



GA-UL350-3B Propellers

Installation and Operation Instructions

For UL350 Engines



ATTENTION: Failure to follow these instructions will void all warranties, expressed and implied. Mounting difficulties, vibration, and or failure can result from improper assembly of the propeller blades and hub components.

CAUTION: Rotating propellers are particularly dangerous. Extreme caution must be exercised to prevent severe bodily injury or death.

Checklist

Read through all instructions first, then use this checklist to check off items as you read through a second time and perform the installation.

Checklist

- ☐ Read through this entire instructions manual
- ☐ Ignition off; wheels chocked; parts inventoried; engine flange cleaned (WD-40)
- ☐ Spinner Back Plate:
 - ☐ Sand protruding lug holes if lugs don't fit through them
 - ☐ Line up with blade cutouts
- ☐ Aft Hub Half:
 - ☐ Line up counter-bores with protruding lugs and ensure flush fit against mounting surface
 - ☐ Torque mounting bolts with Broom Trick
- ☐ Blades and Forward Hub Half:
 - ☐ Leading edges should face clockwise from the plane's perspective
 - ☐ Lightly secure hub over blades
 - ☐ Set approximate blade pitch and SLOWLY tighten and torque bolts (clamping bolts may have different torque value than mounting bolts!)
 - ☐ Re-check blade angles (should be within about 0.3° of each other)
- ☐ Check static RPM and adjust pitch as necessary. Lock washers click loudly when loosened and can be reused about 10 times
- ☐ Run engine for 5 min at 50% RPM and re-check all mounting and clamping bolt torques
- ☐ Install spinner dome and Fairings
- ☐ Fly aircraft and note max rpm in level flight, wide open throttle (DO NOT EXCEED MAX ENGINE RPM!), re-pitch propeller as necessary (see Pitch and Propeller Performance)
- ☐ 5 Hr Inspection
- ☐ Dynamically Balance Propeller (Recommended)
- ☐ Follow all inspections

Quick Reference Sheet

Overall Installation Procedure

- Install Propeller (Do not install spinner dome yet)
- Perform Static RPM Check
- Re-Pitch Propeller as necessary (100 RPM/1°)
- Run 50% of Max RPM for 5 min.
- Check Bolt Torques
- Install Spinner
- Fly aircraft and note max rpm in level flight, wide open throttle (DO NOT EXCEED MAX ENGINE RPM!).
- Re-Pitch Propeller as necessary (see Pitch and Propeller Performance).
- Perform all inspections and recommended dynamic balancing

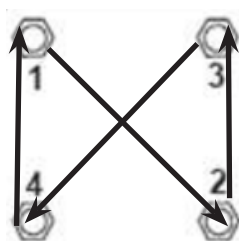
Inspection Intervals	Inspection Type
Any Pitch Change	Check Bolt Torque (Mounting bolts may be different than clamping bolts)
First 5 Hours	
Every 25 Hours	
Every 50 Hours	50 Hr Per Page 12
Repeat intervals every 25 and 50 Hr until 2000 hours is reached and a major periodic inspection is necessary	

Broom Trick: Temporarily install forward hub's mounting bolts and place a broom stick between them while you torque desired mounting bolts.



Bolt Type	Size	Socket	Torque	
			(ft-lbs)	(in-lbs)
Clamping	5/16"	1/2"	15	180
Mounting	5/16"	1/2"	15	180

! To torque bolts, follow tightening pattern below and tighten in the following increments: 50%, 75%, then Full Torque.



Propeller	Example Aircraft	Engine	Blade Pitch	Static RPM
3B-66"	Zenith	UL 350	17°	2400 to 2600

! **NOTE:** Blade pitch angles will typically need to be adjusted until the target static RPM is achieved. See Pitch and Propeller Performance for more info on selecting pitch.

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Propeller Models

These instructions apply to the following propellers:

Model	Diameter(s)
GA-UL350-3B	66"

Bolt Type	Size	Torque
Mounting Bolts (for mounting hub on engine)	5/16" (Allen)	180 in-lbs
Clamping Bolts (for securing two Hub halves together)	5/16" (Allen)	180 in-lbs

Packing List

Non-Threaded Flange

Part	Qty.
Blades	3
Hub (forward & aft halves)	1
Long Mounting Bolts (5/16" x 4")	3
Short Mounting Bolts (5/16" x 1.75")	3
Mounting Washers (5/16")	6
Mounting Lock Nuts (5/16")	6
Clamping Bolts (5/16" x 1.75")	6
Clamping Wedge Lock Washers (5/16")	6
Blade Pitch Paddle	1

One Wedge-lock Washer
(2 Pieces with ramped
sides facing each other)



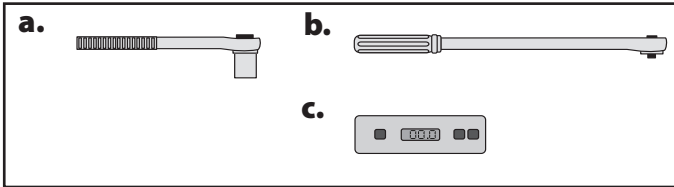
CAUTION – Experimental Installations Only.

This GA-UL350-3B propeller is an experimental propeller system. WWPC has designed and engineered this propeller for specific series engines with general known characteristics. However, it is impossible to know and test all possible modifications and combinations of modifications for these type engines in the experimental category. The owner and operator of this propeller acknowledges this nature of the experimental category and understands that experimental engine modifications can severely limit the life and reliability of this propeller. INSTALLATIONS ON MODIFIED ENGINES MAY CREATE AN UNSAFE CONDITION THAT MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE.

Required Tools

You will need the following tools to assemble your propeller:

- a. (5/16"):1/4" Allen Socket
- b. Torque Wrench
- c. Digital Protractor



NOTE: WD-40 (or similar) is recommended to clean the prop flange before installation.

Description & Installation

Description

Congratulations! You have purchased one of the finest ground adjustable propellers on the market today. Each WWPC propeller is manufactured to meet or exceed ASTM quality standards and is proudly made in USA. The blades are manufactured of pre-pregated carbon fiber and protected with a high quality automotive finish then, each blade is equipped with an electroformed nickle leading edge shield. The Hubs are CNC milled out of 6061T6 Aluminium to exacting tolerances.

Limitations

- 1. MAX RPM : 3300 (do not exceed by more than 10% for 2 minutes)
- 2. Min / Max Pitch : +15° / +22° with pitch paddle.
- 3. Recommended Major Periodic Inspection : 2000 hours (see p. 8 for inspection requirements).



WARNING!

Exceeding the noted RPM limitation for an extended period of time may lead to **CATASTROPHIC FAILURE.**

General Propeller Installation Guidelines

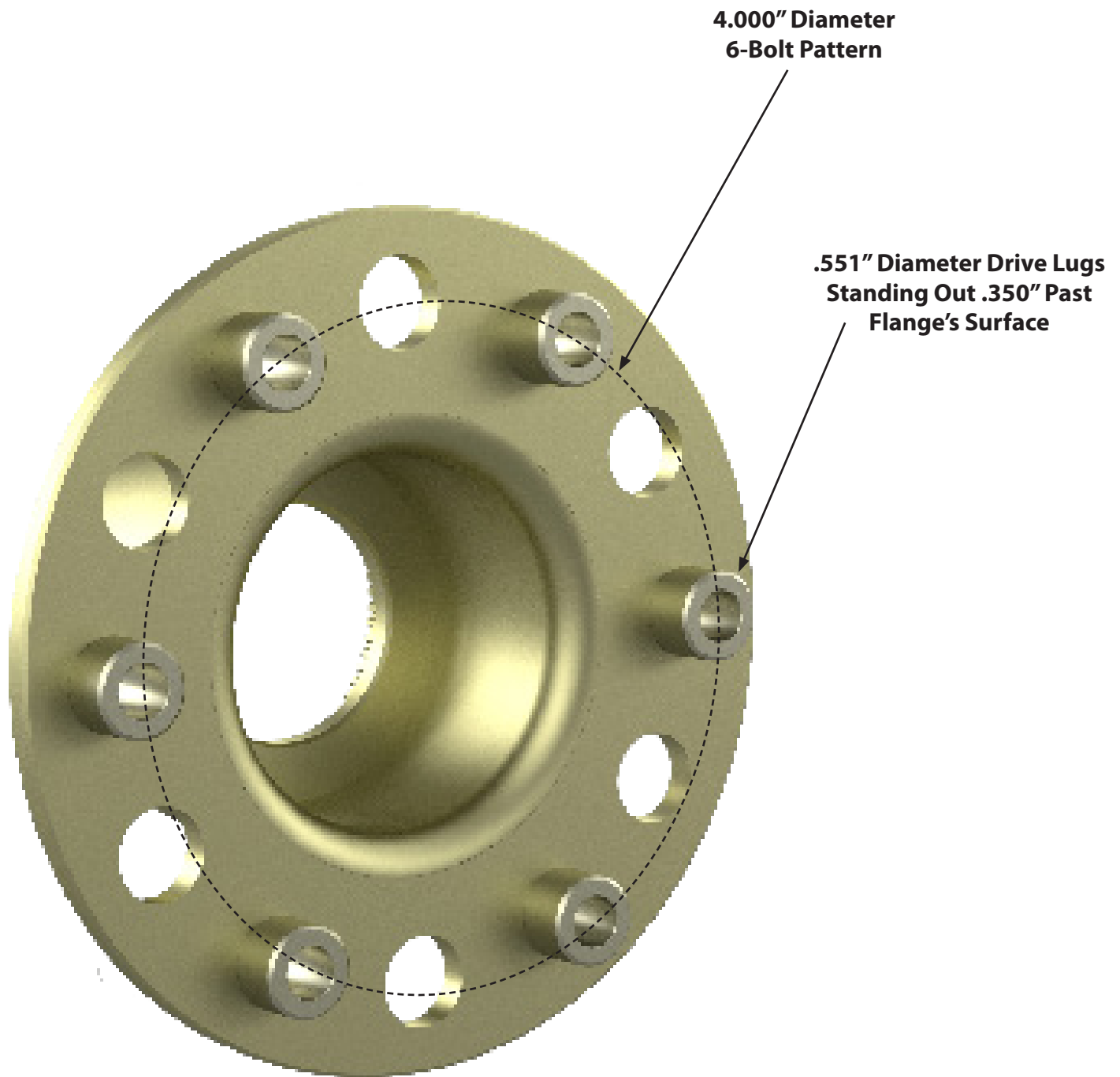
Read and follow these guidelines to ensure a safe, successful propeller installation.

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.

- 1. Verify the magneto (ignition) switch is "OFF" and that both magnetos are grounded.
- 2. Chock the aircraft wheels to prevent movement.
- 3. Clean all dirt and oil residue from the engine flange.
- 4. Always use a calibrated torque wrench when tightening mounting or clamping bolts, and torque to the listed value for your propeller.
- 5. Take inventory of hardware and tools. Ensure that you have the correct number of pieces with the appropriate sizes and lengths.
- 6. Slide washers onto their corresponding bolts so they are ready for installation

WARNING! Exceeding a set or noted limitation for an extended period of time may lead to **CATASTROPHIC FAILURE.**

UL350 Engine Flange



Installation

Install Propeller (Non-Threaded Engine Flange)

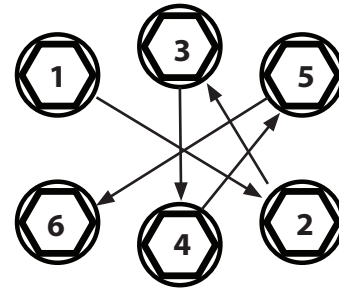
- ❶ If installing spinner place the aft bulkhead on the engine flange making sure to line up the blade cut outs with the flush drive lugs. Check to make sure the protruding drive lugs stand out at least .200" beyond the spinner bulkhead
- ❷ Place aft hub half on the engine flange. Secure aft hub half with the three short mounting bolts and Flat washers. Hold the aft hub half in place by inserting two long mounting bolts and place a sturdy length of wood (roughly the length of the torque wrench being used) in between them to apply counter torque. **Torque Bolts to Appropriate Values** (Table 1, Page 1).

❗ **NOTE:** we recommend using Loctite 242 or 262 on the internal mounting bolts as they cannot be safety wired

- ❸ Now the forward hub and blades can be installed. This is easier with two people however if you are installing the propeller by yourself;
 - Start by placing the blades hub hardware and tools within arms reach of the mounted aft hub.
 - Next turn the aft hub until the blade socket is aligned vertically.
 - Place the top blade in first (with one hand) and hold it in place using the forward hub half (with the other hand).
 - Now angle the hub half so that it holds the top blade but provides a large enough gap to insert the next blade. Angle the hub a final time so the third blade can be inserted into the hub.
 - Once all three blades are in, lightly secure the propeller assembly with the mounting and clamping bolts.
 - Make sure there is an even gap between

the two hub halves. The blades should be secure but easily rotated.

- ❹ Set blade pitch angle, see page 6
- ❺ Ensure all 5/16" Clamping Bolts are **torqued to 180 in-lbs** Using symmetric star pattern (if you have not done so already). **Torque 5/16" mounting bolts to 180 in-lbs** as well.

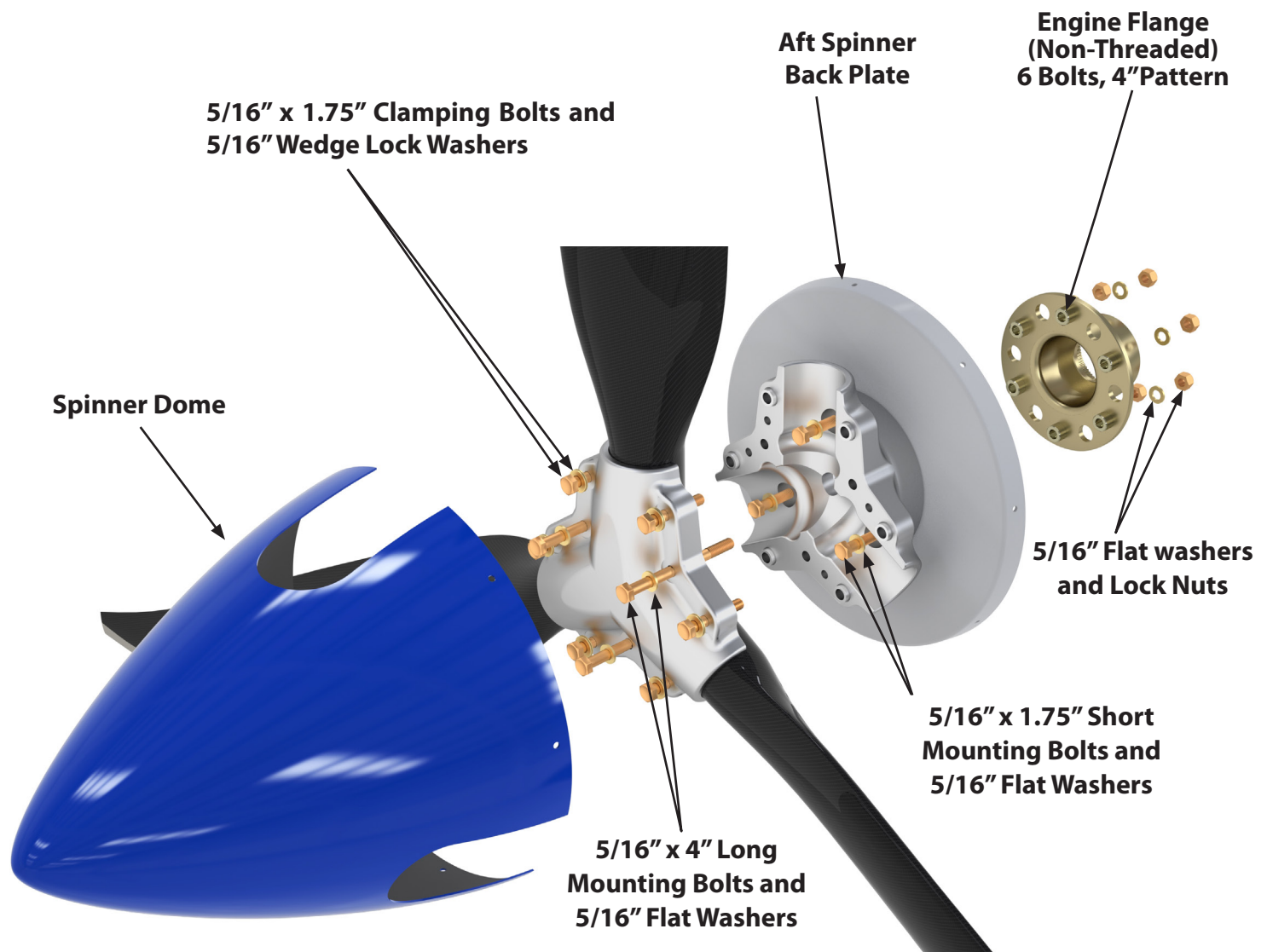


❗ **NOTE:** Follow a symmetrical (star) pattern when tightening bolts is important to avoid changing blade pitch angle.

- ❻ Install and secure Spinner Dome using the supplied #8 screws. Ensure there is a minimum of 3/16" clearance between the spinner dome cutouts and the propeller blades and hub. Inadequate clearance may result in the spinner dome wearing into the blades or hub.
- ❼ Before operation, verify the Static RPM for your engine (refer to the **Verify Static RPM** section on Page 6).

Installation

Bolt Type	Size	Washer Type	Torque Value
Mounting Bolts (for mounting hub on engine)	5/16" (Allen)	Flat	180 in-lbs
Clamping Bolts (for securing two Hub halves together)	5/16" (Allen)	Wedge Lock	180 in-lbs



Installation

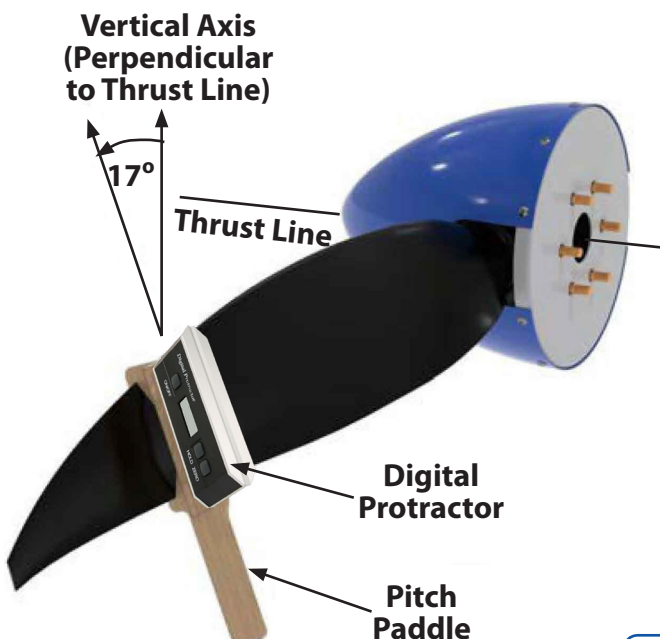
Set Blade Pitch Angle

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

NOTE: Certain aircraft manufacturers limit the total pitch range to comply with aircraft design regulations.

NOTE: If the Clamping Bolts have already been torqued, loosen the bolts so the blades can rotate smoothly in the hub. The Wedge-lock washers will click loudly when loosened.

1. Rotate the propeller so one of the blades is horizontal, or level with the ground.
2. Calibrate protractor by placing it on an exposed flat portion of engine flange and zeroing read out.
3. Slide the pitch paddle and protractor on the blade as shown. Make sure the paddle is parallel with the Blades cord line.
4. Rotate the blade to a recommended starting angle of 17° from vertical. This angle should generate a static RPM of 2400 to 2600.
5. Rotate propeller to next blade and Repeat Steps 1-3 for. Do this for each blade.
6. After the blade pitch is set on all three blades,



torque the Clamping Bolts to 180 in-lbs.

Follow the symmetrical star pattern (see page 6 or 7) tightening each bolt 1/8 to 1/4 turn at a time. It is important to maintain an even gap between the hub half to prevent a change in pitch angle.

IMPORTANT: After the first 5 hours of operation, or any blade angle (pitch) change, re-check all hub mounting bolt and blade clamping bolt torque values.

NOTE: To lower RPM, increase the blade pitch. To increase RPM, decrease the blade pitch. NEVER MASK AN ENGINE PROBLEM WITH A PITCH CHANGE. If you are unsure, please contact the factory

NOTE: All pitch angles should be within 0.20 degrees of each other.

WARNING: Exceeding a Limitation for an extended period of time may lead to a **CATASTROPHIC FAILURE, BODILY INJURY OR DEATH.**

Verify Static RPM

After setting the blade Pitch Angle, verify the static RPM for your engine.

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

1. With the brakes on, run the engine at full throttle and note the static RPM on the tachometer.

For best performance MAX RPM at full throttle during straight and level flight should be 3100 RPM.

WARNING: NEVER EXCEED THE MAXIMUM RPM RATING FOR YOUR ENGINE. If you are not seeing your correct static RPM, be certain the tachometer was properly calibrated.

2. After the desired static RPM is achieved, re-check all bolt torque values (The ideal pitch setting will allow the propeller to reach (with out exceeding) maximum RPM at full throttle in level flight.)

Inspections

Tachometer Inspection

An improperly operating tachometer can lead to propeller failure, excessive vibration or cause an engine to exceed maximum RPM limits established by manufacturers.

Proper tachometer operation and accuracy should always be checked (using the manufacturer's procedure, if available) during normal maintenance intervals.

Pre-Flight Inspection

Perform this inspection 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.

1. 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.
2. Check the leading edge for cracks and debonding.
3. Check the spinner and bulkhead for security, missing screws, damage and cracks. Cracks typically originate from the attachment screws.
4. Check for looseness of the bulkhead. This could be an indication that the mounting bolts are loose and need to be retightened.
5. Note any indications in the logbook for future reference to determine whether an acceptable condition is getting worse.

Initial 50-Hour Inspection, Annual (100-Hour) Inspections

In addition to the recommendations for the Pre-Flight Inspection, the propeller and spinner should be visually examined in detail after the first 50 hours (also annually and at 2000-Hour). This will require the removal of the spinner for a detailed examination.

Initial 50-Hour / 100-Hour or 12 calendar month annual inspection:

1. Remove Spinner Dome and examine it for damage, and cracks. If necessary, replace the spinner dome.
2. Remove Clamping Bolts and dimensionally check against one another. Any bolts that exhibit stretching, corrosion or damage are to be replaced.
3. Remove the Forward Hub-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 nickel 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.
 - 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:
 - Any hole in hollow blade shell (doesn't

Inspections

apply if a replacement metal erosion shield will cover hole)

- Any crack deeper than .025"
 - Any solid tip damage that can't be trimmed off completely
6. Remove Mounting Bolts and dimensionally check against one another. Any bolts that exhibit stretching, 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 Wedge-lock washers.
 10. Reinstall the assembly per the above installation instructions.

2000-hour Major Periodic Inspection Must 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 Clamping Bolts and washers and retire both sets from service.
3. Remove the Hub Clamp Half and set aside.
4. Remove Mounting Bolts and washers and retire both sets from service.
5. Remove the Hub Mount Half .
6. Remove the rear spinner bulkhead and examine for missing fasteners, damage, and cracks. If damaged, replace the spinner bulkhead.
7. Send both hub half's and all 3 blades to an **Approved Propeller Repair Center** for the remaining 2000 hour inspection.

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.

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

! **IMPORTANT:** After any propeller strike the bolts should be replaced.

Lighting Strike

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 unairworthy. Return the blade to the factory or an approved propeller repair center for further examination.

Inspections

Propeller Removal

1. Safe engine ignition system for maintenance by disconnecting the aircraft battery.
2. Perform installation procedure as illustrated on page 4 or 6 (depending on installation) in reverse order of operation.

Normal Wear and Tear

The following picture shows various size paint chips on the aft (high pressure) side of a propeller blade. This is normal wear and tear, no action is needed, and there are no delaminations here. For aesthetics you can use primer to fill chips, sand flush with a sanding block, and touch up with paint. Another option is to paint over with a clear coat.

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



Continued Airworthiness Requirements

The following recommendations 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 unless it is a model approved for the aircraft/engine. The service history must be properly documented, and the propeller must pass a pre-installation inspection.
- A thorough visual inspection will could catch a dangerous flight condition. Use touch and hearing as well as visual clues. Changes in surface roughness, unusual free play, and odd sounds indicate 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.
- The pre-flight walk-around is very important, and should be a studied review of any condition that might give trouble during flight. Refer to the **Pre-Flight Inspection** section for details.
- 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 $3300 \times 1.1 = 3630$) for more than 2 minutes, you must land and perform a 100 hour inspection.
After Suspected Impact or an overspeed condition of 20% or higher, the propeller must be removed from service and returned to the manufacturer for inspection.
- Do not paint over areas of corrosion on hub parts.
- Do not operate any aircraft after a propeller has been subjected to an impact without a thorough inspection. Refer to the **Inspection After Suspected Impact** section for details.

- 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.
- Finish loss off the leading edge is a normal wear item and is dependent on the amount of operation in rain and grit.
- Whenever there is evidence of engine roughness, 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. Rotating the propeller and reinstalling may help.
- If the bolts are inadvertently over-torqued, they should be replaced immediately.
- If your propeller blade(s) or hub assemblies begin to show any of the following conditions, 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.

Aproved Engine/Propeller Combinations and Limitations

Model	Diameter(s)	Weight	Engines	Limits
GA-UL350-3B	66"	13 lbs	UL350 series engines	3300 RPM MAX (Propeller) 130 HP Max

Pitch and Propeller Performance

PROPELLER PERFORMANCE

In selecting a propeller, keep in mind that both aircraft and engines of the same model may vary in performance, and that operators may want different performance characteristics. For instance, one person may require a high climb rate while another seeks maximum cruising efficiency.

STANDARD PITCH / NORMAL FLYING

For normal or cross country flying, a propeller that turns up to maximum continuous engine RPM at full throttle level flight will give best all-around performance. To achieve this configuration, aim for the lowest static rpm within the recommended range.

CRUISE PITCH

A cruise propeller will turn 150 to 250 static RPM less than a standard pitch propeller. While cruise pitches will provide 4-6 mph higher airspeeds at low-altitude cruise power rpm's, maximum level flight speeds are no better than climb or standard pitches, and the take-off and climb performance will noticeably suffer. Additionally, at higher altitude the cruise-power rpm increases to max engine rpm anyway, so the standard pitch configuration then becomes a better cruise pitch configuration for altitudes above about 8,000'.

CLIMB PITCH / HIGH ALTITUDE OPERATION

For improved take-off and climb performance, use a climb pitch that will turn 100 to 200 static rpm more than a standard pitch propeller (Refer to your particular aircraft operating manual for propeller limitations). Climb pitches will typically reduce flight speeds by 4-6 mph at cruise power RPM's. A climb pitch is also recommended for aircraft operating from high density altitude runways. To achieve this configuration, aim for the highest static rpm within the recommended range. Be careful not to exceed max engine rpm when flying a climb pitch configuration.

PITCH NOTES AND LIMITATIONS

The faster the airplane the higher the pitch setting that will be required to keep the engine from overspeeding at Wide Open Throttle (WOT). While the propeller may be structurally operated at any pitch setting from +14° through +26°, the take off RPM at WOT must meet the aircraft manufacturer's recommended limits to ensure safe flight. The propeller RPM should never exceed the engine manufacturers recommended maximum RPM.



NOTE: Certain aircraft manufacturers limit the available propeller pitch range to comply with aircraft design regulations.

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.

Whirl Wind Propellers Corporation

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