



# 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](http://www.mahina.com/forms.html)

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