

Low Cost Snow Tube Fabrication

Greg Hanson, Service Hydrologist, WFO Burlington, VT

(First posted 11/30/00, Updated 04/01/03, 1/5/2015)

This is an alternative to the commonly used, but expensive, Adirondack Snow Tube. It requires some labor to fabricate, but at less than \$200 in materials is significantly less than the \$850 required for the Adirondack Snow Tube.

The low cost method uses PVC pipe, with serrated teeth cut directly into the pipe. The PVC teeth may not prove to be as durable as the metal teeth fitted to the Adirondack Snow Tube, but at \$9.00 PVC pipe is cheap to replace.

The hanging scale, similar to the scale supplied with an Adirondack Snow Tube, is available through GSA. A conversion to inches of water can be taped or glued to the face of the scale. For a 3 inch inside diameter pipe, 1 inch of water weighs 0.25 lb, or 4 ounces. The specified scale is accurate to ½ ounce, or 1/8 inch of water.

As an option I have also tried a 3” diameter automotive exhaust pipe available at a muffler/exhaust shop. The exhaust pipe has a 3” outside diameter, so one end will have to be flared when the pipe is purchased. Construction methods are the same as detailed below, but the pipe should be painted to inhibit rust. Exhaust pipe is heavier than PVC, but the specified scale has enough capacity for the 5 ft length of pipe plus the snow sample. The steel exhaust pipe will be much more durable than PVC, and will have a better capability to get through any ice layer in the snow.

A second option is a much less expensive technique that avoids the use of the hanging dial scale. By using a 4 inch inside diameter tube to obtain the snow core, the snow sample can be melted and measured in a standard 4” rain gage. The rain gage costs around \$25 for the NWS, and shaves another \$100 off the price by eliminating the hanging dial scale. This option works well for observers that have a nearby source to melt the snow. If sampling in a remote location, the weighing method would work better.

Materials list:	Source:	Approximate Cost:
10' x 3" inside diameter schedule 40 PVC pipe	Home Supply/Hardware Store	\$9.00
3' x 3/16" brass rod	Home Supply/Hardware Store	\$3.00
3/4 inch diameter dowel rod	Home Supply/Hardware Store	\$2.00
2 inch hook	Home Supply/Hardware Store	\$1.00
20 lb capacity hanging dial scale	GSA*	\$170.00

* Scale can be ordered from GSA web site www.gsaadvantage.gov. Do a search for model 0723TG. The following information should return:

NSN/Mfr. Part No.	Product	Pkg	Price	Delivery	QTY
	MECHANICAL HANGING SCALE	EA	<u>\$167.20</u>	30 Days	

ing 7" Dial Scale Capacity 20 Lb x ½ oz, CG Scoop 12" x 11" " x 6 3/4" Legal for Trade Class III

r: CHATILLON

[THE SCALE PEOPLE, INC. \[GS-26F-1022B\] \(s/b\)](#)

Tools needed:

Safety glasses

Tape measure

Jig Saw or hack saw

Coarse file or rasp

Permanent marker

Bench vise is helpful but not necessary

Step 1: Cut the pipe

Using a hack saw or jig saw, cut the pipe to length, depending on your application. The length of an Adirondack snow tube is 5 feet, so for this first try I cut two 5 foot long sections from one 10 foot piece of PVC pipe.

Step 2: Lay out the teeth. I used a sawtooth pattern, ½ inch deep, and spaced 1 inch apart.

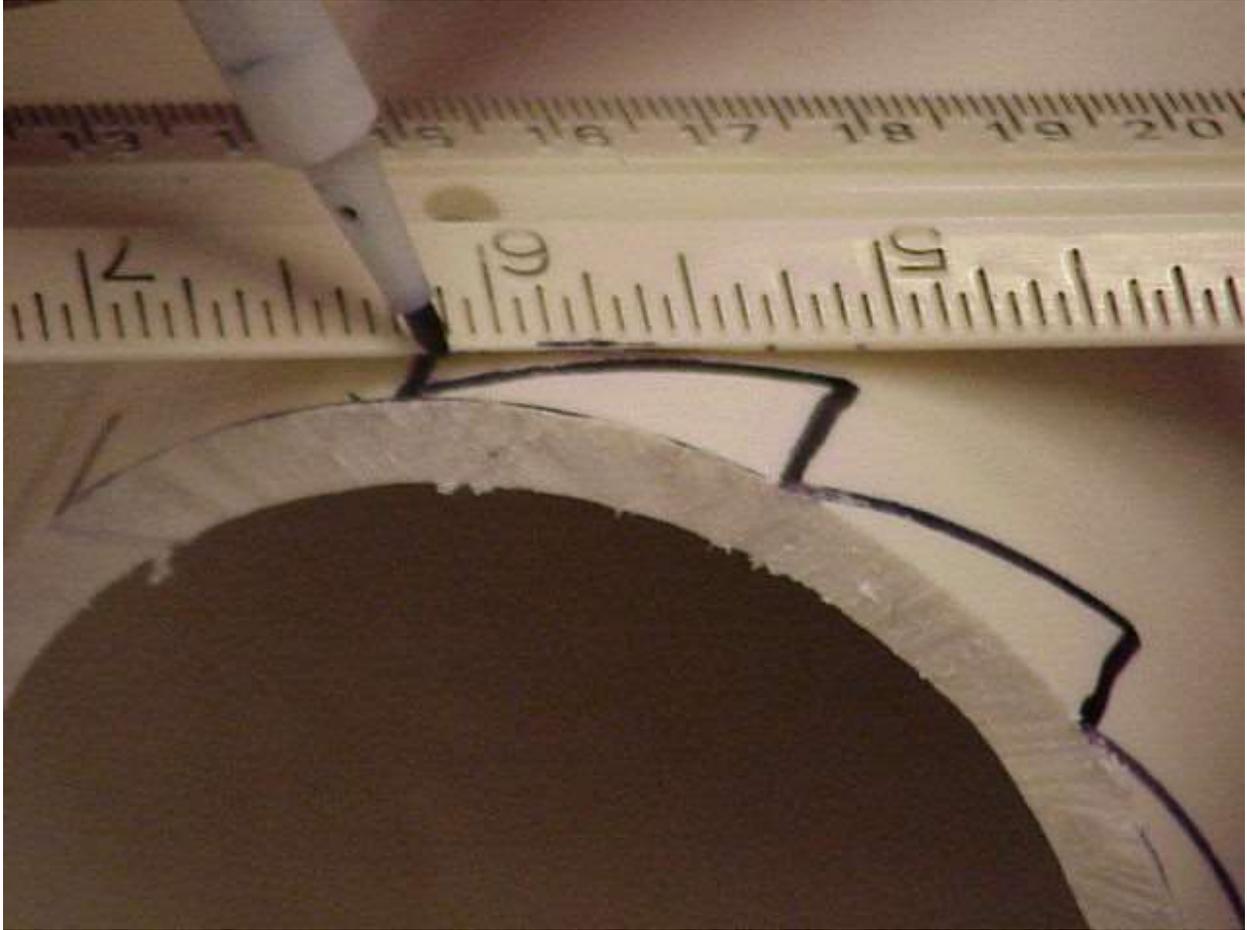
At one end of the tube, draw marks at one inch intervals around the end of the tube.



At each mark, draw a line $\frac{1}{2}$ inch down the tube (picture 2). This will be the depth of the teeth.



Draw a diagonal line from the end of one line to the bottom of the adjacent line.



Step 3: Cut the teeth

With a jig saw or hack saw, cut the teeth. Don't forget your eye protection!



Step 4: Sharpen the teeth (not needed for steel exhaust pipe)

With a file or rasp, sharpen the outside edge of the teeth.



Step 5 (optional): Make the handle

Drill two 3/4 inch holes through the other end of the tube to accept the handle. Cut a piece of 3/4 dowel to 1 foot length.

Step 6: Mark outside of tube

Using a waterproof marker, mark the outside of the tube for snow depth. This example is the steel automotive exhaust pipe, with the end flared to an inside diameter of 3 inches.



Step 6: Make the hanger

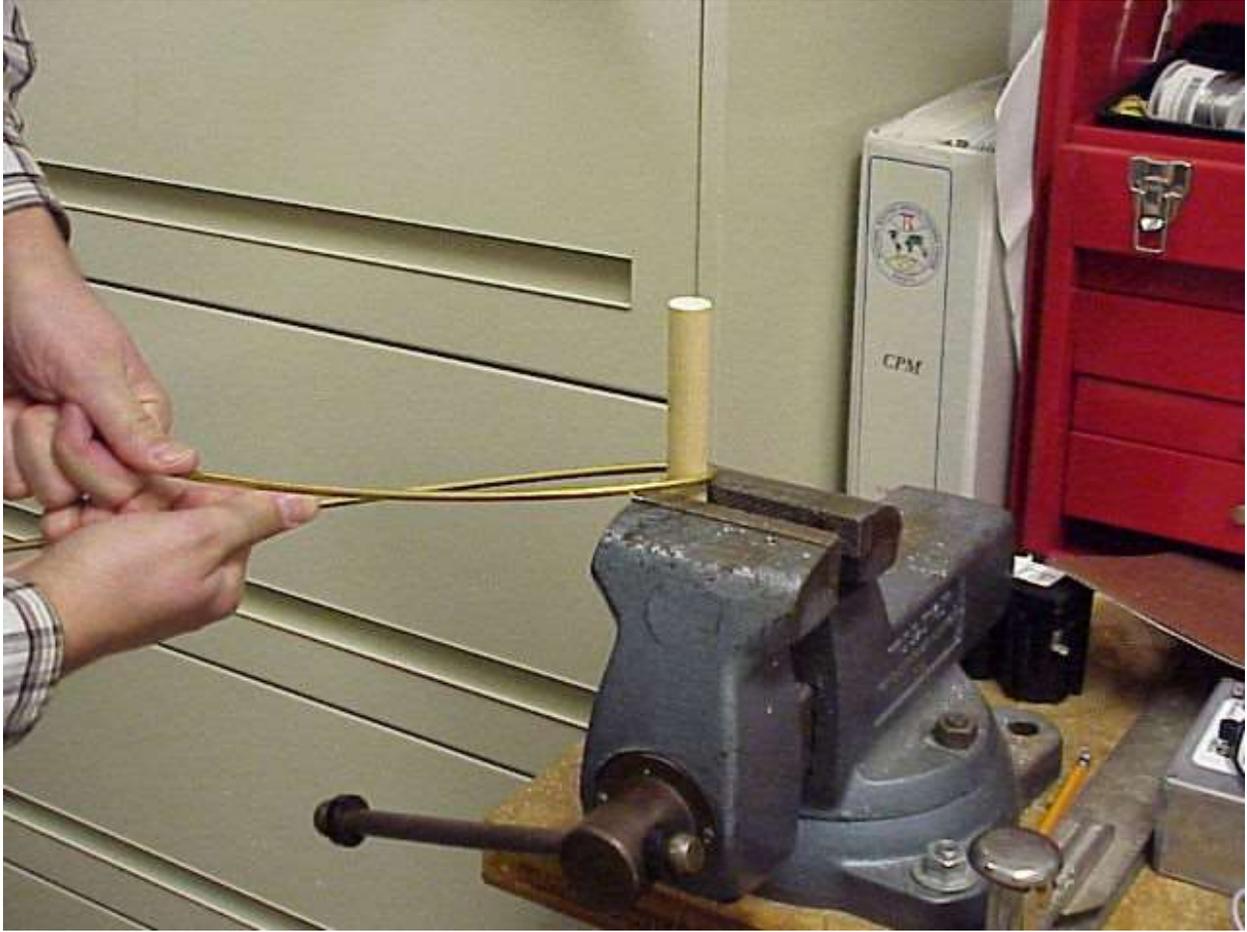
Note: you could probably make a sling out of rope or something similar. I mimicked the Adirondack sampler and made a hanger out of a brass rod. If you can't find brass, a steel rod will work, but it will likely rust.

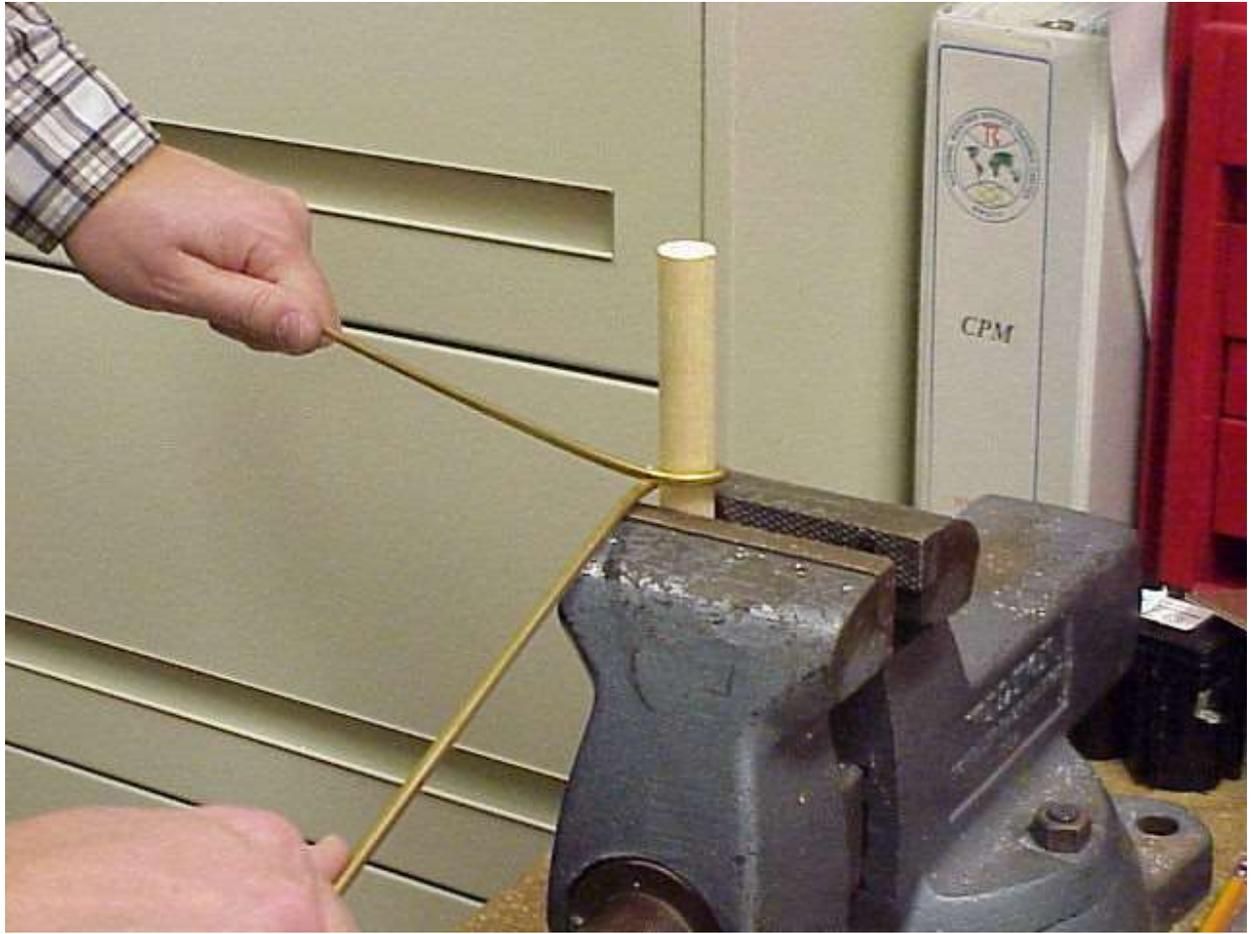
Mark the 3' brass rod at the middle.



Bend a loop in the rod at the middle.

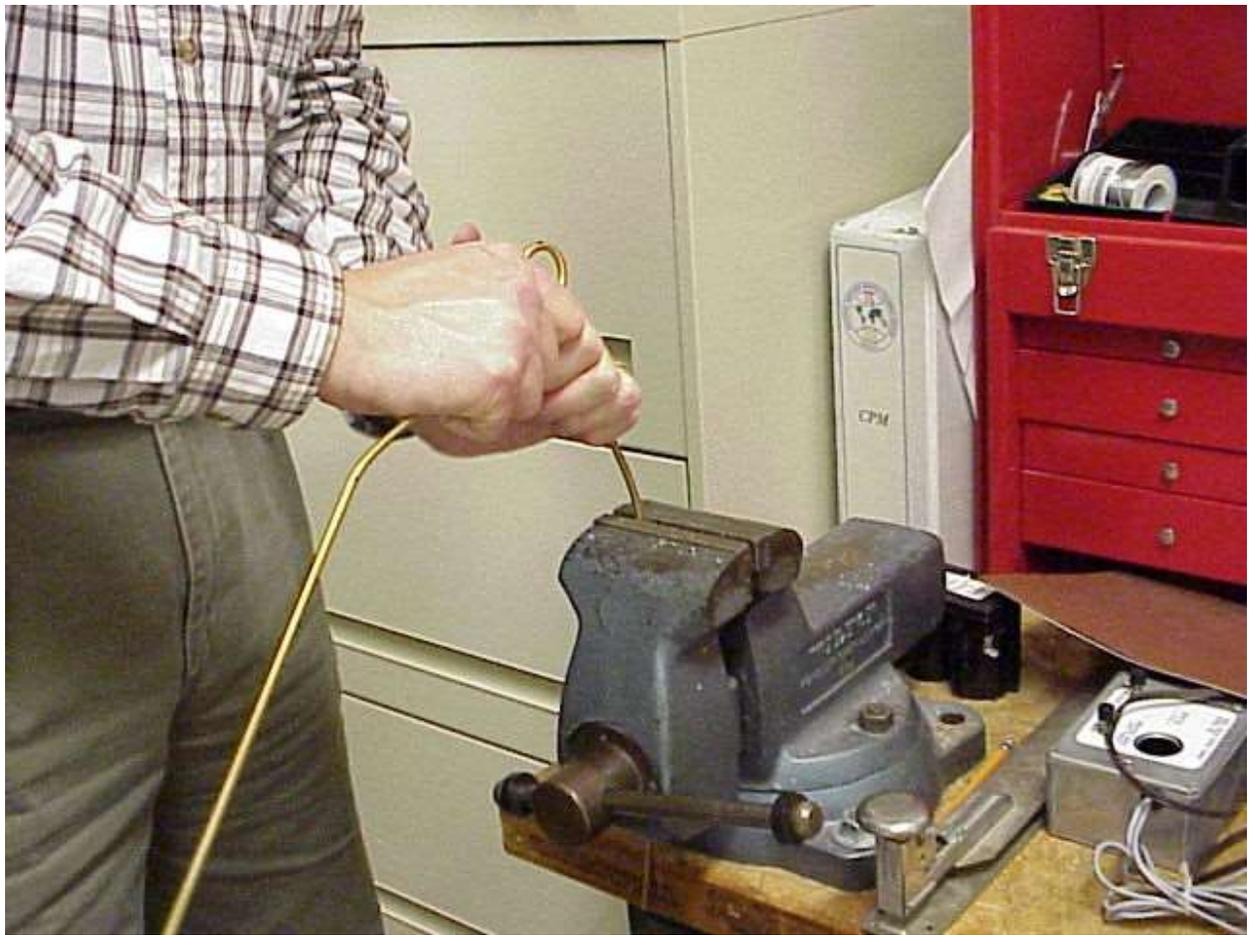
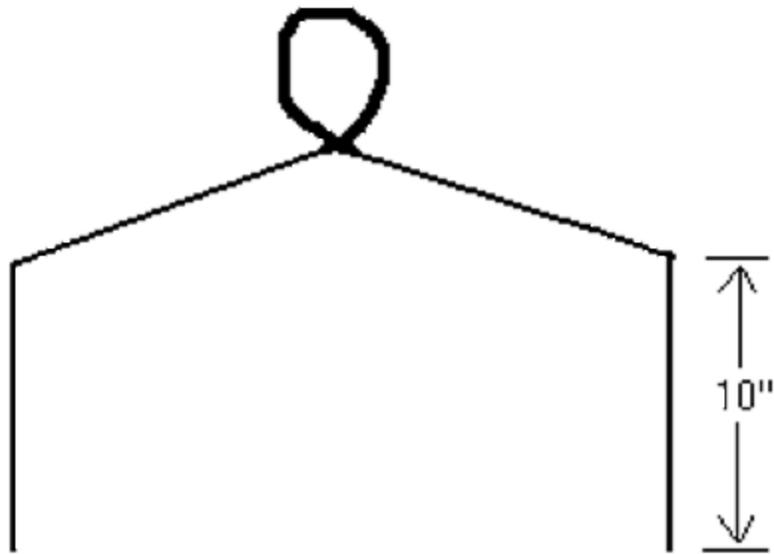
I used a piece of the dowel rod as a break to bend the rod as shown:







Measure 10" in from each end, and bend the rods so that when you hold the rod by the loop in the middle, the bent rod ends point straight down.



Bend the rod ends into a half circle, large enough to hold the PVC pipe. As an option, you can slip a length of 3/16" clear vinyl tube over the ends to add a non-skid surface. The 2 inch hook is used to attach the hanger to the scale.







Step 7: Configure the scale

The scale I purchased had a plastic cover which I removed to gain access to the face. I removed the dial pointer of the scale and repositioned it so that it read zero when the empty tube was hung from it. As it turns out this was a really bad idea, as the pointer kept falling off. A better method is to leave the pointer as is, and adjust the scale so the pointer reads zero when the empty pipe is hung from it. Or note the weight of the empty tube (tare) and subtract it from the snow-filled tube.



Most scales have an adjustment screw on the hanger to fine tune the zero reading. Read the instructions with your unit.

To make the scale I used ¼” plastic rub on numbers, then photocopied it. I cut out the copy, and taped it over the face of the scale.

The final product:



Step 8: Wait for snow.

Optional: A tamper is a useful tool to help take your snow reading. If the snow is dry, or if the lower layers have turned to loose corn snow, you can leave snow on the ground when you remove the tube. The DAPM here has made tampers out of wood to pack the snow into the tube. The former Caribou DAPM has told me that they use "Water Worm" swimming pool toys as a tamper. The Water Worm is a long styrofoam tube that can probably be obtained at any discount store during the summer, or at a swimming pool supply store.

Comments?

Comments are encouraged. Let me know what you think of the design. Give it a try and tell me how (if) it works, and anything you can think of to make an improvement.

Email Greg Hanson at gregory.hanson@noaa.gov