



HOMEGROWN MUSIC

MAKE A BAMBOO FLUTE... AND WARBLE LIKE THE BIRDS! (PART I)

Marc Bristol—a homegrown musician who performs regularly throughout the Pacific Northwest—began sharing his knowledge of do-it-yourself entertainment with MOTHER-readers back in issue 50. Marc's columns have touched on everything from access information for recorded music to detailed instructions on how to make your own instruments. Marc is interested in hearing any suggestions, comments, or questions you may have about the subject of do-it-yourself music, and he'll try to write about requested topics in future columns. Address your correspondence—for this column and this column only—to Marc Bristol, Dept. EMEN, P.O. Box 25, Duwall, Washington 98019.

Marc Bristol

Several years ago a friend gave me a bamboo flute . . . and I became so enamored of the little instrument's pleasing tone and appearance that I set out to learn how to make one myself.

Well, it didn't take me long to discover that fabricating a tube with holes that would make noise when I blew into it was fairly easy . . . but crafting an accurately pitched instrument that played true notes was quite another matter. Luckily though, I soon met Craig Rusbult. He showed me the right way to go about the project, and I'd like to share his instructions with you.

ON BAMBOO AND DIMENSIONS TOO

Craig explained that the pitch and key of a homemade wind instrument—as well as the accuracy of each of its notes—are determined by the relationships between several variables: the size, shape, and placement of the mouthpiece and finger holes . . . and the length, internal diameter, and thickness of the tube itself.

The first step along the path of successful flutemaking, then, is to choose good-quality bamboo of the desirable dimensions. The tube's inside diameter should be between 3/4" and 7/8" . . . and Craig adds that thin-walled (about 1/8"-thick) specimens produce the best sound. Also, you should try to obtain a section of stalk that's well seasoned (not green) and free of cracks.

To make a flute that plays in the key of A, you'll need a 14" length of "pipe" . . . for the key of F, an 18" section . . . and for the key of D, a 21" piece. Look for bamboo with joints that are just a bit more than half as far apart as the intended length of the instrument . . . so that when you cut the piece to size, it'll have a node at one end and another more or less in the middle. (For example, the ideal bamboo "blank" for a 21" key-of-D flute would have about 11" of open "tube" between each pair of joints.)

And where can you find bamboo? Well, in some larger cities (including my home base,

Seattle) sources for the material are listed in the Yellow Pages under—logically enough—"Bamboo". On the other hand, you may very well live in an area where the oversized grass grows wild or in cultivated backyard patches (it's distributed throughout most of the southern half of the U.S., and in much of the north, too). If all else fails, try hunting up some stock at carpet stores . . . flooring is often rolled up on low-quality, but generally usable, bamboo rods.

If the specimen you find is a fairly lengthy piece, so much the better . . . you'll probably want to experiment a bit, anyhow. Indeed, a pole that's several feet long and tapers from a 1" inside diameter at its base to 1/2" at the other is likely to contain enough material for several good 3/4" flutes in its middle.

CUTTING UP

When you take a good look at your bamboo, you'll probably notice that every joint is marked by two circular ridges (this is true of most species, anyway) . . . and that the one on the joint's wider end is always somewhat "sharper"—in other words, narrower—than the other. Each of these double-rimmed nodes marks the location of a hard inner membrane that divides the tube into joint-to-joint compartments.

To cut a usable piece of the material, choose a good two-section, three-joint length and then—with a coping blade or some other fine-toothed saw—cut through the cylinder's broad end just *outside* the first joint . . . leave the middle node intact . . . and slice off the narrow end just *inside* the third joint. (Wrap masking tape around each tip before sawing to help keep the fibers from splitting.)

The result will be a two-section tube that's open at the thinner end and closed at the other extremity by that joint's dividing membrane. The interior "bulkhead" at the middle node will also still be intact. You'll need to remove it by *chopping* it out—a few pieces at a time—with a hammer and a long, sharp tool . . . or *burning* away the material with a hot poker . . . or *boring* it out with a drill and a long bit.

Once you've completed the rough work, take a 20" piece of dowel and glue a two-inch strip of sandpaper around each end . . . coarse at one tip and fine-grit at the other. You can use this tool (and a good bit of patience) to give the inside of your flute a smooth finish.

THE MOUTHPIECE

Now, it's time to make your instrument's "blow hole". Measure about 3/8" to 1/2" in from the smooth ridge at the closed end of the flute, and make a mark at that point. (Some kinds of bamboo have ridge creases running *lengthwise*. If this is the case with your section, you may want to position the

mouthpiece about a quarter-turn *beyond* one of the ridges . . . so the raised part will rest against your chin when you play.)

Once you've located the site for the mouth hole, bore a cavity—using a succession of increasingly larger drill bits (and, again, a "shield" of masking tape) to keep the material from splitting—that's a maximum of 5/16" to 3/8" in diameter. Some flutemakers leave the opening perfectly round, but Craig prefers to "ovalize" his mouthpiece slightly by elongating the hole with a sharp knife or—again—a piece of sandpaper glued to a thin dowel. In any case, you should definitely undercut—by about 15° to 30°—the edge of the opening that'll be farthest from you when you play the instrument (see Fig. 1).

ON PLAYING AND PITCH

At this point your flute should be capable of making . . . well, if not a true note, at least *some sort* of sound. Before you can adjust the instrument's pitch, though, you'll have to learn how to produce a simple consistent tone.

Basically, you'll be trying to accomplish the same thing you did as a child when you'd "hoot" by blowing across the top of an open pop bottle. Hold the flute as depicted in Fig. 2, and place your lower lip against the flute near the edge of the hole. Now, purse your lips just a bit and blow a stream of air across, and slightly into, the cavity.

If you don't get a note, rotate the flute so you'll be blowing at a slightly different angle, and try again. You may have to experiment awhile to get it right (a certain amount of perseverance and breath control are required), but if you've followed my instructions correctly, you should eventually be able to make a sound. If you simply can't coax even a little noise from the tube even after repeated attempts, ask an experienced flute player to show you the technique (if that person can't produce a note from your bamboo tube, you may have to rework the instrument).

You'll probably notice—as you practice—that the placement of your lips, and the angle and force of the blown air, have an effect on the audible result. For example, by putting your mouth further over the hole, you'll produce a flatter note. The differences may seem subtle at first, but if you keep at it, you'll eventually develop a feel for the right position for you. The note will then come easily and sound true each time you play it.

Once you've developed this ability, the tone you're making should be the flute's key note . . . that is, if you've made a 21" key-of-D instrument, the note should be D. Chances are, however, that when you compare the flute's sound against the same note played on a pitchpipe, tuning fork, piano,

or guitar, your instrument's pitch will be slightly off . . . and you'll need to make an adjustment. The mouthpiece's shape and size have some effect in this regard, so—first—make sure you're satisfied with the cavity's configuration and performance, or make any improvements that you feel might help (for instance, you may want to enlarge the hole, or increase the undercut).

If your flute's note is still significantly flat, carefully trim off a very small amount of the instrument's length from the open end . . . play the note to check the flute's pitch . . . and repeat the process as often as needed until the flute reproduces its key note with reasonable accuracy.

FINGER HOLES

Now, you're ready to locate and drill the holes that you'll finger to play the full range of the scale. As you work, keep in mind that the size and—particularly—the placement of each opening in relation to the length of the flute will determine the "trueness" of its note.

I've provided a spacing chart (Fig. 3) that shows you the approximate hole-placement measurements for flutes in the keys of A, F, and D. I stress the word "approximate", however, because variables like the tube's inside diameter, the size of the mouthpiece hole, and the thickness of the bamboo affect the spacing required to produce accurate notes on any given flute.

That's why, in fact, I recommend that you start *small* and drill each hole in gradually increasing increments up to a maximum diameter of 1/4" to 3/8" . . . and that you check the tone of the note produced at each step. Every time you enlarge the hole, the note will become sharper (higher) . . . and by starting small (flat) and working up, you can pretty much "tune in" each cavity.

Also, as you look at the placement chart, you might notice that there are three "extra" openings, designated 1a, 3a, and 5a. Most flutes have just six, but Craig has devised a nine-hole system (employing two thumb holes on the underside of the instrument and an additional finger hole). By making more notes available, these additional perforations will allow you to play in two additional keys (those above and below the instrument's base key).

My advice, though, is to make a six-hole model first, and learn to play it fairly well (I'll include fingering charts for six- and nine-hole flutes in Part II). Then add the optional holes to your flute when you've reached the point where you can make good use of the extra notes. (An alternative is to go ahead and make the nine-hole version . . . but tape over the three extra openings until you've mastered the basics.)

In any case, drill the hole for the lowest note (the one closest to the open end) first, and—once you've tuned it to your liking—proceed to the next, and so on. Remember, though, that the perforations don't have to be in a straight line. As long as you adhere to the recommended distances in the placement chart, you can put each hole anywhere around the circumference of the instrument. Just choose a spot where your finger seems to fall naturally and comfortably when you hold the flute to play.

EDITOR'S NOTE: In our next issue, Marc Bristol will deal with the three F's of the bamboo flute: fine tuning, fingering, and finishing. *

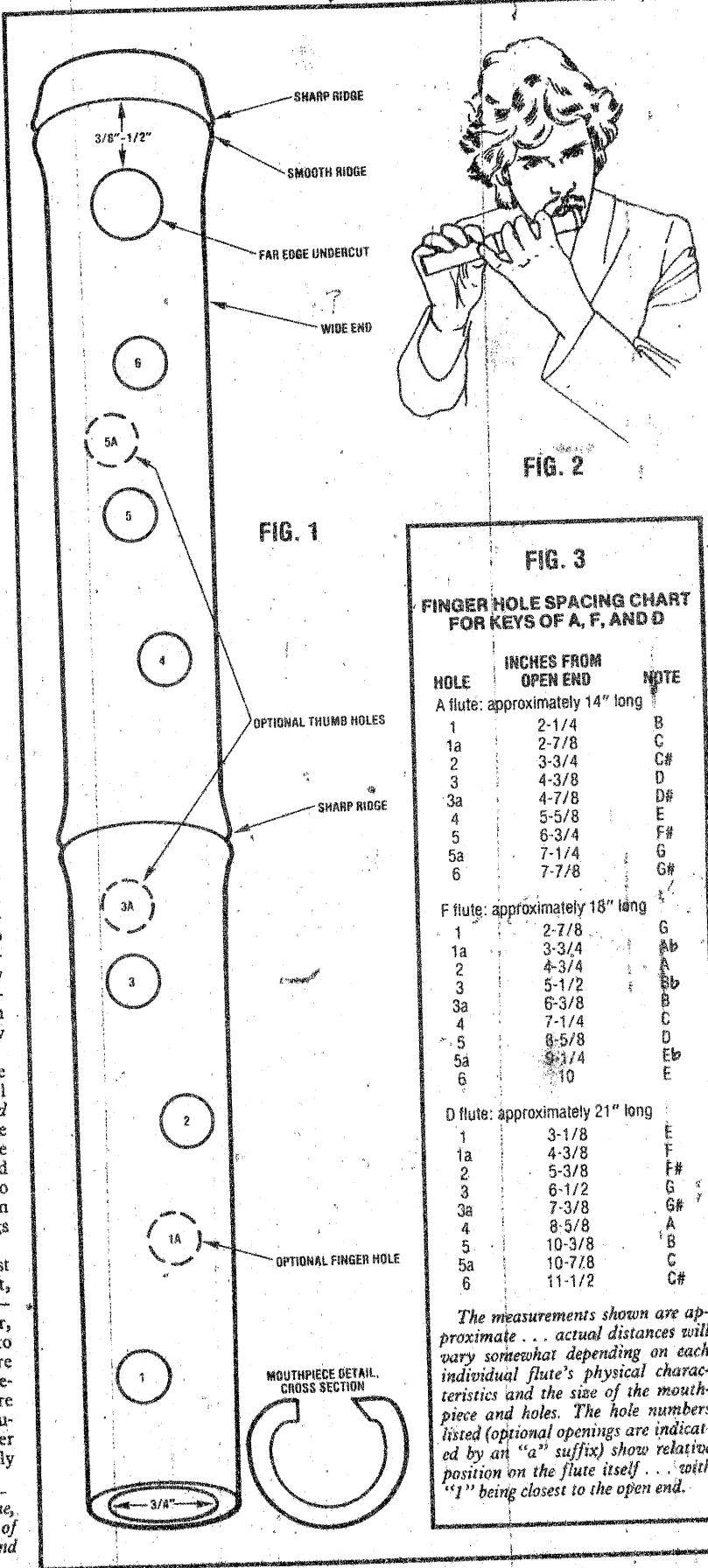


FIG. 2

FIG. 3
FINGER HOLE SPACING CHART
FOR KEYS OF A, F, AND D

HOLE	INCHES FROM OPEN END	NOTE
A flute: approximately 14" long		
1	2-1/4	B
1a	2-7/8	C
2	3-3/4	C#
3	4-3/8	D
3a	4-7/8	D#
4	5-5/8	E
5	6-3/4	F#
5a	7-1/4	G
6	7-7/8	G#
F flute: approximately 18" long		
1	2-7/8	G
1a	3-3/4	A ^b
2	4-3/4	A
3	5-1/2	B ^b
3a	6-3/8	B
4	7-1/4	C
5	8-5/8	D
5a	9-1/4	E ^b
6	10	E
D flute: approximately 21" long		
1	3-1/8	E
1a	4-3/8	F
2	5-3/8	F#
3	6-1/2	G
3a	7-3/8	G#
4	8-5/8	A
5	10-3/8	B
5a	10-7/8	C
6	11-1/2	C#

The measurements shown are approximate . . . actual distances will vary somewhat depending on each individual flute's physical characteristics and the size of the mouthpiece and holes. The hole numbers listed (optional openings are indicated by an "a" suffix) show relative position on the flute itself . . . with "1" being closest to the open end.

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NEWS



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Marc Bristol

In my last column (as most of you will remember), I introduced you to Craig Rusbult, a bamboo-flute-maker *extraordinaire*. And that particular article went on to detail some of the basics of Craig's technique . . . with the aim of allowing you to craft a primitive flute of your own.

We've already discussed where to find the right bamboo for the job . . . how to cut it and remove the central membrane . . . and how to position—and form—the mouthpiece and fingerholes. However, although that column *did* provide all the information necessary to produce a "playable" instrument, the piece didn't include (because of space limitations) the "three F's" of bamboo-flute construction: fine tuning, finishing, and fingering . . . and I aim to remedy that situation here and now.

FINE TUNING

In the first part of this article I explained the importance of enlarging each hole in gradual increments, in order to "sneak up" on the right pitch . . . but there are some other tuning pointers that I think will also prove helpful.

For example, if you drill a small starter hole that produces an on-pitch but relatively weak note, you can obtain a clearer, more open sound by *slightly* enlarging the opening on the side closest to the flute's open end. And if a hole produces a very flat note, you can increase its pitch significantly by gradually expanding the opening on the side nearest the mouthpiece.

Of course, there's always the danger of making a hole *too* large . . . and therefore too sharp. If you find yourself in that situation, you may want to imitate a trick of Craig's: He stands his flute on end (mouthpiece down), applies a little white glue to

the upward-facing edge of the offending opening, and allows it to dry. By building up this surface slightly, he's able to lower the pitch produced by the hole.

DOUBLE UP

You'll likely be glad to know (if you don't already) that your homemade flute is capable of producing a *second* octave, which is played by simply blowing *harder* than usual into the instrument while using the same finger positions as those employed for the "normal" scale. Once you've shaped the holes to your satisfaction, then, you'll want to check the tuning of those higher notes. If your bamboo's natural taper is just right—that is, if the tube's inside diameter decreases very uniformly from its closed to its open end—the upper octave may be naturally in tune.

Chances are, though, that at least some of the notes will be flat. To remedy the situation, carefully sand *all*, or a *portion* of, the area inside the tube between the mouthpiece and the hole closest to it (use the same dowl-and-sandpaper tool you made to smooth the interior while making your flute). If *all* the notes are flat, of course, you'll have to work on the *entire* gap . . . if the three notes closest to the blow hole are the bad ones, sand just that *half* of the region closest to the mouthpiece . . . and, likewise, if the three notes farthest from the mouthpiece are flat, smooth the *other* half of the area. Again, always proceed gradually, and check the flute's performance frequently as you make your adjustments.

FINISHING

Once you're done drilling and tuning your flute, you'll probably want to lightly sand and contour the surface edges around the holes to make it easy for your fingers to form tight seals on the openings (this is, of course, essential if you intend to produce good clear notes). In addition, you may also decide to sand and polish the entire outer skin of the bamboo, and to smooth out the joints as well, to give the final product a truly professional appearance. Do be careful, though, not to sand too deeply into the wood, or you'll destroy the natural beauty of the instrument.

Some flutemakers apply wrappings of colorful waxed linen thread (available at most craft shops) to several areas along the length of the instrument—particularly the portions around the mouthpiece, holes, and open end—to reinforce the tube and prevent (or repair) cracks. You can either glue or lacquer the cord in place.

Well, at this point your bamboo music-maker ought to be ready to warble . . . so here's the third "F" of homegrown fluting.

A PAIR OF POSSIBLE FINGERING SYSTEMS

In Fig. 1—showing the standard six-hole fingering system—the shaded holes indicate finger placement, with the open end of the flute on the right. The numbers—in turn—designate the notes in the scale, in ascending order, with "1" being the key note. In addition, there are many ways to play flat and sharp notes, such as "half holing"—that is, placing your finger over just a portion of a hole to produce an "off" note—plus various other full fingerings not depicted in the chart.

The three "extra" holes shown in Fig. 2—Craig Rusbult's *nine-hole* fingering system—allow you to play in the two keys above and below the flute's "natural" key. The additional openings are situated so that they're covered by your thumbs and right ring finger when the instrument is held in the "normal" six-hole playing position.

The shaded holes represent finger placement, with the open end of the flute on the right. The two crosshatched holes shown indicate a need to finger one, the other, or both openings (depending on the individual flute) to achieve the flatted "6" note. The numbers on the left designate the notes in the scale, in ascending order, with "1" being the key note. The number-and-letter combinations across the top indicate the specific digits to be used: "L" is left, "R" is right, "T" is thumb . . . and "1", "2", "3", and "4" designate index, middle, ring, and "little" fingers, respectively.

AND FINALLY . . .

All you have to do now is experiment, practice, play, and enjoy. I've owned and used my bamboo flute since 1972, and the instrument has stood up faithfully to the test of ten years' wear. (I keep the tune pipe in a quiverlike leather case that—I believe—has helped prevent it from drying and cracking.) I hope you get as much pleasure—and longevity—out of your homemade instrument as I have from mine.

And by all means, write and let me know how your flute toots!

EDITOR'S NOTE: Musicians will also appreciate the articles on pages 68 and 194 of this issue.

And those of you who missed Part I of this series can order MOTHER NO. 78 by turning to page 180. *

II)

musician... flute.

1 six-hole... indicate... of the... in turn... ascend... note. In... play flat... "rolling"—... at a por... note... not de-

in Fig. 2... ring sys... two keys... "real" key... ed so that... and right... is held in... ition.

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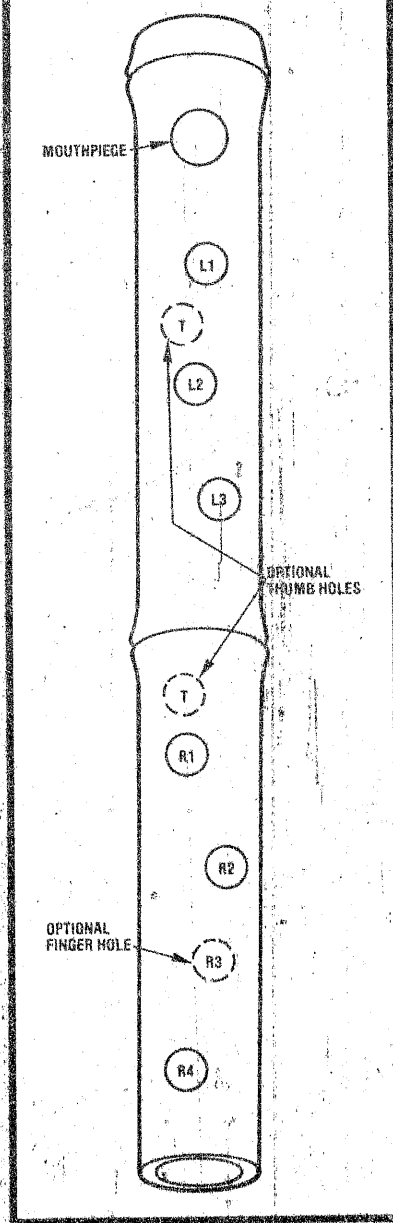


FIG. 1 THE SIX-HOLE FINGERING SYSTEM

	L ¹	L ²	L ³	R ¹	R ²	R ³
7	○	○	○	○	○	○
6	●	○	○	○	○	○
5	●	●	○	○	○	○
4	●	●	●	○	○	○
3	●	●	●	●	○	○
2	●	●	●	●	●	○
1	●	●	●	●	●	●
WHOLE NOTES						
SHARPS AND FLATS						
7 ^b	○	●	○	○	○	○
7 ^b	○	●	●	○	○	○
7 ^b	○	●	○	●	○	○
4 [#]	●	●	○	●	○	○
4 [#]	●	●	○	●	●	○
4 [#]	●	●	○	●	●	●
3 ^b	●	●	●	●	○	●

FIG. 2 CRAIG RUSBULT'S NINE-HOLE FINGERING SYSTEM

	L ¹	T	L ²	L ³	T	R ¹	R ²	R ³	R ⁴
7	○	●	○	○	●	○	○	●	○
7 ^b	●	○	○	○	●	○	○	●	○
6	●	●	○	○	●	○	○	●	○
6 ^b	●	●	○	●	●	○	○	●	○
5	●	●	●	○	●	○	○	●	○
4 [#]	●	●	●	○	○	○	○	●	○
4	●	●	●	●	●	○	○	●	○
3	●	●	●	●	●	●	○	●	○
3 ^b	●	●	●	●	●	●	○	○	○
2	●	●	●	●	●	●	●	●	○
1 [#]	●	●	●	●	●	●	●	●	○
1	●	●	●	●	●	●	●	●	○
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