

Reeds—The Heart of an Organ

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OFTENTIMES we find old organs that deceive us into believing that all the internal parts are there or only perishable parts like leather or bellows cloth are causing their malfunction. However, upon opening the new acquisition to restore it, we find that major reed damage is the reason for the organ not properly sounding. This damage could take the form of broken reed tongues and even reeds that are totally missing. Neither of these problems are impossible to remedy.

Most of us are grimly aware, however, that the cost in hourly wages paid to a professional for restoring the most common organette with this kind of damage can be expensive. A reed organette in perfect working order that sells for \$400 could easily cost that much more in restoration expense. Unless there is some sentimental attachment, these organs are sometimes scrapped in favor of their parts, or they are sold "as is" to the next collector as a bargain. With most MBSI members being hobbyists without the proper tools or skill necessary for this kind of restoration, these organs are passed from collector to collector without much hope of proper restoration.

Background-- Personal Beliefs and Ideas

Here are some notes to describe the ways that I have restored many of the reeds for organs in my collection. Because of



Photo 1. Two types of organ reeds.

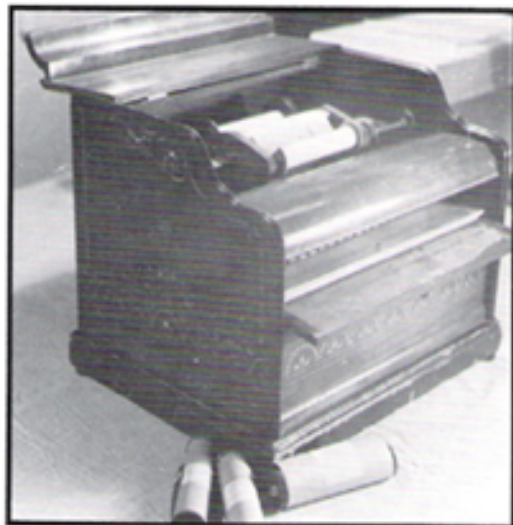


Photo 2. Symphonion paper roll organette.

my efforts, many of these cast-off organs have now been saved from the "beyond-hope organ heap."

The adventurous hobbyist, I hope, may benefit from my work and also save other organettes of similar fate. I warn you, though, that it takes so long to build a reed from scratch that you will quickly find out why it costs so much to have even one reed made.

In reed restoration the collector has two options. First, there is the removal and renovation (tuning) of old reeds of the same size from very damaged cottage or parlor pump organs. The second option is the total fabrication of a new reed or its parts from brass stock.

Note that in Photo No. 1 there are two similar sized but different type reeds. The one on the left is the original reed taken from a Wilcox and White Symphonion paper-roll organette that I am restoring. The other was temporarily removed from my circa 1868 J. Esty and Co. cottage pump organ.

Removal/renovation is by far the easier way to solve the

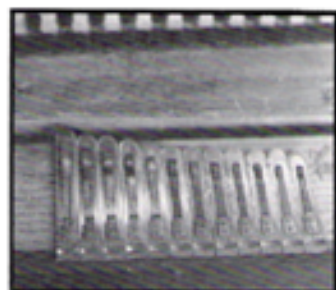


Photo 3. Reeds and reed block.

problem, but it will deprive another instrument in the process. To some mechanical music buffs this action is understandable as these large, lunky instruments don't "do" anything, i.e., you must learn to play them. However, to the reed organ collector, these organs have just as much appeal as organettes and should not be destroyed for the quick fix. Like our mechanical musical instruments, parlor pump reed organs are getting harder to find. It is important to consider the sacrifice of one for the other as the destroyed organ may possibly be a one-of-kind variation of a specific brand of reed organ making it impossible for future generations to see and hear that style of organ.

Assessment

If the first option is selected as your way to solve the problem of reed restoration, then you will only need the information given in the Briefs on Voicing and Tuning. However, if you choose the second option, it will be important to take your time. I describe the steps clearly in the following paragraphs.

The following box includes some new vocabulary words to add to the glossary which was begun in the new MBSI publication *Musical Boxes and other Musical Marvels: A Decade of Listening*.

The first thing you must do is assess the problem by asking the following: Is the reed in the organette? Is the problem dirt, for-

Glossary

Reed Block: a group of reed cells containing a musical scale of similar reeds. Syn.: reed pan.

Reed Cell: the small opening in the block of wood which holds the reed.

Reed Frame: the slotted brass block to which the reed tongue is attached.

Reed Slot: the slot in the reed frame through which the tongue vibrates.

Reed Tongue: the thin metal strip attached to the reed frame at one end which vibrates within the reed frame slot.

eign matter in the reed or reed cells? Is the tongue broken or cracked? Have the rivets that hold the tongue to the block allowed the tongue to shift so that the tongue is now hitting the sides of the slot in the block? These answers can only be arrived at by removing the reeds from the organette (Photo 3).

You should follow the instructions for the removal of the reed block from the reed cells. These procedures are common knowledge to most organ collectors and tuners, and they can be found in reed organ books such as *The American Reed Organ*. The only tool needed to remove most styles of reeds will be a reed hook (Photo 4) or a similarly shaped piece of hard wire stock.



Photo 5. An example of foreign matter (lint) in the reed. This can prevent the reed from sounding.



Photo 4. Tools used in reed organ work: A—reed slip; B—reed puller; C—reed scraper; D—flat file; E—round file.

Reed Cleaning

Most of the time the reed problems in an organette can be solved with a good cleaning, voicing and, if needed, tuning. Foreign matter can get caught in the slot that is between the reed base and the tongue restricting movement of the tongue (Photo 5). Cleaning with soap, water and a toothbrush will help remove most types of this ancient grime without the need of retuning.

A Brief on Cleaning and Voicing

Voicing is the term used to describe the amount of sound that is generated by a reed with a set amount of vacuum that is allowed to pass through that reed during its sounding. All reeds in an organette, whether a 1/2" long, A sharp or a 3" long, B flat, must generate the same volume of sound at the same working vacuum. If the reed tongue totally closes the slot in the block, or is too far away from the block when the reed is called upon to sound, it will have trouble performing. In cleaning a reed try not to force bend the tongue as this will change the voicing of that reed. Before trying to tune the reed, make sure that it is as loud as its neighbors.

Do not polish or buff the brass tongue to the point where it will lose its temper. And don't polish the brass tongue after it is tuned or it will lose its pitch. The reeds were not originally polished and there is no need to do so now.

A Brief on Tuning

Tuning is the pitch (A sharp, G, B flat, etc.) that the reed is sounding. You should be careful not to change the pitch during cleaning by polishing the reeds good as new. Organ reeds did not come polished brand new from the factory. Many people have the idea that brass in and out of old things must be polished. This action will destroy the sound of that reed; besides, there would be no reason to polish your reeds that can not be seen inside the organ some seventy-plus years after the organ was made.

Tongue Repair

Because the broken or cracked tongue is one of the more common problems, I would like to

start my restoration there. This will allow me to talk about some of the other problems along that road. It is assumed that the brass reed is out of the organ and has been cleaned so a clear picture of



Photo 6. The reed tongue and rivet.

its failure can be assessed. First I remove the rivets that hold the tongue to the reed block. This is done by using small needle files to file around the holding lip of the rivet just enough to allow the remainder of the broken tongue to be removed from the reed block (Photo 6).

If a full rivet is holding the tongue to the block as in Photo 7, it may be removed by driving out the rivet with a drift (a small



Photo 7. The rivets must be filed just enough to allow the remainder of the tongue to be removed from the reed block.

chisel) from the bottom side of the reed. A jeweler's anvil or block of steel with a hole drilled slightly larger than the head of the rivet will help support the reed during this process and prevent undue stress that could be put on either

the old tongue or the reed block.

A problem that may arise from the separation of the reed base and tongue when driving out the rivet is the distortion of the old tongue or the reed base. They are brass and are very soft. Careful aim and a small hammer should be used in this process. Even though you are making a new tongue, precise measurements must be

taken from the old parts. It is important to check the old tongue base with a micrometer to determine the starting thickness of the brass stock. This process is often called "miking," the term abbreviated from the tool used (Photo 8).

After the reed tongue base has been miked, the brass for making the new tongue must be softened and rolled to the proper



Photo 8. Measuring the brass with a micrometer.

thickness. While an art student at Washington University in St. Louis, Missouri, I worked in metal smithing, and our projects were mainly constructed of non-ferrous metals such as brass. These are metals that do not contain iron.

Thinning the Brass

For this process you must have access to a small rolling mill in order to continue. A rolling mill resembles the rollers of a ring-type washing machine and will allow you to harden and thin the brass at the same time. As the brass is cranked between the two steel rollers, it squeezes the thickness and expands the brass. This movement is even and consistent throughout the piece. I have tried hammering the brass sheet to harden and thin it only to find that it was too inconsistent in both thickness and hardness for use in my instruments. I'll get back to rolling after discussing some important related steps.

Hard and Soft Brass

Before the rolling can be done, you must make sure that the brass being rolled is not too hard. If the brass becomes too hard, it will develop cracks or flake. Over-hardened brass is more than likely the reason that you have to repair reeds in your organ today. The broken reed tongue which was of the right hardness when it was made, had become work hardened over the many years of service and developed a crack and broke. In building your new reed it is important to prevent this over-hardening problem. The brass should be softened before the rolling process is used.

Brass may be made soft by heating it. This is called annealing. The restorer, in most cases, will have no idea how hard a piece of brass is when starting the hardening process. After the annealing process brass is universally the same—soft.

The finished reed tongue must be hardened to the resilience of a flat spring in order to vibrate the many times per second required to develop a note or tone. If

it is not hardened, and it is finished as a tongue, it may look like the original tongue but it sure won't act the same. If the soft but finished tongue is assembled as a finished reed, it will not sound at all or would have a very dull sound at best.

The annealing process is not a hard or time-consuming task; the only tool needed is a torch for heat and a fireproof base to set the brass on while heating it.



Photo 9. Annealing the brass with a propane torch.

The flame of the torch should touch the brass and must be moved around the surface so as not to melt the sheet brass into a blob. When the brass sheet is annealed, it turns orange-red and a hallowing bounce flame of yellow-orange comes off the metal. For small amounts of sheet brass this process takes less than a minute.

Cleaning the Soft Brass Stock

After the metal is allowed to cool at room temperature, it should be cleaned to remove the oxides and carbon that are left over from the annealing process. This cleaning is done in what is called a pickling bath consisting of water and a small amount of sulfuric acid. The brass will have a dull but clean appearance as a result of this cleaning. The brass can be rolled to the proper thickness necessary for the construction of the reed. If in the rolling of the brass you notice the brass is flaking or cracks develop, you have over-hardened it and you must start over.

You may need to soften the sheet brass many times depending on how thick your brass is when you start the thinning process and how thin you will need to make it. You can lessen the time of making your reed if you start with brass that is close to the size you will need for the finished reed.

Assembly

I trim the brass to the rough size of the old reed and drill a hole for the rivet. Once the brass has been cut and drilled, it should be put on the reed block so that the final size filing may be done. Remember, original clearances must be maintained for proper performance.

Adjusting the Tongue

Filing the three sides should be done first. This is done before thinning the tongue for tuning. The sound of the reed is produced by the tongue vibrating through the slot of the reed base. You must make sure the reed tongue does not hit the sides of the reed block. After the tongue has been filed, the rivets must be made to hold it solid to the base.

The Rivet

The rivet can be made by using a soft or annealed brass rod. The rod must be of soft brass so that it can be peened with a ball peen hammer. This is important so that the parts will be held together by the rivet.

Tuning

Once the two pieces of brass are firmly together, fine tuning can be done. When the rough construction of the reed has been finished, you will be ready to tune it. I use a machinist's feeler gauge and place it between the tongue and reed block to start the final tuning of the reed. As you file

more and more brass off the reed tongue, you must continue to gauge the tongue so as not to remove too much brass. The complete tongue surface must be worked in this manner.

Sound is caused by the tongue as it vibrates throughout the slot in the reed block. If you file the base of the tongue, it will vibrate causing a deep sound as more weight is on the free end of the tongue than the base. If the tip of the reed is filed, the weight of the reed will be less and the tongue will vibrate faster causing a higher pitch. It is the size, weight and length, as well as the proper filing, which must be considered in tuning a reed. Final tuning should be accomplished by scraping the brass tongue either on the tip or the base. At this time it is advisable to work very slowly. You will, at this point, have several hours involved and haste may make it necessary to start the project over.

Originally the tuning and voicing of reeds was done on a "tuning bench." This actually was a desk unit resembling the chest of an organ. (see page 86, figure 140, of *The American Reed Organ*).

The Reed Block

Up to now I have assumed that the reed block came with the organ and only the tongue was broken or missing. Without a reed block the restoration is much harder but not impossible. The old reed gave you some vital starting information. Basic size and shape of the reed is only the beginning. The width and length of tongue slot, thickness and many other factors will go into the construction of a totally new reed. This information may be obtained from the reeds on either side of the reed cell that has the missing reed. There can be many different types or styles of reeds in a given organette; as in many

other parts of our hobby, common sense must still rule the project. If a 1/8" thick reed is in the cell to the left and to the right, then it stands to reason that your missing reed is 1/8" thick. These kinds of obser-

vations must be made throughout the construction of the new reed block as well as the tongue.

After following all of these steps in the construction of reeds, I am sure that you can understand why this kind of work costs so much. Hopefully, you will see that there are no deep, dark secrets as to how reeds work and are constructed. I hope that you will be able to follow these steps and fix one of your instruments. When I first started restoring reed organettes, I was unable to get information on the repairing of reeds. For that reason I feel it necessary to write this article. We all have our own methods of restorations, these work for me. If I missed something, let me know. I would be pleased to do a follow-up article, providing even more information in that article.

I want to thank MBSI member Ralph Heintz for his assistance in developing the glossary for this article.



Photo 10. Note the even space between the tongue and the reed.

It is the size, weight and length, as well as the proper filing, which must be considered in tuning a reed.

Bibliography:

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