fieldhouse yacht surveys

JUNO

Pre-purchase Survey

Completed for
Client Name,
House Name,
Town,
Country

On 15/09/2014

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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 JUNO in accordance with instructions received from Client Name of House Name, Town, Country.

1.2 The primary aim of this document is to report on the factual condition of JUNO 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 2 on page 50. 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 the Marina in Altea, Alicante and also whilst afloat at Puerto Deportivo Luis Campomanes, Alicante on Monday 15th September 2014. Beteeen these two locations, a sea trial was also conducted.

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:

Name of Skipper, Skipper of JUNO

Eur Ing Nic Fieldhouse BEng (Hons) CEng MIMechE AssocIIMS

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2 SUMMARY

2.1 JUNO was seen to be a good example of an 1982 Hallberg Rassy 42' ketch rigged sailing vessel. The GRP hull seemed to be in good structural condition and retained a good finish.

2.2 The deck moulding, masthead rig, engine, domestic services and interior finish were generally all in serviceable condition.

2.3 There was one **type A1 recommendation** 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.

2.3.1 A number of the hoses were secured with a single stainless steel screw clip. The hoses with one clip included the forward heads inlet, galley seawater inlet, forward heads holding tank vent, generator cooling inlet a deck drain hose (item 20 in Figure 7). It is RECOMMENDED (type A1 recommendation) that all hoses that have a skin fitting located near to or below the waterline are fitted with two hose clips at each end (see paragraph 5.1.9.5).

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

2.4.1 There was difficult access inside the vessel to many of the valves. It was considered likely that the current and previous owners did not regularly turn the valves as the majority were stiff. The generator cooling inlet valve was seized. It is RECOMMENDED (type A2 recommendation) that all quarter-turn valves are 'exercised' in order to free them up. Any valves that do not free up adequately should be replaced (see paragraph 5.1.9.4).

2.4.2 An unused skin fitting on the starboard side of the hull was found to have no hose connected and no termination. This skin fitting was located close to the waterline and was originally installed for use as the generator exhaust outlet. I was informed that the generator exhaust was subsequently relocated to the stern of the vessel. It is RECOMMENDED (type A2 recommendation) that the valve is terminated with a bronze or DZR brass end cap. A long term solution would be to remove the skin fitting entirely and fill in the hole with a suitable number of layers of GRP (see paragraph 5.1.9.6).

2.4.3 The aft heads outlet valve was found to be corroded and also had a modified handle, rendering the valve inoperable. It is RECOMMENDED (type A2 recommendation) that the valve is replaced (see paragraph 5.1.9.8).

2.4.4 The aft heads inlet valve had a threaded spigot attached to its upper end. This spigot was loose. It is RECOMMENDED (type A2 recommendation) that the spigot is tightened (see paragraph 5.1.9.9).

2.4.5 The valve and spigot of the aft heads sink outlet was found to be heavily corroded. It is RECOMMENDED (type A2 recommendation) that the valve & spigot are replaced (see paragraph 5.1.9.10).

2.4.6 The valve and spigot of the forward heads sink outlet was found to be heavily corroded. These were tested with light blows from a hammer and the spigot broke where it enters the drain hose. It is RECOMMENDED (type A2 recommendation) that the valve & spigot are replaced (see paragraph 5.1.9.11).

2.4.7 From Figure 18 in Appendix 1, it can be seen that the levels of silicon in the engine oil are high. It is possible that this is due to dust entering the engine through the air filter. It is RECOMMENDED (type A2) that the air filter is inspected and replaced if dirty. The

seal around the air intake filter should also be checked to ensure that dirty air is not by-passing the filter element (see paragraph 5.5.5.14).

2.4.8 The inboard shaft seal was found to be leaking, with a significant flow of water entering the bilges. It is RECOMMENDED (type A2) that the seal is re-adjusted. If the leakage can not be prevented by adjustment, the shaft seal will need to be re-packed. This will require the vessel to be lifted from the water (see paragraph 5.5.7.8).

2.4.9 The anchor chain was attached to the anchor by a stainless steel shackle and stainless steel swivel joint. The chain, shackle and swivel joint were generally free of wear and corrosion and in good working order. It is RECOMMENDED (type A2) that the shackle bolt is locked by seizing wire, 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).

2.4.10 The copper pipe in the locker was not adequately supported; LPG supply pipe should be supported every 500 mm by plastic P-clips A length of plastic electrical conduit was attached to the pipe by two cable ties (Figure 17). It is RECOMMENDED (type A2 recommendation) that the pipe is given adequate support. The conduit should be detached from the pipe and mounted directly to the locker bulkhead (see paragraph 5.6.5.4).

2.4.11 The generator starting battery was also stowed in the cockpit locker. The battery was installed in a plastic storage container, but was not securely tied down to prevent movement in the event of a capsize. It is RECOMMENDED (type A2 recommendation) that the battery is fitted with tie-down straps. These straps should be securely attached to the surrounding locker structure (see paragraph 5.6.8.5).

2.4.12 A manual diaphragm bilge pump was located on the starboard side of the cockpit seating, just next to the helm position. This pump was tested but would not pump out. It is RECOMMENDED (type A2 recommendation) that the pump is serviced (see paragraph 6.1.1).

2.4.13 The manual bilge pump handle was located inside the cockpit locker, but was not tethered to prevent its loss. It is RECOMMENDED (type A2 recommendation) that the pump handle is tethered with a line of sufficient length (see paragraph 6.1.1).

2.4.14 A number of fire extinguishers were found on board. These are summarised in Table 5. It is RECOMMENDED (type A2 recommendation) that the unit stowed in its bracket aft of the chart table seat serviced or replaced. The two new extinguishers should be properly mounted on the vessel (see paragraph 6.2.1).

2.4.15 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 6.2.3).

2.4.16 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 6.3.1).

2.4.17 There was no Carbon Monoxide alarm installed on JUBA III. It is RECOMMENDED (type A2 recommendation) that one is procured and mounted in an appropriate location (see paragraph 6.4.1).

2.4.18 There was no gas alarm installed on JUBA III. It is RECOMMENDED (type A2 recommendation) that one is installed (see paragraph 6.5.1).

2.4.19 One orange plastic life ring was stowed on its mounting on the pushpit, port side. This was not fitted with a flotation light. It is RECOMMENDED (type A2 recommendation) that a flotation light is attached to this buoy (see paragraph 6.9.1).

2.4.20 No emergency flares were found on the vessel. It is RECOMMENDED (type A2 recommendation) that a set of flares (size and quantity appropriate to the sea areas

and sea states expected to be encountered) is procured and stowed ready for use (see paragraph 6.11.1).

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

2.5.1 It is RECOMMENDED (type C recommendation with an implementation time of one year) that all of the antifouling is stripped from the hull & keel. All exposed cavities should be thoroughly cleaned and antifouling debris removed. The hull should then be cleaned by water pressure washing. When fully dry, the cavities should be filled with a suitable filler compound (see paragraph 5.1.4.4).

2.5.2 The port side of the keel featured a bronze drain plug. This was installed for the occasional draining and cleaning of the vessel's bilge sump. The bronze fitting was secured by stainless steel screws. All were inspected and found to be free of corrosion. One of the screws was found to be slightly loose. It is RECOMMENDED (type C recommendation with an implementation time of one year or when the vessel is next lifted for hull maintenance work) that the loose screw is replaced by a more secure fastener. The other fasteners should be checked and replaced if the loose fastener is found to be corroded (see paragraph 5.1.7.2).

2.5.3 JUBA III had an un-balanced skeg-mounted rudder constructed from a bronze stock encapsulated in a GRP or timber blade. It was inspected visually and by hammer testing and found to be in serviceable condition, but with evidence of a previous repair: The forward edge of the blade and the adjacent area of the skeg on the starboard side had been repaired or stiffened by a number of layers of GRP and filler material. The cracked filler material next to the lower bearing can be seen in Figure 4. The filler material was cracked and falling away in the area next to the lower rudder bearing. It is RECOMMENDED (type C recommendation with an implementation time of six months or before an ocean voyage) that the antifouling and loose filler material is removed from the rudder blade & skeg and the repaired area carefully inspected. The blade and skeg should then be suitably repaired (see paragraph 5.1.8.1).

2.5.4 It was noted that there was one small area of weeping on the starboard side of the blade, as shown in Figure 5. This area was inspected closely and it was found that the moisture was leaking out from beneath a piece of copper plate. The size of the piece of copper was not determined as this would have inflicted further damage to the blade. It is RECOMMENDED (type C recommendation with an implementation time of six months or before an ocean voyage) that the cause of the weeping is investigated further (see paragraph 5.1.8.2).

2.5.5 The part of the rudder tube that was positioned below the steering quadrant was inspected. The rudder tube & upper bearing housing was found to be covered in verdigris (copper chloride), which is normal for bronze when exposed to air or sea water. Above the bronze rudder tube & upper bearing a rubber or neoprene seal was installed to prevent sea water entering through the bearing. Adjacent to this rubber seal was a mild steel fitting or fastener. This steel item was corroding, as shown in Figure 6. It is RECOMMENDED (type C recommendation with an implementation time of one year) that the rudder tube and corroded steel fitting are cleaned with a wire brush (bronze wire, not steel). The steel fitting should be replaced by a stainless steel equivalent (see paragraph 5.1.8.9).

2.5.6 It is very likely that the majority of the skin fittings, valves, hoses and clips installed on JUBA III are over thirty years old. In consideration of the condition of the two skin fittings described in paragraphs 5.1.9.11and 5.1.9.12, it is RECOMMENDED (type C recommendation with an implementation time of six months) that all of the vessel's skin fittings, valves, spigots and hoses are replaced. Until this time, and according to best practise, the valves should all be closed off when the vessel is un-occupied (see paragraph 5.1.9.12).

2.5.7 The anode of the bow thruster was concealed behind the plastic propeller and could not be accessed for inspection. It is RECOMMENDED (type C recommendation with

an implementation time of six months or when the vessel is lifted out for maintenance) that the anode of the bow thruster is checked. It should be replaced when more than 50 to 60% wasted (see paragraph 5.1.10.2).

2.5.8 The bow thruster was powered by a deep cycle battery, mounted next to the motor. The battery was inspected and found to be held down by a webbing strap and stowed in a plastic container. The webbing strap was able to restrain the battery in the fore-aft direction, but the strength and efficiency of the strap when load in the athwartships direction was questionable. It was considered that there is a risk that the battery will impact the thruster motor when sailing on a port tack. Repeated impacts could occur when sailing on a port tack for long periods. It is RECOMMENDED (type C recommendation with an implementation time of six months) that additional constraints are fitted in the bow thruster locker to prevent the battery from touching the thruster motor (see paragraph 5.1.11.6).

2.5.9 It was found that the bilge compartments had received a paint treatment that was in addition to the vessel's original coat of bilge paint. This newer layer of paint was flaking off in many areas. It is RECOMMENDED (type C recommendation with an implementation time of one year) that this loose paint is removed as much as is practicable and all debris removed from the bilges. This is to ensure that the loose paint does not block the bilge pumps (see paragraph 5.2.1.2).

2.5.10 The sheave at the top of the mast that guides the jib halyard was found to be heavily worn (see Figure 13). It is RECOMMENDED (type C recommendation with an implementation time of six months or before an ocean voyage) that the sheave is replaced (see paragraph 5.4.1.7).

2.5.11 The line of action of the triatic stay (Figure 14) is not in-line with the axis of its tang at the mast head. It is RECOMMENDED (type C recommendation with an implementation time of six months or before an ocean voyage) that the mast head fitting is adjusted so that the wire and fitting are in-line (see paragraph 5.4.6.5).

2.5.12 It is RECOMMENDED (type C recommendation with an implementation time of two months or before an offshore voyage) that the relevant authorities are informed of the EPIRB's change of ownership. The unit should also be serviced (see paragraph 6.6.4).

2.6 There were three **type D recommendations** whose repair may be left to the owner's convenience:

2.6.1 There was a chip to the gel-coat on the stem, just beneath the bottom edge of the stainless steel forestay fitting. It is RECOMMENDED (type D recommendation) that the chip is repaired with gel-coat filler (see paragraph 5.1.3.3).

2.6.2 The installation of the bow thruster tube was inspected and it was found that the filling compound that was used to fair the tube into the hull had not been adequately finished off. Figure 3 shows that the filler compound on the port side has not been fully faired into the hull profile. It is RECOMMENDED (type D recommendation) that the loose filler is cut out. New filler (and laminate if required) should be applied, ensuring that the substrate is clean, dry and adequately prepared so that the material bond is as strong as possible (see paragraph 5.1.4.6).

2.6.3 Where the sides of the deck meet the enclosure for the sliding hatch cover, there was evidence of damage to the gel-coat of the moulding. An example is shown in Figure 10. This damage has occurred during a sanding operation of the teak deck surfaces. It is RECOMMENDED (type D recommendation) that these areas of damage are filled with gel-coat (see paragraph 5.3.2.4).

3 SCOPE & LIMITATIONS

3.1 The vessel was inspected whilst she was ashore, held in the slings of the Marina lifting hoist. Part of the survey was also carried out whilst she was afloat on her mooring. A sea trial was also performed, allowing a better evaluation of her engine, sails and rigging equipment.

3.2 For the part of the survey performed ashore, there was good, all-round access to the exterior of the hull. The only obstructions were those presented by the two lifting slings. Each of the slings was found to be obscuring a single skin fitting, preventing the inspection of the exterior surfaces of these fittings. Access to the bottom of the keel was limited to the parts not resting on the two chocks.

3.3 At the time of survey the ambient temperature was approximately 30℃, with clear sky and a light wind.

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. 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	JUNO
Spanish Registration Number	XXXXXX
Hull number	#XX
MMSI number	12345678
Built by	Hallberg Rassy
Model	42 E
Type	Ketch rigged sailing yacht
Build date	1982
Lloyds Registration Certificate Number	XXX
Engine manufacturer & Model	Yanmar 4JH4-TE
Engine type	4 stroke, 4 cylinder diesel, turbocharged
Engine power	50.2 kW @ 3101 rpm 55.2 kW (75 HP) @ 3200 rpm

Table 1: Vessel Details

4.1.1 JUNO was seen to be a Hallberg Rassy 42 - a ketch rigged sailing yacht with a fin keel. She was designed by Olle Enderlein and built by Hallberg Rassy in 1982.

4.1.2 The hull of JUNO was moulded in one piece with hand laid GRP, made up of polyester resin, mixed-strand fibreglass mat and woven rovings finished with a white pigmented gel-coat. The keel and skeg were integrally moulded with the hull. Ballast in the keel moulding was provided by an encapsulated material, believed to be lead. The hull was seen to be stiffened internally by four glass fibre longitudinal stringers and a number of transverse floors. Further reinforcing was provided by bulkheads and the bases of the furniture.

4.1.3 The deck moulding was a balsa and plywood cored GRP composite, finished with white pigmented gel-coat. It incorporated the decks, aft coachroof and cockpit. The deck was joined to the hull by the bulwark joining method. The two upturned flanges of the hull & deck were finished with a teak bulwark capping. The teak swept laid deck with nibbed king plank was secured to the deck moulding with adhesive and screws, with the screws covered by wooden plugs.

4.1.4 JUNO had an un-balanced skeg-mounted rudder constructed from a bronze stock encapsulated in a GRP or timber blade. She had a self-draining cockpit and wheel steering. She had a ketch rig, featuring deck-stepped masts, an in-mast furling mizzen sail, an in-mast furling main sail, roller furling genoa and spinnaker.

4.1.5 Accommodation was relatively traditional with a double berth, storage lockers and heads / shower forward. The saloon had settee berths and a folding table in the centre. The galley space was along the starboard side, aft of the saloon seating. A navigation station lay on the port side, just next to the companionway steps. There was an aft cabin & heads compartment, accessed via a passageway beneath the port cockpit seating.

4.1.6 JUNO was fitted with a Yanmar 4JH4-TE, 4 stroke, 4 cylinder, turbocharged diesel engine, with fresh water cooling, driving a three-bladed fixed pitch propeller via a single shaft. One stainless steel fuel tank was located under the engine, with another stainless steel fuel tank beneath the port saloon seating.

4.2 VESSEL'S NAME

4.2.1 JUNO had her name positioned on the port side of her stern in gold-coloured self-adhesive lettering.

4.3 DIMENSIONS

Dimension	Metres	Feet / inches
Length Overall	12.90	42 feet and 4 inches
Length on Waterline	10.49	34 feet and 5 inches
Beam	3.79	12 feet and 5 inches
Draft	2.07	6 feet and 9 inches
Displacement	11500 kg	25,353 lb
Ballast	4500 kg	9,920 lb

Table 2: Vessel Dimensions (Published Data)

4.4 SPANISH REGISTRATION NUMBER

4.4.1 The vessel's registration number was positioned on her port & starboard bow. This number was XXXXXX

4.5 INSPECTED DOCUMENTATION

During the course of the survey, the following documents were inspected:

4.5.1 Inventory Certificate

This Certificate (Inventario del Equipo) detailed the major items of equipment on board the vessel. It also stated that JUNO was allowed to carry a maximum of eight passengers. The certificate expires in October 2016.

4.5.2 Radio Certificates

These Spanish certificates detailed the communication devices on board. These were registered to the name of Raul Rodriguez Muñoz:

Navicom RT650 VHF/DSC radio	Serial number XXX
Raymarine RC420 GPS & chartplotter	Serial number XXX
Jotron Tron TR20 handheld vhf radio	Serial number XXX
EPIRB, PLB-32 satellite 2 cat.1	Serial number XXX

4.5.3 MMSI Certificate

This certificate states that the MMSI number of JUNO was XXX.

4.6 HULL NUMBER

The hull number plate was secured to the coaming of the companionway hatch. The number was 37, as shown in Figure 1.

Figure 1: Craft Identification Number of JUNO

5 THE SURVEY

5.1 HULL EXTERIOR

5.1.1 Material & Details of Construction

5.1.1.1 The hull of JUNO was moulded in one piece with hand laid GRP, made up of polyester resin, mixed-strand fibreglass mat and woven rovings finished with a white pigmented gel-coat. The keel and skeg were integrally moulded with the hull. Ballast in the keel moulding was provided by an encapsulated material, believed to be lead.

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.

5.1.3 Topsides

5.1.3.1 The topsides were finished with unpainted white-pigmented gel-coat. Just above the timber rubbing strake there was a wide dark blue decorative stripe running the length of the hull and across the stern. The dark blue colour was provided by a pigment in the gel-coat. The blue colour was slightly faded. Just above the waterline there was a narrower decorative stripe running the full length of the hull and across the stern. This stripe was made from PVC tape and was in fair condition but with a few minor scratches.

5.1.3.2 The topsides were inspected visually. The gel-coat & laminate was found to be in good condition with no signs of major trauma or stress cracking. There was no evidence of UV degradation. The gel-coat retained a fair level of gloss but was in need of a clean and polish. There were small cosmetic scuff and scratch marks from mooring fenders.

5.1.3.3 There was a chip to the gel-coat on the stem, just beneath the bottom edge of the stainless steel forestay fitting. It is RECOMMENDED (type D recommendation) that the chip is repaired with gel-coat filler.

5.1.3.4 The teak rubbing strakes were found to be in good condition and well secured to the hull.

5.1.4 Hull Below the Waterline

5.1.4.1 The top-most coat of blue ablative type antifouling paint was in good condition and had been well applied. The underlying coats of antifouling had built up to a significant thickness and had been found to be flaking away in some areas. The top-most coat had covered this flaking, but had left the hull surface with a slightly uneven texture.

5.1.4.2 The entire hull was visually inspected, except where surfaces were hidden behind the two lifting slings. Additionally, the antifouling was scraped off in a number of areas in order to inspect the condition of the underlying gel-coat. This inspection revealed no evidence of existing blistering or other damage attributable to water penetration. There was, however, evidence that blisters had once existed and had penetrated parts of the white gel-coat. Each of these old, burst blisters had left a small hole in the gel-coat. All of these holes had been over-painted by subsequent applications of antifouling. The antifouling was cleaned out of a number of these blisters. Exposed glass fibres were visible at the bottom of all of these cavities.

5.1.4.3 Examples of the blisters can be seen in Figure 2. Typical diameters of these cavities were between 2 and 8 mm in diameter. The inspected cavities did not extend more

than approximately 1 mm into the laminate. These broken blisters were found all over the hull and keel, with an estimated concentration of 20 to 30 blisters per 300x300 mm, although there were some areas where there were lower concentrations of exposed cavities than this.

5.1.4.4 As there was no evidence of existing blistering and all of the old cavities had been overpainted by previous coats of antifouling, it is likely that the blistering process in the hull is no longer in progress. In view of this and also the observation that most of the cavities were shallow, it is considered un-necessary to fully strip the gel-coat in order to repair the cavities. It is RECOMMENDED (type C recommendation with an implementation time of one year) that all of the antifouling is stripped from the hull & keel. All exposed cavities should be thoroughly cleaned and antifouling debris removed. The hull should then be cleaned by water pressure washing. When fully dry, the cavities should be filled with a suitable filler compound.

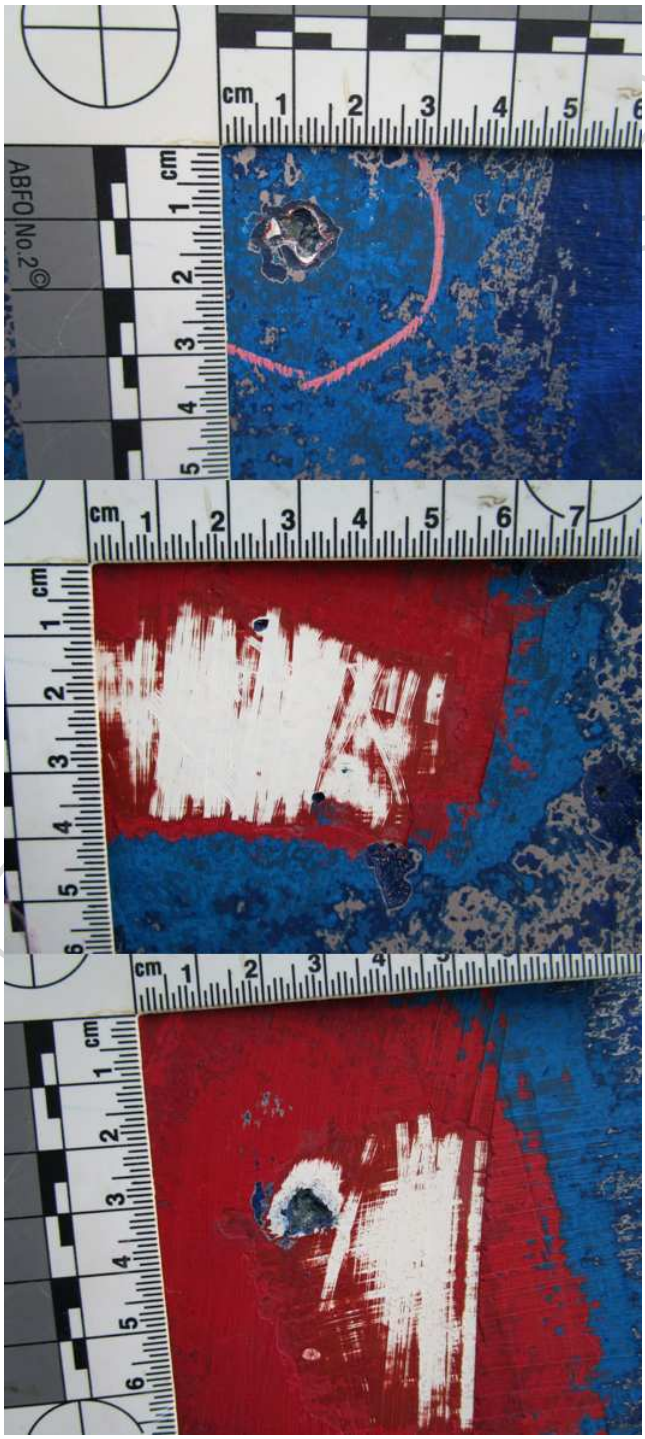


Figure 2: Examples of broken blisters in hull gel-coat

5.1.4.5 No evidence of scratching or chipping of the hull was found.

5.1.4.6 The installation of the bow thruster tube was inspected and it was found that the filling compound that was used to fair the tube into the hull had not been adequately finished off. Figure 3 shows that the filler compound on the port side has not been fully faired into the hull profile. It is RECOMMENDED (type D recommendation) that the loose filler is cut out. New filler (and laminate if required) should be applied, ensuring that the substrate is clean, dry and adequately prepared so that the material bond is as strong as possible.

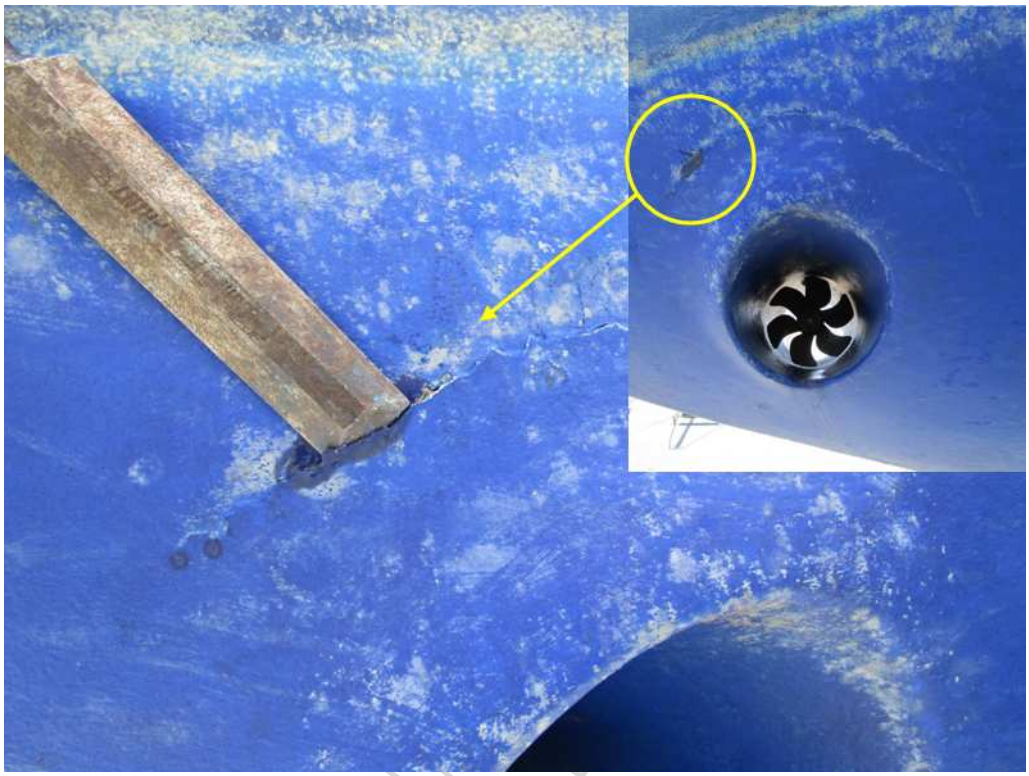


Figure 3: Poor finish of fairing around bow thruster

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 topsides were between 12 and 15, which indicate a low moisture level.

5.1.5.4 Readings taken of the hull below the waterline were between 20 and 30. These readings indicate that the hull laminate below the waterline has a high moisture content. Moisture readings were also taken where the antifouling had been removed. These readings were also high. The high moisture readings can partly be attributed to

the short time that the vessel had spent out of the water. Additionally, the older orthophthalic resins used prior to the mid 1990's tend to retain moisture for a long period.

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 year. The owner should endeavour to keep the bilges as dry as possible. Sources of any leakage into the vessel should be found and cured. 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 fin keel of JUNO integrally moulded with the hull. It was inspected, except where the bottom of the keel was hidden by the two wooden chocks and no evidence of hard grounding or impact was found.

5.1.7.2 The port side of the keel featured a bronze drain plug. This was installed for the occasional draining and cleaning of the vessel's bilge sump. The bronze fitting was secured by stainless steel screws. All were inspected and found to be free of corrosion. One of the screws was found to be slightly loose. It is RECOMMENDED (type C recommendation with an implementation time of one year or when the vessel is next lifted for hull maintenance work) that the loose screw is replaced by a more secure fastener. The other fasteners should be checked and replaced if the loose fastener is found to be corroded.

5.1.8 Rudder & Steering

5.1.8.1 JUNO had an un-balanced skeg-mounted rudder constructed from a bronze stock encapsulated in a GRP or timber blade. It was inspected visually and by hammer testing and found to be in serviceable condition, but with evidence of a previous repair: The forward edge of the blade and the adjacent area of the skeg on the starboard side had been repaired or stiffened by a number of layers of GRP and filler material. Figure 4 shows the cracked filler material next to the lower bearing. The filler material was cracked and falling away in the area next to the lower rudder bearing. It is RECOMMENDED (type C recommendation with an implementation time of six months or before an ocean voyage) that the antifouling and loose filler material is removed from the rudder blade & skeg and the repaired area carefully inspected. The blade and skeg should then be suitably repaired.

Figure 4: Loose filler next to lower bearing of rudder

5.1.8.2 It was also noted that there was one small area of weeping on the starboard side of the blade, as shown in Figure 5. This area was inspected closely and it was found that the moisture was leaking out from beneath a piece of copper plate. The size of the piece of copper was not determined as this would have inflicted further damage to the blade. It is RECOMMENDED (type C recommendation with an implementation time of six months or before an ocean voyage) that the cause of the weeping is investigated further.

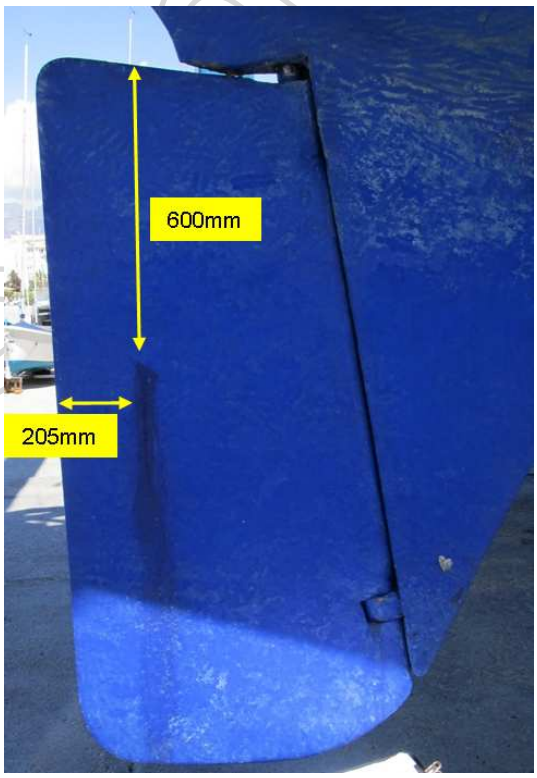


Figure 5: Area of weeping of rudder blade, starboard side

5.1.8.3 The bronze rudder stock was inspected where access allowed. The visible portions of the stock were found to be free of corrosion or evidence of cracking. It should be noted

that the portion of the rudder stock within the bearing housing and rudder blade could not be accessed for inspection; therefore the condition of the stock cannot be guaranteed.

5.1.8.4 The plain bearings of the rudder were inspected. The upper bearing material was found to be made from a plastic material, probably Delrin. The lower bearing could not be accessed to determine its type of material.

5.1.8.5 The upper bearing (housed in the hull of the vessel) was found to be free of lateral & fore-aft movement. The lower bearing was found to have approximately 2 mm of lateral and fore-aft wear. This bearing should be replaced when the wear has increased to between 3 and 4 mm.

5.1.8.6 The stainless steel helm wheel was inspected and found to be adequately secured to the cockpit structure. The wheel operated with full and free movement from lock to lock.

5.1.8.7 The steering gear was driven by a chain, wire and quadrant drive system. The wire was free of corrosion, visible wear and well lubricated. The parts of the mechanism that were located in the steering binnacle were not accessible for inspection.

5.1.8.8 The steering quadrant and fastenings were inspected and where accessible for inspection, were found to be free of corrosion and well secured to the rudder stock.

5.1.8.9 The part of the rudder tube that was positioned below the steering quadrant was inspected. The rudder tube & upper bearing housing was found to be covered in verdigris (copper chloride), which is normal for bronze when exposed to air or sea water. Above the bronze rudder tube & upper bearing a rubber or neoprene seal was installed to prevent sea water entering through the bearing. Adjacent to this rubber seal was a mild steel fitting or fastener. This steel item was corroding, as shown in Figure 6. It is RECOMMENDED (type C recommendation with an implementation time of one year) that the rudder tube and corroded steel fitting are cleaned with a wire brush (bronze wire, not steel). The steel fitting should be replaced by a stainless steel equivalent.

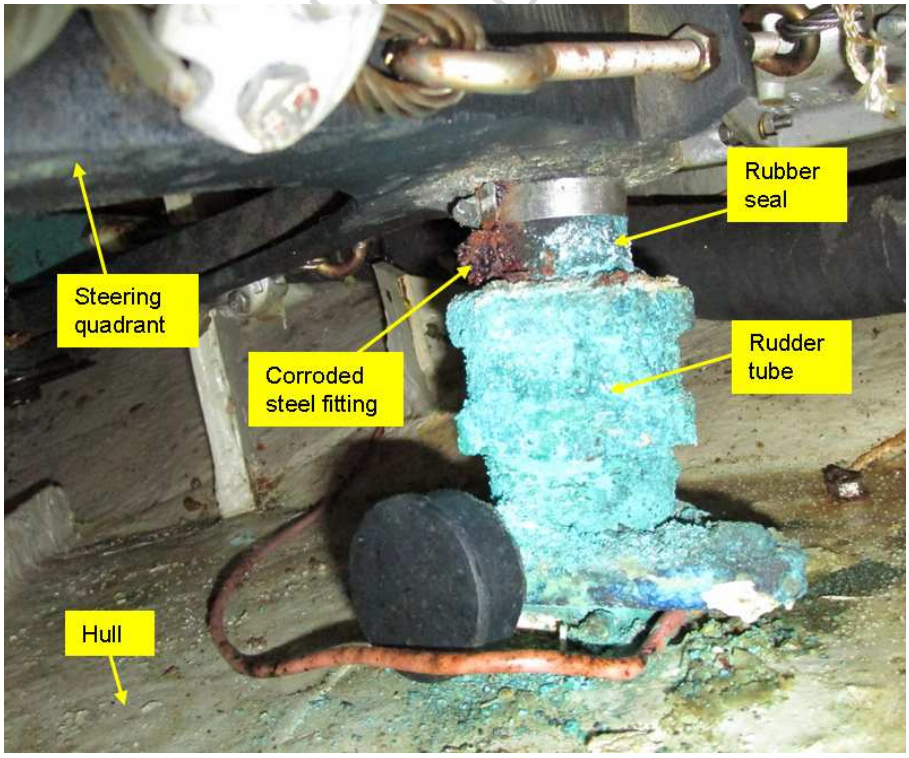


Figure 6: Corroded steel fitting on upper bearing

5.1.8.10 Mechanical end stops prevented excessive articulation of the rudder. These were constructed from welded steel. Each of the two end stops was bolted through the hull skin by two stainless steel fasteners. The fasteners were inspected from outside the vessel and found to be securely attached and free of surface corrosion. The welded steel end stops were covered in bilge paint and were free of visible damage or deformation.

5.1.8.11 The upper end of the rudder stock was accessed by a removable stainless steel cover on the aft deck. The end was suitably machined in order to provide a positive location for an emergency tiller. The varnished wood emergency tiller was stowed in the cockpit locker.

5.1.9 Skin Fittings and Valves

5.1.9.1 The skin fittings were all in serviceable condition. All fittings on or below the waterline were bronze (apart from the plastic speed impellers & depth transducers) and showed no signs of dezincification, apart from a mild surface pinking on some skin fittings.

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 and valves 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 Figure 7 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.

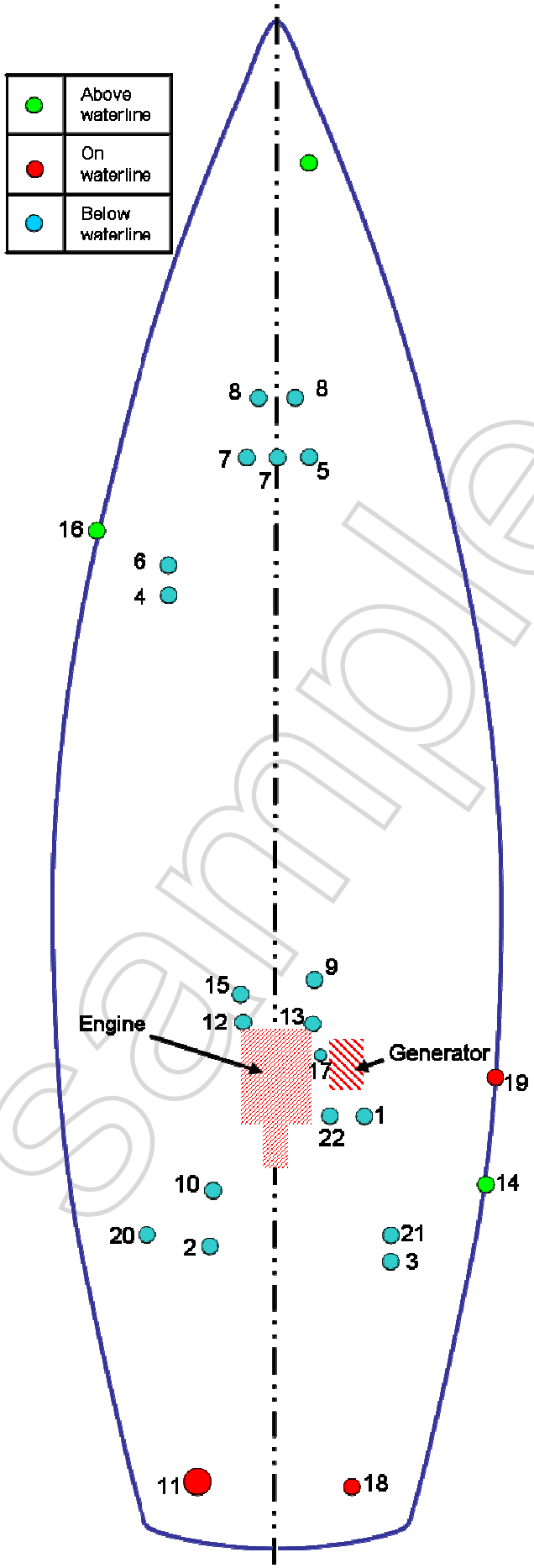


Figure 7: Location of skin fittings (plan view looking from above)

#	Function	Above / Below W/L	EXTERNAL		INTERNAL								Notes
			Skin Fitting		Valve			Hose		Clips			
			Mat.	Cond.	Type	Mat.	Cond.	Reinf.	Cond.	#	Mat.	Cond.	
1	Aft heads out	B	Br	✓	90º	Br	X	✓	✓	2	ss	✓	See para 5.1.9.9
2	Aft heads inlet	B	Br	✓	90º	Br	✓	✓	✓	2	ss	✓	See para 5.1.9.10
3	Aft heads sink out	B	Br	✓	90º	Br	X	✓	✓	2	ss	✓	See para 5.1.9.11
4	Fwd heads out	B	Br	Not seen	90º	Br	✓	✓	✓	2	ss	✓	See para 5.1.9.8
5	Fwd heads inlet	B	Br	✓	90º	Br	✓	✓	✓	1	ss	✓	See para 5.1.9.5
6	Fwd heads sink out	B	Br	✓	90º	Br	X *2	✓	✓	2	ss	✓	See para 5.1.9.12
7	Depth transducer x2	B	Pl	✓	N/A								
8	Speed impeller x2	B	Pl	✓	N/A								
9	Galley sink outlet	B	Br	✓	90º	Br	✓	✓	✓	2	ss	Mild rust	
10	Engine cooling intake	B	Br	✓	90º	Br	✓	✓	✓	2	ss	✓	
11	Engine exhaust & coolant outlet	WL	Br	✓	N/A			✓	✓	2	ss	✓	
12	Cockpit drain	B	Br	✓	90º	Br	✓	✓	✓	2	ss	✓	
13	Cockpit drain	B	Br	✓	90º	Br	✓	✓	✓	2	ss	✓	
14	Aft heads holding tank vent	A	Br	✓	Gate valve	Br	✓	✓	✓	1	ss	✓	See para 5.1.9.5
15	Galley sea water inlet	B	Br	✓	90º	Br	✓	✓	✓	1	ss	✓	See para 5.1.9.5
16	Fwd heads holding tank vent	A	Br	✓	90º	Gate valve	✓	✓	✓	1	ss	✓	See para 5.1.9.5
17	Generator cooling inlet	B	Br	✓	90º	Br	Seized	✓	✓	1	ss	✓	See para 5.1.9.4 See para 5.1.9.5
18	Generator Exhaust outlet	WL	Br	✓	N/A			✓	✓	2	ss	✓	
19	Generator outlet (disused)	WL	Br	✓	90º	Br	✓	✓	✓	2	ss	✓	
20	Deck drain	B	Br	✓	90º	Br	✓	✓	✓	1	ss	✓	See para 5.1.9.5
21	Deck drain	B	Br	Not seen	90º	Br	✓	✓	✓	2	ss	✓	See para 5.1.9.8
22	Not identified	B	Br	✓	90º	Br	✓	✓	✓	2	ss	✓	
Bilge sump drain (not shown)		B	Br	✓	N/A								See para 5.1.7.2

W/L	Waterline	Pl	Plastic
Mat.	Material	ss	Stainless Steel
Cond.	Condition	ms	Mild Steel
Br	Bronze or Brass	Zn	Zinc

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

5.1.9.4 There was difficult access inside the vessel to many of the valves. It was considered likely that the current and previous owners did not regularly turn the valves as the majority were stiff. The generator cooling inlet valve was seized. It is RECOMMENDED (type A2 recommendation) that all quarter-turn valves are 'exercised' in order to free them up. Any valves that do not free up adequately should be replaced.

5.1.9.5 A number of the hoses were secured with a single stainless steel screw clip. The hoses with one clip included the forward heads inlet, galley seawater inlet, forward heads holding tank vent, generator cooling inlet a deck drain hose (item 20 in Figure 7). It is RECOMMENDED (type A1 recommendation) that all hoses that have a skin fitting located near to or below the waterline are fitted with two hose clips at each end.

5.1.9.6 An unused skin fitting on the starboard side of the hull was found to have no hose connected and no termination. This skin fitting was located close to the waterline and

was originally installed for use as the generator exhaust outlet. I was informed that the generator exhaust was subsequently relocated to the stern of the vessel. It is RECOMMENDED (type A2 recommendation) that the valve is terminated with a bronze or DZR brass end cap. A long term solution would be to remove the skin fitting entirely and fill in the hole with a suitable number of layers of GRP.

5.1.9.7 When inspecting the parts of the skin fittings on the outside of the vessel, two fittings were found to be obscured by the lifting slings. These were the skin fittings for the forward heads outlet (item 4 in Figure 7) and one of the deck drains (item 21 in Figure 7). There was, however, limited access to the forward heads outlet and this was seen to have minor pinking of the exterior surface. This pinking did not penetrate deep into the fitting.

5.1.9.8 The aft heads outlet valve was found to be corroded and also had a modified handle, rendering the valve inoperable. It is RECOMMENDED (type A2 recommendation) that the valve is replaced.

5.1.9.9 The aft heads inlet valve had a threaded spigot attached to its upper end. This spigot was loose. It is RECOMMENDED (type A2 recommendation) that the spigot is tightened.

5.1.9.10 The valve and spigot of the aft heads sink outlet was found to be heavily corroded. It is RECOMMENDED (type A2 recommendation) that the valve & spigot are replaced.

5.1.9.11 The valve and spigot of the forward heads sink outlet was found to be heavily corroded. These were tested with light blows from a hammer and the spigot broke where it enters the drain hose. It is RECOMMENDED (type A2 recommendation) that the valve & spigot are replaced.

Figure 8: Fractured spigot of forward heads sink outlet

5.1.9.12 It is very likely that the majority of the skin fittings, valves, hoses and clips installed on JUNO are over thirty years old. In consideration of the condition of the two skin fittings described in paragraphs 5.1.9.10 and 5.1.9.11, it is RECOMMENDED (type C recommendation with an implementation time of six months) that all of the vessel's skin fittings, valves, spigots and hoses are replaced. Until this time, and according to best practise, the valves should all be closed off when the vessel is un-occupied.

5.1.10 Anodes

5.1.10.1 A zinc cone anode (42 mm maximum diameter, 54 mm long) was properly secured to the propeller assembly. This anode was approximately 10% wasted.

5.1.10.2 The anode of the bow thruster was concealed behind the plastic propeller and could not be accessed for inspection. It is RECOMMENDED (type C recommendation with an implementation time of six months or when the vessel is lifted out for maintenance) that the anode of the bow thruster is checked. It should be replaced when more than 50 to 60% wasted.

5.1.11 Bow Thruster

5.1.11.1 A Vetus 12 volt, 4.4 kW bow thruster was installed in the bow. The unit was manufactured in 2010.

5.1.11.2 The bow thruster was used during the seat trial and functioned correctly.

5.1.11.3 The model number of the unit was EC4,4/1,2/29.

5.1.11.4 The serial number of the unit was 10A1680.

5.1.11.5 The installation was inspected and found to be in serviceable condition and adequately installed in the hull. See paragraph 5.1.4.6 for comments on the installation of the bow thruster tube. The plastic propeller and exposed parts of the bronze tailpiece were in good condition and free of damage.

5.1.11.6 The unit was powered by a deep cycle battery, mounted next to the motor. The battery was inspected and found to be held down by a webbing strap and stowed in a plastic container. The webbing strap was able to restrain the battery in the fore-aft direction, but the strength and efficiency of the strap when load in the athwartships direction was questionable. It was considered that there is a risk that the battery will impact the thruster motor when sailing on a port tack. Repeated impacts could occur when sailing on a port tack for long periods. It is RECOMMENDED (type C recommendation with an implementation time of six months) that additional constraints are fitted in the bow thruster locker to prevent the battery from touching the thruster motor.

5.2 HULL INTERNAL STRUCTURE

5.2.1 General Appearance

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

5.2.1.2 It was found that the bilge compartments had received a paint treatment that was in addition to the vessel's original coat of bilge paint. This newer layer of paint was flaking off in many areas. It is RECOMMENDED (type C recommendation with an implementation time of one year) that this loose paint is removed as much as is practicable and all debris removed from the bilges. This is to ensure that the loose paint does not block the bilge pumps.

5.2.1.3 The keel of JUNO has a large drainage sump, located aft of the ballast material and forward of the engine & fuel tank. At the time of survey, this sump was found to be approximately half full of dirty water. The majority of this was pumped out with the electric bilge pump. There was a dirty 'tideline' in this bilge area, suggesting that the bilge water had at one time been much higher than this, with the fuel tank beneath the engine being covered by approximately 100 mm of water.

5.2.2 Stiffeners

5.2.2.1 The hull was seen to be stiffened internally by four glass fibre longitudinal stringers and a number of transverse floors. Further reinforcing was provided by bulkheads and the bases of the furniture. In areas that could be accessed for inspection, there was no evidence of separation of the stringers or floors from the hull.

5.2.2.2 The engine beds were examined and found to be sturdily built and were free of signs of cracks or deformation.

5.2.3 Mast Compression Posts

5.2.3.1 For the main mast a timber compression post supported the deck and transferred the mast compression load to the hull and keel of JUNO. The post was inspected and found to be free of damage from water ingress and well secured to the adjacent bulkhead.

5.2.3.2 The mizzen mast compression post formed part of the enclosure for the aft heads compartment. It was found to be free of rot at its base and adequately attached to the surrounding structure.

5.2.4 Ballast

5.2.4.1 The bottom of the bilge was found to be filled with a ballast material covered and sealed in resin. This resin encapsulation was in good condition and was well adhered to the internal surface of the hull. There was no evidence of water ingress between the ballast and hull.

5.2.5 Bulkheads

5.2.5.1 Where accessible, the mahogany-faced plywood bulkheads were inspected and found to be in very good condition with no evidence of moisture ingress, wood rot or delamination.

5.2.5.2 The bulkheads, semi-bulkheads and locker frames were secured to the hull & deck by GRP cloth tabbing. Where accessible, the integrity of the tabbing was inspected and found to be free of de-bonding, cracks or movement.

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 bulwark joining method. The two upturned flanges were finished with a teak bulwark capping. The timber had previously been treated with varnish. The varnish was almost entirely worn away, apart from a few small areas towards the bow.

5.3.1.2 The timber capping was generally in very good condition and well secured to the deck and hull moulding. The fasteners were concealed beneath wooden bungs.

5.3.1.3 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. However, it may be possible that the damp found within the under-sink cupboard of the aft heads compartment was due to water ingress through this join.

5.3.2 Deck Moulding

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

5.3.2.2 The gel-coat was found to be in sound condition, but with a number of minor scuff and scratch marks. The gel-coat generally retained a fair level of gloss and with no significant evidence of UV degradation.

5.3.2.3 Stress cracks were found in the deck moulding, where the cockpit coaming sides meet the side of the aft cabin coachroof. This was found to occur on both port and starboard sides of the moulding. Figure 9 shows the cracks on the starboard side of the moulding. There was evidence that the gel-coat around the cracks had been repaired in the past. In order to prevent these cracks from re-occurring, it would be necessary to stiffen the corner by adding additional layers of laminate on the inner surface of the deck moulding.

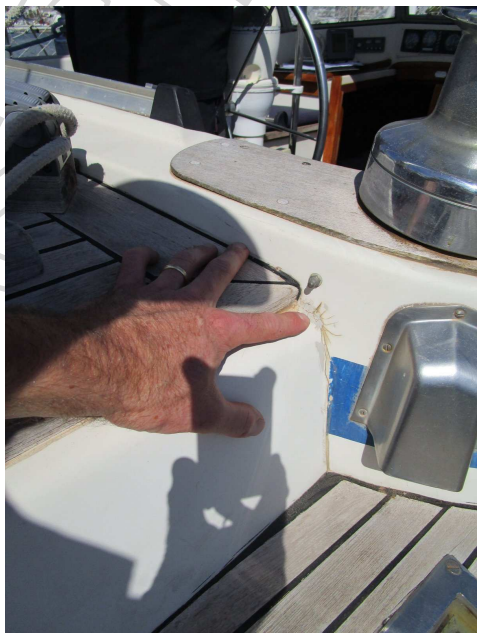


Figure 9: Stress cracks in deck moulding

5.3.2.4 Where the sides of the deck meet the enclosure for the sliding hatch cover, there was evidence of damage to the gel-coat of the moulding. An example is shown in Figure 10. This damage has occurred during a sanding operation of the teak deck surfaces. It is RECOMMENDED (type D recommendation) that these areas of damage are filled with gel-coat.

Figure 10: Abrasion damage to gel-coat

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

5.3.2.6 There was one small storage locker set into the aft deck, just forward of the transom. The hinging GRP lid was finished in teak planking. It was noted that the internal surface of the lid was finished in gel-coat. This gel-coat was found to be blistering, due to the high levels of humidity found within the locker.

5.3.3 Cockpit

5.3.3.1 The cockpit floor, seats and coaming were all in sound condition. There were a number of chips to the gel-coat surfaces at various locations.

5.3.3.2 There was some wear to the gel-coat where the jib sheets run through their pulley blocks and over the cockpit coaming.

5.3.3.3 The cockpit seats and aft end of the sole were covered in teak strip & black caulking. The wood and caulking were found to be in sound condition and well secured.

5.3.3.4 The cockpit sole that was forward of the helm was covered in a timber lattice board. This sole board was in satisfactory condition, but the timber join of the aft, starboard corner was damaged and required repair.

5.3.3.5 In the cockpit area there was one large storage locker beneath the starboard seat. This locker contained the fuel tank and battery for the generator. It also provide stowage space for buckets, warps, shore power cables, emergency tiller and cleaning equipment. The lid of this locker functioned correctly and the hinges & latches were in good working order.

5.3.3.6 A manual diaphragm bilge pump was located on the starboard side of the cockpit seating, just next to the helm position. The handle was stowed inside the locker.

5.3.3.7 There were two recess spaces installed in the sides of the cockpit coaming. These were constructed from moulded GRP, finished in white gel-coat. The edges of these mouldings were cracked, particularly where the securing fasteners passed through the moulding.

5.3.4 Chain Locker & Bulkhead

5.3.4.1 Chain from the locker was fed to the anchor windlass on the deck through a chain pipe in the deck moulding. The locker was inspected and found to be free of damage.

5.3.4.2 The lid moulding and hinges were all in serviceable condition, although the hinges were slightly loose where they were secured to the teak planking of the deck.

5.3.4.3 The locker had a single drain hole located in the starboard side of the hull moulding.

5.3.4.4 The locker was fitted with two boards, providing a raised shelf for the stowage of the LPG cylinder. See paragraph 5.6.5.1 for a discussion of the gas cylinder storage.

5.3.5 Deck Covering

5.3.5.1 The swept laid deck with nibbed king plank was secured to the deck moulding with adhesive and screws, with the screws covered by wooden plugs. The planking on the aft coachroof, cockpit floor and seats was also bonded and screwed. The planking was found to be well bonded over all areas, with no evidence of de-bonding or lifting.

5.3.5.2 The timber planks were found to be worn, with their thickness reduced in many areas. In some locations, such as around the edges of the aft deck, near to the sides of the aft coachroof, the stainless steel fastening screws had been revealed where the teak planking and wooden bungs had worn away.

5.3.5.3 If thickness of the remaining teak allows, these screws could be replaced by slightly shorter ones and set deeper into the planks, then re-covered by new plugs.

5.3.5.4 The planking was generally free of splits and cracks, with just one minor crack found in one plank on the port side deck.

5.3.5.5 The black caulking was generally in good condition, but was starting to crack & shrink slightly in some areas. The planking may need to be replaced in the next few years.

5.3.6 Hatches, Windows and Ventilation

5.3.6.1 One forward hinging hatch (470 x 470mm 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 polycarbonate material and aluminium frame were in good condition. The screw threads of the locking latches were very stiff.

5.3.6.2 Two similar sized forward hinging hatches were installed in the roof of the saloon. These were found to be securely attached and showed no signs of water ingress. The polycarbonate material and aluminium frame were in good condition.

5.3.6.3 One forward hinging hatch was installed in the roof of the aft cabin. This was were found to be securely attached and showed no signs of water ingress. The aluminium frame was in good condition, but the polycarbonate window material was dull and scratched. One of the internal locking latches was missing. I was informed that this item was stowed in one of the lockers.

5.3.6.4 A smaller, side hinging hatch was installed in the forward heads compartment. It was found to be securely attached and showed no signs of water ingress. The

polycarbonate material and aluminium frame were in good condition.

5.3.6.5 Two glass prism roof lights were installed in the deck of JUNO. One was positioned above the aft heads compartment. The other was positioned on the port side deck, above the saloon. These were found to be well installed and free of damage.

5.3.6.6 A total of ten inward opening, rectangular ports were installed in the hull topsides of JUNO. They were in serviceable condition, but the rubber seals had shrunk. In a number of the ports, the rubber seal had shrunk, revealing a gap between the join of the two ends of the rubber, as shown in Figure 11. Any seals that have shrunk should be replaced.

Figure 11: Gap in seal of opening port, forward heads compartment

5.3.6.7 A number of closable stainless steel vents were installed on the deck: The cover of the anchor locker, the cover of the locker located on the aft deck, the forward heads and two above the saloon. The vent located on the port side of the saloon was broken, with the external cap loose on the threaded bar (Figure 12). This vent was also found to be allowing moisture to gather on the saloon seating cushions, situated directly below the vent.

Figure 12: Broken vent, port side of saloon

5.3.6.8 One dorado vent was installed in the forepeak. Two dorado vents were installed in the coachroof of the aft cabin. The vents were in serviceable condition, but the gel-coat of the external mouldings was cracked in places.

5.3.7 Spray Screen

5.3.7.1 The cockpit spray screen was constructed from five flat panes of toughened glass set into an aluminium frame. Additional strength was provided by a moulded GRP surround, which ran around the top of the windows, providing further shelter for the crew.

5.3.7.2 The glass and frames were in serviceable condition. The central window was able to open forwards and was hinged along its top edge. The GRP moulding was in acceptable condition, but with some UV degradation and cracking of the gel-coat.

5.3.7.3 The GRP moulding provided an attachment point for a white canvas sun screen. This screen could be hinged forward on a stainless steel frame. The canvas and stainless steel frame were in good working order.

5.3.8 Deck Fittings and Equipment

5.3.8.1 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 and cockpit coaming.

5.3.8.2 The forestay / bow roller fabrication was constructed from stainless steel. It incorporated one fairlead, mounted to the port side of the forestay. This fabrication was in serviceable condition and adequately secured to the deck and hull moulding.

5.3.8.3 Two hardwood grab rails were fitted to the sides of the aft cabin coachroof. Two hardwood grab rails were installed on the GRP moulding of the cockpit spray screen. They were all in good condition and securely mounted, with all fasteners covered by wooden plugs.

5.3.8.4 The pulpit was a three point, bulwark mounted unit, constructed of 25 mm outside diameter stainless steel tube. It was in good order, securely mounted and free of distortion.

5.3.8.5 The 690 mm high side stanchions (twelve in total) were made from tapered stainless steel, secured to the bulwark caps by stainless steel bases. They were fitted with twin 1 x 19 construction safety wires. The wires were covered in white PVC sleeves. The stanchions, bases, fasteners and safety wires were found secure and in good order. The forward-most stanchion on the starboard side was found to be bent.

5.3.8.6 The pushpit was constructed in two halves from 25 mm outside diameter stainless tubular steel and was found to be in good order, but slightly loose & lacking stiffness on the port side. The access entry point, located between the two halves of the pushpit was closed off by a stainless steel chain and snap shackle. The blue plastic covering of the chain was old and degraded.

5.3.9 Boarding Ladder

5.3.9.1 A five step, hinging, welded stainless steel boarding ladder was secured to the hull moulding on the stern of the vessel. When folded down, the ladder extended well below the waterline in order to aid man overboard recovery. It was found to be adequately secured and free of cracks or deformation.

5.3.10 Davits

5.3.10.1 Tubular stainless steel davits were installed on the aft bulwark rail of JUNO. The davits were securely fastened and the arm mechanisms were free of corrosion. The light construction and small base size of these davits suggests that they are suitable for a small dinghy. Ensure that the davits are not overloaded.

5.4 RIGGING AND SAILS

5.4.1 Main Mast & Boom

5.4.1.1 The Seldén deck-stepped main mast was fitted with a Furlex in-mast reefing system. This equipment was tested during the sea trial and was found to function correctly.

5.4.1.2 The main mast was ascended by halyard & climbing harness in order to inspect the condition of the mast, wires and hardware.

5.4.1.3 The mast extrusion was in sound condition, with no sign of serious corrosion or physical damage. The grey anodised protective coating was in fair condition, but with some minor wear in some areas. There was minor corrosion of the aluminium where stainless steel hardware has been attached to the mast.

5.4.1.4 The mast steps were all in good condition, free of deformation and securely attached to the mast.

5.4.1.5 The two sets of aluminium spreaders were in sound condition. The spreader sockets were briefly inspected and found to be well secured to the mast and free from visible cracks. The rivets that attach the spreader sockets were inspected and found to be well fastened and free from significant corrosion.

5.4.1.6 The mast head was inspected closely and found to be free of cracks or deformation. All mast head fittings, as far as could be ascertained, were securely fastened and adequately locked.

5.4.1.7 The sheave at the top of the mast that guides the jib halyard was found to be heavily worn (see Figure 13). It is RECOMMENDED (type C recommendation with an implementation time of six months or before an ocean voyage) that the sheave is replaced.

Figure 13: Worn-out sheave at mast head

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

5.4.1.9 The boom and gooseneck were in serviceable condition.

5.4.1.10 The Seldén 'rod kicker' boom vang was found to be in serviceable condition and functioned correctly.

5.4.1.11 A grey anodised aluminium spinnaker pole was secured to the front side of the mast. It was in serviceable condition. There was a small dent in the side of the extrusion.

5.4.2 Mizzen Mast & Boom

5.4.2.1 The Seldén deck-stepped mizzen mast was fitted with a Furlex in-mast reefing system. This equipment was tested during the sea trial and was found to function correctly.

5.4.2.2 The mizzen mast could not be ascended with safety, so the rig was examined as far as possible from the deck.

5.4.2.3 The lower part of the mast was in sound condition, with no sign of serious corrosion or physical damage.

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

5.4.2.5 As far as could be ascertained, those parts of the shrouds and stays of the mizzen mast that could be inspected from the deck appeared to be serviceable. The owner should appoint a rigger if a second opinion or a full survey of the rig is required.

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

5.4.2.7 The Tufnol sheave blocks located at the foot of the mast were in serviceable condition, but with minor damage to the edges of some of the blocks.

5.4.2.8 The boom and gooseneck were in serviceable condition.

5.4.3 Shroud Chain Plates

5.4.3.1 The stainless steel shroud chain plates of the main mast were of the straight plate variety that pass through a slot in the deck moulding and are through-bolted to the bulkheads. In some locations, the fasteners that attached the chain plates to the bulkheads could not be examined, therefore their condition could not be fully ascertained. Where accessible for inspection, the chain plates and fasteners were closely examined and found to be well secured, free of cracks and generally free of corrosion.

5.4.3.2 The plywood bulkheads adjacent to the chain plates were inspected closely and found to be free of rot or damage.

5.4.3.3 The stainless steel shroud chain plates of the mizzen mast and the chain plates of the main mast backstays were of the straight plate variety that were through-bolted to the sides of the aft cabin. Where accessible, the plates and fasteners were closely examined and found to be free of cracks, well secured and generally free of corrosion.

5.4.3.4 At the time of survey, the inner forestay was secured to a deck plate in front of the mast. When a storm jib is required, the inner forestay can be secured to a deck fitting located on the foredeck, just aft of the forestay. This deck fitting was found to be free of damage and in good working order.

5.4.4 Forestay & Backstay Chain Plates

5.4.4.1 The forestay chain plate was formed from stainless steel plate secured to the bulwark capping, with an additional strap that extended down the stem and was bolted through the hull by seven 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.

5.4.5 Jib Furling Mechanism

5.4.5.1 The Hood Seafurl 2 roller furling equipment was tested and found generally in good working order with the reefing line square to the drum and of suitable length. The drum was examined and no defects were seen in either the bearings or in the rigging screw attachment. The aluminium alloy luff extrusion was in serviceable condition.

5.4.6 Standing Rigging

5.4.6.1 The age of the standing rigging could not be verified. To be safe, stainless steel standing rigging should be replaced every ten years on a cruising yacht.

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

5.4.6.3 The standing rigging of the main mast comprised double lower shrouds, intermediate shrouds and cap shrouds passing over double spreaders. There was a twin backstay terminating either side of the aft cabin coachroof. The forestay was formed by the headsail reefing foil. A cutter stay was secured to the foredeck.

5.4.6.4 The standing rigging of the mizzen mast comprised double lower shrouds, intermediate shrouds and cap shrouds passing over a single pair of spreaders. A triatic stay spanned between the tops of the main and mizzen mast.

5.4.6.5 Figure 14 shows that the line of action of the triatic stay is not in-line with the axis of its tang at the mast head. It is RECOMMENDED (type C recommendation with an implementation time of six months or before an ocean voyage) that the mast head fitting is adjusted so that the wire and fitting are in-line.

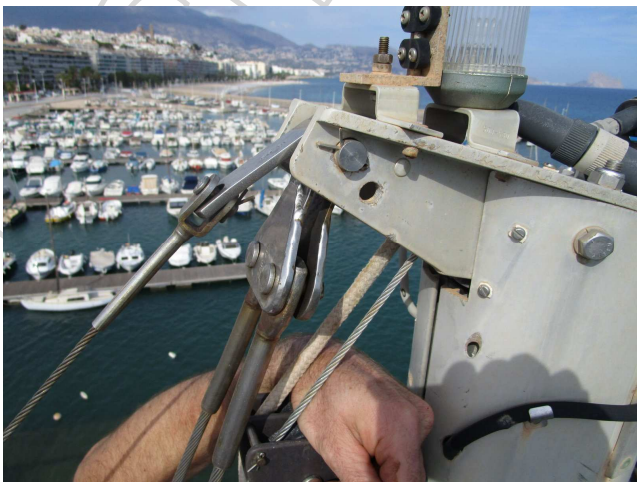


Figure 14: End fitting of triatic stay on main mast

5.4.6.6 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 sound condition, with no signs of bending, splitting, cracking or other failure.

5.4.7 Running Rigging, Travelers, Winches

5.4.7.1 The rope running rigging that was stored on the vessel was inspected and was generally quite worn. The wire-type running rigging was in acceptable condition, where seen. There was no evidence of damage or broken strands.

5.4.7.2 Rutgerson headsail sheet leads were mounted on travelling cars on the side decks. The aluminium tracks were securely mounted and free of damage.

5.4.7.3 The aluminium Lewmar mainsheet track and car for the mainsail were securely mounted to the aft cabin coachroof. They were in serviceable condition.

5.4.7.4 The mizzen sheet block & jammer were fitted with a snap shackle at their lower end, allowing the block & jammer to be secured off at any one of three D-loops installed on the aft deck.

5.4.7.5 Two primary winches (Lewmar 48 two-speed self-tailing) were located on the cockpit coaming. They were found to be adequately secured and in serviceable condition. The chrome plating on the drums was worn.

5.4.7.6 Two secondary winches (Lewmar 42 two-speed self-tailing) were located on the cockpit coaming. They were found to be adequately secured and in serviceable condition.

5.4.7.7 One Lewmar single-speed self-tailing winch was located on top of the coachroof, at the starboard side of the cockpit and adjacent to the companionway hatch. This was found to be in serviceable condition.

5.4.7.8 There were a total of three Lewmar winches at the foot of the main mast and one winch at the foot of the mizzen mast. Not all of these could be fully inspected as they had tensioned lines secured to them.

5.4.7.9 One Simpson Lawrence electric winch was mounted on the starboard side of the cockpit coaming. This functioned correctly.

5.4.8 Sails

5.4.8.1 The mainsail, mizzen sail and genoa were inspected from deck level during the sea trial.

5.4.8.2 The white mainsail & mizzen sail were in very good condition and were probably new when the in-mast furling mechanisms were installed. They did not have any vertical battens or batten pockets. The cloth and stitching appeared to be intact and in good shape. The tack & clew eyes were in good condition and well secured. The condition of the eyes at the heads of the sails was not determined. The off-white UV strips were in acceptable condition.

5.4.8.3 The white genoa was considerably older than the main and mizzen sails. The cloth was slightly dirty and had lost some of its shape. The cloth and stitching was worn where the cloth chafes over the pulpit rail. The cloth had been repaired where it slides into the forestay luff extrusion.

A spinnaker was stowed in its snuffer bag in the forepeak. This was partially opened out and inspected. Of the parts inspected it was found to be in good condition, with very little evidence of use.

5.5 PROPULSION

5.5.1 Engine & Transmission

5.5.2 JUNO was fitted with a Yanmar 4JH4-TE, 4 stroke, 4 cylinder, turbocharged 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 starboard side of the helm binnacle.

5.5.3 The serial number of the engine was E14109. The engine was manufactured in October 2010.

5.5.4 The engine's instrument panel indicated that the engine had run for 380 hours.

5.5.4.1 There was no evidence of engine overheating. The paint coating was in very good condition, with no significant corrosion.

5.5.5 The engine oil was reasonably clean, free of evidence of moisture and at the correct level.

5.5.5.1 The engine started readily from cold, with exhaust gases clear and free of soot.

5.5.5.2 The engine was run under load during the sea trial. When under load the exhaust gases were clear. No fuming was noted in the engine space. No leaks from the engine cooling water, fuel and exhaust systems were evident.

5.5.5.3 Ahead and reverse gears engaged normally.

5.5.5.4 During the sea trial, the sea conditions were slight. The engine was run in forward gear at various speeds and the vessel speed noted. The engine / boat speed is plotted in Table 4.

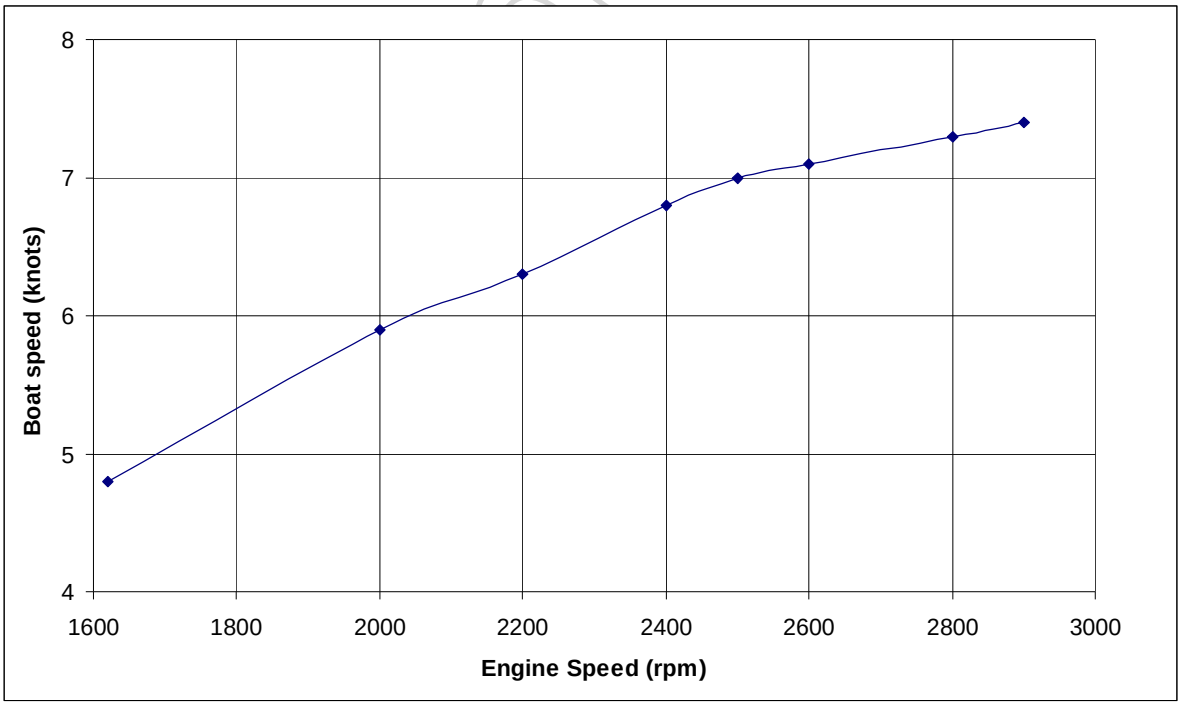


Table 4: Vessel speed / engine speed in slight sea conditions

5.5.5.5 The engine speed gauge (rev counter) behaved normally.

5.5.5.6 The alternator belt appeared to be correctly tensioned.

5.5.5.7 The engine bearers were securely mounted, and the flexible rubber engine mounts were in sound condition. The mounting bolts were tight.

5.5.5.8 Engine exhaust and cooling water were discharged through a muffler box and an armoured flexible hose, to a hull fitting at the stern. These were inspected and found to be in good working order.

5.5.5.9 The cooling feed to the exhaust was suitably fitted with an ant-siphon attachment, with the head of the anti-siphon attachment located in the space beneath the companionway steps.

5.5.5.10 The sound insulation within the engine compartment was found to be in acceptable condition. The insulation material should be manufactured from fire resistant material, but this cannot be checked as part of a normal pre-purchase survey.

5.5.5.11 The air extractor fan for the engine compartment functioned correctly.

5.5.5.12 The engine start panel was provided with a rev counter and gauges for the monitoring of the engine temperature and oil pressure (plus sounder alarm). The rev counter included a digital read-out of the engine hours. The panel also included the electric stop switch for the engine. During the sea trial these were tested and all worked normally.

5.5.5.13 When the engine had been running for approximately one hour, the engine was switched off and an oil sample was taken. This oil sample was submitted for chemical analysis. The results of this analysis can be seen in Figure 18 of Appendix 1. Figure 19 of Appendix 1 provides an explanation of the test results.

5.5.5.14 From Figure 18, it can be seen that the levels of silicon in the engine oil are high. It is possible that this is due to dust entering the engine through the air filter. It is RECOMMENDED (type A2) that the air filter is inspected and replaced if dirty. The seal around the air intake filter should also be checked to ensure that dirty air is not by-passing the filter element.

5.5.5.15 Figure 18 also shows that there are high levels of boron in the oil. Figure 19 indicates that the boron could come from the engine's antifreeze. This is unlikely as the percentage of water in the engine oil is 0%. The boron may therefore be an additive in the engine oil.

5.5.5.16 The engine should be serviced before use. The date of the most recent service was unknown, therefore all fluids and filters should be changed.

5.5.6 Fuel System

5.5.6.1 JUNO was fitted with two stainless steel fuel tanks.

5.5.6.2 One tank was located at the aft end of the keel, beneath the engine. The exterior visible surfaces of the tank were encrusted in dirt from the bilge. The tank was found to be in satisfactory condition, with the fuel line connectors in acceptable condition. Where accessible for inspection, the hoses were found to be free of damage or degradation.

5.5.6.3 The second fuel tank was located underneath the port seating in the saloon. The visible parts of the fuel tank were clean and generally free of damage and corrosion. The fuel line fittings that secure the fuel pipe to the fuel tank were secure and free of corrosion.

5.5.6.4 The two diesel filling points were located on the port side deck, just forward of the mid-ship mooring cleat. They were suitably labelled. The o-ring seals should be inspected and replaced if found to be cracked or degraded.

5.5.6.5 Fuel level was measureable by means of two dial gauges, mounted at the electrical control panel at the chart table.

5.5.7 Stern Gear

5.5.7.1 The exposed section of the 30mm diameter stainless steel propeller shaft was in good condition and as far as could be ascertained, the alignment appeared to be correct.

5.5.7.2 It was found that the propeller shaft was made from a grade of stainless steel that was magnetic and was therefore possibly made from A2 grade stainless steel, which is more susceptible than the A4 grade to corrosion in the marine environment. It is also possible that the shaft is constructed from Aquamet, which is a high strength and corrosion resistant grade of stainless steel. As the grade of stainless steel used in the shaft could not be determined and the fact that the portion of the shaft concealed inside the propeller and cutlass bearing could not be accessed for inspection, the shaft should be carefully inspected for signs of pitting or excessive wear when the cutlass bearing is next replaced.

5.5.7.3 There was minimum wear between the propeller shaft and cutlass bearing in the athwartships direction, but approximately 0.25 mm of wear in the vertical direction. The cutlass bearing should be replaced when the wear in any direction reaches about 1 to 1.5 mm.

5.5.7.4 The length of propeller shaft between the cutlass bearing and the propeller was measured and found to be 65 mm, which is more than twice the diameter of the shaft, as shown in Figure 15. Industry guidelines recommend that the length of shaft between the cutlass bearing and propeller should be equal to one diameter, but this can increase to 1.5 to 2 if a rope cutter is installed. Excessive over hang can lead to shaft vibration. Consideration should be given to reducing the level of overhang at the end of the shaft.

Figure 15: Excessive overhang in propeller shaft

5.5.7.5 The three-bladed 430 mm diameter fixed pitch propeller was in good condition, free of damage and securely attached to the propeller shaft.

5.5.7.6 The propeller was secured to the shaft with a bronze nut, which was locked by a

bronze tab washer. These were in good order.

5.5.7.7 The bronze stern bearing was inspected and found to be free of corrosion and adequately secured to the hull.

5.5.7.8 The inboard shaft seal was found to be leaking, with a significant flow of water entering the bilges. It is RECOMMENDED (type A2) that the seal is re-adjusted. If the leakage can not be prevented by adjustment, the shaft seal will need to be re-packed. This will require the vessel to be lifted from the water.

5.5.7.9 The hose clips that secured the shaft seal had evidence of surface corrosion but were found to be in serviceable condition. No perishing or deterioration of the rubber hose was noted.

5.6 SYSTEMS AND SERVICES

5.6.1 Anchor and Chain

5.6.1.1 The 45 lb galvanised CQR anchor was inspected and found to be free of wear and with only minor surface corrosion. The anchor was stowed on the foredeck bow roller.

5.6.1.2 The anchor chain was attached to the anchor by a stainless steel shackle and stainless steel swivel joint. The chain, shackle and swivel joint were generally free of wear and corrosion and in good working order. It is RECOMMENDED (type A2) that the shackle bolt is locked by seizing wire, 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 anchor chain was made from short plain linked galvanised steel. Dimensions of the chain were 10 mm x 34 mm x 50 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].

5.6.1.4 The length of the anchor chain was not measured.

5.6.1.5 A Danforth type kedge anchor was stowed in the locker located on the aft deck.

5.6.2 Anchor Windlass

5.6.2.1 A Lofrans 12 volt d.c. windlass was installed on the foredeck. This was inspected and found to be adequately secured to the deck. The white paint coating was in acceptable condition.

5.6.2.2 The forward cupboard in the forepeak that housed the windlass motor and electrical control box was damp, suggesting that water from the deck was leaking into this area. The source of this leakage should be identified and cured.

5.6.2.3 The electric operation of the windlass was tested from the helm and found to function correctly.

5.6.2.4 The external surfaces of the electric motor, mounted under the deck and located inside the forward cupboard of the forepeak, were in satisfactory condition, but the copper terminals of the electrical cables were corroded. These would benefit from being cleaned and protected by a light grease. The blue & brown cables of the ‘up’ button on the deck were connected to the electrical control box via an electrical connector block. This block was found to be corroding and should be replaced. Figure 16 shows the corroded terminals and connector block.

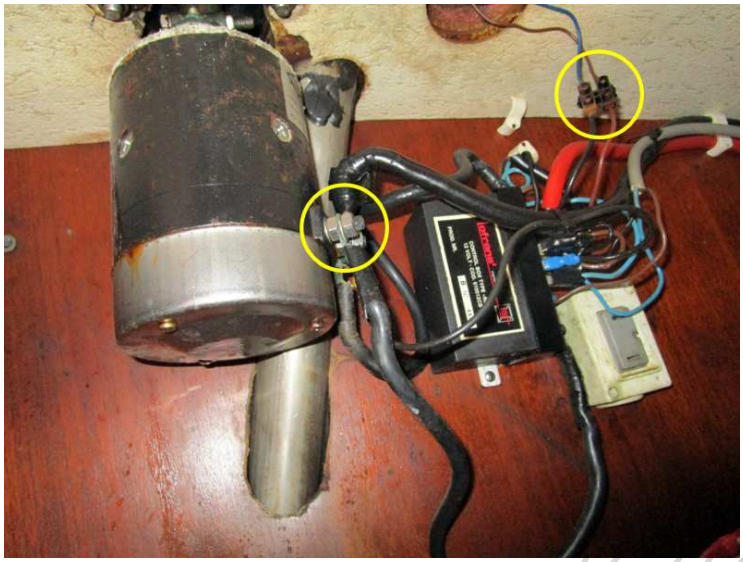


Figure 16: Corroded terminals of anchor windlass

5.6.3 Fresh Water System

5.6.3.1 There was one integrally moulded GRP fresh water tank located beneath the sole boards in the main saloon. This was found to be adequately secured to the adjacent structure.

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

5.6.3.3 Water from the tank was fed into a pressurised water system. The system was tested and found to function correctly.

5.6.3.4 The water that came out of the taps was found to be slightly dirty.

5.6.4 Heads

5.6.4.1 Both of the sea toilets were clean and the pumps appeared to be serviceable. The installations were tested and were found to pump in and out.

5.6.4.2 The sides of the heads compartments were formed by the plywood bulkheads and were found to be in good cosmetic condition.

5.6.4.3 Adjacent to the toilet in each compartment was an enamel sink unit, fed by a mixer tap (forward cabin) or shower nozzle (aft cabin). The cupboards below and behind the sinks were in very good condition. There was evidence of water ingress & mildew inside the cupboard of the aft heads compartment.

5.6.4.4 The forward heads compartment was fitted with an additional space for a shower cubicle. The melamine sides of this compartment were in good condition.

5.6.4.5 The ceilings of the toilets were finished in a soft vinyl lining. These were in acceptable condition.

5.6.4.6 For the forward heads, the toilet inlet and outlet hose was of suitable material and extended upwards behind the toilet to form an anti-siphon loop of adequate size. For the aft heads, there was no anti-siphon loop. When sailing on a port tack, it is possible that sea water may siphon back into the toilet of the aft heads.

5.6.4.7 The teak lattice sole board in each of the heads was in good condition.

5.6.4.8 The GRP moulding beneath the sole boards in each of the heads compartments was in good condition. The drain at the bottom of these mouldings drained directly into the adjacent bilges.

5.6.5 LPG Installation

5.6.5.1 At the time of survey, there was no LPG gas cylinder on JUNO. The storage area for the cylinder was in the anchor locker and accessed from the hinging locker lid on the foredeck. There was no specific storage container for the cylinder within this locker, therefore the cylinder and fittings were not adequately protected from impact by other items inside the locker. Consideration should be given to installing an off-the-shelf cylinder storage container inside this locker. The locker also lacked any efficient method of restraining the gas cylinder. There was a drain hole at the bottom of the locker. Due to the large amount of anchor chain stowed in this locker, it could not be determined whether this drain hole was working. It could not be determined if the locker was gas tight, therefore it is possible that leaking gas may drain into the bilges of the vessel.

5.6.5.2 Within the locker was an LPG pressure regulator and on/off tap. The age of this regulator was not determined, but it was found to be clean and free of corrosion. Pressure regulators should be replaced when ten years old.

5.6.5.3 From the pressure regulator, rubber hose led the gas supply to a copper pipe on the side of the locker. The rubber hose was manufactured in 2012. Gas hose should be replaced every five years. There was no evidence of cracking or other deterioration of the hose.

5.6.5.4 The copper pipe in the locker was not adequately supported; LPG supply pipe should be supported every 500 mm by plastic P-clips A length of plastic electrical conduit was attached to the pipe by two cable ties (Figure 17). It is RECOMMENDED (type A2 recommendation) that the pipe is given adequate support. The conduit should be detached from the pipe and mounted directly to the locker bulkhead.

Figure 17: LPG supply pipe in anchor locker

5.6.5.5 From the anchor locker, the copper pipe then led the gas supply through the locker bulkhead, through the forepeak and saloon, to an isolating valve located behind the cooker. Note that it is considered bad practise to mount the valve in a location that requires the operator to reach over the gas appliance. From this valve a length of flexible armoured hose conveyed the gas supply to the cooker. There was no date on this hose, but it was free of damage or degradation.

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

5.6.5.7 The Dometic ‘Moonlight’ three burner hob, oven and grill installation was secured by a gimbal mechanism to the galley structure. The appliance was not tested as there was

no gas cylinder on board. The appliance was in new condition and unused. The gimbal mechanism was able to pivot, but the lock-off mechanism had not been fully installed.

5.6.5.8 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 gas technician.

5.6.6 Galley

5.6.6.1 The L-shaped galley was situated on the starboard side of the vessel, at the bottom of the companionway steps and aft of the saloon seating.

5.6.6.2 There was a Coolmatic VD-03 12 volt d.c. top-access fridge unit located on the galley worktop, between to the double rectangular stainless steel sink and the gas cooker. The unit was not tested.

5.6.6.3 The double sinks were supplied with fresh water via a chrome mixer tap.

5.6.6.4 Raw sea water was supplied to the left sink by two taps: One manual and one electric. Neither of these taps functioned.

5.6.6.5 A Silvercrest 240 volt a.c microwave oven was installed at head height, mounted on a shelf above the galley. This was briefly tested and was found to work correctly.

5.6.6.6 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 very good condition.

5.6.7 Electrical System

5.6.7.1 JUNO had a 12 volt d.c. electrical system. Three batteries (74 Ah), believed to be engine starting batteries, were stowed beneath starboard bunk of the aft cabin. The batteries were fitted with timber hold-down bars to prevent movement. The batteries were located in an adequately ventilated area.

5.6.7.2 Four batteries, believed to be for supplying power to the vessel's instruments and services, were stowed beneath port bunk of the aft cabin. The batteries were fitted with timber hold-down bars to prevent movement. The batteries were located in an adequately ventilated area.

5.6.7.3 The condition and life expectancy of the batteries was not determined.

5.6.7.4 Battery charging was from the engine alternator, the generator or from shore power via a Victron Phoenix 12 volt d.c., 30 Amp battery charger mounted in a cupboard aft of the chart table.

5.6.7.5 Three quarter-turn switches controlled the output from the batteries. These were located in the space beneath the companionway steps and were accessed through a hinging door on the port side of the steps. There was one switch for the engine starting batteries and one for the service batteries. The third switch, labelled 'paralelo' was believed to be for the purpose of combining the output of the service and engine starting batteries.

5.6.7.6 From the quarter-turn switch that controls the service batteries, service power was then distributed via the vessel's main electrical distribution panel. This was located aft of the chart table seat. On the panel, four analogue needle gauges displayed the diesel fuel level (one for each tank), battery voltage and engine hours. 12 volt d.c. service power was then distributed by 25 contact-breaker switches, each with its own function light.

5.6.7.7 Shore power was connected to the vessel at a socket at the forward end of the cockpit, starboard side. This was connected to a 240 volt a.c. master switch unit, located in the

space beneath the companionway steps and were accessed through a hinging door on the port side of the steps. This area also housed the breakers to isolate the shore power. Shore power was distributed to conventional domestic 13 amp sockets.

5.6.7.8 A Victron Phoenix inverter was installed beneath one of the seats at the forward end of the saloon. This provided an output of 240 volts a.c., with a rating of 300 Watts. Output was to two sockets mounted near to the inverter.

5.6.7.9 The following switches were mounted in a recess in the starboard cockpit coaming:

Anchor light. This was not tested.

Anchor windlass. This worked correctly.

Jib sheet electric winch. This worked correctly.

Bow thruster main switch. This worked correctly.

5.6.7.10 The wiring that could be seen appeared to be serviceable, but the layout and routing of some cables was poorly managed. The wiring should be adequately supported at regular intervals and wherever possible, should not run through the bilges.

5.6.8 Generator

5.6.8.1 A diesel powered generator was installed on JUNO. This unit was mounted in the engine compartment and positioned on the starboard side of the main engine.

5.6.8.2 The control panel for the generator was mounted aft of the top companionway step. Next to the control panel was a switch to change the 240 volts a.c output. between shore power or generator.

5.6.8.3 The generator was tested and was found to start up correctly. The blue casing of the generator was not opened up in order to inspect the condition of the generator. Note that the generator is switched off using the red button on the control panel. This button must be depressed for approximately five seconds whilst the motor goes through its shut-down sequence.

5.6.8.4 The polyethylene fuel tank that supplies fuel to the generator was installed in the cockpit locker. It was inspected externally and found to be in good condition and securely attached to the locker structure.

5.6.8.5 The generator starting battery was also stowed in the cockpit locker. The battery was installed in a plastic storage container, but was not securely tied down to prevent movement in the event of a capsize. It is RECOMMENDED (type A2 recommendation) that the battery is fitted with tie-down straps. These straps should be securely attached to the surrounding locker structure.

5.6.9 Navigation Lights

5.6.9.1 A transom mounted stern light was adequately attached to the pushpit. This light was tested and found to function correctly. The lens was in good condition.

5.6.9.2 Port & starboard lights were mounted on the sides of the pulpit. These were in good condition and functioned correctly.

5.6.9.3 A mast-top anchor light was installed at the top of the main mast. It was not possible to determine whether this light was functioning due to the excessive level of ambient light.

5.6.10 Navigation Equipment

5.6.10.1 JUNO was equipped with a Sestrel binnacle mounted compass, positioned on the helm binnacle. This was found to be in satisfactory condition.

5.6.10.2 An Icom RT-650 VHF/DSC radio was mounted above the chart table. This unit powered up, received signals, but was not tested for transmission. Serial number was xxxxxx.

5.6.10.3 A radar scanner head was mounted on the mizzen mast. The viewing screen was not installed on the vessel.

5.6.10.4 A Jotron Tron TR20 725e hand-held vhf radio was found on the vessel. This worked correctly. Serial number was xxxx.

5.6.10.5 A Raytheon GPS chart plotter, model RC420, was mounted at the forward end of the cockpit, above the companionway hatch. The unit powered up when switched on and subsequently gave an accurate latitude & longitude position. Serial number was xxxxxx.

5.6.10.6 A Cetrek 701 autopilot was mounted at the forward end of the cockpit, above the companionway hatch, with a secondary control at the helm. This unit was tested and functioned correctly.

5.6.10.7 The following instruments were mounted above the companionway hatch:

VDO wind speed indicator. This did not function.

Logic wind speed & direction indicator. This worked correctly.

VDO apparent wind indicator. This did not function.

Stowe depth sounder. This worked correctly.

5.6.10.8 VDO Sumlog speed & distance indicator, with repeater aft of the chart table. These did not function.

5.6.10.9 A Wempe drum barograph was installed near to the chart table. This was mounted inside its own mahogany case.

5.6.10.10 A Furuno facsimile receiver / printer FAX-108 was mounted near to the chart table. This was not tested.

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 interior mahogany woodwork was found to be in very good condition, very well varnished and free of splits or damage. The wood has darkened with age to a deep red-brown.

5.7.1.3 The teak & holly faced plywood sole boards were in fair condition. Some boards were screwed down. The veneer edges of some boards were damaged, with the underlying plies exposed.

5.7.1.4 There was a small area of dark staining on the port bunk side in the aft cabin. The cause of staining could not be determined, but it may have once been caused by a leaking battery (one of the vessel's battery storage locations was under this bunk).

5.7.1.5 The roof lining of the cupboard (hinging door) that was positioned between the aft

cabin and the chart table showed evidence of water ingress. There were four holes in the lining which previously had fasteners passing through them had stain marks where water has leaked into the vessel. It was not determined if this was an existing leak.

5.7.1.6 The vinyl roof lining in the aft cabin was old and split in some areas.

5.7.1.7 The white seating cushions were generally in good condition, but will quickly show up any dirt that settles on them. One of the seating cushions had a small amount of moisture damage from a leaking vent. See paragraph 5.3.6.7.

5.7.1.8 The plywood doors that gave access to the heads and forepeak were found to be in good condition and closed correctly.

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 A manual diaphragm bilge pump was located on the starboard side of the cockpit seating, just next to the helm position. This pump was tested but would not pump out. It is RECOMMENDED (type A2 recommendation) that the pump is serviced. The handle was located inside the cockpit locker, but was not tethered to prevent its loss. It is RECOMMENDED (type A2 recommendation) that the pump handle is tethered with a line of sufficient length.

6.1.2 One electric bilge pump was positioned in the bilge sump. It was actuated by a manual switch, located at the chart table, or by an automatic float switch which was positioned next to the pump. When powered up, the pump was found to operate. The operation of the tilt switch was not verified. This should be checked.

6.1.3 Consideration should be given to installing a second manual bilge pump and an additional electric bilge pump.

6.2 FIRE FIGHTING EQUIPMENT

6.2.1 A number of fire extinguishers were found on board. These are summarised in Table 5. It is RECOMMENDED (type A2 recommendation) that the unit stowed in its bracket aft of the chart table seat serviced or replaced. The two new extinguishers should be properly mounted on the vessel.

Type	Location	Date Stamp	Pressure Gauge
2 kg Dry powder ABC	Aft of chart table seat	Tested 2010 Inspected July 2011	None
2 kg Dry powder ABC	Sealed in original packaging, stowed beneath the chart table seat	New in May 2011	Green
2 kg Dry powder ABC		New in May 2011	Green

Table 5: Fire Extinguishers on board JUNO

6.2.2 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.

6.2.3 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.

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

6.2.5 For an engine of the size found on JUNO, consideration should be given to installing an extinguisher in the engine compartment. This should be of the type that can be remotely triggered by cable or electrical operation. Dry powder extinguishers should be avoided as they can damage engines fitted with a turbocharger, are messy and corrosive. A number of environmentally friendly gas extinguishants are available, such as FM 200 and FE 36.

6.3 First Aid Kit

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

6.4 Carbon Monoxide Alarm

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

6.5 LPG Gas Alarm

6.5.1 There was no gas alarm installed on JUNO. It is RECOMMENDED (type A2 recommendation) that one is installed.

6.6 EPIRB

6.6.1 One EPIRB device was stowed on the vessel. The unit was registered to JUNO. It was not secured to a fixed part of the vessel. The manufacturer's instructions relating to installation location should be followed.

6.6.2 Serial number xxxx.

6.6.3 The EPIRB enclosure had a hydrostatic release replacement date of June 2014.

6.6.4 It is RECOMMENDED (type C recommendation with an implementation time of two months or before an offshore voyage) that the relevant authorities are informed of the EPIRB's change of ownership. The unit should also be serviced.

6.7 Lifejackets

6.7.1 Eight unused, non gas-inflating lifejackets were stowed beneath the seating on the starboard side of the saloon.

6.7.2 Two gas-inflating lifejackets were stowed beneath a seat at the forward end of the saloon. These should be serviced.

6.8 Strong points

6.8.1 Two lifeline strong points (D-loops) were secured to the hull moulding, one on each side of the cockpit seating. The loops were free from deformation and were well secured to the hull moulding. Both were accessible from the cockpit entrance.

6.9 Man Overboard Recovery Equipment

6.9.1 One orange plastic life ring was stowed on its mounting on the pushpit, port side. This was not fitted with a flotation light. It is RECOMMENDED (type A2 recommendation) that a flotation light is attached to this buoy.

6.9.2 A number of flotation lights were stowed in a locker beneath the seating in the saloon. These did not have any batteries fitted.

6.10 LIFERAFT

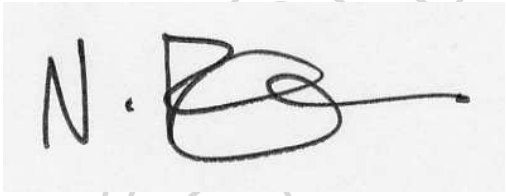
6.10.1 The vessel's liferaft was stowed in its canister, which was securely mounted to the deck in front of the cockpit spray screen by two canvas straps.

6.10.2 The eight person liferaft was an Arimar Iberica 01

6.10.3	Serial number:	xxxx
6.10.4	Date of manufacture:	May 2010
6.10.5	Most recent date of inspection:	10th March 2014
6.10.6	Expiry of emergency pack:	March 2015

6.11 PYROTECHNICS

6.11.1 No emergency flares were found on the vessel. It is RECOMMENDED (type A2 recommendation) that a set of flares (size and quantity appropriate to the sea areas and sea states expected to be encountered) is procured and stowed ready for use.



Dated of publication: Wednesday 24th September 2014

Appendix 1. Engine Oil Analysis

Sample No. P147485-002	Report Date: 19/09/2014	Unit ID	JUBA 111
		Description	YACHT ENGINE
Customer NJP Fieldhouse		Make	
5 Sheepdown Close		Model	
Petworth		Location	NJP FIELDHOUSE
West Sussex			
GU28 0BP		Oil in Use	15/40

****EARLY WARNING****EARLY WARNING****EARLY WARNING****

SYMPTOMS: Note levels of: Silicon
DIAGNOSIS: Silicon is usually derived from dirt/ingress dust or grit
ACTION: Please Check air filtration/trunking and eliminate from entering oil cavity

Date Sampled	15/09/2014
Date Received	18/09/2014
Date Tested	19/09/2014
Oil Life (hrs)	

STATUS		CAUTION	
PHYSICAL PROPERTIES			
Viscosity @ 40°C	cSt	99.1	
Water Content	%wt	0.0	
Total Base No	mgKOH/g	9.7	
Total Insoluble Matter	%wt	0.7	
Fuel Dilution		Negative	
SPECTROCHEMICAL ANALYSIS			
Iron	ppm	21	
Chromium	ppm	1	
Aluminium	ppm	5	
Molybdenum	ppm	42	
Copper	ppm	4	
Lead	ppm	2	
Tin	ppm	0	
Nickel	ppm	0	
Silicon	ppm	**52**	**
Sodium	ppm	2	
Boron	ppm	448	
Vanadium	ppm	0	
Calcium	ppm	3848	
Phosphorus	ppm	1143	
Zinc	ppm	1307	
Magnesium	ppm	10	
Barium	ppm	0	

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Figure 18: Results of analysis of Yanmar engine

OUR GUIDE TO YOUR OIL SAMPLE REPORT

Thank you for using our service, we are confident you will find the attached report useful. By analysing oil on a regular basis you can achieve a long trouble free life from your vehicle or machine and optimum life from your oil.

For your guidance we give below an explanation of the spectrochemical details that are shown on our reports. (ppm = parts per million)

Total Insoluble Matter (TIM) Principally carbon / soot generated by combustion 2.5% max.

Iron Generally results from ring, bore, cam, tappet or crankshaft wear. If the concentration quickly reaches 50 ppm inspect to determine the cause. Permissible maximum is about 100 ppm.

Chromium Usually from piston rings or plated bores, 30 ppm is the normal working maximum.

Aluminium Caused by piston or bearing wear, we would warn you at a level of 20 ppm or above.

Copper May originate from copper/lead bearings, oil coolers and pipework erosion or synchromesh's in gearboxes, we don't like to see above 50 ppm .

Lead Usually derived from lead/tin bearings (white metal) or copper/lead main and big end bearings. Is also used as an octane boosting additive in petrol. If the lead originates from bearing wear, then over 50 ppm indicates a problem. Petrol engines running on leaded fuel can show levels of several thousand ppm.

Tin From lead / tin or aluminium / tin bearings. Levels over 25 ppm need investigation.

Nickel Used as an alloy in steel components and will rise as a function of iron wear.

Silicon Normally derived from sand/clay i.e. Dust, over 20 ppm indicates need for attention to air intake filter/ trunking or excessive wear will result. Other possible sources are antifoam additives, silicon sealant or coolant leaks.

Sodium Indicates water ingress most commonly due to coolant leaking in to oil. Usually caused by faulty head gasket, liner seals or perforated liner. We would expect to see levels of 100 ppm and above if there is a problem

Boron Used either as an additive in antifreeze or as an extreme pressure additive in some oil blends. Levels over 50 ppm if they come from antifreeze indicate a problem.

Vanadium Contained in surface coatings, turbine impeller blades, valves. Also a trace element derived from base oil or fuel - not of concern in normal applications.

Calcium, Phosphorus, Zinc, Magnesium and Barium are additives used by oil companies in the manufacture of their lubricants.

Oil Analysis is such a useful maintenance tool for everyone, whether in industry or at home. Our aim is to make it affordable, accessible and easy to understand. We hope that we have achieved our objective and that we can continue to be of service

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Figure 19: Guide to results of oil analysis

Appendix 2. 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 3. Abbreviations Used in This Report

ac	Alternating current
dc	Direct current
EPIRB	Emergency Position Indicating Radio Beacon
GRP	Glass Reinforced Plastic
HP	Horse Power
IIMS	International Institute of Marine Surveyors
MMSI	Maritime Mobile Service Identity
UV	Ultra Violet