applies only to units that have been installed, used, and maintained properly in strict accordance with our specifications, instructions, and recommendations. It does not cover units that show abuse, alterations, improper installation, improper maintenance or repair, or improper packaging for shipment; and it does not pertain to damage due to object strike, or excessive blade wear due to operation. Overspeed of any kind or use on or with engines or equipment not approved by Whirl Wind Propellers Corporation automatically voids this warranty. This limited warranty is the only warranty provided with respect to covered units, and THERE ARE NO OTHER WARRANTIES, REPRESENTATIONS, CONDITIONS OR GUARANTEES, EXPRESS OR IMPLIED, WITH RESPECT TO THE COVERED UNITS OR THE MANUFACTURE THEREOF, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Repair or replacement of a nonconforming unit or part is the exclusive remedy for breach of this limited warranty, and shall constitute fulfillment of all liabilities of Whirl Wind Propellers to a customer or user, whether based on contract, negligence or otherwise. IN NO EVENT SHALL WHIRL WIND PROPELLERS CORPORATION BE LIABLE FOR ANY OTHER EXPENSES, CLAIMS OR DAMAGES OF ANY KIND HOWSOEVER CAUSED, INCLUDING (WITHOUT LIMITATION) ANY OTHER PRODUCT REPLACEMENT OR INSTALLATION COSTS AND/OR ANY DIRECT, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES.

The purchaser of the covered units has read, understood and, by purchasing the units, agrees to be bound by the above terms and conditions. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.