

pvc "TOOTOPHONE" -- a musical reed instrument

by [Thinkenstein](#) on January 17, 2010

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Intro: Pvc "TOOTOPHONE" -- a musical reed instrument

The body of the tootophone is made of 1/2" CPVC pipe, which is used for hot water plumbing and is of a smaller diameter than 1/2" PVC pipe.

The tootophone is similar to a soprano recorder in terms of size and finger spacing. The mouthpiece is heat formed to make it a little narrower than the CPVC pipe.

The reed is cut from a piece of plastic from an old flat screen monitor I disassembled. Just about any semi-stiff, clear packaging plastic will work to make a reed that vibrates.

I have always liked the idea of playing saxophone, but found the bamboo reeds to be frustrating to get sounds out of. For some reason, these plastic reeds are a lot easier to blow. Being less frustrating to blow, the tootophone is more fun to play, at least for a beginner. Being more fun to play, I play more, and that's what it's all about. Tootophones are fun to play.

Figure maybe a dollar in material and many hours playing around. This is very cost effective entertainment.

Be sure to check out the audio files at the end, to hear what the tootophone sounds like.

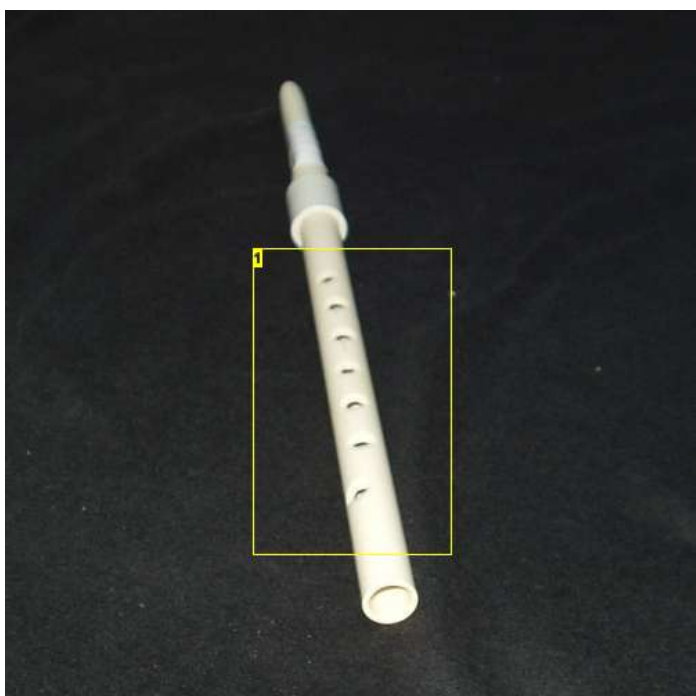


Image Notes

1. Note that the holes are not all exactly centered in a straight line. Mark the distances on the center line, but shift the holes sideways to where your fingers naturally make contact with the pipe for comfort and ease of playing.

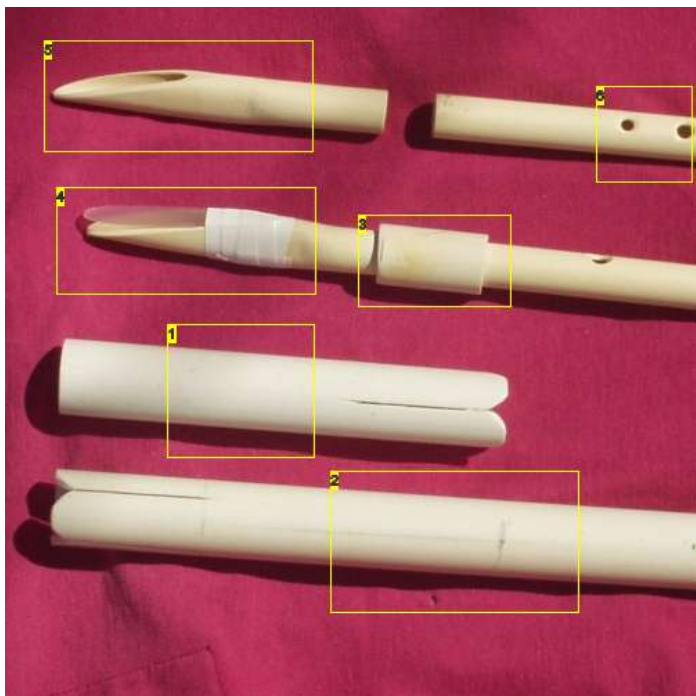


Image Notes

1. Reed protector cap.
2. I make two reed protector caps at a time, because the extra pipe length makes it easier to hold while sawing the slits to make the "fingers".
3. Joint sleeve made of 1/2" PVC, heat formed over a piece of 1/2" CPVC.
4. The plastic reed is cut with scissors from a larger sheet of plastic and is taped to the mouthpiece body with white electrical tape.
5. The pipe is partially flattened, and cut at an angle. The cut edge is filed to reduce contact surface with the reed. That helps keep the reed from sticking to it with saliva.
6. The holes are different diameters, copied from a small recorder.

step 1: 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.

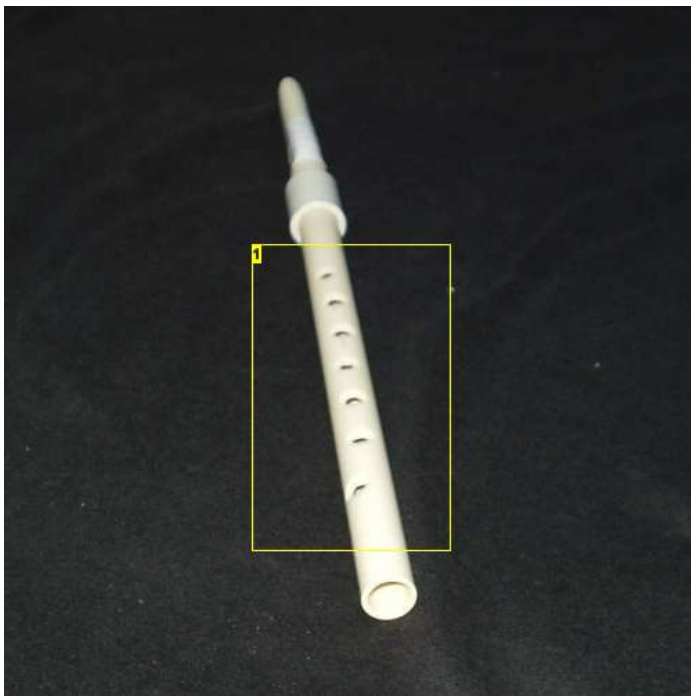
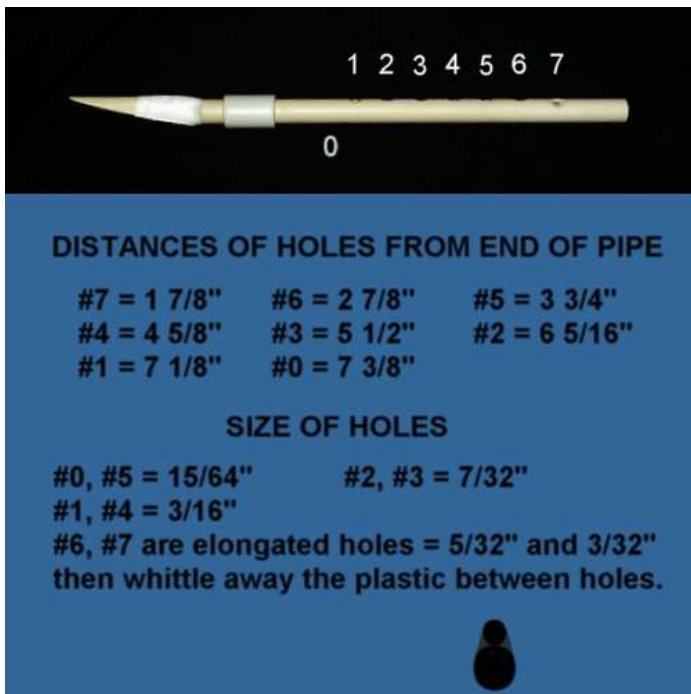


Image Notes

1. Note that the holes are not all exactly centered in a straight line. Mark the distances on the center line, but shift the holes sideways to where your fingers naturally make contact with the pipe for comfort and ease of playing.

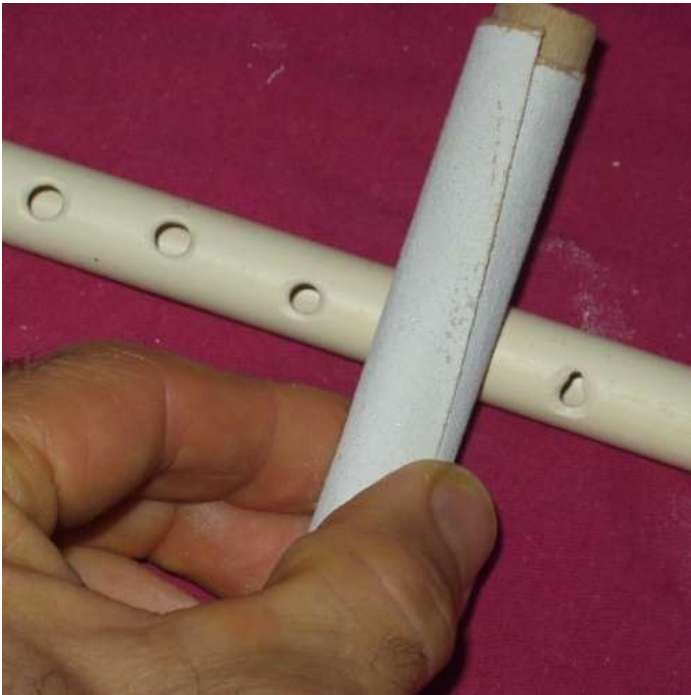


step 2: Shaping the finger holes

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 3: Safety while heating PVC

We love plastics for what they do for us, but plastic manufacture and decay tend to pollute the environment and negatively affect our health.

Vinyl Chloride, one of the components of PVC, is carcinogenic. When it is locked up in the polymer, however, it is much safer to be around. In my years of experience working with PVC, I have not noticed any adverse effects on my health from being around it.

Always work in areas with good ventilation. If you do get caught in a cloud of smoke, hold your breath and move to clean air.

When heating PVC with a gas stove or propane torch, try not to let it burn. Smoke from burning PVC is bad. With experience one burns it less and less. Don't panic the first time you do burn some. It scorches, but doesn't immediately burst into flame. Move the material away from the flame and try again. Don't breathe the smoke. Smoke avoidance comes naturally for most people.

While heating PVC over a gas flame, keep the plastic an appropriate distance from the flame to avoid scorching the surface before the inside can warm up. It takes time for heat to travel to the center of the material being heated.

Keep the plastic moving, and keep an eye on the state of the plastic. When heated, the PVC material is flexible, like leather. Beyond this stage, you risk scorching it.

A word from James, the plastic engineer -- "Just a word of warning, PVC can handle some high heats but if it catches fire, you wont be able to put it out, it does not need oxygen to burn so don't do this inside".

I do work inside, but my house is made of cement and has good ventilation. MAKE SURE THAT YOU HAVE GOOD VENTILATION. PLAY WITH FIRE -- CAREFULLY.



step 4: Heat forming the mouthpiece

One can make a mouthpiece that works just by cutting a piece of pipe at an angle, giving the straight cut a little curvature with a file, and putting on a reed. In pursuit of the ideal mouthpiece, my preferences have led me to doing some heat forming first to narrow the width of the mouthpiece and reed a little. That allows me to make reeds that are long and narrow, which I find easier to control, especially for high notes.

I use a wood forming tool, which fits inside the pipe to help give proper form to the soft plastic.

As with any plastic heat forming, try to avoid burning the material, which creates toxic gasses. See the safety warning step.

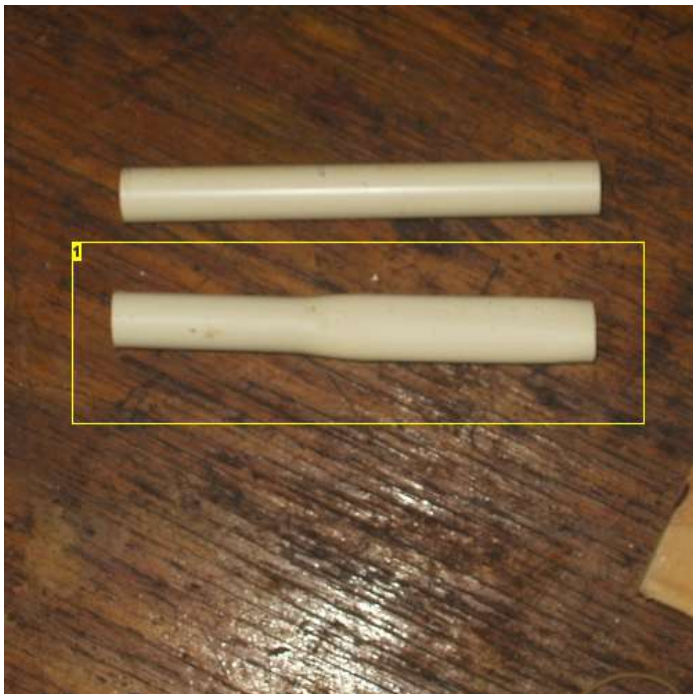


Image Notes

1. The first step is to squash down the end that will be cut at an angle and shaped for the reed.

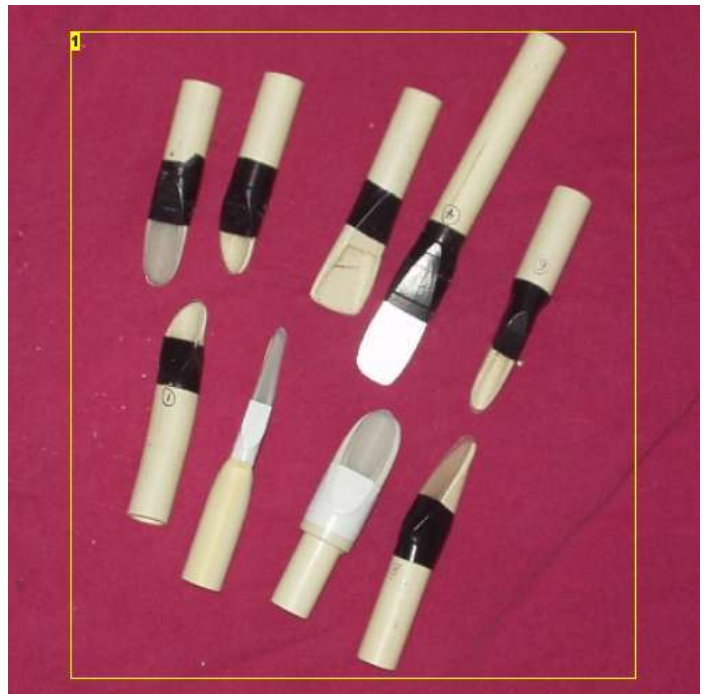


Image Notes

1. These are some of my early mouthpiece experiments.

Mouthpiece Forming Tool

I cut this forming tool out of 1/4" thick wood latice material. After softening the plastic for the mouthpiece, push the wood "finger" in and squeeze the softened plastic between two flat surfaces. The wood maintains the interior hole shape you are after. The hole is for hanging the tool on a nail.



step 5: Shaping the mouthpiece

The reed is held down to the cut surface by one's lower lip. If the cut surface is straight, the part of the reed that is supposed to vibrate will touch that surface and have no room to vibrate. Thus, the cut line needs to be modified to have a slight but continuous curve to it so that no matter where your lip presses down on the reed, like a tangent line on a circle, the tip of the reed will still be able to vibrate.

Water from spittle and condensation are hard to avoid. When water gets between the reed and the contact surface of the mouthpiece, it can stick the reed to the mouthpiece and stop it from vibrating. That kills the sound.

To minimize that problem, minimize the contact area between the reed and mouthpiece by filing the plastic down some.

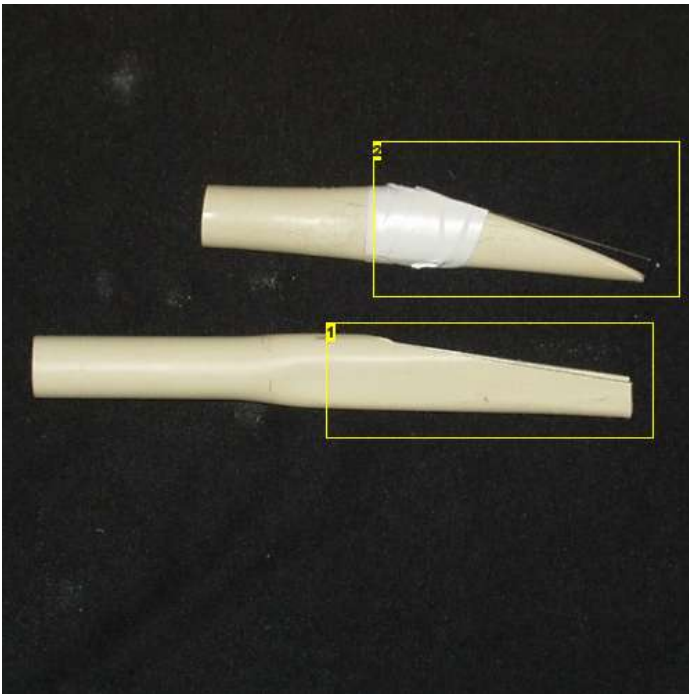


Image Notes

1. Straight saw cut. Keep the angle tight for a longer reed.
2. The plastic reed (barely visible) shows the original saw cut angle. This shows how much has been filed away. The final line has a slight, but continuous curve to it.

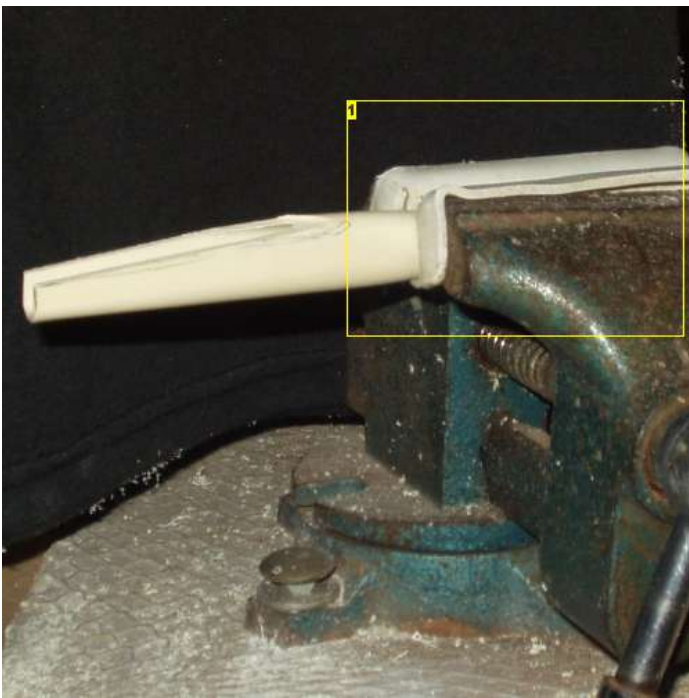
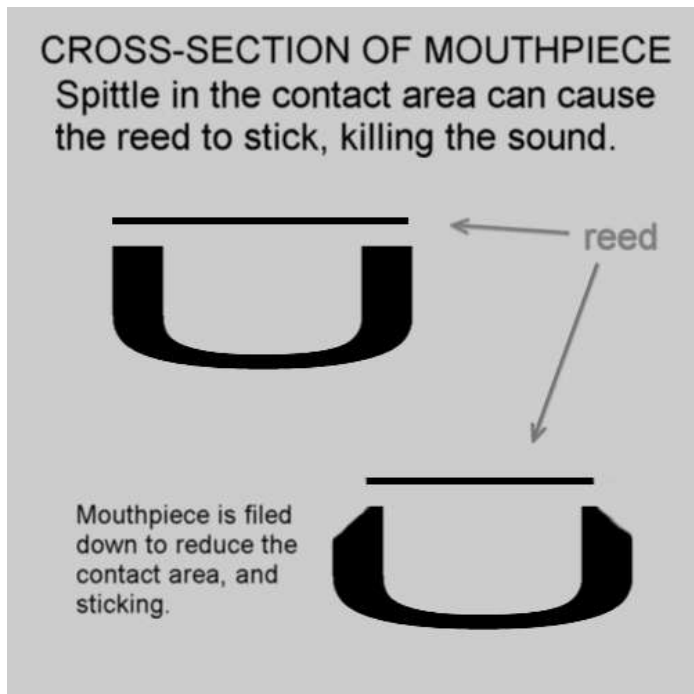
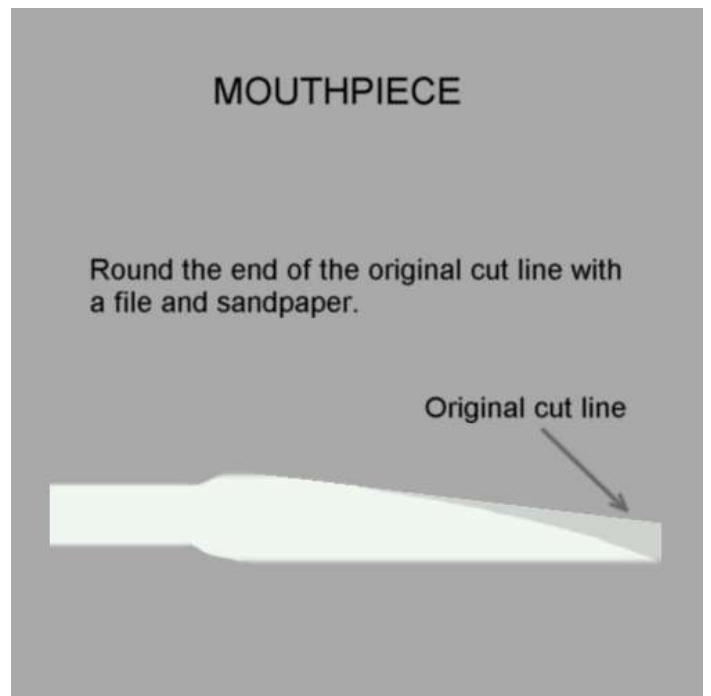


Image Notes

1. <http://www.instructables.com/id/PVC-VISE-ADAPTER-for-holding-pipe/> See my instructable for making vise adapters.

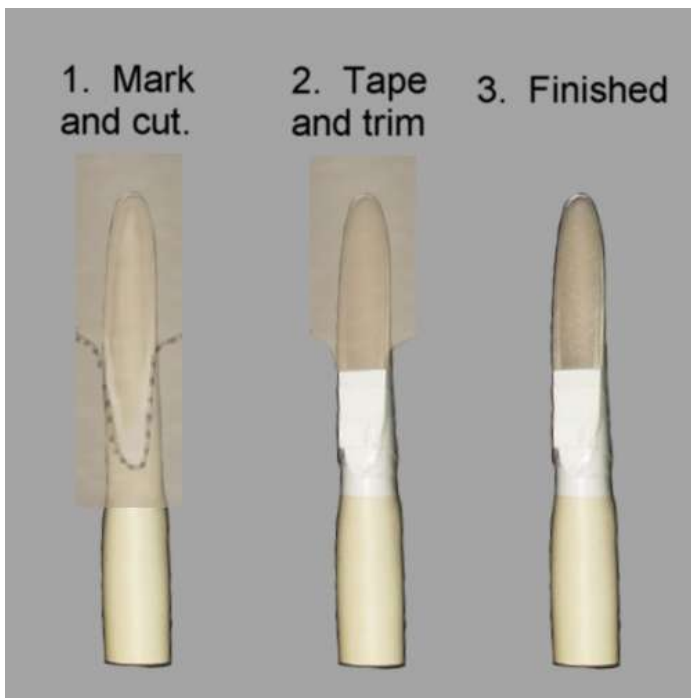


step 6: Forming the reed

Semi-stiff clear plastic that is used in packaging products can work as reed material. What I am using now was salvaged from a junked flat screen monitor.

Hold the mouthpiece up against the plastic so that you can see through the plastic and mark the contours of the contact area with a fine point marking pen.

I mark and cut just the area that is going to be taped to the mouthpiece. I cut the rest of the reed after it is taped down. Try to cut it close to the mouthpiece tight so excess material won't irritate your tongue or lip. Use fine sandpaper on the edge of the reed to round any sharpness that might irritate your lip.



step 7: Heat forming the joint connector

You need to connect the mouthpiece to the body with a connector sleeve. I make the connector out of 1/2" PVC pipe that is 1 1/2" long. It needs to be widened a little bit for the CPVC pipe to fit, so I heat it and then push a piece of the CPVC pipe into it to stretch it out a little. To heat it, I hold it with needle nose pliers over a propane torch flame, being careful to not burn it. After forming, cool it off by dipping it into water, and then tap the connector off of the pipe with a block of wood and a hammer if you can't get it off by hand.

Trim with a knife, or use a file to round off any rough edges.



step 8: Reed protector cap

The reed is delicate and you want to protect it when not being used, especially in travel.

The cap is made of 3/4" PVC. It has four slits, making four fingers which flex outward to hold the tootophone by the joint connector sleeve.



Image Notes

1. 2 caps being made at the same time.
2. The cap in place. (Joint connecting sleeve hidden.)

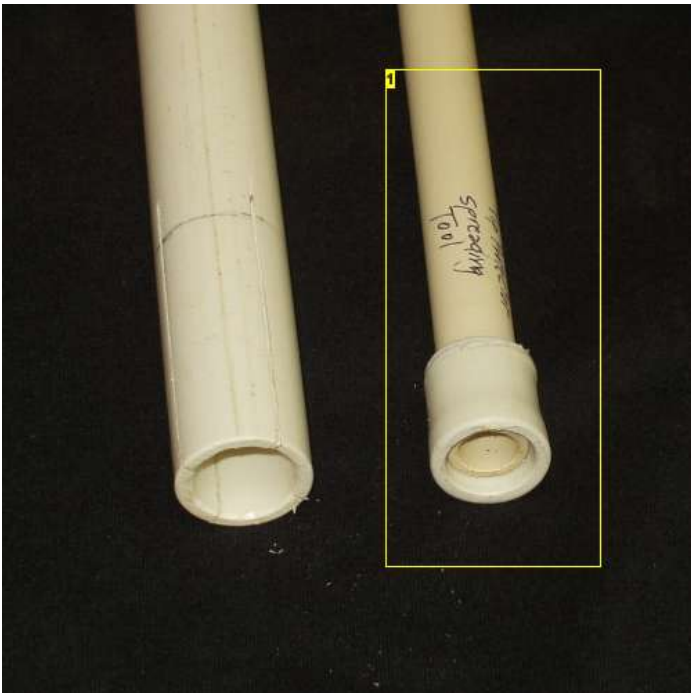


Image Notes

1. Finger spreading tool for making reed protector cap.

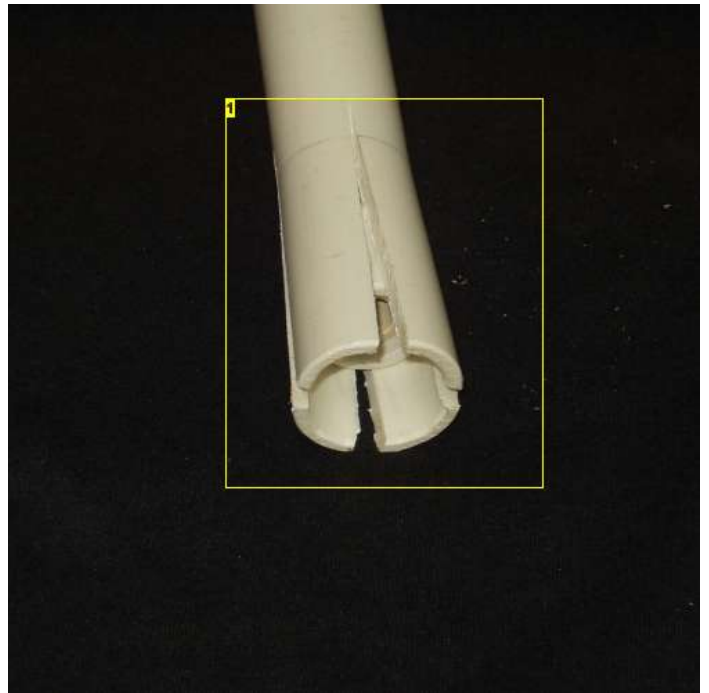


Image Notes

1. The finger spreading tool is inside, pushing the fingers outward.

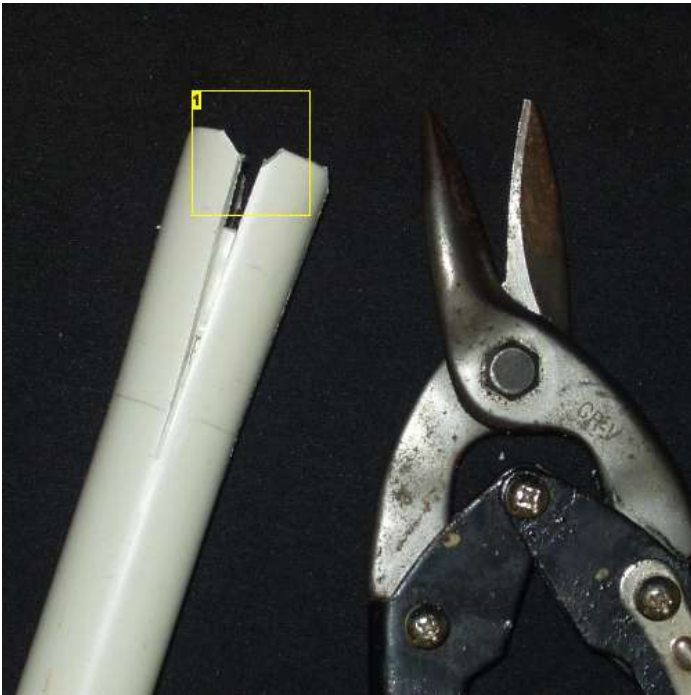


Image Notes

1. I round the corners of the cap fingers to help reduce the risk of getting one of my fingers pinched someday. I use the snips, a file, and an X-acto knife.

step 9: Playing tips

The tootophone is a very intuitively played instrument. You can get the same notes with different lip and finger positions. It is like riding a horse, instead of driving a car.

Playing the tootophone is a lot like singing, only silently, without using the vocal cords. Think of how your Adam's apple goes up and down as you sing high or low notes. Also, the volume of air inside your mouth changes as your tongue moves.

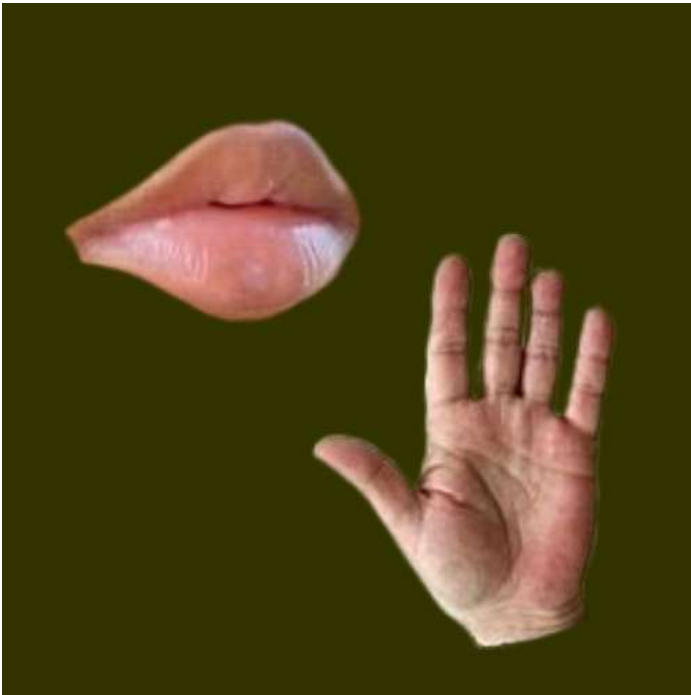
Changing your lip position also affects things, and you have to clamp down tighter on the reed for the higher notes. Allow the whole reed to vibrate for the lowest notes. Shorten the length by moving toward the tip of the reed with your lip. You can get a range of high and low notes without even using your fingers.

When you get into fingering, it helps to be familiar with standard recorder fingering. "Singing" the note while fingering it at the same time sometimes produces a cleaner note than singing alone. Also, you can do rapid effects with the fingers that you can't do with mouth action alone.

I usually bleed a little air off to the side of the mouthpiece while playing. It helps me control my breathing so I don't get tired out from playing and helps me stabilize long held notes, also.

If you are careful to not damage the reed, you can occasionally bend it out a little and clean off saliva build-up with your fingers. Saliva can stick the reed down and kill the sound.

This link will take you to some recorder fingering information, which might give you some fingering hints. <http://en.wikipedia.org/wiki/Recorder>



step 10: Sample "music"

Click the MP3 file below to hear some of the fun sounds the tootophone can produce. This lovely little melody is "Not Jingle Bells".

The other MP3 file is "Alice's Restaurant" (more or less).

(The digital collage is part of my "Party After The Concert".)



File Downloads



NOT JINGLE BELLS.mp3 (780 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'NOT JINGLE BELLS.mp3']



ALICE'S RESTAURANT.mp3 (485 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'ALICE'S RESTAURANT.mp3']

<http://www.instructables.com/id/pvc-TOOTOPHONE-a-musical-reed-instrument/>

Related Instructables



Basic Alto Saxophone (could be applied to tenner, baritone, ect.) Guide by waverider894



Horn from a drinking straw (video) by shoemaker



saxophone tips by BADGER MAN



Altoids Sours Tin Saxophone Survival Kit by CapnTac



Poor Man's Clarinet Stand by mr_fudd



Horn From a Drinking Straw by shoemaker



How to Make a Carrot Instrument by iselinger



How To Ge Free Sheet Music by sharkstun97

Comments

17 comments

[Add Comment](#)



Brother_D says:

Why not just take up the kazoo? You get the same awful sound... (I don't mean to be mean, it's too hard to convey tone over the internet.)

Mar 27, 2010. 1:51 PM [REPLY](#)



Thinkenstein says:

I like to think that it sounds better live than the dictation recorder I have is able to present it. It does have some kazoo qualities at times. Sometimes it sounds sax-like, or horn-like, or like something bizarrely different.

Anyway, I still have a lot of fun playing it, and I think play is an element of music making that is good to hang onto.

While both the kazoo and the tootophone are voice-like in a way, the tootophone has a greater range of notes, and playing a reed instrument is different than humming into a kazoo. There is no use of the vocal cords, for one thing.

I have found that music is sometimes more enjoyable for the musician to listen to than for others. Oh well...

Mar 27, 2010. 4:33 PM [REPLY](#)



Brother_D says:

I see. It is a very interesting and fun looking project. Respect.

Mar 28, 2010. 7:20 AM [REPLY](#)



kimbe mtumbo says:

This would go over great on YouTube. How about some vids?

Feb 27, 2010. 5:08 AM [REPLY](#)



Thinkenstein says:

I don't have any video equipment, but thanks for the idea.

Feb 27, 2010. 7:36 AM [REPLY](#)



whiteoakart says:

Old credit cards, debit cards, and gift cards make great reeds.

I made two of these: one from 3/4" PVC and one from 1" PVC. They sound great, but the finger holes start to get a little far apart for a comfortable reach as the tube gets bigger. A larger mouthpiece will also yield a slower vibration and, therefore, lower note. It might be worth trying to graft a 3/4" PVC mouthpiece onto a 1/2" tooter. The photo is of the 3/4" version. The multitude of holes is for experimentation purposes.

Jan 27, 2010. 8:59 AM [REPLY](#)



whiteoakart says:



Jan 27, 2010. 9:01 AM [REPLY](#)



whiteoakart says:

I should note: You can make a bell on the end by heating the end (per thinkenstein's instructions in Step 3), then pushing the soft end over a cone shape. I used a funnel.

Jan 27, 2010. 9:11 AM [REPLY](#)



SWV1787 says:

Jan 21, 2010. 5:33 AM [REPLY](#)

I would very much like to make one using some old venetian blinds strips to make the reeds as I have some laying around. or do you think they would be too stiff to make an effective reed?



whiteoakart says:

Jan 27, 2010. 9:06 AM [REPLY](#)

Venetian blinds often have a longitudinal curve to them. If they are flat, then they will work. As I mention in another post, I use a discarded credit card, which is pretty darn stiff.



joreknight says:

Jan 21, 2010. 6:01 PM [REPLY](#)

looks cool it reminds me a lot of a xaphoon, a sort-a cross between a sax a clarinet and a recorder.



whiteoakart says:

Jan 27, 2010. 9:04 AM [REPLY](#)

Everyone should go to the site of the guy who makes bamboo xaphoons out of Maui. He is a true maker. He has a video of the process of making one.



Schooniedude says:

Jan 23, 2010. 11:36 AM [REPLY](#)

almost a saprano sax



Kiteman says:

Jan 21, 2010. 11:21 AM [REPLY](#)

We need to see exactly how it goes in the mouth - pointy end first, obviously, but how far, and at what angle?



macmccune says:

Jan 27, 2010. 7:48 AM [REPLY](#)

THATS what she said. :D



Thinkenstein says:

Jan 21, 2010. 4:55 PM [REPLY](#)

Those are all variables one has to explore.

The farther it goes in the mouth, the more reed vibrates and the lower the pitch.



Doctor What says:

Jan 20, 2010. 8:54 PM [REPLY](#)

Cool! I love DIY instruments!
