NEW ZEALAND MARITIME MUSEUM

(NZMM)

MV Nautilus

MNZ 135945

VESSEL MANUAL

Diagrams by Wayne Macdonald

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Contents

SHIP DETAILS

Nautilus was built for Christchurch man Horace Edwin Chester in 1913 by Collings & Bell, prominent Auckland boat builders located in St Mary's Bay.

In 1915 Horace Chester was conscripted to the New Zealand Army. In a patriotic gesture, he and his wife offered the army the use of Nautilus. Nautilus was one of two motorboats carried by the Hospital ship Marama during WW I which commenced her duties in the Mediterranean in 1915. With many thousands of men wounded it would have been heavy work for the kauri hulled craft with her four-cylinder engine.

Since the New Zealand Army returned her to her Christchurch owner in 1919, Nautilus has had several lives. She has been in the excursion business on the Avon River and in the Great Depression she morphed into a passenger ferry on the Lyttleton Harbour.

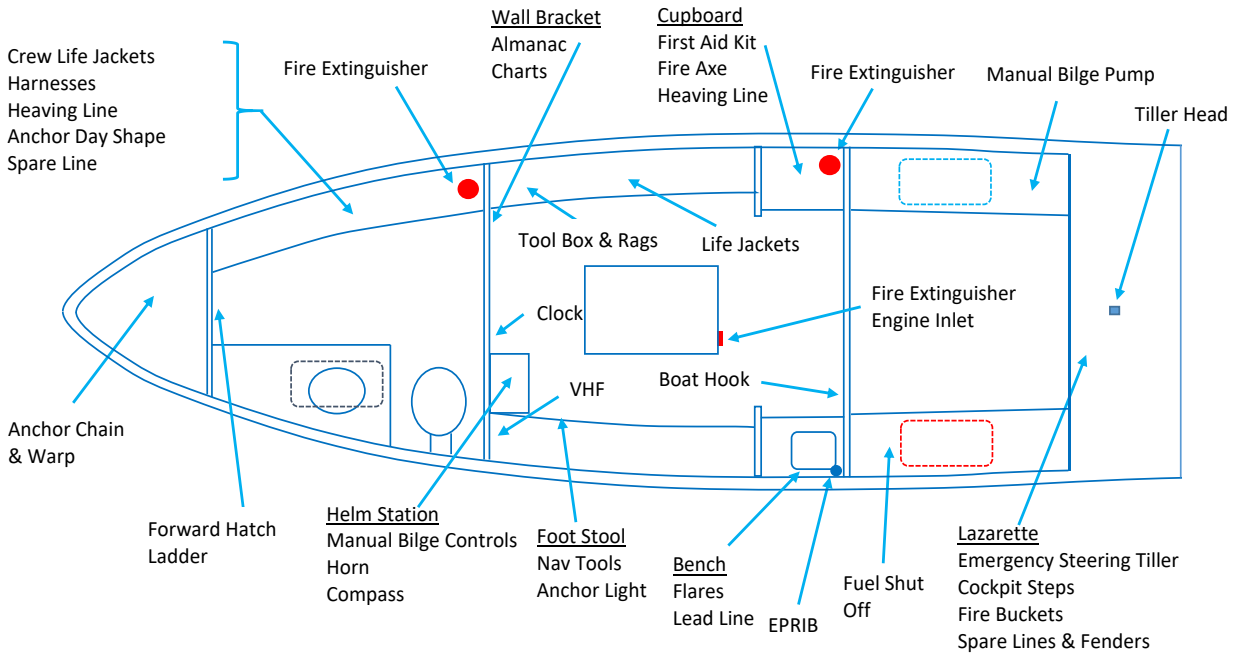
Nautilus was purchased in 1994 by retired Christchurch businessman and former Honorary German Consul General, Allan Williams. Mr Williams gifted Nautilus to the New Zealand Maritime Museum on 9 November 2011. She joined the museum's vintage fleet moored in the marina at Hobson Wharf and is our only working launch.

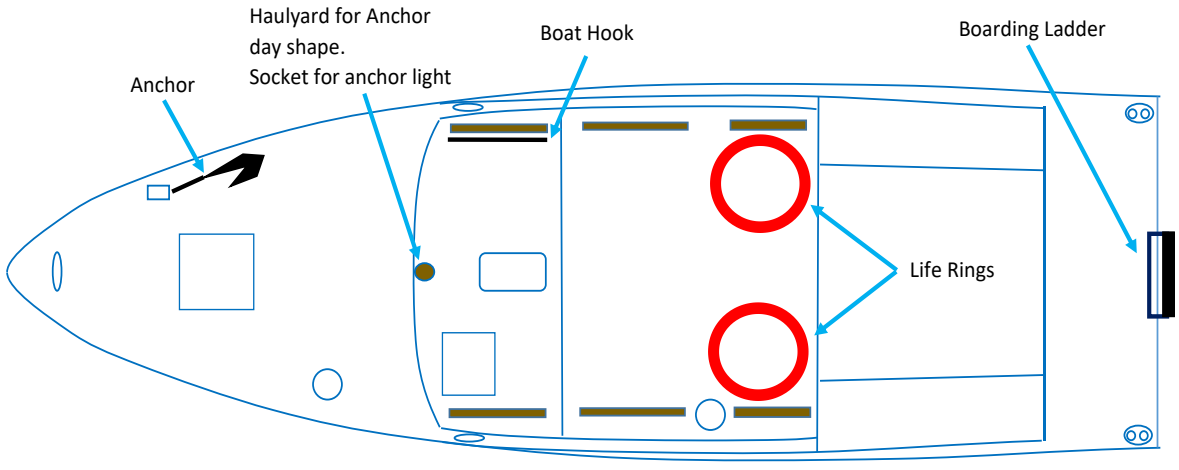
Length	36'	11m	Call Sign	ZMU4642
Beam	8' 10"	2.7m	Crew	Master & Deckhand
Draught	4' 7"	1.4m	Passengers	8
Engines	Volvo Penta 50hp		Limits	20kts wind, 0.75m swell
Fuel tank	90 litre			
Fuel consumption 1.5l/hour				

EQUIPMENT

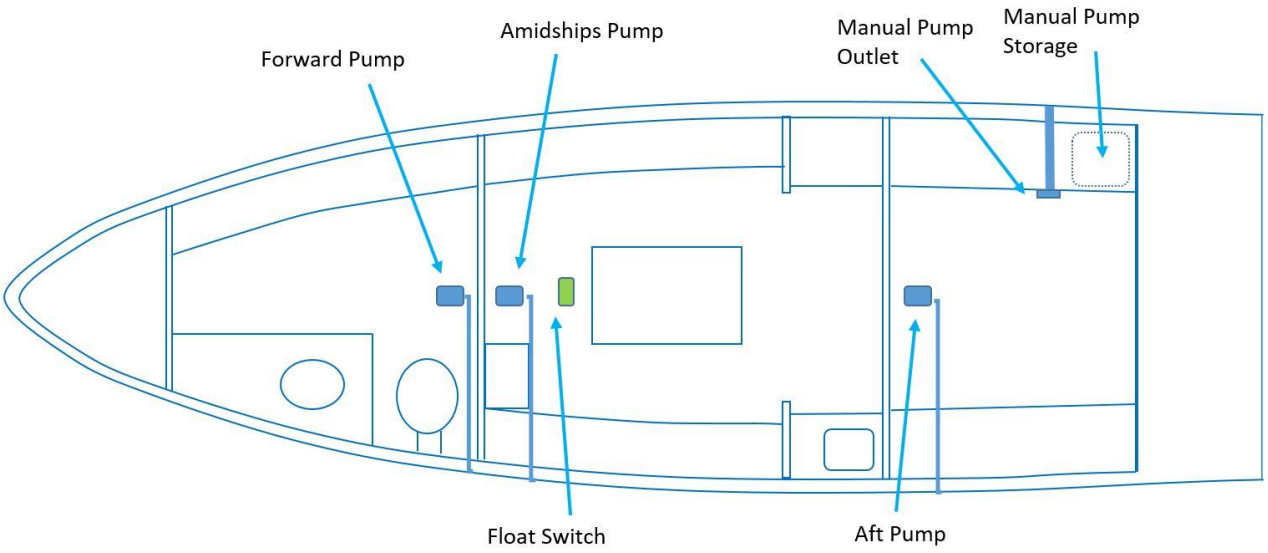
Important: It is expected that each crew member will be acquainted with the position and use of the safety equipment.

NOTE: crew Life Jackets in cockpit whilst underway





BILGE PUMP LAYOUT



Nautilus has three Electric Bilge pumps:

- Forward cabin (Bathroom)
- Main cabin
- Cockpit

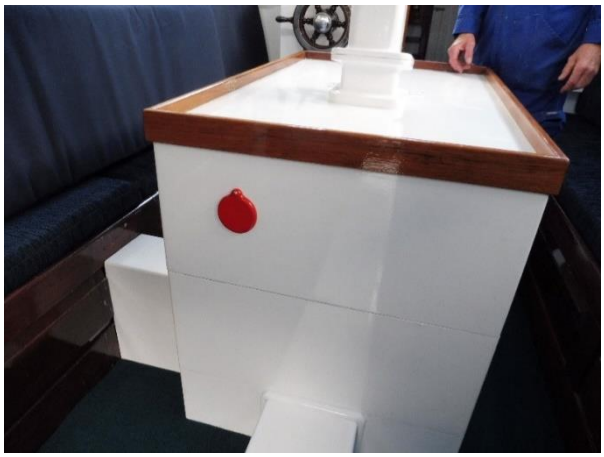
The float switch is in the main cabin, forward of the engine, next to the bilge pump. There are controls to manually operate the pumps on the Helm Station. Press to start the desired pump and press again to stop.

PRE-DEPARTURE CHECKS

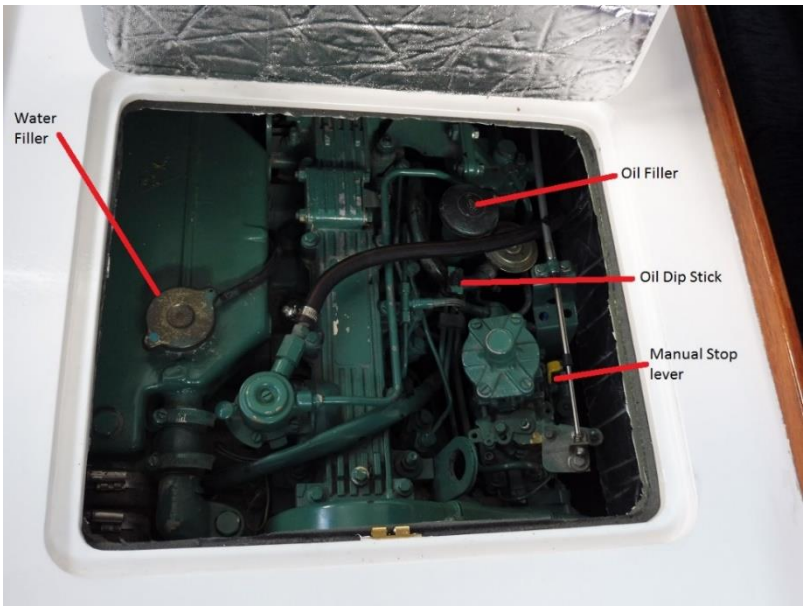
As ***Nautilus*** is boarded from the stern these checks are done was you move forward unlocking the vessel.

1. Open the ***Fuel*** valve, turn the Red handle to be in line with the hose to open. Shown in the closed position. The valve can be found behind the panel on the Port side seats of the cockpit, forward end.
2. Check primary fuel filter for water and sediment.
3. Open the ***Fresh Water*** valve, turn the Blue handle. The valve can be found behind the panel on the Starboard side seats of the cockpit, forward end.

4. The engine is housed in the centre of the main cabin.



5. On the top, forward end of the housing is the inspection hatch for doing the engine checks. There are four points to note under the inspection hatch.
    - Manual Stop lever
    - Oil Dip Stick
    - Oil Filler cap
    - Water Filler Cap

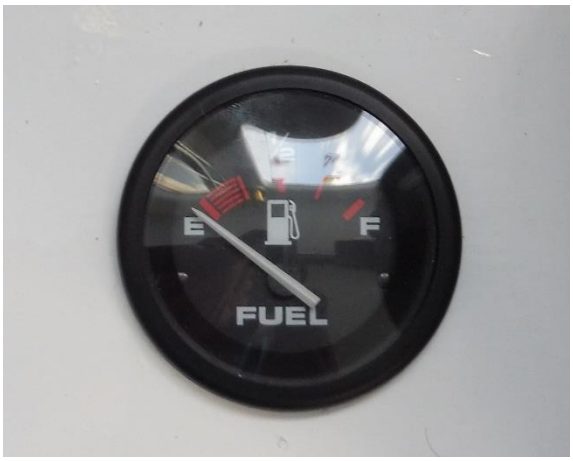


6. Forward of the engine housing on the cabin floor is a hatch that leads to the ***Engine Cooling Sea Cock***. Turn the <u>Blue</u> valve until it's in line with the hose to open. Also, under this hatch is a float switch for the bilge alarm and the mid bilge pump.

7. On the port side of the ***Helm Station*** is the ***Main Battery switch*** and ***Electrical Switchboard***. You also have a pair of USB power ports. The Switchboard has the switch on the left, label in the middle and fuse on the right.
8. The Main Battery switch has four settings, clockwise from top centre. Select 1&2 ON.
    - OFF
    - 1 ON
    - ! &2 ON
    - Parallel

9. Turn on the ***VHF*** (white unit) which is mounted above the Helm Station on the Port side. Just behind it is the ***PA system*** (Black Unit), the speaker is mounted above the cabin doors in the cockpit.

10. Now check your Fuel level the gauge is between the engine control panel and the throttle lever.



11. Next is to test the Horn and Bilge Pumps. Again, these switches can be found between the engine control panel and throttle lever. These are all push button switches and are labelled. These panels also have the Alarm speaker and Alarm Mute button.

12. The Engine Throttle is next, mounted on the Starboard side of the Helm Station. A standard set up with the clutch in the pivot point of the lever.
13. Check the full and free operation of the helm. Verify the movement of the rudder by watching the cap on the top of the rudder shaft on the aft deck.

14. Finally, we come to the Engine Control panel. As well as the Ignition Key and Indictor Light, there are four gauges:
    - Temperature
    - Oil Pressure
    - Alternator Voltage output
    - Rev Counter

15. Once the engine is started, check the following:
    - Overboard discharge from the stern
    - Temperature (< 90°C)
    - Oil pressure (±75psi)
    - Alternator Voltage (13 – 14.4V)
16. On completion of engine checks, test the throttle both Ahead and Astern.
17. Fill in the Logbook.

18. Open the ***Toilet Water Intake*** **valve** located under the panel in the floor of the forward cabin, just in front of the toilet. Turn the <u>Blue</u> value until it's in line with the hose.
19. Check blackwater tank level.

20. Release starboard bow and stern lines.

POST TRIP CHECKS

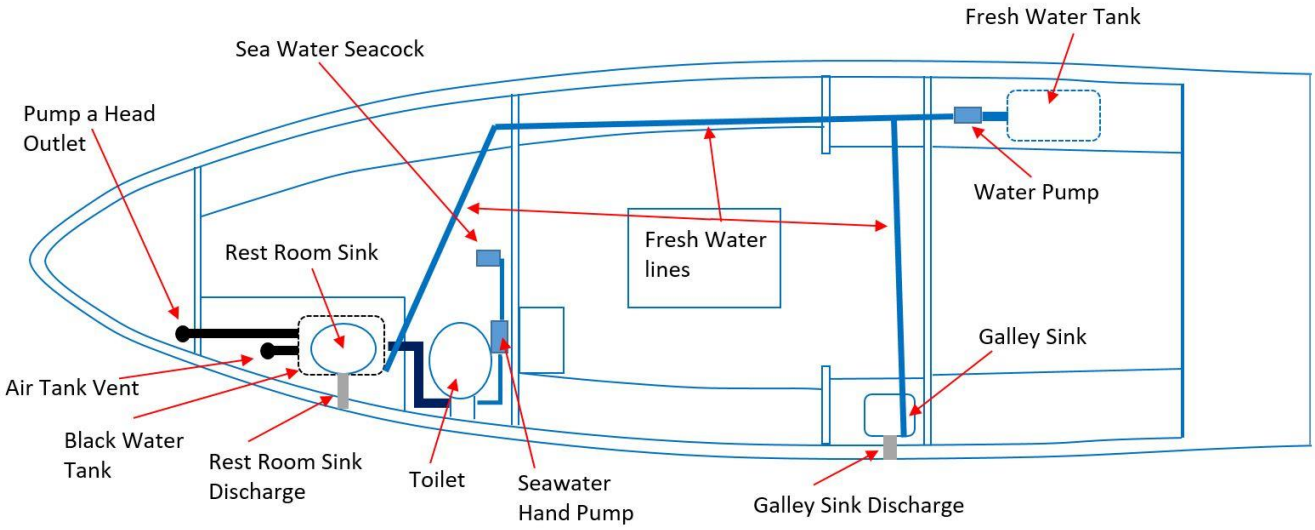
1. Note engine hours in Logbook
2. Turn off Engine
3. Turn off VHF radio and PA system.
4. Turn off Switchboard and Main Battery switch
5. Close the Engine Cooling Seacock, Blue valve.
6. Close the Toilet Water Seacock, Blue valve.
7. Check the head is clear and clean
8. Check basins are clean
9. Close all hatches
10. Do general clean-up of the vessel and remove any rubbish.
11. Close Fuel value
12. Close Fresh Water valve
13. Make sure stern cockpit ladder is stowed in the lazarette
14. Make sure all mooring lines are secure, also, starboard bow and stern lines
15. Make sure all fenders have been placed alongside
16. Lock the cabin doors
17. Put on the cockpit cover

EMERGENCY BILGE PUMP

The Manual Emergency Bilge Pump is in the cockpit, on the Starboard side, at the aft end of the seats.

- Open the hatch, pull out the pump and hose.
- The hose can reach anywhere in the vessel.
- Insert the handle into the pump.
- Insert the output hose of the pump into the socket just forward of the hatch.
- Place strum box end of hose into bilge to be pumped.
- Move the pump handle up and down to pump bilge water overboard.

WATER SYSTEMS



Fresh Water: The freshwater tank is fitted in the cockpit of the vessel, under the Starboard side seats. Fresh water feeds the sinks in the galley and restroom by electric pumps.

Grey Water: The hand basins and galley sink are the simplest of the three systems as they discharge directly over the side of the vessel.

Black water: Nautilus uses a Marine Sea Water head that discharges into a Black Water tank. The tank is in the cupboard next to the Head. There is NO overboard discharge facility for Black Water on Nautilus. Check system/tank before sailing and use.

STEERING SYSTEM

Nautilus has a closed hydraulic steering system. This is a pressurized system were the pressure is constant all the time and isn't built up by a motor attached to the engine.

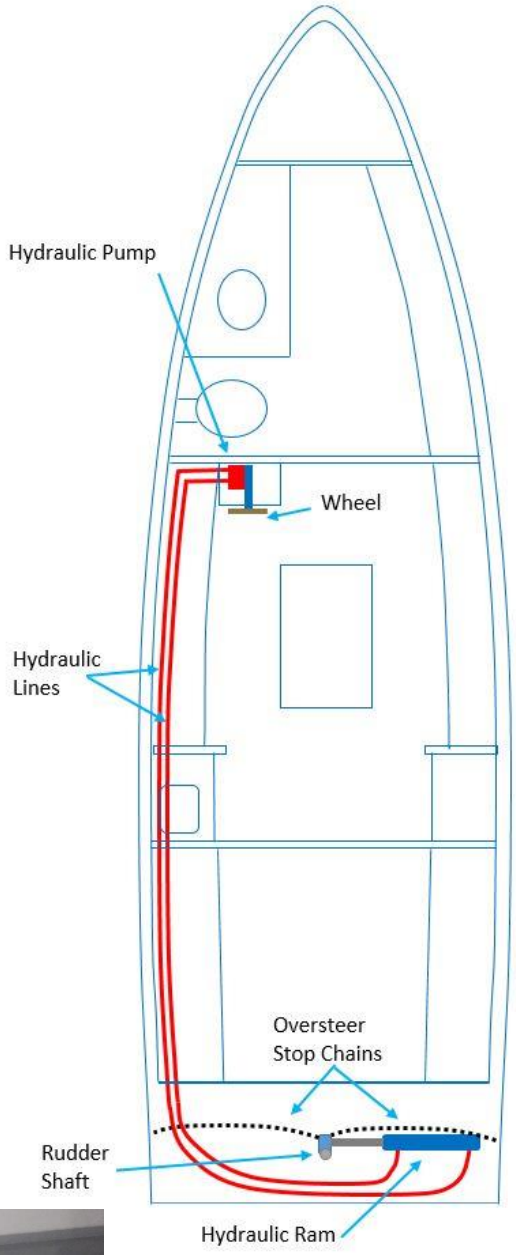
When the wheel at the helm station is turned, the hydraulic fluid is pumped down one of the two hydraulic lines. Fluid is returned to the pump from the other line.

The hydraulic lines enter the hydraulic ram at either end of the ram, so when hydraulic fluid enters at one end, this pushes the piston away from that end and pushes the fluid back to the pump along the other line.

The piston is attached to a tiller arm on the rudder shaft.

When the piston is pushed out, this will turn the rudder to starboard and when the piston is pulled into the ram, the rudder will be turned to port.

Also, attached to the tiller arm is a pair of chains, one to each side of the vessel. These are to stop the rudder going too far over.



ANCHORING

WORKING ON FOREDECK

- Crew member must be wearing a Harness and Lifejacket.
- Crew member must access foredeck though fore hatch, not by walking along sides or over cabin roof.
- Harness is to be clipped to the base of the mast.

LOWERING ANCHOR

- The Crew Member releases the lashings securing the anchor to its brackets.
- Then pulls a couple of meters of chain out of the hawses pipe for ease of movement, locking down the latch after.
- The anchor is then place over the bow roller ready for lowering, any spare chain is fed back into the hawse pipe.
    - If needed a spare fender (from Lazaette) is used as a anchor buoy.
- On the Masters command the crew member releases the latch on the hawse pipe and controls the lowering of the anchor to the seabed.
- The Master will then go astern to lay out the chain and wrap.
- When the Master is happy with the set they will instruct the crew member to secure the warp.
- The crew member will secure the warp to the forward cleat and inform the Master when secure.
- Once the Master is sure the anchor isn't dragging the engine is shut down.
- The shield on the hawse pipe is placed back into position.
- Raise the dayshape or anchor light (stored in footstool) using the haulyard on the mast on the cabintop. Remove the steaming light connector from the socket (starboard side socket at foot of mast) and incert the anchor light. Switch the steaming light switch ON.
- The Master will note the position in the Log Book.

Note: In an emergency and adverse weather, it is not adviseable to go out on the foredeck. At the master's discretion, the anchor may be lowered over the starboard side, while the crew is standing on the forward hatch ladder.

RAISING ANCHOR

- The engine is started.

- The crew member will position themselves in line with the bow roller so to pull in the warp and feed it into the hawse pipe.
    - Best position is a seated one between fore cleat and hawse pipe, this also doesn't block the masters view.
- When the Master is ready, they will inform the crew member to start retrieving the warp and will start bringing the vessel forward slowly.
- When the crew member feels the full weight of the anchor come on the warp, probably means the anchor is free of the bottom. They will inform the Master, **Anchor Aweigh**.
- Carefully the crew member will move the warp, chain and anchor from the bow roller to the side of the vessel and continue to retrieve it. At this point they will have to pile the warp and chain on the foredeck.
- The Master will only maintain steerage way until the anchor is on deck.
- Once the crew member can reach the anchor, they will lift it back onto its brackets.
- Re-lash the anchor to its brackets and feed the last of the warp and chain into the hawse pipe.
- Close the hawse pipe shield.
- Once the foredeck is secure inform the Master.
- Lastly once the crew member is back below the fore hatch, they need to check the warp and chain hasn't coiled down in a way that will cause a problem next time the anchor is used.

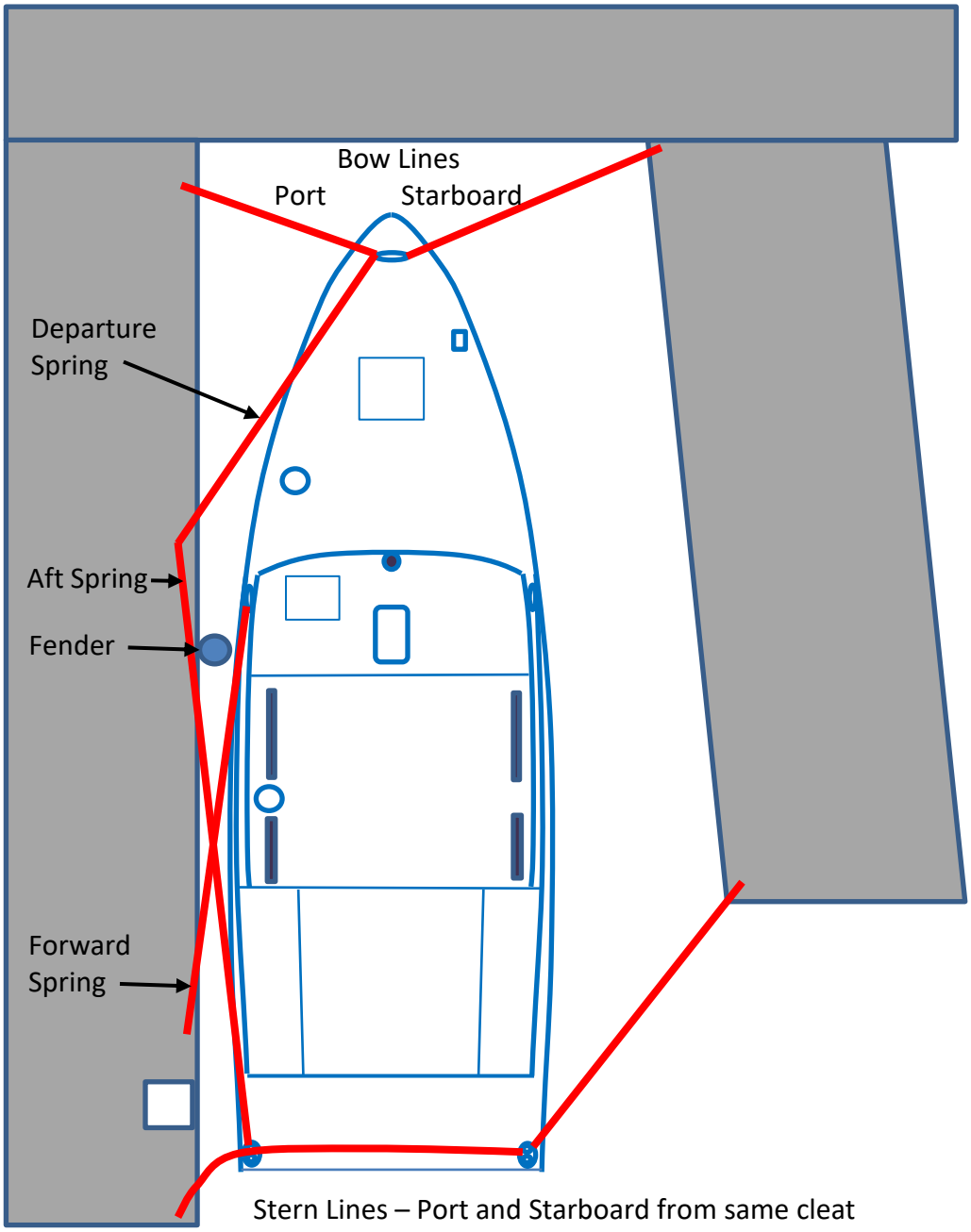
LOSS OF ANCHOR & WARP

Nautilus has no spare anchor, so if the anchor is lost you will have to start the engine and seek a safe berth or ride out the night or storm at sea.

Note the position of the lost anchor on the chart and in the logbook.

If possible, return to the anchor buoy of the lost anchor and retrieve it.

LINES & FENDERS



Stern Lines – Port and Starboard from same cleat

At *Nautilus's* berth at **Hobson Wharf** there are six standard mooring lines.

One fender is used on the port side, between the vessel and the pontoon.

Mooring lines cast off on Master's instructions.

Line	**Location**
Bow Lines	Nautilus uses two bow lines. The Port one goes from the bow cleat to the pontoon just forward of the bow. The Starboard bow line goes from the same cleat to the pontoon opposite Nautilus berth.

Forward Spring	The Forward spring goes from the cleat abreast the forward end of the cabin port side to a cleat on the pontoon, just in front of the boarding step.
Aft Spring	The Aft spring goes from the cleat on the port stern quarter to a cleat on the pontoon, abreast the forward of the cabin.
Port Stern Line	The Port Stern line goes from the bollard on the Starboard stern quarter, around the aft horn of the bollard on the Port stern quarter then to a cleat on the pontoon astern of the Nautilus.
Starboard Stern Line	The Starboard Stern line goes from the bollard on the Starboard Stern quarter to a cleat on the pontoon opposite Nautilus berth.
Departure Spring	The Departure Spring is attached at time of departure to help swing the stern out to an angle for clearing the bow. It attaches to the foredeck cleat.

DEPARTING

For both Berthing and Departing the crew member may have to access the fore deck through the hatch in the roof of the forward cabin. A fold away ladder has been installed to help access through the hatch.

By pulling up the wooden cleat the ladder will fold out and you push down the arms on the side to lock it in position.

To fold away, pull up metal pin, fold up and push the wooden cleat down.

CAUTION: As Nautilus berth is tucked in a corner the Master will always have to take note of what other museum vessels are operating at the same time. The prop wash from these vessels will affect handling during departure and berthing.

- No lines are cast off until the Master gives the command
- The vessel is held along side with engine and rudder
- The Aft Spring is released first
- Next is the Stern Line
- The crew member at this point may move to the fore deck hatch, if necessary.
- The bowline is released and replaced with the Pivot Spring
- Once the Master is ready to depart the marina the Forward spring is released.
- The engine is set to idle ahead and the wheel to port, this will swing the stern away from pontoon.
- Once the desired angle is reached, the engine is put astern and wheel put to starboard.
- The pivot spring is released

- Once the Master has enough clearance to turn and exit the marina, put the engine ahead and set a course to exit the marina.

Note: All Nautilus Mooring Lines stay ashore!

BERTHING

- Contact security on the radio and check its clear to enter the marina
- Visually check it is clear to enter the marina
- The crew member will be stationed in the cockpit for berthing
- The Master will bring the vessel alongside so security can attach the Forward spring to its cleat.
- Depending on the angle security may be able to attach the Bowline at this point also
- Using engine and rudder the Master will swing in the stern and the crew member will receive the Stern line and attach it.
- The Aft spring goes on next
- And if the Bowline wasn't attached earlier the crew member goes up to the fore deck and receive it from security and attaches it.

ENVIRONMENTAL CONTROL

BLACKWATER TANK PUMPING

The Vessel Maintenance team will undertake the pumping of the black water tank under normal circumstances.

Disposable gloves must be worn when working with black water.

To prevent cross-contamination, the black water tank and freshwater tank must not be open at the same time.

PUMPING OUT ALONGSIDE

1. One crew to unwind the pump out hose.
2. Ensure pump valve is **CLOSED.**
3. Using key from locker, unscrew the cap marked WASTE from the foredeck.
4. Screw in adaptor and place the hose end on the adapter and lock levers up to make a good seal.
5. Crew member on dock turns **ON** the Pump-a-Head.
6. Crew member at the hose end OPENS the hose valve.
7. Proceed to empty waste tank until air shows in the sight glass.
8. Immediately CLOSE hose valve to keep air out of line.
9. Turn the pump OFF on pylon.
10. Remove adaptor and close cap and place adaptor & key in container and leave in cupboard with black water tank.
11. Hose to be curled around fitting on back of pump

ENSURE HANDS ARE SANITISED AFTER COMPLETING THE TASK

REFUELLING

Refuelling is to be untaken by the Museum Vessel Maintenance team.

1. Make sure vessel is secured alongside pontoon
2. Agree to a plan for how to immediately stop refuelling if a spill occurs
3. Check tank levels and estimate how much fuel is needed to refuel the vessel
4. Plug the scuppers with sorbent material
5. Place sorbent mats around the fuel intake in the deck
6. No smoking, cell phones, hot work or naked flames whilst refuelling
7. Have spill kit on hand
8. Refuelling from pump (at refuelling pontoon)
    - Check that you are using the DIESEL pump
    - Keep in communication with pump attendant
    - Never leave the fuel pump unattended
    - Make sure a trained person monitors the entire refuelling operation
9. Refuelling from containers
    - Make sure you use a large funnel or siphon hose
    - Make sure a trained person monitors the entire refuelling operation
10. Note amount bunkered in vessel log
11. Replace spill kit if necessary

BOARDING AND DISEMBARKING

BOARDING

- The stern is pulled in so it aligned with the boarding step on the pontoon
- The cockpit ladder is removed from the lazarette and fitted into place.
- The handrails on the stern are checked they are secure
- The crew member assists the passengers from the boarding step onto the stern deck of Nautilus, then instructs the passenger to climb down the cockpit ladder backwards for safety.
- The crew directs the passengers to seating in the cockpit or cabin.

DISEMBARKING

- The cockpit ladder is fitted into place (if removed).
- The stern is pulled in so that it is aligned with the pontoon boarding step and all lines secured.
- The crew directs the passengers to disembark.
- The crew member helps the passengers from the cockpit ladder, across to the boarding step on the pontoon.

DISABLED PASSENGERS

- Less physically mobile passengers will need extra assistance in boarding and moving around the vessel once underway.
- The Master has final say in deciding if the person's lack of mobility represents a safety concern when considering all factors including but not limited to the weather forecast and sea state on the intended passage.
- If necessary, a disabled passenger may require a carer be present to look after the passenger during the voyage
- Nautilus is unable to take Wheelchairs

LOSS OF STEERING

- The hydraulic ram must first be disconnected from the tiller head. Two spanners for removing the retaining nut from the hydraulic actuator, are on a hook inside the lazarette. After this the wheel, MUST NOT be turned, this stops hydraulic fluid from being pumped into the bilge if there is a problem with the system.

- The crew member removes the steering tiller from the lazarette and attaches it to the head of the rudder shaft on the stern deck
- The crew member mans the steering tiller
- The Master retains position at the Helm Station, keeping control of the Engine throttle and with visibility forward.
- The Master uses the PA system to pass helm instructions to the crew member

LOSS OF PROPULSION

Follow instructions from Safety Case Plan.

ELECTRICAL FAILURE

- Do not stop engine until vessel is alongside pontoon or in a safe place to do so.
- Shut down engine using the manual lever on the engine.

With an electrical failure, it is unlikely to be able to restart engine.

FIRE

ENGINE FIRE

- Follow instructions from Safety Case Plan
- Don't open the engine hatch.
- Shut off the fuel.
- Retrieve foam fire extinguisher from forward cabin, if possible.
- Open the small inspection cover at the rear of the engine compartment and empty the fire extinguisher into the engine compartment.

ELECTRICAL FIRE

- Switch OFF the main battery switch but keep the VHF radio ON to call for help, if required.
- Keep the engine running for propulsion.
- If it is obvious where the fire is, use the dry powder fire extinguisher to smother the fire.

MAN OVERBOARD

Follow instructions from Safety Case Plan.

MEDICAL EMERGENCY

Follow instructions from Safety Case Plan.

STRICKEN VESSEL

Follow instructions from Safety Case Plan.

INCIDENT REPORTING

- NZMM Incident Reports are at the Kiosk, Front of House and Nautilus
- Follow instructions from Safety Case Plan.

DOCUMENTATION

The following documents or copies of documents are maintained on the vessel:

- Safety Case Plan
- Safety Case Certificate
- Vessel Manual (this document)
- New Zealand Nautical Almanac NZ 204
- Maritime NZ Radio Handbook
- Charts
- Vessel logbook

HAZARD REGISTER

Hazard	**Significant Yes/No**	**Eliminate, Isolate or Minimalize**	**Actions Required ***	**Person responsible**
Trip Hazard • Shaft cover • Sills	Yes	Min	Point out to all on board	Master
Low roof	Yes	Min	Point out to all on board	Master
Slip Hazard • Quarter deck • Cockpit ladder • Forward hatch ladder	Yes	Min	Assist passengers during boarding Watch for wakes and swells	Master/Crew

* How do I control it?