

# Slipstream®

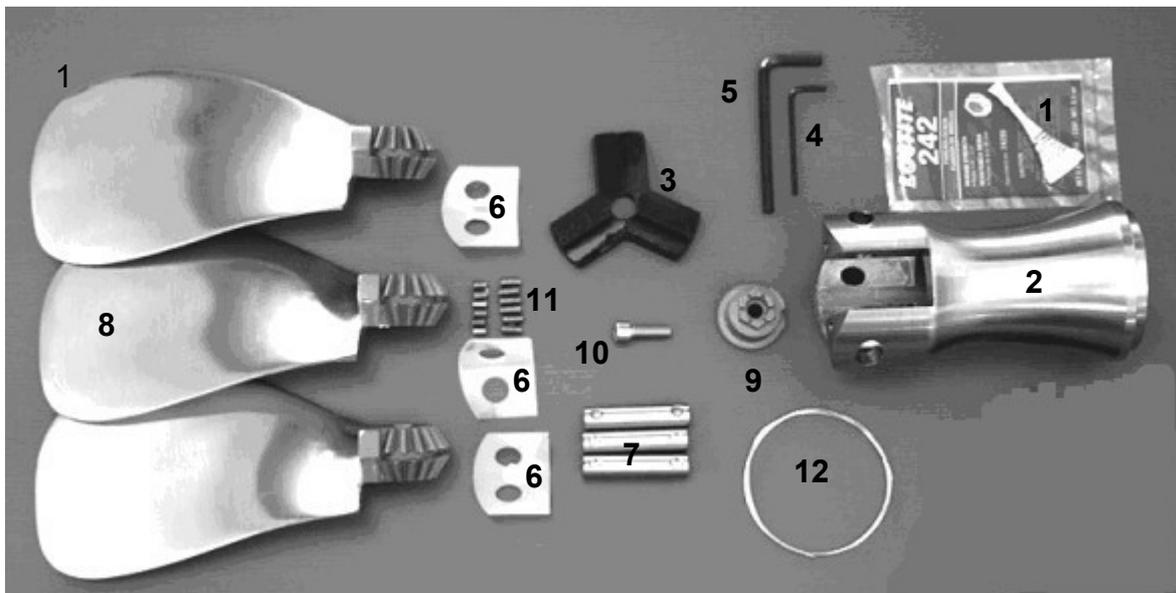
## Folding Sailboat Propellers

### S7 Saildrive Model Installation and Operation Instructions

Your Propeller Serial Number is: .....

#### CAUTIONS:

- This propeller has blades that rotate on pivot pins and incorporates integral gears. To prevent pinching your fingers or hands, keep them clear of the gears and the area around the pivot point of the blades whilst working on your propeller.
- To prevent injury, or damage to the propeller components, use caution not to drop the various parts of the propeller during disassembly/assembly.



- |                        |
|------------------------|
| 1 - Loctite 242 x 2    |
| 2 - Propeller Hub      |
| 3 - 'Bump Stop' Pad    |
| 4 - 3mmHex Wrench      |
| 5 - 6mmHex Wrench      |
| 6 - Side Thrust Plates |

- |                              |
|------------------------------|
| 7 - Blade Pivot Pins         |
| 8 - Blades                   |
| 9 - Shaft Nut                |
| 10 - Shaft Nut Locking Screw |
| 11 - Pivot Pin Set Screws    |
| 12- Locking Wire             |

#### **INSTALLATION TOOLS REQUIRED**

- 3 & 6mm Hex Keys (supplied with propeller)
- 13/16" or 20mm Socket Wrench (same as a standard sparkplug wrench)
- Needle Nose Pliers – (These need to be in good condition)
- Sidecutters and Multi-purpose pliers

## **INSTALLATION**

1. Check the propeller for transit damage and note how the blades open and close and their positions at either extreme for future reference.
2. Before proceeding please read the conditions of the 5-year warranty and remember to send in your warranty registration. If your registration is not received, the warranty will apply from the date that the propeller was shipped from the factory. Your warranty can be registered on-line, via post or fax, you will find all the details at the end of these instructions.
3. Using the supplied 3mm hex wrench (4), remove the 6 x short and 6 x long set screw's (11) that secure the three blade pivot pins (7) in place.
4. One after the other, slide the blade pivot pins (7) out of the propeller hub (2), while holding and wobbling the blades (8). The side thrust plates (6) will start to fall out of their position in the body beside the blades once the second and third pins and blades are removed, put these to one side.

**Note:** The blades are marked "1" "2" & "3", with corresponding numbers on the hub. Take note of this, as it is important the blades are assembled back into their original position.

**Caution:** Once the blades and 'bump stop' pad are removed during the following steps, the propeller nut, which may be stored inside the propeller, may fall out of the propeller hub.

5. Remove the 'bump stop' pad (3) by lifting it directly out of the end of the hub.
6. Remove the old propeller and clean up the shaft. Replace the zinc anode on the saildrive leg if necessary. Any line cutter or spacers should be left in place.

**NOTE:** By design the Slipstream saildrive propeller is a snug fit on the shaft and will be difficult to fit if there is any build up of foreign matter, damage, or poor machining on the shaft. Careful cleaning and removal of any damage will allow the prop to be slid on the shaft.

7. Lightly grease the splines of the saildrive shaft.
8. Fit the propeller to the shaft and rotate it while checking that it is not touching the leg anode. The clearance will vary as suppliers of leg anodes vary. If the propeller body is touching, check that the correct spacers and washers are in place. If there is still insufficient clearance, shape the anode with a file to suit. DO NOT remove any original washers or spacers to decrease this clearance.
9. Place Loctite 242 on the shaft thread, then fit and tighten the main propeller nut to 50Nm or 36ft/lbs of torque using a 20mm or 13/16" socket, taking care not to over tighten.
10. Screw the cap head locking screw (10) into the tip of the shaft and tighten to 15Nm or 11ft/lbs using the supplied 6mm hex key (5)



## USE CAUTION

Most Yanmar shafts are heat-treated. The threaded section may snap off completely if the nut is tightened excessively.

11. Check to see if one of the pairs of holes in the cap head locking screw aligns with any one pair of slots in the nut. This is to allow you to insert a piece of the locking wire through the slots and cap head screw as pictured right. If you cannot insert the locking wire, tighten the locking screw slightly until you can. This is the 'fiddly' part and a good quality pair of needle nose pliers makes this much easier. Be careful not to over tighten the locking screw, it is preferable to be slightly loose than too tight.

12. Once the wire has been inserted through the nut and screw twist the two end together a couple of turns and cut off the excess. Flatten the twist down on to the top of the nut. **Ensure the ends of the wire do not protrude and interfere with the fitting of the bump stop.**



13. Refit the 'bump stop' pad (3) inside the end of the propeller hub, as it was originally fitted.
14. Refit the three side thrust plates (6) into position, using two blade pivot pins (7) in blade positions "2" & "3" to temporarily hold the plates in position.
15. Fit blade number "1" into position "1" between the two empty pivot pin holes, with the gear teeth facing towards the centre of the hub and insert the remaining pivot pin into place, ensuring the two holes line up with the set screw holes. A small screwdriver can be used in the small slot at the end of the pin to assist in lining the holes up. This slot will point directly to the hole if it is in the correct position.
16. Carefully screw one of the long set screws into the hub to secure the pivot pin that is holding the blade in place, then back the screw out  $\frac{1}{2}$  a turn.
17. Remove the temporarily fitted pivot pins, one by one and place the correspondingly numbered blade into position, ensuring the gear teeth are lined up so the blades are in all same position. Tip: Gently moving the blades back and forth slightly will assist in fitting the remaining blades & pins, securing each pin in turn the with one long set screw.
18. Check that the blade gears are engaged correctly and operate in unison. They should open fully and close the same as the propeller was originally shipped.
19. Insert all of the remaining longer pivot pin setscrew's into the hub, snugging them down and them backing off  $\frac{1}{2}$  a turn until all are fitted, tighten snugly, but not tight, once all six are fitted.
20. Add a few drops of the supplied **Loctite 242** to each of the SHORT pivot pin locking set screws (NOT the holes they screw into). Tighten them on top of the longer set screws installed in the previous step.

**Note:** The short set screw's should go **completely** into the propeller hub and be flush with, or just under the surface of the hub, if not this indicates that the long screws are not entering the pivot pin fully and the alignment of the holes must be checked. Failure to correct this may result in the pivot pin becoming loose in operation and possible loss of a blade.

21. Finally, check that the blades open and close in a synchronised fashion and are free from restrictions or stiffness, any problems should be examined and corrected before using the propeller. A little dry binding may occur and should ease with application of a little WD40 or other spray lubricant.
22. Your propeller is now installed and ready to use.

## **OPERATION**

There are a few tips to using your **SLIPSTREAM**® propeller that you should familiarise yourself with **before** use.

**Forward:** As soon as forward gear is engaged the propeller will start to turn, this will cause centrifugal force to swing the blades out and bring them into the full open position, aided by the force of the blade pushing against the water. The propeller performs the same as a fixed propeller in forward.

**It is highly recommended that in normal operation, forward gear be engaged at idle and then throttle applied**, only once the blades have fully opened, this will prolong the life of the 'bump stop'. Opening of the blades occurs in a split second and all that is required is to engage the gearbox, **then** apply the throttle. This will increase the service life of the propeller, gearbox and drive train. Engaging forward gear with engine RPM's above idle will dramatically shorten the life of the pivot pins, bushes and bump stop plate.

While the propeller is sturdy enough to withstand emergency forward engagement at full throttle, this will open the blades with substantial force and increase wear on the propeller, drive chain, and gearbox. This is to be avoided except in emergency to prolong the service life of these items.

**Reverse:** As soon as reverse gear is engaged the propeller will start to turn, this will cause centrifugal force to swing the blades outwards allowing the blades to start to thrust against the water. The blades will find a balance point, between the centrifugal force of the rotating blades and the counteracting force of the thrust created by the blades. This means the propeller will never quite achieve a full open position in reverse and has reduced efficiency - this is a physical limitation of all folding propellers. Usual practice is to add more throttle initially, to start the reversing or stopping manoeuvre, reducing the throttle once the propeller has begun to produce the desired thrust.

**Sea Trials:** The reversing efficiency and behaviour of a folding propeller is affected by many factors and every boat combination behaves in a different way. **It is highly recommended** that your new propeller be trialed in safe, open waters to observe the individual characteristics on your boat, experiment to develop any required technique and understand the behaviour of your sailboat with this new propeller in different situations.

## **SERVICING**

The normal service requirements are minimal and consist of inspection and regular cleaning, in particular around the area of the gears and blade pivot points. Disassembly is not required.

Check once a year or more if possible, that the blade pivot pins and set screws have not become loose or damaged due to electrolysis.

A good quality, saildrive leg zinc anode should be used at all times to protect the shaft and propeller from possible electrolysis. This should be regularly checked and replaced when down to approx 25% of it's original weight, or if it becomes loose.

The 'Bump Stop' pad is a service component and should be checked regularly, at least every season. Replace when the ends become worn, to prevent wear to the blades and hub caused by metal-to-metal contact. The life of this pad will vary greatly, depending on the number of times the prop is operated in forward from the closed position, the speed of engagement, pitch and size of the propeller, gear ratio, etc. It may be possible to notice that the normal noise and feel of the propeller opening has become more metallic in nature, if this is the case check the bump stop as it is likely to require replacing. The 'bump stop' pad is available from your selling dealer or Seahawk as a separate part.

The blade pivot pins and bushes in the blades are also designed to be user replaceable, with an expected service life of 3-5 years. Electrolysis, or repeated aggressive engagement of forward gear are likely to be the causes of any premature wear on the bushes and pins. Use of a shaft zinc anode and sensible operation will maximise the life of these components.

When the blade pins and bushes are worn and require replacement a user self service kit is available from the selling dealer or Seahawk. The kit contains the parts to replace the pivot pins, blade bushes, 'bump stop' pad, side thrust pads and set screws.

## **SAILDRIVE CUSHION HUB NOTES**

Your **SLIPSTREAM**® saildrive model folding propeller is fitted with a rubber cushion hub to protect the small gears within the saildrive and gearbox from the shock of normal forward and reverse gear selection. The design of this cushion hub ensures full drive is maintained even in the unlikely event of total failure of the rubber cushion.

If the cushion hub and spline is removed for inspection, care must be taken when reassembling to ensure the Delrin bearings are not damaged when inserting the splined section into the hub.

Should excessive rotational play develop between the drive shaft and propeller hub, or a metallic 'clunk' be audible when changing direction it is likely the cushion hub require replacement, this is not anticipated to be required for many years, but will eventually become service requirement as the rubber wears and degrades with age. A service kit is available to replace the cushion and associated bearings. Easy to follow instructions are provided with this kit to allow self-service.



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