

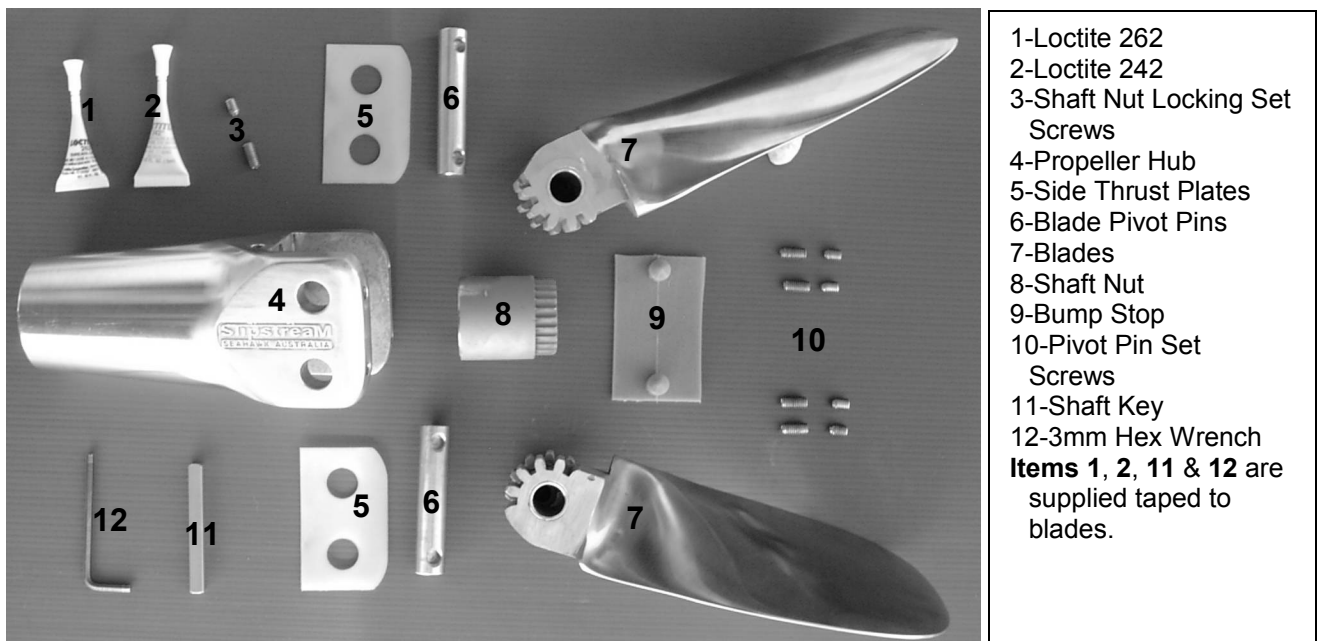
Slipstream®

Folding Sailboat Propellers

S4 Shaft Drive Model Installation and Operation Instructions

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 use caution not to drop the various parts of the propeller during disassembly/assembly.



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, or sent in via post or fax, you will find all the details at the end of these instructions.
3. Using the supplied hex wrench (12), remove the four short and four long setscrew's (10) that secure the blade pivot pins (6) in place.

4. One after the other, slide the blade pivot pins (6) out of the propeller hub (4), while holding the blades (7) as they are released. The side thrust plates (5) will fall out of their position in the body beside the blades once the second pin and blade is removed, put these to one side.

Note: The blades are marked "A" and "B", with corresponding marks on the hub. Take note of this, as it is important the blades are assembled back into their original position.

5. Remove the 'bump stop' pad (9) by lifting it directly out of the end of the hub, pulling the locating pegs out of the two matching holes.
6. Remove the short set screw (3) from the hole in the side of the hub and wind the remaining long screw (3) back a few turns, it is not necessary to fully remove it. (These screws are used as additional locking for the shaft nut)
7. Screw the long propeller nut locking set screw (3) back in, until the end of it is **just visible** on the inside the propeller body.
8. Ensure that the threads of the propeller shaft and nut are clean and dry. If necessary clean the threads with a wire brush and solvent cleaner to remove any paint or old Loctite.

Note: Failure to remove the old Loctite from a previously fitted nut will result in the old Loctite wiping any newly applied Loctite off the threads as the nut is refitted, this will substantially reduce the locking ability of the Loctite compound.

9. Test fit the propeller nut (8) onto the shaft to ensure that it screws on freely by hand. Do not force the nut. Any damage to the threads must be rectified. Remove the nut.

Note: Forcing a stainless steel nut will result in the nut seizing onto the shaft, which is difficult to rectify.

10. Check that the taper matches the shaft correctly, by sliding the propeller hub onto the shaft, without the key in place. Feel for any mis-match of the tapers by attempting to wobble the propeller hub on the shaft, it should sit snugly on the shaft without movement.
11. Check that the end of the shaft taper is lower than the inside face of the propeller hub face that the nut tightens on. If the shaft taper and propeller are not matched and the shaft sits proud at this point the nut is unable to firmly secure the propeller. If there is a problem, it must be rectified before fitting as the shaft and propeller hub are not matched.
12. Accurately mark the propeller shaft with a felt tip pen, scribe, or similar, at the forward end of the propeller hub to indicate where it comes up to on the shaft, without the key fitted.
13. With the hub on the shaft, check that the threaded part of the shaft is not too long for the nut. Measure from the tip of the propeller shaft, to the inner flat face of the propeller hub where the "Bump Stop" was originally fitted. This measurement must be a minimum of 15mm (5/8"). If it is not the end of the threaded portion of shaft must be shortened by cutting off with a saw and cleaning up with a file.

Note: If the threads on the shaft are left too long, they will bottom out in the inside end of the nut before it tightens fully against the propeller body, thus preventing the propeller from being held secure, **this may result in total loss of the propeller.**

14. Remove the propeller hub and fit the key to the keyway.

- Refit the propeller hub and check that it returns to the same position as marked in Step 12. If the key interferes with the fit of the hub on the shaft taper in anyway, carefully file the area of the key that is fouling until the hub fits correctly (Usually the top section of the key is too high). A little clearance on the top of the key to the hub is acceptable, but the sides of the key must be a good fit in the keyway of the hub and shaft.

Note: 2 different Loctite compounds are used, in different areas, do not interchange.

- Read the instructions & cautions on the **Loctite 262** capsule, supplied with the propeller, **Not the Loctite 242 that is also supplied with the propeller.**

Note: Read steps 18 to 21 before performing them. These steps must be completed in sequence, without delay. Once the loctite has had a chance to set, the nut will become difficult to move if necessary.

- Remove the hub and carefully apply 3 drops of **Loctite 262** to the threads of the shaft, taking care to not apply so much that it drips off the threads and refit the hub.
- Apply few drops of **Loctite 262** to the nut threads and fit onto the shaft. Begin to tighten the nut immediately to the correct torque, using a ½” square drive socket wrench. The required torque wrench settings are...

Imperial Thread Size	Torque	Metric Thread Size	Torque
5/8”	50 ft/lb’s	M16	65 Nm
3/4”	75 ft/lb’s	M20	100 Nm
7/8”	100 ft/lb’s	M22	115 Nm
1”	100 ft/lb’s	M24	135 Nm

- As you approach the full torque setting of the propeller nut, check that the tip of the protruding locking screw lines up with one of the grooves in the propeller nut, if it does not, continue to tighten the nut slightly until it does.
- Check that the hub has returned up to, or beyond the mark, you made in step 13 on the shaft. If not, the key is probably fouling and this must be corrected as per step 16.
- Tighten the locking setscrew in the side of the hub so that it engages into one of the grooves in the shaft nut.
- Place a couple of drops of **Loctite 242** on the short set screw and into the threaded hole in the side of the hub. Fit the screw and tighten snugly against the longer screw previously fitted. Note: This set screw screws in on an angle.

Note: The locking screw should now be flush with the surface of, or just inside the propeller hub, if not this indicates that the long setscrew has not entered the grooves on the propeller nut and the alignment of the locking screw with the groove on the nut must be checked. Refer steps 20-23.

- Fit the ‘bump stop’ pad (9) between the two flats of the body, inserting the two locating pins into their respective holes in the body, as it was originally fitted.
- Fit the two side thrust plates (5) into position and fit a blade pivot pin (6) into place on the “B” blade side to temporarily hold the plates.

25. Identify the “A” propeller blade and fit into position “A” 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 are lined up with the set screw holes.
26. Screw one of the long set screws into the hub to secure the pivot pin that is holding the blade in place.
27. Fully close the “A” blade, remove the temporarily fitted pivot pin and place the “B” blade into position “B”, ensuring the gear teeth are lined up so both blades are in the closed position. Tip: Gently moving the blades slightly will assist in fitting the remaining pin.
28. Fit the pivot pin into the hub and through the “B” blade, ensuring the two small holes are lined up with the setscrew holes, secure the pin with one long set screw.
29. Check that the blade gears are engaged correctly by fully opening and closing the propeller blades and checking that both operate in unison, opening fully and closing to a small gap at the tip the same as the propeller was originally shipped.
30. Systematically insert and tighten each of the long set screw's to secure the pivot pins, ensuring they engage fully into the hole in the blade pivot pins.
31. Add a drop of the **Loctite 242** to each of the pivot pin locking set screw holes and the short set screw's. Tighten them snugly on top of the longer set screws installed in the previous step.

Note: The short set screw's should go fully into the propeller hub to 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.

32. 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.
33. Your propeller is now installed and ready to use.

Note

It is imperative that a suitable zinc anode is maintained on the propeller shaft to protect both the propeller and the shaft.

If you have an electrolysis problem check the blade pivot pins and set screws for looseness or damage and replace if needed.

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. 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 achieve a full open position in reverse and have 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 combination behaves in a different way. **It is highly recommended** that your new propeller be trialled 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.

Once per year or more if possible, check the blade pivot pins and set screws have not become loose or damaged from electrolysis. Replace if needed.

A good quality, shaft 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 size, or if it becomes loose on the shaft.

The 'Bump Stop' pad is a wearing 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.

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