

Q: How can water get into the cylinders of an Atomic 4, and what can I do about it?

A: CAUSES OF WATER GETTING INTO CYLINDERS (And running out of the intake throat of the carburetor):

1) The most common way for water to get into the cylinders of an Atomic 4, is for cooling water to back up within the exhaust system by over-cranking the engine with the raw water through-hull open. Without the engine running and producing exhaust pressure to move the cooling water out through the exhaust system, water will continue to collect within the system until it reaches a level that enables it to flow back into the manifold. From there, the water has a direct pathway back into the combustion chambers.

2) Sometimes, problems within the exhaust system will only manifest after sailing. If water intrusion only occurs after sailing, try closing the raw water through-hull fitting while sailing, and see if the problem goes away. If it does, you'll have to troubleshoot the exhaust system, or keep your thru hull closed whenever you're sailing.

3) Raw water can enter and flood the exhaust system through an open (or leaking) through-hull while sailing, or setting in a slip. Since sail boat engines are almost always below the theoretical water line, it is necessary to loop the raw water hose from the engine (or heat exchanger) above the water line prior to connecting it to the exhaust fitting to prevent hydrostatic pressure from outside flooding the exhaust system. The top of this loop must have an anti-siphon valve installed to prevent water from siphoning into the exhaust system and flooding back into the exhaust manifold.

4) Leaky head gaskets can result in water getting into one or more cylinders. When head gaskets fail, there is usually evidence of poor running or hard starting caused by loss of compression, and/or water fouling the spark plugs.

5) Holes or cracks in the head, manifold, or deck of the block can also result in water entering the cylinders. If these problems become suspect, proceed to step (4) below.

WHAT TO DO IF WATER IS DISCOVERED IN THE CYLINDERS (OR RUNNING OUT OF THE INTAKE THROAT OF THE CARBURETOR):

1) If water is discovered in combustion chambers, perform the following precautionary steps as soon as possible:

a. Close the raw water thru-hull valve.

b. Remove all spark plugs and squirt lots (5 or 6 squirts) of Marvel Mystery Oil (MMO) in each cylinder to prevent pistons from seizing. Try to aim the MMO away from the manifold side of the engine, toward the cylinders.

c. Turn the engine over with the starter until most of the evidence of water is gone from the combustion chambers.

d. If water was seen to run out of the intake throat of the carburetor, remove the main passage plug (the plug that you would remove to remove the main jet), and allow all the fuel and water to run out of the carburetor.

2) Dry (or replace) the spark plugs, and try to start the engine. If the engine starts, open the raw water through-hull.

3) If the engine starts and runs satisfactorily, check for water in the crankcase. If water is present, change the oil at least three times, running the engine just long enough between changes to mix up the water and oil, to maximize the amount of water that comes out with each oil change.

4) If engine will not start, or If the engine falters after opening the through-hull, and water is seen to be reentering the cylinders, shut off the engine, re-close the raw water through-hull and proceed to check the following (listed in order of likelihood of occurrence):

a. Perform a compression check. If weak compression is discovered in two adjacent cylinders, a failed head gasket is probably the cause of the water entering into one or more combustion chambers.

b. If compression is weak on only one cylinder, check to see if air can be heard to be escaping into the water jacket of the head during the compression check. A sound of escaping air during the compression check, would indicate a small hole in the combustion chamber of the head.

NOTE: Removal of the thermostat housing would make it easier to hear a compression leak into the water jacket of the head.

c. Remove the hoses from both fittings on the manifold and blow into one fitting while holding a finger over the other. If the manifold will not hold air, a leak in the water jacket is indicated, and the manifold will have to be replaced.

d. If the head, head gasket, and manifold appear sound, a crack in the cooling jacket of the block, would be suspect. In this case, it will be necessary to pressure check the block. The easiest way to pressure test the block (without removing the head) is to first plug the outlet of the thermostat housing. Then remove the hose from the outlet of the water pump, and install a Shroeder valve in the end of the hose, so that a standard bicycle tire pump with a built in pressure gauge can be used for the test. A Shroeder valve is the standard valve used on automobiles, and they are available at any auto parts store. The block should be able to hold 20 psi for an hour or more without a noticeable drop in pressure.

NOTE 1: It would be preferable to remove the manifold for the above pressure test so that the valve ports can be inspected during the test. You can pressure test the manifold by holding your thumb over one port while blowing into the other. If the manifold is leaking, you should be able to blow through it rather easily.

NOTE 2: In many cases, it is preferable to drain the water out of the block and head for the test and listen for an air leak. Small leaks in a combustion chamber (particularly the combustion chamber of the head) can usually be heard through the spark plug hole.

If pressure decays rapidly in the block and head, look for water leaking out through one or more exhaust or intake ports. If water is leaking from an intake or exhaust port, it may be impossible to see exactly where the water is originating, but a defective block would definitely be indicated and the block would have to be removed from the engine and taken to a machine shop for evaluation.