Marine diesel engines – particularly the older models – tend to be fairly simple in operation. Maintenance and troubleshooting should not be beyond most practical boatowners

Rupert Holmes

How to Fix your engine at sea

Rupert Holmes offers tips on avoiding engine failure – and what to do if it does happen...

Today's marine engines are generally much more reliable than those of a generation ago, but they are still far from being immune to breakdown. It's no surprise then that they can be a frequent source of worry, stress and, at times, unscheduled expense when cruising.

Fortunately, boat owners with the right background knowledge, tools and spares stand a good chance of fixing common problems themselves. Even better, there's a lot that can be done to stack the odds of preventing engine failure in your favour.

So what are the most common problems? Sea Start compiles statistics from the 2,300 breakdowns they attend each year. Of these roughly 60% are in marina berths or on moorings, with the rest at sea or in anchorages.

Single or twin engine motor boats account for 62% of callouts, with sailing yachts making up 36%. Sea Start fixes almost 90% of problems on site to a level at which "we get people on their way..." according to the company's founder Nick Eales.

Luckily only 5% of problems are classed as major mechanical failures. This underscores the philosophy that underpins the one day RYA Diesel Engine Maintenance course – that most problems encountered at sea can be sorted relatively easily and without specialist, in-depth mechanical knowledge.

The largest single category of problems, at just over 30% of total callouts, is electrics, including starter motors, alternators and wiring. Fuel system problems are next (21%), followed by overheating (12%). Fouled propellers account for a further 10% of issues and broken drive belts 6%.

PART 1 – Precautionary measures

I used to think of engine failure as a matter of probability; that sooner or later you would encounter problems if you spend enough time on the water. However, that's a somewhat passive approach and in reality, assuming the engine is basically in good condition, properly maintained and your fuel management follows good practice, there's a lot that can be done to improve the intrinsic reliability of systems. What's appropriate for your own circumstances will depend on your boat, crew and sailing area.

1 High capacity fuel filters

The standard CAV296 filters fitted to most small yachts have a relatively small capacity. Upgrading to a filter with a larger capacity, such one from Racor's range, can therefore reduce the incidence of fuel problems. In addition, they are easier and less messy to change. This is a policy routinely taken by charter companies, who may operate in far-flung destinations, yet need their boats to be as reliable as possible.

TIP

Keep any tools you might need to hand – you don't want to hunt through a whole set of spanners in the dark trying to find the right one. It makes sense to have a separate set of tools that you know are the right size for quick emergency engine work.

2 Twin parallel filter systems

Changing fuel filters and bleeding the system inevitably takes time, especially if it's not the type of messy work you do in your day job. However, time can be in short supply if the engine stops at a critical moment, particularly if you're short-handed.

For this reason many single engine motor boats have two filters fitted in parallel that can be switched in and out of the system. If the engine revs drop, or the motor stops completely, the clean spare filter can be switched into use in a few moments.

3 Vacuum gauges

When filters become clogged to the extent that the rate of fuel delivered reduces, the lift pump creates a partial vacuum in the pipework between it and the pre-filter. A vacuum gauge fitted here will give early warning of an impending problem – an increase of vacuum indicates a problem with the filter.

This is also why simply bleeding the air out of a fuel system that has a (mostly) clogged filter may get you going again. The increased vacuum pulls air into the system from joints in the pipework, or around the seals of the filter. In this situation bleeding the system won't make the engine run for ever, but it may get you a few hundred metres past a critical point, especially if the motor is run at slightly lower revs than usual.

High capacity fuel filters can reduce the incidence of fuel problems

Don't forget the secondary fuel filter on the engine. If the primary filter has been clogged this one might be too.

Check condition and tension of the alternator drive belt. For correct tension there should be some deflection like this, but no more than ½in (13mm)

4 Check your fuel tank

Dirty water tends to settle in the bottom of fuel tanks, where it is only disturbed on a rough day at sea – often this is a precursor to clogged filters.

A further problem is the well documented one of microbes (diesel bug) that live in water in the tank, feed on the fuel and have potential to breed rapidly.

Any water will form a layer at the bottom of the tank, along with any dirt and microbes. Many tanks have a drain pipe at their lowest point, or an access point above this for a small pump. Both options enable a sample of liquid to be taken from the tank – if this turns out to be neat diesel then you know the fuel is in good shape.

If there's crud or water present it's worth draining off more fluid – in many cases you may need to run a further two or three litres through before you see clean fuel. If that's the case you're likely then to have cleared most of the problem. However, if you still don't get clean diesel at this stage perhaps emptying and cleaning the tank would be a sensible precaution.

PART 2 – Solving the problem

Electrics, including starter motors, alternators and wiring

Avoiding problems with these items is often a maintenance issue, although wiring should be visually inspected as part of the daily checks for obvious problems. Looking at the tension and condition of the alternator and water pump drive belts will also identify any problem with these well before there's a risk of failure.

If you have an older engine and are cruising longer distances, a spare set of brushes for starter motor and alternator may be a good precaution. Beyond that, having ample power to start the engine is an important factor, which largely boils down to good battery management.

If faced with a lack of power there are a number of actions that may get the engine running again. If your engine is fitted with decompression levers for use with hand starting, then lifting these as you spin the engine on the starter motor will hugely reduce the electrical power needed.

If not, the first stage is to give the batteries their maximum chance of recovering some charge. If possible turn off all electrics for 10-15 minutes – the voltage will rise a little during this time. If power is not being drawn off elsewhere the next time you try to start you might just be lucky.

Another issue could be a loose connection in the high load wiring to the starter motor. A quick check for excessively hot contacts will give an indication to this problem. To fix it, dismantle the terminal, clean contacts thoroughly, reassemble and try again.

Fuel system

Most small marine diesels are so simple that, other than a cooling system, they require only a supply of air and clean diesel to operate. The most common problems are with dirt in the fuel, which slowly blocks filters until the point is reached that insufficient fuel can get past, or air is sucked into the system instead. It's therefore always worth carrying spare filters – normally two types are required, for the pre-filter closest to the fuel tank, plus the second unit that's mounted on the engine itself.

Changing these filters – and then bleeding the air out of the fuel system – is a relatively simple operation.

But trying to figure out how to do so for the first time at sea is not a good move. It makes sense on the first occasion to do this it as part of basic engine servicing. It's a great confidence boost the first time you successfully manage it on your own boat.

TIP

Feeling lucky? In many cases you can get the engine running again simply by bleeding the fuel system. This of course won't fix a clogged filter, but it may be enough to give a few minutes of engine running to get you clear of the most immediate trouble.

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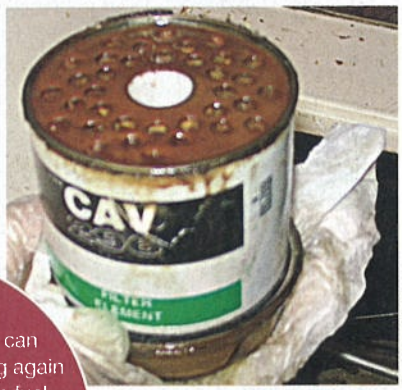
Holding decompression levers open while cranking gives a low battery a better chance of spinning the engine up to speed

Not every water pump impeller housing is as easy to reach as this one. Removing a damaged impeller can be tricky



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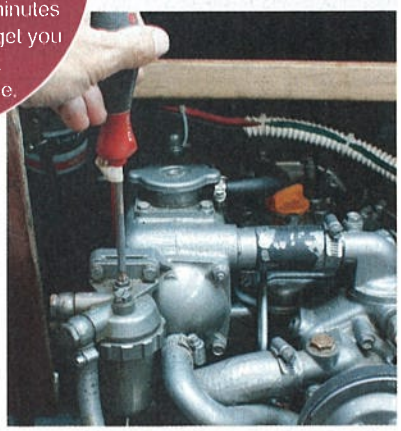
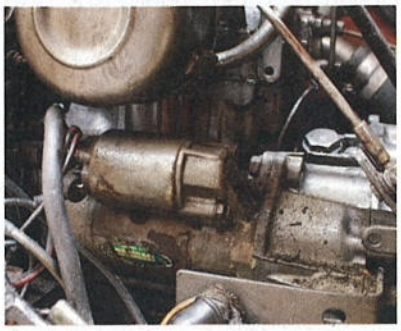
If your motor won't run and the fuel filter is as dirty as this you may have found your problem



After changing a primary fuel filter chances are you'll need to bleed air from the supply system at the secondary filter



Poor contacts on the starter motor solenoid can stop electrical juice getting through. Ensure contacts are secure

Overheating

Most problems stem from the raw (sea) water side of the system. At the very simplest a plastic bag or sheeting may be sucked across the inlet through-hull fitting, blocking the water flow. This can be hard to diagnose, as the plastic may float away when the engine is turned off.

Alternatively, debris can be drawn into the filter. If so, cleaning the filter is usually all that's needed to get the engine working again. But… the flexible rubber impeller that pumps the sea water around that side of the system relies on a supply of water for lubrication. If the engine is run without cooling water circulating for more than a minute or two the impeller may overheat, or blades may break off. If this has happened the impeller needs to be replaced – and any broken pieces retrieved so they don't block waterways.

Impellers have a limited service life, even on engines that only clock up a handful of hours each year. If you flex the blades of an impeller that's at the end of its useful life tell-tale cracks can often be seen at the base of the vanes.

Fouled propellers

I'm often astonished by the number of boats where the engine is started and forward power engaged while the headsail sheets are flailing around. It's a quick job to tidy the sheet tails such that they can't create embarrassing problems later. This of course also applies to spinnaker gear and halyards that are handled at the mast.

Even if your boat's own lines are kept impeccably tidy, there's still plenty of scope to encounter floating lines, plastic sheeting and nets in the water, especially in the dark. Prop shaft rope cutters will deal with all but the most stubborn of these and prevent consequential damage caused by the engine and gearbox attempting to continue to rotate while the propeller is jammed in one position.