

Marine Diesel Basics - Saildrive Checklist

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What needs to be done to keep the complete system in good condition

Saildrive Maintenance

Regular maintenance is essential as saildrives are less forgiving than in-line transmissions for any lack of attention. Best practice is to check the oil level before every engine start-up (along with the engine oil). This is more important with saildrives because 1) water can leak unnoticed *into* the lower unit, 2) water, especially salt water, can seriously damage the lower unit through corrosion and by preventing lubrication (presence of water is the absence of oil). Check in the operator manual which engine oil or gear oil should be used for lubrication.

Main Concerns

- failure of a seal allowing water into the lower-unit damaging the gears
- failure of the rubber boot/diaphragm allowing water to flood the vessel
- scratches and paint damage on the lower-unit, leading to premature consumption of the anode, allowing corrosion damage to the saildrive unit and propeller

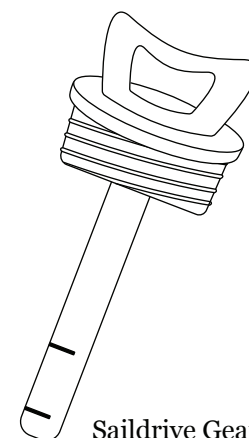
Saildrive Oil Seals

If seals fail, corrosive raw water (salt or fresh) can enter under pressure into the lower unit, mix with the gear oil and cause extensive damage. Seals can only be checked with the vessel out of the water, so the saildrive's oil dipstick should be checked for signs of emulsification (oil mixing with water) regularly. Water mixed with oil looks "milky" or like "mayonnaise". With the vessel out of the water, check for fishing line or netting caught in the gap between the propeller and saildrive anode or housing. Line can damage the oil seals and rubber hub fitted in many saildrive propellers.

The diaphragm/sealing membrane, which prevents water coming into the boat, should last 5 – 10 years depending on maintenance and service intensity. Replacing the diaphragm is typically a dealer-only procedure.

Maintenance Task List

	Description	Frequency
1	check saildrive gear oil level & top up	daily
2	change gear oil in lower unit	100 - 250 hrs*
3	burp air from gear oil dipstick	
4	inspect exterior rubber fairing flange	yearly
5	inspect interior rubber sealing ring(s) (diaphragm(s) & water sensor alarm	yearly
6	inspect saildrive anodes	3 - 6 months
7	inspect and repair paint protection	monthly
8	clean raw water intake	monthly
9	inspect the propeller	yearly
10	grease a feathering propeller	yearly



Saildrive Gear Oil Dipstick

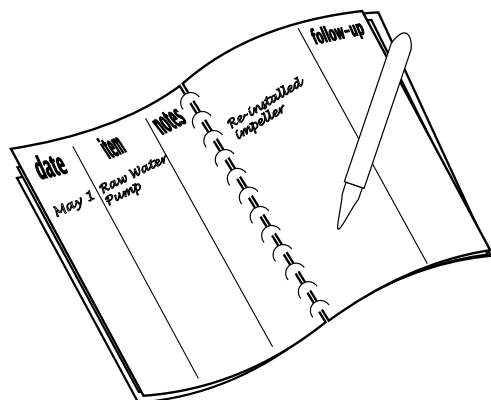
* see saildrive operator manual

Value of the Maintenance Log

One of the most important, and easiest ways to ensure the health and longevity of all mechanical equipment on a boat is to keep a Maintenance Log. The more comprehensive and detailed, the more useful the logbook becomes over time.

The Maintenance Log has four main functions:

- early warning of potential problems. Most problems develop slowly and are often simple to correct if caught early. E.g. an anode is being consumed more quickly than before - why?
- time and details of any changes in performance.
- recording details of work done and equipment serviced
- system history – what was done, when, how and by whom



☐ Check Gear Oil Level and Top Up, if Necessary

Regularly checking the saildrive dipstick is very important for two reasons:

1. keeping gear oil topped up as necessary
2. early detection of any water infiltration and failure of the lower-unit seals

☐ Change the Saildrive Gear Oil

Changing the gear oil regularly is especially important because of the risk of water leaking into the lower unit and damaging the gears:

- change the oil at least every year (follow manufacturer's recommendation)
- follow the correct procedure for the specific make & model of saildrive
- check to use gear oil or 15W-20 (some specifications have changed)
- inspect dipstick for signs of emulsification (oil mixing with water).
- saildrive gear oil is formulated to give some protection if water enters the gearcase
- seals will likely need replacing if water is mixed with oil (emulsified)

☐ Burp Air from Saildrive Gear Oil Dipstick

With the vessel in the water, the dipstick should be removed the first time the saildrive is operated after a gear oil change to allow any trapped air to escape. Air can be trapped in the small passages of the lower unit (gear case). After engine shut down, check the level of gear oil and top up to maximum on the dipstick.

☐ Watertight Diaphragm(s) (boot, bladder, foot sealing membrane)

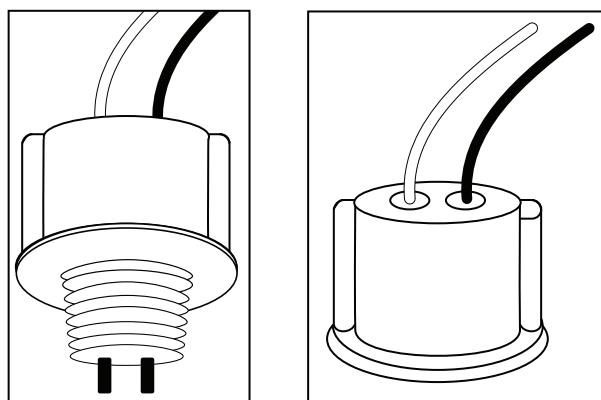
A rubber double membrane (diaphragm), between the upper and lower parts of a saildrive, prevents water entering the boat; failure can sink the vessel. Some models have two diaphragms and offer a built-in sensor & alarm (which requires a reliable electrical system).

The membrane should be replaced every 7 – 10 years. This is typically a dealer-only procedure. Failure to replace the boot may void a vessel's insurance. In addition, a rectangular rubber fairing flange may be "glued" to the hull around the saildrive to reduce turbulence around the opening in the hull:

- flange does not affect watertight seal (which is inside the hull of the boat)
- use removable adhesive (NOT permanent) to reattach flange if it detaches

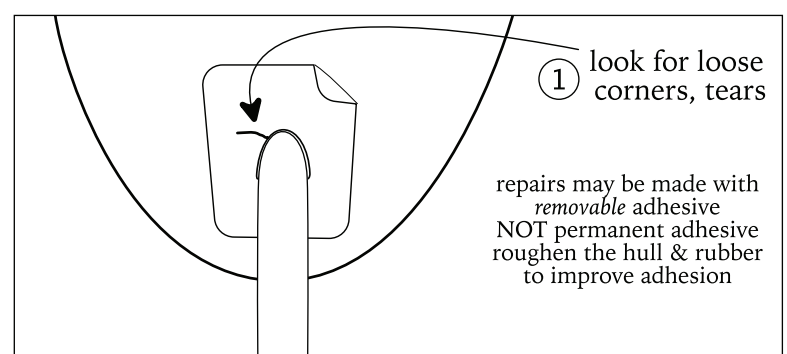
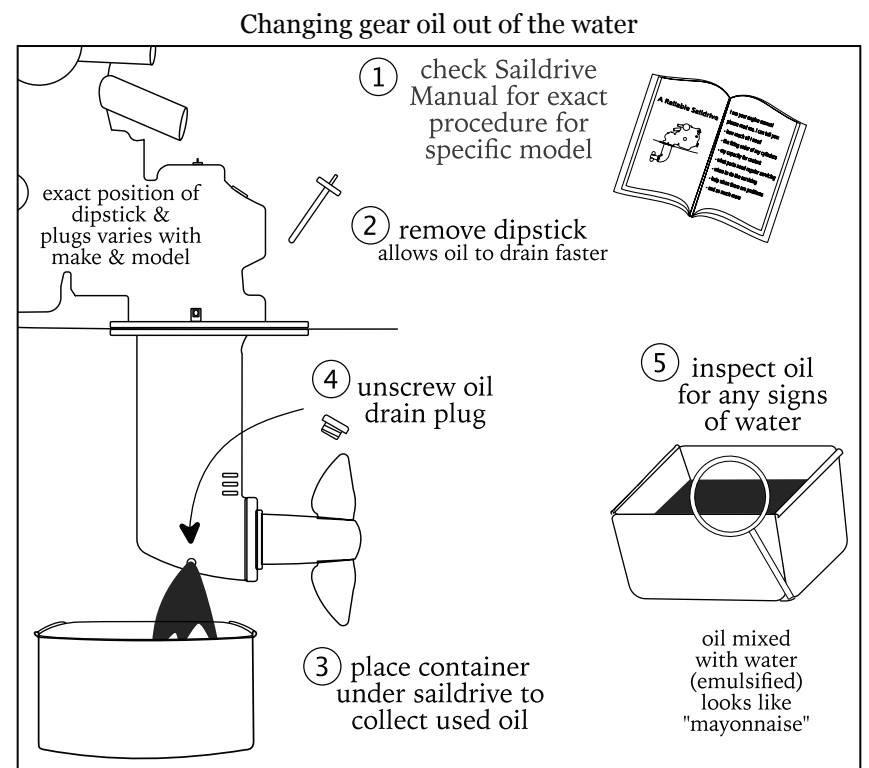
☐ Inspect Exterior Rubber Fairing Flange

The primary purpose of the flange is to reduce turbulence, though often referred to as a seal. Turbulence will tend to pull the flange off the hull if a loose corner is not repaired.



☐ Inspect Interior Rubber Sealing Diaphragm & Water Sensor Alarm

Water Sensor Alarm



☐ Inspect Saildrive Anodes

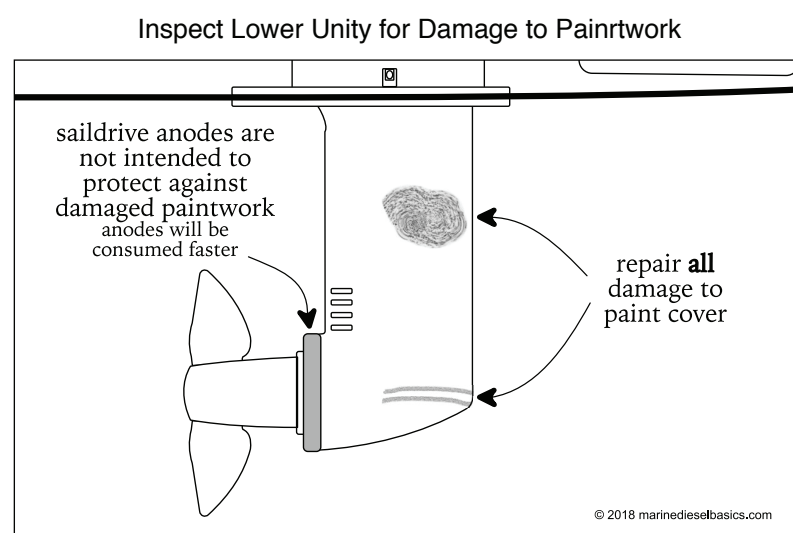
Saildrives can be quickly eaten away by corrosion because their aluminum casing is galvanically very active, much more active than a bronze thruhull or exposed steel keel. In addition, aluminum has only a slightly greater electrical potential than materials typically used as anodes (including aluminum)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

☐ Inspect and Repair Paint Protection

Touch-up any damage or scratches immediately:

- use 2-part epoxy sealer/paint if original manufacturer's paint is not available
- underwater damage – touch up with special two-part underwater epoxy paint
- use only an anti-foul paint formulated specifically for aluminum outboards, saildrives or sterndrives. Never use paint with (cuprous) copper oxide as this will promote galvanic corrosion
- keep the anode clean of marine growth and never paint an anode



☐ Clean Raw Water Intakes

Engines with saildrives draw their raw water for engine cooling through intake ports in the saildrive's lower unit. Raw water is drawn up through a passage from the intake ports then should flow first to a sea strainer before reaching the raw water pump. Any marine growth or blockage of the inlet ports will decrease engine cooling capacity.

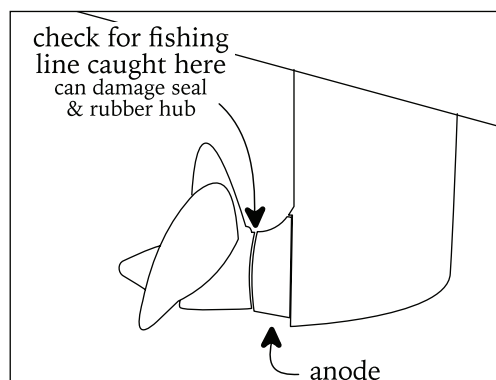
- clean the inlet grilles on the lower unit regularly

☐ Inspect the Propeller

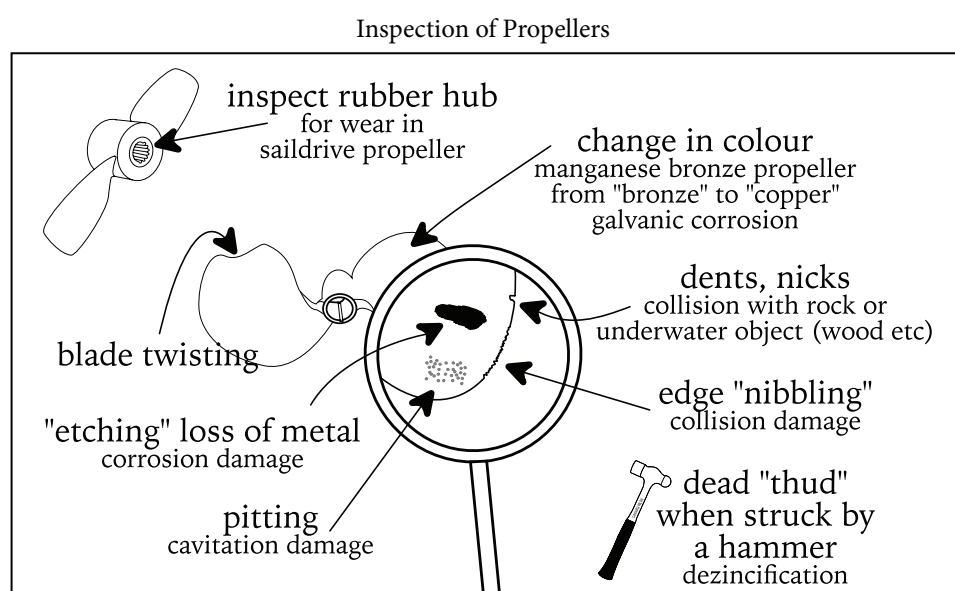
Imperfections in the propeller can create noise and vibration that can damage other parts of the drive train. The propeller should be looked at carefully every time the vessel comes out of the water. The blades should be smooth to the touch, with no "nicks", pitting or signs of damage. An aluminum propeller is especially prone to damage if the saildrives anode(s) are not being regularly inspected and changed.

A bronze propeller should have a uniform colour; a change in the hue towards reddish "copper" may indicate the propeller is *not* manganese bronze, but an inferior material that is not being protected by an anode and has been losing zinc (dezincification). This structurally weakens the blades, which are likely to eventually break apart. A sound propeller hit with a hammer will "ring"; compromised metal will give a short, dead "thud".

Check for any fishing line or netting caught between the propeller and saildrive housing - which can damage the oil seal and the inner rubber hub which connects many saildrive propellers to the saildrive's output shaft.

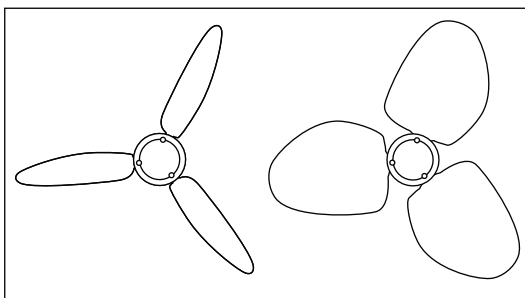


☐ Grease a Feathering Propeller

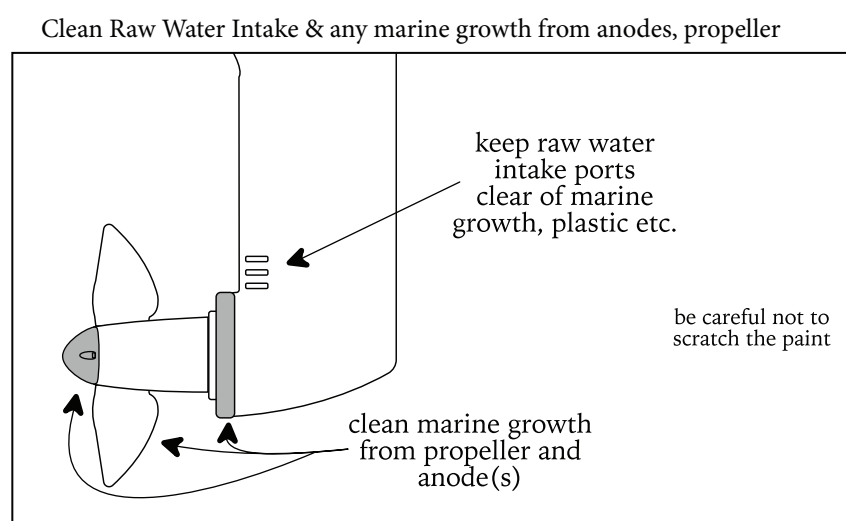


Lay-up Task List

- ☐ Change Gear Oil in Lower Unit
- ☐ Burp Air from Gear Oil Dipstick
- ☐ Inspect Exterior Rubber Fairing Flange, if fitted
- ☐ Inspect Interior Rubber Sealing Diaphragm & Water Sensor Alarm
- ☐ Inspect Saildrive Anodes
- ☐ Inspect and Repair Paint Protection
- ☐ Clean Raw Water Intake
- ☐ Inspect the Propeller
- ☐ Grease a Feathering Propeller



Feathering Propellers

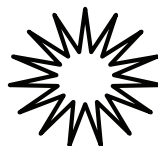


- ☐ Drain Raw Water from Saildrive



In locations where there is a danger of cold weather, the complete raw water circuit must be either completely drained or protected against freezing by flushing with propylene glycol antifreeze. This includes the raw water passage in the saildrive.

When the vessel is out of the water, make sure all the raw water in the saildrive drains from the intake ports by opening the seacock in the saildrive's upper unit.



Especially in tropical waters marine growth can quickly engulf an exposed surface not protected with anti-foul paint. The raw water intake and the seal forward of the propeller are particularly vulnerable to clogging.

- ☐ Protect Lower Unit from Marine Growth

Marine Diesel Basics - Saildrive Checklist

*What needs to be done to keep the complete **system** in good condition*

Recommission Task List

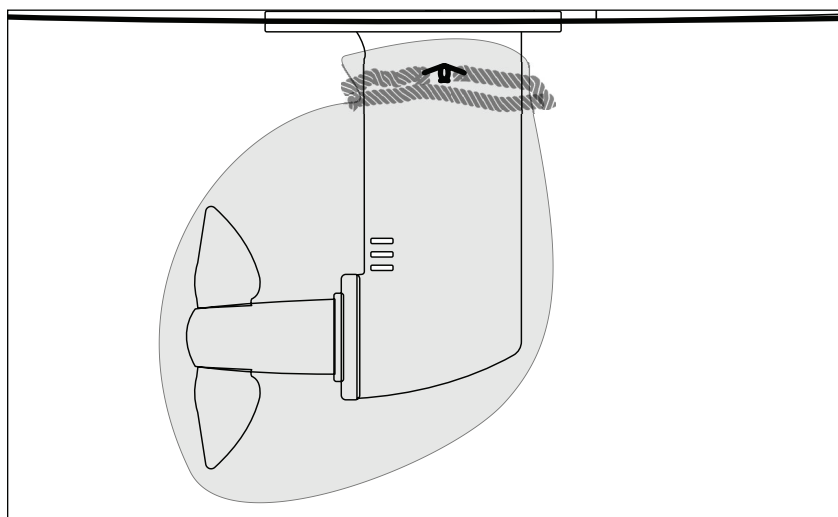
- ☐ Check Level of Gear Oil
- ☐ Inspect Interior Rubber Sealing Ring & Water Sensor Alarm
- ☐ Inspect Exterior Rubber Fairing Flange
- ☐ Inspect and Repair Paint Protection

Paint is a very important part of the protection against corrosion on a saildrive. Any scratches or imperfect paintwork increases the load on the saildrives anodes, which will be consumed faster.

Vessel Laid-up in the Water

- ☐ Remove Covering from Propeller & Shaft

If the vessel was laid up in the water, any plastic or sisal bag protecting the propeller and shaft from marine growth should be removed. It may be necessary to scrape off barnacles where the bags were tied. Care should be taken not to damage the paint.



- ☐ Inspect Saildrive Anodes

If the vessel was laid-up in the water, the anodes should be checked and changed, if nearly 50% consumed. Saildrives are very susceptible to corrosion (because the lower unit is aluminum). Care should be taken to ensure the anodes are always in good order.

- ☐ Inspect and Repair Paint Protection

Paint is an important part of the protection against corrosion on a saildrive. Any scratches or imperfect paintwork increases the load on the saildrives anodes which will be consumed faster.

- ☐ Clean Raw Water Intake

If the vessel was laid up in the water, the raw water intake ports should be cleaned as thoroughly as possible.

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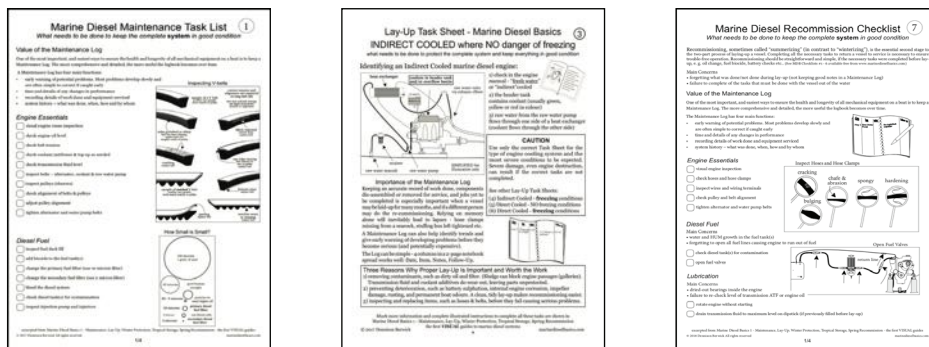
What needs to be done to keep the complete system in good condition

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Marine Diesel Basics Checklists



- #1 Maintenance
- #2 Maintenance Schedule
- #3 Lay-up Indirect Cooled NO Frost
- #4 Lay-up Indirect Cooled Frost DANGER
- #5 Lay-Up Direct Cooled NO Frost
- #6 Lay-up Direct Cooled Frost DANGER
- #7 Recommission Checklist
- #8 Saildrive Checklist

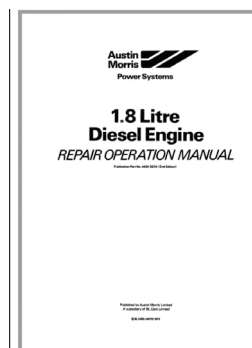
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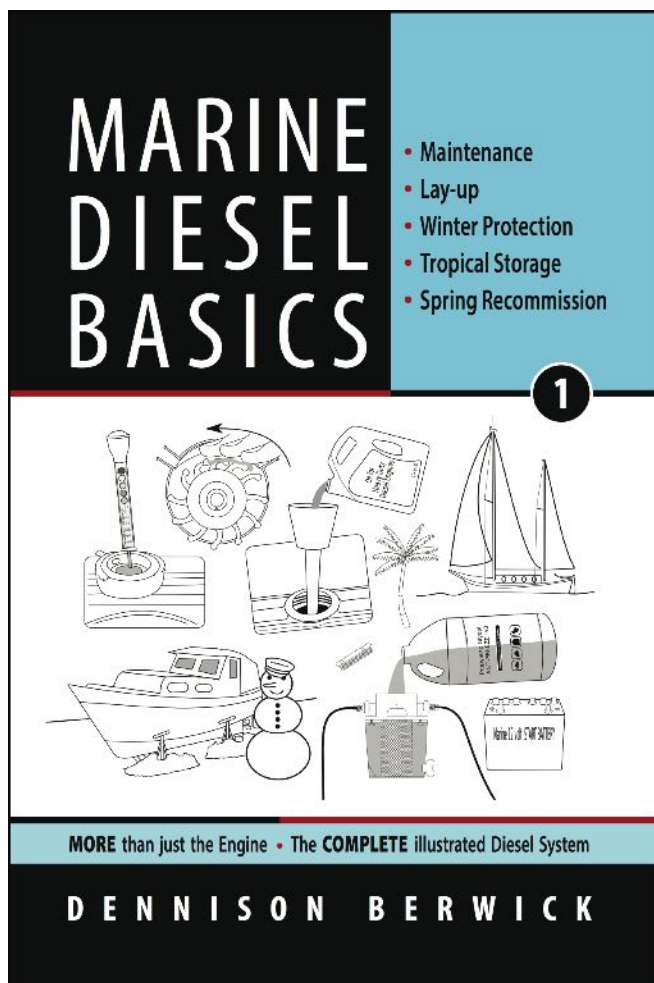
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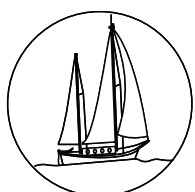
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