



DIESEL ENGINE ESSENTIALS

presented by

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What does a diesel engine do?

- Converts diesel fuel to energy: torque and electricity

6 Components of a Diesel Engine (similarities to your body)

1. Fuel system (food)
2. Lubricating system (blood stream)
3. Cooling system (hydration, sweating)
4. Air (breathing)
5. Electrical (brain)
6. Transmission (movement)

1. Fuel System

- Engine must have clean fuel: West Marine Fuel Filter Funnel, Fuel Additive
- Tanks must be clean to start with: fuel polishing, tank inspection and clean out
- Lift pump brings the fuel from the tank to the fuel filter
- Injection pump pressurizes the fuel and sends it to the injectors
- Injectors spray the fuel into the cylinders at the right moment
- BANG! The fuel/air mixture explodes due to compression

2. Lubricating System - Oil

- Keeps the parts moving. Without oil, the engine stops.
- Carries away waste by-products (sulfur and carbon)
- Needs to be filtered. Oil filter is like your liver, filtering out impurities
- Changing the oil and oil filter every season or 100 hours is very important
- Annual oil analysis show unusual wear patterns

3. Cooling System

- Engine generates a lot of heat from the explosions
- Without efficient cooling, the engine overheats and stops
- Marine diesel engines use seawater to cool them, by way of a heat exchanger
- Sea water is sucked into the heat exchanger by a raw water pump
- The heat exchanger allows fresh water (with anti-freeze/coolant additive) which circulates inside the engine to be cooled by sea water
- Any blockage of the fresh water or sea water cooling system results in engine overheating
- Potential problems causing overheating: something sucked into sea water intake (plastic bag, jellyfish, etc.), water pump impeller wearing out, belts slipping or broken, hose or worn hose
- Check simplest solutions first: check for water flow, check belt tension before checking impeller

4. Air

- Diesel engines need lots of clean air
- Air filter needs to be cleaned or replaced at least once a season or when visually dirty

5. Electrical

- The electrical system on your boat is very similar to the one in your car
- An electric starter motor starts the engine and an alternator generates electricity
- Belt tension is very important; if the belts slip, the alternator doesn't work or gets "fried"
- Check for "wiggle" in all wire connections
- Replacing standard alternator with a high output Balmar and smart regulator speeds charging

6. Transmission

- The transmission on a boat is similar to one in a car; it takes energy from the engine to make the boat move forward.
- The transmission fluid level needs to be checked weekly and replaced at least annually

Start Up and Operating Procedures

- Before start up
- After start up
- While motoring

Engine Maintenance

- Engine log and hourmeter
- Zincs
- Winterizing
- Siphon break

Annual Mechanics Check

- Valves
- Alignment

Environmental Matters

- Do the right thing!

20 Year Old Engine and Heading Offshore

- Compression check
- Service injectors
- Rebuild starter and alternator
- Service heat exchanger, oil & transmission coolers
- Replace engine mounts
- Replace exhaust water injection elbow
- Remove & inspect shaft, replace stern bearing
- Check damper drive plate

Resources

- Diesel Engine Care & Repair - West Marine Quick Guide by Nigel Calder
- Diesels Afloat - Pat Manley
- Marine Diesel Engines - Nigel Calder
- Engine Manuals: operators, shop & parts

www.mahina.com/forms.html

- Engine Spare Parts List
- Spare Parts on Mahina Tiare
- Mahina Expeditions Diesel Engine Test