

Best Practices – Boat Inspection

J Boats has compiled, with the help of several industry experts, the following “best practices” inspection, maintenance and use guide for J/Boat owners. We urge each owner to read carefully the recommendations, to proactively and periodically inspect all critical components of your boat, and to contact anyone in the J/Boats network of dealers, builders and class associations if you need any assistance.

INSPECTION OVERVIEW

Considering the typical high-frequency use seen by many J/Boats, at a minimum, we recommend that owners have their boats inspected on an annual basis and that a professional survey be done every five years. An inspection should include a detailed review of the high-load areas, such as the rudder and keel attachments, rigging terminals, structural bulkheads, keel floors, mast step, mast partners, steering systems, mast and boom fittings, lifelines, etc. Inspection should also include identifying any possible leaks, including thru-hull fittings, as well as identifying worn rigging and hardware. Additional inspections/surveys should be performed immediately after any instances of grounding, collision, and/or extreme weather sailing.

The American Bureau of Shipping (A.B.S.) calls for a detailed inspection every two years and a professional survey every 6 years (see Appendix B for details) following new construction.

According to Carter Gowrie of the Gowrie Group, most insurance companies mandate a professional survey for boats at 10 years. A survey may indicate a structural or safety issue that an owner needs to address in order to continue insurance coverage. For boats that haven't changed hands (which usually triggers a pre-sale survey), it's otherwise left entirely to the owner to determine when a survey should occur.

KEEL/ KEEL FLOORS

Overview - One of the most critical areas of a modern, fin-keeled composite boat is the keel and keel floor area. This is an area that absorbs incredible loads and enormous stress. Any periodic inspection should include a keel tip deflection test, which is easily done when the boat is out of the water. With your boat suspended from travel lift straps (OK) or braced in a cradle (best) or trailer (good), grab the keel at the bottom and attempt to forcefully rock it back and forth. This deflection test on a deep keel boat should create a small amount of flex over the keelspan and sump (if solid fiberglass like most Js), but there should otherwise be minimal movement from side to side. When you release the keel it should immediately return to position (and not continue to cycle). It is also important to have someone belowdecks to check for movement in the keel floor or bilge area, or any evidence that the sump is moving independently of the keel floors. Any excess movement should automatically trigger further investigation and survey.

Use Considerations:

- 1) **Groundings** - after any grounding or collision with any underwater object, soft or hard, be sure to carefully inspect the keel, sump area and keel floors for any signs of cracking or weakness. This is best handled by a qualified marine surveyor. Even a seemingly minor grounding can weaken the overall structure, particularly if left un-repaired for any length of time and/or if the boat continues to sail without repairing. There have been cases where a moderate grounding revealed no visible damage (due to the bottom of the boat absorbing the impact and then returning to shape), only later to reveal the presence of fractured glass on the inner hull laminate just aft of the keel. Have repairs done by a professional yard with a follow-up survey.

- 2) **Trailing/ hauling/ poppets** - boats that are actively trailered can be subject to excessive stress and strain on the keel/hull joint. In fact, years of trailering alone can subject a keel/ hull joint to excessively sharp vertical accelerations that can cause significant wear and tear on any portion of the composite structure; including keel sump and keel floors.

According to Triad Trailers, one should first load a trailer by placing most of the weight (80-90%) on the keel as it sits in the trailer's keel tray. Then screw each individual hull support up to the hull just until light contact is made. Do this for each of the six individual hull support stands (on the Triad Trailer). After all six stands are touching the hull release the lifting straps so the boat is now mostly on the keel with the hull support stands preventing the boat from tipping side to side. Adjust each hull support stand upwards towards the hull to a point where you are only able to spin the carpeted top on the hull with a good amount of force. After each hull support stand is properly adjusted tighten the set screw on each of the 6 hull supports. This set screw prevents the wing nut handle from vibrating down during travel.

Be particularly careful when strapping a boat down to the trailer. It's not uncommon at regatta venues to see boats quickly hauled and lowered onto their trailers, with little time to get the boat aligned and sitting properly on the poppets, then strapped down hard onto the trailer with powerful ratcheting webbing straps and then driven off. In short, the hull is being pulled down hard on top of the keel/sump and in a very short period of time is potentially subjected to excessive stresses and strains on the entire hull/keel/sump structure. **If you have a bow-stop on the trailer, use shorter strap runs (running nearly vertical) over the boat rather than long diagonal straps through the bow and stern rails. This reduces the possibility of trailer flex contributing to any excess strain.**

- 3) **Docking & mooring** - care should be taken to avoid mooring or docking your boat in locations that can result in the keel being occasionally imbedded in the mud/sand/silt when at low tide or low water. A combination of the keel bulb imbedded with any sort of wave action against the hull can cause undue stress to the hull and structure. The same is true for boats that use special dockside hoisting systems to hoist the hull out of the water, while the keel remains underwater and unsupported.

Maintenance Considerations:

- 1) Care should be taken to avoid having standing water in the bilge. Not only does standing water accelerate corrosion of wiring, fasteners and keel bolts over time, it ruins floor boards and interior woodwork. As the gelcoat/ paint ages in the bilge area, bilge water can eventually seep into the fiberglass laminate by way of pin holes in the gelcoat and weaken the fiberglass laminate structure. The *process of hydrolysis* can be initiated in the fiberglass laminate *anytime* there is ingress through cracks in the paint/gelcoat in the bilge. *The process of hydrolysis is persistent and invisible- it's water that chemically degrades the quality and strength of the laminate over time.* Bilges (all areas under the floorboards, not just the centerline bilge) should be cleaned thoroughly once per year and then every five years recoated with fresh gelcoat or epoxy paint to ensure proper protection. In northern climates, water turns to ice in the winter. If moisture gets into the laminate and freezes, this can rapidly accelerate deterioration in the laminate. The New Hampshire Materials Testing Labs website (www.nhml.com) has an informative article on hydrolysis, see Newsletter of May 1, 2006.
- 2) In any cored hull, take special care to avoid having any fasteners penetrate the inner hull laminate. Water in the bilge area can easily weep through the fastener into the laminate and

cause core damage. If you need to secure a fitting or wire tie to the hull, the best fastening method is to glue a piece of epoxy coated marine ply to the hull and then fasten into the ply.

- 3) A growing trend amongst active one-design racers is to use a dehumidifier to keep the inside of the boat dry. This extra step not only keeps the boat a little lighter, but helps everything from wiring, to woodwork, to sails, last longer.

RIGGING

- 1) **Standing rigging** - The general rule of thumb from Hall Spars is that standing rigging (whether wire or rod) should be replaced every 10 years, unless excess strain due to hard ocean sailing shortens this life. Fatigue can be in any form- sailing in extreme wind conditions, unnecessary flogging of loose leeward shrouds, corrosive environment. Any signs of a broken wire strand(s) indicate immediate replacement is necessary. Otherwise keep a close look out for corrosion or cracking in the swage fittings and turnbuckle threads. In southern coastal areas, with the high salinity and year round warm weather, rigging must sometimes be replaced every 5 years. Fresh water sailed boats will generally have a longer rigging life, but are still subject to fatiguing after years of stress.
- 2) **Headstay** - The top of the headstay (wire or rod) should be checked to make sure it's not bent. The fasteners and the top of the headstay foil should also be routinely checked.
- 3) **Clevis pins** - More rigging and spar mishaps are caused by clevis pins backing out, than perhaps any other culprit. If the clevis pins are semi-permanent (only removed a few times per year), then use appropriate sized cotter pin and fully bend them back around the clevis pin. Then cover with clear sealant rather than tape so that they are visible.
- 4) **Running rigging** - suffers the greatest wear and tear (chafing primarily) and should be checked frequently for wear, particularly high load lines like main and jib halyards and jib sheets.

SPARS

- 1) Spar life can vary, but Hall's general rule is the mast should be replaced every 20 years. Frequently check your spar for problems. Spars break more often than not by a failure in the standing rigging, but there are some specific areas to keep an eye out for:
- 2) **Deck area** - The mast section at the partners (where the mast passes through the deck) is usually subject to the most fatigue over time. This is due to the rig getting set up with pre-bend, then pulling on lots of backstay tension, and the constant flexing of the spar over many years. The best prevention is a good set of mast wedges or the Spartite mast wedge system. Unchecked movement at the deck can significantly shorten the life of the spar. Be especially careful about drilling any holes in the mast near the deck, and periodically inspect any holes in the area to make sure, there are no cracks developing. Any holes must be round or have rounded corners.
- 3) **Spreader tips** - these should be untaped and inspected annually. Seizing wire should be redone annually so that the shrouds will never "pop" out of the spreader tip. Use spreader chafe covers that won't collect water.
- 4) **Rig tuning** - to provide not only the best performance but also a longer mast life, it's very important to properly "tune the mast." Tuning means adjusting the shroud tension so that the

top of the mast is centered over the boat, and such that the mast is in column or straight as you site up the mast groove on the aft side. Proper tuning for all conditions usually means maintaining enough tension on the shrouds so that they do not go completely slack on the leeward side while sailing. Many successful one-design classes have tuning guides published and provided by sailmakers. Some of these may suggest very loose settings on the shrouds for better light air performance. Care should be taken by owners to avoid sailing in windy conditions with light air shroud settings. This may significantly shorten the life of the mast and lead to breakage.

- 4) **Aluminum spars** - are subject to corrosion and fittings should be routinely inspected and replaced when necessary. Particular problem areas over time can be fasteners around boom vang, boom and mast ends, and gooseneck attachment brackets.
- 5) **Booms** - often have a shorter life than masts, particularly on race boats that do a lot of windward-leeward buoy racing in breezy conditions. In some class boats it is common practice to pull the boom vang hard going upwind (vang-sheeting) and then release the boom vang several inches going downwind. However if one bears away without first releasing the boom vang (from its vang-sheeted position) then most booms will bend under this load. Repeated occurrences will shorten the life of the boom and could cause breakage.
- 6) **Rig cutting tool** - Every sailboat should carry aboard a tool that is capable of cutting through standing rigging quickly. When a mast does break, the portion that is in the water can easily ram a hole and potentially sink a boat. You may not have time to unwrap the rigging tape and pull clevis pins at all the attachment points. The top of the line cutters are hydraulic, which can be used on wire or rod rigging. For small one designs (ex...J22, J24 & J80), a good hacksaw should be carried at a minimum.

OTHER STRUCTURE

- 1) **Bulkhead tabbing** - the primary structural bulkheads of the boat are tabbed both to the hull and to the deck. This tabbing (or fiberglass tape) should be inspected annually and, especially, after any groundings or excessive exposure to “hard trailering”. If there is any evidence of gelcoat cracking or actual tabbing visibly loose or beginning to peel, ensure that a marine surveyor inspects the boat and recommends adequate remedies to correct potential damage.
- 2) **Hull-to-deck joint** - all modern J/Boats are built with a “glued” PLEXUS (2-part elastomer glue) hull to deck joint. It is an ISO/ABS approved method for hull-to-deck bonding. This joint should be inspected at least annually and, in particular, if any leaking is noticed inside the hull. Sometimes the best check is to use a “non-permanent dye” in water to squeeze into the hull/deck joint and look for “runs” inside the hull. If any leaking is observed, have the hull to deck joint surveyed and have the surveyor make recommendations for adequate remedies to correct potential damage.
- 3) **Chainplate fittings** - Both port and starboard chainplates and the bow and stern chainplates should be checked at least annually. Look for leaks where they intersect the deck.
- 4) **Bow sprit system** - the sprit system is a combination of a carbon tube, pulley system and an integral bulkhead/ bow support. The system can easily be damaged, particularly when struck laterally or vertically at the end of the pole with any force (e.g. when rounding marks hitting sterns, hitting metal buoys, or burying the bow in steep seas under full force of the asymmetric

spinnaker too many times). Regularly inspect the sprit for excessive wear where the sprit intersects the outer bearing at full extension.

DECK HARDWARE

- 1) **Wire lifelines and lifeline fittings** - should be replaced at least every 10 years or at the first sign of corrosion or damage to the wire strands, swages or turnbuckles. Many older boats have white vinyl coated lifelines, which are no longer allowed by ORC Offshore regulations, as the vinyl can disguise ongoing corrosion or damage to the wire. These should be replaced using appropriate wire type and diameter immediately.
- 2) **Sealants** - used for deck hardware can last anywhere from 3 -10 years depending on the stress exerted on the hardware. If most of your hardware is still original, you should consider backing off the fasteners and rebedding with Sikaflex or other suitable marine sealant. Jib and genoa tracks are usually the first areas to start to leak over time. Stanchion set screws should be re-inspected and replaced when necessary.

ADDITIONAL REMARKS

There are few industry guidelines regarding pro-active maintenance, inspection and periodic replacement of key components on aging composite boats. Many owners rely on reminders from their boatyards for upgrades or required maintenance. For trailerable one-designs, it's mostly up to the owner unless a surveyor gets involved with a pre-sale survey, and even then, not all surveyors are versed in composites. There are critical areas on every boat that need to be vigilantly looked after and routinely inspected, and we strongly encourage all owners to start by inspecting their boats now to best ensure a long, productive life.

FOOTNOTE: The contents of this article are thought to be accurate, but do not necessarily include all of the possible preventative maintenance suggestions that owners could follow to ensure long-term, safe operation of their boats. Boats incur wear and tear in unique ways. When in doubt please consult a professional for advice/instruction on maintaining, inspecting, repairing and/or operating your boat.