



● **FUEL TANKS**
Ensure there is access to the top of the fuel tank for inspection and extracting water and diesel bug

BLUEWATER DIESELS

KEEP YOUR ENGINE RUNNING LIKE CLOCKWORK WITH ON-PASSAGE REPAIRS. PAUL STRINGER REPORTS

Technology has mitigated many of the challenges faced by mariners, and has made passage making easier and safer than ever before.

We take for granted pinpoint navigational accuracy, autopilots and the ubiquitous diesel engine, along with the domestic niceties of modern yachting like fridges and water makers. But the bells and whistles come at a price, that price is complexity. To travel safely, you must learn the intricacies of your yacht and prepare for technology to fail.

The extent to which you prepare yourself and your vessel depends on where you are going and for how long. If undertaking coastal cruising in areas with good marine infrastructure, then the basic skills should be enough. However if you're venturing further afield, then the vessel needs to be prepared, spare parts and tools purchased, and the crew trained to deal with issues as they arise.

BASIC ISSUES AND BASIC SKILLS

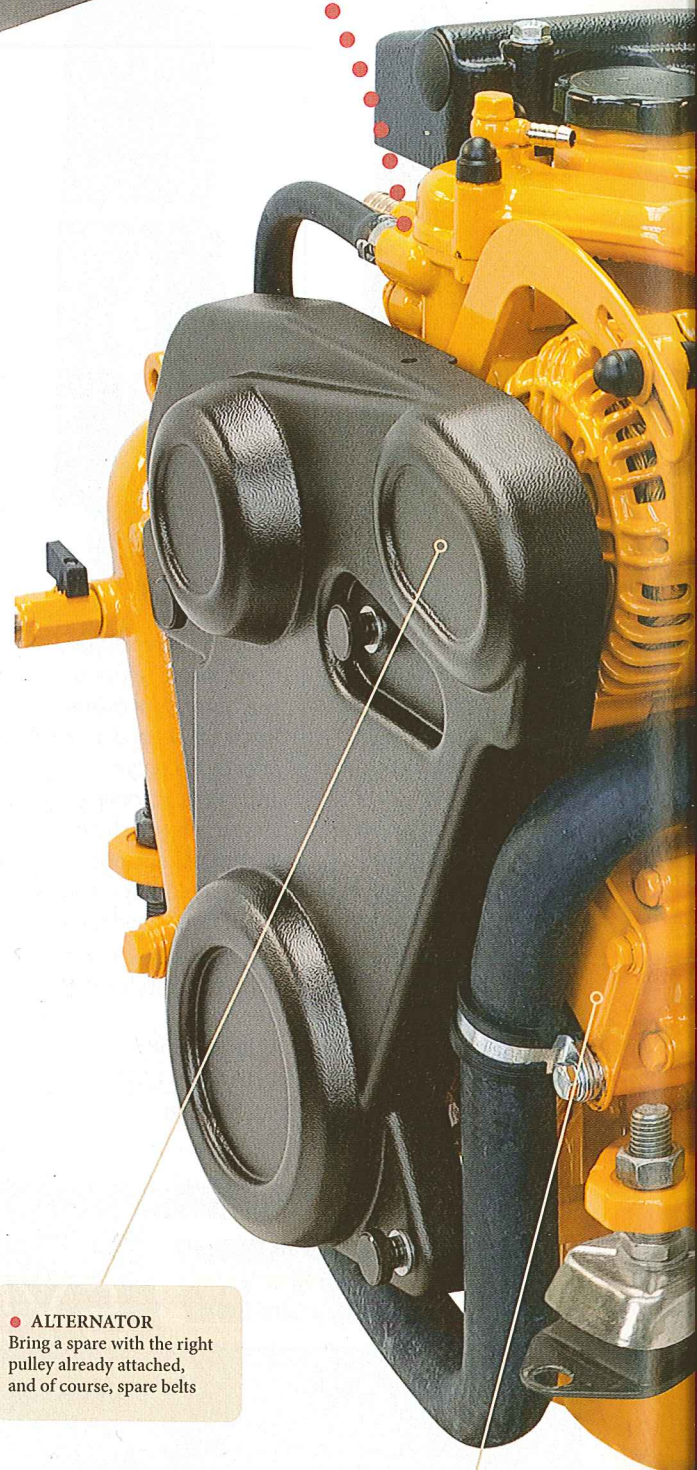
A yacht's greatest vulnerabilities are its engine's fuel and raw water systems. If they fail, then sooner or later the engine will fail. If you have

a diesel generator, it has the same systems and needs the same love. As a bare minimum, every yacht and crew should have the spares, tools and skills to replace fuel filters and bleed the system, and to change the raw water impeller. These things are not difficult to learn and form an absolutely essential skill-set for sailors.

You should identify the bleeds on the engine and either paint it red, or fit a red cable tie next to it so you can identify it at a later date. Paint or cable tie the appropriate spanners too so you pick up the right spanner first time, because sometimes

Tools:

- Spanners (two of each size) Socket sets 1/4, 3/8 and 1/2 inch drive plus torque wrenches to suit
- Screw drivers, for just about everything
- Electrical test meter
- Oil extractor pump, the vacuum types are superb but remember to warm up the engine before extraction or it takes ages. And carry a couple of empty oil cans for the waste oil
- Equipment manuals - available online



● **ALTERNATOR**
Bring a spare with the right pulley already attached, and of course, spare belts

● **RAW WATER PUMP**
These can corrode fast, so bring a new set of bearings and seals, or just a whole spare pump

● **ANTIFREEZE**

Renew every two years to protect from corrosion, but use the old silicate product, not the new organic acid version that is bad for brass/bronze and solder

● **HEAT EXCHANGER**

These corrode and block over time, so clean regularly. Include new seals and O rings in your spares kit as a minimum

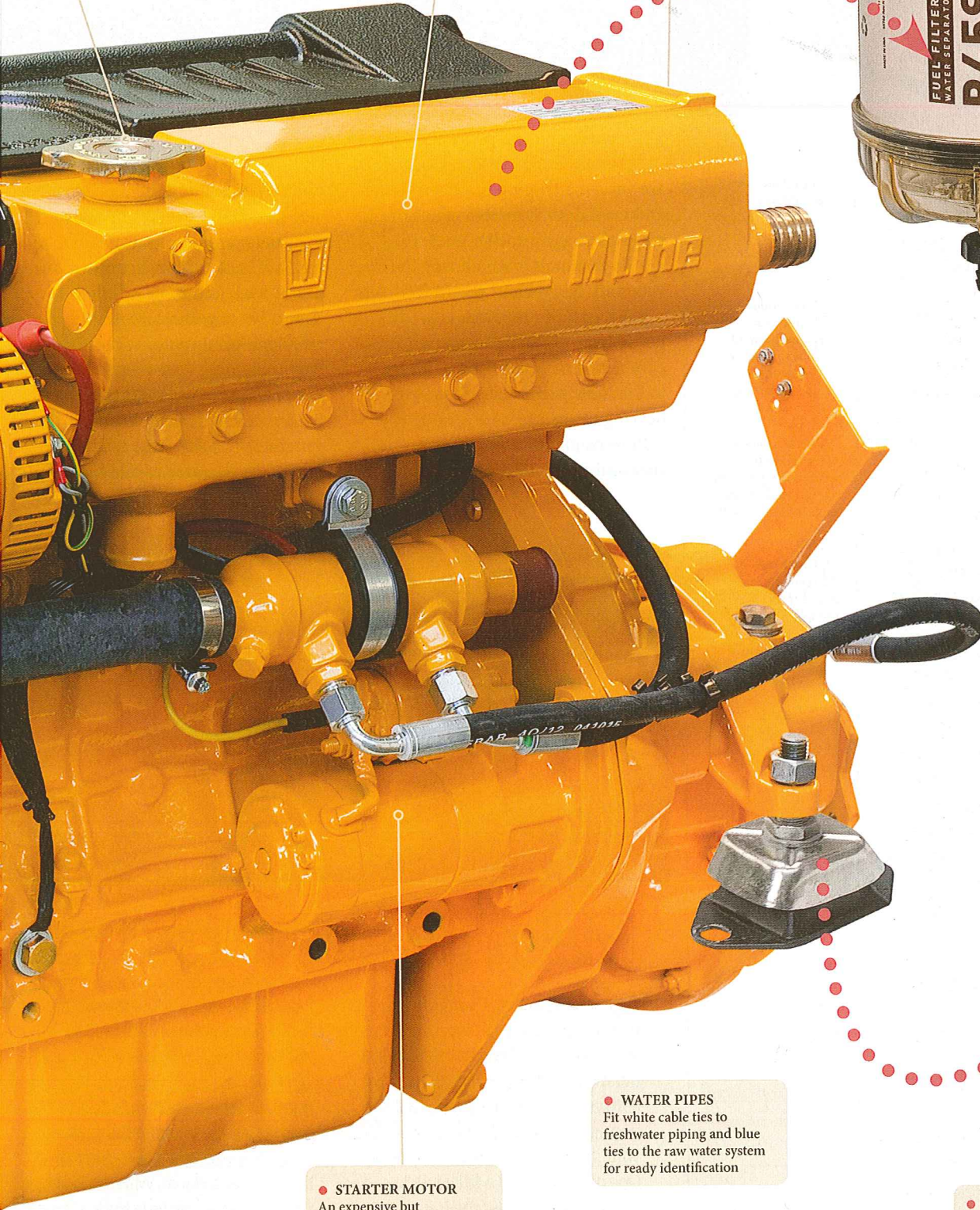
● **EXHAUST ELBOW**

If your engine isn't brand new, or you're planning a lengthy cruise, include an exhaust elbow in your spares kit, as they are susceptible to corrosion



● **FILTERS**

Fuel and oil filters should be easily accessible and everyone on board should know how to change them



● **FUEL BLEEDS**

Identify where they are and paint them red, or mark with a cable tie, for easy reference in an emergency

● **STARTER MOTOR**

An expensive but worthwhile spare. Without it, you may not be able to generate power to recharge the batteries

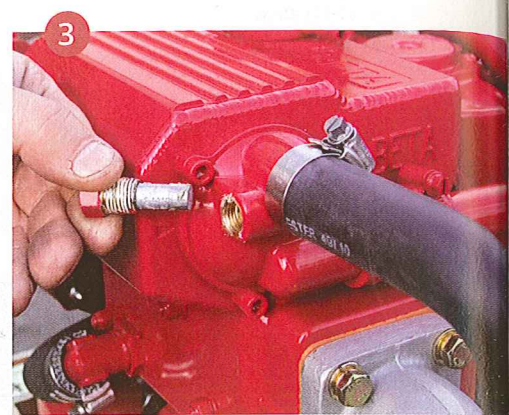
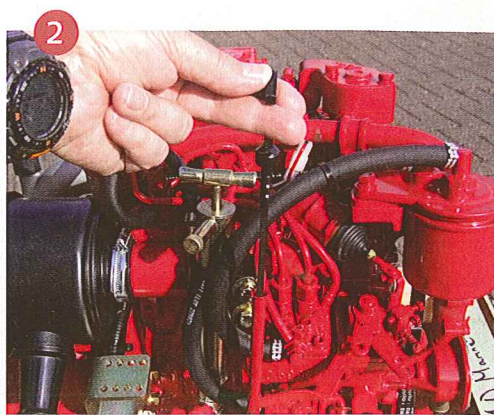
● **WATER PIPES**

Fit white cable ties to freshwater piping and blue ties to the raw water system for ready identification



● **CONTROL CABLES**

Tie spare engine and gearbox control cables alongside the existing ones so they can be quickly switched over if they fail



seconds count. While you have your pack of multi-coloured cable ties to hand, fit blue ones to the raw water pipes and white ones to the fresh water plumbing, whilst such things are at the forefront of your mind. You may have travelled half a world away before something gets in the middle of the night.

BEYOND THE BASICS

OK so you are going further for longer. What are the considerations? Just how much money and space you dedicate to spares, depends on where you are going and for how long. For example, engine exhaust injection elbows corrode away in time. If you are setting off for a year with a brand-new engine, you don't need to take one. If your engine is aged or your plans opened then you really should.

Fuel. A water-separator type fuel funnel is essential to remove water and debris when refuelling. Carry a small 'concertina' style hand fuel pump to extract water and bug from the bottom of your fuel tanks. Do you know how to access the top of the tanks to do so?

Engine raw water-cooling circuit? Take plenty of spare impellers, do you need a puller to remove the old one? Most impellers are accessible enough to be popped out with two screwdrivers but some

1 The oil filter should be readily accessible. Lightly oil the O ring seal and don't overtighten

2 Prevention is better than cure: keep an eye on oil levels and look out for leakages under the engine in the bilge

3 There should be an anode in the raw water cooling system. Check regularly and replace as necessary

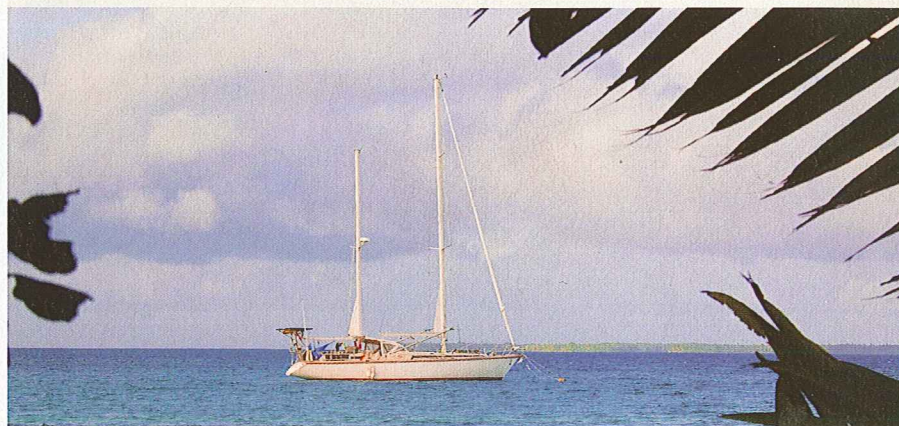
4 Check belt tension regularly and look out for telltale signs of wear that suggest the belt is being overworked

are very challenging to access – and no it doesn't matter which way round the impeller goes in nor does it matter which way the vanes are lying when you fit it.

Take a set of raw water pump bearings and seals or a complete new pump. It's easier to fit a new pump than fit new bearings to an old one.

Remove the heat exchanger core and inspect for corrosion

and clogging, even the fresh water side gets clogged-up eventually. Proprietary solutions are available to clean heat exchangers but elbow grease and gumption will do it too. Take a set of gaskets, seals and 'o' rings, as appropriate, to re-fit the heat exchanger core away from home. Take a spare core too, if you're feeling flush. Remember the generator has the same systems. Engine fresh water-cooling



Make do and mend

Ever since watching *Captain Ron* with that awesome line "a diesel loves its oil like a sailor loves his rum," I have a little ritual: check the oil, check the coolant, and have a general look around the engine room for anything out of place, writes Delos skipper Brian Trautman. One day, in Chagos, a little puddle caught my eye under the transmission.

A dab of my finger and a touch to my tongue later I knew we had a saltwater leak. Its source was the engine's saltwater pump. The leak was small, but the real problem was the water had run down the shaft,

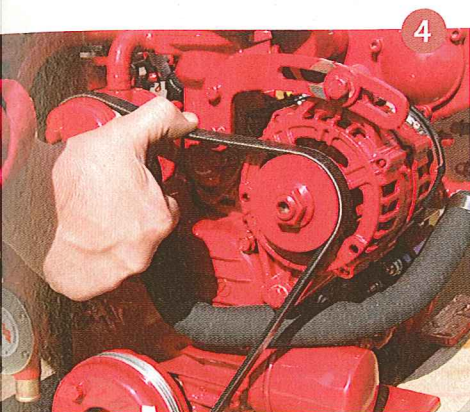
onto the bearings, causing them to seize. Our trusty main engine had suddenly become nearly worthless.

We didn't have a rebuild kit on board and the closest chandlery was in Thailand, thousands of miles away, so we resigned ourselves to being a pure sailboat. With the Indian Ocean's reliable easterly trades, I was certain we could make it to our next stop, 2,000nm away in Madagascar without too much drama. I just had to make sure a new pump was waiting for us when we got there.

However, our Master Volt battery

Basic tools and spares

Have a small tool box with just the tools and spares needed to perform the basic fuel and raw water pump tasks and keep it accessible. You could add a head torch and some gloves too, get nitrile ones that don't melt on contact with diesel.

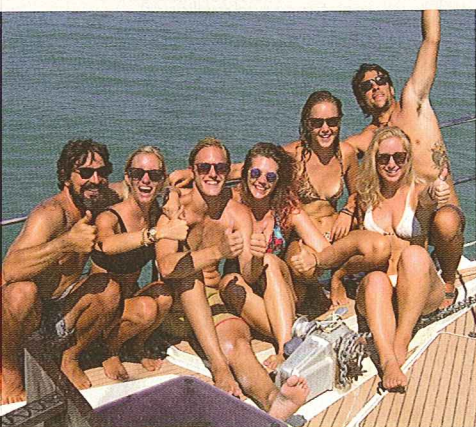


circuit. Make sure the antifreeze is fresh even if sailing where the butter melts. Antifreeze prevents corrosion but the effect diminishes over time. Change it every two years and use the 'old style' silicate antifreeze not the modern long-life organic acid stuff that isn't compatible with our brass/bronze and solder heat exchangers.

Engine electrics. Take a spare alternator. Does the spare alternator

have a pulley ready fitted? They usually don't so have one fitted before you depart, you won't remove the pulley from the worn out alternator without a puller. Take a spare starter motor, you may never need it but if yours stops working you are stuck with no propulsion and no engine generated electricity. Solar panels are great but won't ever do what an engine driving an alternator does. Consider the battery charging arrangements. Carry appropriate spares and see if you can come up with a work-around to get power from alternator to batteries if the intelligent charge management system manages to outwit itself far from home.

Take spare engine belts. If the belts are wearing prematurely (they should last for years) and you are getting black dust in the engine box you are asking too much of your belts. Perhaps you upgraded the charging system



charger packed up before we could set sail, so we suddenly found ourselves unable to generate power from either the engine or the Onan generator. We went into ultra-power conservation mode: turning the freezers off at night; using nature's heads; and not charging our laptops. It all added up and soon we were living 100 per cent off solar energy.

The sailing was beautiful and after 10 days of hand-steering we made the coast of Madagascar and dropped the hook in Nosy Be. My next week was spent tracking down parts to fix our pump. I explored back alleys and every hardware and automotive shop in the village. I needed bearings, seals, and some sort of hydraulic press to

get it all back together again. It took lots of patience and hand gestures. Finally I resorted to carrying a plastic container full of broken parts with me everywhere, so I could just pull out a greasy bit, smile and point.

Then one day I hit the jackpot. I met an Austrian expat who knew just about everyone in town and sent me to a German with a hidden auto repair garage. Within two days the pump was good as new for a cost of about \$18 – instead of \$800 plus shipping hassles for a new one. Better still, he had a brand new 24V Victron battery charger, which he sold me for \$600 instead of its \$1,300 RRP. Within a week, all systems were go!

LESSONS LEARNED:

- Systems failures are part of cruising! Think things through, improvise, and adapt your lifestyle to the situation.
- We now carry a spare rebuild kit for anything we can rebuild ourselves, including raw water, coolant, bilge and toilet pumps.
- Look for parts in strange places! Take your broken part with you and look forward to an adventure.
- Seek out an expat! These guys are a treasure of local information!



ONLINE

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with a bigger alternator? Talk to the engine manufacturer about upgrading the belts.

Take spare engine and gearbox control cables. Tie the new ones alongside the existing ones so they are already in place, grease the threaded ends and wrap in plastic to prevent corrosion.

OEM or pattern spares?

There is a global trade in 'knock-off' parts; that is components which are not made by the 'Original Equipment Manufacturer', but by a third party. It's always best to purchase branded OEM parts. Sometimes manufacturers' prices are eye-wateringly steep or genuine parts unavailable. Which spares to buy is a difficult judgement call. The only smart response is to become as fully informed as possible. Online forums are useful here.

RIGHT
Delos' elderly Volvo Penta works well but requires running maintenance and plenty of ingenuity to keep in shape

BELOW RIGHT
Brian uses Delos' on-board work bench to replace the bearings of the engine's raw water pump

