STERNA COMPOSITE AIRCRAFT PROPELLER OPERATION, INSTALLATION and MAINTENANCE MANUAL
for
TEXAS AIRCRAFT COLT

STERNA AIRCRAFT LLC

STERNA-TXA-COLT-OM-IM-MM-01 REV. 01

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About Sterna Aircraft Propellers

1. Propeller Description and Features

1.1 Advanced Aerodynamic design

Adhering to the most advanced composite design and construction techniques in the world of aviation, Sterna crafts its propellers for true high performance, efficiency and durability.

1.2 Compliance with ASTM Propeller Standards

Sterna propellers have been tested to meet and or exceed all structural loading tests required for ASTM compliance. By using advanced manufacturing processes along with one-step molding technology, continuous carbon fiber prepreg and pressurized curing, Sterna cost effectively provides its customers with safe and reliable products.

1.3 Design features

Sterna Propellers are designed to be ground adjustable. Propeller pitch is adjusted using a split hub design made from high-strength, forged aviation grade aluminum. This conventional structure is widely adopted by the aviation industry due to its exceptional reliability and proven design characteristics.

2. Propeller Design and Usage

By exceeding the requirements of ASTM 2506, Sterna propellers are designed for optimized performance on Certified Light Sport as well as Experimental aircraft. Sterna's proprietary finishing process also makes their propellers suitable for amphibious aircraft due to its extremely durable coating.

3. Basic Structure of the Blade

Propeller model **S69CBMR** blade is constructed from single piece carbon fiber prepreg utilizing a hollow blade design, a solid carbon fiber shank with an aluminum shank cover and retaining end cap. The nickel alloy leading edge protection is fully imbedded into the propeller blade shank. This design allows for a light weight design with very high strength and durability.

Design Parameters and Limitations

1. Basic Parameters for Swift Model S69CBMR

• Propeller Diameter	**1752mm (69 in)**
• Propeller Weight	**5310 g**
• Blade Pitch Angle Range	**13°- 23°**
• Max Propeller RPM	**2700 rpm**
• Max Rated Power	**115 hp**
• Engine Flange Type	**Rotax (4”x13 mm)**
• Applicable Temperature	**-40°C - 80°C**
• Mass Moment of Inertia	**0.1410 kg*m^2**

2. Use Limitations

• Useful Life Time	**No Limit***
• Life Time for Storage	**10 years**

***Factory Inspection required at 1500 Hours**

3. Approved Engine/Propeller Combinations and Limitations

• Propeller Model	**S69CBMR**
• Propeller Type	**Tractor**
• Min Diameter	**68”**
• Max Diameter	**70”**
• Mass Moment of Inertia	**0.1410 kg*m^2**
• Weight (w/o Spacer)	**5310 g**
• Approved Engine Models	**Rotax 912ULS/S, 914**
• Max Propeller RPM Limit (continuous)	**2400 rpm**
• Horse Power Limit	**115 hp**

Packing List for Swift Propeller Model S69CBMR 3 Blade

PART	QUANITITY
Propeller Blade Model Number S69CBMR	3
Aluminum Hub Half 3-RT-B (Side A)	1
Aluminum Hub Half 3-RT-B (Side B)	1
Aviation Grade Bolts (AN4-21A)	6
Aviation Grade Nuts (AN365-428A)	6
Aviation Grade Washers (AN960-416L)	12

Blade Model and Serial Number

Figure 1: Propeller Blade Barcode

The propeller bar code is located on the blade root. Please see the explanation of the propeller serial number below.

Referring to **Figure 1**, there are two parts in the label, the upper part is the bar code and lower part is the tracking number consisting of letters and numbers. The first 5 spaces describe the propeller blade type and model. The next 6 spaces represent the propeller serial number. Please see the details below:

1. Propeller Blade Model Number

- S is for propeller brand STERNA.
- The next two numbers like 70, 72 and 68 etc. is the propeller diameter (inches)
- The 4th letter A, B, C or D etc. is for the propeller's aerodynamic airfoil design
  - **A** is for all semi-scimitar shaped blade design (Falcon Series)
  - **B** is for all square-tipped blade design (Osprey Series)
  - **C** is for semi-scimitar and square root blade design (Swift Series)
  - **D** is for RV type blade design (Eagle Series)
  - **E** is for STOL design (Condor Series)
- The 5th letter A, B, C or D etc. is for the blade shank diameter (inches)
  - **A** = 1.5
  - **B** = 2.0
  - **C** = 2.375
  - **D** = 3.0

2. Propeller Blade Serial Number

- The 6th letter is for the range of the cruise speed
  - **L** = lower speed
  - **M** = medium speed
  - **H** = high speed
- The 7th letter is for the propeller rotation direction as viewed from the pilot's seat
  - **R** is for right hand rotation (clockwise)
  - **L** is for left hand rotation (counter clockwise)
- The 8th letter represents the year manufactured
  - **D** = 2015
  - **E** = 2016
  - **F** = 2017
  - **G** = 2018, etc.
- The 9th letter represents the month manufactured
  - **A** = Jan
  - **B** = Feb
  - **C** = Mar, etc.
- The 10th and 11th numbers indicate production number of the blade
  - **01**, **02**, **03**, etc.

Hub Model and Serial Number

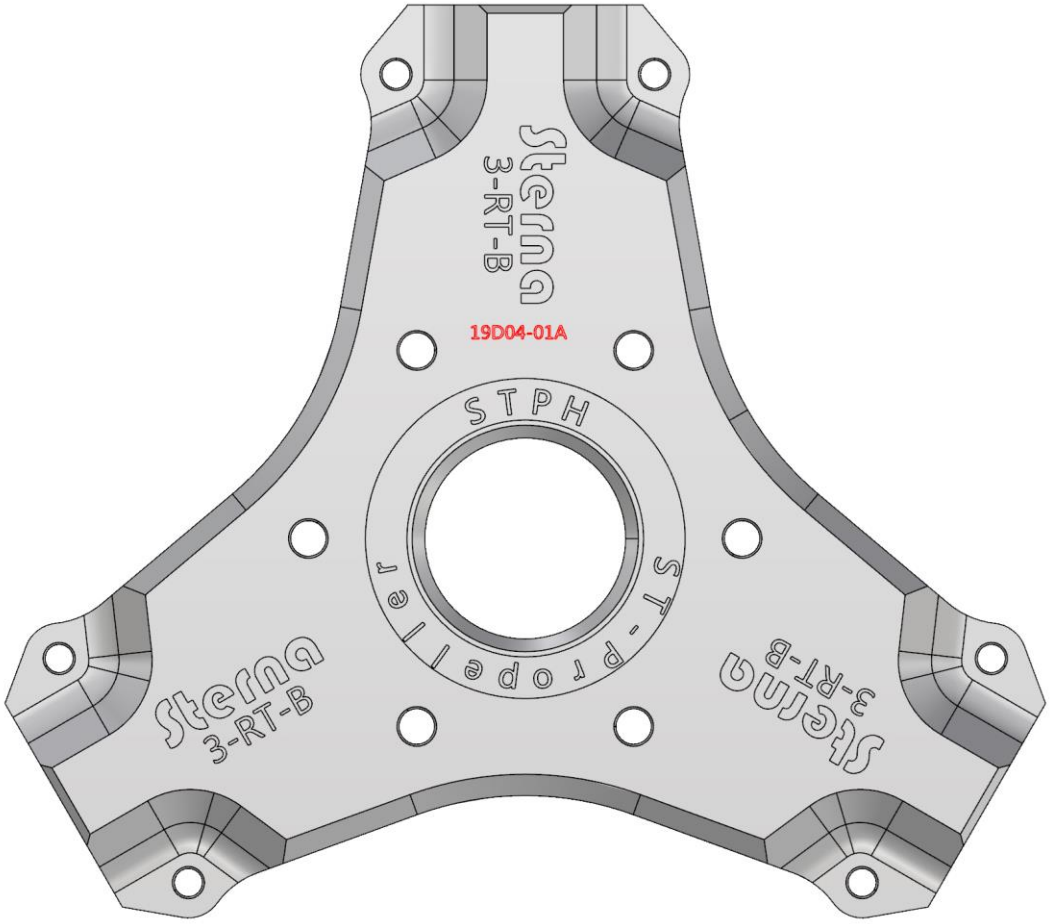

Figure 2: Illustration showing position hub model number and serial number.
(Position may vary slightly among other hub models)

Hub Model Number location: The hub model number is located in 3 places on each side of the hub half. It is directly located under the name Sterna.

Hub Serial Number location: The hub serial number is located near the center hole of the hub and shown in red in the above illustration. Each hub will have its own serial number ending with either an A (Front half) or B (Back half).

Hub Model Number

3-RT-B as an example for illustration (see Figure 2)

a. The number **3** = number of blades
   (**2**, **3**, **4** and **5** blades are available)
b. **RT** is for matching ROTAX 912/582 engine flange
   UL260 for UL POWER 260 series engine flange
   UL350 for UL POWER 350 series engine flange
   CT200A is for Continental O-200/Lycoming O-290 engine flange
   CTIO240 is for Continental IO-240 engine flange
   RT is for ROTAX 912/582 engine flange
   LY360 is for matching Lycoming O 360 engine flange
   LY190 is for THUNDER 190/BLACK EVIL engine flange
   LY100 is for THUNDER 100 engine flange
c. **SJ** is for reduced diameter hub type
   (Normal style hub is designated by absence of the letters **SJ**)
d. **B** is for B type shank diameter (inches)
   (**A** = 1.5, **B** = 2.0, **C** = 2.375 and **D** = 3.0)

Hub Serial Number

19D04-01A as an example for illustration (see Figure 2)

a. **19** is for the year the hub is made in; **17**=2017, **18**=2018, **19**=2019, etc.
b. **D** is for the month the hub was made in; **A**=Jan, **B**=Feb, **C**=Mar, **D**=Apr, etc.
c. **04** is for the day of the month the hub was made on; 01, 02, 03, 04, etc.
d. **-01** is the hub piece production number; **-01**, **-02**, **-03**, **-04**, etc.
e. **A** is for Side A of the hub assembly
   Side **A** = front side hub (towards spinner)
   Side **B** = back side hub (towards engine)

NOTE: For installing propeller hubs that are universal and not marked as side A or B, install the hub half with the smaller center hole in front of the propeller blades and the hub half with the larger center hole on the back side of the blade.

Propeller Assembly Diagram and Parts List

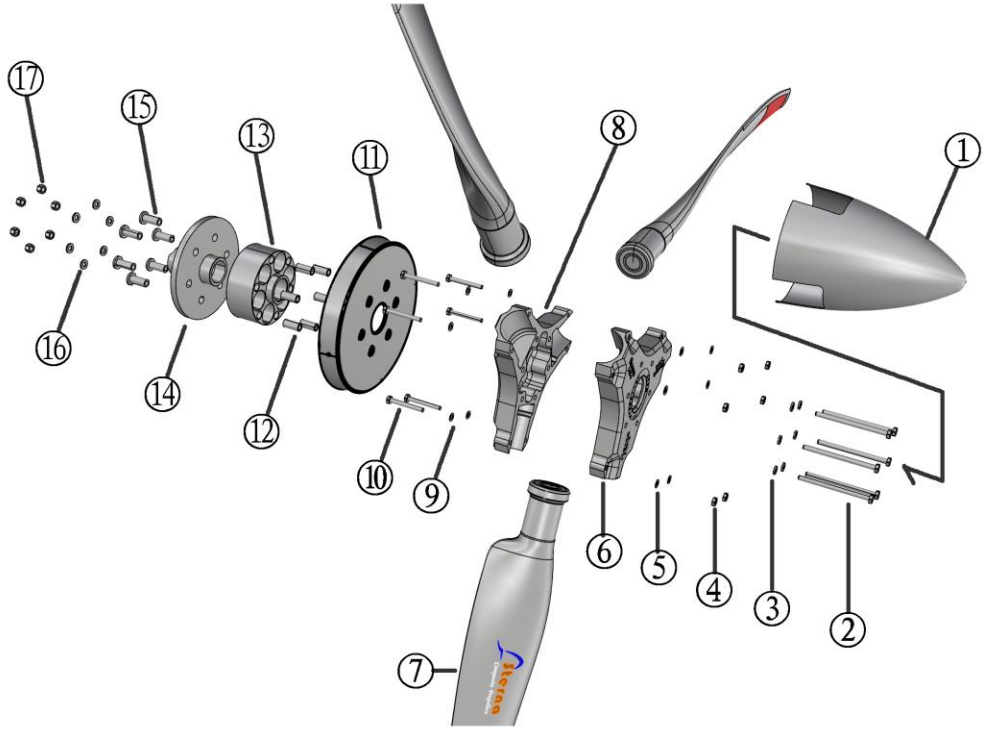

Figure 3: 3 Blade Propeller Assembly (Exploded View)

Item	Description	Qty	Item	Description	Qty
1	Spinner T1.61A.1000.005	1	10	AN4-21A Bolt	6
2	AN5-54A Bolt	6	11	Backplate T1.61A.1000.006	1
3/16	AN590-516 Washer	12	12	Socket I T1.61A.1000.002	6
4	AN365-428A Nut	6	13	Flange Ext. T1.61A.1000.001	1
5/9	AN960-416L Washer	12	14	Rotax 912 Engine Flange	1
6	Hub Half 3-RT-B (Side A)	1	15	Socket T T1.61A.1000.003	6
7	Propeller Blade S69CBMR	3	17	AN363-524 Nut	6
8	Hub Half 3-RT-B (Side B)	1	n/a	n/a	n/a

WARNING: Do not use these installation instructions to install other brand propellers. STERNA will not accept any responsibility from the use of these directions with products from other manufactures.

1. The bolts and nuts for mounting the hub to engine are not standard-equipped parts and are provided by manufacture (If required, please remark when ordering)
2. The spinner and back plate are not standard equipped parts and are provided by manufacture (If required, please remark when ordering)
3. The engine flange drive lugs and spacer bushings are not standard-equipped parts (If required, please remark when ordering)
4. The ports on the spinner and back plate are not pre-cut unless special ordered (as shown in **Figure 4** and **Figure 5**)
5. The locking bolts for the blades are standard aviation grade AN4-21 bolts. The washers are AN960-416L and nuts are AN365-428A

NOTE: Different propeller models may use different bolt sizes.

Spinner and Backplate Installation Instructions

The propeller spinner ports typically are not cut when the spinner is shipped out to customers. This is done in order to providing more options for different propeller and hub combinations. Factory will only provide precut spinner ports upon customers special request. Refer to spinner manufacture for installation procedure.

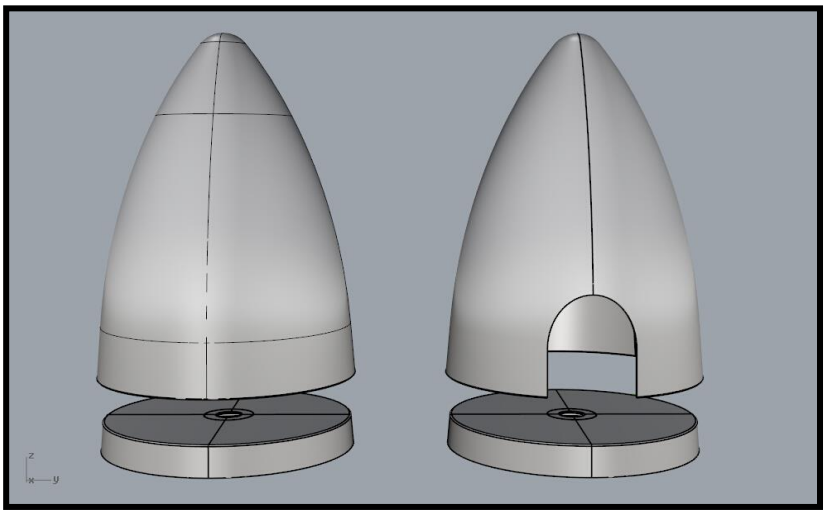

Figure 4: Spinners with and without cutting ports

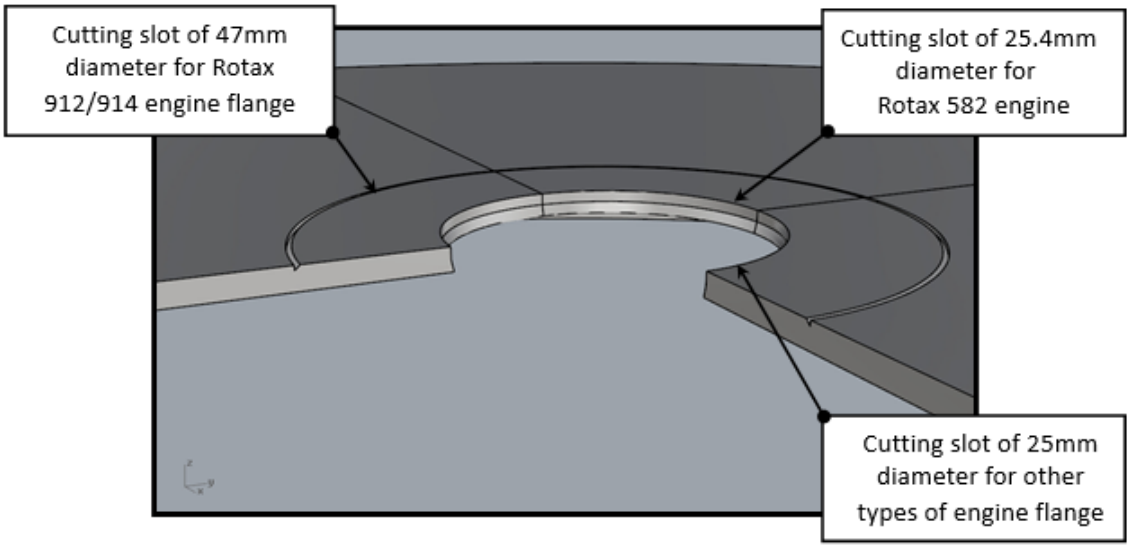

Figure 5: Size of the cutting slot of the center hole in the back plate

There is only one center hole in the back plate when shipped out so that customers can change the size of the hole according to their own needs. Note: we provide three standard cutting positions for options. They are 25mm 25.4mm and 47mm (See **Figure 5**)

Propeller Assembly Instructions

Tool List for Propeller Assembly:

- Calibrated torque wrench
- Pitch setting gauge for measuring blade angle
- 7⁄16” socket-for torque wrench
- 7⁄16” box wrench

1. Refer to **Figure 3** in the 3 Blade Propeller Assembly (Exploded View) for the position reference of part numbers 6, 7 and 8. Place the hub mount half (**side B)** flat on a suitable level workbench with engraving side down.

2. Each blade airfoil has a round side and a flat side. For **tractor** propellers, insert the blades with the **rounded side** facing away from the workbench (**upward**); for **pusher** propellers, insert the blades with the **rounded side** facing the workbench (**downward**). Insert one blade at a time into the hub bottom half (side B).

3. Place the hub top half (**side A**) over the assembled blades, then install the AN4-21A bolts, AN960-416L washers and AN365-428A nuts into applicable bolt holes for each blade. Use two washers per bolt with one installed under the head of the bolt and one under the nut. There are (2) retaining bolts per blade.

4. Tighten the clamping bolts until blades are held snug but able to rotate with light force. If the blades cannot rotate in the hub, loosen the clamping bolts slightly.

5. Place the blade angle gauge on the blade to measure the blade angle for precise adjustments. For location on propeller see arrows on **Figure 6** below. For tractor installations, rotate the blade's leading edge away from the work surface to produce high pitch, or more "bite". For pusher installations, rotate the blade's leading edge towards the work surface to produce high pitch, or more bite.

6. After making blade angle adjustments, use a calibrated torque wrench to tighten the 6 mounting bolts using the pattern illustrated in **Figure 7** below. Tighten the bolts evenly in several increments, such as 50%, 75%, and 100% full torque (Re-check blade angles at each increment to verify pitch angle remains constant. See **Table 1** below for bolt torque values.

Note: Pay attention to the tightening order and that proper torque is applied when securing the blade bolts. **Do not tighten bolts one time**. Tighten bolts in successive steps checking the blade angle as you proceed. Verify clearance between hub halves are the same.

Figure 6: Guide for blade angle gauge placement

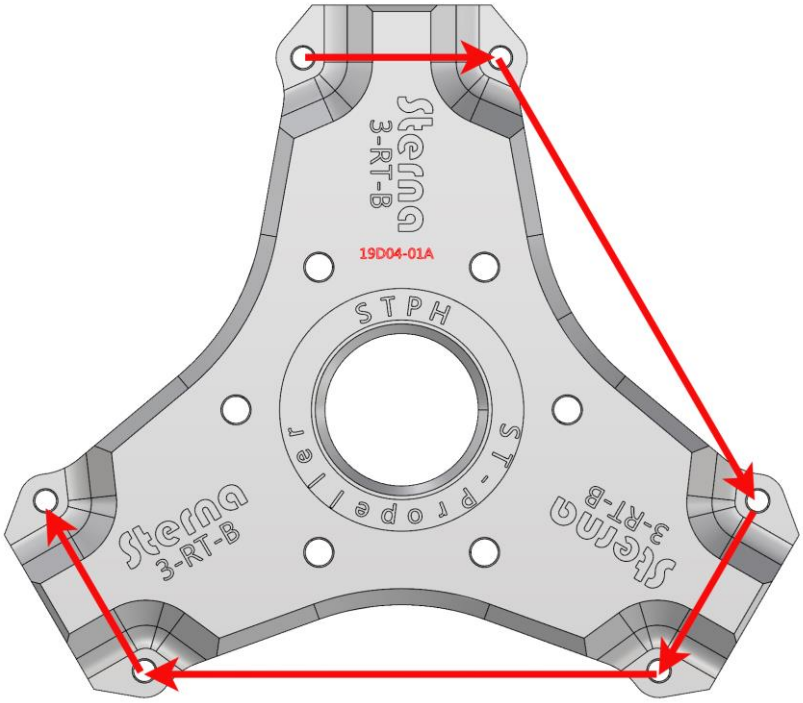

Figure 7: Hub blade bolt tightening order

MOUNTING HARDWARE	TORQUE (in*lbs)
AN4	50-70
AN5	120-140
AN6	160-190

Table 1. Installation Torque for Mounting and Clamping Hardware

Propeller Installation Instructions

Tool List for Propeller Installation:

- Calibrated torque wrench
- Pitch setting gauge for measuring blade angle
- 7/16" socket (for torque wrench)
- 7/16" box wrench
- 1/2" socket (for torque wrench)
- 1/2" box wrench
- Tachometer calibration tool

1. Be certain that the aircraft ignition or magneto switch is "OFF" and that all magnetos are grounded any time the propeller is handled. Chock the aircraft wheels to prevent movement. Clean dirt and oil residue from the engine flange.

2. Place rear spinner backplate as shown in **Figure 3** and the assembled propeller on the propeller mounting flange. Check for proper bushing fit into the hub mount half.

WARNING: It is important that the hub sits completely flush against the mounting flange. Some installations may require a hub spacer kit or trimming of the drive bushings for proper fit on the engine flange. Bolt breakage *WILL* occur if there is a gap between the propeller hub, the spacer (if used), and the engine flange.

3. Place the washer on bolt and insert the mounting bolt through the assembled hub and into the flange bushings as shown in **Figure 3**.

NOTE: Do NOT insert the mounting bolts backwards through the engine flange. The lock nuts will not fit inside the hub, preventing the blade shanks from fully seating and the hub from closing properly.

4. Using a calibrated torque wrench, torque the 6 mounting bolts evenly using a star pattern. Tighten the bolts in several increments up to full torque, such as 50%, 75%, and full torque. **See Table 1** above or hub decal for mounting bolt torques.

5. The blue pattern in **Figure 8** below is the tightening sequence for mounting the hub onto the engine flange. Tighten the two No. 1 bolts opposite of each other first, then tighten the two No. 2 bolts opposite of each other, finally tighten the two No. 3 bolts opposite of each other.

Note: Pay attention to the tightening order and that proper torque is applied when securing the hub-flange bolts. **Do not tighten bolts one time**. Tighten bolts in successive steps. Verify clearance between hub halves are the same.

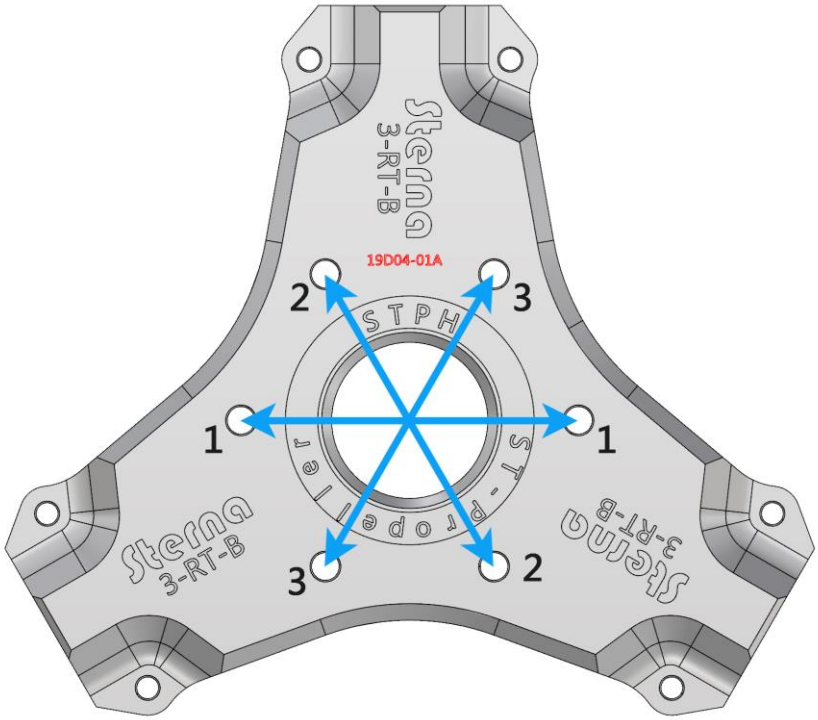

Figure 8: Use "Star Pattern" for tightening engine flange bolts

6. Check the propeller blades for tracking. The blades should track within 3⁄16" of each other at the tip. Setting the pitch accurately is more important than track from blade to blade.

CAUTION: Make sure the pitch setting gauge has been removed from the blades before starting the engine.

NOTE: Tachometer accuracy is critical for safe operation of the propeller: Verify accuracy.

7. Run your propeller for approximately 5 minutes at 50% cruise rpm then re-torque mounting and clamping bolts. It is not unusual for bolts to need re-torqueing.

NOTE: This torque value should be checked after the first 5 hours of operation and at least once a year thereafter.

8. With the brakes on, run up the propeller to check your pitch for desired maximum rpm. Remember, the propeller will pick up RPM at full throttle/level flight. If rpm is too low, adjust blades to a lower pitch setting. If rpm is too high, adjust the blades to a higher pitch setting. Check your aircraft and/or engine manual for recommended static rpm. If you are not seeing your expected static rpm, verify the tach was properly calibrated.

9. Install spinner front plate (if required) and spinner dome (if used).

NOTE: Ensure there is adequate clearance between the spinner dome cutouts and the propeller blades and hub. Inadequate clearance may result in the spinner dome wearing into the blade or hub. The amount of clearance depends on engine type and spinner construction, but a minimum of 1/8" clearance is recommended.

Changing Propeller Blade Pitch

Required Tool List:

- Calibrated torque wrench
- Pitch setting gauge for measuring blade angle
- 7/16" socket (for torque wrench)
- 7/16" box wrench
- 1/2" socket (for torque wrench)
- 1/2" box wrench

If Propeller Blade Requires Re-pitching:

1. Be certain that the aircraft ignition switch or magneto is "OFF" and that all magnetos are grounded any time the propeller is handled.

2. Loosen the clamp and mount bolts.

3. With the pitch setting gauge in place, adjust the blade angle and snug down the two clamping bolts for that barrel to prevent unwanted rotation of the blade.

4. Rotate propeller to next blade and repeat step 3 for the remaining blade(s).

5. Using a calibrated torque wrench, torque the clamping and mounting bolts evenly using patterns and sequences shown in **Figures 7** and **8**. Tighten the bolts in several increments up to full torque, such as 50%, 75%, and full torque. See **Table 1** for bolt torque values.

Propeller Removal and Disassembly

Required Tool List:

- 7/16" socket (for socket wrench)
- 7/16" box wrench
- 1/2" socket (for socket wrench)
- 1/2" box wrench
- Socket wrench

1. Be certain that the aircraft ignition switch or magneto is "OFF" and that all magnetos are grounded any time the propeller is handled.

2. Remove spinner dome from propeller assembly (if used).
   NOTE: Some installations also have a spacer.

3. Remove aircraft propeller assembly by loosening and removing propeller hub mount bolts. Set propeller on flat surface.

4. Propeller blades may be removed from hub by removing clamping bolts.

Propeller Maintenance

Instructions for Continuous Airworthiness

The following will help you operate your propeller safely and maximize its life.

- Only install a propeller on an aircraft that has been approved for that aircraft and engine. Inspect propeller to verify that it is in worthiness condition before installation.
- Propeller inspection during aircraft Pre-Flight is considered mandatory. A visual inspection along with physically touching the propeller is the best way to check propeller condition. Also listen for abnormal sounds. It is not necessary to remove the spinner (if equipped) to perform this task. The use of a 10x magnifying glass can be helpful to identify small features or find cracking.
- **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 X 1.1 = 3025) for more than 2 minutes, you must perform the Inspection after suspected impact listed below. Do not spin your propeller above the engine RPM Limits listed in Design Parameters and Limitations. Do not operate any aircraft after a propeller has been subjected to an impact without a thorough inspection. See Inspection After Suspected Impact below
- The propeller has been static balanced at the factory. Dynamic balancing the propeller on the aircraft can reduce vibration and wear of engine accessories and is recommended for optimal performance.
- The propeller should not be used 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.
- Leading edge loss of finish is a normal wear item and is dependent on the amount of operation in rain and grit.
- If roughness is observed during operation, re-torque propeller bolts and verify propeller blades track within 3⁄16” of each other at the tip.
- **If the bolts are ever over-torqued, they should be replaced immediately.**
- **Check bolt torque at least once a year.**
- When the propeller is not in use and exposed to weather cover it with a white cloth cover to extend the life of the finish.

Inspections

Pre-Flight Inspection

Should be completed before each flight

1. Tightly hold a propeller blade while moving it side to side and back and forth to check for any movement between blade and hub. Repeat for each blade. If any amount of free play is noticed, retorquing of the propeller hub bolts is required.
2. Run your fingers along the leading edge of the propeller checking for rough edges. Surface should be smooth and free of any surface cracks or delamination. Inspect blade appearance to see if there is any damage.

Inspection After Suspected Lightning Strike

A&P, IA, or Repairman

Any STERNA 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 the propeller has been struck by lightning, 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 Station for further examination.

Inspection After Suspected Impact

A&P, IA, or Repairman

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 an Approved Propeller Repair Station.

- A blade that tracks more than 3⁄16” to the other blades
- Loose blades in the hub
- Any noticeable or suspected damage to the blade
- Any diameter reduction (tip damage)
- Visible major damage to the hub that exceeds the limits specified for **Minor Hub Repairs**. In particular, inspect for cracks in the bolt holes, counterbores, and barrel cavities which clamp the blades

- Visible major damage to a blade that exceeds the limits specified for **Minor Blade Repairs**. Also refer to Mandatory Inspections section below for maximum allowable blade damage
- Operating changes, such as vibration or abnormal RPM

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

Mandatory Inspections

Annual Inspection

A&P, IA, or Repairman

1. Remove spinner dome and examine it for damage, and cracks. If necessary, replace the spinner dome. See manufacturer for repairs.
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 cover 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. No dents in the Leading Edge (metal erosion shield) should be deeper than 1/8". No dents should puncture the metal erosion shield. There should be no wear through or cracks in the leading edge. If blade damage is beyond Minor Blade Repair instructions below, the blade must either be retired from service or sent to a repair station for evaluation before further service.
5. Examine the data plate on the shank of each blade. Verify that you are using approved blades for the hub and engine model. If you are unsure contact the factory for assistance.
6. Conditions requiring blade retirement from service:
    - Any hole in hollow blade shell (doesn't apply if a replacement metal erosion shield will cover hole)
    - Any crack or damage deeper than .025"
    - Any solid tip damage that can't be trimmed off completely within the limits for minimum diameter
7. Remove the mounting 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.

8. Remove the hub mount half and spacer. Inspect both hub halves for corrosion. If necessary, carefully remove any flaked or blistered paint from the hub surface, taking care not to scratch the aluminum surface. If there is any corrosion or damage present, please see Minor Hub Repair instructions below.
9. Remove the rear spinner bulkhead and examine for missing fasteners, damage, and cracks. If damaged or cracked, replace the spinner bulkhead.
10. Reinstall the assembly per the above installation instructions.

1500 Hour Major Periodic Inspection

A&P, IA, or Repairman (for spinner and propeller removal only)

1. Remove spinner dome and examine for damage, and cracks. If necessary, replace the spinner dome. See Spinner Repairs below
2. Remove clamp bolts and washers and retire from service.
3. Remove the hub cover half and blades. Set aside.
4. Remove mount bolts and special lock washers and retire from service.
5. Remove rear spinner bulkhead and examine for damage, and cracks. If necessary, replace the rear bulkhead.
6. Remove the hub mount half and spacer (if applicable).
7. **Send hub cover half, hub mount half, and blades to an Approved Propeller Repair Station or Sterna factory for the remaining 1500-hour inspection.**
8. Reinstall propeller repair station approved or new propeller, spacer (if necessary), and spinner per the above installation instructions.

Repairs

Minor Blade Repairs

A&P, IA, or Repairman

For minor impact damage, nicks, and gouges in composite material of blade not to exceed .025 depth and or .5 square inches of surface area:

1. Fill with high strength epoxy resin West System 105/206 or equivalent thickened with aerospace filler material, such as Colloidal Silica 406, Cabosil, or equivalent.
2. Sand smooth when dry.

Wear and/or roughness of metal erosion shield on blade leading edge. If metal is not worn through:

1. Use 220 grit sandpaper or coarse scotch pad to remove roughness or minor pitting, being careful to not grind through the erosion shield.
2. Polish with fine scotch pad or equivalent to remove scratches.
3. Blade wear is inevitable on the blade and 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. When using touch up paint, keep in mind that excess paint can cause an out of balance situation so touch up should be kept to a minimum.

Minor Hub Repairs

A&P, IA, or Repairman

Any hub or spacer that would exceed what is depicted below in **Figure 9** below for minor repair must be retired from service. These dimensions (other than radius) are maximum allowable. Anything less is acceptable. Radius can be greater. A hub can be returned to service with the following limitations:

- No more than two (2) repairs in a single barrel half (where the blade touches the hub) for a total of (8) barrel repairs in one (1) complete 2-blade hub or (12) barrel repairs in a 3-blade hub, as long as the repairs do not touch.
- General hub repairs can be indefinite, both inside and outside as long as the repairs do not touch.
- No repairs over a previous repair.
- No repairs on the hub mounting flange face.
- No repairs on either flange face of the spacer.

Corrosion – **Note:** All corrosion must be removed before a hub can be returned to service. Corrosion removal is considered a repair.

Instructions for removing the damage or corrosion spot:

1. Sand the area with 220 wet-or-dry abrasive paper until all evidence of damage or corrosion is removed. A small motorized grinding tool may be used. The repaired area must not exceed the limits shown in **Figure 9.**
2. Polish the area with 320 grit (or finer) to remove all scratches.
3. Clean the area thoroughly and inspect with a l0X glass. A penetrant inspection (ASTM E 1417 or equivalent) is recommended if damage is still suspected after the repair, **NOTE: It is extremely important that all corrosion be completely removed.** If cavities reappear during penetrant inspection, the repair operation must be repeated.
4. Remove penetrant from the affected area.
5. Spot Alodine the repaired area.

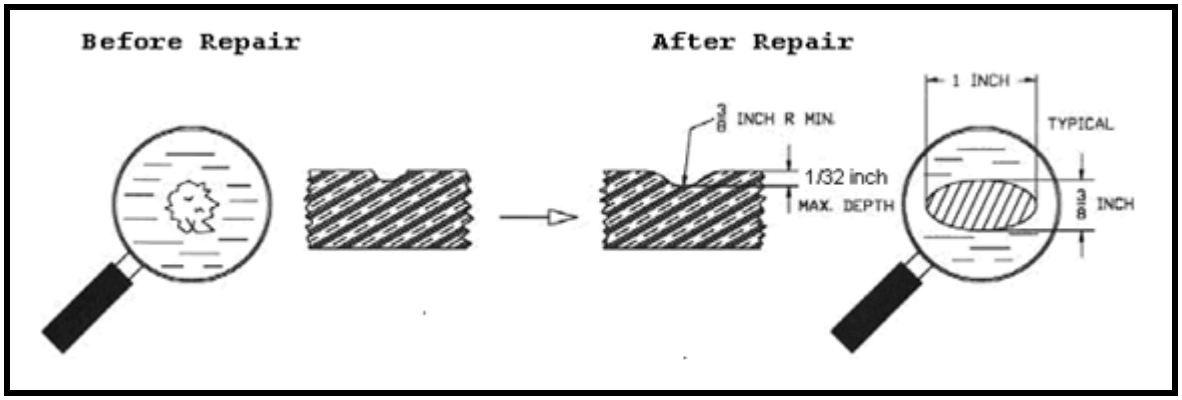

FIGURE 9: Minor Hub Repair Limits

Spinner Repairs

- See instructions from Spinner Manufacturer

Limited Warranty

STERNA offers a one year limited warranty on any defect in materials and workmanship.

In the event a unit does not conform to this express warranty, Sterna Aircraft LLC will repair or replace the defective material at its place of business in Zephyrhills, FL 33542 USA. Sterna 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 Sterna Aircraft. 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 Sterna Aircraft or sending email to prop@sternaaircraft.com), and a brief description of the defect. Sterna composite propellers are made with aviation grade material and advanced manufacturing technology. All Sterna propellers have been balanced and inspected before delivery.

Conditions, Exclusions, and Disclaimers

This limited warranty applies only to units that have been installed, used, and properly maintained 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. Racing use of any kind or use on or with engines or equipment not approved by Sterna and 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, EXPRESSED 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 Sterna Propeller to a customer or user, whether based on contract, negligence or otherwise. **IN NO EVENT SHALL STERNA PROPELLER 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.

DESCRIPTION OF ALL OPERATIONS PERTAINING TO INSPECTIONS AND MAINTENANCE (1 of 2)

DATE	TACH TIME	DESCRIPTION OF WORK	SIGNATURE

DESCRIPTION OF ALL OPERATIONS PERTAINING TO INSPECTIONS AND MAINTENANCE (2 of 2)

DATE	TACH TIME	DESCRIPTION OF WORK	SIGNATURE