PVC Soprano Recorder
by Thinkenstein on October 23, 2010

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I'm a refugee from Los Angeles, living in backwoods Puerto Rico for about 35 years now and loving it. I built my own home from discarded nylon fishnet and cement.

Intro: PVC Soprano Recorder

Recorders are fairly easy to play; much easier than side-blown flutes. They are relatively cheap instruments to buy, but if you want some DIY fun, here's how to make one out of PVC pipe.

To hear how it sounds, listen to the .mp3 audio file in the last step.

step 1: The Parts of the Recorder

The recorder is composed of three parts; the mouthpiece, the body with the fingering holes, and the standard connector which joins the mouthpiece and the body.

The spacing and size of the holes in the body are copied from a store-bought plastic recorder.

The mouthpiece is composed of concentric layers of different size pipe. The pipe diameters are: 1/2" CPVC (smallest diameter used for hot water), 1/2" PVC (the layer around it with a section removed to create an air channel), and 3/4" PVC (to cap the top of the air channel).

The air channel conducts the air you blow to a sounding hole. A wedge shape at the hole interrupts the air flow and creates vibration and sound.

The fingering holes in the body modify the pitch of the sound by creating different amounts of resistance to the air passing through the pipe. Opening all the holes lets air escape with less resistance by the easiest route, through the first holes. Closing all the holes creates a longer column of air inside the body, and more resistance, which results in lower notes.

step 2: The Mouthpiece

PVC pipe comes with a variety of wall thicknesses. Schedule 40 is common, and is what I used. The 1/2" CPVC doesn't quite fit inside the 1/2" PVC, and the 1/2" PVC doesn't quite fit inside the 3/4" PVC. By sawing a slit down one side of the pipe, it can spring open and fit tightly on the next size pipe down.

My mouthpiece parts fit so tightly that no glue was needed.

I cut the 1/2" PVC channel and put it in place to mark the size of the rectangular sounding hole. Then I removed the 1/2" PVC, drilled the hole, and touched it up with an X-acto crafts knife. You need a narrow and sharp blade to get in the hole and carve out the wedge-shaped edge of the hole.

I put the wooden dowel plug right up to the start of the sounding hole. Setting it further back toward the mouth changes the pitch and allows some tuning. I used a metal drift pin and a hammer to set the plug inside the pipe.

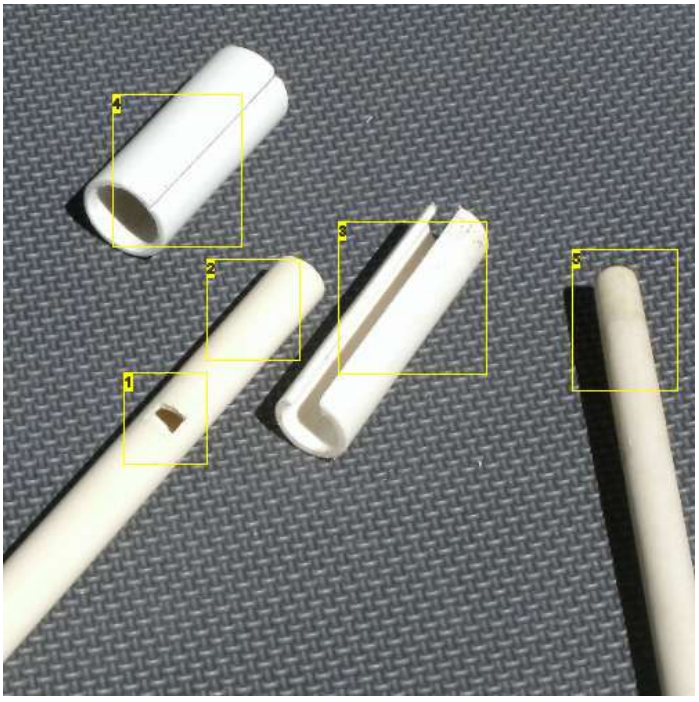


Image Notes
1. Rectangular sounding hole.
2. 1/2" diameter CPVC. 2 1/2" from sounding hole to this end of the pipe. Leave the other end long. You will trim it later.
3. 1/2" PVC, 3 1/4" long, with a strip cut out to create the air channel.
4. 3/4" PVC, 2 1/2" long, with a slit cut on one side with a saw. The slit allows for expansion and goes on the side opposite the air channel. This layer covers the top of the air channel.
5. 1/2" diameter wooden dowel, which fits tightly inside the 1/2" CPVC pipe. An

Image Notes
1. This is the strip cut out of the 1/2" PVC to make the air channel.

approximately 1" long section of the dowel will be cut off and used as a plug inside the mouthpiece.

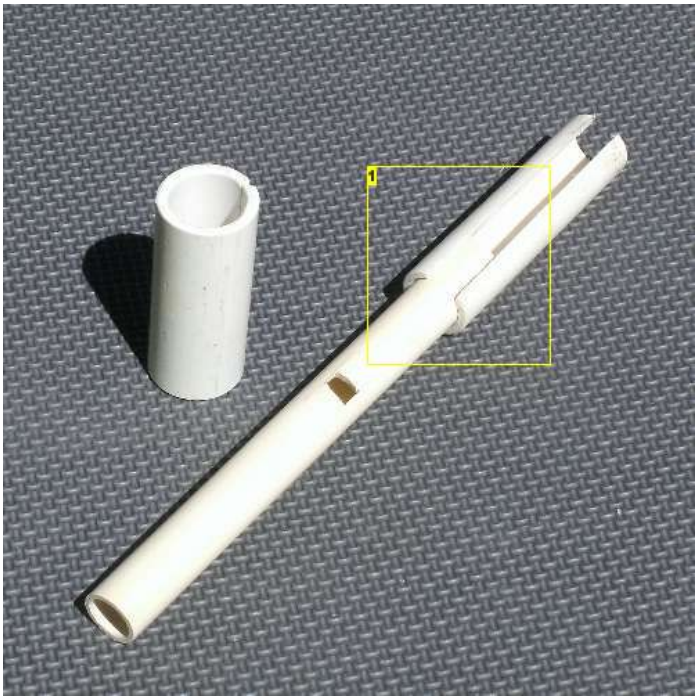
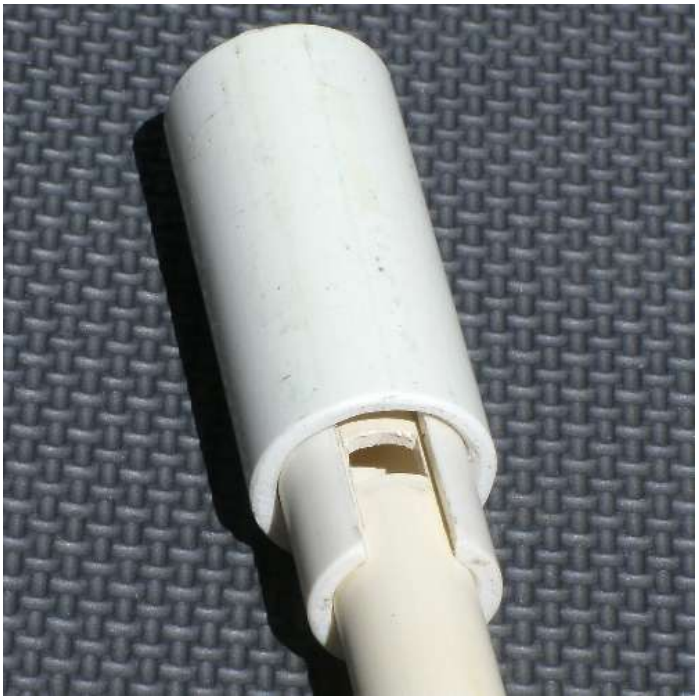


Image Notes
1. Starting to place the 1/2" PVC over the 1/2" CPVC



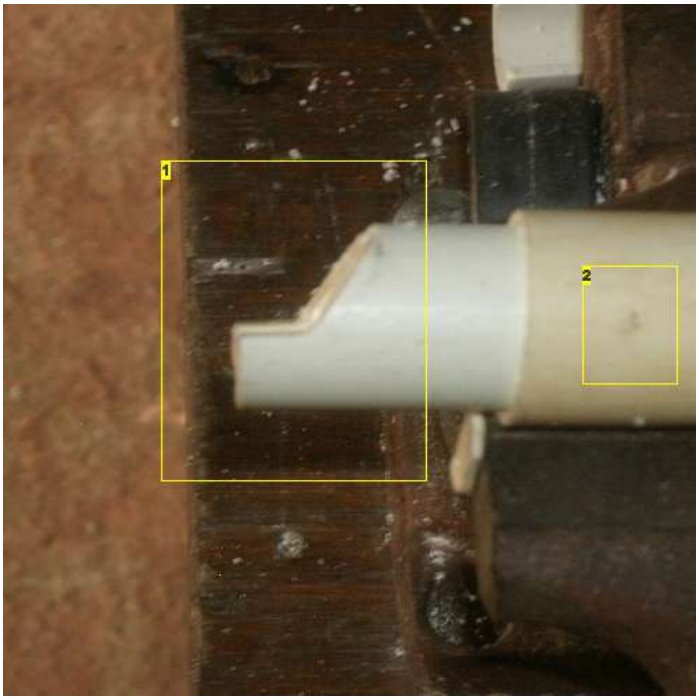


Image Notes
1. The mouthpiece is held in a vise. Two saw cuts are made to begin the forming.
2. This is a pipe holding vise adapter I made, not part of the mouthpiece.

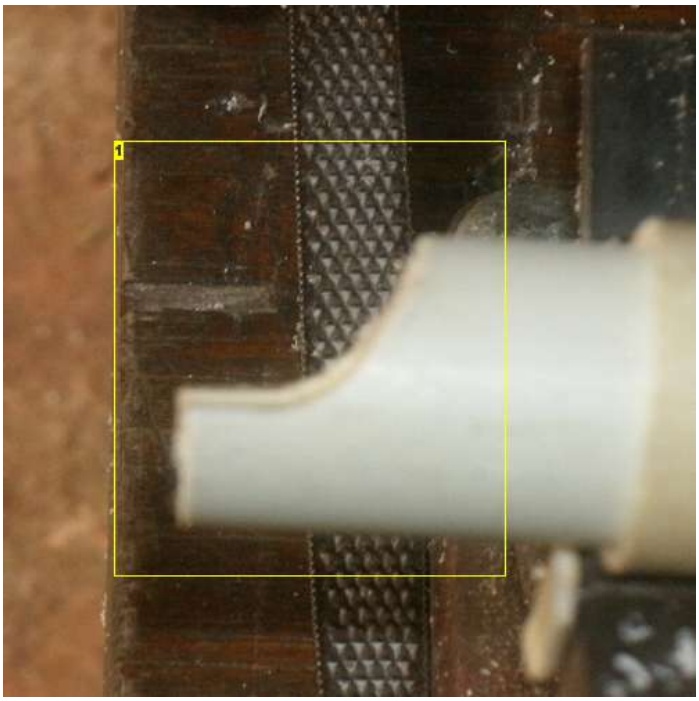
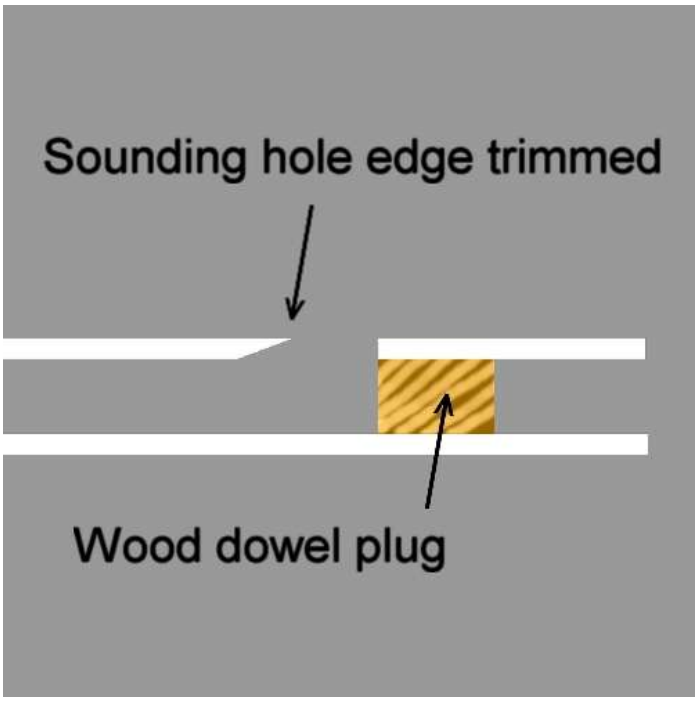


Image Notes
1. A half-round file was used to shape the curve. The rest of the shaping was done with an X-acto knife, and other files. Shape it to fit your mouth, without any air leaks.



step 3: Finger Hole Size and Spacing

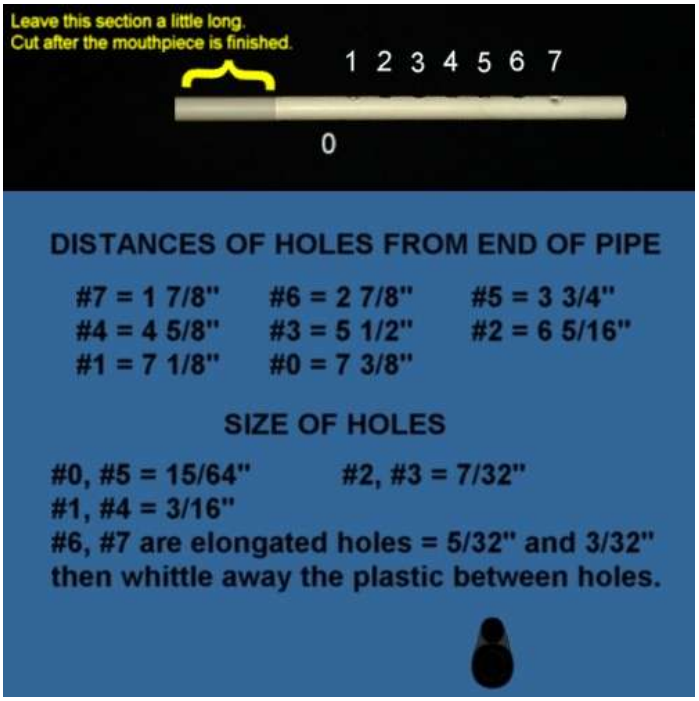
Use a piece of 1/2" CPVC for the body. Cut it about 12" long. You will trim some off the mouthpiece end later.

FINGER HOLE SPACING:

The distances between holes are copied from a soprano recorder. The holes are not all placed on the center line down the pipe. Since some fingers are longer than others, the holes have a little sideways displacement to increase comfort while playing. When penciling hole locations, hold the pipe as you would while playing it to find and mark a comfortable side displacement for each finger hole.

There are seven finger holes and one hole for the thumb on the opposite side of the body -- the same as on a recorder.

On a recorder, double holes at #6 and #7 help get half tones. I elongate my holes and just half-close them when needed.

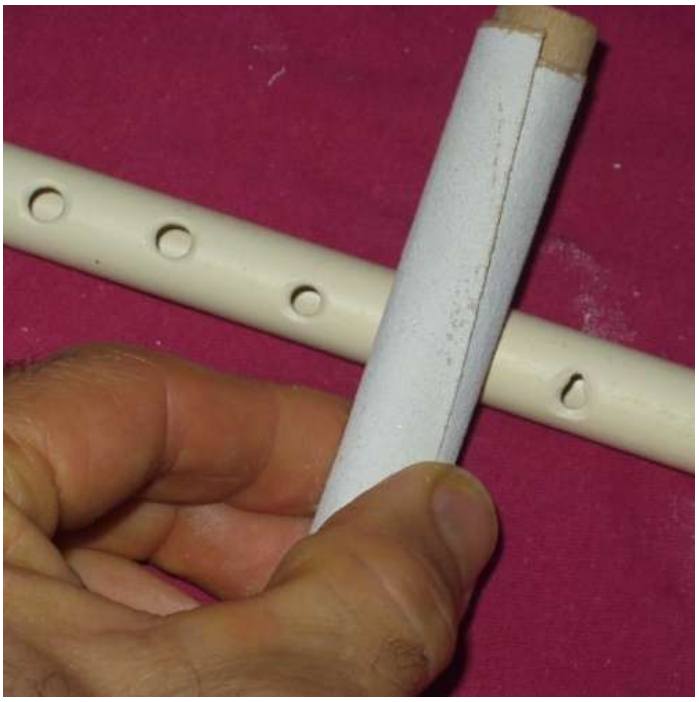


step 4: Shaping the Finger Holes

After drilling the appropriately sized holes, I use some sandpaper wrapped around a piece of 5/8" wooden dowel material to modify the hole. That makes it easier to seal the hole with one's finger, reducing unwanted squawking sounds.

In the raw hole, there is a pocket of air inside the hole underneath the finger. I like to bring the finger down a little lower, thus reducing the pocket of air and turbulence inside the tootophone body. It probably results in a cleaner sound.

I made a special tool to get inside the drilled finger holes and scrape the burrs from inside of the tootophone body. (A tiny knife with a bent end, made of stainless steel welding rod.) That, too, reduces turbulence and makes the instrument easier to play.



step 5: Trimming the Mouthpiece and Body

The distance from the sounding hole on my store-bought recorder to the #1 hole (See step 3 for hole numbering) is about 4 inches. I didn't want the connector piece, which is raised up some above the surface of the 1/2" CPVC to create a step that would interfere with air flow around the sounding hole. For that reason, it is better not to have the connector located too close to the sounding hole.

I cut the mouthpiece 2 1/4" from the sounding hole. I cut the body 1 3/4" from the #1 hole. No science involved there. I just eyeballed it.

step 6: Hear the Recorder

To hear how the recorder sounds, click on the .mp3 audio file thumbnail icon below. It looks like a piece of paper with the corner folded over.

File Downloads

COLONIAL ERA TUNE.mp3 (298 KB)
[NOTE: When saving, if you see .tmp as the file ext, rename it to 'COLONIAL ERA TUNE.mp3']

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