

- 1) **INTRODUCTION:** Thank you for having chosen a Max-Prop automatic feathering propeller for your vessel. This instruction booklet is designed to answer all your questions on assembly of the Max-Prop. Please read it carefully and assemble the propeller at least once before installing it on your boat.
- 2) **PITCH ADJUSTMENT: This is a critical step,** make sure that you know what pitch to set the propeller at, either by your old propeller or by your engine and reduction ratio.
- The pitch is adjustable from 10 to 30 degrees of blade angle.
  - Figure 1 shows the conversion from inches of pitch to degrees of blade angle.
  - To properly convert from inches to degrees follow steps A thru C.
- A) Determine the diameter of your propeller
- B) Go down the column that corresponds to your propeller diameter until you find the desired amount of pitch.
- C) Cross reference this pitch in inches to the blade setting angle directly across the chart and you will have the desired blade angle.

		Propeller Diameter														
		12"	13"	14"	15"	16"	17"	18"	19"	20"	21"	22"	23"	24"	25"	26"
Blade angle	10°	4	4.3	4.6	4.9	5.2	5.5	6.0	6.3	6.7	7.1	7.4	7.7	8.0	8.3	8.6
	12°	4.8	5.2	5.6	6.0	6.4	6.8	7.2	7.6	8.0	8.4	8.8	9.2	9.6	10.0	10.4
	14°	5.6	6	6.6	7.1	7.6	8.0	8.4	8.8	9.4	9.8	10.4	10.8	11.2	11.6	12.2
	16°	6.4	6.9	7.6	8.1	8.6	9.1	9.8	10.3	10.8	11.3	12.0	12.5	13.0	13.5	14.0
	18°	7.2	7.8	8.6	9.2	9.8	10.4	11.0	11.5	12.1	12.8	13.4	14.0	14.6	15.2	16.0
	20°	8.2	8.9	9.6	10.3	11.0	11.6	12.4	13.0	13.7	14.5	15.0	15.6	16.4	17.0	17.8
	22°	9.2	10	10.7	11.4	12.2	12.9	13.6	14.3	15.1	16.0	16.8	17.5	18.2	18.9	19.8
	24°	10	10.9	11.8	12.5	13.4	14.2	15.0	15.8	16.8	17.6	18.4	19.2	20.2	21.0	21.8
	26°	11	12	12.8	13.8	14.7	15.7	16.6	17.4	18.4	19.3	20.2	21.0	22.0	22.9	23.8
	28°	12	13	13.9	15.0	16.0	17.0	18.0	18.9	20.0	21.0	22.0	23.0	24.0	25.0	26.0
	30°	13	14	15.1	16.2	17.3	18.5	19.6	20.6	21.7	22.8	24.0	25.0	26.1	27.3	28.2

Fig. 1

Max-Prop offers the great advantage of pitch adjustability in order to optimize the performance of the propeller. If the propeller does not reach the desired RPM, reduce the blade angle. If, on the contrary, the engine exceeds the desired RPM, increase the blade angle. A two degrees change in blade angle will change the engine RPM by 13-15%, at the same boat speed.

The adjustment of angle and therefore of pitch is done, when the propeller is mounted on the shaft. To obtain the different values of angle you have to follow the assembly instruction.

- 3) **ASSEMBLY:** Make sure if you receive more than one propeller that you do not interchange parts. Each propeller is individually balanced and if interchanged it will be put out of balance. Please use figure 2 in the instruction book for part number references.

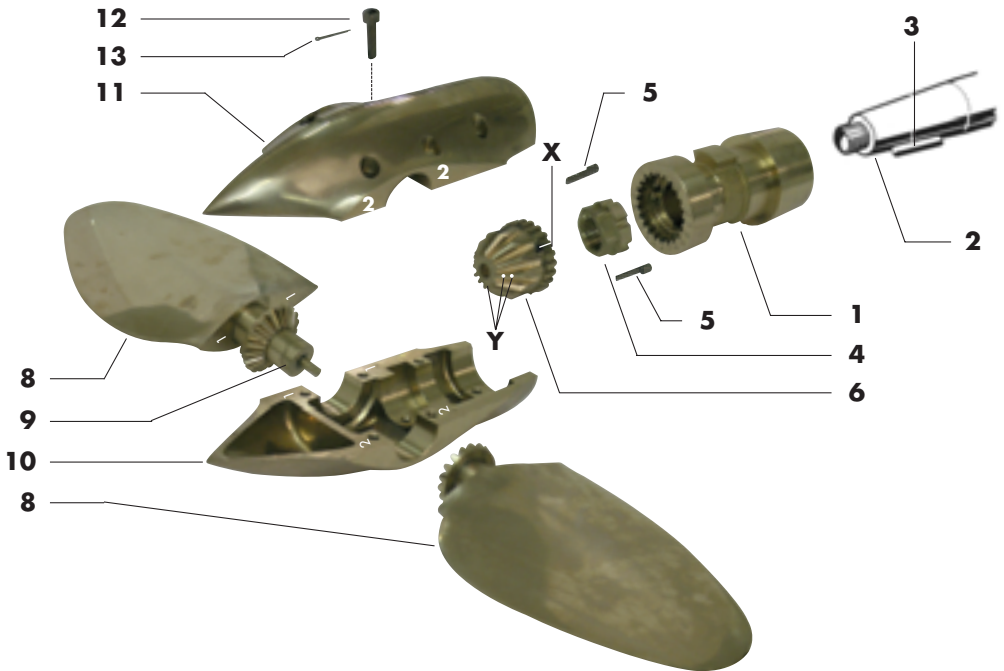


Fig. 2

A) Fit the hub [1] to the propeller shaft [2]. Be sure that the key [3] is the proper dimension and that the hub slides completely onto the shaft. If you are not sure, remove the key and slide the hub onto the shaft making a mark on the shaft where the hub stops on the shaft. Re-insert the key and slide the hub on to the shaft, if it slides up to your mark, it is fine. If not, you will need to file down the sides or top of the key until the hub slides completely onto the shaft.

B) Two types of nuts are available in the Max-Prop:

I) **Drilled Nut:** Tighten the nut (4) onto the shaft and secure it with the pin (5) by drilling a hole completely through the nut and shaft (a cobalt drill bit makes this task easier).

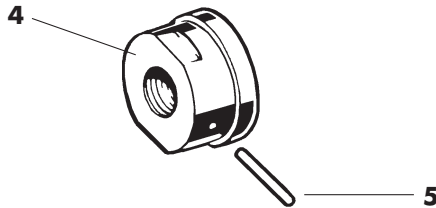


Fig. 2 (detail)

II) **No Drill Nut:** Tighten the nut (4) onto the shaft. Align the grooves in the base of the nut with the grooves in the central hub, so as to obtain two complete holes allowing insertion of the pins (5). Insert the pins, as shown in the drawing below, so as not to interfere with the inserting of the central cone gear

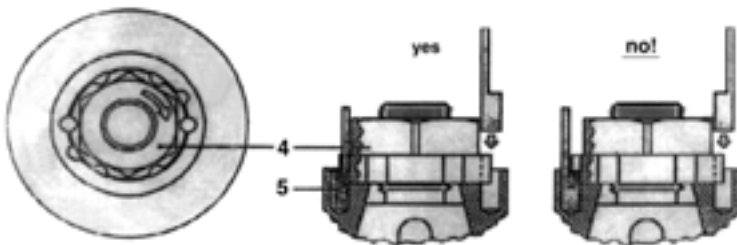


Fig. 2 (detail)

One thread can be exposed aft of either nut system, if more than that are showing it will be necessary to cut off the excess with a hack saw. If too many threads are exposed it will raise the central cone gear (6) and effect the performance of the propeller.

- C) On the bottom of the central gear [6] there is a groove on the bottom of one of the teeth, this represents the “X” on the chart in figure 3. Place the tooth with the groove into the corresponding lettered gear on the hub [1].

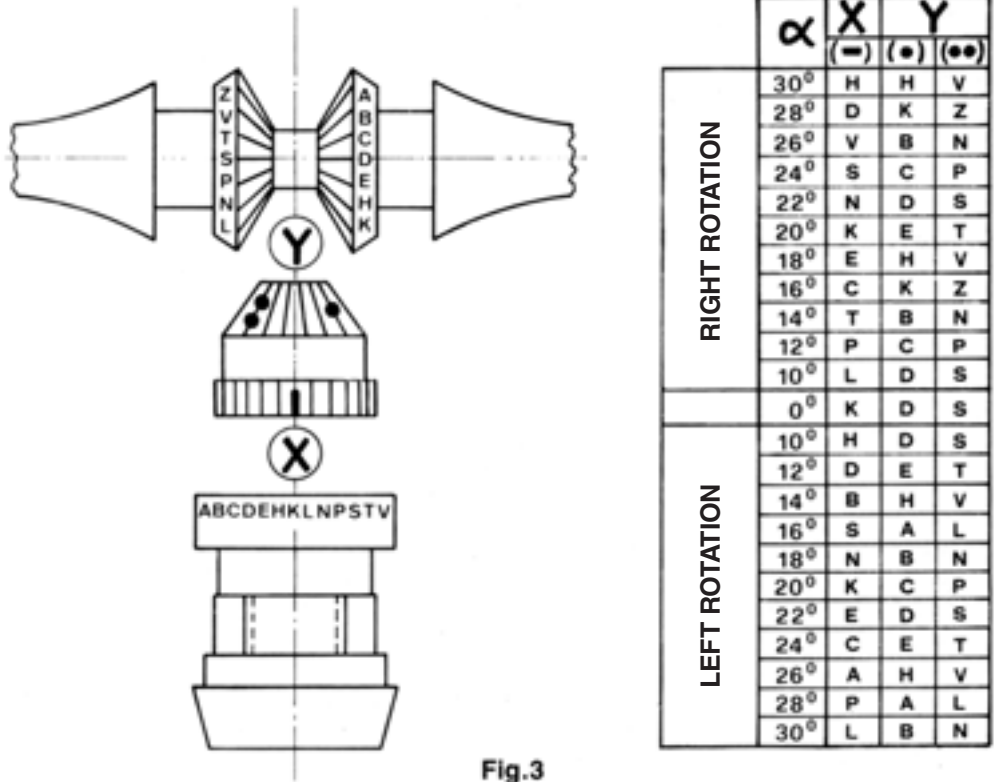


Fig.3

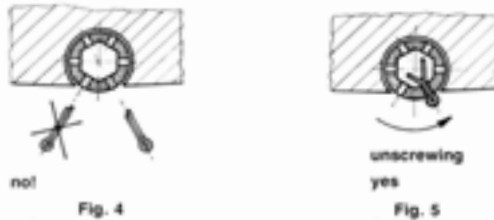
- D) Next engage the gear on the blades with those of the central cone gear as shown in figure 3. When engaging the gears make sure that the correct letters on the blades are inserted into the corresponding “●” and “●●” in the depth of the teeth of the central cone gear.

NOTE: The letters from “A” to “K” marked on the teeth of one blade must engage with “●”. On the central cone gear. Also that the letters from “L” to “Z” marked on the teeth of the other blade must engage with “●●” on the central gear.

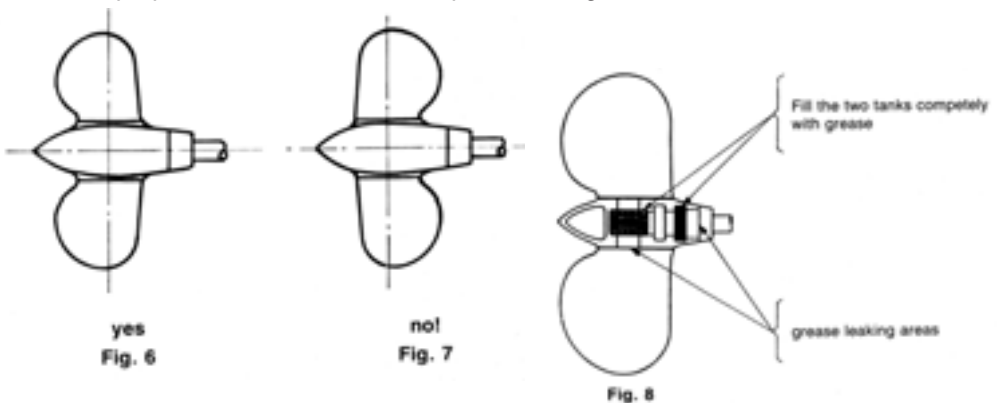
- E) Keeping the two blades steady and pressed on to the spacer [9], put one half spinner [11] onto the hub. Make sure that the numbers on the blades and the spinner correspond 1 to 1 and 2 to 2.

NOTE: Once one half of the spinner is on you can rotate the blades to make sure that the correct letters on the blades match up with the dots on the central cone gear.

- F) Fill the second half-spinner [11] completely with very fluid grease, mount it and insert all the screws [12]
- G) To let the blades rotate more freely, it is advisable, after having tightened all the screws [12], to give some bedding blows on the spinner [10 - 11] and blades [8] with a plastic or wooden mallet.
- H) To make sure that the screws will not loosen insert a cotter pin into the head of each screw. Put them on so that if the screw were too loosen it would hit the cotter pin as shown in figure 5. Cut the cotter pins to a length of 1/4" and put them in. A light tap with a hammer on the head of the pin will spread the ends open, if not use a screw driver to spread them apart.



- I) Make sure that the propeller is protected from galvanic corrosion by using the usual zinc anodes on the shaft. The Max-Prop® propeller works properly only if the central body [10 - 11] is completely filled with a very fluid grease. Before launching the boat, it is absolutely necessary to operate as follows:
- Lock the driving shaft
  - Check that the blades of the propeller rotates freely from forward to backward just by a very light thrust of your hands at travel and that the inclination is the one you have selected.
  - Verify that the grease is leaking from the rotating joints between the central part and the hub (see fig. 8) so that all of the moving surfaces are perfectly oiled. The grease used must be very fluid so that it will keep leaking from the moving surfaces even after years of working.
  - In the feathered position the blades must be perfectly lined up and set like in fig. 6. The propeller must never be in the position of fig. 7.



4) **TROUBLE SHOOTING:** If the propeller feels stiff or has a hard spot in the rotation, systematically go through the points below.

- A) If the propeller does not rotate freely, remove some of the grease from the spinner and reassemble.
- B) Sometimes it can happen that a small piece of metal or burr enters among the gears, or a piece of the propeller has been dinged; in this case the blade movement can become hard. It is necessary then to do as follows, referring to figure 9.
  - I) Open the propeller and assemble it again after having taken the central cone gear (6) out, so that the blade and the hub rotation are independent. If the hub rotation is hard, remove 0.01 mm from surfaces "A" with an emery cloth. On the contrary if the blades rotation is hard, remove 0.01 mm from surfaces "B" of the spacer using emery cloth wrapped around a flat file. Try until both hub and blades rotate freely.
  - II) Again mount the central cone gear (6) and reassemble the propeller. If the propeller rotation still has some hard points remove 0.1 mm with a flat file from surface (C) so that central cone gear sits lower and the clearance between conical gears increases.

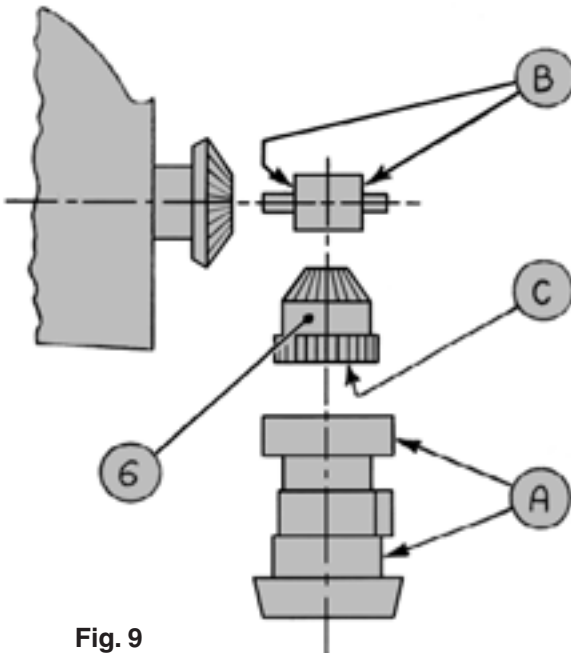


Fig. 9

- 5) **PROPELLER USE:** The Max-prop works automatically. By putting the engine in gear the blades will engage in either forward or reverse. The best way to feather the propeller is:
- Power at 2 to 3 knots in forward.
  - Kill the engine while still engaged in forward.
  - When the engine has stopped, if the shaft is still spinning engage the transmission in reverse to stop the freewheeling.

You can check to see if the propeller is feathered or not by taking the engine out of gear. If the propeller is not feathered the shaft will freewheel like with a fixed blade propeller.

In that case start the engine again and repeat the three steps. If your propeller has been greased properly it will feather in a fraction of a second as soon as you stop the shaft from freewheeling. Once the prop is feathered, you can either leave the transmission in gear or out of gear, it does not matter. **DO NOT** kill the engine while in reverse. In this case the blades will be in the reverse position and will not feather. You can actually use this feature to drive a shaft alternator.

- 6) **PROPELLER MAINTENANCE:** The Max-Prop needs to be regreased a minimum of once every year. We recommend the official Max-Prop grease.

There are two holes in the spinner of the propeller to grease. Remove the set screw from the forward holes with a #3 metric Allen wrench and screw in the zerc tower, attach your grease gun and fill the propeller with grease until the grease starts to come out between the hub (1) and the spinner (10-11). Replace the set screw and remove the set screw from the more aft hole. Reinstall the zerc tower and attach your grease gun and fill the propeller with grease until the grease starts to come out between the blades and the spinners. Remove the zerc tower and reinsert the set screw into the propeller. Do not leave the zerc tower in the propeller.

- With each pump of the grease gun rotate the propeller from forward to reverse to allow the grease to work through the propeller.
- The numbers above are from Figure 2 at the beginning of this Max-Prop Manual
- **Make sure that you always keep the zinc anodes in good condition.** They must be replaced at least once a year. The propeller must be protected by a lot of zinc, so also use a zinc on the shaft when possible. When replacing it make sure that you clean the contact point between the zinc and the propeller shaft.

- 7) **PROPELLER REMOVAL:** In order to remove the propeller you must first remove the spinner and nut. Be sure only to pull from outside the hub (figure 10). If the surfaces on the hub are hit or dinged it can effect the performance of the propeller.

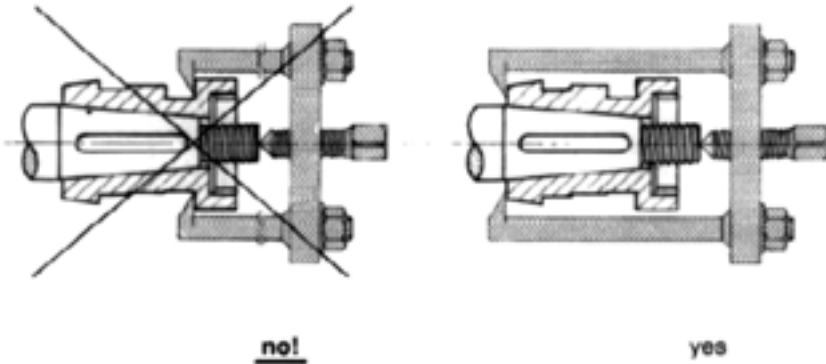


Fig. 10

- 8) **WARNING** It is important to follow the instruction below carefully so as to avoid a shock to the gears on the blades and cone gear, that could be damaging to the teeth.
- A) When going from forward to reverse and the opposite, it is necessary to idle down and shift at low RPM's between gears.
  - B) The propeller body must always be completely filled with a very fluid grease. This is so when you reverse direction the rotation will be smooth with no binding. Binding points will produce a shock and could damage the gears.
- 9) **INSTRUCTIONS TO MAKE A TAPERED BORE IN THE PROPELLER HUB:**  
Cut out the key slot on the side opposite the pawl so as not to weaken the same (see fig. 11).

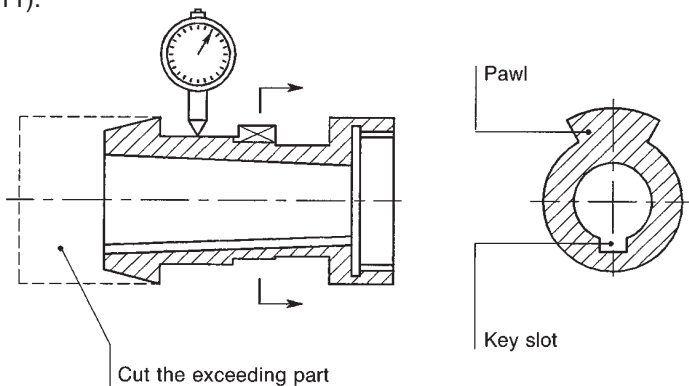


Fig.11

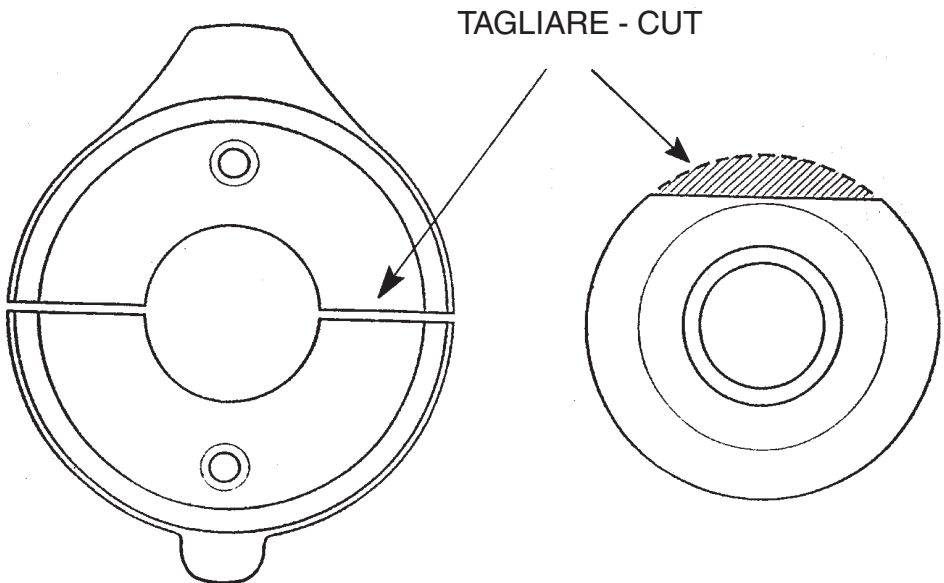
## 10) SUGGESTIONS FOR REPLACEMENT OF SAIL-DRIVE ANODES

The anodes for the sail-drive leg of your boat can be replaced without disassembling your Max-Prop.

Before installing the Max-Prop proceed as follows:

- A** Cut the ring anode (figure 12) in two halves, avoiding to make the cut through the screw holes.
- B** Remove a section of the thrust washer ring as shown on figure 13. Enough so when in place you can access the zinc screw holes.
- C** Insert the thrust washer ring on the sail-drive shaft.
- D** Assemble the two halves (figure 12) fixing them on the sail-drive leg by means of their standard screw.
- E** Mount the propeller.

You can now cut the new sail-drive anodes and replace the consumed ones without removing the propeller.



**Fig. 12**

**Fig. 13**