# Tuning and Maintenance of Concertinas

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*ABSTRACT*

This document presents information relating to the tuning and maintenance of English Concertinas. The information is generally applicable to Anglo Concertinas which have been manufactured in England, or according to the construction practices common in England. Some of the information is also applicable to the tuning and maintenance of Accordions, Melodeons, and Anglo concertinas manufactured in other locations, such as Germany, Italy, etc. You will have to use some imagination to determine how best to apply the applicable parts, and even to determine which parts are applicable. You are on your own here. This started as a letter in answer to a query from Mr. James Lim of the Bay Area Reference Center, San Francisco Public Library, Civic Center, San Francisco, California, 94102. The document was subsequently published in the *Concertina and Squeezebox* magazine, with minimal editing. I have performed some subsequent editing to the original document, to produce this document. It appears here with the kind consent of the last editor of *Concertina and Squeezebox* magazine, Joel Cowan. This magazine was something which any person who is interested in either Concertinas or Accordions (at least button accordions) should get. It published technical articles, such as this, articles on playing styles, articles on those who play the instruments and are (or should be) well known, interviews with makers of the instruments, and gatherings of those who play them. Unfortunately, the magazine is now sadly defunct. I have performed subsequent editing at various times to keep this document up to date.

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## 1. Introduction

Since I was once in the position of being a ‘‘courageous amateur’’ myself, I can sympathize with your desire to know more about the maintenance of an instrument which is most likely to be acquired in an extremely used condition. Even those in good condition still need occasional tweaking. They also fall prey to problems such as airborne cat hair, which can stop a reed instantly. I was fortunate enough to meet Neil Wayne (the noted concertina collector and restorer of years past from England), and observe his actions while tuning concertina reeds. From this start, I was able to develop methods for tuning reeds. Experience with many instruments has given me a list of other problems which may develop, and ways to deal with most of these.

This information is assuming that you are working on an English-made concertina, not one of the Italian or German types, (even the Italian copies of the English system instruments such as Bastaris and more recently Stagis). (Note, however, that the instruments made in Germany by Suttner may be considered "English-made" instruments for the purpose of this discussion, since they use the same construction techniques.) The ones not made in England tend to use the types of reeds and the mounting of them which is found in accordions and harmonicas. You will have to adapt my hints if you are dealing with one of these.

## 2. Determining the proper pitch:

The first thing that you should know is that the pitch produced by a reed outside the instrument will not be the same as that with the instrument assembled. If you have a tuning meter which will tell you how many cents in error the reed is within the instrument, take another reading of the reed outside the instrument, and tune it to a pitch determined by adding the error within the instrument to the observed pitch outside the instrument.

## 3. Needed tools:

The tuning will be much easier if you have or fabricate a tuning fixture to sound the reeds outside the instrument. Since the reed carriers (the brass feet) are dovetailed into the reed-pan, it is possible to produce a box with a dovetailed slot to accept the reed and carrier, attach it to a vacuum source (located in another room, and connected by a long hose to keep the sound of the pump from interfering with the process of measuring the pitch of the reeds). You should insert a needle valve in the vacuum line to allow you to regulate the flow of air through the reed. It is advantageous to include a floating-ball air-flow meter to allow you to verify the sensitivity of the reed. You can use the concertina itself for driving the reeds under test, but this results in an inordinate amount of disassembly and reassembly of the instrument, and slows you greatly.

To tune the reeds, you will need some way to remove metal from them. For tuning a single instrument, you may use a swiss needle-file (half-round preferred). For more than one instrument, or preferred even for a single instrument if it is steel-reeded and is being tuned from Salvation Army Pitch (about A-456) to modern (A-440), the most convenient tool is a small-diameter grinding stone, powered by an electric motor. The grinder should have a method for controlling its speed, since high-pitched reeds can respond with large steps of pitch with very little metal removal. A very workable system is the Dremel flexible-shaft tool, with a foot-operated speed control. These foot-operated speed controls seem to not be made anymore, at least not by Dremel. I suspect that it is because it would not work well with the newer Dremel tools with a built-in speed control, which does not seem to have as much range. However, Foredom makes an excellent flexible shaft grinding tool. One of the accessories available for it is a small handpiece with an additionally flexible neck, to allow more precise control when touching up a reed. The recom-

mended stone is the green silicon-carbide stone. You should have a way to round the edges of the stone (an industrial diamond is best, but there are other ways). This is done while the stone is mounted in the tool and rotating at high speed. The reason for the rounded stone or the half-round file is to reduce the chance of leaving a step in the length of the reed. All changes of thickness must be gentle, or there will be an increased chance of metal fatigue at the step after many hours of reed operation.

**4. Why the reed is not properly tuned:**

There are several reasons why the reed may be out-of-tune. Sometimes it is a combination of these causes. If all reeds are very sharp, the instrument is probably tuned to Salvation Army pitch (old outdoor brass band pitch). This is near A-456. If only the D# and Eb reeds seem to be off from modern, it may be that the instrument was tuned acoustically. This will produce very pure chords in C-major or A-minor, but as the key goes into more sharps or flats, these notes will sound worse and worse. Most brass-reed instruments that I have found have been tuned this way (but in old pitch -- about A=436).

A steel-reed instrument can condense water on the reeds when played in air which is warmer than the interior of the instrument. This moisture will lead to rust, which will shift the pitch, and in extreme cases, cause reeds to stick or rasp. The first step in this case is to scrape all visible rust off the flats and edges of the reeds. To do this, use a good jeweler´s screwdriver blade as a scraper, and support the reed with shim stock as in tuning. Be sure to remove any rust from the bottom of the reed as well. To do this, invert the reed, place it on a hard surface such as a table top, with the clamp bar over the edge and the entire length of the reed in contact with the hard surface. After scraping off all rust, use a compressed-air duster (available from photo stores) to blow away all rust. These days, the compressed-air cans (which were in reality, freon) are considered an environmental hazard, and are difficult to obtain. However, there are now dusters made with compressed $CO_2$ (no environmental hazards), which will actually do the job better than the freon-powered cans. I have found them in some electronics stores (tools and components, not entertainment systems). I have not recently checked whether they are also available from photo stores, but I have no reason to believe that they are not. If the rust has built up on the edge of the reed, or a piece of dust has become wedged between the edge and the carrier, the pitch of the reed will shift sharply upward. Remove the dust particle by sliding the shim-stock between the reed and its carrier in a vertical orientation.

In the case of brass reeds, if a reed is very flat, and shortly after re-tuning, shifts flat again, it has a hairline crack in the underside. To verify this, press down on the tip of the reed, while examining the top with magnification. You will see a point at which the curvature of the reed is more pronounced than at other locations. This reed must be replaced, as there is no way to get it to keep in tune, and the reed will soon break with continued playing.

If a reed sounds on-pitch at moderate pressure levels, but shifts very sharp at high pressures, it is possible that it is hitting the edge of the slot in the reed pan. This is cured by careful surgery. Just remove the wood where it hits. To locate this, press the reed inward with a jeweler´s screwdriver until it binds.

**5. How To Tune:**

Tuning a reed is accomplished by removing metal from the reed. Prior to removing material from the reed, you must support it. This is to prevent it from retreating from your cutting tool, and to prevent damage to the brass (or aluminum) carrier in which the reed is mounted. I recommend the use of steel shim stock .0015 inches thick (near 0.04mm, for those more accustomed to metric units). The shim stock is placed between the reed and its carrier. The shim stock comes in rolls 6 inches wide and may be cut with standard scissors. The shim stock is available from machine tool suppliers, as is the mounted industrial diamond for shaping the grindstone. For such a supplier which will deal via telephone or web, I can suggest *MSC* (http://www.mscdirect.com/). I just got a suggestion that the metal slider on 3.5" floppy disks could be used for this purpose. It is a bit thick for the extreme treble end, and especially so for an extended-treble instrument, but it would work well for the mid and lower end reeds -- especially in a field-repair situation. At last -- something to do with those America On Line disks that keep coming in the mail. (Thanks Dirk - e-mail bounced - this will have to do.)

**6. Where to tune:**

To increase the pitch of the reed, remove material at the tip. To lower the pitch (which will be the case with Salvation-Army tuned instruments), remove material near the root of the reed. Examination of the reed will show an area that is thinner than either the tip or root of the reed. This will be somewhere between the 1/4 and 1/3 distance from the clamp at the root and the tip.

**7. Slow-starting & non-starting reeds:**

If the reed does not start quickly, it is probably caused by the reed´s angle to the carrier. If it does not start at all, first check if it is binding, and if so, go to *Setting of Reed* (Section 8). If you have tuned the reed down by a large amount (say, from Salvation-Army pitch), the angle will be wrong, and the reed will not start without plucking. The proper position of the reed with no air-flow past it is: Straight, and at a slight upward angle from the carrier. Major re-tuning as above, relieves stresses in the metal of the reed, allowing it to take a downward curve, with the tip below the surface of the carrier. The first step is to straighten it with pressure from below on the tip with a jeweler´s screwdriver, and from above with a thumb in the center. Once the reed is straight, then pressure near the root with the screwdriver can be used to select the angle. This angle is a function of the individual reed, and can best be verified by adjusting until the reed starts quickly after the button is depressed with little bellows pressure. Lower-pitched reeds are inherently slower than higher-pitched ones. Brass reeds are slower than steel ones of the same pitch. After adjusting a slow-starting or non-starting reed, re-check the pitch, as it is often modified by the angle of the reed. A reed that is curved upward will change its pitch more with bellows pressure than a straight one. One with a slight downward curve will also display this same sensitivity to pressure. More extreme cases will not start to sound without plucking (in a fixture). All reeds will display some sensitivity to pressure, with the lower reeds being most sensitive, so try to tune them so your normal playing pressure produces the proper pitch.

**8. Setting of Reed:**

*If it all possible, avoid loosening the two screws that clamp the bar across the root of the reed.* It is very tedious to re-position the reed once it has been disturbed. The reed is not tuned by shifting it in its mount. If the reed has shifted so that it hits the side of the slot in the carrier, it will be necessary to reposition it. The best method which I have found is to cut three pieces of shim stock as described above. Two are almost as wide as the length of the slot in the reed carrier. The other is slightly less wide than the reed. These are placed so that they are vertical on either side of the reed, and at the end. While they are held vertical, the reed is pushed down until it is level with the top of the carrier, and then pushed forward until it contacts the shim stock at the tip of the slot. While holding this undisturbed, the two clamp screws are tightened evenly until the reed is firmly held. The reed is then tested, and the process is repeated if necessary (sometimes many times).

**9. Other sound problems:**

The reed is not the sole cause of improper sounds from your concertina. If you hear a buzzing in one direction, but not another, a probable culprit is a reed-carrier that is loose in the reed-pan. It may just need pressing more firmly into the reed pan (in a radial direction toward the center). If this will not cure it, try cutting a thin strip of paper and placing it between one edge of the reed-carrier and the mating dovetail in the reed pan. Feel for the portion that is loose. Sometimes, the paper is best formed into a ‘U’, and placed around the tip of the carrier. If you find a position that works, glue the paper in place with a microscopic dot of ‘liquid hide glue’. *Franklins* is readily available, and works well. A warning here that sometimes shimming the reed carrier will cause the side wall of the reed carrier to bend in and bind the reed. It will play without trouble in the tuning fixture, but will not play at all in the instrument. If there is a shim installed, cut out most of the side part, leaving only the heel and toe shimmed. Once I found this problem on a non-shimmed reed. I suspect that it was a replacement reed. The cure for this was to carefully shave off some of the wood along that side of the dovetailed slot.

In rare cases, the source of the buzz will be the leather flap that seals the slot for the the reed against air flowing in the opposite direction. This may have stiffened, and developed a resonance at the pitch of the reed. You may add a dot of glue to shorten the portion of the flap allowed to flex. (I have received information that this is far from a rare problem in accordions, so those of you who are reading this for its applicability to accordions should bear this difference in mind. -- Thanks Alan) Another problem related to the flap is that if it is stuck (such as from being pressed down into its slot) it will not allow the associated reed to start.

In even more rare cases, the problem will be that the sound of the reed is reasonable at low pressures, but develops a buzz or other objectionable sound when the playing pressure is increased. In one case, I found that the tip of the reed was contacting the slot through the reed pan when the excursion of the reed tip exceeded a certain level. In another case, the sound was normal except for the last half-inch of bellows travel, when a fold of the bellows was interfering with the swing of the reed tip. This was a low reed on a brass-reed instrument, and there already was a heavy staple bridging the reed to attempt to prevent this.

If you hear a second note join the first above a minimal pressure on the bellows, the problem is cross-partition leakage. You can frequently spot where this has been happening by a darkening of the leather seal on the partition top, where airborne dirt has been deposited. The probable cause here is one of the corner blocks from the bellows frame. If the glue holding it has weakened, it will no-longer support the corner of the reed-pan, allowing it to warp away from the valve-board. Finish breaking it away if it shows any movement, clean off all old glue, and re-glue it. Try to glue it in a position so it properly supports the reed pan level with the edge of the bellows frame. If you cannot be precise, here, err on the side of too little support. You may than add small thicknesses of cardboard (such as that from a *Kleenex* box) until the level is correct. The cardboard alone will do if the block is securely mounted, but not at a sufficient height.

A final source of harsh reed sound to beware of, since it may cause much un-necessary work, is modulation of the sound of the reed by external sources. I once spent over an hour trying to cure several reeds in my own instrument that had suddenly and simultaneously developed harshness. The final cure was very simple, but not obvious. I turned off the ceiling fan whose blades were causing Doppler shift of the pitch.

**10. Other Sources of Information:**

Here I originally had the address of Concertina & Squeezebox magazine. Unfortunately, the magazine is no more, so there is no point to putting an address here.

**11. Other Questions:**

If you have other questions, I can be reached at the above number after noon and before midnight (EST or EDST, depending on season) on most days. Since this is but one of many sidelines, I cannot always be available. However, the phone number is always good, as I am now retired. I do stay up very late, and go to bed equally late, so don't expect coherent communications prior to noon.