

THE TUNING OF MBIRA REEDS

A contribution to the craft of Mbira making

by

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As a result of making a number of traditional style mbiras in the last eight years I have naturally come across some of the practical physical principles involved in making and tuning the reeds. Most of these principles, of course, are well known to African mbira makers, who are able to put them into effect amazingly well, considering the tools that they originally had to work with. Even with a modern powered workshop it is not easy to achieve the refinement of design, tone and tuning of some of the old makers.

Old — here we have one of the problems. In the Rhodesia-lower Zambesi area where the mbira culture is perhaps the richest in Africa, one of the main difficulties for someone wanting to learn the mbira is how to find an instrument on which to learn, and most of the makers are old men. I have frequently been asked, and not only in Africa, how to get hold of a good playable mbira, and have had to say that there *is* no way, except to make one for one's self. Either that or go to the country concerned and buy one on the spot from a musician, thereby probably depriving him of his music for some time, if not for good. Of course there are the curio shop mbiras, such as those made in large numbers in the Livingstone area, Zambia, but I have only rarely met one that would be genuinely acceptable to an African musician.

Right! You must make one for yourself. But how? Several people whom I know, have attempted to make an mbira, and have generally succeeded with the wooden part, the body, which serves as the primary resonator. This part conforms more or less with the acoustical properties of other, better known instruments. But it is always the reeds that cause the trouble. At this point I do not propose to give complete instructions on "How to Make an Mbira", because there are so many quite different varieties¹. But I would like to describe briefly some of the principles which are common to all mbiras, i.e. those for making and tuning the reeds, which is undoubtedly the hardest part of the operation. I should say first that the method I describe is the one I have found best for myself. It would be strange indeed if all the thousands of mbira makers in Africa were found to use the same procedures or sequence of manufacture.

Further, I have not attempted to account for these principles in mathematical terms; this would be beyond me anyway; but simply in terms comprehensible to myself as an apprentice mbira maker.

In common with every other musical instrument, the tuning of an mbira reed can be considered as depending upon three factors: size, weight and elasticity. In the case of the mbira reed, these factors can be better put as:

length, weight and flexibility

Each one of these three affects the pitch of the reed. The more of each quality, the deeper the pitch, i.e. if a reed is either longer, heavier or more flexible, it will be deeper in pitch, and the converse. To take them in order:

When making an mbira to a traditional or any other pattern, not much variation is allowed, or even possible, in the lengths of the reeds. Their tips have to be in such a position that they can be played easily by the thumbs (or in some cases the forefingers). This means that the tips of the reeds in each section of the keyboard have to be in relatively straight lines or curves, so that the thumbs, swivelling naturally at their

1. See for instance the varieties listed in Hugh Tracey, "A Case for the name Mbira", *African Music*, Vol. 2, No. 4, and Gerhard Kubik "Generic names for the mbira", *African Music*, Vol. 3, Nos. 3 and 4.

base, can move easily from one reed to the next without too much backward and forward movement. The reeds must also be placed on the fingerboard in such a position that the thumbs can easily reach them while the fingers of the hand are holding the whole instrument for playing.

Because of the above it follows that length cannot be a major factor in *making* an mbira reed. It comes into play only when the mbira has been completely finished, when one's *day-to-day tuning-up* before performing is done by slightly adjusting the playing lengths of the reeds, shorter to sharpen, longer to flatten. This fine tuning is not normally enough to disturb the good arrangements of reeds on an instrument that was well made and tuned in the first place.

The other two factors, weight and flexibility, are the important ones in the making of a reed. Now because of the nature of an mbira reed, being of metal (or occasionally of cane), it is only possible to *remove* metal from the reed for the purpose of tuning it (unless you use sophisticated and time consuming techniques such as welding). Depending from which part of the reed you remove metal, you will either lessen the weight, i.e. sharpen, or increase flexibility, i.e. flatten. The part of the reed most sensitive to weight change is the very tip, and the part most sensitive to change in flexibility is the point directly over the bridge. Here is the principle then:

To *sharpen* a reed you file, or grind, or otherwise remove weight from the *tip*; to *flatten* you hammer, file or grind over the *bridge*, thereby increasing the flexibility, making it weaker if you like, therefore flatter.

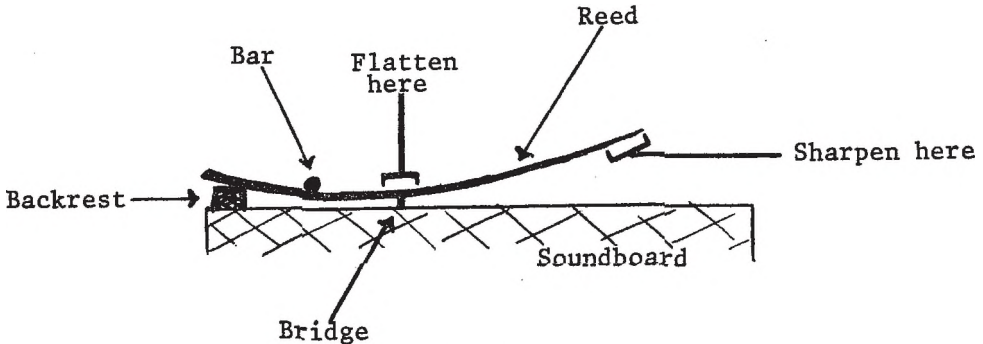


Fig. 1

To avoid confusion over the names of parts of the mbira, the diagram shows which parts of an mbira are the reed, bridge, bar, backrest and soundboard, and also which areas to file or grind in order to sharpen or flatten.

The general procedure then, is to place the reed in the instrument at the correct length where you want it eventually to be, and sound it. If it is either sharp or flat, correct it by filing in the appropriate place, until the reed is both at the correct length and in tune.

Now let us go through the entire sequence of making an mbira reed. First, assuming that you have made the soundboard and attachments for holding the reeds, you mark on the front of the soundboard the positions where you want the tips of your finished reeds. Then choosing a certain reed, you cut an appropriate length of wire, umbrella or bicycle spoke, nail, or whatever you plan to use. I always use ordinary galvanized iron fencing wire, of from 8 to 12 gauge, for the Rhodesian family of mbiras, which have fairly heavy notes. There is no need to use hard-drawn wire, as firstly it is harder to work, and secondly, galvanized wire becomes quite hard and springy enough with all the hammering.

Using a heavy hammer on an anvil, beat the wire flat, to the approximate thickness you want. The reed, viewed from the side, should taper very smoothly over its whole length. The tip can usually be very thin. Be careful not to thin the reed too much in the middle, around the bridge area; too thin here and you may flatten the reed irretrievably.

Next, you file or grind the edges of the reed to an agreeable shape (grinding is certainly far quicker). This will depend largely from what type of mbira you are modelling. Some Rhodesian mbiras have reeds up to half an inch wide²; many, perhaps most mbira reeds, are between $\frac{1}{8}$ inch and $\frac{1}{4}$ inch. Some reeds are square ended, some round, some diagonal. Also file the upper side of the tip, where you pluck it, so that it is quite smooth.

Now commences the tuning process. Place the reed in the instrument, at the right playing length, as marked on the soundboard, and sound it. It may sound a note very far from the one you want, but do not be alarmed.

Providing you have not thinned the reed too much in the hammering process you have quite a large range of correction available.

Tune the reed by filing or grinding in the appropriate places. You will immediately find that the bridge area is far more sensitive than the tip to small amounts of metal being removed. Much more metal needs to be removed from the tip for an equivalent change in pitch³. This is why, if your reed is too low to start with, because of too much initial thinning over the bridge, you will not be able to raise it by much more than a third, if that, without making the tip too thin and weak for playing. If this should happen you will probably have to beat out a new reed. It is far better if the reed sounds sharp at first; there is almost no limit to the amount that a reed can be flattened.

The next point to be considered is the playing resistance offered by the reed. You now have the reed at the correct length, and in tune, but you may find that it is too stiff to play comfortably without hurting your thumbs. This you can correct by filing alternately at the tip and then over the bridge, balancing one operation against the other so that the reed always stays in tune at its correct length. The more you do this, the softer the playing action will become. You will also find the tone and the volume produced by the reed altering. Too much, and of course the reed will become weak, lose tone and start to rattle. Remember that you have to remove much more metal from the tip than from over the bridge for the equivalent pitch change. If a reed becomes too weak, there is no curing it; you have to start again. For an even toned instrument, all the reeds should have approximately the same playing action.

Some Rhodesian mbiras are made with a very heavy playing action, in order to sound loud for dancing; these mbiras are often played with wire wrapped around the thumbs for protection. Most African mbiras, however, are light and responsive to the touch and should not hurt even after long bouts of playing.

The procedure just described contains the essentials of mbira reed making. There are, however, several more observations of importance. One concerns a subsidiary method of sharpening a reed that is too flat. If you have already taken off as much metal as you feel you can from the tip, and the reed still remains flat, you can try hammering the sides of the reed in the area of the bridge. This consolidates the reed in this area, makes it stiffer again, thus sharper. You will often see little ridges along this part of the side of the reeds on African mbiras, indicating that this has been done.

A method of flattening that is used in Angola, Cameroons and elsewhere, is to add extra weight to the reed, by means of attaching a small amount of sticky wax on the under side of the tip. This method has two useful applications: one is that you can make an mbira with all the reeds identical in shape, length, weight, etc., and then tune them all with varying amounts of wax. This is done, for instance, on the big Cameroons *timbili*,

2. E.g. *Mbira dza vadzimu*. See my article in *African Music*, Vol. 3, No. 2.

3. Similarly with tuning a xylophone key: the middle, where you flatten, is more sensitive than the two ends, where you sharpen.

with its cane reeds. All reeds are the same length, in a straight line across the finger-board and they are tuned up or down respectively by cutting the reed away to a fine point (i.e. reducing the weight), or adding wax under the tip.

Another use for wax is when, for some reason, you need to have a fairly short reed sounding a relatively low note. Wax gives an easy way of doing this, whereby you avoid having to file the reed so much at the bridge as to run the risk of weakening it. Other means of weighting, such as solder, are equally good and more permanent.

A point to note about the initial beating out of high notes — you have to be very careful to beat as little as possible from the bridge area all the way to the top (non-playing) end of the reed. One blow too many may scrap the reed. Conversely, to get brilliant sounding high notes you have to beat the playing end of the reed, from the tip to about half way to the bridge, considerably thinner than that of the middle or lower-pitch reeds.

The final question to be considered here is that of overtones. Anyone who has heard any deep-pitched African mbira will have noticed:

1. that the fundamentals of the deeper notes can often hardly be heard at all, and that in many cases the maker has tuned them so that the prominent overtone, rather than the fundamental, gives the note desired.

2. that even in cases where the fundamental is correctly tuned, the overtone is often wildly discordant, commonly, but not always, being about two octaves and a third above the fundamental. These naturally discordant overtones are the reason for much of the tinkling, metallic effect of many mbiras.

The fact that the natural overtone of an mbira reed seems to be about two octaves above the fundamental set me thinking that perhaps the predominant secondary vibration of the reed was the second octave harmonic. Therefore it should be possible to find the anti-nodes, the points of maximum movement, of this second octave, and by altering the weight of the reed at those points, to tune the overtone.

Experiments proved that by dividing up the part of the reed from the tip to the bridge into four approximately equal areas, it was possible to assign a specific tuning function to each area, and in fact to make reeds where the overtones were exactly in tune, two octaves above the fundamental. One of the nodes of the overtone, the one nearest the tip, can be found fairly easily by lightly stopping the reed at about $\frac{1}{4}$ the distance to the bridge where areas C and D meet. This damps the fundamental and lets the overtone sing out.

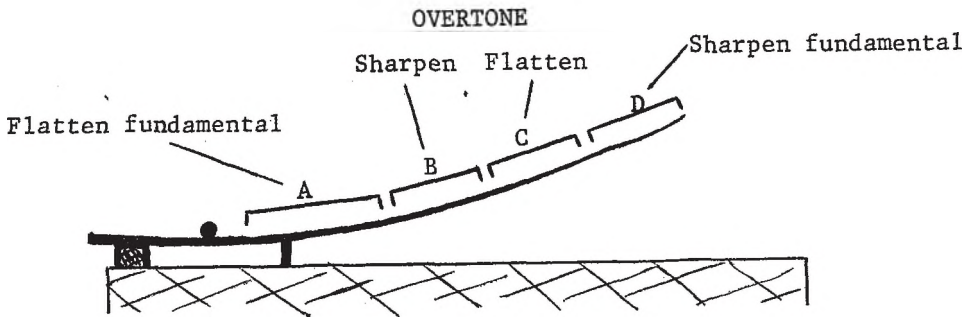


Fig. 2

I found, as shown in the diagram, that filing the tip area sharpened the fundamental, the next area flattened the overtone, the next area sharpened the overtone, and the

bridge area flattened the fundamental. However, the areas tend to overlap, especially A with B and C with D, so that one cannot simply tune the fundamental, then proceed to tune the overtone, because that will inevitably alter the fundamental again. You have to work them both together, and as in the basic tuning procedure described above, it is easier to flatten than sharpen the overtone without affecting the fundamental.

So an ideal procedure would be (by no means always possible!):

1. Tune the fundamental approximately right and make the playing action a little bit stiffer than required.
2. See where this puts the overtone. If it is high, flatten it down to the right pitch by filing in area C.
3. This will have raised the fundamental slightly, so flatten it by a touch of the file in area A (the most sensitive area).

On the other hand, if the overtone turns out to be low after stage one it is possible to work it the other way, but much harder. In stage three, when you will be resharpening the fundamental, the tip of the reed is much less sensitive, and you will be very liable to reflatten the overtone in your attempt, particularly if your reed is short, when the four tuning areas are less easily distinguishable. This may lead to chasing the tuning in a never-ending cycle.

Having made a few mbiras with tuned overtones, I can report that the clarity is remarkable. The comparison inevitably springs to mind with the Trinidadian "steel drum", whose makers have only recently discovered that it is possible to tune its overtones, which in their case are only about one octave above the fundamental, therefore that much more discordant if out of tune. The steel drums made in the last three years or so have a far more concordant and ringing, less noisy sound than the old ones⁴.

So far I have only come across one such African mbira, a Korekore/*Tavara njari buru* from the Chikoa district of Moçambique right under the Rhodesian Mvuradonna Mountains, collected by my father in 1932, and mentioned in his article in this journal. The maker, Kabango, has obviously tuned the fundamentals and overtones together, in the lowest octave at least, where it is most important. Was this a piece of inspired empirical experimentation on his part, or was it a specialised part of the mbira-making craft that has long since died along with so many of the old mbira makers of Rhodesia? Whatever it may be, I think there are not a few young and educated Shona men in Rhodesia who would like to turn back to their traditional instrument, but cannot for want of the physical object itself. They would do well to realise that the only way in fact is to make one for one's self, and that the old makers, who, of course, all had their own magics for good mbira making, did not actually depend on these at all, but on a very sound knowledge indeed of physical and acoustical principles.

4. See Notes and News in the last number of this journal. Vol. III, No. 2, p. 70.