Pre Purchase Survey Report No: CHE0012

# Name of Vessel: [redacted]

Survey Commissioned by:

[redacted]


Hugh Ellacott
Yacht and Small Craft Surveyor
Diploma Yacht and Small Craft Surveying, IBTC
Member British Marine Surveyors Europe
[redacted]

3 Penton House
Donegal Street
London
N1 9QE

07956 371 614
hugh@isis-marine.co.uk
www.isis-marine.uk

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## 1. About the Survey and this Report

This survey was carried out by Hugh Ellacott at the request of [redacted] who is the prospective buyer of the vessel.

### Scope of Survey

This is a pre-purchase survey and its purpose is to establish the structural and general condition of the vessel. Where items of equipment have been tested this is stated in the text.

### Conditions of Survey

The survey took place on 26th and 27th January 2012. A survey of the interior and superstructure was under taken on the 26th while [redacted] was lying in a mud berth in the cut below Thames Lock at Brentford. On the 27th a survey of the hull below the waterline was undertaken between tides while she lay on the grid at Strand on the Green.

On both days the weather was cool but sunny.

### Limitations

- This report has been prepared for the use of the commissioning client and no liability is extended to others who may read or rely on it.
- The hull could not be inspected where the vessel lay on shores.
- In some cases it was not possible to detect latent and hidden defects without destructive testing which was not possible without owner's consent.
- Electrical and electronic equipment was not examined or tested.
- The extent of the survey was limited by the requirement to move the vessel on the late afternoon tide during on the first day of the survey and the requirement to complete the survey of the hull below the waterline between the tides.

### Methods

Thickness Gauging

The thickness of the steel hull was measured using a Cygnus 3 multiple echo ultrasonic gauge. The use of multiple echoes provides readings that are accurate and reliable without the need for grinding. Protective coatings such as paint and resin need not be removed as the gauge will measure through such layers but not include their thickness in the reading. The calibration of the gauge was checked against a test piece at the start of the survey.

One probe was used in taking the measurements:

- 2.25 MHz, three quarter inch large diameter probe

Where scale, dirt, or loose coatings were present, they were removed using a scraper, but on occasions a grinder was used to prepare the surface of the steel when readings were difficult to obtain.

Measuring Pit Depth

Pit depths were measured using a Sealey VS0563 digital tyre tread depth gauge, which is VOSA approved. The gauge has a resolution of 0.01mm and an accuracy of

± 0.01mm. However, measurements in this report have been rounded to the nearest tenth of a millimetre. Prior to the start of the survey the gauge was zeroed.

**Conventions**

Numbered items in the text are referred to from forward to aft, e.g. frame 4 is the fourth frame aft of the stem and forward of frame 5.

**Recommendations**

Recommendations in this report fall into two categories, which are explained below.

*Recommendations*
Recommendations are limited to those defects which should be rectified before the vessel is used (or within a given time span if specified) or may affect the ability to obtain insurance for the vessel.

*Advice*
Advice is given concerning defects that do not restrict the use of the vessel or her safe use. These defects may be cosmetic or concern actions that will prevent more serious defects developing in the future. Although these defects may be considered minor, do not assume repair costs are low.

Recommendations and advice made in the body of the report are both printed in italic font. A table of all recommendations and advice is reproduced at the end of the conclusions.

## 2. Particulars of the Vessel

[redacted] has a straight stem and fine bow which flares gently to the widest beam amidships. There is a counter stern that appears to have been extended to create space for replacement steering gear. The hull is constructed from rivetted steel plate.

No documents were provided to me during the survey. I was informed that the [redacted] was constructed in the Netherlands in 1906. It is possible this date is incorrect; the starboard side of the aft bulkhead of the superstructure appears to show a date; however the numbers are only part legible because of over painting. A "9" followed by a "2" are visible; it could be that the vessel was built in the 1920s.

I was informed that [redacted] worked as an oil carrier in the early part of her life. Apparently the hold contained two steel oil tanks that were used for construction of the cabin on the upper deck when she was converted to a liveaboard vessel.

The broker's details report the following specifications.

- Length Overall 117' 0"
- Beam 17' 6"
- Draft 4' 0"

A hull number was found on the at the aft end superstructure, to port:

- HN 3409

On the starboard side there was further information which appeared to be 230T and an illegible date (as described above). Scraping back the paintwork would probably reveal the lettering.

## 3. Keel

The hull is flat bottomed.

## 4. Hull Below the Waterline

The hull is of rivetted construction and constructed from what is assumed to be mild steel plate.

Visual inspection revealed the hull below the waterline was coated with what appeared to be a black bituminous coating that was providing fair protection to the underlying steel. The bottom has been extensively replated in a piecemeal fashion. I estimate replating covers approximately 80% of the underwater area. Replating was less extensive towards the stern. No weld defects were noted.

The whole underwater section of the hull was hammer sounded and no significant defects were identified. However, a number of locations were marked for gauging during the ultrasonic thickness survey that followed.

Appendix A shows a sketch of the hull with readings obtained during gauging of the hull plating. Thickness measurements were taken as described in Section 1.

Readings were taken every 3.0m on both sides of the hull. Measurements were taken just below waterline, inboard of the turn of the bilge and close to the centre line. Given the relatively few readings that could be taken between the tides, measurements were selectively taken from original plating; it being older it might be expected to exhibit more advanced corrosion that steel used for overplating.

Visual inspection noted pitting to at the waterline on both the starboard and port quarters. Overplating could be undertaken here, but a more cost-effective remedy may be to fill isolated pits by spot welding.

*Recommendation*
*Overplate or spot weld pits in original plating at quarters*

Isolating pits were also noted affecting the original plating on the boat of the vessel. The deepest pit was measured at 4.7mm.

Some of the steel used for overplating was of poor quality and requires cutting out and a new overplate added. This includes a section amidships to starboard between 14m to 30m. Here, plate thickness varied between 3.8mm and 4.8mm. Some pits along this section exceeded 1.5mm, the deepest being 1.9mm. Although not so seriously corroded, steel that appeared to be from the same batch was found on the port quarter and port bow and should also be replaced. Photographs of some areas requiring overplating are shown in Appendix B.

*Recommendation*
*The following overplating should be undertaken within 12 months with 6mm mild steel.*

- *Port bottom, 19m aft of stem, overplate original plate, approx. 1m x 0.6m.*
- *Port bottom, 21m aft of stem, overplate two areas of original plate; approx. 0.5sqm each.*
- *Starboard bottom, 15m aft of stem, overplate original plate by way of deep pits; approx. 1sqm.*
- *Port side wall, 4m aft of stem, cut out doubler and overplate approx. 2.5m x 0.3m*
- *Port side wall, 28-30m aft of stem, cut out doubler and overplate, approx. 2m x 0.6m.*
- *Starboard side wall, 14-30m aft of stem, cut out doubler and overplate; approx. 16m x 0.6m*
- *Starboard quarter, 30-33m aft of stem, overplate original plating in two areas; approx. 1sqm.*
- *There are two additional areas identified in the 2010 survey report on starboard bow and port bottom that account for 6.2sqm of overplating.*

There were a number of locations where groves between plates that may promote crevice corrosion and are difficult to monitor for plate thickness. Examples are shown in Appendix B. These should be overplated.

*Recommendation*
*Overplate groves and slots between plates.*

It was only possible to examine structural frames in a very few locations. Above the level of the lower deck sole (floor) the interior steelwork has been spray-foamed. On the starboard bow frames were measured at approximately 18 inch centres, but could not be examined because of the foam. In the back cabin it was possible to see two frames, both have suffered from extensive corrosion, but only the forward one has been repaired. The shell at this point was also perforated and it was assumed that this part of the counter stern, which is above the waterline, has been overplated.

The only bulkhead that could be examined in the vessel was that between the engine compartment and the forward accommodation; no defects were identified.

## 5. Topsides

The topsides were painted in a dark navy gloss with a matt black boot top. A white undercoat underlay the navy topcoat. The coating was generally in good condition and there were few areas where it had failed. There was not time between the tides to examine the topsides in detail; extensive areas of pit corrosion were noted along the wind / waterline with isolated pits higher on the topsides. The coating has effectively halt corrosion to pitted areas of the topsides.

Pitting on topsides

Impact dents to port amidships

A number of areas of impact damage were noted particularly on the port side amidships and at the stern. Three references thickness readings were taken from port bow topside plating as follows: 8.1mm, 6.7mm and 7.0mm.

## 6. Deck

The foredeck, side decks and aft deck were lightly hammer tested and no defects were detected. Much of the deck was made of treaded steel plate, which is probably not original. On the foredeck there was non-treaded plate, which had some pitting and was probably original. Two ultrasonic thickness measurements were taken of the deck plating.

| | |
|---|---|
| Stern port side | 3.8mm |
| Port side deck adjacent to cabin | 5.7mm (treaded plate) |

All decks were painted in cream paint (the same as the superstructure). The coating was generally in good condition and only a few places were noted where it was failing or rust was showing.

*Advice*
*Strip back to bare metal, treat and paint areas of deck where rust is breaking through.*

## 7. Superstructure

There are four parts to the superstructure.

- A steel coachroof has been constructed over the forward part of the hold to create lower deck accommodation.
- A steel cabin has been constructed at deck level forward of the original cabin; it accommodated the galley and a saloon on the upper deck.
- The original steel cabin at the stern.
- A wheelhouse constructed above the original cabin.

The steel structures were painted cream and the coating was generally in good condition. Ultrasonic thickness measurements revealed that:

- Sun deck above lower deck accommodation approximately 6.0mm.
- The upper deck cabin sides were approximately 6.0mm.
- The roof of the upper deck is constructed of 3.0mm steel.
- Back cabin wall 3.9mm, roof 3.8mm

The wheelhouse was of collapsible design and was constructed of plywood panels and softwood uprights. There were doors to port and starboard.

The wheelhouse suffered a collision with a bridge that had caused extensive damage to its roof and aft bulkhead and broken many of the glass windows (not safety glass). Prior to the accident it was generally of rough construction and painted surfaces were in poor condition particularly on the roof where bare wood was showing through. Given its poor condition before its accident, the wheelhouse should be rebuilt to a higher standard in keeping with other parts of the superstructure.

*Recommendation*
*Rebuild wheelhouse to standard commensurate with steel superstructure.*

## 8. Rudder and Steering

The rudder is constructed of mild steel and has a hydrodynamic shape. There have been some repairs to the steelwork. It was hammer tested and no defects were detected.

The rudder is supported on a skeg below and hung from above. No movement was noted when pushed laterally; however a large gap (approx. 5mm) was visible between the bearing surface at the lower bearing suggesting the possibility of some play when the vessel is under way. The bolts from which the rudder was hung were hammer tested and no defects were detected. Wear was noted to the rudderstock.

*Recommendation*
*Draw rudderstock prior to use of vessel at sea (i.e. downstream of Thames Barrier). Inspect bearing at skeg.*

The rudder stock tube was inspected in the compartment beneath the aft deck. There was evidence of corrosion particularly towards its base. The steel of the tube was gauged at 3.9mm. The tube is wholly above the waterline so its condition does not affect watertight integrity. A greaser is located in the compartment was fully screwed down and assumed to be out of grease. It feeds grease to the lower part of the rudderstock tube that protrudes below the counter stern.

*Advice*
*Refill greaser serving rudderstock tube.*

A recent woodworm attack was noted affecting timber lining in the compartment containing the rudderstock tube.

*Advice*
*Treat woodworm affected timber with insecticide.*

The rudder is operated by means of hydraulics. A steel housing at deck level protects the hydraulic pistons that actuate the rudderstock. The housing has been cut and therefore it is difficult to move safely around the aft deck.

*Recommendation*
*Make good the housing for steering mechanism on aft deck, before vessel is used for navigation.*

The hydraulic pump (Volvo V1-038-R5P-RQN) is mounted on the port side of the engine and driven by a belt from the main shaft. There is a hydraulic reservoir and manifold to port of the engine compartment. Visual inspection revealed no defects; the level of hydraulic fluid was not checked. When the engine was running a valve connected to the hydraulic system read 15 bar. It was not ascertained whether the valve was reading accurately.

The mechanism for operating the steering is inadequate and should be condemned. It consists of a lever and pulleys mounted in the wheelhouse. The thin gauge wires feed back to the hydraulics via pulleys; in places it runs against steel potentially wearing the wire.

Steering and engine controls

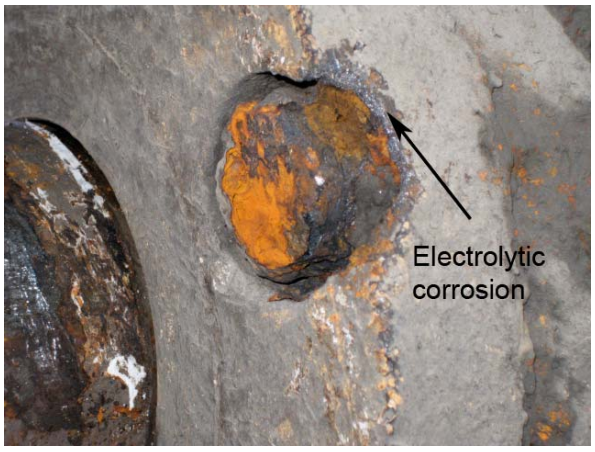
I observed the steering in operation. The rudder operated effectively but hard to port represented only a 20º movement of the rudder, while to starboard the movement was approximately 40º. The rudder indicator in the wheelhouse was inverted and did not appear to be accurate.

*Recommendation*
*Replace steering mechanism, prior to use of vessel for navigation.*

## 9. Stern Gear

The propeller was right-handed and three-bladed. Its diameter was measured at 1.1m. The surface was scraped revealing yellow metal presumed to be manganese bronze; there was no evidence of dezincification and the blade tips showed little evidence of impact damage. The propeller was in good condition for its presumed age.

The prop shaft was magnetic and presumed to be mild steel; it turned freely. A large mild steel nut with tab secured the propeller to the shaft. It was hammer tested and found to be sound though it exhibited signs of corrosion in the form of rust scale. This corrosion does not a present threaten the security of the fastening given its massive size, but progression of corrosion should be monitored at each haul out.




The end cap for the stern tube was secured with mild steel bolts that were clearly corroding; however, they were hammer tested and found to be secure. There was evidence of minor electrolytic corrosion to the end cap adjacent to the recess for one of the securing bolts. However, the cap was hammer tested and found to be secure at the time of the survey. Progress of corrosion should be monitored at the next haul out.

*Recommendation*

*Draw shaft prior to use of vessel at sea (i.e. downstream of Thames Barrier) and inspect shaft by way of outboard bearing and propeller. Inspect end cap and replace if necessary.*

Inboard the bolts securing shaft couples were hammer tested and found to be secure. Aft of the couple there was a bearing; the oil level in the bearing was checked and found to be correct. The inboard gland was secured by means of three bolts that were hammer tested and found to be secure. There was evidence of grease oozing from the gland. A greaser appeared to inject grease into the prop shaft tube aft of the inboard gland.

## 10. Cathodic Protection

There were six anodes on each side of hull, equally spaced from stem to stern. They showed no sign of any wastage and were coated in white scale. It is probable they are made from zinc and are therefore ineffective. Aluminium anodes are recommended for brackish water and magnesium ones for freshwater. In addition, to these relatively new anodes there were two smaller anodes weld close to the stern gear. These were approximately 50-70% wasted, but also exhibited considerable build up of scale.

Four anodes were welded to the rudder, two were relatively new, showed no sign of wasted and were covered in scale and maybe zinc. The other two were older and had wasted but were also covered in white scale.

*Recommendation*
*Ascertain whether anodes are of zinc and if so replace with appropriate ones at next haul out.*

## 11. Through Hull Apertures

There were four though hull apertures below the waterline, excluding the stern tube. Only one was in use. There was also one circulate plate weld very close to the centre line forward of the engine compartment, which probably secures a former through hull. It was hammer tested and found to be secure. Other fittings associated with the through hulls were not hammer tested because the survey was carried out while afloat.

*Recommendation*
*Test security of skin fittings associated with through hull apertures when vessel is next docked.*

On the starboard side the two through hull apertures were located in the engine room and were redundant. Inboard the forward through hull was fitted with a 75mm diameter pipe (approx.) with massive flanged gate valve. The valve appeared to be open. It was not operated. From the valve a pipe led vertically into the wheelhouse, but there was no access to its top end. The purpose of the pipework is unknown, but could have been to do with tank cleaning when the vessel operated as an oil carrier.

*Advice*
*Close (if possible) large, green, flanged gate valve.*

The second through hull to starboard was fitted with a ball valve. There was a single pipe fitting bolted to the flange of the valve; it was not blanked off.

There were two skin fittings to port. It was impossible to gain access to them as the companionway from the upper deck to the lower deck cut prevented access. It was possible to insert a camera passed the generating set to observe the skin fittings. It was not possible to perform any test on the skin fittings.

*Recommendation*
*Establish access to port side skin fittings, possibly by decommissioning and remove generating set and its engine. Inspect skin fittings once access has been established. This should be done as soon as is possible.*

It appeared from the photograph and visual inspection from a distance that the higher of the two was closed by means of a gate valve. A length of 2" suction hose was attached to the valve and its open end was lodged up at deck level, indicating it was unused.

*Advice*
*Blank off pipework for two redundant skin fittings, one to starboard and one to port of engine compartment.*

The lower through hull on the port side appeared to provide raw water cooling for the engine, though there is an inaccessible section of pipe under the sole in the bathroom forward of the engine compartment. The photo revealed a large chamber in the pipework assumed to be a strainer and a second valve indicating water could be supplied elsewhere. Integrity of all pipework associated with the skin fitting should be investigated once access is established. When [redacted] is next taken ashore for work, it would be advisable to weld external plates over all redundant through hull apertures.

*Advice*
*Weld external plates over redundant through hull apertures when the vessel is next dock.*

## 12. Access to Accommodation

Access to the main saloon on the lower deck is via companionway steps from the foredeck. The steps are steel, are welded into the superstructure and are drained by means of a scupper that discharges to port. The pipework for the scupper is poorly finished.

The door was timber-framed with two glass panels. It was secured with a mortise lock and an additional deadlock. It is important that this door can always be opened from the interior of the boat as it represents the main means of escape from the lower deck. From the door, steel steps allow access into the main saloon. The steps and their handrail were tested and found to be secure.

Access to the saloon and galley on the upper deck is though sliding double doors at the forward end of the cabin. The doors slide easily and could be locked shut. A second door allowed access from the port side deck into the aft end of the galley. The doorframe was made from aluminium alloy and could be securely locked shut. However, the two double glazing units in the upper and lower panels of the door were roughly held in place with self-tapping screws and the door is therefore not particularly secure.

*Advice*
*Improve fastening of window panels in port side door into galley.*

A stairway on the port side of the galley leads down to the lower deck. The stairs and the railing that surrounds it were found to be secure.

## 13. Windows and Ports

There are twenty cast aluminium alloy portlights cut into the topsides that provide natural daylight for the accommodation on the lower deck. Some were examined at random and they were found to open and close with relative ease and their seals were found to be in good condition. The ports were glazed with toughen glass.

Just above deck level eight windows have been cut in the sides of the lower deck saloon. They are glazed with pre-made double glazed units and finished inside with untreated hardwood. No evidence of leaks was seen.

There are eight windows in the upper deck saloon and galley. They are made from pre made double glazed units with untreated hardwood frames on the interior. No evidence of leaks was detected. There are also two of the aluminium portlights on either side of the galley.

There was a single bronze portlight in the bathroom forward of the engine compartment. Its rubber seal had perished. A similar portlight was found on the

starboard side of the engine compartment. In the back cabin two of the aluminium portlights had be let into the cabin sides towards the forward bulkhead. Two original portlights are located in the aft bulkhead. The glass in the porthand light was broken and additional trim at the bottom of the one to starboard suggests it may have at one time leaked.

There are two lights let into the sole of the upper deck saloon, which provide natural light for the accommodation below. The glass was secure.

## 14. Stanchions

The railings surrounding the sun deck were aggressively tested and found to be secure. Handholds by way of the wheelhouse were found to be secure.

The side decks besides the upper deck accommodation are narrow and it was not safe to move along these decks as there were no handholds.

*Recommendation*
*Fit handrails alongside upper deck cabin, prior to use of the vessel for navigation.*

## 15. Ground Tackle and Mooring Arrangements

A stockless anchor is chained to the port side of the vessel. Its weight is unknown, but it appears to be of sufficient size for the vessel. The chain was not inspected. Access to the chain locker was through a hatch screwed into the forward bulkhead of the forepeak cabin. Access was not gained.

The anchor is raised by means of a hand-operated winch located on the foredeck. It was not operated during the survey. Its steelwork was inspected and the plate on the starboard side was found to be perforated.

*Recommendation*
*Repair steelwork on anchor winch and service prior to the vessel being used for navigation. Chain clench should also be checked.*

Steel Samson posts on the port bow, starboard bow and stern were found to be secure. A number of steel loops have been welded to the superstructure to provide additional mooring points, though these are not as strong as the posts.

## 16. Navigation Lights

The vessel did not have any operational navigation lights.

*Recommendation*
*Fit navigation lights if the vessel is likely to be used for navigation after sunset.*

There was no operation horn.

*Recommendation*
*Fit horn prior to the vessel being used for navigation.*

It should also be noted that all vessels greater than 45 feet, length over all (LOA), are required to carry a VHS radio when navigating on the tidal Thames. [redacted] did not have a VHS radio but the requirement can be met by the use of a handheld set.

## 17. Bilge Pumping Arrangements

At the time of the survey there was a 240v AC bilge pump located aft of the engine. As the vessel does not generate 240v AC when underway the pump would not be operational when most likely to be needed. The current owner of the [redacted] informed me that arrangements were being made to fit a 12v bilge pump. Bilge pumps should be fitted in both the engine compartment (the best location would be forward of the engine) and in the bilge under the main accommodation. It is probably the best location is in the bilge beneath the bathroom forward of the engine compartment, but without knowledge of how the bilges are compartmentalised this is not certain.

*Recommendation*
*Fit two 2000gph automatic bilge pumps, one in engine compartment and one under main accommodation.*

As a liveaboard vessel it would be appropriate if high-level bilge alarms were fitted in each bilge compartment.

*Advice*
*Fit high level alarms in each bilge compartment.*

## 18. Firefighting and Emergency Equipment

There were three life rings aboard [redacted] they were in serviceable condition.

There was no firefighting equipment on board [redacted]

*Recommendation*
*Fit fire extinguishers as follows: 1kg dry powder extinguishers in forepeak cabin, second cabin, first cabin and back cabin; fit 2kg dry powder fire extinguishers in upper deck saloon, lower deck saloon and engine compartment.*

*Recommendation*
*Fit fire blanket in galley*

A smoke alarm was present in the galley; the test button was operated and it sounded.

*Recommendation*
*Fit a smoke alarm in the lower deck saloon.*

No carbon monoxide monitors were present. It would be sensible to install a CO monitor in the galley and it is also a good idea to have them in sleeping quarters.

*Advice*
*As a minimum, install a carbon monoxide monitor in the galley.*

## 19. Engine and Installation

The engine is a six cylinder DAF. I believe it to be a DK 1160 and not as quoted in the previous 2010 survey and broker's information. The DAF 1160 has an approximate power rating of 200hp. Engine hours were not recorded.

- Engine No. F19310

The plate on the gearbox indicates it was made by Pont a Mousson and records the following information:

- Type NF3
- Reduction 1/4,5
- Number 12615
- Date 22/1/75

The engine and gearbox were mounted on two strong fore and aft girders. The engine was rigidly mounted; all engine/gear box mounting bolts were hammer tested and found to be secure.

The following checks were made.

- Oil checked under filler cap for dirt and emulsion; none found.
- Engine oil dipstick checked to reveal correct oil level; no untoward odour, colour or emulsion seen in oil.
- Gearbox oil dipstick checked to reveal correct oil level; oil golden with no untoward odour, colour or emulsion seen in oil.
- A blotter test of engine and gearbox oil did not indicate either oil to be spent or excessively loaded with contaminants.
- Water in heat exchanger clean but level down by about 1/3.
- Fan belt tension on 12v alternator was very slightly loose.

There was no ignition switch or starter button for the engine, I presume the engine was started by jumping the solenoid circuit on the starter.

*Recommendation*
*Install engine starter circuit prior to vessel being used for navigation.*

The engine controls were in the form of a temporary installation that should be condemned. The controls on the engine and gearbox were acceptable, the deficiency was the installation in the wheelhouse and cabling to the engine / gearbox.

*Recommendation*
*Throttle and gear controls between the wheelhouse and engine should be reinstalled prior to use of the boat for navigation.*

There did not appear to be any means of stopping the engine from the wheelhouse, though a solenoid was fitted to the engine so an electric push button stop could be installed.

*Recommendation*
*Install engine stop in wheelhouse prior to vessel being used for navigation.*

The exhaust was not lagged.

*Advice*
*Lag exhaust at least as far as raw water injection point.*

Covers were missing from the starter and a junction box on the port side of the engine. There are no air filters fitted to the air intakes.

*Advice*
*Fit air filters to engine.*

Hose clips on the engine were made of mild steel and many exhibited surface rusting. Hose clips should be replaced with similar made of 316 stainless steel, particularly those associated with the raw water system. The rubber hose between the raw water inlet pipe and the water pump should be double clipped at both ends - failure here could flood the vessel.

*Recommendation*
*Double clip hose between raw water inlet pipe and water pump using 316 stainless steel hose clips. Only undertake this action when the inlet valve is closed, but complete as soon as possible.*

The vessel had neither a bow thruster or stern thruster as advertised on the broker's web site.

The engine was observed running. It started readily and was not excessively smoky. The gearbox engaged forward and reverse gears. While running the temperature gauge on the exhaust read 150ºC; it was not possible to monitor it over time.

## 20. Fuel System

There was one fuel filler point in the port side deck and two on the starboard side deck. The forward one to starboard did not feed a tank and was an open-ended pipe. None of the fuel filler points are labelled

*Advice*
*Blank off open ended fuel pipe and label fuel filler points.*

There are three fuel tanks located in the engine compartment; two main tanks, one to port and one to starboard. A day tank is located forward of the starboard tank. All tanks are made from mild steel and painted. It was possible to visual inspect the underside of the day tank where there was no painted. No significant corrosion was noted on any tanks. All tanks had sight gauges that were opened by a spring operated valve at their lower end. No tank vents were noted outside the engine compartment; appropriate venting of fuel tanks should be investigated.

*Advice*
*Investigate venting of fuel tanks.*

The main tanks were connected by a large bore mild steel pipe controlled by a valve. The day tank could be feed from the starboard tank via large bore steel pipes using a hand-operated pump. There was an inline strainer.

The day tank fed both the engine and a diesel-fired boiler; both fuel lines were controlled by valves near the tank. The line to the boiler included an inline pump and malleable copper pipe. The pump was unsupported, as was the copper pipe throughout its length.

*Recommendation*
*Provide support for inline pump and fuel line feeding diesel-fired boiler.*

The copper fuel line serving the engine was passed through the bilge. A length of braided hose was included in the line to the boiler and the fuel leak off from the engine. Both appear old and no specification was apparent on either.

*Recommendation*
*Replace braided fuel hoses with flexible hose that is specified to BS EN ISO 7840 or an equivalent standard.*

## 21. General Accommodation

This report does not describe the interior accommodation in detail. There is little fitted joinery in the accommodation, most furniture such as beds were free standing. The exception is the back cabin that retained some original joinery that was generally in conditions. However the lining above the bunks was damp and the fibreboard had deteriorated considerable. It was not apparent where water was penetrating as the cabin sides and roof are made of steel.

*Advice*
*Identify the source of water ingress into the back cabin; once leak-free made good the lining in the back cabin.*

The sliding doors in the back cabin are an attractive original feature of [redacted] though many of the leaded glass panes are loose. I suggest the doors are restored.

## 22. Gas Installation

The gas system was examined with the aim of finding visually identifiable deficiencies in the gas system. There may be other defects in the system that cannot be found by visual examination. The visual examination does not constitute any kind of gas safety certificate, which is only obtainable in the UK after comprehensive pressure testing and assessment by a qualified person registered by Gas Safe (www.gassaferegister.co.uk).

There were serious deficiencies with the gas system; a new gas system should be installed.

- There was no gas locker with dedicated gas drains to ensure gas does not enter the vessel.

- Gas bottles stand on the wheelhouse deck; they are not retained in any way.
- Gas is piped to the galley via unsupported gas hose, albeit less than two years old; copper gas pipe should be used here.

*Recommendation*
*Install gas locker and run gas from locker to galley via supported copper pipe.*

The gas system supplied a cooker in galley. The cooker included a four-ring hob, a grill and an oven. It was securely held in place. The gas rings on the hob did not have any flame failure devices.

*Advice*
*Consider replacing cooker with model fitted with fail failure devices.*

Scorching was noted to the wooden worktop adjacent to one of the rings.

*Recommendation*
*Cut back wooden worktop adjacent to cooker or provide some means to protect the worktop from scorching.*

In addition to the gas system described above, there was a free standing gas heater in the lower deck saloon. Use of such appliances in a vessel is considered dangerous.

*Recommendation*
*Remove free standing butane gas heater from vessel.*

## 23. Fresh Water and Sanitation

The water system was considered adequate for a houseboat, but not for a vessel used for navigation.

An open polyethylene water tank was located under the companionway into the lower deck saloon. The tank is not secured and is open topped. The tank is plumbed into the mains water supply and a ballcock automatically controls the level in the tank. Water was pumped around the system via a 240v pump equipped with an accumulator tank. The water pump was not secured but placed in a second plastic tank adjacent to the water tank. It was not clear whether the water pump supplied the whole water system on [redacted] or alternatively some of the system was supplied directly from the mains. I did not locate a stopcock in the vessel to shut of the mains supply from inside the vessel; a stopcock would enable the supply to be shut off should a leak in the plumbing occur which could flood the vessel.

*Advice*
*Locate or fit mains stop cock in vessel.*

There is an unused tank on the starboard side of the engine compartment that is assumed to be the original water tank. There is a deck filler point above the tank.

*Advice*

*Consider reinstalling original water tank with 12v water pump to provide water when 240v mains electricity supply is not available.*

The water system supplies:

- The galley
- Bathroom in back cabin
- Bathroom forward of engine compartment
- Bathroom aft of lower deck saloon.

Each bathroom had a bath with showerhead, basin and toilet with a 240v macerator. All macerators were tested and operated when the toilets were flushed. Dirty water is discharged overboard via a pipe fed through the portlight on the starboard side of the engine compartment. My understanding is that discharge of sewage from vessels is not illegal on Port of London waters.

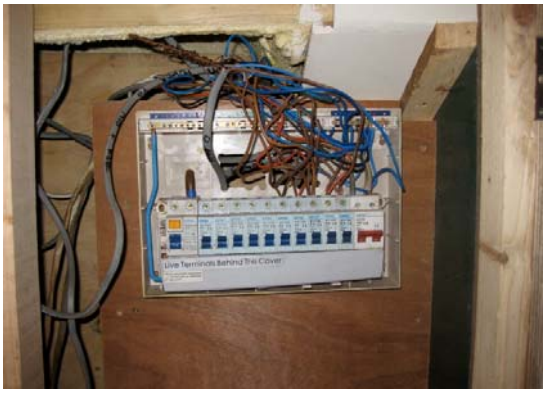
Hot water was supplied from a 240v AC immersion heater installed in the engine room.

## 24. Electrical Installation

230/240 volt AC

The 230/240 volt AC distribution box is located in a locker at the aft end of the lower deck passage. There was what I assumed to be a redundant distribution board adjacent to the generator in the engine compartment. The general impression of the electrical installation was poor.

- Domestic cable has been used which is unsuitable for marine electrical installations because it is made from solid wire rather than stranded wire.
- A domestic consumer unit was used to distribute power to the various circuits. It was very poorly wired, e.g. no earth bus bar was used.
- Many circuits appear to rely on the use of extension leads with four gang sockets.
- Polarity appeared to be reversed see below.



I tested the voltages across live, neutral and earth at one of the sockets in the upper deck saloon.

| | |
|---|---|
| Live to Neutral | 222v |
| Live to Earth | 9v |
| Neutral to Earth | 231v |

The readings indicate that the polarity was reversed (my findings should be rechecked with a polarity indicator), though this could be a fault dockside rather than on [redacted] The 240v system should be examined by a marine electrician; however, my view on initial inspection, is that some rewiring will be required.

*Recommendation*
*Have the 240v AC electrical system examined by a marine electrician.*

In several of the cabins switches have been installed and cable has been threaded through to holes in the deckhead lining, but light fittings are present. No galvanic isolator was identified which reduces the risk of stray current galvanic corrosion affecting the hull and stern gear. An isolation transformer would be an even better solution.

*Advice*
*Install an isolation transformer or at minimum a galvanic isolator.*

12/24 volt DC

Essentially there was no 12/24v DC electric system. However, there were two 12v batteries lodge upon the day tank that were used for starting the engine. A third battery was located on a tray adjacent to the generator. A number of DC electric services need to be installed on the vessel, e.g. bilge pumps, and a 12/24v electrical system needs to be installed.

*Recommendation*
*Secure 12v batteries in a ventilated battery box.*

*Recommendation*
*Install 12v electrical system.*

## 25. Heating, Ventilation and Refrigeration

A solid fuel stove was located in the upper deck saloon. It was not securely fastened to in place.

*Recommendation*
*Secure solid fuel stove in place.*

A diesel-fired boiler was located in the galley. It was flued through the coach roof and it was noted its front panel was loose. The boiler did not appear to be secured in position.

*Recommendation*
*Secure diesel-fired boiler in position.*

It was assumed that the boiler supplies hot water to radiators located throughout the accommodation. It was noted that there were also 240v electric, oil-filled radiators in several of the cabins.

Spray foam insulation was noted where it was possible to see behind linings or in lockers. Its depth was measured at two locations and found to be 45mm and 50mm deep. This indicates the vessel is reasonably well insulated.

There is no dedicate ventilation in the accommodation; portlights are not sufficient as they can be tightly closed. As a minimum high and low level ventilation should be installed on the upper deck where fuels are burned. Consideration should also be given to providing ventilation to the engine room.

*Recommendation*
*Provide ventilation for the upper deck accommodation.*

There is an under-counter 240v electric fridge installed in the galley.

## 26. CONCLUSIONS AND RECOMMENDATIONS:

### Conclusions

[redacted] is an attractive vessel with generous accommodation, which includes eight berths, two saloons, a galley and three bathrooms. However, services are reliant on shore power for the vessel to habitable as there is no 12volt system installed. The 240v AC installation is poor and requires inspection by a marine electrician. Similarly, the existing gas system does not meet an acceptable standard and a new system should be installed. Dedicated ventilation needs to be established in the galley and upper deck saloon.

The bottom of the hull has been overplated in a piecemeal fashion; approximately 80% of the original plating has been covered. Some steel used for overplating is of poor quality and needs to be cut off and the shell overplated again. There were areas where the original plating requires overplating.

There appeared to have been little maintenance of the steering and stern gear in the recent past. The prop shaft and rudderstock should be drawn if a sea voyage is contemplated. The wheelhouse needs rebuilding followed by installation of engine and steering controls. Access needs be established to valves controlling through hull apertures.

In conclusion, much has been done on board [redacted] by the present owner to make her an attractive liveaboard vessel, but there is still much work and expenditure required before the project is complete.

Hugh Ellacott, 31/1/12

### List of Recommendations

The recommendations made in the report are listed below with their respective page numbers. All recommendations should be carried out before use of the vessel.

*Overplate or spot weld pits in original plating at quarters*

*The following overplating should be undertaken within 12 months with 6mm mild steel.*

- *Port bottom, 19m aft of stem, overplate original plate, approx. 1m x 0.6m.*
- *Port bottom, 21m aft of stem, overplate two areas of original plate; approx. 0.5sqm each.*
- *Starboard bottom, 15m aft of stem, overplate original plate by way of deep pits; approx. 1sqm.*

- *Port side wall, 4m aft of stem, cut out doubler and overplate approx. 2.5m x 0.3m*
- *Port side wall, 28-30m aft of stem, cut out doubler and overplate, approx. 2m x 0.6m.*
- *Starboard side wall, 14-30m aft of stem, cut out doubler and overplate; approx. 16m x 0.6m*
- *Starboard quarter, 30-33m aft of stem, overplate original plating in two areas; approx. 1sqm.*
- *There are two additional areas identified in the 2010 survey report on starboard bow and port bottom that account for 6.2sqm of overplating.*

*Overplate groves and slots between plates.*

*Rebuild wheelhouse to standard commensurate with steel superstructure.*

*Draw rudderstock prior to use of vessel at sea (i.e. downstream of Thames Barrier). Inspect bearing at skeg.*

*Make good the housing for steering mechanism on aft deck, before vessel is used for navigation.*

*Replace steering mechanism, prior to use of vessel for navigation.*

*Draw shaft prior to use of vessel at sea (i.e. downstream of Thames Barrier) and inspect shaft by way of outboard bearing and propeller. Inspect end cap and replace if necessary.*

*Ascertain whether anodes are of zinc and if so replace with appropriate ones at next haul out.*

*Establish access to port side skin fittings, possibly by decommissioning and remove generating set and its engine. Inspect skin fittings once access has been established. This should be done as soon as is possible.*

*Fit handrails alongside upper deck cabin, prior to use of the vessel for navigation.*

*Repair steelwork on anchor winch and service prior to the vessel being used for navigation. Chain clench should also be checked.*

*Fit navigation lights if the vessel is likely to be used for navigation after sunset.*

*Fit horn prior to the vessel being used for navigation.*

*Fit two 2000gph automatic bilge pumps, one in engine compartment and one under main accommodation.*

*Fit fire extinguishers as follows: 1kg dry powder extinguishers in forepeak cabin, second cabin, first cabin and back cabin; fit 2kg dry powder fire extinguishers in upper deck saloon, lower deck saloon and engine compartment.*

*Fit fire blanket in galley*

*Install engine starter circuit prior to vessel being used for navigation.*

*Throttle and gear controls between the wheelhouse and engine should be reinstalled prior to use of the boat for navigation.*

*Install engine stop in wheelhouse prior to vessel being used for navigation.*

*Double clip hose between raw water inlet pipe and water pump using 316 stainless steel hose clips. Only undertake this action when the inlet valve is closed, but complete as soon as possible.*

*Provide support for inline pump and fuel line feeding diesel-fired boiler.*

*Replace braided fuel hoses with flexible hose that is specified to BS EN ISO 7840 or an equivalent standard.*

*Install gas locker and run gas from locker to galley via supported copper pipe.*

*Cut back wooden worktop adjacent to cooker or provide some means to protect the worktop from scorching.*

*Remove free standing butane gas heater from vessel.*

*Have the 240v AC electrical system examined by a marine electrician.*

*Secure 12v batteries in a ventilated battery box.*

*Install 12v electrical system.*

*Secure solid fuel stove in place.*

*Secure diesel-fired boiler in position.*

*Provide ventilation for the upper deck accommodation.*

**List of Advice**

The advice notes given in the report are listed below with their respective page numbers. It is not necessary to carry out advice before use of vessel.

*Strip back to bare metal, treat and paint areas of deck where rust is breaking through.*

*Refill greaser serving rudderstock tube.*

*Treat woodworm affected timber with insecticide.*

*Close large, green, flanged gate valve.*

*Blank off pipework for two redundant skin fittings, one to starboard and one to port of engine compartment.*

*Weld external plates over redundant through hull apertures when the vessel is next dock.*

*Improve fastening of window panels in port side door into galley.*

*Fit high level alarms in each bilge compartment.*

*As a minimum, install a carbon monoxide monitor in the galley.*

*Lag exhaust at least as far as raw water injection point.*

*Fit air filters to engine.*

*Blank off open ended fuel pipe and label fuel filler points.*

*Investigate venting of fuel tanks.*

*Identify the source of water ingress into the back cabin; once leak-free made good the lining in the back cabin.*

*Consider replacing cooker with model fitted with fail failure devices.*

*Locate or fit mains stop cock in vessel.*

*Consider reinstalling original water tank with 12v water pump to provide water when 240v mains electricity supply is not available.*

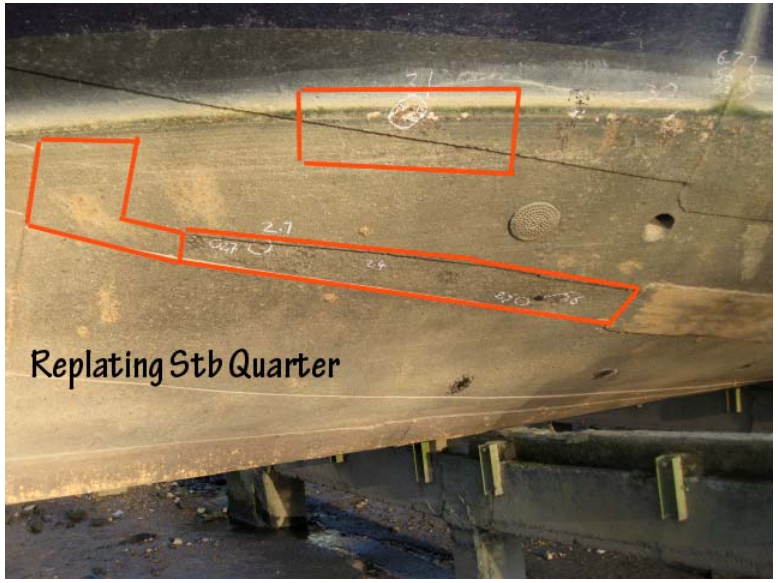
*Install an isolation transformer or at minimum a galvanic isolator.*

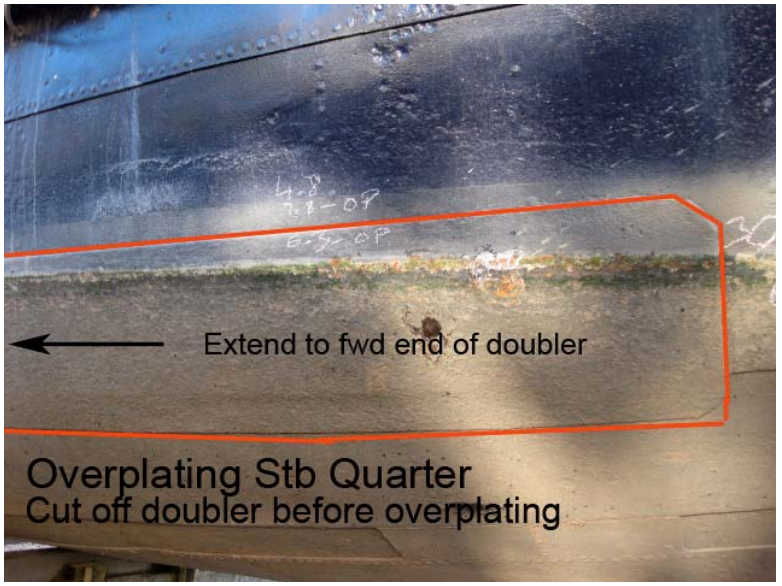
  

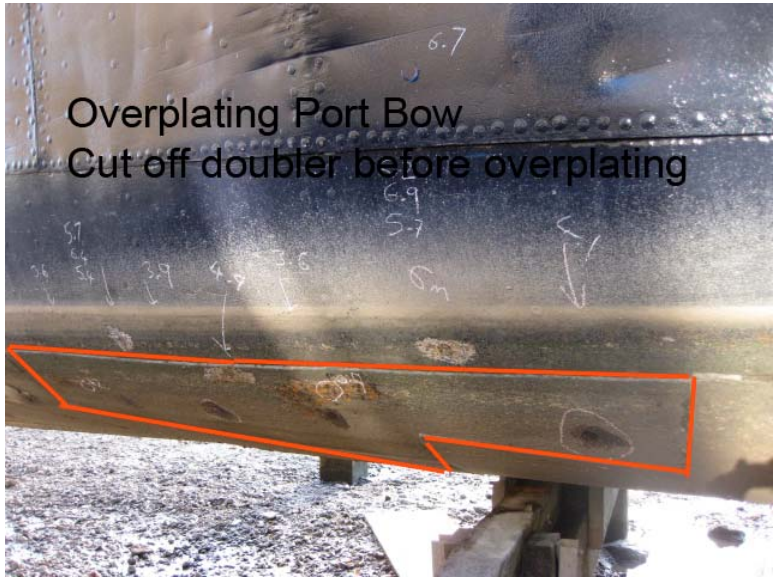
## APPENDIX A: Sketch of Ultrasonic Thickness Measurements

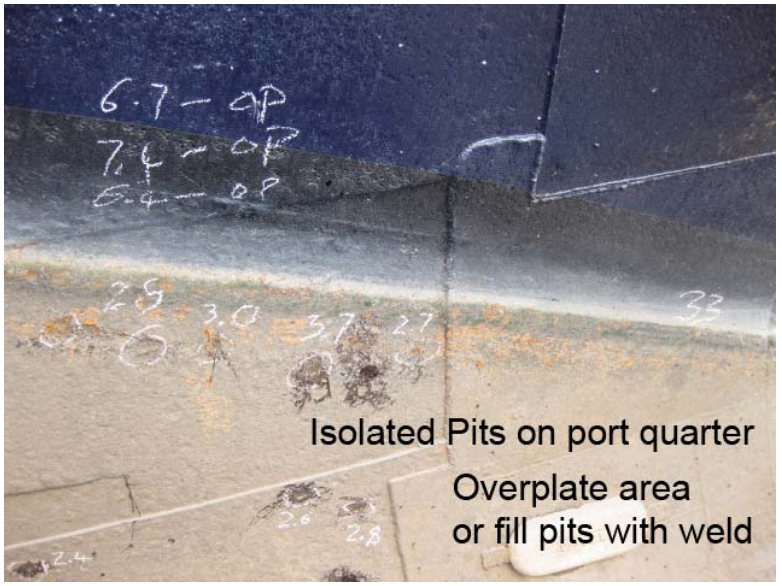
**APPENDIX B:  Photographs Showing Proposed Overplating**

Not all areas are shown in photographs


Replating Stb Quarter


Extend to fwd end of doubler
Overplating Stb Quarter
Cut off doubler before overplating


Overplating Port Bow
Cut off doubler before overplating


Isolated Pits on port quarter
Overplate area
or fill pits with weld


Starboard Amidships
Overplate slot


Starboard Bow
Overplate slot