

# Boston Valve Filler to Military Valve Adapter Fabricated with Hand Tools, version 1.1

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By **R. G. Sparber**

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My Advanced Elements AirVolution™ kayak uses a type of Military valve. It has many wonderful features, but compatibility with a Boston valve filler is not one of them.

My Ryobi high-volume/low-pressure inflator has a Boston valve filler. With a bit of reverse engineering, I designed an adapter.

This project is made from a 1-inch length of ½-inch schedule 40 PVC pipe, a compatible slip fit coupler, three O-rings, and six inches of metal coat hanger or similar straight wire. For tools, you will need a means of heating the end of the coat hanger until it glows, a wire cutter able to cut the coat hanger, and a file to square up the end of the coat hanger. You will also need a way of cutting the PVC pipe to length.

In a twin article<sup>2</sup>, I explain how to make this coupler using a lathe. Ryan Ugolini reminded me that a lathe is not a common shop tool. I lucked out and was able to redesign the adapter so it is within reach of people with just hand tools.

You can see the adapter in action:

<https://www.youtube.com/watch?v=ZO9f5NruxKY>

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<sup>2</sup> See <https://rick.sparber.org/BostonValveToMilitaryValveAdapterLathe.pdf>



Start by marking off ½ inch from the end and 1 inch from the end with a pencil.



Perform the following outside where there is good ventilation.

Using a torch, heat the end of the coat hanger until it glows. Then push the wire through the PVC pipe at the ½ inch mark. Try your best to get the wire parallel with the end of the pipe and on a diameter. Let the PVC and wire cool without disturbing them.

Remove the wire from the pipe and pry off any bits of plastic from the outside of the pipe.



Using the outside diameter of the pipe as your gage, cut a piece of the coat hanger. Use a file to make the ends square. The goal is to push the coat hanger through the holes just formed and have the wire not stick out either side.



Cut the pipe off at the 1-inch line.



The piece of pipe is pressed into the coupler until the ends of the wire are hidden. I'm using a vise to do this task, but it can be done by pushing the assemble down on a table. Check often to be sure you don't push it in too far. Getting it back out is not easy.

This locks the wire in place.



Here are the three O-rings ready for final assembly.

The one on the far left is a bit of a mystery. It came from a box marked  $7/8 \times 1-1/8 \times 1$ . The  $7/8$  makes sense as the inside diameter because it matches the outside diameter of the PVC pipe. The ring's outside diameter is around  $1-1/8$  inches. But what does that last digit mean?

In the center is a 012, and on the right is a 113. I'm no expert on O-rings, but I think these are the right numbers. I suggest you bring the adapter plus the Boston filler nozzle to the hardware store and trial fit the O-rings. The largest O-ring should be a snug fit around the pipe. Initially I used one that was too small and it eventually broke.



The largest O-ring fits around the pipe. Given the low pressure, pushing this down on the Military valve provides a good seal.



The 012 O-ring slides onto the Boston nozzle first. Then put on the 113.

Position the 113 to be near the end of the nozzle.



Using a twisting and pushing motion, work the end of the nozzle into the coupler. When the O-ring is all inside, straighten the nozzle and push it in.



The 012 O-ring helps to center the nozzle in the bore but is not a pressure seal.



Here is the finished adapter.



To use the adapter, take off the Military valve's cap and be sure the push button found inside is up. In this position, air can flow in but will not come out.

Start the Ryobi inflator and push the adapter down on the valve.

The coat hanger wire will push down on the button and let the high-volume/low-pressure air go in. When the pitch of the motor changes, lift the adapter off of the valve and turn off the inflator.

You will likely need to use your hand pump to attain the final high pressure.

The adapter works just as well to deflate the air chamber. Just move the adapter to the suction port of the Ryobi and repeat the process.

I welcome your comments and questions.

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Rick Sparber  
[Rgsparber.ha@gmail.com](mailto:Rgsparber.ha@gmail.com)  
Rick.Sparber.org