fieldhouse yacht surveys

VOYAGER

Pre-purchase Survey

Completed for

Colin Adams,
33 Valley Road,
London,
SW23 4JQ

On 09/12/2015

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LAW AND JURISDICTION

This document is to be construed under English Law and English Law shall be used in interpreting the document and for resolving all claims or disputes arising out of or connected with the document.

1 INTRODUCTION

1.1 This is to certify that Nic Fieldhouse, Principal Surveyor of Fieldhouse Yacht Surveys, carried out a Pre-purchase Survey on VOYAGER in accordance with instructions received from Colin Adams of 33 Valley Road, London.

1.2 The primary aim of this document is to report on the factual condition of VOYAGER at the time of the survey. Where the equipment has been inspected or tested and found to be in an unsatisfactory condition, recommendations for rectification, repair or replacement will be detailed in this report. These recommendations will be assigned one of the five categories detailed in Appendix 1 on page 45. For clarity, all recommendations will be printed in upper case and red font thus: RECOMMENDED.

1.3 Where reference is made to the condition, this must be considered in relation to the age of the vessel.

1.4 The vessel was inspected whilst ashore on the hard-standing at Marine Yacht Haven, Hampshire on Wednesday 9th December 2015.

1.5 The survey was conducted by Nic Fieldhouse, Principal Surveyor of Fieldhouse Yacht Surveys.

1.6 The survey was carried out in accordance with Fieldhouse Yacht Surveys Standard Terms and Conditions and with relevant codes of practice published by the International Institute of Marine Surveying.

1.7 Those present during the survey were:

Colin Adams, Client (for part of the survey)

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2 SUMMARY

2.1.1 VOYAGER was seen to be a Southerly 100 - a masthead rigged sailing yacht with a cast iron lifting fin keel. She was built by Northshore Yacht Yards Ltd in 1995.

2.1.2 The GRP hull seemed to be in good condition and retained a good finish, but in need of a polish. There were two locations where the internal structure of the hull required minor repair. The cast iron drop keel was seized in the stowed position and was in need of a service.

2.1.3 The deck moulding, masthead rig, engine, domestic services and interior finish were generally all in good working order.

2.1.4 Once the recommendations detailed below have been addressed, there is no reason why VOYAGER should not give good service.

2.2 TYPE A1 RECOMMENDATIONS

2.2.1 There were ten **type A1 recommendations** that must be implemented before the vessel is relaunched. Please refer to Appendix 1 for a full description of the categories of recommendations used in this report.

2.2.2 At the start of the survey, the lifting keel was stowed in its fully raised position. The hydraulic mechanism on LIZZIE DOUGLAS was tested. The hydraulic release valve was opened, but the keel would not move. When the valve was closed and the handle pumped, the lifting rope was seen to go into tension, but no movement in the keel was seen. It is RECOMMENDED (type A1 recommendation) that the lifting keel is freed-up. The surfaces of the GRP keel box (accessed from beneath the vessel and via the removable access panel in the saloon) should be cleaned of all mud, debris and marine growth. With the drop keel in its lowered position, the exposed surfaces of the casting should be cleaned of rust and treated with a suitable paint system. The Dyneema line and end fittings should also be inspected (see paragraph 5.1.7.2).

2.2.3 The outer skin of the heads outlet hose (item # 1 in Figure 5 and Table 3) was old and degraded. It is RECOMMENDED (type A1 recommendation) that this hose is replaced (see paragraph 5.1.9.4).

2.2.4 It is RECOMMENDED (type A1 recommendation) that the slots of the skin fitting that provide the sea water to the heads toilet (item # 2 in Figure 5 and Table 3) should be cleared of antifouling and internal marine growth that might obstruct the flow of water into the toilet (see paragraph 5.1.9.5).

2.2.5 The bronze or dezincification resistant brass spigot that connects the heads sink outlet hose to the valve (item # 3 in Figure 5 and Table 3) was corroding heavily, with evidence of water seeping into the vessel. It is RECOMMENDED (type A1 recommendation) that the valve and spigot are replaced with bronze or dezincification resistant brass items (see paragraph 5.1.9.6).

2.2.6 The hoses for the electric bilge pump outlet, shower tray pump outlet and gas locker vent (items # 9, 10 & 14 in Figure 5 and Table 3) were secured with a single stainless steel screw clip. It is RECOMMENDED (type A1 recommendation) that where the barbed spigot of the skin fitting is long enough to accept two clips, all hoses that have a skin fitting located near to or below the waterline should be fitted with two hose clips at each end (see paragraph 5.1.9.8).

2.2.7 The electrical connection between the hull anode and the propeller shaft & propeller was tested with a multimeter and the resistance found to be approximately 42 Ω. The resistance between the anode and bronze stern bearing was found to be 0.6 Ω. There was no electrical continuity between the anode and the upper rudder bearing or rudder stock. Inspection of the anode wiring located in the engine compartment revealed that

the wire that connected the anode to the rudder stock was broken, as shown in Figure 7. The recommended maximum resistance is 1.0 Ω. It is RECOMMENDED (type A1 recommendation) that the bonding of the anode to the propeller shaft (via the engine block) and the bonding to the rudder stock is inspected further and the wires & terminals overhauled where necessary (see paragraph 5.1.10.3).

2.2.8 It is RECOMMENDED (type A1 recommendation) that the engine is serviced. All fluids and filters should be changed. The engine zinc anode should also be replaced (see paragraph 5.5.4.15).

2.2.9 The paper cartridge and glass-bowl primary fuel filter was in good condition, with all connections free of corrosion. There was a small amount of dirt and water at the bottom of the glass bowl. It is RECOMMENDED (type A1 recommendation) that the bowl is removed and cleaned (see paragraph 5.5.5.5).

2.2.10 The inboard propeller shaft seal was inspected and found to be in good working order with no evidence of damage or perishing of the rubber. The two hose clips that secure the seal were made from stainless steel. The bolt of the forward clip was corroding. It is RECOMMENDED (type A1 recommendation) that both clips are replaced (see paragraph 5.5.6.5).

2.2.11 A locker drain hose was installed at the bottom of the gas cylinder locker in order to drain any leaked gas to the outside of the hull. The hose and attachments were in serviceable condition, but the drain was partially blocked by leaves & debris. The gradient of the fall of the hose was such that no water trap could be formed. It is RECOMMENDED (type A1 recommendation) that the locker and drain hose are thoroughly cleaned and all debris removed (see paragraph 5.6.5.2).

2.3 TYPE A2 RECOMMENDATIONS

2.3.1 There were twenty four **type A2 recommendations** that must be implemented before the vessel is taken cruising:

2.3.2 The hull was heavily reinforced around the recess that locates the cast iron grounding plate and also at the lower end of the hydraulic strut that lifts the keel. One small crack was found in the hull moulding, extending from the galvanised steel base plate that secured the hydraulic strut to the hull. This crack is shown in Figure 8. The depth of the crack was not determined, but it was found to be within the outer layer of laminate and possibly deeper. It is RECOMMENDED (type A2 recommendation) that the galvanised steel hull bracket of the hydraulic strut is temporarily removed. The sharp corners of the base plate should be modified to form a radius. The laminate around the crack should be cleaned of all paint. The crack should be cut back to sound laminate and thoroughly cleaned. The area should be repaired with layers of GRP cloth and epoxy resin, ensuring that each successive layer of cloth is larger than the previous. When the hull bracket of the hydraulic strut is re-fastened, it should be bedded onto a semi-hardened sealing compound (see paragraph 5.2.1.4).

2.3.3 It was found that the lower edges of the main bulkhead, positioned beneath the sole boards of the saloon and forepeak, were not connected to the bulkhead by GRP tabbing. The forward face of the bulkhead beneath the forepeak sole can be seen in Figure 9. The 2 mm gap between the hull and the lower edge of the bulkhead was filled with a soft mastic sealant. This sealant was loose and peeling along the majority of the gap. Inspection of the adjacent bulkhead revealed that the adjacent plywood was covered in one or more layers of GRP cloth. This indicates that the lower edge of the bulkhead was originally attached to the hull by GRP tabbing, as was normal build practise with the majority of sailing vessels of this size and era. It is RECOMMENDED (type A2 recommendation) that this area is repaired with woven GRP cloth and epoxy resin. The surfaces of the hull and bulkhead either side of the gap should be cleaned of all paint, grease and dirt. Layers of GRP cloth should be applied, ensuring that each successive layer of cloth is larger than the previous. The repair should extend as far up

the bulkhead as possible and at least 150 mm along the hull in the fore-aft direction (see paragraph 5.2.4.3).

2.3.4 When under load no fuming was noted in the engine space. No leaks from the engine cooling water, fuel and exhaust systems were evident, except for a water leak in the side of the stainless steel muffler, as shown in Figure 11. It is RECOMMENDED (type A2 recommendation) that the muffler is replaced (see paragraph 5.5.4.5).

2.3.5 The engine coolant hoses were connected to the impeller pump by mild steel screw clips. These were corroding. It is RECOMMENDED (type A2 recommendation) that all fittings on the engine that use mild steel hose clips are secured with two hose clips made from marine grade stainless steel (see paragraph 5.5.4.8).

2.3.6 The engine cooling feed to the exhaust was suitably fitted with an ant-siphon attachment, with the head of the anti-siphon venting through a skin fitting on the transom, just beneath deck level. The anti-siphon loop was mounted inside the large cockpit locker. The supply & return hoses connected to the anti-siphon loop were cracked and degraded, as shown in Figure 12. It is RECOMMENDED (type A2 recommendation) that these hoses are replaced (see paragraph 5.5.4.12).

2.3.7 The anchor was secured to a length of chain by a single stainless steel shackle, which was in good working order but was not seized in order to prevent the bolt from coming loose. It is RECOMMENDED (type A2 recommendation) that seizing wire is used to lock the shackle bolt, or the end of the thread should be peened over to prevent loosening. Stainless steel shackles are particularly prone to coming undone (see paragraph 5.6.1.2).

2.3.8 The bitter end of the anchor warp was shackled to a U-bolt that was secured to the hull moulding. It is RECOMMENDED (type A2 recommendation) that the bitter end connection is modified so that it is tethered to the U-bolt by a short length of line that could easily be cut in an emergency (see paragraph 5.6.1.4).

2.3.9 Connected to one of the butane gas cylinders was an isolation valve. From the valve, flexible rubber hose led the gas supply to a pressure regulator on the side of the gas locker. The rubber hose was manufactured in May 2007. Gas hose should be replaced every five years. It is RECOMMENDED (type A2 recommendation) that this hose is replaced by a maximum length of one metre of appropriately labelled gas hose. This recommendation also applies to the reinforced gas hose behind the galley stove. The hose should be marked to BS 3212 type 2 or BS 3212:1991 or BS EN 1763 class 2/3/4. This work should be performed by a qualified gas technician, such as those listed on the gas safety register (see paragraph 5.6.5.3).

2.3.10 There was no date on the LPG pressure regulator to indicate its age but it is likely that it was older than ten years and should therefore be replaced. It is RECOMMENDED (type A2 recommendation) that the regulator is replaced with one of marine grade (see paragraph 5.6.5.4).

2.3.11 Three Autohelm instruments were mounted to a binnacle, just above the cockpit sliding hatch: The depth sounder display screen powered up but its full operation could not be assessed. The wind instrument gave a reading of wind direction, but not of wind speed. The masthead anemometer was not rotating. The third instrument was a speed & distance readout. This was tested and functioned, but the accuracy of the impeller could not be assessed. It is RECOMMENDED (type A2 recommendation) that the masthead anemometer is serviced (see paragraph 5.6.9.5).

2.3.12 An Autohelm autopilot unit was mounted to the helm, with control unit mounted to the side of the starboard cockpit coaming. This unit was tested and found to function. When the drive belt of the autopilot was disengaged from the helm wheel and the helm wheel was turned, it was found that the autopilot gear wheel was still partially engaged, producing a noise as the wheel was turned. It is RECOMMENDED (type A2 recommendation) that the autopilot mechanism is serviced or adjusted (see paragraph 5.6.9.6).

2.3.13 An attempt was made to power up the Eberspächer heater but the unit would not start. It is RECOMMENDED (type A2 recommendation) that the Eberspächer heating system is repaired or serviced by an authorised Eberspächer technician (see paragraph 5.6.10.4).

2.3.14 A manual diaphragm bilge pump was located in the side of the cockpit seating, aft of the helm wheel. The inlet to the bilge pump was located in the bilge sump, positioned in the skeg moulding. It was correctly fitted with a strum box. The handle was located on the underside of the aft-most starboard cockpit locker, but was not tethered to prevent its loss. It is RECOMMENDED (type A2 recommendation) that the bilge pump handle is tethered in order to prevent its loss in the event of a capsize. It was noted that the teak planking of the cockpit sole prevented the full up-down movement of the pump handle (see paragraph 6.1.2).

2.3.15 An electric bilge pump was also installed on LIZZIE DOUGLAS, with its inlet located in the bilge sump, positioned in the skeg moulding. It was correctly fitted with a strum box. The pump was controlled by a switch located in the side of the bunk of the quarterberth. The pumped powered up when the switch was set to manual. The pump also powered up when the switch was set to automatic, even when there was no water to be pumped out. It is RECOMMENDED (type A2 recommendation) that the float switch is serviced or replaced (see paragraph 6.1.3).

2.3.16 It is RECOMMENDED (type A2 recommendation) that both bilge pumps are tested, with the inlet end of the hose or pump temporarily placed in a bucket of water (see paragraph 6.1.4).

2.3.17 It is RECOMMENDED (type A2 recommendation) that two buckets (with lanyards) are stowed on board. These should be between 9 and 14 litres in capacity (see paragraph 6.1.5).

2.3.18 There was no fog horn found on board. It is RECOMMENDED (type A2 recommendation) that one is stowed on board. If the fog horn is of the aerosol, compressed gas type, a spare cylinder should be carried on board (see paragraph 6.2.1).

2.3.19 A number of fire extinguishers were found on board. Only one of the extinguishers had a replacement date marked on its case and the other two looked to be much older than five years. These are summarised in Table 4. It is RECOMMENDED (type A2 recommendation) that all of the units are serviced or replaced (see paragraph 6.3.1).

2.3.20 There was no fire blanket located in the galley area. It is RECOMMENDED (type A2 recommendation) that one is installed within two arm lengths of the cooker (see paragraph 6.3.3).

2.3.21 There was no first aid kit found on the vessel. It is RECOMMENDED (type A2 recommendation) that one is procured and stowed on board (see paragraph 6.4.1).

2.3.22 There was no Carbon Monoxide alarm installed on LIZZIE DOUGLAS. It is RECOMMENDED (type A2 recommendation) that one is procured and mounted in an appropriate location (see paragraph 6.5.1).

2.3.23 One yellow horse shoe buoy was stowed on its mounting on the port side of the pushpit. The covering of the buoy was heavily degraded and in poor condition. The buoy was correctly labelled with the vessel's name. It was fitted with a flotation light. The light did not operate. It is RECOMMENDED (type A2 recommendation) that the buoy and flotation lamp are replaced (see paragraph 6.8.1).

2.3.24 A Plastimo Cruiser, standard specification, four person liferaft was stowed in its blue valise in the large cockpit locker. It was not opened up for inspection. The part number was 28822, type SF and the serial number was 2822Z0016. The liferaft was registered to LIZZIE DOUGLAS. There was no legible service date on the bag. It is

RECOMMENDED (type A2 recommendation) that the liferaft is serviced before the vessel ventures into open waters (see paragraph 6.9.1).

2.3.25 One offshore distress flare pack (Pains-Wessex) was found on board and found to have expired in December 2002. It is RECOMMENDED (type A2 recommendation or before venturing into open waters) that a new pack is procured and stowed ready for use (see paragraph 6.10.1).

2.4 TYPE C RECOMMENDATIONS

2.4.1 There were seven **type C recommendations** that do not require immediate attention but are to be dealt with within a specified time period:

2.4.2 The edges of the transom, located above the waterline, were damaged at three locations (two on starboard side and one at the mid-ships), with some fracturing of the laminate. Moisture readings were taken at these locations and were found to be higher than the adjacent laminate. There was evidence that these have been repaired in the past, but with subsequent cracking of the filler material. It is RECOMMENDED (type C recommendation with an implementation time of one year) that the damaged areas are cleaned and repaired, ensuring that the edge of the laminate is adequately sealed to prevent moisture ingress (see paragraph 5.1.3.6).

2.4.3 The hydraulic keel lifting mechanism was inspected via the lifting sole boards in the galley area. The hydraulic strut had some minor surface corrosion. There was evidence of hydraulic fluid around the end terminals of the hoses attached to the strut, as shown in Figure 4. It is RECOMMENDED (type C recommendation with an inspection interval of six months) that the hydraulic system is periodically inspected for evidence of further fluid leakage. If further leaks develop, the system may need to be fully overhauled (see paragraph 5.1.7.4).

2.4.4 The wheel positioned inside the raised saloon, starboard side, was a Morse type, with a push-pull Bowden cable mechanism. The detachable wheel was in good order. The mechanism was tested and functioned correctly. The aft end of the Bowden cable was secured to the hull structure via a white-painted mild steel bracket, secured to the hull structure and accessible from the aft-most starboard cockpit locker. The steel bracket was well painted, but with evidence of some surface corrosion. Similar brackets found on other sailing vessels have been found to corrode quickly. It is RECOMMENDED (type C recommendation with an inspection interval of one year) that this bracket is periodically inspected for corrosion and degradation (see paragraph 5.1.8.7).

2.4.5 The length of engine exhaust hose (item # 8 in Figure 5 and Table 3) that runs between the stainless steel exhaust muffler and the hull fitting was found to be partially degraded on its outer skin, as shown in Figure 6. It is RECOMMENDED (type C recommendation with an implementation time of two years) that this length of hose is replaced (see paragraph 5.1.9.7).

2.4.6 One aft hinging Lewmar hatch (490 x 490 mm opening) was installed in the roof of the forepeak. This size meets the recommendation for the minimum dimension to allow escape in an emergency, which is 380mm [BS EN ISO 9094-1:2003, Small Craft - Fire Protection]. It was found to be securely attached and showed no signs of water ingress. The aluminium frame was in good cosmetic condition. The clear Acrylic window was moderately crazed. It is RECOMMENDED (type C recommendation with an implementation time of two years) that the Acrylic is replaced (see paragraph 5.3.4.1).

2.4.7 The windlass was bolted through the deck moulding with four stainless steel fasteners. It was found that the backing washers were of the plain washer (small) type. These washers were heavily corroded. It is RECOMMENDED (type C recommendation with an implementation time of six months) that these washers are replaced with penny washers. These will give better load distribution of the loads applied to the fastening

bolts. At the same time, the windlass mechanism should be serviced and the outer body repainted (see paragraph 5.6.2.2).

2.4.8 A transom mounted stern light was adequately attached to the pushpit. This was tested and found to function correctly. The lens was inspected and found to be cracked and slightly crazed. It is RECOMMENDED (type C recommendation with an implementation time of one year) that the lamp lens is replaced (see paragraph 5.6.8.1).

3 SCOPE & LIMITATIONS

3.1 The vessel was inspected whilst ashore on the hard-standing. There was good, all-round access to the exterior of the hull. The only obstructions were those presented by four shores on each side and one shore towards the bow. Access to the bottom of the keel base plate was limited to the parts not resting on the two chocks. The drop keel was jammed in the fully retracted position and could not be lowered for inspection.

3.2 At the time of survey the ambient temperature was approximately 12℃, with sunny spells and a fresh wind. There was no rainfall on the day of the survey or during the preceding day.

3.3 I was informed by the broker that VOYAGER had been ashore since the summer of 2015.

3.4 Internal inspection was limited to the areas that are normally accessible directly or through lockers, inspection hatches, removable panels, etc. No part of the vessel was dismantled; no bolts were removed for inspection and no linings removed, except in order to gain access to the fresh water tank and the Eberspächer space heater unit. Consequently, any part of the vessel, her equipment or fittings, which were unexposed or inaccessible, cannot be confirmed to be free from defect.

3.5 All tanks were inspected where visible but not internally inspected and they have not been pressure tested; their contents have not been tested for contamination.

3.6 Window hatches and external doors have not been tested for water tightness.

3.7 We have not inspected fibreglass laminate, woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are, therefore, unable to report that any such part of the structure is free from defects, rot or deterioration.

3.8 The vessel and her equipment were not assessed for design or suitability for any particular purpose, or compliance with any rules, regulation, standard or code.

3.9 Note that the terms “serviceable” or “serviceable condition”, as used in the report, means that the item remained usable, despite possible wear or deterioration. The item may nevertheless require maintenance or replacement in due course.

3.10 No dismantling of the engine took place and so the internal condition of the engine cannot be commented upon. Components hidden from view, such as the sump, crankshaft, camshafts, pistons, valves and cylinder head gaskets could not be examined for latent defects. No compression tests of the cylinders took place. Comments can only be made with regard to the general condition of the engine on the day of the inspection. No guarantee can be made regarding the life expectancy of the engine.

4 THE VESSEL

4.1 DETAILS

Name	VOYAGER
Hull Number	xxx
Official Number	xxxx
Registered Tonnage	8.6 tons
Built by	Northshore Yacht Yards Ltd, Itchenor
Designed	Dick Carter
Model	Southerly 100
Type	Bermudian sloop with lifting keel
Build date	June 1995
Engine manufacturer & Model	Yanmar 2GM20F
Engine type	4 stroke, 2 cylinder diesel, naturally aspirated
Engine power	13.4 kW (18 HP) @ 3600 rpm

Table 1: Vessel Details

4.1.1 VOYAGER was seen to be a Southerly 100 - a masthead rigged sailing yacht with a cast iron lifting fin keel. She was built by Northshore Yacht Yards Ltd in 1995.

4.1.2 The topsides (from the waterline to deck level) of VOYAGER were of sandwich construction, with a low-density foam or balsa layer sandwiched between the inner and outer layers of GRP. The part of the hull below the waterline was of monolithic construction, made up of polyester resin, mixed-strand fibreglass mat and woven rovings. The hull had raised topsides, which is where the hull moulding extends upwards from the hull to deck join, before turning horizontally to form the deck surface.

4.1.3 The external surfaces of the topsides were finished with a white pigmented gel-coat. The hull below the waterline had been treated with a number of coats of copper-based antifouling. The grounding plate and drop keel were constructed from cast iron. The grounding plate was fastened to the hull with a number of marine grade stainless steel studs and nuts.

4.1.4 The deck moulding was a foam or balsa cored GRP composite, finished with white pigmented gel-coat and extensive areas of Treadmaster non-slip material. It incorporated the decks, coachroof, raised coachroof and cockpit. Hull to deck join was of the shoebox type.

4.1.5 VOYAGER had a balanced skeg-mounted rudder constructed from a stainless steel rudder stock encapsulated in a foam filled GRP moulding. She had a self-draining cockpit and two locations for wheel steering: One in the cockpit and one on the starboard side of the raised saloon area. The steering position in the saloon had a poor field of vision. She had a masthead sloop rig, featuring a deck-stepped mast, a mainsail, roller furling genoa (plus spare), gennaker and spinnaker.

4.1.6 Accommodation was well laid out with a double berth and storage lockers forward. The saloon had two settee berths and a lifting table in the centre. The port berth converts to a double bed using an infill cushion. The galley space was along the port side, aft of the saloon seating. A navigation station / steering position lay on the starboard side, just next to the companionway steps, with heads compartment aft of the navigation station. There was a quarter berth under the port cockpit seating. The GRP keel box was positioned just next to the athwartships part of the galley.

4.1.7 A Yanmar 2GM20F, two cylinder diesel engine, with fresh water cooling drove a three-blade, 16” diameter, feathering Maxprop propeller through a reduction gearbox. Engine control was via a single lever, giving forward and reverse gears and throttle control, mounted next to the helm on the port side of the helm binnacle. One stainless steel fuel tank was located under the cockpit sole, accessible from the large starboard cockpit locker.

4.2 DIMENSIONS

Dimension	Metres	Feet / inches
Length Overall	9.75	32 feet and 0 inches
Length on Waterline	7.62	25 feet and 0 inches
Beam	3.03	9 feet and 11 inches
Draft (keel lifted)	0.56	1 feet and 10 inches
Displacement	4,309 kg	9,500 lb
Ballast	1998 kg	4,406 lb

Table 2: Vessel Dimensions (Yachtsnet.co.uk)

4.3 VESSEL'S NAME

4.3.1 VOYAGER had her name positioned on her stern and also on both sides of her hull topsides, located at the bow. These were applied with blue paint. The lettering was faded and worn.

4.4 OFFICIAL NUMBER

4.4.1 The vessel's Official Number was xxxxx. Registered Tonnage was 8.6 tons. This information was cut into the vessel's carving plate, which located on the main bulkhead in the saloon (Figure 1). The original registration certificate was not seen.

Image of carving plate

Figure 1: Carving Plate

4.5 HULL NUMBER

4.5.1 The hull number of VOYAGER was engraved onto a brass plate, located on the main bulkhead in the saloon, as shown in Figure 2. It was also moulded into the topside of the hull moulding, port quarter side of the vessel's transom, as shown in Figure 3.

Image of Yard number

Figure 2: Hull number mounted on main bulkhead

Image of Hull Number

Figure 3: Hull number moulded into topside, port quarter

5 THE SURVEY

5.1 HULL EXTERIOR

5.1.1 Material & Details of Construction

5.1.1.1 The topsides (from the waterline to deck level) of VOYAGER were of sandwich construction, with a low-density foam or balsa layer sandwiched between the inner and outer layers of GRP. The part of the hull below the waterline was of monolithic construction, made up of polyester resin, mixed-strand fibreglass mat and woven rovings.

5.1.1.2 The hull had raised topsides, which is where the hull moulding extends upwards from the hull to deck join, before turning horizontally to form the deck surface.

5.1.1.3 The external surfaces of the topsides were finished with a white pigmented gel-coat. The hull below the waterline had been treated with a number of coats of copper-based antifouling. At the one location where this copper coating had peeled off, the underlying gel-coat was seen to be un-pigmented. The skeg was integrally moulded with the hull.

5.1.1.4 The grounding plate and drop keel were constructed from cast iron. The grounding plate was fastened to the hull with a number of marine grade stainless steel studs and nuts.

5.1.2 General Appearance

5.1.2.1 The hull was sighted from a distance fore and aft and visually inspected all round. Her lines were symmetrical, fair and true, with no signs of distortion or flat areas. The weave pattern of the underlying laminate (termed ‘print-through’) was visible through the gel-coat.

5.1.3 Topsides

5.1.3.1 The topsides were finished with unpainted, white -pigmented gel-coat.

5.1.3.2 One 1½” wide dark blue trim line ran the length of the hull, positioned 3” below the teak rubbing strake. A pair of 1” & 3” wide dark blue trim lines ran the length of the hull, positioned immediately above the water line. The colour of these trim lines was given by a pigmented gel-coat. These stripes were faded but in acceptable cosmetic condition. It is likely that rubbing and polishing of these lines will not significantly improve the gloss levels of the blue colour.

5.1.3.3 The topsides were generally tarnished and were covered in a layer of oxidised gel-coat. The white gel-coat should be cleaned and treated with a light rubbing compound, followed by an application of fibreglass polish.

5.1.3.4 The topsides were inspected visually. The gel-coat of the topsides was found to be in good condition with no signs of major trauma or stress cracking. There was no evidence of gel-coat cracking on the topsides due to impact with pontoons or from loading by mooring fenders.

5.1.3.5 There were small cosmetic scuff & scratch marks from mooring fenders and some scratching at the bows caused by an anchor or mooring chain. There were a few horizontal scratches on the port & starboard beam. None of these had penetrated the gel-coat.

5.1.3.6 The edges of the transom, located above the waterline, were damaged at three locations (two on starboard side and one at the mid-ships), with some fracturing of the

laminate. Moisture readings were taken at these locations and were found to be higher than the adjacent laminate. There was evidence that these have been repaired in the past, but with subsequent cracking of the filler material. It is RECOMMENDED (type C recommendation with an implementation time of one year) that the damaged areas are cleaned and repaired, ensuring that the edge of the laminate is adequately sealed to prevent moisture ingress.

5.1.3.7 The teak rubbing strakes were found to be in good condition, but with minor wear from cleaning. They were well secured to the deck & hull moulding, with all wooden plugs intact.

5.1.4 Hull Below the Waterline

5.1.4.1 The blue ablative type antifouling paint below the waterline was in need of a new application. Numerous coats of the antifouling have built up, giving a rough surface and these were flaking in some areas.

5.1.4.2 Beneath the layers of ablative antifouling, the hull had been treated with a number of coats of copper-based antifouling. At the one location where this copper coating had peeled off, the underlying gel-coat was seen to be un-pigmented.

5.1.4.3 The copper coating had been well applied and was bonding well to the underlying un-pigmented gel-coat, except for one location next to the forward, port corner of the iron grounding plate. This area of peeling was approximately 80 mm in diameter.

5.1.4.4 The entire hull was visually inspected, except where surfaces were hidden behind the nine timber shores. Additionally, the antifouling was scraped off in a number of areas in order to inspect the condition of the underlying gel-coat. Particular attention was paid to the areas around the corners of the grounding plate and the root of the skeg. There was no evidence of blistering or other damage attributable to water penetration. No evidence of cracking, scratching or chipping of the hull was found.

5.1.5 Moisture Readings

5.1.5.1 Moisture readings were taken using a Tramex Skipper Plus capacitance type moisture meter. The meter was set to range 2, which measures deep into the layup. Figures quoted are from the meter's percentage H_20 scale. Note that by convention, moisture meters are calibrated for timber, so the percentage moisture readings are not directly applicable to GRP. The true moisture content of GRP is very approximately 10% of those quoted.

5.1.5.2 Readings were taken both above and below the waterline in order to obtain a comparison. Note that high moisture content is not generally a structural defect and is to be expected in older boats. Where some moisture has been absorbed, the likelihood of moisture related problems occurring are higher. When this occurs, the actual state of the laminate cannot be completely guaranteed without destructive testing and chemical analysis. The opinion given in this survey report is based on all the evidence available at the time but without destructive testing.

5.1.5.3 Moisture readings taken on the majority of the topsides were between 7 and 12, which indicate a low moisture level. Readings taken at the aft end of the port quarter were up to 20, indicating a high moisture content. Hammer testing of this area did not indicate any damage or saturation of the balsa or foam core in the topside.

5.1.5.4 Readings taken of the hull below the waterline were between 15 and 25, with the highest readings found in the lower bilges. These readings indicate that the hull laminate below the waterline has a medium to high moisture content.

5.1.5.5 To limit the moisture levels in the hull laminate, the boat should ideally be stored ashore for a few months each winter. The owner should endeavour to keep the bilges as dry as possible. When the vessel is to be left unattended for more than a few days,

the sole boards and internal locker covers should be opened up to allow the moisture in the bilges to evaporate.

5.1.6 Hammer Testing of Hull Surfaces

5.1.6.1 In order to identify any areas of delamination or poorly resinated laminate, the exterior surfaces of the hull were then tested with a small plastic-headed hammer. The test gave sound returns with no indications of softening, poor lay-up or delamination of the GRP.

5.1.7 Keel

5.1.7.1 The lifting keel of VOYAGER was constructed from cast iron and was comprised of a cast iron grounding plate and a cast iron drop keel. The grounding plate was fastened from the outside to a recess in the hull moulding by a number of stainless steel studs, each with its own galvanised steel backing plate. See section 5.2.6 for details of the grounding plate fasteners. This grounding plate provides stiffening for the fin keel and supports the keel's pivot pin. The keel of the Southerly 100 is raised and lowered with a hand-pumped hydraulic ram that operates on a Dyneema line. The keel lifts into a moulded GRP case, positioned at the bottom of the companionway steps and forms part of the athwartships galley unit. The hydraulic pump was located beneath the bunk of the quarterberth, with the handle mounted in the side of the bunk.

5.1.7.2 At the start of the survey, the lifting keel was stowed in its fully raised position. The hydraulic mechanism on VOYAGER was tested. The hydraulic release valve was opened, but the keel would not move. When the valve was closed and the handle pumped, the lifting rope was seen to go into tension, but no movement in the keel was seen. It is RECOMMENDED (type A1 recommendation) that the lifting keel is freed-up. The surfaces of the GRP keel box (accessed from beneath the vessel and via the removable access panel in the saloon) should be cleaned of all mud, debris and marine growth. With the drop keel in its lowered position, the exposed surfaces of the casting should be cleaned of rust and treated with a suitable paint system. The Dyneema line and end fittings should also be inspected.

5.1.7.3 Inspection of the keel plate from beneath the vessel and also via the inspection cover in the side of the GRP keel box showed that there was rust scale on all exposed parts of the casting. The exposed surfaces of the iron grounding plate were sealed by a paint treatment. This paint coating was in fair condition, but with rust appearing at various locations. The mastic sealant around the perimeter of the grounding plate was in serviceable condition, but with some minor peeling at the edges of the sealant. Access to the surfaces of the pivot pin from beneath the vessel was very limited. The parts that could be seen appeared to be in serviceable condition.

5.1.7.4 The hydraulic mechanism was inspected via the lifting sole boards in the galley area. The hydraulic strut had some minor surface corrosion. There was evidence of hydraulic fluid around the end terminals of the hoses attached to the strut, as shown in Figure 4. It is RECOMMENDED (type C recommendation with an inspection interval of six months) that the hydraulic system is periodically inspected for evidence of further fluid leakage. If further leaks develop, the system may need to be fully overhauled.

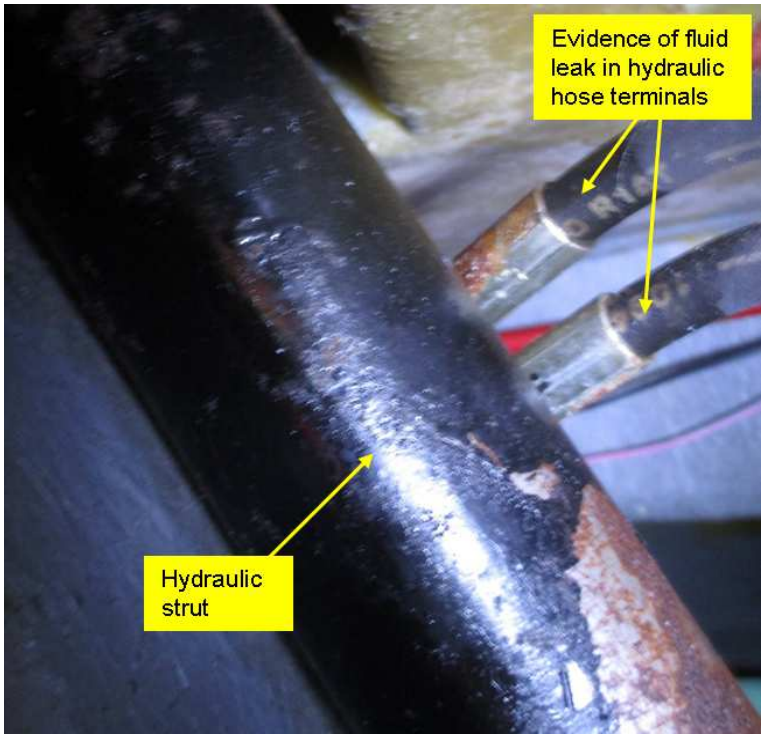


Figure 4: Hydraulic strut and hoses

5.1.7.5 The welded fabrication that supported the upper pulley sheaves of the lifting mechanism, located next to the galley sink, was in serviceable condition, with minor surface corrosion. The sheaves and sheave axles were also found to be in serviceable condition.

5.1.7.6 The Dyneema line was inspected from inside the vessel. Where accessible for inspection, the external braid was free of damage or significant wear. The two U-bolt clamps that were accessible for inspection had some surface corrosion but were in acceptable condition. The manufacturer's recommended replacement period for the line is every ten years. It is unlikely that the keel lifting line on VOYAGER has ever been replaced, therefore consideration should be given to the replacement of new line and U-bolt clamps.

5.1.8 Rudder & Steering

5.1.8.1 VOYAGER had a balanced skeg-mounted rudder constructed from a stainless steel rudder stock encapsulated in a foam filled GRP moulding. It was inspected visually and found to be in serviceable condition and free from damage or cracks.

5.1.8.2 The 1½" diameter rudder stock was inspected where access allowed. The visible portions of the stock were found to be free of pitting corrosion or evidence of cracking. It should be noted that the portions of the rudder stock within the rudder tube and within the blade could not be accessed for inspection; therefore the condition of the stock cannot be guaranteed.

5.1.8.3 The plain bearings of the rudder were inspected and found to be free of lateral movement. There was approximately 10 mm of vertical movement of the blade & stock, but any contact between the blade and the hull was prevented by the upper rudder bearing.

5.1.8.4 The lower bearing was mounted on a U-section bracket, extending aft of the GRP skeg. This bracket was 420 mm long and constructed from 10 mm thick welded stainless steel. This bracket was secured to the lower edge of the skeg by four stainless steel fasteners. These were screwed into tapped holes in the bracket. The bracket and screws were inspected and found to be free of significant corrosion and

well secured to the GRP skeg.

5.1.8.5 The upper bearing assembly was secured to a GRP plate that was bonded to the upper end of the GRP rudder tube. The rudder tube (this is the tube that is fixed to the hull & deck, through which the rudder stock passes) was inspected from inside the aft-most starboard cockpit locker. It was found to be securely attached to the hull by large GRP webs, over-laminated with GRP tabbing. The tube, GRP top plate, webs and tabbing were in very good condition and free of cracks or debonding.

5.1.8.6 VOYAGER was fitted with two helm positions: One at the chart table in the raised saloon and one at the aft end of the cockpit.

5.1.8.7 The wheel positioned inside the raised saloon, starboard side, was a Morse type, with a push-pull Bowden cable mechanism. The detachable wheel was in good order. The mechanism was tested and functioned correctly. The aft end of the Bowden cable was secured to the hull structure via a white-painted mild steel bracket, secured to the hull structure and accessible from the aft-most starboard cockpit locker. The steel bracket was well painted, but with evidence of some surface corrosion. Similar brackets found on other sailing vessels have been found to corrode quickly. It is RECOMMENDED (type C recommendation with an inspection interval of one year) that this bracket is periodically inspected for corrosion and degradation.

5.1.8.8 The helm wheel in the cockpit was mounted to a Whitlock aluminium pedestal. The pedestal was in good working order and adequately secured to the GRP deck moulding. The six spoke stainless steel and leather sheathed wheel was inspected and found to be adequately secured to the binnacle. The leather on the wheel rim was weathered and degraded in some areas. The wheel operated with full and free movement from lock to lock although there was some noise from the attached autopilot. See paragraph 5.6.9.6 for comments relating to the mechanism of the Autohelm ST4000 autopilot.

5.1.8.9 The Whitlock helm wheel turned a shaft whose lower end projected into the engine compartment. A stainless steel lever arm was secured to the lower end of this shaft. The lever arm was connected to a push-rod which ran aft. The aft end of the push-rod was connected to the same stainless steel tiller arm that the Morse steering system was connected to. The tiller arm was clamped to the upper end of the rudder stock by two large stainless steel bolts. The nyloc nuts that secured each end of the push-rod to the lever arm and tiller arm were constructed from passivated mild steel. These had some minor surface corrosion. The steering gear, push-rod and tiller arm were inspected where access allowed. They were found to be well secured and free of significant wear.

5.1.8.10 Mechanical end stops, constructed from welded & galvanised steel, were attached to the webs of the rudder tube reinforcement. These end stops prevented excessive articulation of the rudder. These were found to be in good working order and free of damage.

5.1.8.11 The upper end of the rudder stock was machined to a square cross section in order to provide a positive location for an emergency tiller. No emergency tiller was found on board. Additionally, there was no removable cover in the cockpit floor that would provide access to the top of the rudder stock. Consideration should be given to installing an emergency steering mechanism.

5.1.9 Skin Fittings and Valves

5.1.9.1 Figure 5 and Table 3 below show the location and function of the skin fittings, together with the condition of the valves, hoses and clips. The items in red text in Table 3 indicate a defect or poor condition of the items and are addressed in the recommendations below.

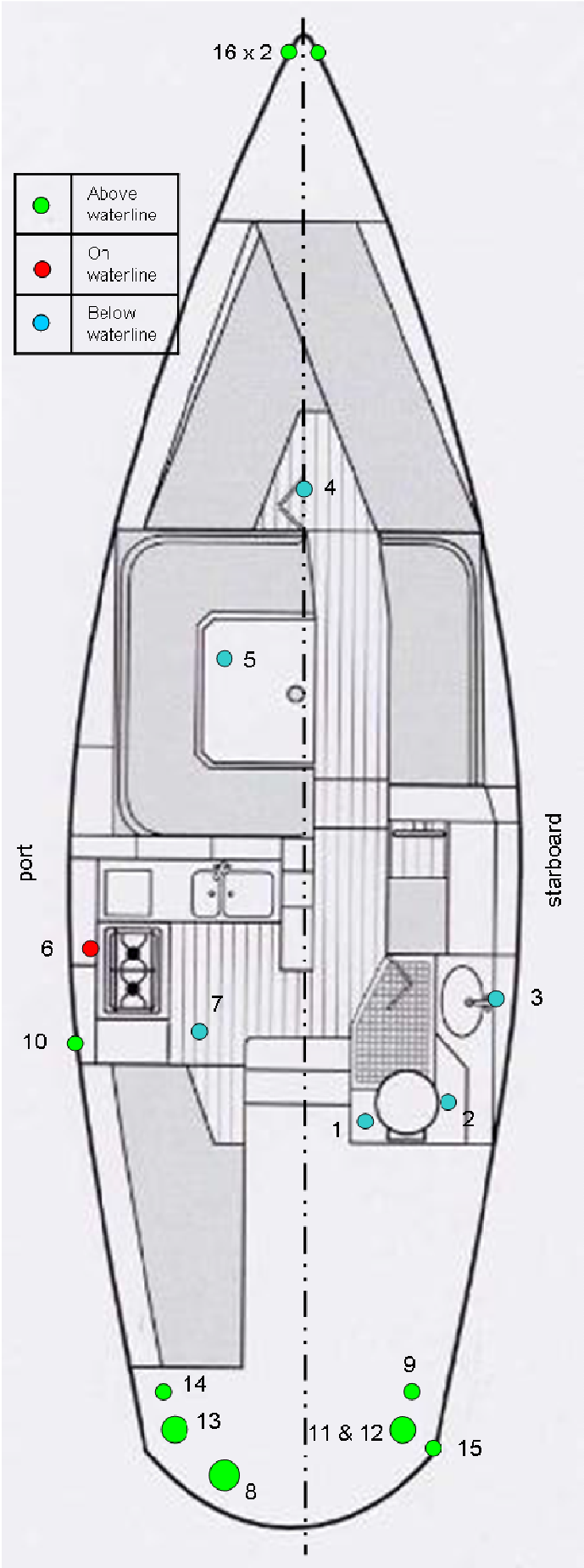


Figure 5: Location of skin fittings (plan view looking from above)

#	Function	Above / Below WL	EXTERNAL		INTERNAL								Notes
			Skin Fitting		Valve			Hose		Clips			
			Mat.	Cond.	Type	Mat.	Cond.	Reinf.	Cond.	#	Mat.	Cond.	
1	Heads outlet	B	Br	✓	Blakes	Br	✓	✓	Old	2	ss	✓	See paragraph 5.1.9.4
2	Heads inlet	B	Br	✓	Blakes	Br	✓	✓	✓	2	ss	✓	See paragraph 5.1.9.5
3	Heads sink outlet	2”B	Br	✓	Ball	Br	X	✓	✓	2	ss	✓	See paragraph 5.1.9.6
4	Depth transducer	B	Pl	✓	N/A								
5	Speed Impeller	B	Pl	✓	N/A								
6	Galley sink outlet	WL	Br	✓	Ball	Br	✓	✓	✓	2	ss	✓	
7	Engine cooling intake	B	Br	✓	Ball	Br	✓	✓	✓	2	ss	✓	
8	Engine exhaust & coolant outlet	5”A	Br	✓	None			✓	Old, minor cracks	2	ss	✓	See paragraph 5.1.9.7
9	Electric bilge pump outlet	4”A	PVC	✓	None			✓	✓	1	ss	✓	See paragraph 5.1.9.8
10	Shower tray bilge pump outlet	12”A	PVC	✓	None			✓	✓	1	ss	✓	
11	Manual bilge pump outlet	4”A	PVC	✓	None			✓	✓	2	ss	✓	
12	Cockpit drain starboard	4”A	PVC	✓	None			✓	✓	2	ss	✓	
13	Cockpit drain port	4”A	PVC	✓	None			✓	✓	2	ss	✓	
14	Gas locker vent	4”A	PVC	✓	None			✓	✓	1	ss	✓	See paragraph 5.1.9.8
15	Space heater exhaust	A	ss	✓	None			✓	✓	1	ss	✓	
16	2x anchor locker drain	A	ss	✓	None								

WL	Waterline	Pl	Plastic
Mat.	Material	ss	Stainless steel
Cond.	Condition	ms	Mild Steel
Br	Bronze or dezincification resistant Brass		

Table 3: Function and condition of skin fittings, valves, hoses and clips

5.1.9.2 No skin fittings or valves were dismantled as part of the survey but the following tests were performed:

Examination from outside and inside the vessel

All valves opened and closed to their full extent

Where accessible, the fixing bolts and nuts were hammer tested

The through-hull fittings, hose clips and valve bodies were hammer tested

The fittings were aggressively tested to assess their security of attachment to the hull

Where accessible, hose clips were inspected and hoses were aggressively tested

5.1.9.3 The skin fittings were all in serviceable condition. All fittings on or below the waterline ere bronze or dezincification resistant brass (apart from the plastic speed impeller & depth transducer) and showed no signs of dezincification.

5.1.9.4 The outer skin of the heads outlet hose (item # 1 in Figure 5 and Table 3) was old and degraded. It is RECOMMENDED (type A1 recommendation) that this hose is replaced.

5.1.9.5 It is RECOMMENDED (type A1 recommendation) that the slots of the skin fitting that provide the sea water to the heads toilet (item # 2 in Figure 5 and Table 3) should be cleared of antifouling and internal marine growth that might obstruct the flow of water into the toilet.

5.1.9.6 The bronze or dezincification resistant brass spigot that connects the heads sink outlet hose to the valve (item # 3 in Figure 5 and Table 3) was corroding heavily, with evidence of water seeping into the vessel. It is RECOMMENDED (type A1 recommendation) that the valve and spigot are replaced with bronze or dezincification resistant brass items.

5.1.9.7 The length of engine exhaust hose (item # 8 in Figure 5 and Table 3) that runs between the stainless steel exhaust muffler and the hull fitting was found to be partially degraded on its outer skin, as shown in Figure 6. It is RECOMMENDED (type C recommendation with an implementation time of two years) that this length of hose is replaced.

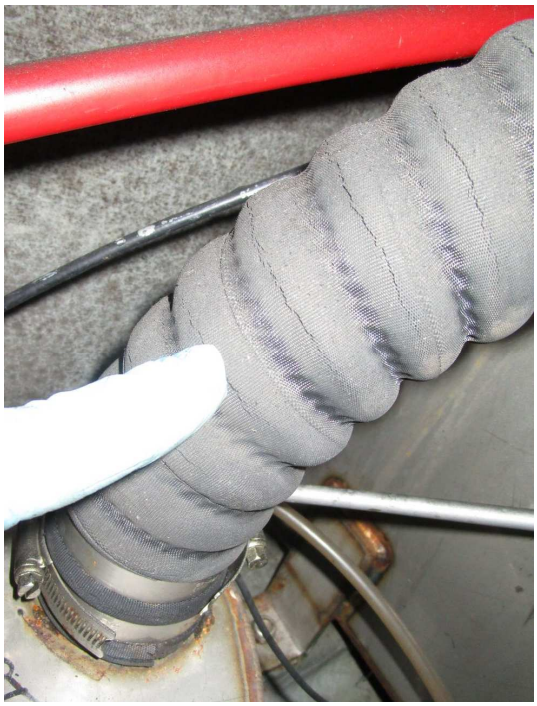


Figure 6: Cracking on outer skin of exhaust hose

5.1.9.8 The hoses for the electric bilge pump outlet, shower tray pump outlet and gas locker vent (items # 9, 10 & 14 in Figure 5 and Table 3) were secured with a single stainless steel screw clip. It is RECOMMENDED (type A1 recommendation) that where the barbed spigot of the skin fitting is long enough to accept two clips, all hoses that have a skin fitting located near to or below the waterline should be fitted with two hose clips at each end.

5.1.10 Anodes

5.1.10.1 A cone anode was properly secured to the propeller assembly. This anode was approximately 10% wasted.

5.1.10.2 A pear anode was through-bolted to the hull, positioned on the port side of the hull, approximately 1 metre forwards of the of the propeller shaft. The anode was approximately 10% wasted. The steel securing studs & double nuts were well secured and in acceptable condition. The surface of the anode should be cleaned of white deposits that have formed on its surface.

5.1.10.3 The electrical connection between the hull anode and the propeller shaft & propeller was tested with a multimeter and the resistance found to be approximately 42 Ω. The resistance between the anode and bronze stern bearing was found to be 0.6 Ω. There was no electrical continuity between the anode and the upper rudder bearing or rudder stock. Inspection of the anode wiring located in the engine compartment revealed that the wire that connected the anode to the rudder stock was broken, as shown in Figure 7. The recommended maximum resistance is 1.0 Ω. It is RECOMMENDED (type A1 recommendation) that the bonding of the anode to the propeller shaft (via the engine block) and the bonding to the rudder stock is inspected further and the wires & terminals overhauled where necessary.

Figure 7: Broken wiring of anode to rudder stock connection

5.1.10.4 Zinc anodes should be replaced when they are approximately 50 to 60% wasted.

5.2 HULL INTERNAL STRUCTURE

5.2.1 General Appearance

5.2.1.1 Within the galley area, saloon and forepeak accommodation, there were a number of removable sole boards. These were all lifted in order to inspect the internal hull and Internal Moulding stiffening structure. Access to the hull structure was also gained by lifting the seats in the saloon area, lifting the bunk covers in the forepeak & quarterberth and also via the engine compartment.

5.2.1.2 The Internal Moulding prevented access to parts of the hull surface. Access was also limited by fixed equipment such as the fuel tank and fresh water tank.

5.2.1.3 The bilges were mostly clean, with no evidence of engine oil spillage or flooding. The internal grey-coloured hull paint application was generally in very good condition.

5.2.1.4 The hull was heavily reinforced around the recess that locates the cast iron grounding plate and also at the lower end of the hydraulic strut that lifts the keel. One small crack was found in the hull moulding, extending from the galvanised steel base plate that secured the hydraulic strut to the hull. This crack is shown in Figure 8. The depth of the crack was not determined, but it was found to be within the outer layer of laminate and possibly deeper. It is RECOMMENDED (type A2 recommendation) that the galvanised

steel hull bracket of the hydraulic strut is temporarily removed. The sharp corners of the base plate should be modified to form a radius. The laminate around the crack should be cleaned of all paint. The crack should be cut back to sound laminate and thoroughly cleaned. The area should be repaired with layers of GRP cloth and epoxy resin, ensuring that each successive layer of cloth is larger than the previous. When the hull bracket of the hydraulic strut is re-fastened, it should be bedded onto a semi-hardened sealing compound.

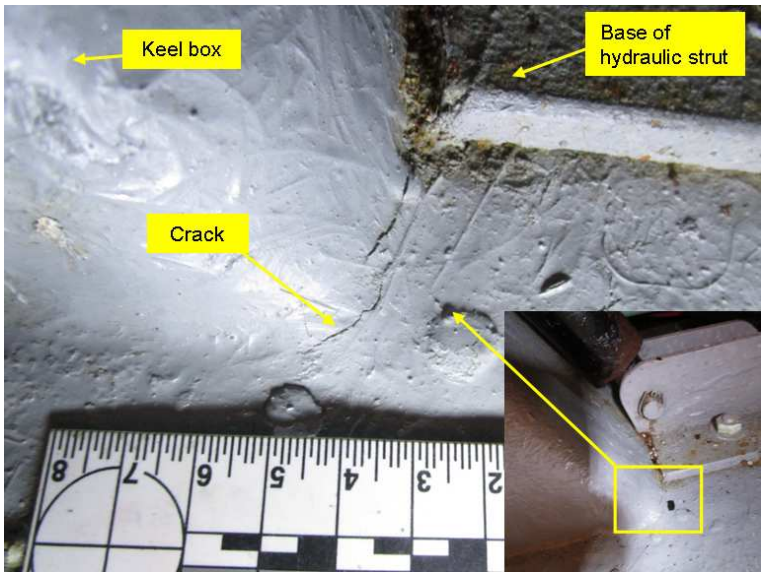


Figure 8: Crack in hull at base of hydraulic strut

5.2.2 Hull Internal Moulding Structure

5.2.2.1 A Hull Internal Moulding of GRP was located in the area that stretched from beneath the forepeak bunks to the aft end of the port quarterberth and spanned athwartships to finish behind the seating cushions. This Internal Moulding was bonded to the hull and strengthens & stiffens the hull moulding. It also formed the sides of the keel casing, the sink & unit of the heads compartment, the heads shower tray and also the structure of the engine beds.

5.2.2.2 This Internal Moulding was secured to the internal surface of the hull, bulkheads and semi-bulkheads with GRP tabbing. Some parts of the Internal Moulding were also secured to the bulkheads by stainless steel screws and penny washers. The exposed surfaces of the Internal Moulding were finished in beige gel-coat. The visible gel-coat surfaces of the internal moulding were in good cosmetic condition, but with minor surface scratches. Where accessible, the Internal Moulding was inspected and no evidence of cracking or other damage was noted. There was no evidence of the debonding of the Internal Moulding from the hull.

5.2.3 Mast Compression Post

5.2.3.1 A 3” diameter cylindrical aluminium column supported the coachroof and transferred the mast compression load to the hull and keel of VOYAGER. The base of the compression post was mounted to the upper surface of the forward end of the GRP keel box. The post was inspected and found to be free of damage from and well secured to the coachroof and the hull moulding. The adjacent GRP structure was free of damage, cracks or deformation.

5.2.4 Bulkheads

5.2.4.1 Where accessible, the teak-faced plywood bulkheads were inspected and found to be

in good condition with no evidence of moisture ingress, wood rot or delamination.

5.2.4.2 The bulkheads, semi-bulkheads and locker frames were secured to the hull & deck by GRP cloth tabbing, except for the location described in paragraph 5.2.4.3. The integrity of the tabbing was inspected and found to be free of de-bonding, cracks or movement. Where the GRP tabbing had been applied, the outer teak ply on each side of the bulkheads was removed during the build of the vessel. This procedure had been correctly performed in order to ensure a good bond to the plywood as the natural oils in the teak plies prevent efficient bonding of the mating surfaces.

5.2.4.3 It was found that the lower edges of the main bulkhead, positioned beneath the sole boards of the saloon and forepeak, were not connected to the bulkhead by GRP tabbing. The forward face of the bulkhead beneath the forepeak sole can be seen in Figure 9. The 2 mm gap between the hull and the lower edge of the bulkhead was filled with a soft mastic sealant. This sealant was loose and peeling along the majority of the gap. Inspection of the adjacent bulkhead revealed that the adjacent plywood was covered in one or more layers of GRP cloth. This indicates that the lower edge of the bulkhead was originally attached to the hull by GRP tabbing, as was normal build practise with the majority of sailing vessels of this size and era. It is RECOMMENDED (type A2 recommendation) that this area is repaired with woven GRP cloth and epoxy resin. The surfaces of the hull and bulkhead either side of the gap should be cleaned of all paint, grease and dirt. Layers of GRP cloth should be applied, ensuring that each successive layer of cloth is larger than the previous. The repair should extend as far up the bulkhead as possible and at least 150 mm along the hull in the fore-aft direction.

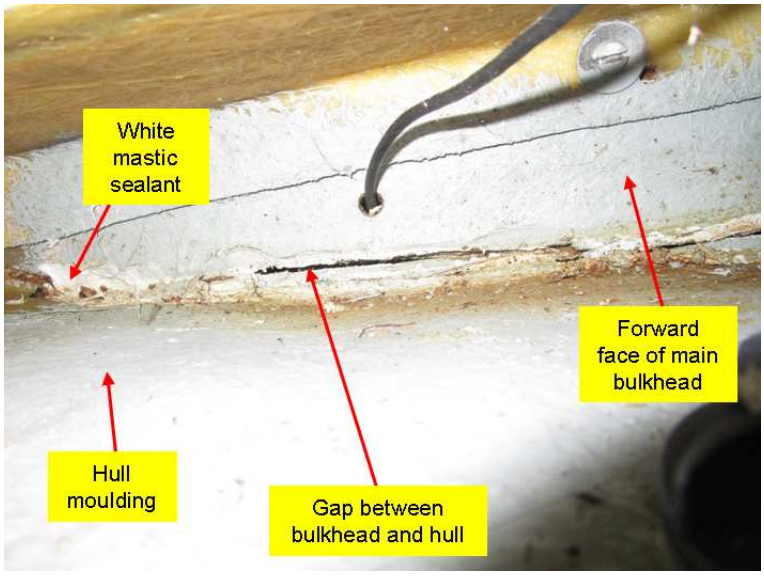


Figure 9: Joint between main bulkhead and hull

5.2.5 Engine Beds

5.2.5.1 The engine beds were formed from the same GRP moulding described in paragraph 5.2.2.1. The engine beds were examined and found to be sturdily built and were free of signs of cracks or deformation.

5.2.6 Grounding Plate Studs

5.2.6.1 The iron grounding plate of the lifting keel structure was fastened from the outside to a recess in the hull moulding by a number of ½" diameter stainless steel studs. Each stud was secured by a single stainless steel nut, each supported by a backing plate. The backing plates were constructed from ¼" thick, 4" x 4" galvanised steel plate.

5.2.6.2 None of the grounding plate studs were removed for inspection. Consequently, the parts of the fasteners that were unexposed or inaccessible cannot be confirmed to be

free from defect.

5.2.6.3 Where accessible, the exposed studs and nuts were hammer tested and found to be securely attached. There was no evidence of corrosion on the studs, nuts or backing plates.

5.2.6.4 There was no evidence of seepage or water ingress around any of the grounding plate studs.

5.3 DECK AND EXTERNAL FITTINGS

5.3.1 Hull / Deck Join

5.3.1.1 The deck was joined to the hull by the shoe box joining method. The external joint was concealed behind teak rubbing strakes running the full length of the vessel, but not across the stern. These rubbing strakes were fastened through the hull to deck join at approximately 150 mm intervals with stainless steel self-tapping screws.

5.3.1.2 Inspection of the interior faces of the join was limited to the aft-most starboard cockpit locker and the anchor chain locker. As far as could be ascertained, the hull to deck joint appeared to be sound and in areas that could be accessed for inspection, there was no evidence of water ingress to the vessel interior through this joint.

5.3.2 Deck Moulding

5.3.2.1 The deck moulding was a foam or balsa cored GRP composite, finished with white pigmented gel-coat. It incorporated the decks, coachroof, raised coachroof and cockpit. Structurally the deck seemed to be in sound condition, with no signs of damage or delamination between core and skin.

5.3.2.2 The gel-coat was found to be in good cosmetic condition with only minor scuff and scratch marks. The gel-coat was dull & tarnished and would benefit from a clean & polish.

5.3.2.3 The non-slip surfaces on the decks, coachroof, and stern platform were provided by blue Treadmaster. This was found to be free of significant damage and well bonded to the deck moulding.

5.3.2.4 The integrity of the deck structure was checked by applying the Surveyor's weight to the deck surface. No excessive deformation was noted.

5.3.2.5 Particular attention was paid to the condition of the coachroof around the mast foot. No cracks or deformation were noted in the gel-coat or underlying structure.

5.3.2.6 On VOYAGER, moisture levels in the deck, cockpit and coachroof moulding were measured at regular intervals, paying particular attention to the laminate adjacent to deck fittings. All readings were found to be low.

5.3.2.7 The vessel's toe rails were incorporated into the deck moulding. These were in good condition and free of cracks.

5.3.2.8 The helmsman's seat was constructed from solid teak and was fastened to the top of the aft cockpit seating. The timber of the seat was free of damage or degradation and was sturdily built.

5.3.2.9 The cockpit coaming was finished with a solid teak capping. These were free of damage or degradation.

5.3.2.10 The cockpit seats were finished with teak planks. The wood was found to be in good condition and adequately secured to the cockpit moulding.

5.3.2.11 The teak plank cockpit sole boards were in CONDITION, with no cracking or splitting of the timber.

5.3.2.12 In the cockpit area there was one storage locker specifically equipped as a gas cylinder storage locker. The gas locker was located at the aft end of the cockpit seating, port side. See section 5.6.5 for details of the inspection of the gas locker.

5.3.2.13 In the cockpit area there was one large storage locker located beneath the port seat. This locker gave access to the engine coolant anti-siphon unit hot water calorifier, located beneath the base of the locker. The locker provided storage for the liferaft, emergency flare pack, anchor ball, two motoring cones and various other items of gear.

5.3.2.14 A smaller locker was located at the aft end of the starboard cockpit seat. This locker gave access to the internal parts of the steering gear, the aft end of the diesel fuel tank and parts of the manual bilge pump. It was used for the storage of warps and fenders.

5.3.2.15 The lids of these lockers functioned correctly and the hinges & latches were in good working order.

5.3.2.16 A manual diaphragm bilge pump was located in the side of the helm seat. This was not tested. See section 6.1 for a description of the bilge pump.

5.3.2.17 Access to the main cabin was from the cockpit hatch, located on the centreline of the cockpit. The moulded GRP sliding hatch was in good condition and free of damage. The single teak washboard and double-hinging teak door were in serviceable condition. The hatch and doors were locked by a large stainless steel bar that was secured at its lower end to a D-loop on the cockpit floor. The upper end of the bar was padlocked to a D-loop that was bolted to the GRP sliding hatch. The mechanism, was in good working order and free of damage.

5.3.2.18 Padlocks were used to prevent access to the cockpit lockers. These were corroded.

5.3.3 Chain Locker & Bulkhead

5.3.3.1 The anchor locker was accessed through a single solid timber, removable door, located at the forward end of the forepeak. The door was in good condition and the brass latch functioned correctly.

5.3.3.2 The locker was inspected and found to be adequately attached to the hull and free of damage. The plywood bulkhead of the locker was lined with GRP, which protected the plywood from abrasion from the chain. The base of the locker was dry and free of degradation.

5.3.3.3 Chain from the locker was fed to the anchor windlass on the deck through a hole in the deck moulding. The locker had two drain holes located in the stem of the hull moulding.

5.3.3.4 The anchor chain should temporarily be removed from the locker. The locker should then be cleaned, ensuring that the drain holes are clear.

5.3.4 Hatches, Windows and Ventilation

5.3.4.1 One aft hinging Lewmar hatch (490 x 490 mm opening) was installed in the roof of the forepeak. This size meets the recommendation for the minimum dimension to allow escape in an emergency, which is 380mm [BS EN ISO 9094-1:2003, Small Craft - Fire Protection]. It was found to be securely attached and showed no signs of water ingress. The aluminium frame was in good cosmetic condition. The clear Acrylic window was moderately crazed. It is RECOMMENDED (type C recommendation with an implementation time of two years) that the Acrylic is replaced.

5.3.4.2 There were six fixed clear Acrylic windows in the sides of the hull topsides. Two were

located in the forepeak, three in the sides of the saloon and one in the heads. These were well sealed into the hull sides, were free of crazing but with light scratches. They showed no sign of water ingress.

5.3.4.3 One small, round, inward opening window was installed in the heads compartment. This was in acceptable working order but the seal was aged and hardened.

5.3.4.4 Six fixed, clear Acrylic windows were mounted in the upper coachroof area: Two at the forward end and two on each side. The Acrylic was clear and free of degradation, except for some alight crazing of the side windows. They showed no sign of water ingress.

5.3.4.5 One closable, plastic vent was mounted above the dining table in the saloon. This was in serviceable condition but with some UV degradation of the plastic outer housing.

5.3.5 Deck Fittings and Equipment

5.3.5.1 There were six aluminium mooring cleats: Two on the foredeck, two on the aft deck and two amid-ships. All were inspected and found to be adequately secured to the deck moulding. Where access allowed, they were found to have adequately sized backing pads.

5.3.5.2 There were two aluminium fairleads fitted to the hull moulding on the foredeck. They were inspected and found to be adequately secured to the deck moulding with adequately sized backing pads.

5.3.5.3 One stainless steel Samson post was mounted to the foredeck, located in the foredeck well. This was securely bolted through the deck by four stainless steel bolts. The post and fasteners were free of damage or corrosion.

5.3.5.4 Two tubular stainless steel grab rails were fitted to either side of the coachroof. They were in good cosmetic condition, free of distortion and securely mounted.

5.3.5.5 A tubular welded stainless steel grab handle was securely fastened to the helm binnacle. This was in good condition and free of damage or distortion.

5.3.5.6 A tubular welded stainless steel grab handle, covered with leather, was secured to the aft edge of the spray hood frame. This was in good condition but the leather was old and dirty.

5.3.5.7 Two tubular stainless steel grab rails were fitted to the transom, to assist entry onto the boat from the stern. They were in sound condition and securely mounted.

5.3.5.8 The vessel was fitted with a pulpit, side stanchions and pushpit.

5.3.5.9 The pulpit was a four post, deck mounted unit, constructed from 1” outside diameter stainless steel tube. It was in good order and securely mounted to the deck by two stainless steel fasteners at each post. The welded fabrication was free of damage or distortion. The lower rail on the port side of the pulpit was constructed from stainless steel tube, but the lower rail on the starboard side was made from 4 mm diameter 1 x 19 stainless steel wire, secured at the aft end by a pelican hook.

5.3.5.10 The 575 mm high side stanchion posts and base fittings were made from 1” diameter stainless steel tube and fitted with twin 1 x 19 construction, 4 mm diameter upper and lower safety wires. The upper wires were covered in white PVC sheathing. The stanchion bases were securely attached to the deck moulding by three stainless steel bolts at each base. The stanchions, bases, fasteners and safety wires were found secure and in good order.

5.3.5.11 The six point pushpit was constructed in two halves from 1” diameter tubular stainless steel construction and was found secure and in good order. It was mounted through

the deck moulding.

5.3.5.12 An entry point was provided through the transom. This was closed off by a 4 mm diameter, 1 x 19 stainless steel safety wire, with a pelican hook at one end. The wire and hook were in good working order and functioned correctly.

5.3.5.13 A five step, hinging, welded stainless steel boarding ladder was secured to the hull moulding on the stern of the vessel. This ladder hinged down to and below the waterline in order to assist with man overboard recovery. It was inspected and found to be adequately secured, but was not tested with the surveyor's weight. It was free of cracks or deformation.

5.4 RIGGING AND SAILS

5.4.1 Mast & Boom

5.4.1.1 The Kemp deck-stepped mast could not be ascended with safety, so the rig was examined as far as possible from the deck. The mast was an oval-sectioned aluminium construction protected by grey coloured anodising.

5.4.1.2 The lower part of the mast was in sound condition, with no sign of serious corrosion or physical damage. The grey anodised protective coating was in good cosmetic condition. There was minor corrosion of the aluminium where stainless steel hardware has been attached to the mast.

5.4.1.3 The cast aluminium deck plate was closely inspected and found to be free of cracks and was securely mounted to the coachroof.

5.4.1.4 The boom and gooseneck were in serviceable condition, with no significant wear on the gooseneck pivots or to the end fittings of the boom.

5.4.1.5 Two grey anodised aluminium spinnaker poles were secured to the foredeck. Both were in very good condition. All of the end pins were found to be in good order and functioned correctly.

5.4.1.6 The Kemp boom vang was found to be in good working order and functioned correctly.

5.4.1.7 It is advisable to take the mast down for a full inspection every few years, as part of the routine maintenance programme. In the short term, closer examination of the mast, spreaders and masthead gear would be possible once the boat is afloat.

5.4.2 Shroud Chain Plates

5.4.2.1 The chain plates for the cap shrouds and lower shrouds were constructed from $^{3}/_{8}$" diameter stainless steel U-bolts secured through the deck. These were inspected from the outside of the vessel and found to be in good condition and free of visible cracks or corrosion.

5.4.2.2 Beneath the deck, each of the U-bolts was fastened to a T-plate constructed from welded stainless steel. The web of the T-plate was then connected to a ½" diameter stainless steel adjustable tie bar. The lower end of each tie bar was welded to a large plate constructed from $^{1}/_{8}$" thick stainless steel. Each plate was bolted through a substantial GRP & timber web by seven $^{3}/_{8}$" diameter stainless steel bolts and a large, $^{1}/_{8}$" thick stainless steel backing pad. The GRP & timber webs were securely connected to the hull by layers of GRP cloth. The T-plates beneath the deck, stainless steel tie bars and end fittings were examined and found to be securely attached and with no evidence of undue loading, cracking or other deformation.

5.4.3 Forestay & Backstay Chain Plates

5.4.3.1 The forestay deck plate was formed by the stainless steel bow roller fabrication. It was secured to the deck by two stainless steel fasteners and secured to the stem by a further two stainless steel fasteners. The forestay chain plate & fasteners were examined and found to be free of damage or corrosion, adequately secured to the hull and with no evidence of undue strain on the mountings.

5.4.3.2 The inner forestay was fastened to the deck via a $^{3}/_{8}$" diameter stainless steel U-bolt. This was adequately secured to the deck moulding and with no evidence of undue strain on the mountings.

5.4.3.3 The split backstay deck plates were constructed from $^{3}/_{8}$" diameter stainless steel U-bolts passing through the deck moulding. These were inspected from the outside of the vessel and via the aft-most starboard cockpit locker. They were found to be in good condition and free of visible cracks or corrosion. The backing washers were of the plain type. Consideration should be given to replacing these with larger penny washers.

5.4.4 Jib Furling Mechanism

5.4.4.1 The Furlex roller furling equipment was tested as far as practical and found generally in good working order. The drum was examined and no defects were seen in either the bearings or in the rigging screw attachment.

5.4.4.2 The aluminium alloy luff extrusion appeared to be straight and with no kinks.

5.4.5 Standing Rigging

5.4.5.1 The age of the standing rigging could not be verified. To be safe, stainless steel standing rigging should be replaced approximately every five years if the yacht is raced and every ten years if she is just cruised.

5.4.5.2 The masthead standing rigging was formed from 1x19 stainless steel wire, with swaged terminals secured to the chain plates by toggles and bottle screws.

5.4.5.3 The standing rigging comprised 7 mm diameter single lower shrouds and 7 mm diameter cap shrouds passing over single spreaders. There was a 6 mm diameter split backstay terminating on each side of the transom and a 6 mm diameter babystay secured to the forward end of the coachroof. The forestay (diameter of this wire could not be measured) was formed by the headsail reefing foil.

5.4.5.4 The swaged terminals were inspected and appeared to be free from any bending or distortion that might occur during their manufacture. As far as could be ascertained, the bottle screws and toggles appeared to be in serviceable condition, with no signs of bending, splitting, cracking or other failure.

5.4.5.5 As far as could be ascertained, those parts of the shrouds and stays that could be inspected from the deck appeared to be serviceable.

5.4.6 Winches, Jammers, Travellers

5.4.6.1 The running rigging that was stored on the vessel was inspected and showed only minor signs of wear. These all remain serviceable.

5.4.6.2 Lewmar headsail sheet leads were mounted on travelling cars on the side decks. The aluminium tracks were securely mounted and in good cosmetic condition.

5.4.6.3 The mainsheet block was mounted to a stainless steel bar, positioned forwards of the cockpit sprayhood. It was securely mounted and in good working order. The mainsail

sheet was lead back to a jamming cleat on the starboard side of the cockpit.

5.4.6.4 Two primary winches (Lewmar 30, two-speed, self-tailing) were located on the cockpit coaming. They were found to be adequately secured, with the chrome-plated drums in fair cosmetic condition but with some wear to the friction surfaces. The bearing & ratchet mechanisms on each winch were stiff. They should be stripped down and serviced.

5.4.6.5 Two halyard winches (Lewmar 8, single-speed, non self-tailing) were mounted on the coachroof, on either side of the cockpit hatch. They were found to be adequately secured and in serviceable condition. The grey anodised drums were free of significant wear. The bearings and ratchet mechanisms were in good working order.

5.4.6.6 One Lewmar 8, single-speed, non self-tailing winch was mounted on the port side of the mast, between the boom and foot. It was found to be adequately secured and in good working order. The grey anodised drum was free of significant wear. The bearings and ratchet mechanism was in good working order.

5.4.6.7 A total of five Spinlock jamming cleats were mounted on the coachroof. They were found to be adequately secured and in good working order. A further two jammers were mounted on the port side of the mast.

5.4.7 Sails

5.4.7.1 All of the vessel's sails were stowed in their bags in the forepeak. They were all opened up for inspection inside the saloon.

5.4.7.2 The Dacron Arun, fully battened mainsail was opened up for inspection. The sail cloth and double stitching were in good working order, with some discolouration of the cloth and minor evidence of wear & stretching. There was some minor UV degradation of the cloth at the clew although no tears or holes were found here. The batten pockets were in good order and free of significant wear. The cloth was free of tears and with no repair patches. The aluminium headboard was in good working order. The mast sliders were adequately secured. The sail number (GBR 5255T) was fitted to both sides of the sail with black cloth.

5.4.7.3 The Dacron Arun furling genoa was opened up for inspection. The blue sacrificial UV strips were in acceptable condition. The cloth and double stitching had some wear, but no tears or repairs were found. The tack tape, head tap and clew eye were all in good condition.

5.4.7.4 The Southern Sails furling genoa was found to be in good working order, with the blue UV strips in good condition. The tack tape, head tape and clew eye were all in good condition.

5.4.7.5 A spinnaker was packed in its snuffer bag. The white & light green nylon cloth was free of tears or wear. The sail has had very light use. The was some very minor mildew staining on the white cloth.

5.4.7.6 A blue, turquoise and yellow gennaker was stowed inside the mainsail bag. The Rotofurl furling drum and attached tackle was in very good condition. The nylon cloth and no evidence of significant wear. The cloth and stitching was free of mildew or other staining.

5.4.8 Canvas

5.4.8.1 The blue canvas spray hood was in poor condition, with worn stitching and some fading of the cloth. The windows were in poor condition, with some parts heavily degraded. The 'lift the dot' fasteners and webbing straps were in satisfactory condition. The stainless steel framework was in good working order, free of distortion and well attached to the saloon coachroof.

5.4.8.2 A blue canvas sail cover was stowed inside the boat. This was in very poor condition and should be replaced.

5.4.8.3 A white canvas Arun wheel cover was used to cover the helm wheel and compass binnacle. It was in good condition, with the zip in good working order.

5.5 PROPULSION

5.5.1 Engine & Transmission

5.5.2 VOYAGER was fitted with a Yanmar 2GM20F, two cylinder diesel engine, with fresh water cooling, driving through a reduction gearbox. Engine control was via a single lever, giving forward and reverse gears and throttle control, mounted next to the helm on the port side of the helm binnacle.

5.5.3 The serial number of the engine was 21885.

5.5.3.1 The engine's instruments included an engine hour meter. This read 989 hours.

5.5.3.2 There was no evidence of engine overheating. The paint coating was in very good condition, but with some minor corrosion and peeling.

5.5.3.3 The exhaust elbow was inspected and found to be in good order and free of corrosion or cracking on its outer surface. There was no evidence of recent leakage, but rust deposits around the exhaust manifold indicated that the joint or elbow has leaked in the past, allowing sea water to drip over the diesel lift pump. When the engine is next run under load and at full working temperature, the elbow should be inspected for any coolant leakage.

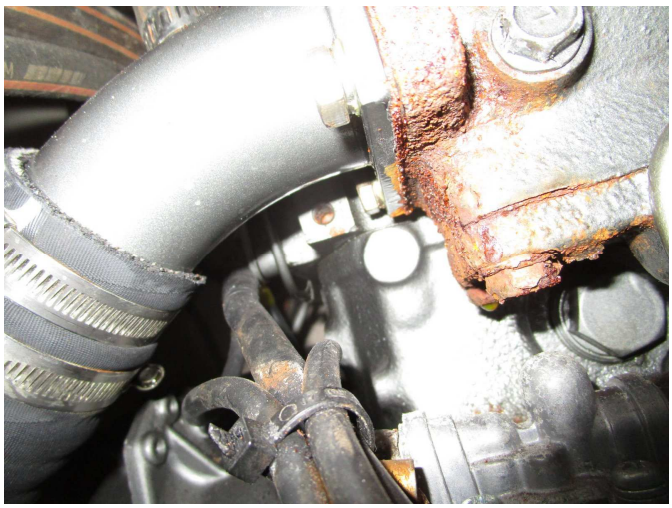


Figure 10: Corrosion on exhaust manifold at flange of elbow

5.5.3.4 The engine oil was at the correct level, free of water ingress but very dirty. The engine oil should be changed.

5.5.3.5 Each of the engine's two cylinders was fitted with a decompression lever. There was no provision for a starting handle, therefore the engine could not be turned over by hand in order to make an assessment of the compression in each cylinder.

5.5.4 The Kanzaki reduction drive gearbox was a model KM2P, serial number 38877.

5.5.4.1 The gearbox oil was inspected and found to be clean, free of moisture and at the correct level.

5.5.4.2 The engine was briefly run, with coolant water being fed to the raw water intake via a

water container that was continuously fed by a hose. Initially, the engine did not fire. The reason for this could not be determined, but it may be due to lack of fuel in the supply line or due to poor compression in the cylinders. Exhaust gases were clear and mostly free of soot.

5.5.4.3 Once the engine had been run for a few minutes, it was turned off. After one minute the engine was started again at tick over speed. The engine started immediately.

5.5.4.4 The engine could not be run under load and the cylinders were not compression tested, therefore no assessment could be made of the engine's compression condition. The engine was not run long enough to assess the efficiency of the engine cooling system.

5.5.4.5 When under load no fuming was noted in the engine space. No leaks from the engine cooling water, fuel and exhaust systems were evident, except for a water leak in the side of the stainless steel muffler, as shown in Figure 11. It is RECOMMENDED (type A2 recommendation) that the muffler is replaced.

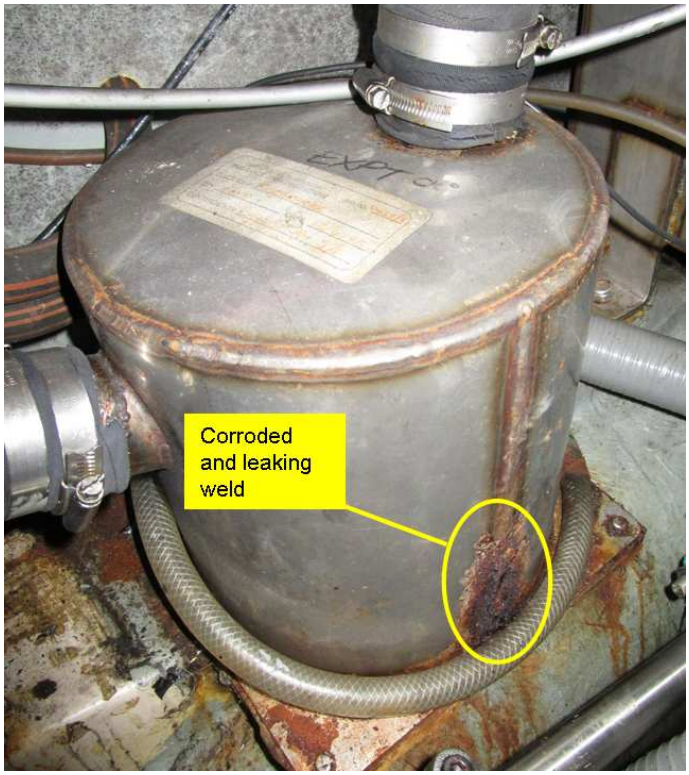


Figure 11: Exhaust muffler

5.5.4.6 Ahead and reverse gears could not be tested as the vessel was out of the water.

5.5.4.7 The alternator belt and impeller pump belt were loose. These should be adjusted.

5.5.4.8 The coolant hoses were connected to the impeller pump by mild steel screw clips. These were corroding. It is RECOMMENDED (type A2 recommendation) that all fittings on the engine that use mild steel hose clips are secured with two hose clips made from marine grade stainless steel.

5.5.4.9 The engine bearers were securely mounted, and the flexible rubber engine mounts were in good working order. The mounting bolts were tight.

5.5.4.10 The engine stop pull handle was mounted next to the engine control panel. It operated with full and free movement.

5.5.4.11 Access to the engine's coolant impeller, alternator, raw water strainer, oil filter and oil dipstick were good.

5.5.4.12 The cooling feed to the exhaust was suitably fitted with an ant-siphon attachment, with the head of the anti-siphon venting through a skin fitting on the transom, just beneath deck level. The anti-siphon loop was mounted inside the large cockpit locker. The supply & return hoses connected to the anti-siphon loop were cracked and degraded, as shown in Figure 12. It is RECOMMENDED (type A2 recommendation) that these hoses are replaced.

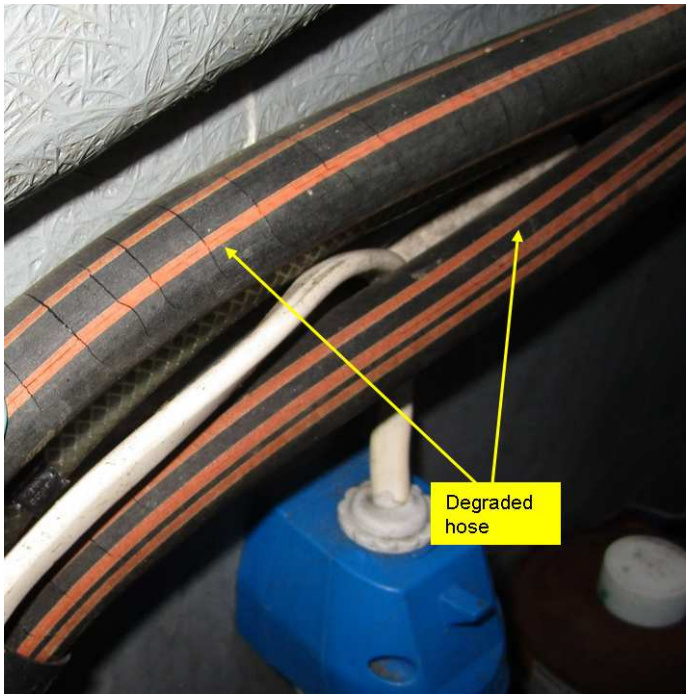


Figure 12: Supply & return hose for engine anti-siphon loop.

5.5.4.13 Engine exhaust and cooling water were discharged through a stainless steel muffler box and an armoured flexible hose, to a hull fitting on the stern, port side. See paragraph 5.1.9.7 for a recommendation relating to the engine exhaust hose. See paragraph 5.5.4.5 for a recommendation relating to the muffler.

5.5.4.14 The engine switch panel was located in the side of the starboard cockpit coaming. The panel included the start key, engine pull-stop handle and lamps for alternator output, oil pressure and engine coolant temperature. The engine coolant temperature warning lamp could not be tested. All other lamps functioned, but the correct operation of the alternator output sensor and the oil pressure sensor could not be verified.

5.5.4.15 It is RECOMMENDED (type A1 recommendation) that the engine is serviced. All fluids and filters should be changed. The engine zinc anode should also be replaced.

5.5.5 Fuel System

5.5.5.1 There was one welded stainless steel fuel tank mounted under the cockpit sole. Access to the fuel tank was from the aft-most starboard cockpit locker. The visible parts of the fuel tank were clean and generally free of damage, but with minor corrosion around the welds.

5.5.5.2 The hose clips that secure the fuel filler pipe to the fuel tank and to the deck fitting were secure and free of corrosion. The hose fittings that secure the fuel return pipe to the fuel tank and engine were secure and free of corrosion. The fuel hoses were in good condition and free of damage or degradation.

5.5.5.3 The hose clips that secure the fuel feed hose to the fuel tank and filter were secure and free of corrosion. The fuel hose was in good condition and free of damage or degradation.

5.5.5.4 The fuel filler cap was located on the starboard side of the transom. The cap was suitably labelled. The plastic o-ring seal was in satisfactory condition and free of cracks. The short length of chain that secures the filler cap to the main body of the filler pipe was in good condition.

5.5.5.5 The paper cartridge and glass-bowl primary fuel filter was in good condition, with all connections free of corrosion. There was a small amount of dirt and water at the bottom of the glass bowl. It is RECOMMENDED (type A1 recommendation) that the bowl is removed and cleaned.

5.5.5.6 The fuel shut-off valve was mounted in the side of the bunk of the port quarter berth. This gate valve was in good condition and functioned correctly.

5.5.5.7 A fuel tank shut-off ball valve was located on the forward end of the fuel tank and was accessed by reaching over the top of the engine.

5.5.5.8 Fuel level in the tank was measured by means of a clear plastic sighting tube, mounted on the forward face of the fuel tank. The sighting tube had a shut-off ball valve at its lower end. The tube, valve and end fittings were in good order.

5.5.6 Stern Gear

5.5.6.1 The exposed section of the 1” diameter stainless steel propeller shaft was in good condition and as far as could be ascertained, the alignment of the shaft appeared to be correct.

5.5.6.2 There was minimum wear between the propeller shaft and cutlass bearing in all directions.

5.5.6.3 The three-blade 16” diameter, feathering Maxprop propeller was in acceptable condition and securely attached to the propeller shaft. There was some wear and dents on the blade tips. The bearings of the propeller boss had some wear. There was also some wear in the bearings of each blade. These may need to be refurbished in the next few seasons.

5.5.6.4 The bronze stern bearing was inspected and found to be free of corrosion and adequately secured to the hull. The two bolts and nyloc nuts were made from stainless steel. These were in good condition and free of surface corrosion.

5.5.6.5 The inboard shaft seal was inspected and found to be in good working order with no evidence of damage or perishing of the rubber. The two hose clips that secure the seal were made from stainless steel. The bolt of the forward clip was corroding. It is RECOMMENDED (type A1 recommendation) that both clips are replaced.

5.5.6.6 A rope cutter was mounted forwards of the propeller. This was inspected and found to be free of damage.

5.5.6.7 The inboard shaft seal was lubricated by raw water fed from a reinforced hose that was connected to the engine raw water coolant system.

5.6 SYSTEMS AND SERVICES

5.6.1 Anchor and Chain

5.6.1.1 The 33 lb galvanised steel Bruce anchor was inspected and found to be free of wear and with only minor surface corrosion. The anchor was secured to the pulpit, in front of the forestay.

5.6.1.2 The anchor was secured to a length of chain by a single stainless steel shackle, which was in good working order but was not seized in order to prevent the bolt from coming

loose. It is RECOMMENDED (type A2 recommendation) that seizing wire is used to lock the shackle bolt, or the end of the thread should be peened over to prevent loosening. Stainless steel shackles are particularly prone to coming undone.

5.6.1.3 The chain was generally free of wear & corrosion and in very good condition. The chain was attached to a length of suitably sized rope. The anchor chain was made from short plain-linked MATERIAL. Dimensions of the chain were 10 mm x 32 mm x 46 mm. The recommended length of anchor chain that should be stowed on a small craft is 45 metres, which equates to a length: depth ratio of 5:1 in 9 metres of water. [Gerr, Dave. Boat Mechanical Systems Handbook. Adlard Coles Nautical, 2009]. The chain was not fully inspected. The length of the chain was not measured. The chain should be laid out and checked for damage or significant corrosion.

5.6.1.4 The bitter end of the warp was shackled to a U-bolt that was secured to the hull moulding. It is RECOMMENDED (type A2 recommendation) that the bitter end connection is modified so that it is tethered to the U-bolt by a short length of line that could easily be cut in an emergency.

5.6.1.5 A spare Danforth anchor was lashed to the port side of the pushpit and resting on a timber block that was mounted to the aft end of the deck. The anchor was in serviceable condition, but with surface rust on the edges of the flukes.

5.6.2 Anchor Windlass

5.6.2.1 A Simpson Lawrence Hyspeed manual windlass was installed on the foredeck. The external surfaces of the cast aluminium body were in poor cosmetic condition, but free of damage. The white paint was flaking in numerous places. The winding mechanism was tested and was found to be stiff.

5.6.2.2 The windlass was bolted through the deck moulding with four stainless steel fasteners. It was found that the backing washers were of the plain washer (small) type. These washers were heavily corroded. It is RECOMMENDED (type C recommendation with an implementation time of six months) that these washers are replaced with penny washers. These will give better load distribution of the loads applied to the fastening bolts. At the same time, the windlass mechanism should be serviced and the outer body repainted.

5.6.3 Fresh Water System

5.6.3.1 There was one welded stainless steel water tank, located beneath the athwartships seat in the saloon, just forwards of the galley area. It was found to be adequately secured to the adjacent structure and where access allowed, was found to be in good condition, but with minor corrosion of the welds.

5.6.3.2 The suitably labelled filler cap for the fresh water tank was located on the port side deck.

5.6.3.3 Water from the tank was fed into a pressurised water system, pressurised by a pump located beneath the galley sole. A calorifier beneath the aft-most starboard cockpit locker supplied hot water to the taps in the galley and heads compartment. The calorifier was heated by hot water from the engine cooling system.

5.6.3.4 The pump and taps were tested and found to function correctly. The water that came out of the taps was found to be clear. The calorifier was not tested.

5.6.4 Heads

5.6.4.1 The Jabsco manually operated sea toilet was clean and the bowl and pump were adequately attached to the beige coloured Internal Moulding. The installation could not be fully tested while the vessel was ashore but the water pump-out mechanism was

tested and worked correctly.

5.6.4.2 The lower half of the sides of the heads compartment was constructed from the GRP Internal Moulding and was finished in a beige gel-coat. This moulding also formed the oval sink unit, which was served by a hot & cold mixer tap / shower head. The solid timber & plywood cupboards below the sink and the shelves behind the sink were in acceptable cosmetic condition, but in need of a new varnish treatment.

5.6.4.3 The bi-fold heads door was constructed from teak faced plywood and melamine. It was in very good cosmetic condition, but the lower edge of the door rubbed on the sill of the door frame.

5.6.4.4 The teak planked sole board was supported by a GRP shower tray, also formed by the beige coloured Internal Moulding structure. The sole board was in good condition and free of damage. The shower tray featured a sump that housed a Rule, 500 gallons per hour electric pump, operated by a pull switch mounted on the aft bulkhead of the heads compartment. This pumped the water out of the shower tray and out of the vessel via a PVC skin fitting located on the port beam. The pump was tested and was found to function correctly.

5.6.5 LPG Installation

5.6.5.1 In the cockpit area there was one storage locker specifically equipped as a gas cylinder storage locker. The gas locker was located at the aft end of the cockpit seating, port side. Two 2.72 kg LPG (butane) gas cylinders were stored in this locker. The locker was constructed from a single GRP moulding, with a hinging and latching GRP lid. The locker was not tested for integrity but was considered to be gas-tight to a level above the pressure regulator.

5.6.5.2 A locker drain hose was installed at the bottom of the gas cylinder locker in order to drain any leaked gas to the outside of the hull. The hose and attachments were in serviceable condition, but the drain was partially blocked by leaves & debris. The gradient of the fall of the hose was such that no water trap could be formed. It is RECOMMENDED (type A1 recommendation) that the locker and drain hose are thoroughly cleaned and all debris removed.

5.6.5.3 Connected to one of the butane gas cylinders was an isolation valve. From the valve, flexible rubber hose led the gas supply to a pressure regulator on the side of the gas locker. The rubber hose was manufactured in May 2007. Gas hose should be replaced every five years. It is RECOMMENDED (type A2 recommendation) that this hose is replaced by a maximum length of one metre of appropriately labelled gas hose. This recommendation also applies to the reinforced gas hose behind the galley stove. The hose should be marked to BS 3212 type 2 or BS 3212:1991 or BS EN 1763 class 2/3/4. This work should be performed by a qualified gas technician, such as those listed on the gas safety register.

5.6.5.4 There was no date on the LPG pressure regulator to indicate its age but it is likely that it was older than ten years and should therefore be replaced. It is RECOMMENDED (type A2 recommendation) that the regulator is replaced with one of marine grade.

5.6.5.5 From the pressure regulator, copper pipe then led the supply through the quarter berth and to an isolating valve located beneath the forward end of the quarterberth bunk. A further length of copper pipe led the supply to the galley, where the pipe was connected to a length of armoured gas hose which conveyed the gas supply to the cooker. This hose had no date of manufacture and is likely to be older than five years.

5.6.5.6 The copper pipe passing through the cockpit locker and quarterberth was well protected inside PVC pipe and was adequately supported.

5.6.5.7 The installation was not further inspected or pressure tested for leaks.

5.6.5.8 Three spare 2.72 kg butane gas cylinders were stored in the large cockpit locker and beneath the bunk of the port quarterberth. It is not considered good practise to store gas cylinders in lockers that are inside the vessel or that are not specifically equipped as a gas storage container. These should be removed from the vessel.

5.6.5.9 Strong consideration should be given to installing a bubble leak tester on VOYAGER.

5.6.5.10 The ENO twin burner hob, grill and oven installation was secured by a gimbal mechanism to the galley structure. The cooker was clean. The burners were not tested.

5.6.5.11 Note that this survey is not any kind of gas safety certificate. This is only obtainable after comprehensive pressure testing and assessment by a qualified person listed on the gas safety register. The above recommendations should be undertaken by a qualified gas technician, such as those listed on the gas safety register. See http://www.gassaferegister.co.uk for further details.

5.6.6 Galley

5.6.6.1 The L-shaped galley was situated on the port side of the vessel, aft of the dining table and opposite the heads compartment.

5.6.6.2 The Eno cooker was mounted on the part of the galley that ran fore-aft. There was a 12 volt d.c. Isotherm top-access fridge unit located on the galley worktop, next to the twin rectangular stainless steel sink. The fridge functioned correctly. The sink was supplied with hot & cold fresh water via a chrome tap.

5.6.6.3 There were a range of cupboards with sliding doors and drawer units. The work surfaces and shelves were all fitted with fiddles to prevent items from sliding off when at sea. The galley units were all in acceptable cosmetic condition, but the varnish finish was worn in many areas. The fiddles were scratched in places.

5.6.7 Electrical System

5.6.7.1 VOYAGER had a 12 volt d.c. electrical system, with one engine starting battery (96 Amp hour) and two batteries (96 Amp hour each) for services. The batteries were fitted with tie down straps to prevent movement.

5.6.7.2 Battery charging was from the engine alternator, from the flexible solar panel mounted on the coachroof or from shore power through an automatic battery charger. These were not tested. A Stirling Power Products alternator booster was mounted inside the engine compartment.

5.6.7.3 One quarter-turn switch controlled the output from the engine battery, one quarter-turn switch controlled the output from the service batteries and one quarter-turn switch was provided for the linking of the two sets of batteries. These functioned correctly.

5.6.7.4 A single rotary breaker switch controlled the output from the batteries. Service power was then distributed via a trip-switch panel, consisting of thirteen labelled and illuminated push buttons. This panel was positioned above the chart table.

5.6.7.5 Shore power was connected to the vessel at a socket mounted inside the large starboard cockpit locker. This was connected to a 240 volt a.c. master switch unit, located inside the engine compartment. This unit housed the breakers to isolate the shore power. Shore power was distributed to conventional domestic 13 amp sockets.

5.6.7.6 The single windscreen wiper motor, secured to the inside of the starboard, forward facing window in the raised saloon, was tested and functioned. At the time of survey, there was no wiper arm attached.

5.6.7.7 The wiring that could be seen appeared to be serviceable, was adequately supported

and was routed above the lower bilges.

5.6.8 Navigation Lights

5.6.8.1 A transom mounted stern light was adequately attached to the pushpit. This was tested and found to function correctly. The lens was inspected and found to be cracked and slightly crazed. It is RECOMMENDED (type C recommendation with an implementation time of one year) that the lamp lens is replaced.

5.6.8.2 A bicolour light was mounted on the pulpit. This was tested and found to function correctly.

5.6.8.3 A mast-top tricolour, mast-top anchor light and steaming light was installed. These lights were tested and found to function correctly.

5.6.9 Navigation Equipment

5.6.9.1 VOYAGER was equipped with a Ritchie Powerdamp binnacle mounted compass. The lens was clear, free of scratches and the fluid inside was free of bubbles.

5.6.9.2 A Swiftech M-168 VHF radio (non-DSC) was mounted above the chart table. This unit powered up, received signals, but was not tested for transmission. The serial number of this unit was B980247.

5.6.9.3 A Garmin GPS 75 unit was mounted at the chart table. This unit powered up but did not give a latitude and longitude fix. The display screen stated that insufficient satellites had been sighted. The serial number of this unit was 37570034.

5.6.9.4 A Koden MRD-88 radar display screen was mounted at the chart table. The serial number of this unit was 77701573. The screen was manufactured in June 1997. The radar was powered up and was found to function correctly.

5.6.9.5 Three Autohelm instruments were mounted to a binnacle, just above the cockpit sliding hatch: The depth sounder display screen powered up but its full operation could not be assessed. The wind instrument gave a reading of wind direction, but not of wind speed. The masthead anemometer was not rotating. The third instrument was a speed & distance readout. This was tested and functioned, but the accuracy of the impeller could not be assessed. It is RECOMMENDED (type A2 recommendation) that the masthead anemometer is serviced.

5.6.9.6 An Autohelm autopilot unit was mounted to the helm, with control unit mounted to the side of the starboard cockpit coaming. This unit was tested and found to function. When the drive belt of the autopilot was disengaged from the helm wheel and the helm wheel was turned, it was found that the autopilot gear wheel was still partially engaged, producing a noise as the wheel was turned. It is RECOMMENDED (type A2 recommendation) that the autopilot mechanism is serviced or adjusted.

5.6.9.7 A SX Micro 90 hand held VHF radio was stored in its original packaging. The serial number of the handset was 7949. The battery charger was also packed within the box. This unit was not tested. The battery required charging.

5.6.9.8 A barometer was mounted on the main bulkhead in the saloon.

5.6.10 Space Heating System

5.6.10.1 VOYAGER was fitted with an Eberspächer D3LC, 2,800 Watt, diesel powered heating system. The version number of the main unit was 25_1843_01 and the serial number was 002824. The heater unit was mounted behind a plywood panel in the large starboard cockpit locker.

5.6.10.2 Where accessible for inspection, the warm air ducting hose was found to be in good condition.

5.6.10.3 The insulated exhaust tubing of the Eberspächer space heater, located in the cockpit locker, could not be inspected as it was concealed by a rigid outer tube.

5.6.10.4 An attempt was made to power up the heater but the unit would not start. It is RECOMMENDED (type A2 recommendation) that the Eberspächer heating system is repaired or serviced by an authorised Eberspächer technician.

5.7 ACCOMMODATION AND DÉCOR

5.7.1.1 Access to the main cabin was from the cockpit hatch, located on the centreline of the vessel.

5.7.1.2 The teak & holly faced plywood sole boards were in serviceable condition but in need of a new varnish treatment.

5.7.1.3 The plywood and solid timber saloon table functioned correctly and was able to move up and down the mast compression post, which also functioned as the single table support.

5.7.1.4 The interior woodwork was found to be in good condition and free of splits or damage.

5.7.1.5 The bunk and seating cushions were found to be in good cosmetic condition and were generally free of stains or fading.

5.7.2 The interior headlining was clean, free of damage and well secured to the coachroof.

5.7.2.1 The bi-fold door of the heads compartment was constructed from teak faced plywood and melamine. It was in very good cosmetic condition, but the lower edge of the door rubbed on the sill of the door frame.

6 SAFETY EQUIPMENT

Refer to the Boat Safety Handbook [RYA publication, 2012, ISBN 978-1-906435-53-0]. This book gives recommendations and advice concerning the selection and installation of safety equipment.

6.1 BAILING / BILGE PUMPING

6.1.1 The bilge pumps were not tested as this would have required a large volume of water to be placed in the bilge. Their function and efficiency should be verified.

6.1.2 A manual diaphragm bilge pump was located in the side of the cockpit seating, aft of the helm wheel. The inlet to the bilge pump was located in the bilge sump, positioned in the skeg moulding. It was correctly fitted with a strum box. The handle was located on the underside of the aft-most starboard cockpit locker, but was not tethered to prevent its loss. It is RECOMMENDED (type A2 recommendation) that the bilge pump handle is tethered in order to prevent its loss in the event of a capsize. It was noted that the teak planking of the cockpit sole prevented the full up-down movement of the pump handle.

6.1.3 An electric bilge pump was also installed on VOYAGER, with its inlet located in the bilge sump, positioned in the skeg moulding. It was correctly fitted with a strum box. The pump was controlled by a switch located in the side of the bunk of the quarterberth. The pumped powered up when the switch was set to manual. The pump also powered up when the switch was set to automatic, even when there was no water to be pumped out. It is RECOMMENDED (type A2 recommendation) that the float switch is serviced or replaced.

6.1.4 It is RECOMMENDED (type A2 recommendation) that both pumps are tested, with the inlet end of the hose or pump temporarily placed in a bucket of water.

6.1.5 It is RECOMMENDED (type A2 recommendation) that two buckets (with lanyards) are stowed on board. These should be between 9 and 14 litres in capacity.

6.2 DETECTION EQUIPMENT

6.2.1 There was no fog horn found on board. It is RECOMMENDED (type A2 recommendation) that one is stowed on board. If the fog horn is of the aerosol, compressed gas type, a spare cylinder should be carried on board.

6.2.2 A Firdell Blipper, passive type radar reflector was secured to the mast.

6.2.3 There were two motoring cones and one anchor ball found on board.

6.3 FIRE FIGHTING EQUIPMENT

6.3.1 A number of fire extinguishers were found on board. Only one of the extinguishers had a replacement date marked on its case and the other two looked to be much older than five years. These are summarised in Table 4. It is RECOMMENDED (type A2 recommendation) that all of the units are serviced or replaced.

Type	Location	Date Stamp	Pressure Gauge
1.36 kg Dry powder	Bottom of companionway steps	Replace 2000	None
1 kg AB dry powder	Bottom of companionway steps. Poorly secured	No date visible	Green
1.5 kg Dry Nitrogen, automatic discharge	Engine compartment	No date visible	Green

Table 4: Fire Extinguishers on board VOYAGER

6.3.2 Most fire extinguishers have a five year service life. Ensure that the extinguishers are serviced or replaced after this five year period. Regularly shake dry powder extinguishers to prevent the powder coagulating.

6.3.3 There was no fire blanket located in the galley area. It is RECOMMENDED (type A2 recommendation) that one is installed within two arm lengths of the cooker.

6.3.4 The engine compartment was not fitted with a fire extinguisher injection port. Consideration should be given to installing one.

6.4 FIRST AID KIT

6.4.1 There was no first aid kit found on the vessel. It is RECOMMENDED (type A2 recommendation) that one is procured and stowed on board.

6.5 CARBON MONOXIDE ALARM

6.5.1 There was no Carbon Monoxide alarm installed on VOYAGER. It is RECOMMENDED (type A2 recommendation) that one is procured and mounted in an appropriate location.

6.6 EPIRB

6.6.1 One EPIRB was stowed on the vessel, mounted to the side of the heads compartment, at the bottom of the companionway steps. The unit was not inspected. The unit should be serviced if necessary. The MCA must be informed of the EPIRB's change of ownership.

6.7 STRONG POINTS

6.7.1 The vessel was fitted with webbing jackstays. The webbing and deck fittings were found to be secure and in good order.

6.7.2 There were no lifeline strong points were secured to the hull moulding in the cockpit. Strong consideration should be given to fitting two of these in the cockpit. One of the fittings should be accessible from the cockpit, the other from the helm position.

6.8 MAN OVERBOARD RECOVERY EQUIPMENT

6.8.1 One yellow horse shoe buoy was stowed on its mounting on the port side of the pushpit. The covering of the buoy was heavily degraded and in poor condition. The buoy was correctly labelled with the vessel's name. It was fitted with a flotation light. The light did not operate. It is RECOMMENDED (type A2 recommendation) that the buoy and flotation lamp are replaced.

6.8.2 One Plastimo recovery sling and flotation line was stowed in its canvas bag and was secured to the pushpit, starboard side. The sling was slightly clean and free of fading and appeared to be in serviceable condition.

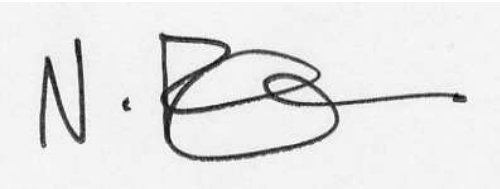
6.8.3 One old danbuoy was mounted to its fitting on the starboard side of the pushpit. The buoy had no flag, drogue or floating safety line.

6.9 LIFERAFT

6.9.1 A Plastimo Cruiser, standard specification, four person liferaft was stowed in its blue valise in the large cockpit locker. It was not opened up for inspection. The part number was 28822, type SF and the serial number was 2822Z0016. The liferaft was registered to VOYAGER. There was no legible service date on the bag. It is RECOMMENDED (type A2 recommendation) that the liferaft is serviced before the vessel ventures into open waters.

6.10 PYROTECHNICS

6.10.1 One offshore distress flare pack (Pains-Wessex) was found on board and found to have expired in December 2002. It is RECOMMENDED (type A2 recommendation or before venturing into open waters) that a new pack is procured and stowed ready for use.



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Appendix 1. Types of Recommendations Used in This Report

The recommendations detailed within the body of this report are presented in five categories and are classified as follows:

Type A1 Structural, mechanical or other defects requiring IMMEDIATE attention i.e. those affecting structural strength, seaworthiness or safety which MUST be repaired BEFORE the vessel is relaunched at this time.

Type A2 Structural, mechanical or other defects affecting strength, seaworthiness or safety which may be repaired after the vessel is relaunched but MUST be repaired before the vessel is taken to sea.

Type B Defects not affecting strength, seaworthiness or safety but which, by their nature, should be dealt with before putting the vessel afloat.

Type C Structural, mechanical or other defects NOT requiring immediate attention but are to be dealt with within a specified time period.

Type D Non-essential or cosmetic defects whose repair may be left to the Owner's convenience. All suggestions are, unless noted otherwise, of this type.

These recommendations are intended to be only a guide to necessary rectification work. Both type A and type B recommendations cover urgent remedial work to be carried out as soon as practical. Type C recommendations cover significant remedial works to be carried out within the specified time period. It should also be noted that, in some instances, defects are noted within this report without a covering recommendation. In such cases either no action is necessary or the remedy is self-evident.

Appendix 2. Abbreviations Used in This Report

a.c.	Alternating current
d.c.	Direct Current
GRP	Glass Reinforced Plastic
HP	Horse Power
IIMS	International Institute of Marine Surveyors
LPG	Liquid Petroleum Gas
PVC	Polyvinylchloride
UV	Ultra Violet
VHF	Very High Frequency