

# ETHNIC INSTRUMENTS

## THE MAKING OF NATIVE AMERICAN STYLE FLUTES

by Bruce Gage

*"Every tree has a soul,  
every soul... a song."*

I have been a woodworker for over twenty years and I must say there has not been a venture more pleasurable than the reawakening of a tree's song. I was inspired to pursue this art after hearing the tree's song from a medicine woman. The Native American style flute has a melody like no other. And each flute has its own song that is an intertwining of the tree, the craftsman, and the player. The making and playing of these flutes has been such a gift to me that I would like to take this opportunity to share with those who would like to embark on a similar adventure.

I make my flutes similar to the Native-American tradition. They are end-blown rather than traverse, fipple style (a channel with either leather and/or a fetish on top), and 5-6 holes. They can range in size from 12" to about 32" in length (generally speaking, the longer the flute, the lower the tone and the larger the hand required to traverse the hole spacing). Most flutes are 'tuned to the tree' with one octave though I can make flutes in specific keys (usually 7 notes).

Each flute is custom-made to its caretaker, not only in hand but in heart. A part of flute-making is the ability to be a matchmaker so to speak. A flute's song should match your soul's song, its hole-spacing -your hand, and its adornment -your spirit and personality. And finally and probably most important is its purpose -is it for spiritual reasons, recreational, or another particular purpose?



There are several guiding principles which I believe are important in flute-making. Actually I have learned to incorporate these into every wood-working endeavor. Much of what I do is by the Spirit. You do not have to believe as I do for me to make a flute for you or to use my plans if you choose to make it yourself. However, for myself, I have found a big difference in the final product if I adhere to these.

### Have a song in your heart...

Flute makers long ago realized this guiding principle. If a flute-maker was ill or in a bad mood, there would be no flutes made that day. Though I knew of this tale, I had to learn its lesson for myself. I have as yet to make a flute sing when I am feeling pressured with completing an order, in a foul mood, tired, or any bit out of sorts.

### Honor the tree...

Every time you hold a piece of wood in your hands, let the tree know you appreciate its gift. Gaze deep into its grain, touch it, smell it, listen for a whisper of its song. From time to time, go and plant a new tree, tend to one's injuries, or visit the forest to say thanks.

### Honor the Creator...

Whatever you conceive this to be, give honor and thanks for the tree's life and your skill to make the wind sing once more through its wood. Flute-making is a special gift given to you.

### Allow the wood to choose...

You may think this would be the part where I suggest a certain type of wood, grain pattern, or quality of material. When I make flutes, I go to my wood and listen. Yes, listen. Allow the wood to choose itself. If you have done the above with a true heart, you will understand.

### Discover and use your own medicine...

Everyone has their own medicine. And this is a very special ingredient for the flute and its song. Before beginning any flute, I usually spend time to meditate in the woods on its caretaker-to-be, its purpose, its songs, its appearance. During the making, I sing or play for the flute. At various points, I will meditate, pray, or perform smudgings of the flutes with various herbs. When I make a flute for others, I will often have their picture or a token present that has their spirit. All of these make flute-making a very special event, not only to myself but to the tree. Each flute-maker discovers their own medicine. Mine will not work for you nor yours for me.



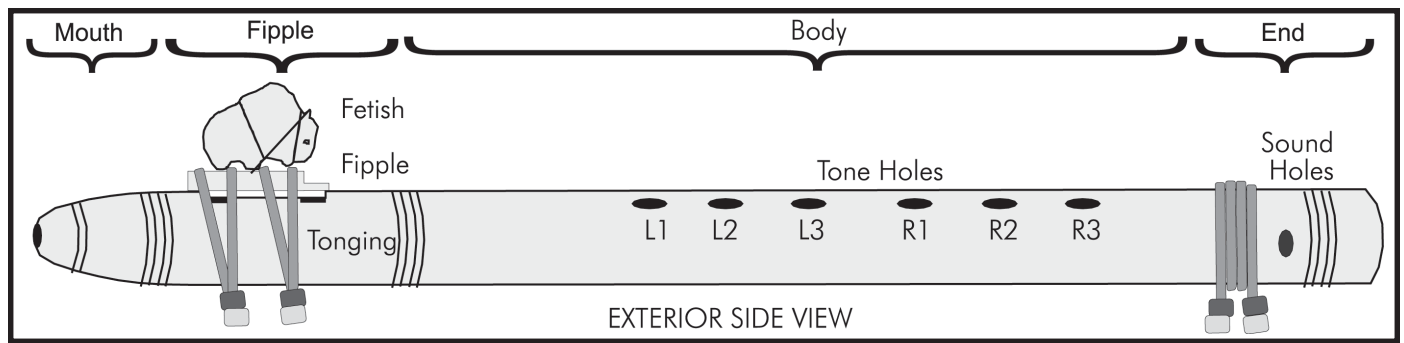


Figure 1. Parts of the flute

## Visioning your Flute

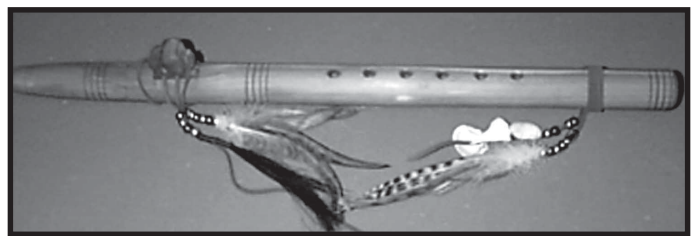
Visioning your flute requires that you give up what you think your flute ought to be and discover what awaits you. Flutes can come in all colors, sizes, and shapes and each will have their own song. But is it your song? Many times this stage takes longer than the actual making of the flute!

There are many things that go into finding your flute. First, it must fit you in hand. Without such consideration, you will not give the flute the full honor of playing its song. A large flute and a small hand will make a beautiful ornament but not a companion. There are a number of ways in finding the appropriate measurements. First take a piece of paper and draw a straight line on it. Next place your left hand on the line with your ring finger, middle, and index fingers parallel with each other (as if you were covering the holes of a flute). Now slowly spread them out keeping them on the line. Now mark the center for each finger. Do the same for the right hand. Now measure the distance between the ring finger and the index for each hand. These two distances are for your hole placement. Next measure from your elbow to the tip of your middle finger. And then, as if holding a flute with your right hand (the lower hand), measure the distance from your mouth to your ring finger. Keep your elbow bent and don't over-extend. This can give you an idea of the maximum length of the farthest tone hole from your mouth. Remember, all of these measurements should feel comfortable.

Now that we have fit your hand, it is time to fit your heart. In order to find this, you must be willing to spend some time on reflecting on what you are and what your flute is to be. Everyone goes about this differently. Some think in terms of the elements (earth, wind, fire, water)... others the seasons (planting, growing, harvest, and rest)... others, special animal totems, guides, or teachers, some the stars. Some will recall a special place they have found, or a time that had great meaning in their life.

Next, think in terms of your flute. How did you come upon wanting to be a caretaker of such? What do you wish of its songs? Take all of this to dream-time, prayer, meditation or wherever you go to find your answers. Have the flute come to you. See it, touch it, hear its song. During this time, try to remember all that is around you... the sights... the sounds... the smells... Write it down, draw pictures... try to capture the essence of what you have learned. Do not try to rush or

force this to happen (I have as yet to find one who has not had such an experience). This becomes our initial blueprint. I try with all my heart to blend all of these.



## Knowing your Flute

When I first started making flutes, I had no idea that there were so many kinds. Most Native American style flutes are end-blown, five to six holes, and use a fipple style channel and block. European and Oriental flutes tend to be traverse (holding a flute sideways and blowing over an embouchure hole). It is also different from many of the South American designs such as the Andean quena which is basically an open bore with a notch at the mouth piece that is blown over. Peruvian flutes tend to have a notch in the body similar to recorders. You will also see on many other types of flutes 8 hole finger patterns, holes of different sizes and a thumb hole. Typically this is not seen on Native American styles.

The flute can be divided into four sections: the mouth, the fipple, the body, and the end. Figure 1 shows the different parts of the flute in both diagram and photo form.

## Mouth

The mouth section is usually tapered though I have made some flutes that are the same bore size as the end. On the tapered flutes, the bore is usually smaller (about 1/4" to 3/8" in diameter) and often enters a small air compression chamber at the fipple section (see Figure 2 for interior diagram).

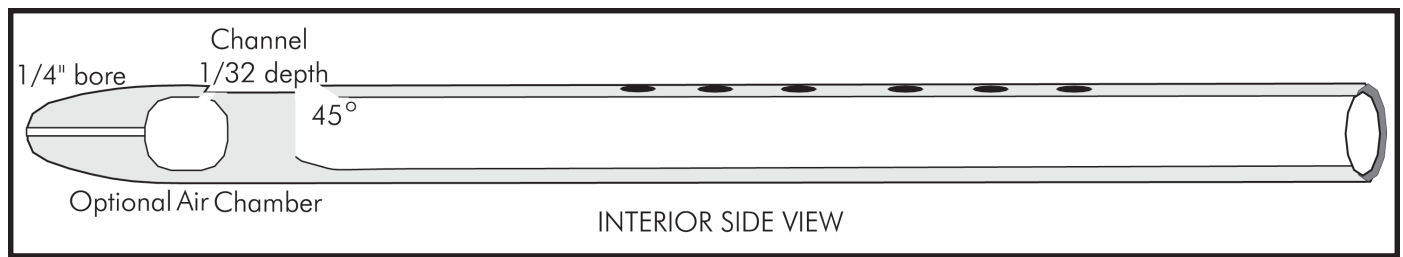


Figure 2. Interior view of flute.



## Fipple

The fipple section of the flute is probably the most important section of the flute. In all flutes, the air must be split before it enters the sound chamber in order for a tone to occur. In other style flutes, this occurs at the mouthpiece where air is blown over an embouchure. Also, some may use a v-notch similar to recorders to split the air. Fipple style flutes do the same as the notched ones just that the angle is on the interior of the chamber. The fipple section contains a narrow shallow channel (about 1/4" in width and 1/32" in depth) with squared holes at each end on the top of the flute. Resting over this channel is the actual fipple which forces the air rising from the mouth-end squared hole to ride along the channel until it reaches the squared hole entering the body of the flute. The hole is angled (about 37 to 45 degrees) at the body end to a very fine edge. Ideally, this edge should be parallel to half of the height of the channel in order to split the air evenly. As air is forced through the channel, some of the air enters the flute's body while the rest escapes over the top of the hole. This splitting of the air produces a sound wave.

Fipple mechanisms vary from flute-maker to flute-maker. Some have a channel in the fetish, some use a gasket or nest, and some have the channel in the body of the flute. I have heard where early flutes were only 4 holes as the other hand was used to cover the channel. Later, a piece of leather was used to serve the same purpose freeing up the other hand and allowing more holes. The majority of my flutes have the channel in the body. I then use either leather and/or a fetish to cover this channel.

As you can see by the diagram, the leather and/or fetish is tightly secured over the channel by means of tonging of leather strapping. Sound quality and volume are influenced by moisture, temperature, and air pressure thus the fipple must be adjustable. For the most part, the fetish rests about 1/16" to 1/8" in from the end of the

channel. The tonging allows the user to adjust the fipple back and forth for best sound quality. An airier sound suggests that the fipple be moved forward while a note jumping an octave would suggest the fipple be moved back a bit.

## Body

The flute body has 5-6 finger or tone holes. You will notice in the first diagram, they are labeled L1 to R3. This corresponds to the left and right hand fingers (1 = index, 2 = middle, & 3 = ring fingers). You will notice on my flutes that these finger holes are carved with an indentation so that your fingers can easily find their way. These indentations are tapered toward the back to improve the tone of each note.



## End

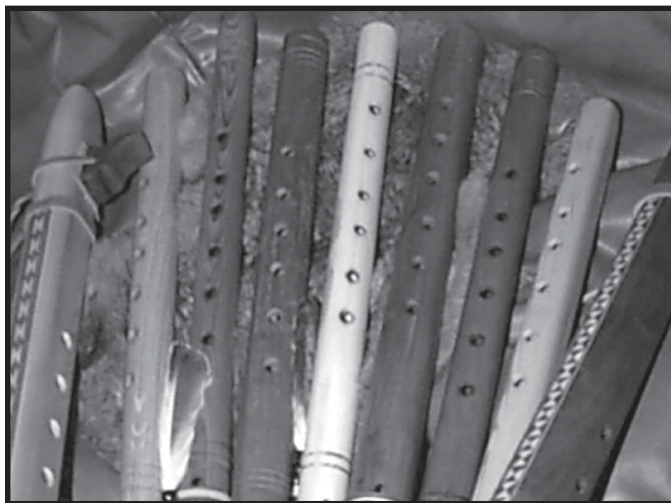
Toward the end of the flute, you may see on some several sounding holes. This is actually where the last and lowest note is produced (all fingers covered). By having sound holes the end of the flute can be solid with or without a fetish or it may be used to extend the length of the flute for personal preferences.

## Making Your Flute

It has been said that one of the first flutes was from a branch that insects were the craftsmen and the wind called through it to one who plucked it from the tree. What a special gift! I have as yet to find such myself, so I must search within for other gifts to bring about my own. In order to make a flute, I believe the way of the heart is more important than any other. There are many ways of the hand. You could follow any one method to the exact specification and the tree would still not sing if there is not something special in your heart.

## Wood Selection

Having been a woodworker for years, it never ceases to amaze me the distinct personality of woods, not only in species but between trees themselves and even from different parts of the same tree. Flute making seems to exemplify the mysteries of these distinctions. Each flute is born with an individualism that is an expression of the tree and myself as well as the one I make it for. The woods I have used so far include the softwoods of pine, fir, white cedar, red cedar, and redwood; and the hardwoods of maple, oak, cherry, mahogany, and walnut. I am willing to try other woods as well as long as they are not endangered species or it is 'found' wood. A favorite tree of the caretaker that has passed on often makes a very special flute.



The method and tools I use are certainly not the ways of the old. I use what I have just as those before me. Some of you may not have certain pieces of equipment. I understand full well. It took me years to build my shop. I will try and recommend alternatives where I can. But you will also find your own answers. Keep in mind, that someone created a flute long before you with much less on hand than what you are working with now. But the element you do share is your desire to once again make the tree sing.

## Dimensioning Lumber

As much of my wood is rough sawn, I first begin by dimensioning the lumber through planing, joining, and sawing. Planing provides a smooth flat surface while joining does the same for the edge of the board. Giving exact dimensions is tough as I make several different sizes of flutes and use various methods of construction. Give yourself at least an extra inch on both ends and start with a thickness at least 1/4" more than what you need for each half. If you are planing to start out with a single piece and rip it in half, remember to take into account your saw kerf.



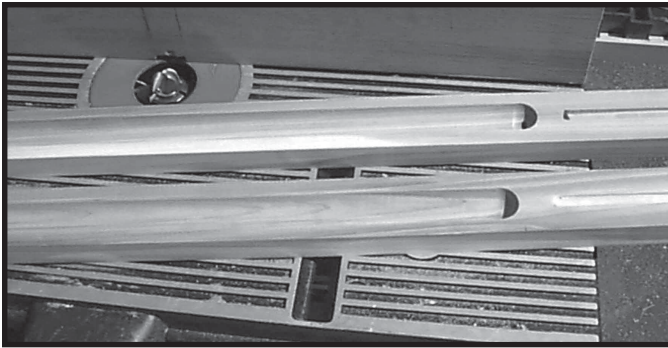
The large flutes have a 1" bore so I usually start out with boards at least 2" wide and at least 30" in length. The medium size flutes have a 7/8" bore using boards 1 3/4" wide and at least 24" in length. Finally the smaller flutes have a 3/4" bore using boards 1 1/2" and at least 20" in length. Depending on whether you are making the flute out of two pieces or splitting one piece, make sure the thickness is at least 1/4"+ half the diameter for each half.

After you have finished dimensioning your lumber, you should have two pieces that are equal in length, width and thickness. When you sandwich the pieces together, they should appear almost seamless even without glue. If you find that your pieces are warped, cupped, or bowed it is best that you start over at this point as a tight glue joint is necessary when joining the two halves together.

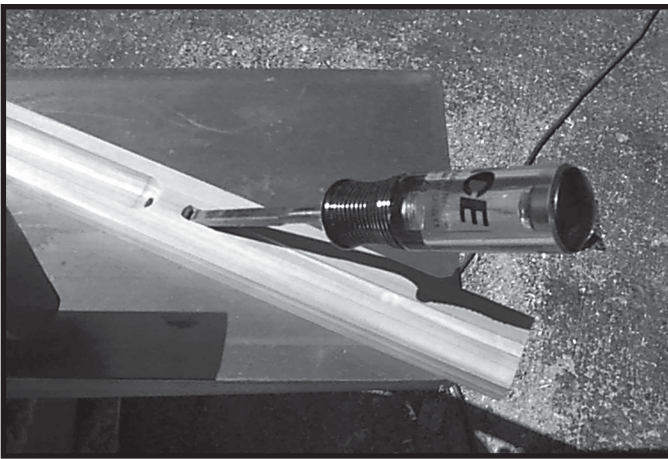
## Making the Bore

The next step is making the bore of the flute. Because I use the split-half method of making the flute, the objective is to make a half-circle bore in each piece so when fitted together they form a perfect round bore.

I use a shaper and a half-round veining bit to produce the half sections of the bore on the inside of each half. Remember, only raise the bit to half of the diameter. If you are making a 1" bore,

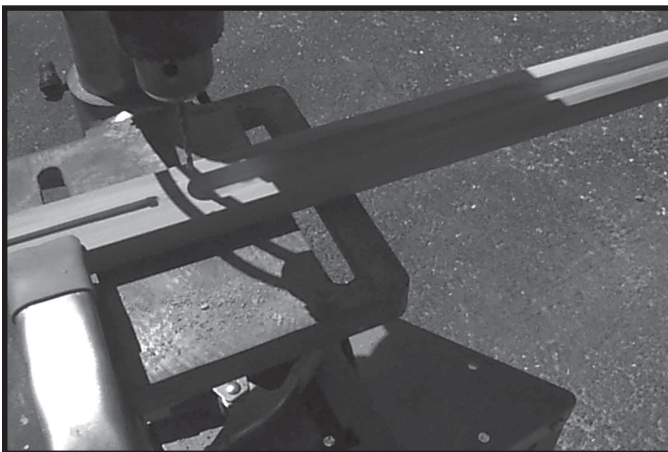


make sure your depth of cut is set at exactly 1/2". I leave anywhere from 3" - 8" unbored for the fipple and mouthpiece area. When the two pieces are placed together, you should have a perfect round bore.



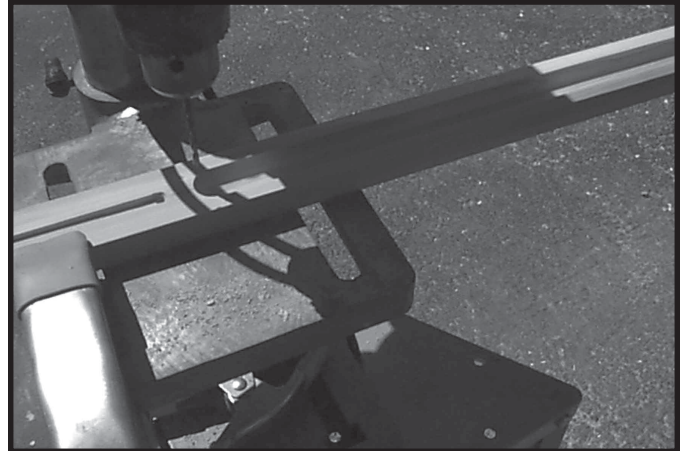
## Air Chamber/Channel

About 1/2" - 3/4" from where your bore stops at the fipple end, make another bore of the same diameter 1" - 2" in length. This is an optional air compression chamber. Then channel a 1/4" channel from this chamber to the mouth end of the flute. On some flutes, I skip the chamber and just channel up to about 1/2" - 3/4" of the bore as seen in the picture.



## Fipple Holes

This is probably the most important step of your flute. Mark the center of where your bore stops and the air chamber/channel. Working on the inside of the top half of your flute, drill two holes at their edge (1/4" +/- 1/16" in diameter). Next, file these holes square. Now file their opposite sides to about 45 degrees. Later you will be carving a shallow channel between these holes on the top side of the flute.

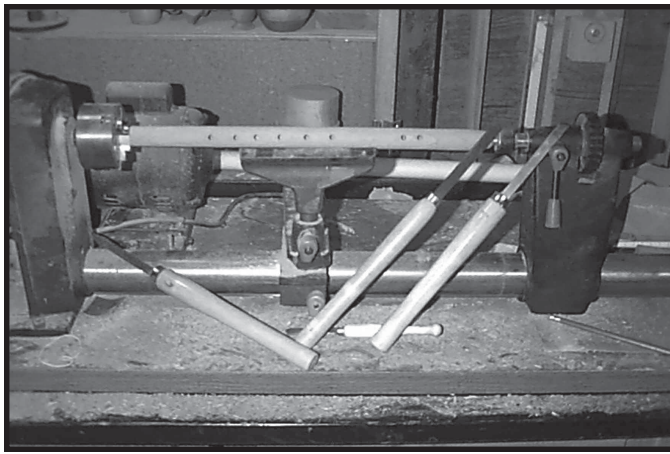


## Glue-up

Now that you have much of the interior done, it is time to glue up the halves. Make sure that the two halves fit seamlessly. Use a water-resistant or water-proof wood glue. Lightly coat both halves and then clamp together for at least 24hrs. Use enough clamps to make a good seal. Be careful not to over-tighten your clamps as your flute will easily crack under high pressure. Make sure that the bore is properly aligned by feeling the interior.

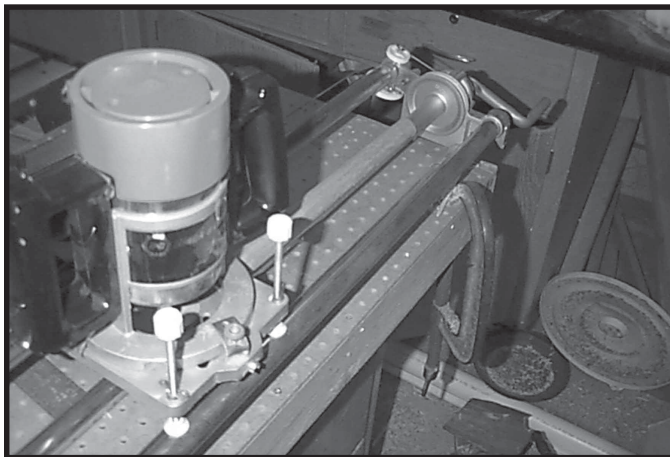


**TIP:** You may also want to take a dowel with a damp piece of cloth attached at its end and swab the interior of the bore before it dries.



## Turning

Shaping the exterior of your flute can be done a number of ways. I usually start out by joining the glue edge flat and then taking off the corners at a 45 degree angle, turning the square into an octagon. At this point you could plane or sand it down. It doesn't have to be a perfect tube on the outside. For some flutes, I'll mount them on a router crafter that shapes the blank as a cylinder through successive indexing of the blank.



Others I'll put on the lathe. Wall thickness should be about 1/8" - 3/16" for the bore of the flute running from the fipple to the end. Once you get the general shape you desire, work on the mouth end by tapering it down.

**TIP:** The reason for leaving an extra inch or so at each end of the flute blank is if you plan to use either a router crafter or a lathe. I glue a 3/4" dowel at the end side and a 1/4" dowel at the mouth end. In this way I can easily turn the blank.

## Sanding

If I am turning the flute on a lathe this is the best time to sand. I start with 120 grit paper and move up (220, 320, 400) to 600 grit paper. I then use 1500 grit with Danish oil and a few coats of carnauba wax. I then remove the plugs from each end of the flute and sand the interior using a smaller diameter dowel wrapped with sand paper.

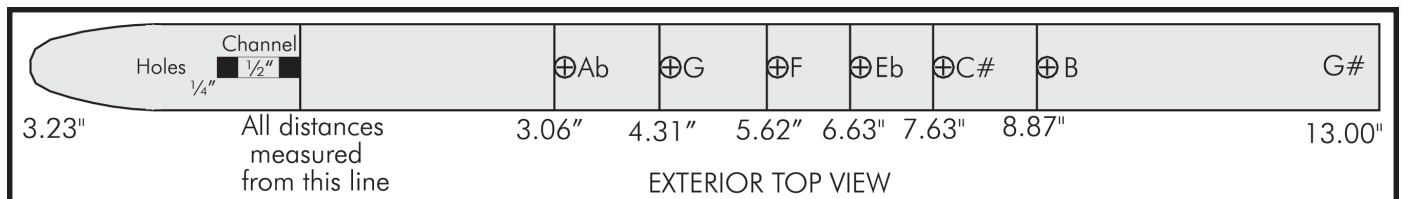
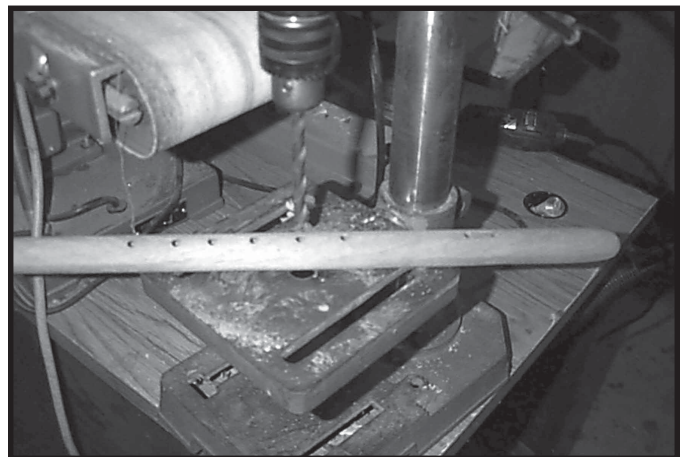
## Channel

In the fipple area, I usually sand this section fairly flat so as to get a tight fit when the fipple is attached. Another method is to wrap the flute with sand paper (grit side up) and sand the fipple to fit the curve. On the top side of the flute make a 1/32" deep channel from fipple hole to fipple hole. I use a straight bit chucked in my drill press for this or a wood chisel. The channel should be flat and the same width as the holes.

To test your flute, take a piece of masking tape and cover the fipple hole closest to your mouth and almost all of the channel (except about 1/16" - 1/8"). Make sure your tape tightly covers the channel but does not restrict air flow in the channel. Gently blow on the flute. Without any holes drilled, this first note is the key of your flute. You can sharpen this note by sanding or lopping off the end in small increments until you get the key desired.

## Drilling Tone or Finger Holes

For flutes that are tuned to the tree, about 3" - 4" from the end, your first hole is drilled. The spacing of successive holes is usually about 1" - 1 1/4" apart. If you are making the G# flute, use the measurements for hole spacing in the diagram. I use a 7/16" bit or smaller to drill these holes.

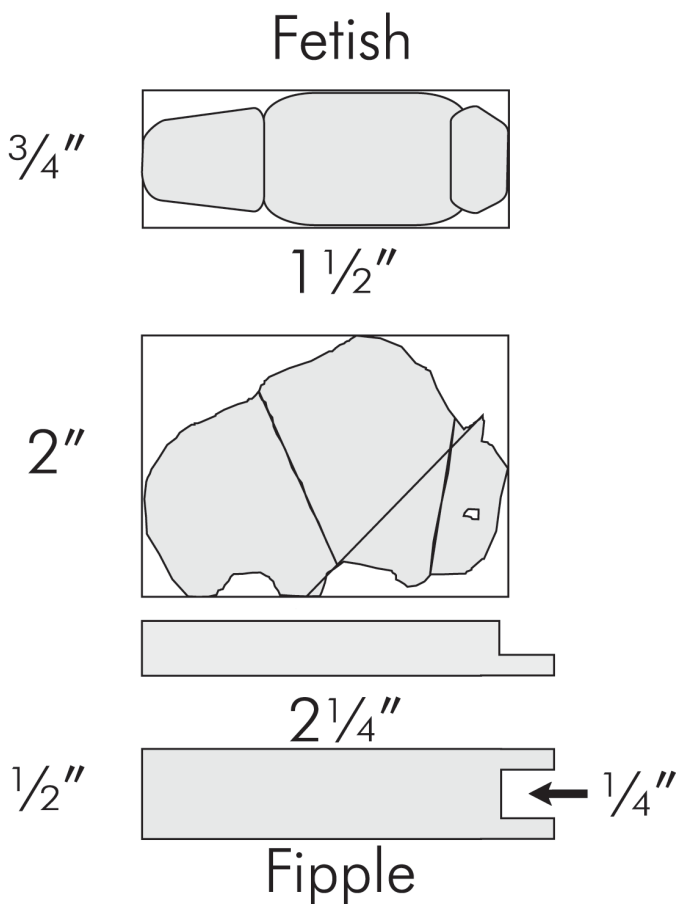


**TIP:** Place a dowel inside the flute before drill to reduce tear out or chipping on the inside of the flute. If you are absolutely sure of your measurements, you can also drill tone holes from the inside before joining the halves.

I work from the end up (R3, R2, R1, L3, L2, L1). Each tone hole is carefully drilled and lightly sanded. Then I use a tuner to test the note produced. If a hole produces a note too flat, drilling a bit more toward the mouth end will sharpen the note. However, if the note is too sharp there is nothing you can do to flatten the note unfortunately. I usually finish up each hole by using a 3/8" bit over the top and lightly make an indentation over the hole. Then I will smooth out that indentation by sanding them toward the end side of the flute.

### Fipple/Fetish

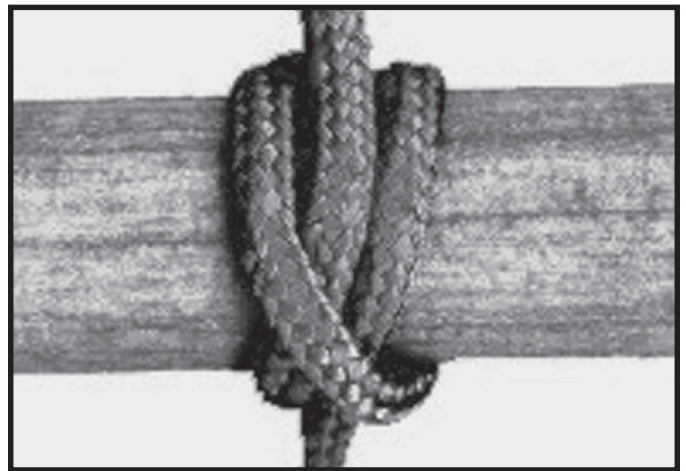
The fipple is usually a thin piece of wood that fits tightly over the channel. You can also use a piece of leather to achieve this purpose. The design below is an example of a notched fipple; however, the notching is not as important as having a tight fit. The fipple is



attached to the flute by means of leather tonging. In this way, it remains adjustable. The fipple covers the mouth end fipple hole completely and the channel up to about 1/16 to 1/8 inch from the end side fipple hole.

### Adornments

A fetish can be glued on top of the fipple as decoration. Most of my fetishes are animals that represent spiritual totems. I first design out the side view of the totem on a 3/4" piece of wood. Next I will bandsaw this shape. Using a dremel tool and carving knives, I give it its final three-dimensional shape. Once glued on top of the fipple, I secure it over the channel using 1/8" leather tonging. The leather is usually wrapped at least a couple of times over the fipple block and then I use a clove hitch knot on the underneath side of the flute (where the beginning and the end of the leather are slid under the banding before it). In this way, when you pull both ends, the strapping tightens and locks in place.



Here are just a few examples of some of the fetishes on my own flutes:



Carvings can be on the body of the flute by several means. I typically use a dremel tool or a wood-burner with a very fine tip. The only precaution is to remember that the walls of the flute are rather thin.

On flutes with thicker walls, I have used inlay banding. I usually route a channel down the length of the flute and



glue in the banding of choice. I then sand it down flush with the body of the flute.

Featherwork and beading typically hang from the tonging at the fipple end and at the base of the flute. I usually leave about 6" of tonging that I



will hang stone or glass pony beads, shells, feathers, horse hair, etc. I also try and work closely with the caretaker in selecting adornments that reflect their clan, totems, signs, or preference.

### Final Finishing

After all the work is done, I disassemble the flute and dip it several times in linseed oil. I then allow it to dry, end side down on a dowel. After the flute is thoroughly dried, I will add a few coats of carnauba wax. The flute is then reassembled and ready to play!



### Playing your Flute

Just as there are technical aspects of flute-making and the more spiritual ones, I have found this to be true of playing as well. Let's first begin with the technical and some pointers.

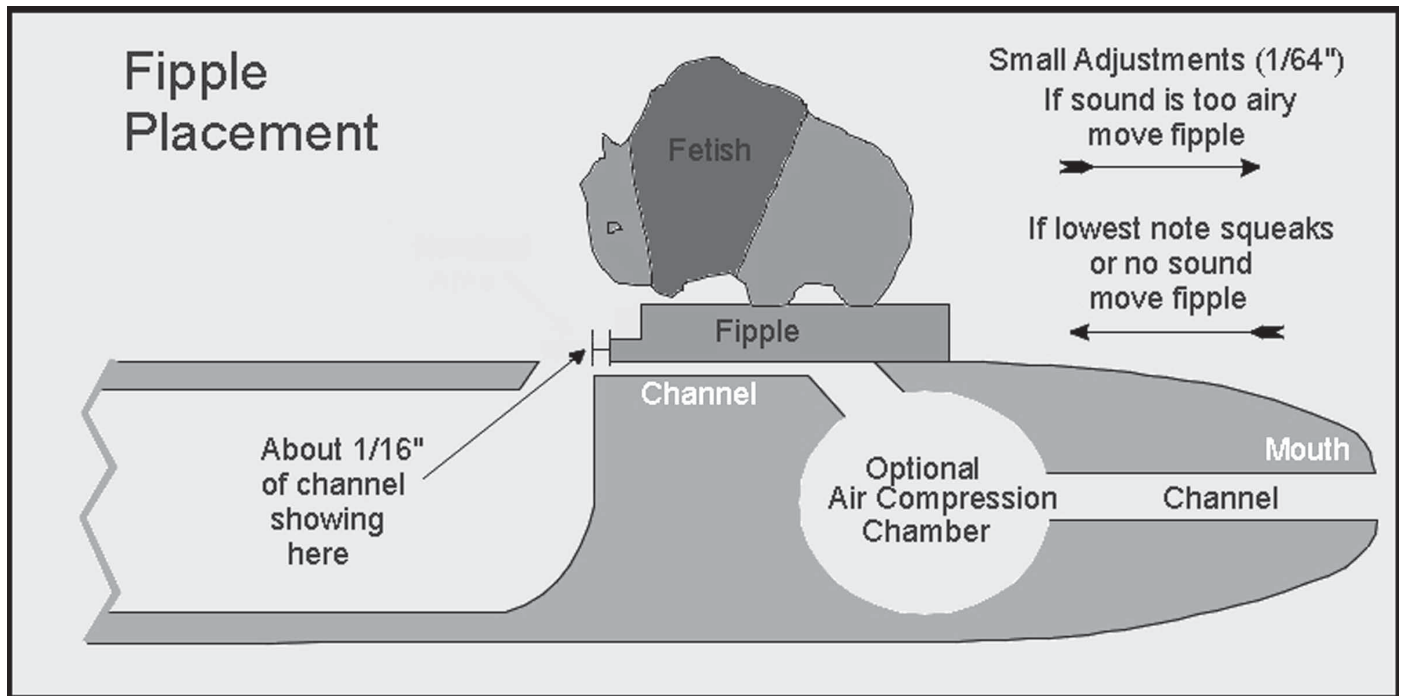
First of all, before you begin playing, make sure your fipple is tight on your flute. You can tighten it by pulling gently on the bandings in opposite directions away from the flute. The fipple should be in such a position that you see the entire fipple sounding hole (the one farthest from the mouthpiece) and about 1/16" to an 1/8" of the channel.

Flutes seem to play their best when you are sitting or standing with your back erect. Hold the flute at a slight angle away from your body. Hold the flute gently in a relaxed position.

As your flute was built to your hand, your fingers should fit comfortably in the spacing. Your left hand should be on top, with your index finger on the tone hole closest to the fipple end of the flute. Depending on how many tone holes your flute has, your fingers will go down successively. On five and six hole flutes, your pinkies are never used.

Make sure that when you play a note, that the pad of your fingertip completely covers the tone hole. The only exception is when you half a note (which will be discussed later). You do not need to tightly clamp down on the hole but it does need to be completely covered.

With all tone holes covered, lightly blow on the flute. Adjust your air flow so that you get a nice pure tone. This note is the key your flute is in. Too hard of a breath, and you will notice that the note jumps an octave or squeaks.



If the note sounds too airy, first make sure that the fipple is tight then try and adjust the fipple slightly forward (1/64 increments, it doesn't take much!). If not enough volume, move it slightly back.

So the first note is with all holes covered. The next note, raise your finger from the hole farthest from you. This should be one note up from the one you just played. Repeat by raising each successive finger. You may find that the higher notes you will have to increase your breath just a bit. For most flutes, these seven notes (for 6 holed flutes) form the scale of the flute.

Notes in between these 7 notes can be achieved in one of two ways. The first way, is to raise the second to last finger while keeping the last finger down as you go up. In other words, the first such note,

your fingers would be down on L1, L2, L3, R1, & R3 while raising your finger on R2. The next such note would be: fingers down on L1, L2, L3, & R2 while raising your fingers on R1 & R3... and so forth. Another way to achieve these notes is called half-stepping. This takes a little practice but instead of raising a middle finger, the last finger on a hole is opened just halfway with the lower section being open.



One note here... I have played several flutes

where I rarely raise L3. Thus the highest two notes are with L3 still closed. Try this with your flute and see.

Finally, the last set of notes can sometimes be achieved on flutes. These are called over-blow notes and most of the time can only be done on the lowest notes of your flute. Start with all fingers down, blow the note as it is supposed to be played. Now gradually apply more breath until it produces a higher note. When done correctly, this note is exactly one octave higher than the original.

All other keying, will produce one of the above notes so as you see there is very little for you to remember!

You will also find that you can achieve different sounds by changing your air flow. Such effects as tonguing will give you a staccato effect. If you can flutter your diaphragm while blowing, you can achieve a nice vibrato. A sharp blow at the end of a song also has

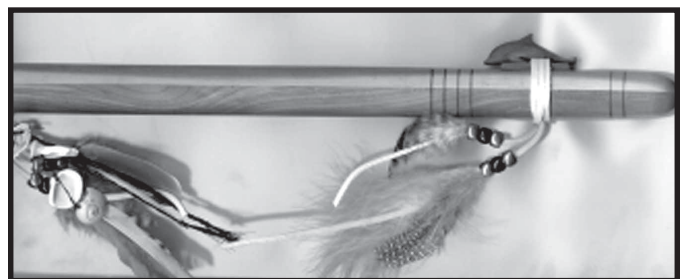
a nice sound to it. Finally fluttering a key by rapidly raising and closing gives a two-tone vibrato and slowly doing this gives a waa-waa effect.

Some people enjoy playing by sheet music. The only thing one must remember is that flutes will vary as to what finger combinations play what notes. Once you are knowledgeable of your own flute, sheet music can be played fairly easily. This is also true for others who play by ear.

As a child, I had learned both ways. But it was not until the flute, that I realized there is also a third way.... that is, playing by the heart or spirit. To tell you the truth, this is the only way I play the flute. For one, I have forgotten how to read music! And playing by ear rarely happens as much of what I play are songs I have never heard before.

Such playing occurs when I am giving honour or thanks to something such as a beautiful sunrise, a hawk circling above, a laughing child playing in a meadow. It also happens when I pray with the flute, when I am seeking an answer to some problem, or when I am just meditating to renew myself.

For me, all of a sudden, I feel as if I am no longer playing. I am aware that I am supplying the wind but that's about it. Often images will come to mind and I can only describe it as playing the soundtrack for a movie. If I try and analyze it too closely, I easily lose it! But usually afterward I have played in such ways, I come away with a very special feeling, or answers, or lots of energy. The way I see it, if it works use it! I have had others describe similar experiences as well. As with most things of this nature, you must discover your own path to find it. I can only assure you that if your heart is in earnest of such and you are diligent, you too can find this joy.



## Caretaking

As your flute is made out of wood, its care should be like any other wood product. Wood breathes just as we do. It expands with heat, contracts with cold, and absorbs moisture. It doesn't like to go from one extreme to another. And certainly it likes to be handled with care. If you follow these simple rules, your flute will probably last beyond even you!

Avoid high humidity, moisture, water and excessive heat. Wood absorbs water. This will cause the wood to expand leading to splitting or cracking of the glue joints. Excessive heat will do the same. Using a water-resistant glue and treating the flute with many coats of tung oil and carnauba wax in the finishing stage reduces this possibility. However, long exposure to water or heat will break down such measures. Moving from very warm places to very cold places or vice versa is also a shock to the wood.

Store your flute in a dry cool place. The back of a car with the windows rolled up on a hot summer's day or leaving your flute in the rain are not the best ideas! Many make flute racks to display their flute. My recommendation is to find one or make it so that the flute is at a slight angle with the mouth-piece lower (this moves the moisture away from most of the flute).

The tubular shape of a flute makes it quite durable in falls. I've dropped mine a few times without incidence. However, it is not recommended that you do this as a practice. If it should happen, check your flute immediately for damage (scratches, dents, chips, cracks, etc.).

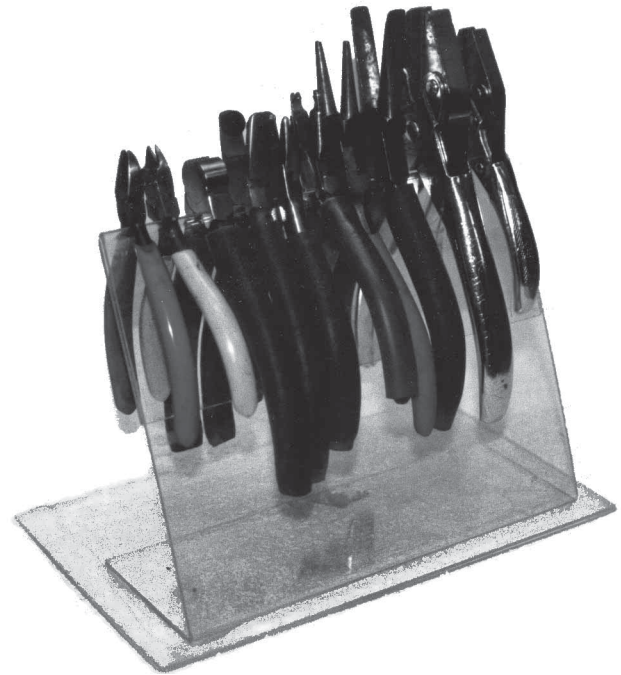
Use a protective case when traveling and store the flute in a safe area. Soft cases can be made out of an old blanket, felt, cotton-backed naugahyde, leather, deerskin, etc. Hard cases can be made out of PVC pipe and even cardboard mailing tubes and then covered with fabric.

Dry out your flute after playing. After playing your flute for awhile, you will notice that moisture collects in the mouthpiece, the fipple channel, and even the barrel of the flute. After playing, I usually give a hard blow to the fipple holes forcing the moisture toward both ends of the flute. I then take a dowel that has had a cotton cloth securely taped or stapled to the end and swab out the barrel. Be careful not to lose the swab in the barrel! And never use anything which you have to force up the chambers! A light swabbing will do. Clean and oil your flute occasionally. Most owners are reluctant to remove the bandings of the fipple. However, look at the way it was tied, slightly loosen each end and slide it back toward the mouth piece until you see both fipple holes. With a soft cloth, clean the channel. Never sand! Then take a cloth that is damp (not soaked) with tung or Danish oil (available at most discount or hardware stores near the paint). Lightly rub the exterior and swab the interior. Take your dry cloth and then repeat. Then let your flute dry for a day at an angle (mouthpiece down). Do not use waxes (they tend to build up), furniture polish (they contain alcohol which will dry your wood), or oils such as canola or sunflower (they do not dry).

Finally, the last step in flute care is to play the flute! Flutes do have a spirit! And I have found that the more I play them, the better they sound!

If you have any questions feel free to write: [bgage@pop.uky.edu](mailto:bgage@pop.uky.edu)

# SHOP TIPS



Handy plexiglass plier caddy

## Know your barbarians



Viking



Mongol



Goth



Visigoth



Turk



Drummer