



# **Gori 3-Blade Shaft Installation Instructions**

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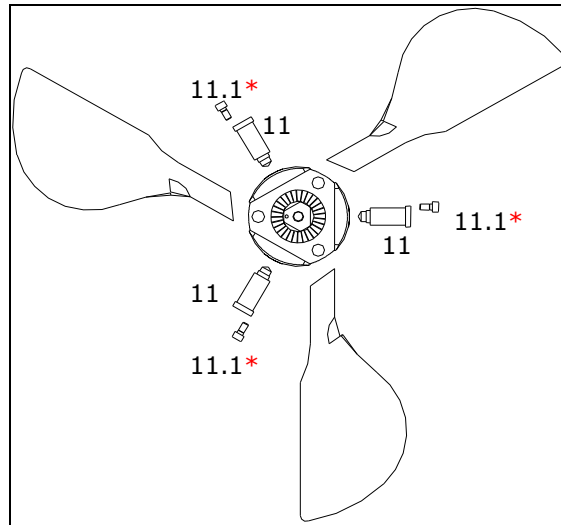
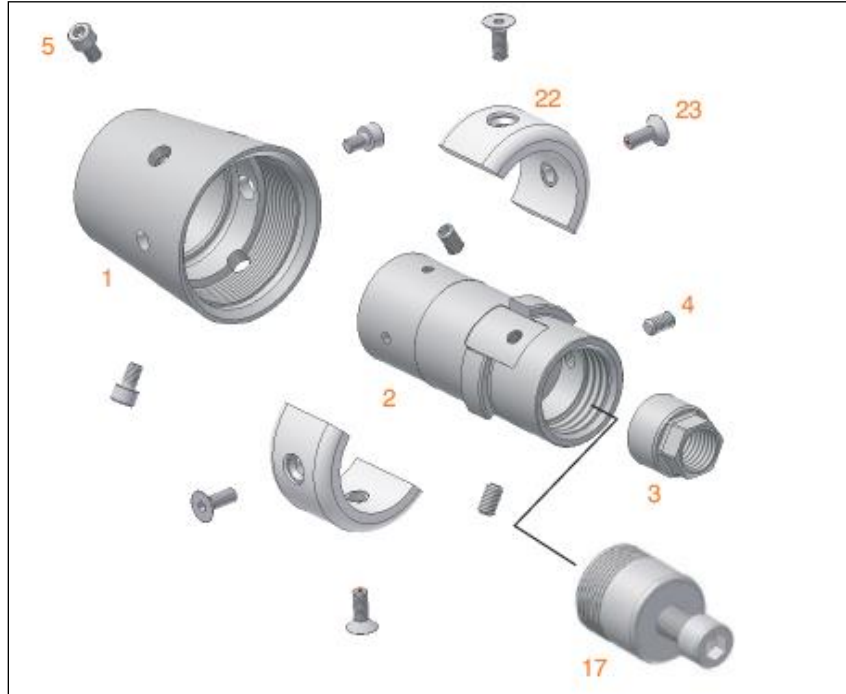
## **Parts List**

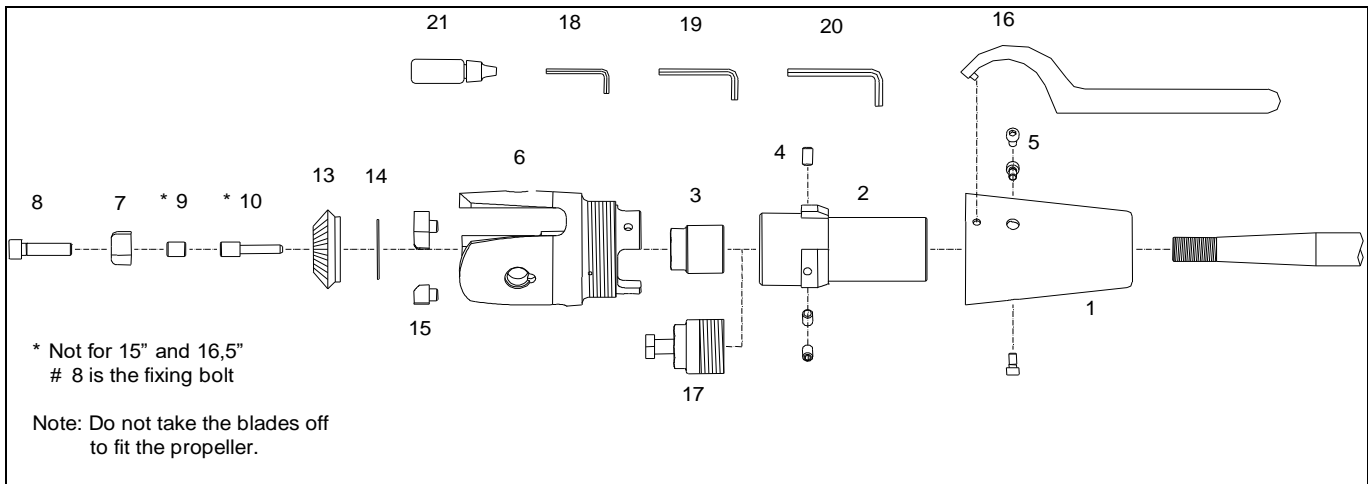
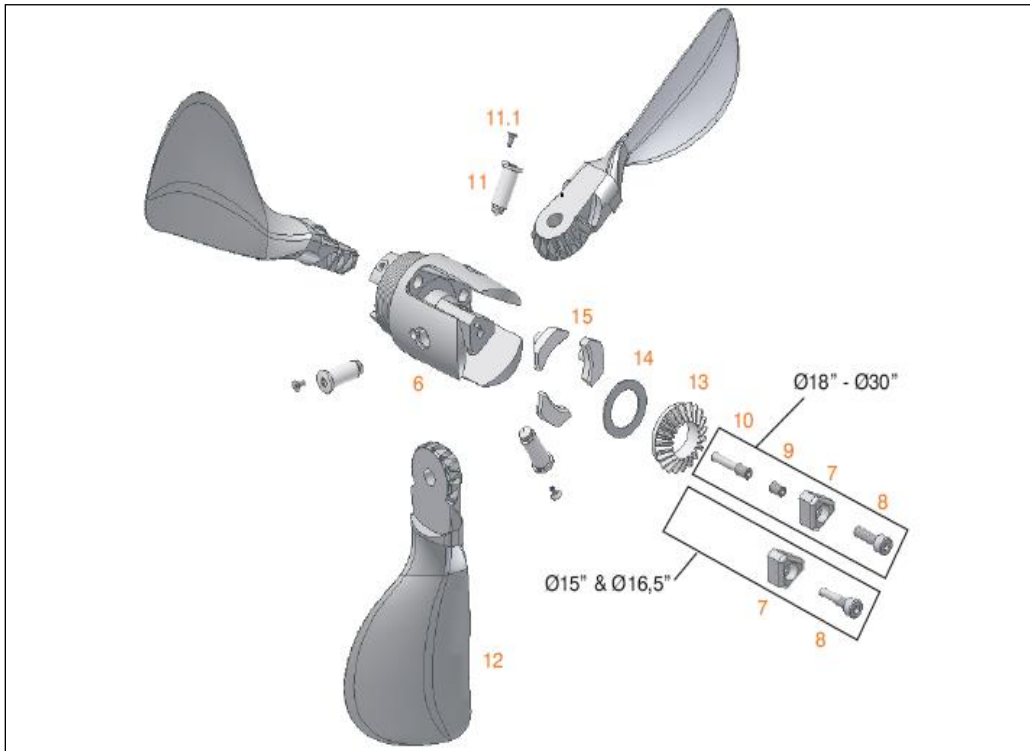
|      |  |    |                          |
|------|--|----|--------------------------|
| 1    | Jacket   | 12 | Propeller Blades (3)     |
| 2    | Hub (Cone)   | 13 | Gear-Wheel               |
| 3    | Shaft Nut  | 14 | Spacer                   |
| 4    | Allen Screws (3) for Locking Shaft Nut             | 15 | Flexible Stops (3)       |
| 5    | Lock Bolts (3) for Jacket (item 1)                 | 16 | C - Spanner              |
| 6    | Blade Housing                                      | 17 | Propeller Puller         |
| 7    | Aft Zinc Anode                                     | 18 | Allen Key 4mm            |
| 8    | Lock bolt for zinc & fixing bolt for 15-16.5" dia. | 19 | Allen Key 5mm            |
| 9    | Threaded pin                                       | 20 | Allen Key 6mm            |
| 10   | Fixing bolt for Blade pins (Item11)                | 21 | Loctite (Blue) 243       |
| 11   | Blade Pins (3)                                     | 22 | Forward collar zinc      |
| 11.1 | External Pin Locking Bolts                         | 23 | Collar zinc fixing bolts |

## **Shaft Nut Socket Sizes**

|                          |                       |              |
|--------------------------|-----------------------|--------------|
| 3-Blade ~ Standard Shaft | 15" to 16.5" diameter | 22 mm socket |
| 3-Blade ~ Standard Shaft | 18" to 20" diameter   | 30 mm socket |
| 3-Blade ~ Standard Shaft | 22" to 26" diameter   | 36 mm socket |
| 3-Blade ~ Standard Shaft | 28" to 30" diameter   | 50 mm socket |

## Schematic Drawings





### Torque Settings for Shaft Nuts

| <b>40Nm or 30ft/lb<br/>or 40nm<br/>or 30 ft/ib</b> | <b>60Nm or 45ft/lb</b> | <b>70N/m or 50 ft/lb</b> | <b>100Nm or 75ft/lb</b> | <b>125Nm or 75ft/lb</b> |
|--|------------------------|--------------------------|-------------------------|-------------------------|
| M14 X 2.0  | M16 X 2.0              | M16 x 1.5                | M20 x 2.0               | M20 X 2.5               |
| M14 X 1.5  | 5/8" BSW               | 5/8" BSF                 |                         | 3/4 BSW                 |
| 1/2" UNC   | 5/8" UNC               | 5/8" UNC                 |                         | 3/4" UNC                |
| 1/2" BSF   |                        |                          |                         |                         |

| <b>135Nm or 100ft/lb</b> | <b>160Nm or 115ft/lb</b> | <b>225Nm or 165ft/lb</b> |
|--------------------------|--------------------------|--------------------------|
| M20x1.5                  | 7/8" UNC                 | M24 x 2.0                |
| 3/4" BSF                 |                          | 1" BSF                   |
| 3/4" UNF                 |                          | 1" UNF                   |

## Installing the Propeller

The propeller is delivered assembled. This ensures that at the factory the propeller has been checked and balanced before shipping. See [GORI 3 Blade Shaft Installation – YouTube](#)

**Warning ~ Do Not remove the blades from the blade housing when installing or removing the propeller from the shaft!**

1. Unscrew collar zinc screws (23), remove the collar zinc (22).
2. Remove the 3 x Allen head bolts (5) holding the jacket (1) in place.
3. Unscrew and remove the jacket (1) from the blade housing (6) using the C-Spanner (16). The thread on the blade housing assembly is a standard right to tight and left to loose. You may use a hammer with care, to get the jacket started as it is torqued in place. Place the C-Spanner on the stb. side of the propeller and hit C-Spanner down.
4. Pull the hub cone straight out of the blade housing. You now have the jacket and blade housing (with blades installed) and the hub cone (2) separated.
5. Check the fit of the hub cone (2) onto the shaft without the key. Shaft end should not protrude beyond hub cone aft end. Install hub cone on shaft with key in place. Check the key for fit, nicks and dings. There should be a slight gap at the top of the key. The taper fit is dry – do not use a lubricant on hub cone or shaft taper.
6. Check that the shaft nut (3) threads onto the shaft threads. After confirming fit remove shaft nut.
7. Slide the jacket (1) onto the shaft first. Lightly smear/coat the jacket threads with waterproof grease, Lanocoat, Tuffgel etc. Remove the three locking dog (cone) point Allen screws (4) from the nut hub cone (2). Slide the hub cone (2) onto the shaft and tighten the shaft nut (3) to recommended torque. [See chart]
8. Coat the three dog (cone) point Allen screws (4) with Loctite-243 and tighten securely into the hub cone (2), locking the shaft nut(3), firmly in place. To do this you may need to rotate the jacket to line up an access hole with the allen screws (4).
9. Lightly coat the blade housing jacket threads with waterproof grease, Lanocoat, Tuffgel etc. Slide the blade housing assembly onto the hub cone (2), making sure that the tabs engage the hub cone. Push it forward until you can start the thread of the jacket (1).
10. Tighten the jacket (1) to the blade housing assembly. Use the C-Spanner (16) to tighten and align the three threaded holes (5) with the holes in the jacket.
11. Now using locking glue (Loctite 243), re-install the 3 Allen head bolts (5) into the jacket holes and tighten firmly to 8Nm Torque. 15-26”dia. - M6x8, A4-70. 28-32”dia. - M8 x 10, A4-70

**The supplied Loctite 243 locking glue is “Blue” and is for disassemble of parts with hand tools. Note: If Loctite “Red” is used it is permanent and requires heat to undo (450°F for 5 minutes). Applying locking glue “Blue” correctly is important. The surfaces must be clean and degreased. Locking Glue needs to be put in the hole as well as threads for blind holes such as with the Locking bolt.**

12. Check that the blades will move freely from forward to reverse.

Your Gori is water lubricated. At hauling, after cleaning, before storage, put a light "smear" of a waterproof grease over the blade teeth, blade cheeks, gear wheel (13) and blade fork housing (6) contact points. This will allow you to check blade operation and stop oxidization of the metal when out of the water.

## Removing the Propeller

**Warning ~ Do Not remove the blades from the blade housing when removing the propeller from the shaft**

1. Remove the collar zinc (22) by removing screws (23). Ensure zinc surface is clean/unobstructed.
2. Take apart the jacket (1) from the blade housing (6) - First remove the 3 x Allen head bolts (5), from the jacket.
3. Using the C-Spanner (16), unscrew the jacket so that it separates from the blade housing and push it forward on the shaft. To unscrew the jacket, place the C-Spanner on the stb side of the propeller and hit the C-Spanner down. The jacket unscrews forward. Lubricate threads if necessary to facilitate unscrewing.
4. Remove the blade housing assembly by pulling straight aft from the Hub cone.
5. Undo the Allen screws (4) to allow removal of the shaft nut (3). It is not necessary to remove them completely from the Hub cone (2).
6. Unscrew the shaft nut (3) counterclockwise using socket.
7. Install the bronze puller (17) into the hub cone (2). Thread it in all the way.
8. Tighten the large bolt in the centre of the puller (17) and this will draw the hub cone off of the shaft. Use a shock hit to the bolt end to remove the hub. As you tighten center bolt, hit with hammer, continue with tighten-hit, tighten-hit, etc., until it breaks free from taper. Use heat if necessary.

## Replacing the Aft Zinc

This should be done if more than 50% of the zinc (7), has been eroded away.

1. Undo the Allen head bolt (8) and remove the old zinc (7).
2. Clean the zinc contact surface on the blade housing to ensure clean strong bond with the new zinc.
3. Replace the zinc with a new zinc. Locate and align the zinc with the pin on the end of the blade housing.
4. Use the new Allen head bolt supplied. Smear with loctite (supplied) before re-installing the bolt. Note: on 15"-16.5" diameter propellers this bolt retains the blade pins so use the Gori zinc and bolt.
5. Check that the zinc is correctly aligned and blades swing through completely from forward to reverse. If zinc and blades contact each other, realign zinc (tap with hammer to align).

## Replacing the Forward Collar Zinc

1. Remove the 4 x Allen-head bolts and remove what is left of the zinc
2. Clean the surface of the propeller blade housing to ensure a good clean contact between the hub and the new zinc

3. Install the new zinc using the Loctite (supplied) on each of the 4 x Allen-head bolts

## **Replacing Flexible Stops**

The Replaceable Flexible Stops serve to minimise noise and absorb blade opening shock load at start-up and when going into reverse and Overdrive. There is no standard time/hours for replacement, it depends on the amount of wear due to engine hours, blade loading and inertia.

The stops "sit" (are installed) under the bevel of the center gear wheel between each blade slot with their round tit pressed/located into a hole (see schematic). The propeller does not need to be disassembled to remove and install new Flexible Stops, however the task is easier if the propeller is disassembled - blades and gear wheel removed.

### For a Disassembled propeller with Blades removed

1. To remove old stops (15), use a flat head screwdriver positioned under the stop and pry the stop up and out of the retaining hole.
2. Clean the hole and surrounding area.
3. Ensure the "tit" hole is clean.
4. Apply a smear of a lubricant – lite oil/grease/dish washing liquid - to the tit.
5. To install new stops, locate the stop tit over the hole.
6. Press the stop into the hole ensuring it is fully seated. Use a wood dowel and tap down to press the stop fully home in the hole.
7. Reassemble propeller making sure the PEPT spacer and center gear wheel are positioned and turn freely.

### For a non-disassembled propeller with Blades installed

1. Move the blades into the fully folded position, exposing the old stops (15).
2. Use a flat head screwdriver positioned under the stop and pry the stop up and out of the retaining hole.
3. Clean the hole and surrounding area.
4. Ensure the "tit" hole is clean.
5. Apply a smear of a lubricant – lite oil/grease/dish washing liquid - to the tit and to the back bevel inside face to the gear bevel.
6. Ensure the blades are in the fully folded position, exposing the retaining slot "tit" holes.
7. To install new stops, locate the stop tit over the hole.
8. Press/work the stop into the slot between the gear teeth by moving the blades slightly back and forth, swivelling them open and closed, to obtain the best angle and position over the hole.
9. The stop will be sitting above the gear wheel. Use a flat blade screwdriver to position and hold the stop tit over the hole.
10. Bring the blade 'down' into the fully open position (with a bit of force), "popping" the stop into position under the gear wheel bevel and fully into the hole. Alternatively using a wood dowel over the stop, tap the stop down so it 'pops' under the center gear bevel.

Notes:

- If the stops are loaded left and then right, the stops may get twisted causing the teeth and stops to rub on one end of the stop.
- If loaded with stop tit pointed upwards, and then pushed down to rotate the entire stop, as in pushing the tit on the stop downwards along the centerline of the stop, this keeps the stop better aligned with the gears as it gets its tit inserted (pushed) into the housing. Use the blade of the prop plus a flathead-screwdriver blade to do this to fully insert the tit into the housing.

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# **Removing the blades from the Blade Housing**

***This ONLY needs to be done when cleaning and full service of the propeller is required. Blades are not removed for the installation and removal of the propeller.***

1. Remove the zinc centre bolt (8) and the zinc anode (7), using a 5mm Allen key (19).
2. On propellers 18.0" Dia. and larger it will also be necessary to: Remove the threaded pin (9) using a 6mm Allen key ... then Remove the fixing lock bolt (10) using a 6mm Allen key.

***Failure to remove the Center Fixing Locking Bolt first will result in damage to the internal threads of the blade housing (6), blade pins (11) and Fixing Lock Bolt (10).***

3. Remove the blade pin External Locking Bolts (11.1).
4. Disassemble the blade pins (11) from the blade housing using 6mm Allen key. Note that blades, pins and the housing are matched and numbered. They should only be reassembled in the correct location ... that is #1 - # 2 - # 3. (Note: Pins are torqued into place)
5. Remove the blades.
6. Remove the flexible stops (15) using either a flat blade screwdriver or pliers.
7. Remove the gear-wheel (13) and the spacer (14).
8. Remove the flexible stops (15) if required using either a flat blade screwdriver or pliers.
9. The blade housing (6), the pins (11) and the propeller blades (12) are numbered 1,2 & 3 and must be matched when reassembling. When re-mounting the blades to the housing it is important to apply loctite-243 to all of the following: blade pins and external locking screw/bolt (11 & 11.1), fixing lock bolt (10), threaded pin (9), zinc anode bolt (8).
10. On older models without the external lock bolt (11.1), the blade housing (6) and the blade pin head (11) are marked with a hatch line and must align when remounting.
11. The fixing bolt (8) on 15-16.5" dia or (10) on 18" dia. & larger, locates in the ½ moon cut out in the blade pin end and stops the blade pin from unscrewing/coming out.
12. The fixing lock bolt (10) or the zinc fixing bolt (8) are the very last items to be reassembled.
13. Be sure that all components fit back together and that the blade pins (11) are located as before removal as they are indexed inside the hub to lock bolts (10 +8) by the external Lock Bolts (11.1) or the hatch line.

## **Note:**

- If more than 50% of either of the zincs (7-17) has been eroded away they should be replaced.
- If the gear wheel (13) has been damaged or worn, it should be replaced
- If spacer is damaged, replace. If there is wear, excessive wear (play) between the blade pin, the blade pin hole, blade teeth and gear wheel, the spacer can be replaced with a thicker one to engage all parts.
- If the flexible stops (15) have been damaged or worn...they must be replaced.
- Apply a "lite" smearing of a lithium based waterproof grease to all blade, hub fork and gear teeth contact surfaces at haul out to stop oxidizing and just prior to launch.

# Operating Instructions

The Gori 3-blade propeller has two distinct pitch settings in the forward direction - standard and overdrive.

Standard forward pitch allows the engine to perform to the required engine manufacturer's RPM.

The higher overdrive pitch will absorb approximately 300~600 additional engine RPM. Thus the boat will attain the same boat speed at lower RPM in the overdrive position.

## **Ahead**

The propeller will operate in the standard forward setting when the blades open, due to the centrifugal force of the shaft when in gear.

Should you have backed out of your slip, and then engage forward, you be in overdrive. To go back to standard forward gear, simply move the shift lever into neutral for ~2 seconds (allowing the blades time to fold together) and then go back into forward. You will soon learn the difference between standard and overdrive by checking boat speed and engine RPM sounds.

When maneuvering around the marina you may well remain in overdrive. Therefore, when leaving the marina and beginning your trip always check that you are in the drive position you want.

## **Astern**

In the reverse position the blades swivel 180° opposite the forward position which ensures the same blade shape and leading edge to the water, resulting in higher efficiency. This will also eliminate prop-walk when maneuvering in reverse in the marina. If the boat has not been used for sometime, it is wise to shift cautiously between forward and reverse a few times before going out sailing in order to clean the teeth of the blades and the gears from further fouling.

In the reverse position the pitch on the blades is at a greater angle than when in standard forward. This is done purposely as many transmissions have higher ratios in reverse than forward and so require a greater pitch to take into account the slower shaft rpm when in reverse.

## **Overdrive**

As mentioned above, this position is obtained when the blades are set in the reverse position, but the blades and shaft are rotating forward. In this situation you will have a propeller with an increased pitch. Overdrive allows a lower cruising RPM for the same boat speed. It will be as much as 300~600 engine RPM lower than when in standard forward.

### **How to get into or out of overdrive?**

**Overdrive » standard drive:** Be sure that you are moving ahead at around 3~4kts ... now move your shift lever into the neutral position (if you have dual lever control then reduce RPM accordingly) ... wait ~2 seconds, to allow the blades to fold to their sailing position ... now reengage forward with the shift lever (and if necessary increase engine RPM with the second lever). You should now be in standard forward and this will show with increased engine RPM, which perhaps were not attainable, while in overdrive. On some larger vessels it has been found that to stop the shaft rotation even more quickly than as above ... simply put the shift lever into the reverse position momentarily, this will cause the shaft to stop its freewheeling more quickly than just relying on the water flow. Once the shaft has stopped re-engage forward and increase engine RPM.

**Standard » overdrive:** Reduce RPM and move the shift lever into neutral ... now go into reverse and increase engine RPM to around 1000-1800 RPM. This will set the blades into reverse. Now go from reverse to forward position without hesitation ... you will now be in overdrive. By moving the shift lever smartly from reverse thru to forward the shaft and blades will not have the opportunity to stop and the water flow fold the blades as for sailing ... thereby remaining open in the reverse or overdrive position. Do not press the engine to the max RPM when in overdrive as this will result in overloading. Only use overdrive when motoring in clam weather or when motor-sailing.

*\*Gori propeller disclaims the responsibility for any damage caused by overloading the engine. In case of doubt about the engine loading, you should contact the authorized engine service agent and Gori propeller as well.*

## Sailing

When sailing, the blades will fold and the shaft will not spin, giving you less drag and more speed. When starting to sail, to fold the Gori blades immediately, go into reverse for a brief second, then back to neutral. This stops the shaft immediately and the blades will fold and align with least resistance. Turn off the engine. With mechanical transmissions you can put the shift lever into reverse – see your engine manufacturer’s instructions. Hydraulic transmissions will not rotate when under sail with the Gori propeller.

### **WARNING!!!**

- Do not start the engine while the boat is out of the water
- The prop may have sharp edges... be careful not to cut yourself
- Make sure the blades do not open or close suddenly and trap your fingers
- Stop the engine before diving or swimming in the vicinity of the boat
- Propeller blades can cause considerable damage when rotating ... be careful.
- Do not remove fish nets, rope or similar from the prop with the engine running.
- Check that the prop works in both forward and reverse before each trip.
- If any strange sounds or vibrations are noticed coming from the propeller stop the engine and investigate the reasons/solve the problem.
- In case of problems in connection with the mounting, use or other function of the propeller, contact Gori propeller or the local agent/importer.

# **Cleaning and Maintenance**

## **Annual Maintenance**

1. Clean your propeller with an acid cleaner such as Barnacle Buster – per MSDS, use 85% phosphoric acid with concentration of 5%-20%. When pressurewashing, using Scotchbrite, wire brush/wheel, bead blaster or 120 grit paper, be mindful of, i.e., do not “attack”, the blade edges.

***Propeller blades “work” with attached water flow - 1mm of growth on a blade causes loss of approximately 12% of its efficiency - so keep the blades clean.***

2. Remove any growth on the blade gear teeth.
3. Smear with your finger a light coating of a Lithium based waterproof grease on the teeth/forks/blade root - the contact faces and moving parts. This stops surface oxidizing over the winter and ensures smooth operation.
4. If you have disassembled your GORI make sure that the Jacket/Blade assembly threads are greased so that any calcium build up is negated in the thread.
5. Change the anodes at 55% wastage, i.e. 45% is remaining ([Saildrive and 3-blade](#))
6. Check the flexible stops ([3-blade](#)) for wear
7. Paint with hard anti-foiling paint, ablative antifouling and a silicon based epoxy (i.e. PropSpeed), zinc spray or any other product that says it negates/stops growth (Lanolin etc) can be used.
8. Ensure that the coating is smooth and does not impair the operation of the blades (gear teeth, bearings, seals etc).

## **Underwater Installation**

***Underwater installation is NOT recommended, but can be accomplished by a skilled diver and appropriate tools and underwater fastener adhesives***

**Loctite 248** is a medium strength Threadlocker Stick that is sold to be used under water. Apply the 248 to clean dry threads out of the water and make sure the wax based product is thoroughly pushed into all of the threads (no air gaps) before taking the fastener below the water. It takes 24hrs for full cure after installation. Loctite 248 blue stick can be purchased from Fastenal <http://www.fastenal.com/web/locations.ex>

**Vibra-Tite VC-3** is an automotive product that can be used under water. Apply to the fastener threads, let dry for 10-30 minutes and install below water. VC-3 is available from most auto parts stores - we have the VC-3 in stock (used with our Shaft Shark line cutter) and can ship the same day as your order.

***Do Not Use regular thread locking glue not intended for use underwater – attempts to apply it under water will ultimately fail/wash off***

Bondchem WT03 Thread Locker liquid glue, supplied by Gori, and Loctite Blue 242 liquid (or Red) cannot be used under water - they cure anaerobically and must be applied to a clean dry surface as per their instructions.