

Maintenance with excellence - Maintaining the Kings Fleet

Intro

As representatives of the Lord, I believe we should look to do everything as *'unto the Lord'* Colossians 3:23-25 and our vessels are a very visual representation of this.

We should also be setting the standard for safety and operating in a way that is above question, with excellence, this in itself will open doors.

As the King's Fleet expands, we need to be known as safe, conscientious operators, this will affect our interaction with maritime authorities, harbour masters, surveyors, flag state controllers.

We shouldn't try to 'get by' with anything, but accept the rules relevant to our operations and go above and even beyond where possible.

This extends to the little everyday details, that no one 'enforces' fenders hanging sloppily or not being brought in when under way, shore power cables creating a trip hazard, halyards not properly secured, a hundred and one little things, which can all be summarised as good seamanship.

Maintenance goes hand in hand with good seamanship.



I wasn't always good at this... Six and a half years with very little maintenance, lot's of adventures and this was the result!

Maintenance with excellence - Maintaining the Kings Fleet

Primary goal:

To ensure the vessel and her crew / guests reach their destination safely and on time.

To ensure the vessel is maintained in such a way as to continue her operations and maintain her value.

Secondary goal:

To upgrade and improve the vessel, as finances permit.

It's important to separate between cosmetics / wish list and safety / maintenance.

Sometimes there will be an overlap, for example: rust streaks both look bad and will need more maintenance the longer you leave them.

Fundamentals of maintenance

- If something looks 'wrong' then it almost certainly is
- Never delay investigating a problem because you think it might be expensive or difficult
- Maintenance should be treated like reefing:
If you are thinking about it, you should already have done it.
- If something moves grease it, if it doesn't paint it! (an old navy saying)
- Look with fresh eyes, this takes practice, you can become so used to looking at something that you just look past it. Stop, take a bit longer and really look at that hose or electrical connection.
- Be sensitive to smells!
- Don't be afraid to get stuck in!

If you ignore something because you are unsure how it works, or whether it is correct, you might be forced to investigate it at sea, with the boat rolling around and in an emergency of some kind.

Don't be afraid to test and operate every system on board, beware of firefighting systems, better to test this with an expert, but I can't think of anything else that you shouldn't be able to test / operate yourself.

Get to know all the systems on your vessel. This of course varies depending on the size of boat, and the crew on board. On a 500 ton yacht I will have a couple of good and experienced engineers but as captain, I still need to know the systems well

Maintenance with excellence - Maintaining the Kings Fleet

enough to operate them and carry out at least basic troubleshooting myself, enough to be able to get home safely should something happen to the engineer. (You also have to know enough to know that the engineer is talking sense!)

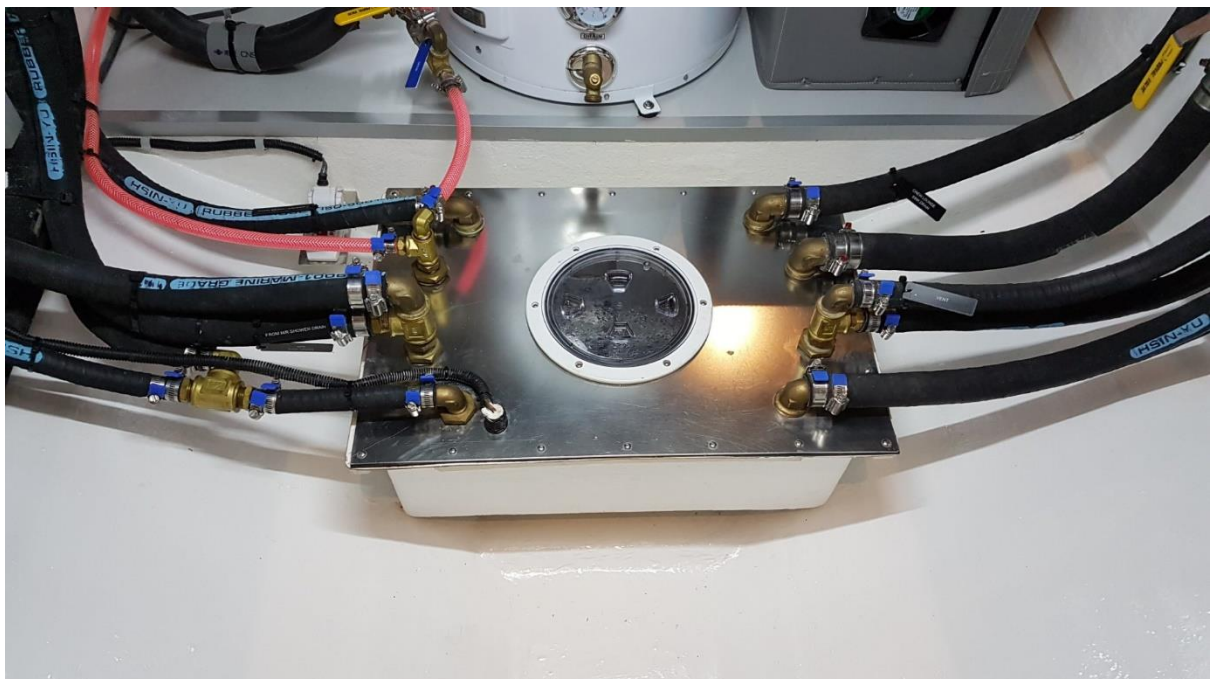
On a smaller yacht, you will probably be the engineer and skipper, so it all falls on your shoulders.

That doesn't mean that you need to be the one to check the engine room every hour when you are underway, or to service everything yourself, but you have to set the standard on board, so that the crew member that goes to check the engine room, knows what to look for, listen for and smell.

At sea or in certain circumstances a temporary repair may be required. However a temporary repair is just that, and the item in question should be bought back into full working order as a matter of priority.

The key to maintenance is to be methodical and organized.

And remember that your vessel will be more reliable the more everything is used, sitting at a dock is the enemy of any seagoing vessel!



Maintenance with excellence - Maintaining the Kings Fleet

- Keep it clean! Leaks are easier to spot, it's nicer and easier to work when the area is clean. If it is not, that's the first job then make sure it's always left better than when you started work.



- Label things, blue tape and a sharpie (marker pen) are your best friends. Blue masking tape won't damage anything and allows the label to be easily removed when irrelevant, better than writing on things directly.
- Photographs are a great way to record and automatically include the date, but they must be organised and handed over properly, otherwise they are useless.
- Assume it will be someone else following you, then when it is actually you, you will get a nice surprise and the job will be easier!



Get into even the most inaccessible parts of your vessel, if you find it hard to get there, then the chances are it's been ignored...

There should be no, no go zones, on a boat.

If a floorboard or area has been sealed, then the area behind should be an immediate area of concern /

investigation.

An endoscope camera for your phone is only £10-£15 and will allow you to look around corners and into places you can't get to easily.

Maintenance with excellence - Maintaining the Kings Fleet

Focus on the Ancillaries

The ancillaries cause the majority of problems, for example:

In the case of engines/generators	fuel or cooling water supply
Electrical failures or faults	connections or cabling
In the case of the mast	split pins, or the standing / running rigging

With maintenance as with troubleshooting always start with the basics.

Checklists

Checklists are crucial, with the best will in the world, we all forget things, they also allow someone else to step in and continue without an interruption in maintenance.

So lets run through the basic starting points.

If lists aren't simple they simply won't be used. KISS

You will need at least the following:

Daily checklists

Weekly checklists

Monthly checklists

Annual works plan

Five yearly plan

Thoroughly work through your vessel, starting on deck at the bow and working your way to the stern on each deck and below. Then move onto the mast (s) and tender (s).

Start by listing defects and categorizing them

- Safety
- Urgent
- Low priority / Cosmetic

Then list everything that requires maintenance

Separate the lists into, daily, weekly, monthly and annual priorities.

Maintenance with excellence - Maintaining the Kings Fleet

As you walk through each area, this will always remind you of things you have forgotten.

Categorise them to make it easier for yourself, for example, to spend an hour checking all the bilge pumps and alarms at the same time once per month is a lot easier than if they are spread throughout the month.

Remember all equipment needs to be operated.

Valves that you are relying on to shut off fuel in an emergency.

Hatch dampers to shut off the engine room so you can release your extinguishers

Emergency steering gear – does it work in reality or just in harbour with no waves?

Daily checklists

DAILY & WEEKLY MAINTENANCE

TASK	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Sea Chest Strainers	*				*
Air-con Anodes		*			
Shore Supply CW Pressure			*		
Nav Lights	*		*		
Fuel Levels	*	*	*	*	*
CW Pressure	*	*	*	*	*
Hot Water Temp/Pressure	*	*	*	*	*
Fridge/Freezer Temp (Discuss with Chef)					*
Shorepower Consumption (When Connected)	*	*	*	*	*
Shaft Seal Check			*		
Air Compressor Drain Reciever					*
Water Maker Strainers Clean				*	
Check Defect Log	*				
Guest Tender				*	
Rescue Tender				*	

For a daily check list to be used I believe it has to be small enough to fit on one page, A4 or A5 depending on the size of your vessel.

On a larger yacht, you will have these lists for each area Deck / Engineering / Interior.

You will need **At Sea** and **In Harbour** checklists, as they will be different.

A simple check list can look like this and be used for both daily and weekly items.

Maintenance with excellence - Maintaining the Kings Fleet

Weekly checklists

These should include running equipment that might be unused on a day to day basis, such as:

- Cleaning Sea Chest Strainers
- Cleaning Water Maker strainers
- Checking Fridge / Freezer temperatures
- Checking Nav Lights
- Checking shaft seal
- Operating sea cocks
- Check drip trays under hydraulics, engines, air con
- Draining Air Compressor (water) and checking oil
- Running engines, generator, tender
- Checking levels on hydraulics

Monthly checklists

- Safety gear inspection and test everything possible, same day as drills
- Operate watertight doors, hatches
- Check anodes, engines, generators, air con, tenders
- Air Con filters
- Lubricate steering / stern gland / windlass (grease nipples)
- Check all oil levels, make a list so you don't miss something, hydraulic steering / autopilot is an easy one to forget.

Annual works

Start a dedicated list for annual maintenance works

Always separate out of water and in water jobs, as it will usually be costing more to be ashore so use the time wisely.

Again, always categorize by priority and then this will determine the jobs you start first.

- Safety
- Urgent
- Low priority / Cosmetic

Five yearly plan

I tend to keep a rolling 5 yearly plan as this coincides with survey requirements and allows you to plan ahead for big expenses.

Maintenance with excellence - Maintaining the Kings Fleet

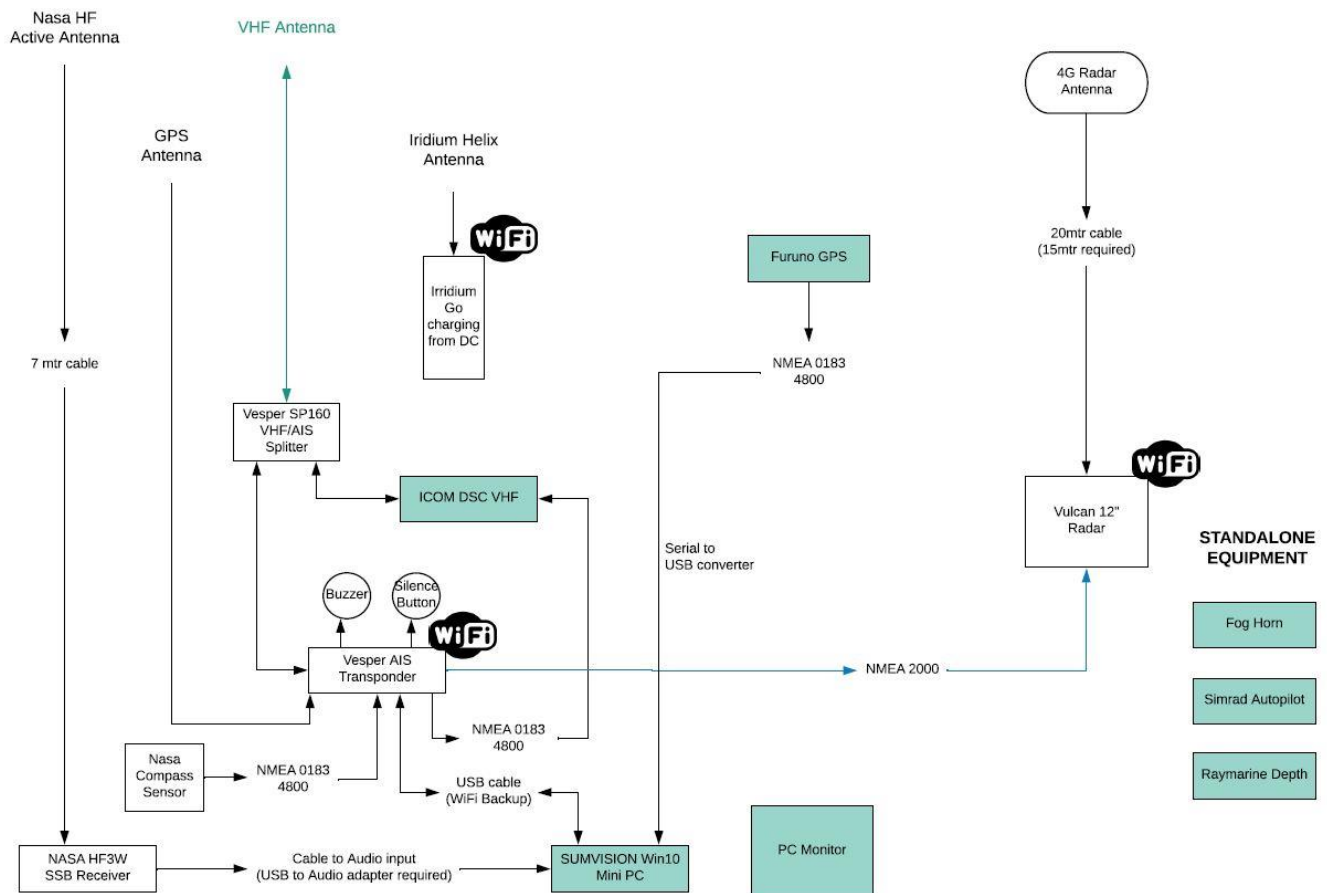
When installing new equipment

Always test it before you need it. Watermakers prime example, sucking air etc.

When contractors are installing something for you, be there watching and learning, handing them tools, making cups of tea, you will learn so much in the process.

Don't forget to update the on board paperwork:

- Make alterations / additions to the schematics where required
- Add the maintenance items to your checklists
- Add the new manuals to your records
- If you don't have schematics on board, start now, over time they can be added to. I use [LucidChart](#) which is free up to a point and very easy to use.



Maintenance with excellence - Maintaining the Kings Fleet

Fuel

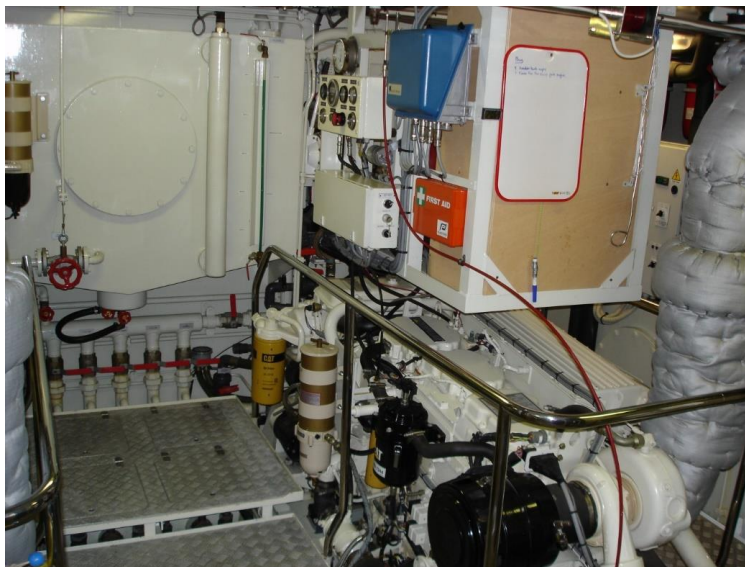
You will never get an engine to run if it has dirty fuel, or air in the system and yet when was the last time you emptied your tanks and looked inside? They should be spotless.



Of course, it is essential that you carry plenty of spare fuel filters and have a way to drain water off from the primary filters, but if you have the bug in your tank you will easily get through more all your filters and still have a problem.

Modern diesel contains some water, without even accounting for condensation, water encourages bacteria growth and before you know it you have the fuel bug.

- Keep your tanks full, when possible to reduce condensation.
- Where the tank is accessible, on a regular basis (monthly) drain off a small sample from the bottom of the tank, let it sit in a glass jar and check for water or bug.
- I always add [Fuel Set](#) to my tanks, this is a product that treats the fuel and allows small amounts of water or bug to burn off in the combustion process. There are many alternative products, but I have used this for years with great results and it pays for itself in the improved economy.
- Consider fitting an [H2out](#) in the fuel tank vent line to help remove moisture from the tank, these are great, but rarely fitted.



A well designed day tank, with an angled bottom and sump to encourage any dirt or water to go the lowest point, a simple drain valve with hose, clear site tube and large inspection hatch.

Maintenance with excellence - Maintaining the Kings Fleet

Electrics



Electrics tend to scare many people, but there are actually few areas on a boat that are really dangerous, and none if you take proper precautions.

You do need to be especially careful around batteries, especially Lithium, often people don't realise the huge power there. If you are undoing a connection on the battery, make sure your spanner is small enough not to reach between the terminals and / or is well insulated.

Primarily you are looking for loose or poor connections.

If you look behind many switch panels or instrument panels you will find loose terminals.

You should be able to pull gently on a cable in a crimp terminal and feel no movement. If it moves at all, it must be re-crimped.

There should never be any copper wire visible in any kind of connection.

I lost two close friends due to a poorly crimped connection on an engine stop solenoid.

Finding a loose connection when tied to the dock is always preferable to when you are at sea!

Try to use a good quality crimp tool like this, not the thin ones that only crimp in one place. It makes a big difference.

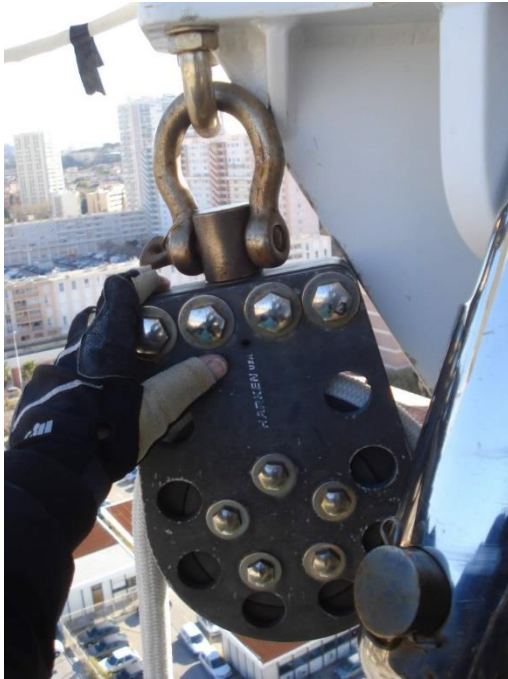
If you can, then also use the heat shrink crimp terminals, as they make a waterproof connection, essential for bilges etc. they are the slightly transparent ones.



A multi-meter set on continuity or DC voltage setting will help you fix the majority of problems!

Maintenance with excellence - Maintaining the Kings Fleet

Rigging



Be microscopic in your rig check, sometimes you can actually use a magnifying glass to spot hairline fractures, take your time and look at every fitting.

Remember, if it doesn't look right, it probably isn't!

You should know your rig as intimately as the rest of the boat, always go up the rig and take time to look at every fitting and block connection before any big passage.

Don't just rely on the riggers inspection which will probably only be done annually if that.

Stern Gear

Steering



Steering gear can often be forgotten as it is quite inaccessible and generally just works, until one day it doesn't...

Even maintenance free steering gear needs to be checked, and you should always check full rudder movement along with engine propulsion before leaving the dock. This has saved my bacon on so many occasions, perhaps the steering pump is off, or an engine has been in local mode, something that could have caused an accident if not picked up before any lines were cast off.

On older boats you can expect to find a grease gun that needs turning, or a flange that needs tightening to push packing into the seal, in the same way as a stern tube with packing.

If this is inaccessible then it will usually be forgotten, leading to problems in the future.

Maintenance with excellence - Maintaining the Kings Fleet

Test your emergency steering / bypass valves at sea, not only in harbour, this usually reveals something that needs changing or improving to work reliably.

If you're relying on steering with twin engines, try that in different conditions so you know the limitations.

Stern glands

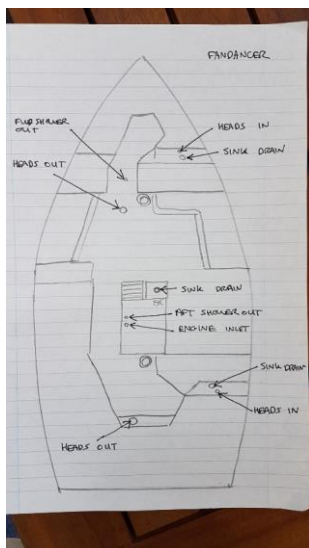
There are many varieties of stern glands, lubricated by water, oil, grease or a combination of these, some are supposedly maintenance free, whatever you have get to know your system and how to maintain it.

When a boat is sat in harbour the shafts are often not turned over regularly, which can lead to pitting in the shaft where oxygen has accumulated or through electrolysis. This is another reason boats need to move!

Stern glands generally should have an occasional drip when under way, but be dry when stationary.

A damaged stern gland can let a lot of water into your boat quickly and be tricky to block. Larger boats often have an air collar around them setup for just such an occasion, but this has to be coupled with a shaft brake, otherwise as soon as you start moving through the water and the prop spins, it will wreck the collar, often the brake is missed from the installation!

Skin Fittings



Must be operated regularly to be able to be closed in an emergency.

For emergency use and to make sure you are operating all of them on a regular basis you need a simple diagram of all skin fittings and sea cocks, and to add them to your checklists.

Modern plastic sea cocks are great and don't seize up in the same way, but an old Blakes bronze seacock will always needs greasing and even then sometimes needs a big spanner on it to operate.

Remember they can often only be serviced out of the water, so don't miss the opportunity.

Note:

Whilst operating the seacocks, check that all hoses below the waterline are double hose clamped and of good quality marine hose (in the engine room / space this should always be fire retardant).

Maintenance with excellence - Maintaining the Kings Fleet

Grease Nipples



You will find grease nipples all over your vessel, they are there for a reason and essential to continued smooth running.

Make sure they are listed on your checklists and always make sure the grease is actually going in, if it's not, investigate further!

Safety Drills



Drills go hand in hand with maintenance. A well run drill, even if it's just a walk through almost always highlights things that need attention. Whether it's as small as a snap shackle that is led wrong on a liferaft, or as large as the fire pump not operating.

Small boats might not see the need for a drill and of course, it is different, but running through

scenarios always brings up something to improve, consider or learn from.

Commercial vessels have to run monthly safety drills by law, as a minimum.

Expect the worse to happen.

The day before this fire broke out on the yacht next to us, I had been working on the fuel system, and although it was the end of the day, decided to take the extra few minutes to connect and refill the day tank, just in case we needed it. If I hadn't then our engines would have failed about the same time I turned around and took this photo, approximately three minutes after the fire started.

Ask yourself if this widget fails, how do we get home safely?

Maintenance with excellence - Maintaining the Kings Fleet

So what do I need?

[Boat Owners Mechanical and Electrical Manual](#)

Tools – there is a great list in the book above, Appendix C

Spares – of course this is unique to your vessel and area of operation, but there is a good starting list also in Appendix C

The [Code of Safe Working Practices](#) is aimed at Merchant marine, but is full of very practical information, and is regularly updated. It is a great free reference and interesting to learn from how the commercial industry does it. For example if you are working out hand signals to communicate when launching your tender, why not learn the internationally recognised hand signals from the start?

Summary

Above all, get stuck in and even if it does not come naturally, be organised, write things down and work methodically through your boat.

Any time and money spent in maintenance, you will recoup in saved repair costs and in the process you will get to know your boat better, making you a safer seafarer.