



OCEAN MARINE SURVEYS

MARINE SURVEYS & CONSULTANCY

PRE-PURCHASE SURVEY OF:

Type Sailing sloop

Name [REDACTED]

Class Twister 28



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ABOUT THIS SURVEY

LIMITATIONS

1. I have not inspected any GRP structures or any other parts of the vessel that are covered, unexposed or inaccessible and I am therefore unable to report that any such parts of the vessel are free from defect.
2. This is a confidential document and responsibility for the contents is only accepted by the undersigned to the above-mentioned client and his agents.
3. This survey report gives no guarantees against faulty design, bad workmanship, latent defect or suitability for the vessel for a particular purpose. It also gives no guarantee that the vessel complies with any European or MCA directives if applicable (unless otherwise specified herein).
4. None of the fastenings were drawn or removed for inspection unless specifically requested (unless otherwise specified herein).
5. My engine inspection does not include any stripping or compression testing and is an assessment of the unit's external visual condition only.
6. Electrically operated pumps have been switched tested but no opinion is given in relation to their internal condition unless flow rate data can be provided.
7. The electrical installation is limited to a general appraisal of the condition of wiring and includes switch testing of circuits. No opinion is given in relation to the design of the system (unless otherwise specified herein).
8. Fuel and water tanks have only been examined externally whilst in situ and no pressure testing or testing for contamination will be carried out (unless otherwise specified herein).
9. No stripping out of the vessels fixed linings was carried out (unless otherwise specified herein).
10. The mast, spars and rigging were examined with the mast as found. As the mast was stepped, only the lower parts of the mast and rigging were examined.
11. My examination of sails is limited to sampling the condition of the fabric, stitching and rope work. No opinion is given in relation to their shape and degree of stretch. Spinnakers and lightweight running sails are not included in my examination. Sails are only examined if they are aboard at the time of the survey and laying them out will depend upon weather conditions. Sails will not be hoisted if the vessel is ashore.
12. The anchor chain is only partially removed for inspection unless it is specifically requested that the whole length should be flaked out. No opinion is given as to the chains compatibility with the associated windlass gypsy, if fitted.
13. Although the service dates of life saving equipment present at the time of the survey is noted in this report, my examination does not extend to an assessment of condition or the condition of tenders and other movable items.
14. Stability and performance were not assessed.



ITEMS INSPECTED IN THIS SURVEY (PRE-PURCHASE)

Hull, Deck & Structure

1. Details of vessel
2. General description, dimensions, registration etc.
3. Keel & attachment to hull
4. Hull below waterline
5. Moisture readings and osmosis check / hull soundings on steel vessel
6. Topsides above waterline including rubbing strake etc.
7. Deck moulding
8. Coachroof
9. Cockpit
10. Hull/deck join
11. Bulkheads and structural stiffening including internal mouldings

Steering, Stern Gear and Skin Fittings

12. Rudder and steering
13. Stern gear
14. Cathodic protection
15. Skin fittings and other through hulls

On Deck

16. Main companion way and accesses to accommodation
17. Ports & windows etc.
18. Pulpit, pushpit, stanchions, lifelines and jackstays
19. Rigging attachment points
20. Ground tackle and mooring arrangements
21. Other deck gear and fittings

Rig

22. Spars
23. Standing rigging
24. Running rigging
25. Sails & covers etc.

Safety

26. Navigation lights
27. Bilge pumping arrangements
28. Fire fighting equipment
29. Lifesaving and emergency equipment

Engine

30. Engine & installation
31. Fuel system

Accommodation and Onboard Systems

32. Accommodation general
33. Gas installation
34. Fresh water tanks and delivery
35. Heads
36. Electrical installation
37. Electronic and navigation equipment



RECOMMENDATIONS

Categorisation of defects will be presented as follows:

Recommendations (R) will be written in bold. These will be restricted to serious defects, which should be rectified before the vessel is used (or within a given time span if specified) and are items that may affect insurability.

Suggestions (S) will be written in bold italics. These are items that should be addressed in the near future in order to prevent further problems and/or to maintain value. If not addressed, these items may later become more serious safety or structural issues. Timescales may be applied.

Cosmetics (C) will be written in italics. These are items that are purely cosmetic and have no relevance to safety or structure of the vessel. If addressed some of these items may enhance the vessel's value or saleability.

The items above are contained in the body of the report in order that they may be read in context. The **(R) Recommendations** are also listed as part of the conclusions at the end of the report.

CONDITIONS OF SURVEY

At the request of Mr. [REDACTED] the following survey was carried out at Yacht Haven Quay, Plymouth on the [REDACTED] 2013. The purpose of my examination was to ascertain the vessel's condition within the scope of a pre-purchase survey.

The vessel was examined ashore in a cradle, resting on her keel. As the vessel was not examined afloat I cannot guarantee her watertight integrity.

According to information from the broker the vessel has been ashore for a period of approximately 4 months. Prior to this she was afloat for the summer season of 2012.

There was a large amount of equipment stowed in the cockpit locker to starboard, which to a degree hindered my examination of this area.

The weather conditions on the day of my examination although very overcast, were dry and I was able to take a full set of reliable moisture readings from the deck and from the hull both above and below the waterline.



HULL DECK & STRUCTURE

DETAILS OF VESSEL

The following was derived from broker's details, observations made during the course of my examination, as well as information from the Twister class owners' association; as such I cannot guarantee the accuracy of all of this information.

Type	Auxiliary Bermudan Sloop	
Class Name	Twister 28	
Designer	C.R. Holman	
Builder	Tyler - Uphams	
Year Built	[REDACTED]	
Construction	GRP	
Engine	[REDACTED]	
Engine Year	2006 (no documentation seen)	
Registration	[REDACTED] (seen on coachroof only)	
Principal Dimensions	LOD	8.61 m
	Beam	2.46 m
	Draught	1.52 m

As the vessel was built in the EU prior to 15th June 1998 there was no requirement for it to meet the standards of the Recreational Craft Directive (RCD), hence no such documentation exists.

As the vessel was built in the UK prior to 31st December 1984 she can be considered tax-exempt. To qualify for tax-exempt status it may need to be proven that the vessel was physically in the EU on the 31st December 1992 if queried by HMRC. Although this can be difficult, such documented evidence should be sought if possible.

No documentation was available at the time of survey.

GENERAL DESCRIPTION

External

The vessel is of heavy displacement with a long encapsulated keel and transom hung rudder. The hull is of GRP laminate construction with a raked bow and counter hung transom.

The deck is also of GRP laminate construction with the coachroof and deep self-draining cockpit integral with the deck moulding. There is a large locker in the cockpit to starboard and a gas storage compartment to port.

Access to the accommodation is through a traditional style companionway forward of the cockpit.



Internal

The interior is of traditional layout with cushioned bench style saloon seating to port and starboard. The galley is aft and to starboard comprising a 3 burner stove and sink unit. There is a chart table area aft and to port with lifting lid for chart stowage. Aft of the chart table is a further stowage area extending under the cockpit seating.

The heads compartment forward and to starboard comprises a toilet unit and some small lockers for stowage of toiletries. Opposite the heads compartment there is a large wet locker to port that drains directly into the main bilge.

The forepeak comprises 2 single berths and access to the anchor locker forward.

The engine is located beneath the companionway steps.

KEEL

The long keel is encapsulated in GRP integral with the hull moulding. A compass held close to the keel was not found deflecting suggesting the ballast material to be of lead.

Visual examination of the keel externally found it to be in good condition with no evidence of significant impact or abrasion damage noted, other than some minor scuffing on the underside commensurate with light contact in mud or soft shale. Hammer sounding did not reveal any evidence of delamination between the GRP sheathing and lead ballast.

Visual examination of the top of the keel from inside the cabin did not reveal any evidence of swelling or cracking of the over lamination or seepage. It should be noted that access to this area of the vessel was partially limited by the presence of a flexible water tank.

HULL BELOW WATERLINE

The hull is of single skin laminate panel construction reinforced by a series of plywood bulkheads laminated into the skin moulding during construction. Visual examination of the hull below the waterline did not reveal any evidence of stressing in way of internal members or evidence of impact or abrasion damage. No areas of repair were noted.

Light hammer sounding of the hull below waterline did not reveal any voids or areas of delamination.

The red antifoul is carried a few inches above the waterline. This coating has begun to flake in isolated areas over the years where it has subsequently been over coated. It would be of benefit to clean up any existing areas of loose antifoul with coarse sandpaper or wire brush before the application of further coats. Although the antifoul is beginning to become slightly built up I do not consider it necessary to strip at this stage unless a completely smooth finish is desired.



Note: many boatyards offer the removal of old antifouling by slurry blasting. Be aware that gelcoat and epoxy coatings can easily become damaged during this process and it is therefore not recommended.

MOISTURE READINGS AND OSMOSIS CHECK

The hull was cleared of antifoul in 12 areas chosen at random of approximately 70mm x 70mm plus 2 further areas on the rudder to reveal an epoxy coating.

Moisture readings were taken in those areas cleared of antifouling using a capacitance type moisture meter of Sovereign Quantum type, operating in both shallow and deep reading modes. The meter was first checked for correct calibration.

The readings are on a relative scale and **do not** express moisture content as a percentage of dry weight. Readings were taken both above and below waterline in order to obtain a comparison. High moisture content is not generally a structural defect, and is to be expected in older boats. However where some moisture has been absorbed the likelihood of moisture related problems occurring is higher, and the actual state of the laminate cannot be completely guaranteed without destructive testing followed by chemical analysis. The opinion given in this survey is based on all the evidence available at the time but without destructive testing.

See Appendix for Suggested Guideline Interpretation of Moisture readings.

Air temperature	8.3 C
Surface temperature	8.5 C
Relative humidity	59.5%
Dew point	7.7 C
Precipitation	None
In summary conditions for obtaining moisture readings were good	

Readings were as follows:

Meter	Range below waterline	Range above waterline
Sovereign Quantum, scale 0 – 100	18 - 21	17 - 20
Deep mode	No appreciable increase	No appreciable increase

These moisture levels can be considered very acceptable. Although some moisture is present at low levels it is of no particular concern. For all practicable purposes the laminate can be considered dry.

Visual examination of the areas cleared of antifoul did not reveal any visibly detectable signs of moisture related defects and the epoxy coating was found to be adhering well. No information on the age of the epoxy coating was available to me at the time of the survey. A discussion with the owner of the vessel revealed that he was



unaware that the vessel had epoxy coatings, illustrating that the existing coatings must have been applied prior to his ownership of 12 years. Examination of the hull around skin fittings and along the waterline suggests that the coatings were added as a preventative measure rather than as part of an osmosis treatment. However, without scraping further through the coatings to determine whether or not the gelcoat has been removed (as it would have been in the case of an osmosis treatment) this is sometimes difficult to confirm. Regardless of the above, the low moisture readings, absence of visibly detectable moisture related defects and elapsed time since application suggest that the epoxy coatings (whatever their nature) have been successfully applied.

Storing a yacht ashore out of season to allow some natural drying is good practice with a GRP hull and will contribute significantly to maintaining its current condition.

TOPSIDES ABOVE WATERLINE INCLUDING RUBBING STRAKE ETC

The topsides are finished in the original white gelcoat and were seen in good condition. There was one very small area of impact damage approximately the size of a 5 pence piece amidships and to port. This damage was seen approximately 25cm below the rubbing strake where a localised gelcoat repair has been undertaken. Moisture readings taken over this area of damage were not raised and hammer sounding did not reveal any delamination or dead areas where moisture may have been absorbed. The repair itself was found adhering well and as such is of little significance.

There have been various repairs up the stem the and on the corners of the transom that are of fair quality, however as far as could be ascertained the visible damage in these areas is limited to minor gelcoat chips and the repairs only cosmetic. Moisture readings taken in these areas were not found raised and gently hammer sounding did not reveal any delamination. All repairs found adhering well.

The rubbing strake is integral with the hull moulding and was seen in good condition with no significant damage noted.

DECK MOULDING

The deck moulding is of laminate panel construction utilising a core material for panel stiffness. Where this core material was visible in way of a vent in the heads compartment it was found to be foam. Also where visible plywood was seen incorporated in way of load-bearing fittings.

The deck was found firm underfoot and light hammer sounding did not reveal any voids or areas of delamination.

The non-slip surface is achieved via a diamond print moulded into the original gelcoat finish although this has now been refinished with non-slip paint. This paint is flaking off in a number of areas and now detracts from the overall aesthetics to some degree. Cleaning up and re-finishing the non-slip areas would certainly enhance the vessel's overall appearance. (See figure 1).





Figure 1

Non-slip is paint flaking in areas over the deck and coachroof.

(C) Give some consideration to cleaning up and reapplying non-slip paint to the areas of the deck and coachroof where the existing coating is flaking.

Visual examination of the deck did not reveal any significant areas of stress crazing and no evidence of significant impact or abrasion damage was noted.

Moisture readings taken over the area of the deck were in a range of 17 – 28 with no appreciable increase on deep reading mode. These readings indicate that although some moisture is present in the structure of the deck the levels are low and of no great significance.

There is a varnished teak capping-rail, found secure although the varnish is beginning to peel and look unsightly. This rail could either be stripped of varnish completely to be left bare or refinished as desired. The timber below the varnish coating is in good condition.

COACH ROOF

The coach roof is of GRP laminate panel construction and is integral with the deck moulding. The coach roof was found firm underfoot and light hammer sounding did not reveal any voids or areas of delamination.

The non-slip surface is achieved via a diamond print moulded into the original gelcoat, which again has been refinished in non-slip paint and may benefit from some attention as already discussed above.

There are 2 teak handrails, one on either side of the coach roof, both found secure. Again these are finished in varnish, which is currently in poor condition.

No distortion was noted in the way of the deck-stepped mast.



No life raft was seen aboard but moulded GRP mounts were seen secure on the coach roof with eyebolts for a lashing a life raft into position.

COCKPIT

The self-draining cockpit is integral with the deck moulding. The cockpit was found firm underfoot and light hammer sounding where possible did not reveal any voids or areas of delamination.

The cockpit seating has been overlaid with timber planking that was found secure and in good condition however examination of the laminate beneath this planking was not possible.

Removable varnished planking is laid over the cockpit floor, seen in good condition. This planking was lifted to reveal Tread Master non-slip bonded to the original finish. Again, the cockpit sole was found firm underfoot but due to the covering I was unable to make any appraisal of the condition of the GRP laminate or core material in this area.

There is a deep cockpit locker to starboard and a smaller gas stowage locker aft and to port. Both of the locker lids were found secure on their hinges. All associated catches were found secure and in good condition.

There were 2 areas of stress crazing noted on the port side of the cockpit well and a further area of crazing at the aft end of the cockpit to starboard. Moisture readings taken over the areas of this crazing were not raised and hammer sounding did not reveal any delamination as such I do not consider these to be of any structural significance. (See figure 2).



Figure 2
Areas of crazing in cockpit well to port.



The appearance of this crazing will be greatly reduced if it is cleaned or polished and a heavy coat of wax applied annually will help prevent any moisture ingress to the laminate in the future.

HULL DECK JOIN

The hull to deck joint is formed by the bulwarks whereby the upward flange of the deck forming these bulwarks marries up to the upper sides of the hull. During construction the deck is lowered into the hull to the correct level and supported whilst the joint is over laminated from the inside the vessel. A gap left between the hull and deck mouldings is then filled with thickened resin consolidating the joint. This forms a very robust joint indeed, far stronger than the joints one would typically find in modern construction.

Visual access to this joint internally was very limited but during the course of my examination no evidence of movement or seepage was noted.

BULKHEADS AND STRUCTURAL STIFFENING INCLUDING INTERNAL MOULDINGS

A number of components contribute to the overall structure of this vessel, which can be considered robust. These components are as follows:

- The hull moulding of laminate panel construction is much thicker than one would expect to find in modern yacht construction and as such can be considered substantial.
- Transverse rigidity is achieved by a number of timber intermediate bulkheads laminated into the shell moulding as well as the main structural bulkheads forward of the saloon and forward of the heads compartment.
- Stringers laminated into the hull above the waterline provide longitudinal rigidity. The moulding of the encapsulated long keel provides significant additional longitudinal rigidity.
- The mast compression loadings are distributed via 4 compression posts associated with the 2 main bulkheads forward of the saloon and forward of the heads compartment. Each bulkhead has 2 compression posts, one on either side of the central doorway. A beam then runs athwart ships bridging each pair of compression posts. On deck a substantial galvanised mast foot bridges longitudinally across these 2 beams distributing the mast compression loadings down through all 4 compression posts to the hull moulding.
- The various items of cabinetry laminated into the hull moulding provide further longitudinal and transverse rigidity.

Visual examination of the structure revealed 2 areas where the tabbing between plywood intermediate bulkheads and hull moulding has become detached as follows:



1. Intermediate bulkhead immediately forward of the forward most main bulkhead. The tabbing associated with this intermediate bulkhead has failed on the aft side of the bulkhead to port. Access to this area of tabbing can be gained under the berth to port. (See figure 3).
2. Intermediate bulkhead immediately forward of the galley to starboard. The tabbing associated with this intermediate bulkhead has failed on the aft side of the bulkhead. Access to this area of tabbing can be gained through the small cabinet door below the stove.



Figure 3

Tabbing detached from intermediate bulkhead in forepeak.

I do not consider this defect to be of structural significance at this stage. However it is prudent to address these minor defects early before they develop into more significant structural problems. An easy repair can be carried out to the areas outlined above by prising the tabbing away from the bulkhead and injecting thickened epoxy. Additional reinforcement can then be added by through bolting the tabbing onto the bulkhead using 5mm pan head bolts with penny washers on each side.

(S) Give some consideration to a suitable method of repair with regards to the detached tabbing in the 2 areas outlined above. Failure to address this currently minor defect in a timely manner could lead to a more significant and costly repair in the future.



STEERING, STEERING GEAR AND SKIN FITTINGS

RUDDER AND STEERING

External

The transom-hung rudder is of laminate panel construction with a core material used in the areas below the waterline (core material undetermined). Above the waterline the rudder tapers into the GRP box section rudderstock, which as far as can be ascertained by hammer sounding, is hollow.

The rudder is supported by 2 pintles above the waterline to the transom, a stainless steel strap to the keel immediately below the recess for the propeller and a bushing at the rudders lower end housed within the keel moulding.

Visual examination of the rudder did not reveal any evidence of impact, abrasion damage or repair and no undue play was noted in any of the rudder pintles or mounting fixtures. No signs of splitting around the perimeter of the rudder were seen. Where possible all external bolts were hammer tested and found secure.

Hammer sounding over the surface of the rudder blade did not reveal any voids or areas of delamination and moisture readings taken from the 2 areas cleared of antifoul were in a range of 26 – 32 on shallow reading mode with no significant increase on deep mode. Again these readings can be considered very acceptable for a rudder of this type of construction.

The tiller hood is of stainless steel and found secure with a wooden tiller in good condition. A spare tiller was also seen in the wet locker.

STERN GEAR

External

The 3 blade fixed propeller is of right-hand rotation, constructed of manganese bronze (or similar). The propeller was seen secure on the stainless steel shaft with a drilled nut and split pin to prevent the nut from backing off. Visual examination of the propeller did not reveal any evidence of dezincification further to which it was noted that the propeller looks to be quite new, although no documentation was seen to support this statement.

A small amount of play was noted in the Cutless style bearing although still considered to be in serviceable condition at this time. Some thought should be given to replacement of this item over the next 2 or 3 years depending on use as part of the vessel's ongoing maintenance.

The bearing housing is mounted to the aft of the long keel. A small area of the antifoul was scraped back from the housing to reveal a bright shiny surface with no significant evidence of dezincification noted. As such this housing can be considered to be of bronze (or of a similar dezincification resistant material). External bolts were hammer tested and all were found secure and in good condition.

The shaft was easily rotated by hand.



Internal

Internally no evidence of seepage was noted from the traditional style stuffing box seen secure and in good condition, mounted directly to the hull moulding.

Where visible the shaft inside the vessel was seen in good condition with an R&D coupling between the shaft and gearbox, all found secure.

CATHODIC PROTECTION

Cathodic protection is provided by a stud-mounted hull anode. Continuity was established to this anode from the engine, gearbox, stuffing box and bearing housing. It was noted however, that there is no continuity to the propeller shaft or the propeller itself. The absence of any cathodic protection to the propeller shaft and propeller will promote galvanic corrosion between these two items. It crosses my mind that the current propeller may indeed be a recent replacement due to damage to the previous propeller by this lack of cathodic protection.

The absence of any bonding to the propeller shaft and propeller can be explained by the presence of the R&D coupling. This plastic unit isolates the shaft from the engine thus excluding it from the bonded system. To reinstate cathodic protection to the shaft R&D can supply a silver impregnated rubber element to be installed between the 2 fail-safe straps of the coupling. A guide to the installation of this item can be found at the following web address:

<http://www.randdmarine.com/flexiblecinst.asp>

(R) Install R&D silver impregnated rubber element to flexible coupling establishing continuity across the R&D coupling to provide galvanic protection to the shaft and propeller. Ideally this should be carried out prior to re-commissioning of the vessel.

Note: It can be considered good maintenance to withdraw the shaft periodically to check for evidence of pitting, crevice corrosion or excessive wear in way of seals or bearings. As the shaft has not been withdrawn as part of my examination I am unable to comment on the condition of the section of the shaft hidden within the bearing housing, stern tube or water seals.

SKIN FITTINGS AND OTHER THROUGH HULL APERTURES

No skin fittings or valves were dismantled as part of this survey but the following routine tests were carried out:

- Examination from outside and inside the boat.
- All valves opened and closed to their full extent where possible.
- Any fixing bolts hammer tested where accessible.
- Bodies of the valves or seacocks tested with a hammer inside the boat and external parts hammer tested outside the boat.
- Skin fittings and valves scraped back in places to check for visible corrosion.
- Fittings aggressively tested inside the boat for security in the hull.
- Hose clamps inspected and hoses aggressively tested for security.



The following through hull fittings were seen below the waterline:

1. 2 x cockpit drains - skin fittings with gate valves.
2. Engine cooling water inlet - skin fitting with ball valve.
3. Galley sink outlet - skin fitting with ball valve.
4. Toilet water inlet – Rowe seacock (seized).
5. Toilet water outlet – Blakes seacock (seized).

All of the above skin fittings, ball valves and seacocks were found secure in the hull and in good condition opening and closing to their full extent with the exception of items no. 4 & 5, which were found seized. External flanges were scraped back and found bright and as such can be assumed of bronze or of a similar dezincification resistant material. 2 hose clamps have been used to secure the associated hoses to each of the through hull fittings below the waterline as is best practice.

Items 4 & 5 above associated with the toilet unit require freeing off and servicing. It is good maintenance to dismantle these cone style seacocks on an annual basis for inspection, cleaning and re-greasing.

(R) The 2 seacocks associated with the toilet unit are both seized and require servicing. This should be done before continued use of the vessel.

Wherever visible all associated hoses were examined, found secure to their associated appliance and in good external condition.

The following through hull fittings were seen above the waterline:

1. Gas locker drain - plastic skin fitting.
2. Manual bilge pump outlet - plastic skin fitting.
3. Electric bilge pump outlet - plastic skin fitting.
4. Obsolete outlet in the transom - plastic skin fitting (see notes below).
5. Engine exhaust outlet - stainless steel skin fitting.

All of the above through hull fittings were found secure in the hull and in good condition. All associated hoses were found secure with either 1 or 2 hose clamps and where visible seen in good condition with no evidence of seepage.

Note: item number 4 is obsolete. There is a section of hose attached to this fitting in the transom which can be seen running below the cockpit seat to the forward end of the cockpit locker to starboard but then terminates with nothing to close it off. It would be possible that in a following sea, water could enter through this fitting and drain directly into the cockpit locker. This fitting should be securely blocked off.

(R) Give some consideration to a suitable method of blocking off the obsolete through hull fitting above the waterline in the transom to starboard. This should be done before continued use of the vessel.



ON DECK

MAIN COMPANIONWAY

Access to the accommodation is via the traditional companionway at the forward end of the cockpit. The companionway comprises a moulded sliding hatch with 2 wooden washboards that have been fitted with an unusually robust locking mechanism. All found secure and in good condition with no evidence of seepage.

PORTS & WINDOWS ETC

Ports and windows are as follows:

- 1 x Lewmar opening hatch over the forepeak - aluminium frame with polycarbonate (or similar) lens.
- 6 x fixed port lights, 3 on either side of the coach roof - aluminium frames with glass lenses.

All of the above were found secure and in good condition with no evidence of seepage. The fore hatch was found opening and closing freely with seals intact and clamps secure. This unit can be opened from outside as well as from inside the vessel. It was noted that the fore hatch is not the original installation but a Lewmar replacement installed to a good standard.

PULPIT, PUSHBIT, STANCHIONS, LIFELINES AND JACKSTAYS

The pushpit, pulpit and stanchions are all of stainless steel with stainless steel feet. All were found secure to the deck. It was noted that the pulpit has been damaged insofar as the starboard side has been bent inwards to a small degree and the forward most upper rail forming the U-shape around the bow has been bent downwards through approximately 25 degrees. This latter damage has also caused the associated up-rights to crush inwards in way of the welded joints. This may be difficult to repair without some degree of re-fabrication or reinforcement.

(S) Give some consideration to a suitable method of repair and reinforcement to the forward most U section of the pulpit. This item has been bent downwards, partially crushing in the associated upright sections of stainless tubing at the welded joints.

The guard wires are 1 x 19 stainless wire found secure at each end. At the aft end of the guard wires the terminals have been lashed such that they can be cut to help facilitate the recovery of a man overboard. It was noted that these lashings are looking somewhat rotten and would now benefit from replacement.

(R) The stainless steel guard wires are secured by lashings at the aft end. These lashings look somewhat rotten and require replacement. This should be done before continued use of the vessel.

A pair of webbing jackstays was seen stowed in the forward cabin and in good condition. In my opinion it is always good practice to remove webbing jackstays when not in use to reduce unnecessary UV damage and wear. Although no dedicated



fittings were seen on deck for attachment of these jackstays it would be possible to secure them between the deck cleats, which can be considered suitably robust.

There is a stainless steel antenna mast on the aft port quarter found secure and in good condition. Atop this mast is a GPS mushroom antenna and 2 wire antennas, the purpose of which I cannot be sure although I suspect one may be for the FM radio. Further to this there is a Navtex antenna and a further GPS mushroom antenna both mounted securely on the stern rail.

RIGGING ATTACHMENT POINTS

Rigging attachment points are as follows:

- Forestay
- Removable inner forestay
- Cap shrouds
- Forward diagonals
- Aft diagonals
- Split backstays

The forestay attaches to the stem head fitting which is integral with the anchor roller. This unit is of stainless steel and found securely through bolted into the hull and foredeck. As far as can be ascertained the stem head fitting has been modified at some point to extend the flanges that lie on the port and starboard side of the hull and around the stem. Although this modification looks somewhat home made it was found secure and will benefit the overall strength of this fitting. (See figure 4).



Figure 4
Modification to stem head fitting.

All bolts associated with the stem head fitting were examined from inside the anchor locker and found secure with penny washers and double nuts.



The removable inner forestay attaches to a D-bolt through bolted into a plywood backing plate visible on the underside of the deck.

The shrouds and diagonals are attached to D-bolts, which are through bolted into the deck. Beneath the deck are GRP knees laminated to the underside of the deck and to the hull. The D-bolts are mounted such that the legs pass through the deck one on each side of these laminated knees. Where visible all nuts associated with the D-bolts were found secure and in good condition.

The split backstays are attached to chain plates that are through bolted into the transom. These chain plates were seen secure, lying flush to the transom and in good condition.

GROUND TACKLE AND MOORING ARRANGEMENTS

The main anchor is a galvanised 25lb Sowester of plough type. The anchor was seen attached to a length of 8 mm galvanised chain using a stainless steel swivel type anchor link. The chain was not laid out and examined link by link however the first few meters flaked out were found in serviceable condition. Bitter end not established. The anchor itself is considered suitable for inland waterways and estuaries in fair weather but should be increased to 30 - 35lbs before the vessel is used for offshore sailing.

The anchor windlass is a manual unit manufactured by Simpson Lawrence, S-L Hyspeed comprising a gypsy and capstan. This unit was found in good condition externally and secure to the deck. When raising the anchor the unit was found operating smoothly but it was noted that the clutch mechanism associated with the gypsy for deploying the anchor is seized and requires freeing off.

(S) Give some consideration to servicing the anchor windlass with regard to the seized clutch mechanism. Note: deploying the anchor by hand is still possible in its current condition.

The kedge anchor is a galvanised 10 kg Bruce type. The anchor was seen in good condition stowed in the wet locker to port with a short length of 8mm chain seen in serviceable condition but not laid out and examined link by link.

Deck cleats are as follows:

- 2 x aluminium deck cleats forward with associated fairleads.
- 2 x plastic cleats mounted on sliders on the jib track.
- 2 x aluminium deck cleats aft with 2 sets of associated fairleads, one set on the capping rail outboard and a 2nd set on the capping rail in way of the transom.

All of the above were found secure and in good condition. The plastic cleats mounted on the jib track were found sliding forward and aft freely such that the position can be adjusted as necessary. Note: these track-mounted cleats are significantly less substantial than the fore and aft mounted deck cleats.



The stem head fitting comprises an anchor roller to starboard and a 2nd position to port to facilitate taking a line over the bow to the capstan associated with the anchor windlass. All found secure and in good condition. There is a pin to prevent the anchor jumping off the anchor roller in rough weather however the anchor fluke is too deep to enable this pin to locate properly.

(R) Give some consideration to a suitable method of securing the anchor to prevent it from jumping off the roller in rough conditions. This should be done before continued use of the vessel.

OTHER DECK GEAR AND FITTINGS

Winches seen aboard as follows:

- 2 x primary winches in cockpit Barlow 25
- Halyard winch on port side of mast Gibb UK
- Halyard winch on starboard side of mast Gibb UK
- Plastic reefing winch on boom port Plastimo
- Plastic reefing winch on boom starboard Enkes KS2

All winches are of non self-tailing type. All found turning freely with no appreciable wear in their spindles.

All other deck hardware was found to be mostly original and in serviceable condition. All found secure to the deck and where visible adequate backing plates were seen.

RIG

SPARS

Mast

The deck-stepped mast is of aluminium, anodised in a gold colour. There is a single set of in line spreaders seen secure in their brackets and the brackets secure to the mast. There is an internal track for mainsail sliders and a track for the spinnaker pole mounted on the front with associated car and pole attachment toggle. When the shrouds were swigged aggressively forward and aft no undue movement was noted at the spreaders.

My examination of the mast from deck level and up to a height of 2m above the deck found the mast to be in good condition with no significant corrosion around fixtures and fittings. When eyed from the deck the mast was seen in column.

Boom

The boom is also of aluminium, anodised in a gold colour. This roller style boom has been adapted for conventional use as a fixed spar and a through bolt has been inserted where the roller mechanism would previously have been to prevent it from turning.

No corrosion of any significance was noted around any of the fittings and fixtures. The gooseneck fitting was found secure and in good condition with no undue play.



Other

There was a single gold anodised spinnaker pole seen attached to retaining brackets on deck. Although this has clearly seen some aggressive use over the years it is still in serviceable condition. Jaws at each end were found opening and closing freely.

Note: the broker's inventory refers to the vessel as having 2 spinnaker poles but only one was seen aboard at the time of my examination.

STANDING RIGGING

The vessel was examined with the rigging set up hard. The masthead rig utilises 1 x 19 stainless rigging wire with swaged terminals at the upper end and Norseman type terminals at the lower end. The bottle screws are all open bodied type chrome plated bronze with the exception of the backstays that utilise the older style closed bodied stainless steel bottle screws. Note: these stainless steel closed bodied type bottle screws have been out of production for approximately 18 years.

It is understood that the rigging was replaced in 2006 although no documentation of this was seen at the time of my examination. The old-style bottle screws associated with the backstays does raise the question as to whether or not all elements of the rigging were replaced. Perhaps the owner of the vessel can shed some light on these details.

(S) Give some consideration to determining which elements of the rigging were replaced in 2006 and whether or not there is any supporting documentation to prove this.

Rigging dimensions as follows:

Split backstays	6mm
Aft diagonals	6mm
Cap shrouds	6mm
Fwd diagonals	6mm
Removable inner forestay	6mm
Forestay	(not examined)

All of the rigging at deck level was examined and no defects were noted. Note: the forestay inside the foil was not visible and therefore not examined.

The headsail furler manufactured by Furlex was found rotating freely and in good condition. The foil was found secure in the furler and also in good condition. There is a toggle between the stem head fitting and the forestay to allow full articulation of the rig at this point.

RUNNING RIGGING

As far as can be ascertained all of the running rigging was present. The mainsheet and lines associated with the main traveller were seen stowed in the forepeak and were found in good condition. The halyards were seen on the mast, slightly worn and green with algae. If these halyards were to be washed I'm confident they would come up



clean but it is difficult to determine the degree of UV degradation until this has been done.

I did not see a spinnaker halyard aboard further to which it was noted that there is currently no block at the masthead to accept one.

Although replacement of the running rigging is not necessary at this time some consideration may have to be given to its replacement over the next few seasons.

Note: running rigging was examined from deck level only and not examined where lines or halyards pass inside the mast or spars.

SAILS AND COVERS ETC

The following sails were examined:

- | | | |
|---------------------|-----------------|---------------------|
| • Mainsail | Mouse Sails | Sail No. [REDACTED] |
| • Genoa | Mouse Sails | |
| • Working/No. 2 jib | RB Sails | |
| • Storm Trisail | Hong Kong Sails | |
| • Storm/No. 3 jib | Hong Kong Sails | |

All of the above sails are of Dacron construction and found in good condition. The mainsail and genoa are clearly newer than the rest of the sails although no information on the age of any of the sails was available at the time of survey.

The sacrificial strip on the foot of the genoa is suffering from some UV damage and the stitching in this area is beginning to fail. At the very least the foot of this sail requires re-stitching but I would give some consideration to improving on the material used for the sacrificial strip in this area which differs from the material used on the leech.

(S) Give some consideration to reworking the sacrificial strip associated with the foot of the genoa.

The following canvasses were seen aboard:

- Spray Hood
- 2 x Dodgers
- Mainsail Cover

The blue canvas spray hood is beginning to show some significant signs of age. Much of the stitching is failing and although the canvas and windows are still in reasonable condition I question the value in trying to re-stitch this item. It may be that the spray hood would see one more season's careful use but beyond that it has little further value.

(S) Give some consideration to replacing the spray hood over the next season or two.



The blue monogrammed dodgers were seen stowed in the cockpit locker to starboard. Although these items are somewhat worn they are still in serviceable condition.

The blue canvas mainsail cover was seen stowed in the forepeak and in good condition.

SAFETY

NAVIGATION LIGHTS

The vessel is fitted with the following navigation lights:

- Bi-colour on pulpit (not working)
- Stern light
- Tricolour (masthead)
- Anchor light (masthead)
- Steaming light
- Foredeck light

All of the lights were tested and can be confirmed working at the time of my examination with the exception of the bi-colour light on the pulpit. Therefore, once all lights have been serviced and/or confirmed working the vessel will conform to the current regulations for this length overall.

(R) Service the bi-colour bow light as necessary. This should be done before continued use of the vessel at night.

BILGE PUMPING ARRANGEMENTS

The manual bilge pump is a Henderson Mk V, which is installed in the side of the cockpit well to port. This unit was operated using the handle found stowed in a locker in the main saloon to port, found moving freely. Without flow testing this unit I cannot guarantee the pump's integrity or flow rate. All associated hoses were found secure.

There is an electric bilge pump located in the keel sump however I was unable to gain visual access to this item due to the location of the fresh water tank.

A switch on the main distribution panel engages the electric bilge pump. When this pump was operated it was found to remove the small amount of bilge water present at what I would consider to be a satisfactory rate. However without measuring this flow rate and comparing it with the manufacturer specifications I cannot guarantee the unit's efficiency.



FIRE FIGHTING EQUIPMENT

The following fire fighting equipment was seen aboard:

- Sentinel fire blanket in galley
- 1kg powder extinguisher at chart table, manufactured 11/2000
- 2kg powder extinguisher in cockpit locker, manufactured 08/2000 (gauge in green)

Although this is a sensible inventory of fire fighting equipment for a vessel of this size, in the absence of any service history consideration should be given to having the extinguishers serviced by an authorised service centre or replaced with up-to-date units of a suitable BS standard.

(S) Give some consideration to having the fire extinguishers serviced by an authorised service centre or replace them with up-to-date units of a suitable BS standard.

Note: in some cases the absence of up-to-date fire fighting equipment can affect insurability.

LIFE-SAVING EQUIPMENT

The following life saving equipment was seen aboard:

- 2 x horseshoe buoys with associated flashing lights (not seen working)
- Throw line (home-made)

The above-mentioned horseshoe buoys were seen in good condition. Brackets were seen mounted on the pushpit for these items. It was noted the associated flashing lights were not working and it may be that new batteries are required.

(S) Give some consideration to servicing the flashing lights associated with the horseshoe buoys as necessary.

The RNLI operate an excellent free inspection and advice service concerning levels of safety equipment (SEA check) and can be contacted on 0800 328 0600 or via the RNLI website www.rnli.org.uk.

ENGINE

ENGINE AND INSTALLATION

Access to the engine spaces is from behind the companionway steps as well as through a removable panel on the inside of the cockpit locker and through a further removable panel in the locker behind the chart table to port. The engine space was found tidy and in good condition.



The engine beds are of moulded GRP formed over what are most likely to be timber bearers (but not confirmed). This arrangement is laminated into the hull moulding.

The engine mounts were all found secure and in good condition with no significant corrosion.

Engine details as follows:

Engine: [REDACTED]
Cylinders: 2
Fuel Type: Diesel
Power: 16 hp
Cooling: Fresh water
Hours: 152.4

It is understood that this engine was a new installation in [REDACTED] although no supporting documentation of this was seen at the time of survey.

The engine was found mostly clean but with some minor evidence of wear noted on the cabinetry surrounding the engine in the vicinity of the fan belt. The fan belt has been removed for winterisation of the engine but when this is replaced it would be prudent to check the alignment of belt and adjust the alternator as necessary.

(S) Give some consideration to checking the alignment of the alternator when the fan belt is reinstalled.

All hoses and control cables found secure. The exhaust elbow was found secure and in good external condition. The exhaust hose continues from the elbow to a muffler and separate Vetus water lock before exhausting over the transom. All fittings found secure and in good external condition.

There is a Vetus sea strainer on the raw water inlet as well as a vented anti-siphon loop, all found secure and in good condition with no evidence of seepage.

The oil was seen at the correct level and found clean with no evidence of emulsification under the filler cap.

FUEL SYSTEM

The single plastic fuel tank is located at the forward end of the cockpit locker to starboard, capacity undetermined. The tank was seen secure and where visible all associated hoses were secure with the exception of the breather pipe. This pipe relies on a rubber gland to seal and hold the pipe barb into the tank. This gland has perished and the associated breather pipe has come loose leaving an open hole in the top of the tank. (See figure 5).



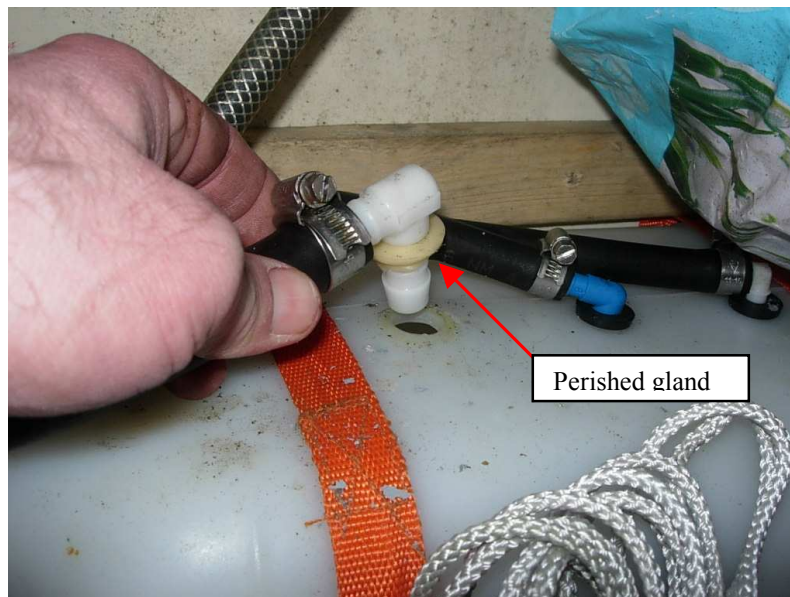


Figure 5

The inner section of this gland has perished such that the fuel breather hose is no longer secure to the tank.

(R) Replace the gland associated with the fuel breather pipe at the diesel tank. This should be done before continued use of the vessel.

Where visible it was noted that approved ISO 7840 flexible fuel hose has been used in way of the fuel delivery and return system, found secure and in good condition.

There is a primary fuel filter/water separator with glass bowl installed inside the engine compartment with a shut-off valve just prior to this filter unit. Note that in the event of an engine room fire there is no facility to shut off the fuel supply to the engine outside of the engine compartment.

(S) Give some consideration to the installation of a fuel shut off valve at the tank such that in the event of an engine room fire the fuel supply to the engine compartment can be shut off without having to open up the engine space.

No fuel gauge was seen associated with this tank.

ACCOMMODATION AND ON BOARD SYSTEMS

ACCOMMODATION GENERAL

The general condition of the interior should be considered tidy. The mahogany joinery has a number of minor dents and scratches much of which could easily be sanded out and recoated if desired.

It was noted that the foam backed headlining is beginning to drop in a few isolated places. In my experience it is difficult to re-attach these linings and some



consideration may want to be given to replacement at some point over the next few years. This is only of minor consequence at this stage.

The upholstery is of faux leather and seen in good condition with no obvious tears, staining or undue wear; however the foam within the upholstery is clearly old and as such has now lost much of its integrity.

GAS INSTALLATION

As this boat is not intended for commercial use it does not need to comply with the MCA code of practice which requires specific standards for gas systems and unless for use on inland waterways there is no requirement for it meet the stipulations of the Boat Safety Scheme.

Irrespective of the above gas systems are subject to the checks listed below as part of this survey. Recommendations will be made where there is an obvious serious safety issue and these must be carried out before use. Suggestions will also be made where appropriate to enhance safety criteria, particularly with systems where there is no mandatory requirement to conform to a standard.

Test	Result
Condition and efficiency of self-draining bottle storage	Good.
Age and condition of flexible hose	Hose at bottle and stove is out of date. Hose at bottle beginning to perish.
Age and condition of regulator	Regulator in good condition but age not established.
Condition of copper tubing where accessible	Copper tubing seen in good condition where accessible.
Is tubing adequately supported and not under stress where accessible	All tubing found well supported.
Are all appliances fitted with flame failure devices on all burners	Yes, all found operational.
Is a gas alarm fitted	None fitted.
Is each appliance fitted with an isolating tap	Yes, opening and closing to full extent.
If fitted did leak bubble tester function	None fitted.

(R) Gas hose at the bottle and stove is out of date and should now be replaced. This should be done before continued use of the vessel.

Please note this survey is not a gas safety certificate, that is only obtainable in the UK after pressure testing and assessment by a qualified person listed on the gas safe register (formally CORGI) www.gassaferegister.co.uk



Sources of further information:

www.boatsafetyscheme.com Even if your boat is not required to comply with this standard it contains much sensible advice and the manual can be downloaded free of charge.

FRESH WATER TANKS AND DELIVERY

There is a single flexible freshwater tank located centrally in the bilge area. Without removing the tank it was not possible to gain full access but where visible the tank was seen in good condition, still flexible and with all associated hoses secure and in good external condition.

There is a manual fresh water hand pump at the galley, which was operated and found working.

No level gauge was seen associated with this system.

HEADS

The heads compartment was found clean with the Simpson Lawrence manual salt water flush toilet unit well fixed down. The pump handle on the toilet unit was found moving freely but without testing this unit with the vessel afloat I cannot guarantee the pump's integrity.

Both inlet and outlet pipes rise into anti-siphon loops, were found secure and in good condition externally but as already discussed both seacocks for the inlet and outlet water were found seized.

ELECTRICAL INSTALLATION

There are 3 x 12v batteries found secure in a battery box below the chart table area to port. Batteries as follows:

<i>Battery</i>	<i>Specification</i>	<i>Measured volts</i>
Engine start battery	12v – 110Ah	12.33v
House bank	12v – 108Ah	12.34v
Spare	12v – 108Ah	12.06v

This spare battery was seen connected only to the GPS chart plotter and Navtex receiver and currently not wired to any means of charging. I believe the intended use of this battery is that it is removed periodically, recharged at home and replaced. However given that this is currently supplying the GPS, an important navigational tool, it should be integrated with the vessel's charging system.

(S) Give some consideration to an alternative method of wiring the spare battery, perhaps paralleling it with the house bank, such that it benefits from the vessel's charging system.

All batteries were found secure, in good external condition with clean terminals.



There is a master breaker switch at the chart table and a further breaker switch in the engine compartment on the port side. As far as can be ascertained fuses at the main distribution panel protect all circuits.

Charging is via the alternator on the main engine but could not be tested during the course of my examination.

Where visible wiring was found to be in good external condition, well supported and tidy.

ELECTRONIC AND NAVIGATION EQUIPMENT

Electronic and navigation equipment seen aboard as follows:

At chart table:

- Standard Horizon GPS Chart CP 300i with chart card for West European coasts 2008
- Furuno GPS Navigator GP31
- Furuno Navtex NX-300
- Silva S15 DSC VHF
- Phillips radio cassette player

In cockpit:

- Raymarine ST60 speed
- Raymarine ST60 depth
- Garmin GPS - by companionway beneath spray hood
- Plastimo Contest steering compass

All the above items were switched tested and found working with the exception of the Garmin GPS on which the LCD display is failing.

(S) Give some consideration to replacement or to the necessity of the additional Garmin GPS.

I cannot confirm the integrity of the speed or depth instruments without a sea trial and although the Furuno Navtex switched on I did not see any data received during the course of my examination.



RECOMMENDATIONS AND CONCLUSIONS

(R) Install R&D silver impregnated rubber element to flexible coupling establishing continuity across the R&D coupling to provide galvanic protection to the shaft and propeller. Ideally this should be carried out prior to re-commissioning of the vessel. (Ref: Page 16)

(R) The 2 seacocks associated with the toilet unit are both seized and require servicing. This should be done before continued use of the vessel. (Ref: Page 17)

(R) Give some consideration to a suitable method of blocking off the obsolete through hull fitting above the waterline in the transom to starboard. This should be done before continued use of the vessel. (Ref: Page 17)

(R) The stainless steel guard wires are secured by lashings at the aft end. These lashings look somewhat old and require replacement. This should be done before continued use of the vessel. (Ref: Page 18)

(R) Give some consideration to a suitable method of securing the anchor to prevent it from jumping off the roller in rough conditions. This should be done before continued use of the vessel. (Ref: Page 21)

(R) Service the bi-colour bow light as necessary. This should be done before continued use of the vessel at night. (Ref: Page 24)

(R) Replace the gland associated with the fuel breather pipe at the diesel tank. This should be done before continued use of the vessel. (Ref: Page 27)

(R) Gas hose at the bottle and stove is out of date and should now be replaced. This should be done before continued use of the vessel. (Ref: Page 28)

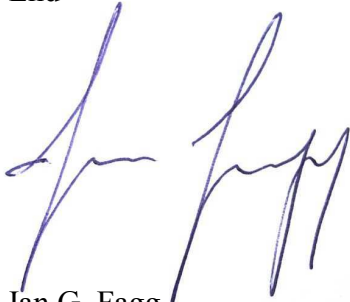


CONCLUSIONS & MAINTENANCE OVERVIEW

Overall this vessel was found in tidy condition. She is a nice example of her class and the list of defects outlined in this report is no more than one would expect, she has clearly been well maintained. The recommendations outlined above are all fairly minor and inexpensive to remedy with the exception of the navigation light on the bow if a replacement is required and the installation of the silver impregnated rubber element associated with the R&D coupling unless the work were to be undertaken oneself.

Once the above list of **recommendations** have been satisfied the vessel can be considered fit for purpose. Observation of the **suggestions** outlined within the body of this report will go some way to reducing future deterioration and help the vessel retain her true market value. The Twister has a proven reputation for being a fast racer/cruiser of her era and benefits from an active class association.

End



Ian G. Fagg
Ocean Marine Surveys
[REDACTED] 2013



APPENDIX

SUGGESTED GUIDELINE INTERPRETATION OF MOISTURE READINGS.

Relative Readings	Suggested Guidelines	Examples	Comments
0 – 15	For all practical purposes may be considered dry.	<ol style="list-style-type: none"> 1. Modern yachts with epoxy protection from new 2. Yacht with gelcoat removed after drying out period prior to an epoxy treatment scheme. 	Establish minimum before proceeding with any treatment.
16 - 20	Some moisture present at low levels, but of no great concern.	<ol style="list-style-type: none"> 1. Yachts with isophthalic and vinyl ester gelcoat resins after initial lift out, but will quickly reduce dependent on weather conditions. 2. Older orthophthalic resins may take longer for readings to reduce. 	Follow 3 steps:
21 - 30	Risk of associated moisture defects considered medium, but toward top of this range levels are becoming significant.		Use both shallow and deep modes to make comparative readings.
31 - 45	Considered high and at a level where the risk of moisture related defects being present, but not yet physically detectable, is significant.		Use due point facility and thermistor sensor to identify potential condensation problems and spurious readings. Monitor at a later date to confirm readings.
46 - 60	Very high and is usually accompanied by physically detectable signs.	<ol style="list-style-type: none"> 1. Blistering is visible or where the gelcoat has been starred or cracked. 2. Susceptible location and boat age. 	As above.
61 - 80	Extremely high and indicative of possible laminate damage in addition to osmotic blistering and physically detectable signs.		Experience and knowledge of particular construction is essential before reaching any conclusions.
81 +			

Sovereign technical department, October 2010

