



Major Maintenance and Repair Action

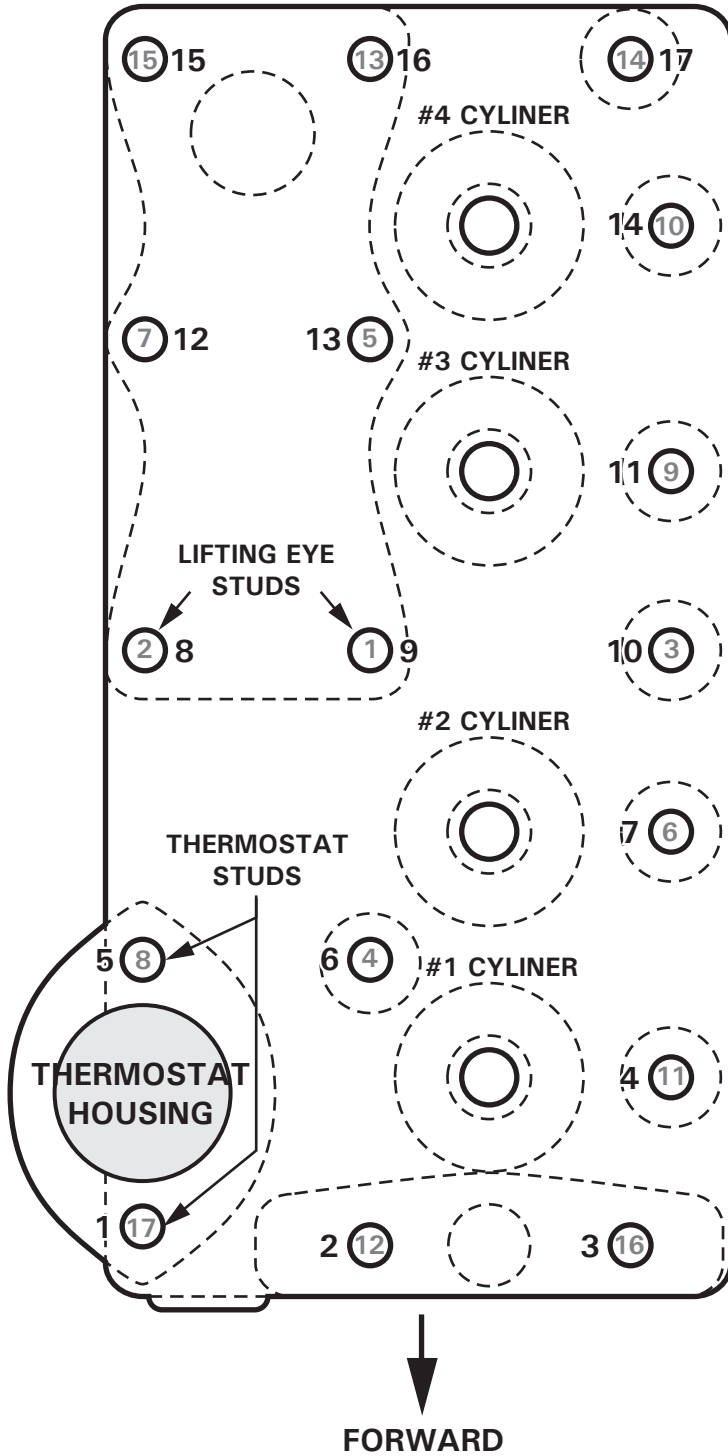
Hull 269 – Jade

Maintenance or Repair Action: Replaced Cylinder Head		Number: 004	
Reason for Action	Cylinder Head Cracked and Overheating Issues	System	Engine
		Start	6/1/2018
		Complete	12/23/2018
		Cost	\$900.00
DESCRIPTION OF ACTION			
<p>After launching for the first season, the engine would overheat within minutes after starting. Soon afterwards a crack in the cylinder head was found just aft of the thermostat on the starboard side. Reasons for overheating include thermostat malfunction, fouled cooling water circulation, and inadequate flow from cooling water pump. Action #003 (Rebuild Water Pumps) and #005 (Overhaul Cooling System) addressed water flow and fouled cooling water circulation. It is suspected the cylinder head cooling water passages were fouled since the jacket cooling water appeared clear, however the overheating might have caused the crack.</p> <p>The old cylinder head was removed after using Aerokroil Penetrating Oil on the cylinder head nuts. Eleven (11) of the Seventeen (17) cylinder block studs came out, leaving only six (6) existing studs. A formal diagram of the cylinder head was created to document the history and status of each stud (attached). The top of the cylinder block was carefully cleaned with a Dremel Tool with a small rotating wire brush attachment and Scotch Brite pads to avoid harsh action on machined surfaces. A nylon zip tie was passed through the cooling water passages in the block to ensure there were no blockages.</p> <p>A new cylinder head, studs, and nuts were procured from Moyer Marine International (MMI): 3/8" Thermostat Stud (1), 3/8" Lifting Eye Stud (1), 3/8" Head Stud (9), 7/16" Repair Stud (1), nuts (17), along with spares. During re-installation, the #8 stud did not hold torque and a repair bushing (Phosphate Steel Key-Locking Insert for Soft Metal, 3/8"-16 Thread Size, 1/2"-13 Tap Size) was installed since a 7/16" repair stud had previously been used. Epoxy was used as required, and Locktite Threadlock was applied to the lower end of the studs as per the Repair Manual. Two (2) Head Gaskets were then installed, along with the new Cylinder Head. A new Thermostat Housing (with Hose Barb Fittings), Thermostat (160 Degree, Late Model Double Acting) and Gasket was procured and installed.</p> <p>Finally, as per the Overhaul Manual, new Cylinder Head Nuts were installed and torqued to first 25 ft-lbs, then 30 ft-lbs, and finally 35 ft-lbs.</p>			
NOTES			
<p>After assembly, the engine was run for 30 minutes and allowed to cool down and nuts re-torqued three times, as per the manual. Of concern was the starboard side of the engine due to corrosion (corrective action was for preservation – descaling, priming, and painting, of engine), and #9 (centermost stud) that tightened to 35 ft-lbs of torque but seemed to require more turns than the other studs.</p> <p><i>See attached:</i></p> <ul style="list-style-type: none"> • <i>Cylinder Head Diagram</i> • <i>Photos</i> 			
Tools, Materials, Manuals, and Diagrams Used		Parts Used	
	Name	Part Number	
Hammer, Mallet and Chisel	Cylinder Head	OVCM_01_193 (MMI)	
Dremel Tool and Wire Brush attachments	Head Gaskets (2)	GASK_03_142 (MMI)	
Scotch Brite Pads	3/8" Thermostat Stud (1)	OBLK_02_112 (MMI)	
90 Degree Offset Drill and Drill Bits	3/8" Lifting Eye Stud (1)	OBLK_02_111 (MMI)	
Tap and Die Set	3/8" Head Stud (9)	OBLK_02_110 (MMI)	
Torque Wrench and Sockets	7/16" Repair Stud (1)	OBLK_06_42 (MMI)	
JB Weld Epoxy, Locktite Threadlock	Threaded Insert	92070A125 (McMaster-Carr)	
Kano Aerokroil Penetrating Oil	Thermostat Housing	CSTH_01_134 (MMI)	
Universal Atomic 4 Overhaul Manual (Moyer Marine)	Thermostat	CSTH_588 (MMI)	
Cylinder Head Diagram	Thermostat Housing Gasket	GASK_05_144 (MMI)	

UNIVERSAL ATOMIC 4 CYLINDER HEAD DIAGRAM *(NOT TO SCALE)*

DATE:

NOTES FOR EACH STUD:

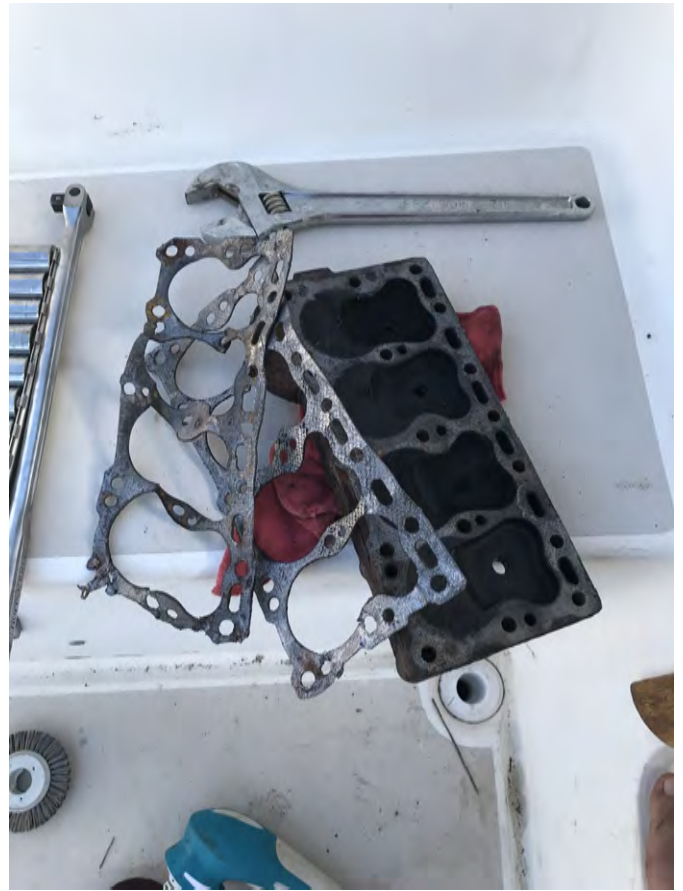


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Numbers in Black: Stud Number from Front of Engine
Numbers in Gray: Cylinder Nut Torque Order



Old Cylinder Head Removed - Stud #8 (circled) broken off in head



Old Cylinder Head and Head Gaskets



Cylinder Block after Head removal and in process of being cleaned - Six studs remain in block. Piston and valve heads and cylinders appear in good condition



Of concern was starboard side with corrosion - preservation required



New Cylinder Head Painted with High Temperature "Antique Copper" Paint



Eleven new studs installed - nylon zip tie used to ensure clear cooling passages



After final cleaning, two head gaskets placed before cylinder head installation



Engine block preservation completed, head installed and tightened as per manual (25, 30, and 35 ft-lbs of torque)



Final reassembly - note the nuts were also painted to prevent rust