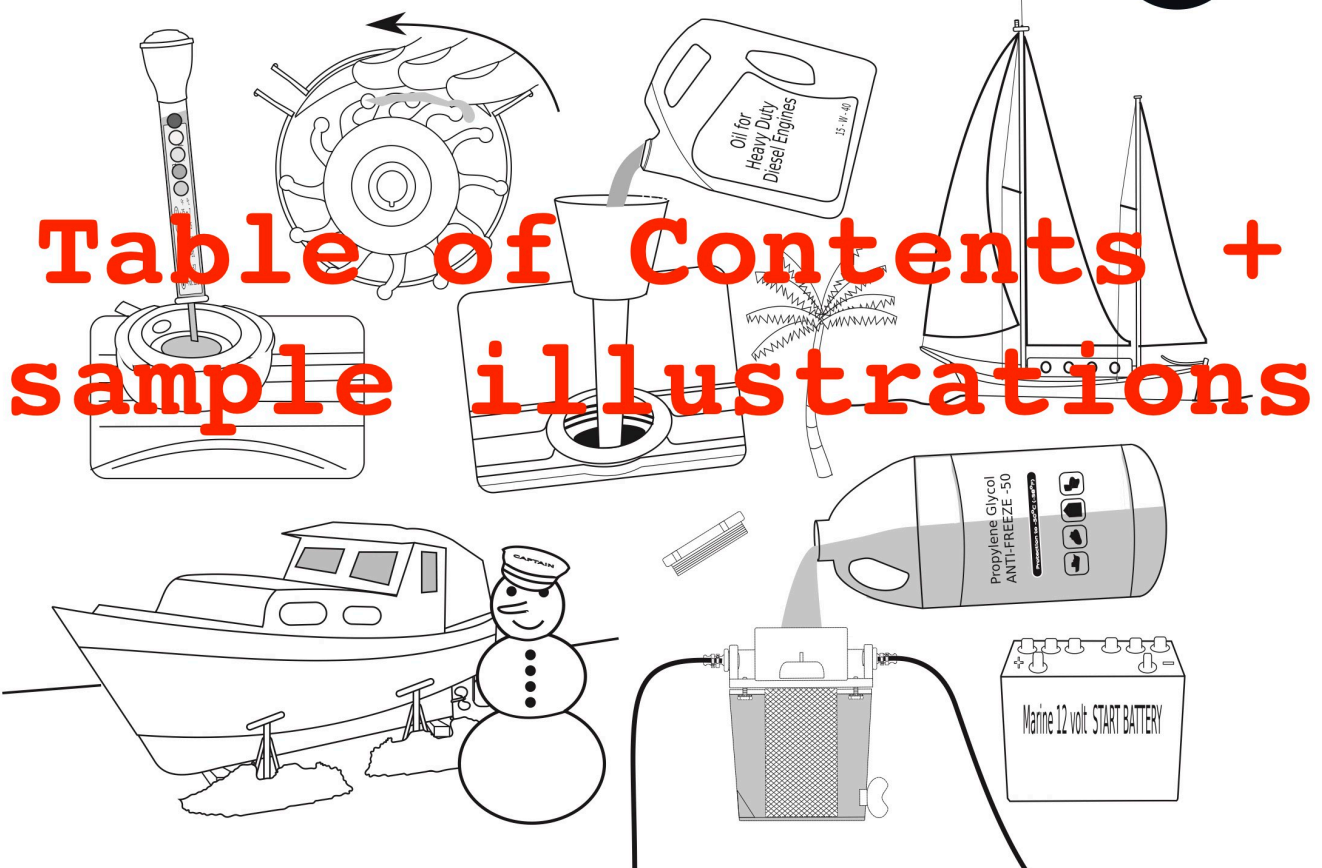


# MARINE DIESEL BASICS

- Maintenance
- Lay-up
- Winter Protection
- Tropical Storage
- Spring Recommission

1



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# Marine Diesel Basics 1

*Maintenance*

*Lay-up*

*Winter Protection*

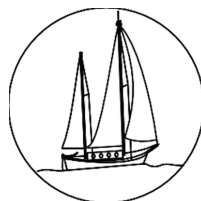
*Tropical Storage*

*Spring Recommission*

written and illustrated by  
Dennison Berwick

Marine Diesel Basics

the first **visual** guides to marine diesel systems on sail, power & narrowboats



Voyage Press

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This is the first book in the Marine Diesel Basics series. Forthcoming titles:

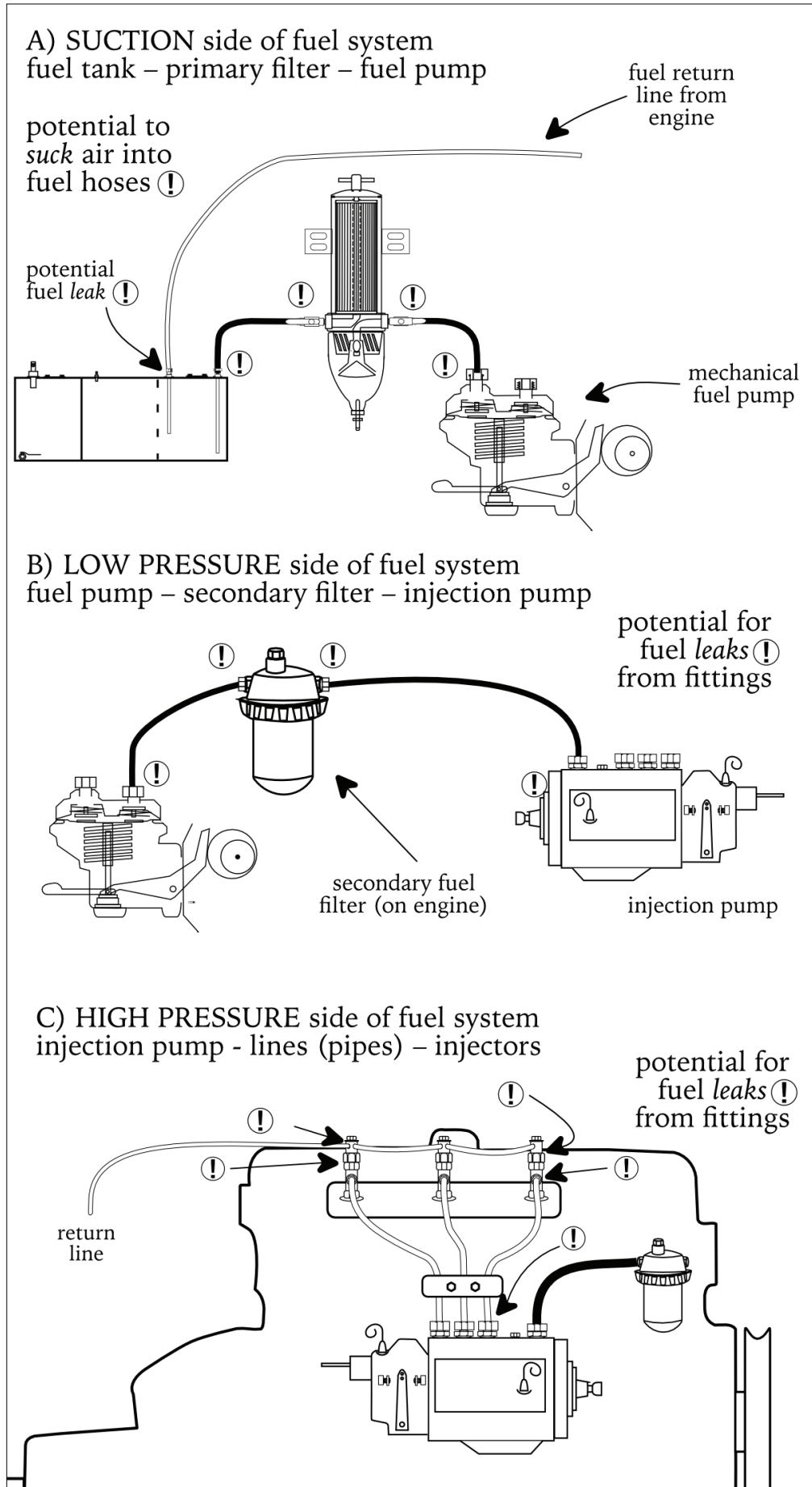
*MDB2 Boat Buyer's Guide* – pre-purchase assessment, how things work, priorities

*MDB3 Troubleshooting* – identifying problems, not symptoms, anywhere in the system

*MDB4 Marine Mechanic's Know-How* – techniques, corrosion, more maintenance

For much more information go to [marinedieselbasics.com](http://marinedieselbasics.com)

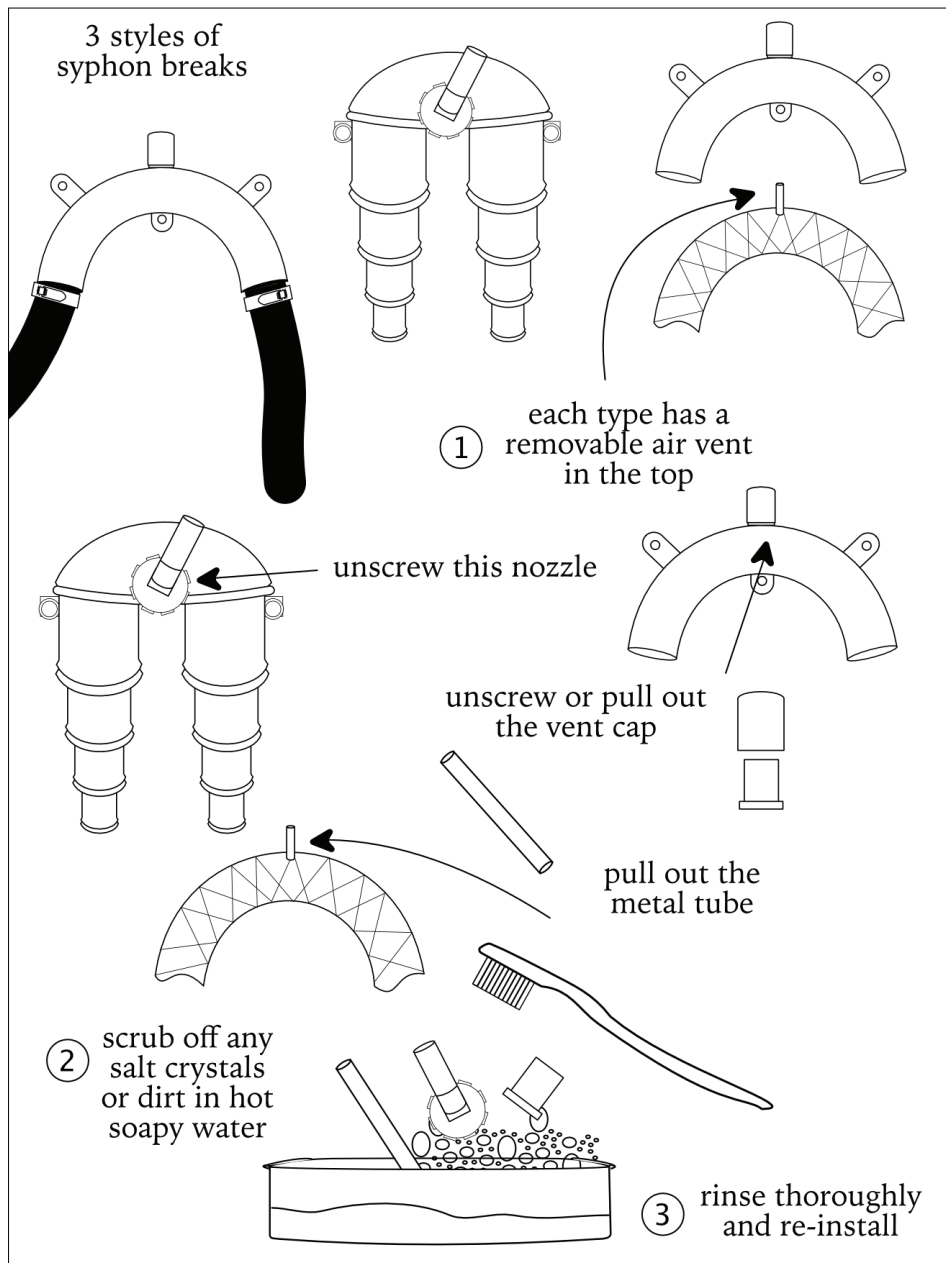
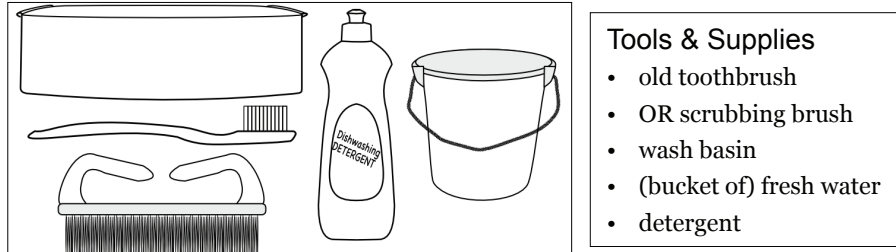
### Three Sections of the Fuel Supply Circuit



## 7 Flush and Clean the Syphon Break

### *Indirect and Direct cooling – all conditions*

The purpose of this syphon break is to prevent raw water syphoning back into the engine after the motor has been stopped. If the air vent, in the top of the syphon break, becomes encrusted with salt crystals or blocked (e.g. impeller fragment) the wet muffler exhaust hose can backfill with water, flooding the engine cylinders with raw water.



## Check Specific Gravity of a Wet-Cell Battery

**1** wear safety glasses & rubber gloves  
remove jewellery  
be aware of your route to safety & have fresh water close-by  
acid will eat through clothing

**2** it may be necessary to disconnect wires to be able to open vent caps  
disconnect **NEGATIVE** first  
be mindful using metal tools near the battery posts

**3** insert the tube into the cell  
squeeze and release the bulb to fill the tube  
may need to squeeze & release several times

**4** make sure the float is floating freely & not sticking to the side

**5** note the specific gravity of each cell  
all cells should read about the same  
cells with a difference of 0.050 should be re-checked; if verified, the cell (& battery) may be failing. Monitor the battery

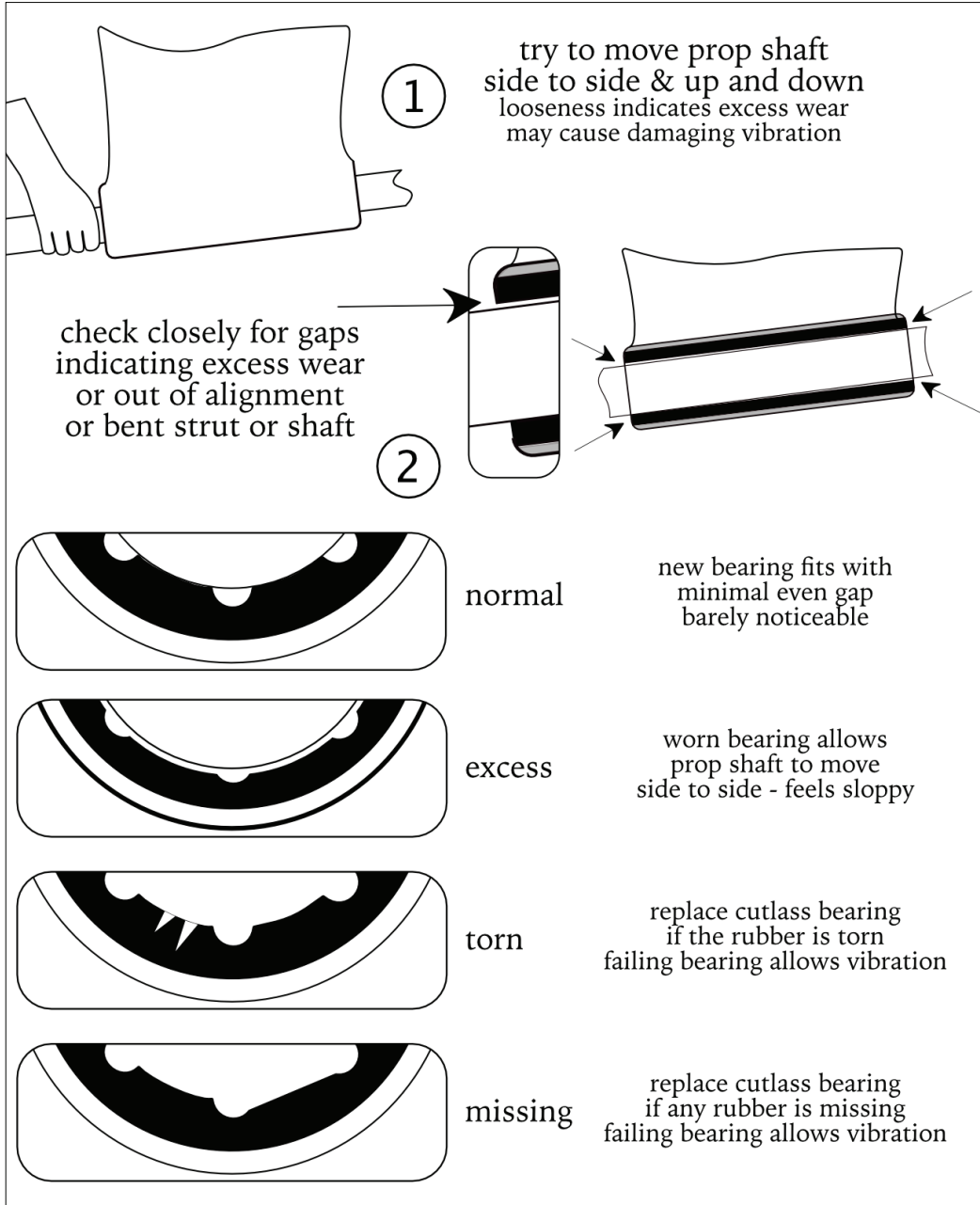
**6** wipe up spills to avoid dirt & corrosion  
baking soda (sodium bicarbonate) can be used to neutralize the acid  
discard acid rags in plastic bag or rinse out in lots of water  
keep end of hydrometer in a rag to avoid dripping electrolyte over clothing & equipment  
rinse well in fresh water

date	item	NOTES	temperature	follow-up
Oct 5	Start battery		27°C (80°F)	
	cell 1		1.245	
	cell 2		1.240	
	cell 3		1.240	
	cell 4		1.244	
	cell 5		1.244	
	cell 6		1.2	charge battery

## 5 Inspect the Cutlass Bearing

Some wear to the rubber in a cutlass bearing, over several years, is normal; noticeable deterioration from the previous inspection (as noted in the Maintenance Log) should be investigated and the root cause identified and rectified *before* the cutlass bearing is changed. Damage to a cutlass bearing is always a symptom - find the cause! If not, vibration is only likely to increase causing more damage to the drive train.

NOTE: “Cutless” is a brand name trademarked by Duramax Marine. “Cutlass bearing” is a generic term to cover all makes of this type of bearing with a rubber/nitrile insert.



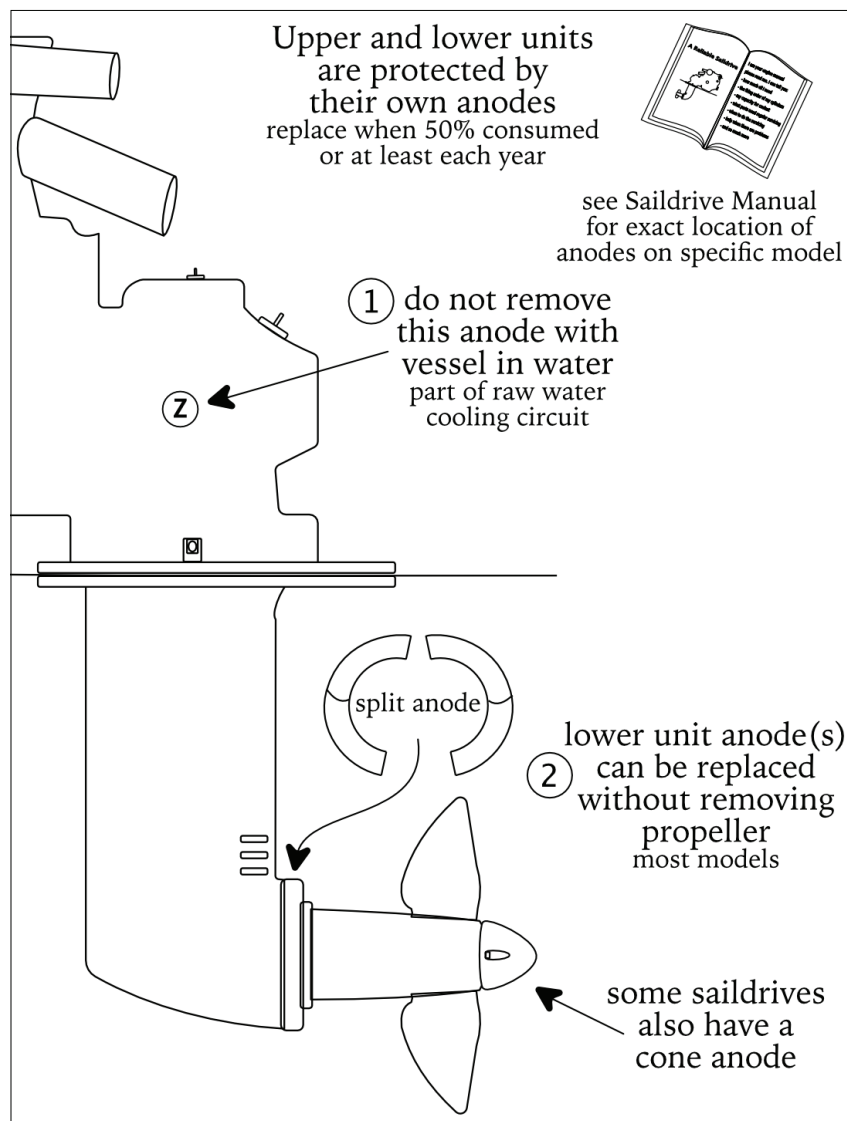
Replacing the cutlass bearing is beyond the scope of this book as it is best done with a specialist tool (if accessible) or the cutlass bearing has to be cut out with a hacksaw.

## 6 Inspect Saildrive Anodes

Saildrives can be quickly eaten away by corrosion because their aluminum casing is galvanically very active, much more active than a bronze thruhull or exposed steel keel. In addition, aluminum has only a slightly greater electrical potential than materials typically used as anodes (including aluminum) so protection is minimal. Any compromise in protection is likely to allow corrosion:

- use the correct anode(s) for the vessel's location. Replace when 50% consumed
- saildrive may have three anodes – on upper unit (inside boat), lower unit/leg and on the propeller cone
- do not assume anode(s) installed by dealer or previous owner are correct for current location
- saildrive anode(s) are sized to protect only the saildrive and the original propeller; installing a feathering prop (with greater surface area) can increase the cathodic load on the anode – protection will need to be increased
- paint coverage is part of a saildrive's anti-corrosion regime. **Any** scratches increase the area of metal to be protected by an anode. The anode will be consumed faster.

For more information on anodes, see page 68.



## Direct Cooling Task List

Necessary tasks to lay-up a vessel using direct cooling where there's a danger of freezing conditions or high heat and humidity. Follow the number to the relevant task detailed on the page listed below.

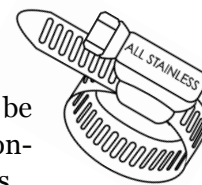
For more about direct cooling see page 59, Maintenance – Raw Water Cooling.

	Winter Protection	Tropical Storage	Page
1	inspect hoses & hose clamps	inspect hoses & hose clamps	7
2	drain raw water from engine block	--	131
3	check & change engine anode	check & change engine anode	133
4	remove engine thermostat	--	134
5	fill engine block with antifreeze	--	135
6	re-install engine thermostat	--	136
7	add antifreeze to header tank	--	137
8	add antifreeze to circuit	--	137
9	run engine to flush circuit	--	139
10	drain raw water hoses (if not filled with antifreeze) vessel OUT of water - open seacock vessel IN water - close seacock	drain all raw water hoses vessel OUT of water - open seacock vessel IN water - close seacock	139
11	drain strainer (if not filled with antifreeze)	drain strainer	140
12	service raw water pump & impeller	service raw water pump & impeller	63
13	--	--	
14	--	--	
15	--	protect thruhull from marine growth	142
16	service exhaust riser	service exhaust riser	143
17	clean syphon break	clean syphon break	70
18	drain water-lift muffler (if not filled with antifreeze)	drain water-lift muffler	145

### 1 Inspect Hoses and Hose Clamps

#### *Indirect and Direct cooled engines – All Conditions*

No hose lasts for ever. Raw water and coolant hoses should be inspected now, if they have not been checked as part of regular, on-going maintenance. See page 7, Maintenance – Engine Essentials



### 2 Drain Raw Water from the Engine Block

#### *Direct Cooled Engines*

Draining raw water from the engine block before running propylene glycol antifreeze through the cooling system is **essential** on direct cooled engines. Failure to do this will almost certainly lead to the engine block cracking in freezing conditions, destroying the engine. This is because the thermostat is unlikely to open in the brief time the engine is running, so antifreeze bypasses the cooling passages inside the engine block.

