

**PATTON MARINE SURVEYORS
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Our Time and Experience
is our Stock in Trade

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December 14, 2024
File No.: 13717-24
Page 1 of 22

**RE: "SAPPHIRE", 2009,
50.44 Meter Trinity Motor Yacht**

RECOMMENDATIONS

Notes:

- A. The items marked with a star (★) should be taken care of for safe operation and/or insurability.
- B. Many of the following items describe systems that are either not operational or not functioning properly.
- C. Most of the other items are considered to be issues of general maintenance.
- D. In addition to this recommendation list, there are 58 pages of survey text which is an integral part of the report and should be read in conjunction with these recommendations.

GENERAL:

1. It is recommended that the buyer or buyers agent be provided with a written affidavit from the seller stating that the above named yacht is free and clear of any liens, fines or debts.

SAFETY EQUIPMENT:

1. ★The main engine bypass exhaust is plumbed through crew cabins located aft of the engine room bulkhead. Recommend that CO (Carbon Monoxide) meters with alert functions are installed in the cabins and workspaces in these areas.
2. ★No current compass correction card was sighted onboard. If the compass deviation exceeds 5⁰ after dry docking or after 1 year, swing the compass and provide an up dated deviation card.
3. ★File a waste management plan onboard as per US Coastguard regulation.
4. ★During testing of the galley fire damper system, it was discovered that the duct ventilation supply sensor was broken loose. The engineers were to carry out replacement of the sensor.

TANKS:

1. Comment Only: All onboard liquid contents tanks were visually examined, externally only. Unless otherwise mentioned in the "RECOMMENDATIONS" section of this report, no external signs of leaks or damage were found during these examinations. It is to be noted that the tanks are not totally accessible or visible on all sides. For a complete evaluation of tank tightness, they should be hydro-tested.
2. There is damaged/ missing paint and areas of corrosion, on the lube oil tank top, in the forward Engine Room. Treat the corrosion and apply a new protective paint coating,
3. There is evidence of plate replacement, and tank penetration replacement, on the exterior surfaces of the freshwater tanks. Comment only

THROUGH-HULLS:

1. As an annual maintenance project, it is recommended that all of the seacocks and sea strainers be disassembled, cleaned, inspected, and lubricated.
2. On the portside forward hull, the second scupper discharge aft of the bow has a loose clamshell screw-fastened fitting, it is separating from the hull. Tighten, re-secure the clamshell fitting.

BILGES:

1. Bilges of aluminum yachts should be kept as clean and dry as possible. Comment Only.
2. There is coating damage and corrosion noted in the centerline crew mess bilge beneath the tank. Treat the corrosion and reapply protective paint coatings.
3. There is water accumulation below the MSD (Marine Sanitation Device) tank, in the forward guest bilge. Remove the water, monitor for leaks.
4. There are areas of corrosion and damaged paint coatings in the Engine Room bilge, on system piping, bilge plates and framework. The bilges are found dry and relatively clean. Recommend a systematic application of paint coatings in the Engine Room below the deck plates as part of regular maintenance and upkeep.

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FUEL SYSTEM:

1. There are flexible fuel hose connections to the main engine primary fuel filters that could not be identified as to its fire protection rating. Confirm the flexible hose connections are marine and engine hose rated. Accepted ratings: SAE J1527, TYPE A CLASS 1, USCG SAE J1942/ISO7840/ USCG H/HF.
2. There was a small fuel leak pooling in the bilge, under the fuel transfer station. The source of the leak could not be determined. Clean the bilge area of fuel. Investigate and repair the leak.

FRESH WATER SYSTEM:

- 1 There is a glycerin leak from the pressure gauge, on the outlet of the freshwater system particulate filter in the crew bilge. Repair the cap on the gauge and clean the leak.
- 2 There is evidence of corrosion and a previous water leak, on the plumbing and isolation valve for the freshwater system pressure sender, on the outboard connection port side, in the aft crew bilge. Treat the corroded plumbing, monitor for leaks.
- 3 The master head hot tub was filled and function well-proven. When shutting off the water, the spout did continue to drip. A slight valve adjustment is needed.

WATERMAKERS:

- 1 There are some areas of missing/damaged paint, on the base of the watermaker prefilters. Treat the corrosion and apply new paint protection.
- 2 The flexible hose connections connecting the sea water feed pumps to the seawater supply piping, and to the media filters are single clamped. Ensure all seawater hose connections are double clamped.

JACUZZI:

1. The perimeter spillover grilles of the jacuzzi is deteriorated due to UV and chemical exposure. Recommend investigating a method to refinish the grille to increase the lifespan or replace the grilles.

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GREY WATER:

1. In the lower deck starboard aft cabin, a loud gurgling was occurring and a consequent pungent foul odor. It is not clear what happened, but engineers did ameliorate the issue. Investigate tank level alarms.

PLUMBING and PIPING:

1. The plumbing and piping was inspected, however, not all of the plumbing and piping is visible or accessible. Due to the age of the yacht, it is possible that some of the plumbing and piping, especially the raw water piping, will develop leaks. Recommend that the plumbing and piping be monitored and changed out as necessary.
2. There is corroded pipework, adjacent to the watermaker brine overboard discharge valve, below the deck plates. Treat the corroded piping and recoat with a protective paint system.

AIR CONDITIONING:

1. During the survey, the ambient weather was very cool, this limited capacity testing of the HVAC chiller system. Comment only.
2. During testing, the following fan coil unit heating elements did not activate:
 - Port Aft Guest Cabin,
 - Starboard Aft Guest Cabin,
 - Port Forward Guest Cabin,
 - Main Salon Starboard Aft,
 - Forward Lounge,
 - Starboard Pilothouse.

Investigate the control systems for correct function.

VENTILATION:

Engine Room:

1. The Engine Room axial circulation fan protective grilles are corroded. Remove, treat the corrosion and re-apply a protective paint coating.

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ENGINES:

1. ★During testing, while testing the back-up Engine Room remote station main engine throttle/gear pendants and start/stop functions. The port main engine did not shut down when commanded. Investigate the cause of the fault and rectify.
2. There is burn through on the MTU Main Engine Local Control LCD displays, in the Engine Room. Repair or replace the display screens.

EXHAUST SYSTEM:

MAIN ENGINES:

1. There is coating separation, on the port main engine aluminum exhaust downpipe to the underwater discharge cowl, after the cooling spray ring. Bare aluminum is observed with signs of material degradation and pitting. Recommend the piping is media blasted, inspected for condition. Recommend the application of heat tolerate protective paint coatings to protect the pipe material, such as composite/epoxy products.
2. There is evidence of previous seawater leaks for both the port and starboard main engine exhaust cooling spray ring connections. During the survey, no active leaks were noted. Monitor the spray rings, anticipate further investigation and repairs.
3. The thermal insulation collars at the turbocharger discharge flange connections to the remaining exhaust system are loosely fitted. Re-fit the collars so they are tight around the flanges to prevent hot spots.

GENERATORS:

1. There is coating deformation and separation on the port side generator gas discharge piping, outboard of the isolation valve. Recommend the damaged coating is removed, the piping media blasted, inspected for condition. Recommend the application of heat tolerant protective paint coatings to protect the pipe material, such as composite/epoxy products.

HYDRAULICS:

1. There are nuisance leaks on some hydraulic flexible connections to the Stabilizer/Hydraulic powerpack and valve bodies. Tighten the affected fittings, clean oil spots and monitor condition.

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ELECTRICAL SYSTEMS:

The vessels electrical system was reviewed during this visit; the installed system(s) have used quality components and have been connected in a professional manner consistent with vessels of this pedigree and have been maintained to a high standard.

Although there are numerous electrical recommendations it is this surveyor's opinion that the recommendations are minor in nature and are not detrimental to the overall electrical system, the electrical system in this surveyor opinion is in very good condition.

Shore Power:

1. The shore power input is arranged with Sace over current protection breakers which are not E.L.C.I. (Equipment leakage Circuit Interrupter) or G.F.C.I. (Ground Fault Circuit Interrupter) type to aid in preventing E.S.D. (Electrical Shock Drowning) it is our professional opinion safety could be improved by the following recommendation. Install ground fault protection breakers conforming to the IEC regulation.
2. The vessels shore power input grounds are fitted with a galvanic isolators, the isolators diodes were tested, the voltage across the diodes was captured at 0.257 VDC indicating shorted diodes. Service the galvanic isolator, anticipate diode replacement.
3. The shore power cables when connected to dock side services are not arranged with cable chafe protection or cable strain relief. Provide adequate cable strain relief and chafe protection for connected shore power cables.
4. Power supply cable and output cables to the Asea converter are connected without pins or ferrules, the securing screws bears down directly on to the copper conductors. Re-connect using pins, ferrules or like reduce the risk of damage to the conductors.
5. The Asea shore power converters are water cooled, the cooling water is tapped off the air conditioning chilled water loop, should the air conditioning system be placed in the heating mode, or off for servicing, the cooling for the Asea converters will be reduced. Provide exclusive means of supplying cooling for these converters.

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Main Switchboard:

1. During dock side connection a Fluke Clamp on amp meter was place on the neutral to ground connection within the main switch board, a ground fault of > 3.7 amps was captured. Trace and remove all ground faults.



2. The vessels VAC ground fault meter is scaled in amps, ground fault meters are to be scaled in milliampere. Replace this meter to read Milliampere (mA).
3. The vessels VAC ground fault meter is not operational. Further review this condition and rectify.
4. All main switchboard terminations to include mechanical fasteners should be checked for proper torque as per fastener design and construction. Recommend this procedure be performed annually within the main switchboard and all distribution boards to aid in eliminating excessive heat caused by loose connections.

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5. The main switchboard generator and shore power energized buss connections are exposed. Provide clear protection covers.



6. Main switchboard shore power, generator and heavy consumer over current protection breakers are not fitted with phase separation sheets. Install phase separation sheets.



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7. The main switchboard meters for shore power and generators are not hash marked to show nominal volts or amps. Hash mark switchboard meters.
8. Several of the main switchboard analog meters were found slightly out of calibration when compared to a calibrated Fluke 435 power analyzer. Re-calibrate all main switchboard meters.
9. No Classification approval stamp for the main switchboard was located. Verify this switchboard has classification approval.
10. The main switchboard neutral to ground connection (TN-S) is a fixed connection, no removable link has been provided. Provide removable link in this connection for service and testing.
11. Dust accumulation can be readily seen in the main switchboard especially in the lower sections, which can lead to tracking. Clean the main switchboard.



12. The main switchboard ships three phase load is not well balanced, L-2 load was constantly lower than L-1 and L-3 fluctuating by approximately 30-50 Amps. Balance single phase consumers as much as practical.

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13. The main switchboard air conditioning system #1 protection breakers running temperature was captured at 34.4°C, load at this time was captured at 28 amps. Further review this condition and ensure correctly sized cable and over current protection has been provided for the expected load.



Generators:

1. Both the port and starboard generator local operator panels (LOP) battery volt meters are pegged. Rectify these conditions
2. The generators are not fitted with protection breakers on or near the electrical ends. It is understood that the classification requirements appear to be satisfied by the existing arrangements; however, it is our professional opinion that safety could be improved through use of the following recommendation. Install over current protection breakers as close as possible to the generator electrical ends.
3. Test procedures for the generators reverse power, short circuit protection and under voltage trips and manual operation were not provided, therefore reverse power trips were not demonstrated. Provide test procedure plaque and fully test and prove generators reverse power, under voltage and short circuit trip system, and manual operation during switchboard control failure.

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4. The port and starboard main engines and generator starter and slave solenoids potentially energized positive connections are exposed. Provide “boot” type protection covers or similar.



5. The generators are fitted with information labels indicating anti-condensation heaters are fitted in the electrical ends, this was not verified nor was any over current protection located. Verify the generators are fitted with anti-condensation heaters to reduce the risk of condensation contamination.
6. Due to limited access the generators electrical ends were not reviewed. Provide access to the generator’s electrical ends for stator, rotor, and rotating rectifier diode pack review, both generators electrical ends run hours are reportedly at approximately 30,000 hours, anticipate rotating rectifier and bearing replacement.

Batteries:

1. The main engine, generator and service battery banks are not secured against vertical movement. Strap down all of the vessel’s battery banks. .
2. The vessels battery chargers are manufactured by Mastervolt which utilize battery heat sensors which aid in reducing over charging and unwanted release of battery gasses, no heat sensors have been connected. Install battery bank heat sensors.

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3. The provided electrical drawings show the main engine starting switch arrangement was break before make isolation switches able to select either bank, but not in parallel. The system has been modified to include on/off witches and maintained parallel switches; in addition, the banks are in permanent parallel by cross connection cables. Re-connect the starting system back to the original design.
4. The vessels VDC system has V- ground faults. Trace and remove all VDC ground faults.
5. The emergency fire pumps batteries permanently energized connections, and the motor starter and solenoid connections are exposed. Provide suitable protection covers.
6. The generator and main engine battery chargers associated charge dividers permanently energized connections are exposed. Provide connection covers.



7. The vessels battery banks permanently energized posts are not protected against accidental short circuit. Install "Boot" type protection covers or similar.
8. The main engine, generator and service battery banks are fitted in aluminum battery boxes and racks which are not resistant to battery electrolyte. Provide purpose made battery boxes.

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9. The emergency fire pump battery voltage is not monitored. Add this bank to the vessel alarm and monitoring system.
10. The main engine starting banks are arranged with a single 50 amp battery charger with charge divider, this arrangement is light for these particular engines. It is suggested the banks be fitted with exclusive 100-amp battery chargers.

Engine Room fans

1. The engine room fan main control enclosure doors are not fitted with hold open devices. Install hold open devices.
2. The provided engine room fan drawings show the frequency drives are fitted with line reactors to aid in reducing harmonic distortion, these reactors have not been fitted, in addition frequency drive brakes (choppers) have been fitted. Install line reactors as originally designed and provide updated electrical drawings showing the use of brakes (choppers).

Air conditioning

1. The air conditioning main control enclosure doors are not fitted with hold open devices. Install hold open devices.
2. Motor starter breaker #5F3 running temperature was captured at 44.7°C. Further review this condition and verify the over current protection and associated conductors are correctly sized for the full running load.



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3. Contactor #1206 running temperature was captured at 40.2°C. Further review this condition and verify the over current protection and associated conductors are correctly sized for the full running load.



4. The air conditioning systems supply cable is not conforming to bend radius minimums, the cable is generating heat captured at 35.5°C. Relieve this cables tight bend and re check running temperature.

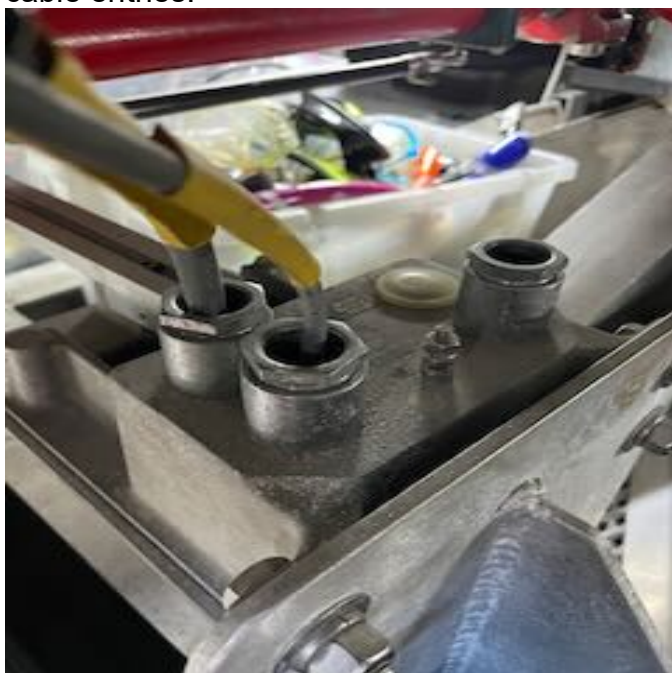


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Cable:

1. All main arteries, and heavy consumer cables appears to be original, it is our professional opinion that safety could be improved by the following recommendation. Megger test all main artery and heavy consumer cables.
2. Multiple cable runs in the lazarette require additional cable support and protection. Further review lazarette cable runs and provide additional cable support and protection as necessary.
3. Cables exiting the starboard generators at the sound shield lack chafe protection. Provide additional cable chafe protection.
4. Cables to the steering feed back connection housing are not sealed. Seal these cable entries.



5. Supply cable to the fire pump has pulled from the motor connection housing. Re-install this motors supply cable. Multiple cable runs in the engine room, especially under the deck plates require additional cable support and protection.

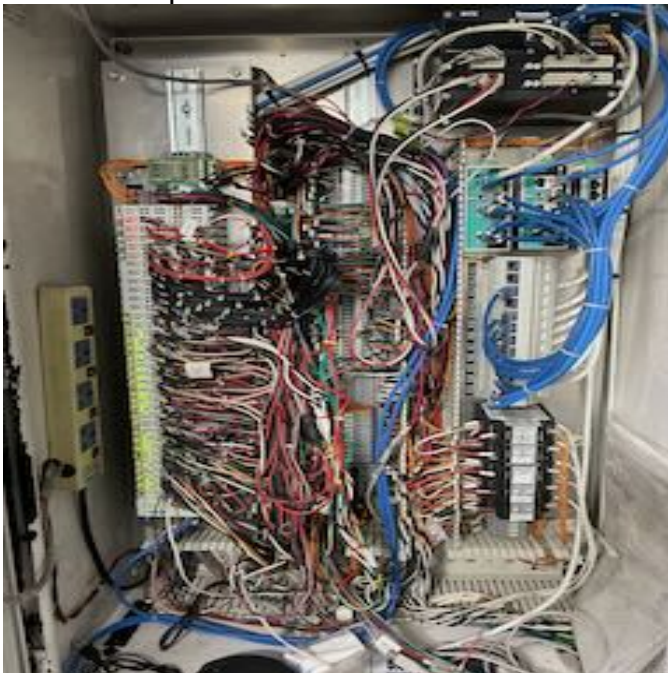
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6. There is a corroded junction box, located below the deck plating in the Engine Room, adjacent to the Bilge and Fire pumps. The junction box cable gland is also incorrectly fitted. Recommend replacing the junction box and remaking the cable connection and glands.



7. The engine room Servowatch PLC connection panels internal wiring is considered poor. Further review these conditions and rectify.



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8. The alarm beacon supply cables out of the Servowatch PLC connection panel are not chafe protected. Provide cable chafe protection.

Lighting:

1. The overhead halogen lights in the wheelhouse are generating heat captured at 115.2°C, lights in the dinning room at 128.2°C and > 200°C in the dinning room, heat generated by these lights lowers the ignition point of the surrounding materials and could become a hazard. Replace all halogen lights with low voltage LED or similar.



Grounding:

1. The vessel is not fitted with protection against a lightning strike. Install a lightning rod or at minimum OBO type surge arrestors.
2. The starboard generators ground connection is connected to a painted surface. Re-connect this and all similar connections to a chemically cleaned paint free surface.

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3. The rudder stocks are not grounded. Ground the rudder stocks.



General:

1. Several of the hull mounted sacrificial zinc anodes have crusted over (Passivation), this condition will prevent the anodes from working correctly. Clean anodes.



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2. The vessels Cathelco C-Shield propeller shaft earthing system is not operational, in addition the hull mounted reference cells are contaminated. Service the entire system.



3. The emergency fire pumps diesel fuel tank is not filled. Fill this fire pumps diesel tank.
4. The permanently energized capacitor connections located in the Atlas 60-50 Hz converter are exposed. Provide suitable clear protection cover.
5. The water makers aft sea water supply pumps motor connection housings securing hardware is missing, in addition the associated cable is not secured. Rectify these conditions.
6. An electrical junction box associated with the steering systems hydraulic power pack is poorly secured with tie wraps. Re-secure this junction box.
7. Relays mounted in the machinery control panel, engine room fan control panel, and steering control panels are not fitted with relay retaining clips to aid in preventing the relays from working loose. Install relay retaining clips.

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8. The main engine Hilzinger jacket water heater systems associated contactors over load relays have running temperature was captured at 57.3°C port and 50.5°C Starboard. Further review these conditions and verify the contactors and overload relays are correctly sized for the full running load.
9. The engine room circulation fan motor associated start/ run capacitors are contaminated. Further review this condition, anticipate capacitor replacement.

Power Quality:

1. It is recommended that a full harmonic analysis be conducted during off shore operations to identify equipment producing harmonics and to decide what equipment should be filtered and if passive line reactors are sufficient to reduce the harmonic levels.
2. Failure to address the harmonic distortion issues could lead to premature equipment and electronics failures, and a multitude of related issues.
3. Before any onboard systems failures can be correctly diagnosed, the vessels power system is to be a "clean system," failure to address the vessels THD, the likelihood of experiencing problems will continue to increase.

HATCHES, WINDOWS, AND DOORS:

1. Port main deck salon window numbers one (1) & two (2) are seen with lower aft corner broken seals and internal moisture is causing "glass fog" (75mm/3" area). There is no repair possible. At some point, pane replacement may be considered.
2. In general, all main deck window seams and black tint trim is delaminating and seen with tiny air bubbles in the mounting adhesive. As above, in the distant future window substitution could be taken into account.
3. The master aft bridge deck clear acrylic side wind screens are seen with bubbling and separation on the lower third of the curved edges. Monitor.
4. The sun deck forward windscreen is now crazed at all sections and at some future refit should be replaced.
5. The starboard forward main deck oval window (VIP lounge) is seen from the exterior with what appears to be discoloration on the aft edge (cannot be seen from interior). Monitor.

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6. The captain's cabin oval window is also seen with the same area discolored (exterior only). Monitor.
7. The main deck port forward guest cabin window gasket slipped at top edge. Re-insert.
8. The VIP Lounge port window gasket forward section dislodged. As above.
9. The VIP Lounge port and starboard countertops are lightly scratched and scuffed. They appear to be used as work surfaces. Re-touch and protect.
10. The sun deck day head door is grinding on the hinges. Adjust/lubricate.

INTERIOR:

1. The main deck salon floor area aft of the bar, forward of the glass doors is creaking. Soften as possible.
2. The main salon bar appliance doors are chaffing. Note damage on fridge latch area. Touch up/repair.
3. The main deck inboard wall panels (4-5) have baggy upholstered fabric. Re-wrapping is now needed.
4. The aft dining wall lower port corner fabric is loose. As above.
5. The master stateroom port and starboard aft fabric is baggy. As above.
6. The main deck starboard forward cabin hanging locker is seen with finish damage on center. Re-touch.
7. Comment: the lower deck starboard forward guest cabin floor aft section is creaking underfoot. (There may be a hatch beneath the carpet.)
8. The pilothouse center window Polster material is sun damaged and will need to be replaced.

PASSARELLE:

1. Just as a note: the function was well proven, but only with the wireless control. Locate handheld cord pendant and prove.

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COMMUNICATIONS:

1. The Sat-C printer is not printing properly, Update the system.

SUGGESTIONS ONLY:

Note: All of the following items are considered to be improvements and upgrades that an owner and/or his captain and crew may want to consider. The yacht has run fine without any of the following.

1. Affix a proper size emergency wooden plug near each through-hull.

Note: In addition to this recommendation list, there are 58 pages of survey text which is an integral part of the report and should be read in conjunction with these recommendations.

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