

HOW TO MAKE CHIME BARS

And Use them in Schools



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Chime Bars can be made from 15mm standard copper pipe. In Turkey, this is the type of pipe that is used for gas central heating systems.

At 2005 prices, the copper pipe can be obtained for approx YTL3.20 per metre. You will need a maximum of 5 metres of pipe.

Some wood will be required to make a simple wooden frame, from which to hang the chime bars. This should not cost more than YTL 5.00 and can possibly be obtained for less from the scrap wood pile of a kind furniture maker: especially if you say the wood is for school use!

It should be possible to make the chime bars, therefore, for less than YTL 25.00.

If you are a teacher trainer, and are planning a chime bar making workshop, it might be a good idea to try to arrange for this to take place in a wood or metal workshop of a secondary school or college. A vice, for example, can be useful for holding the copper pipe when cutting or filing. However, it is still possible, though a little more difficult, to make chime bars without any specialist facilities.

The detailed instructions on the following pages assume that an example set of chime bars is NOT available to copy. They provide guidance on tuning and cutting.

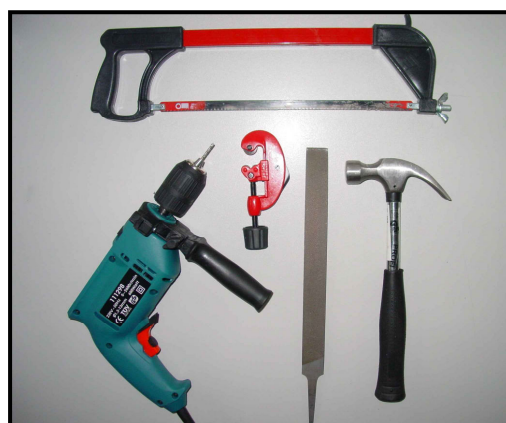
If, however, you have a set of chime bars to copy, making the chime bars is much simpler, especially if a pipe cutter is available. Provided the type of copper tubing you are using is the same, all you then need to do is copy the lengths of each chime bar exactly, and you should be able to reproduce your own set of chime bars with very little effort and with little or no tuning being necessary.

Insert each chime bar you cut in the original set of chime bars to compare and test its tuning. Make any adjustments necessary.

Detailed Instructions for Chime Bar Construction:

These are the tools you will need:

- Either a pipe cutter, or a hacksaw for cutting the copper pipe. The pipe cutter makes the job much easier, but a hacksaw will perform satisfactorily. (It might be helpful to have a couple of spare blades)
- A course file
- A drill and 2.5mm drill bit, suited for metal.
- A hammer, nails and glue: for constructing the wooden frame.



The tools required

The following table gives approximate lengths for a set of 12 chime bars:

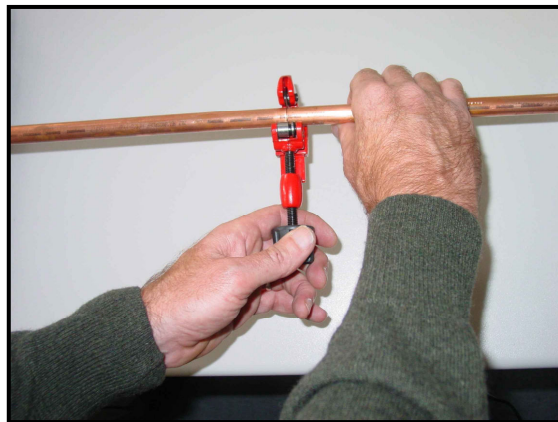
Chime Bar Number	Note:	Approximate Length in mm
1	Low C	418 mm
2	Low D	396 mm
3	Low E	370 mm
4	Low F	358 mm
5	Low G	336 mm
6	Low A	314 mm
7	Low B	299 mm
8	High C	291 mm
9	High D	270 mm
10	High E	252 mm
11	High F	216 mm
12	High G	204 mm

The shorter the chime bar, the higher the note.

Start by cutting the longest chime bar ("Low C"). The photograph to the right shows the copper tubing being cut using a pipe cutter.

Tighten the pipe cutter **gently** onto the pipe. Rotate the pipe cutter round the tube to score a groove.

Gradually tighten the cutter, after each two or three rotations, until the pipe is cut. This is by far the easiest method of cutting pipe. Use a hacksaw if a pipe cutter is not available.

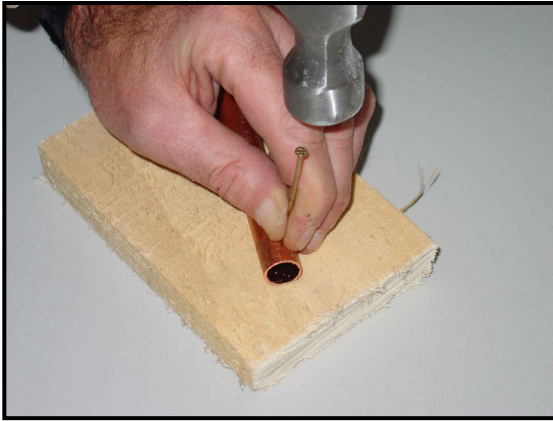


Using a pipe cutter to cut the copper tubing

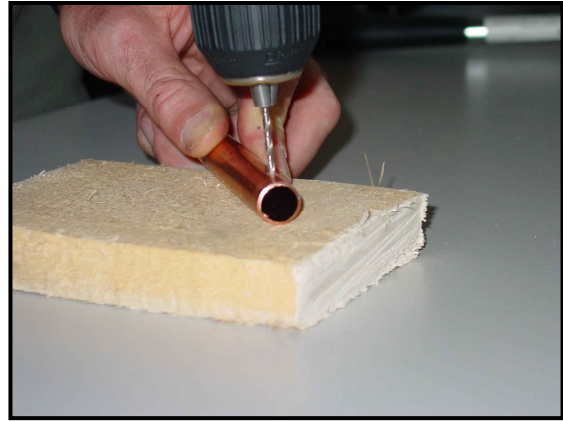
Prepare to drill a 2.5 mm diameter hole, right through the pipe, 10 mm from one end. Do this by making a small indentation in the pipe, where the hole will be drilled, using a nail (see the photograph on the next page). This makes it less likely that the drill will slip on the round surface.

Carefully drill the hole through both sides of the tube. Hold the tube in a vice, or use a scrap piece of wood underneath the pipe if resting on a flat surface (see the photograph on the next page)

Thread a piece of chord through the hole as shown in the photograph on the next page.



Make a small indentation in the pipe, 10 mm from the end, using a nail. This will help the drill bit to grip.



Carefully drill the hole through both sides of the tube.

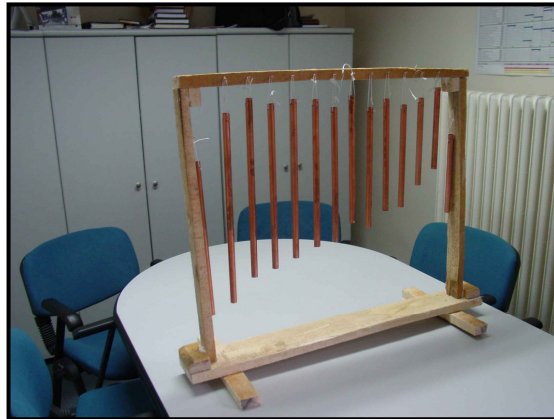


*Thread the tube with string and hang on the wooden frame as shown.
(See separate details for frame construction)*

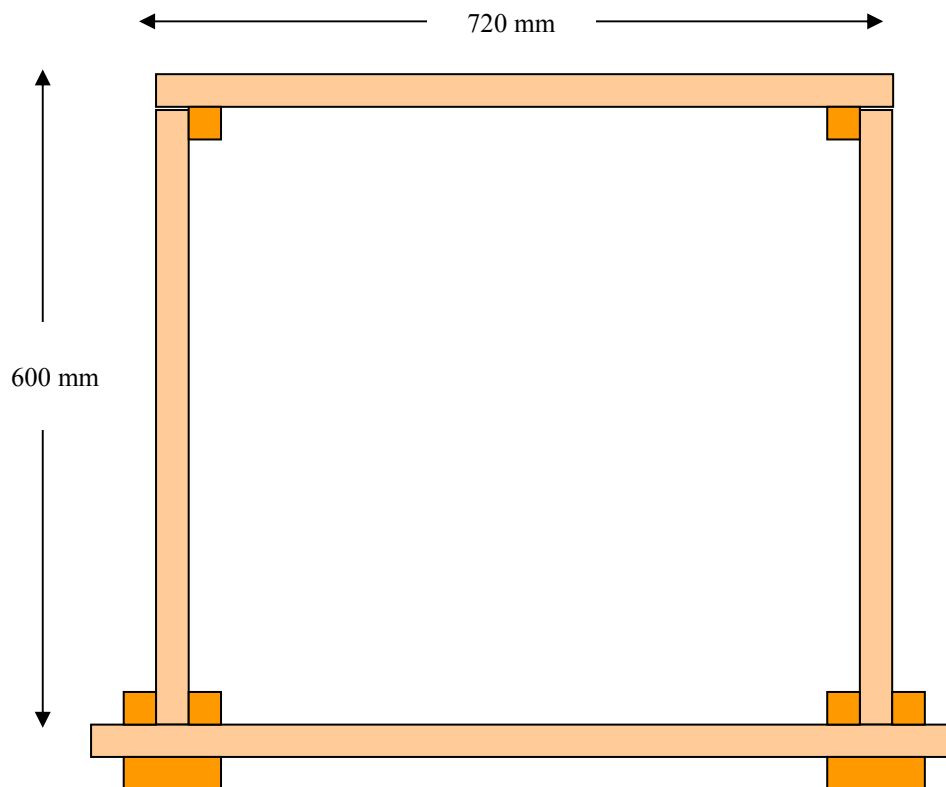
Making the wooden frame:

The exact size of the frame, the thickness of the timber used, and how it is constructed is not important.

The following photograph and sketch diagram serve as a guide.



Chime Bars on a Wooden Frame



Tuning:

(It is helpful if tuning is undertaken by someone who plays a stringed instrument, such as a guitar, and who is used to tuning instruments)

The basic principle of tuning is as follows:

Chime bars can only be tuned "up" (made sharper). This is achieved by making them **shorter**: by filing or cutting - depending on how flat the note is and how much metal needs to be removed.

- Hold the chime bar by the string and give it a tap with an object such as a pencil.
- Listen to the sound.
- Compare this to a known note, which could be obtained from an instrument such as a piano, or a harmonica or even from an electronic tuner, if any of these are available. The CD supporting the Active Learning Workshop, contains a software programme that will provide you with an "on screen" electronic keyboard for a desktop or laptop computer. This is very helpful for tuning the bars.

Hopefully, the first chime bar you cut will be in perfect tune (which is rather unlikely!) or, (more probably) it will be slightly flat. If it is flat, tune it up by making it shorter. Do this by either filing away a bit of metal from the end, or by cutting off a bit of metal from the end, with a hacksaw or pipe cutter. Choose whether to use a file or cut depending on how flat you think the note is, and how much metal needs to be removed.

If you find the first chime bar is already too sharp, before you make any adjustments, you will have to cut another chime bar that is a little bit longer. (Save the first piece for a higher note later).

When making tuning adjustments, err on the side of caution! It is better to cut off or file off too little. You can always remove a bit more metal if the note is still too flat.

If, by mistake, you cut off too much and the note is now "sharp" (too high) you will need to start again with a longer piece of tube. Use the

abandoned piece of tube for another note later on. (This is why it is best to start with the long tubes and work smaller, and not the other way round!)

The basic set of 12 chime bars can play in the musical Key of "C" Major.

By making four extra chime bars, as follows, it will also be possible to play in the musical keys of "G" Major and "D" Major:

Chime Bar Number	Note:	Approximate Length in mm
13	Low F sharp	350 mm
14	High F sharp	210 mm
15	Low C sharp	412 mm
16	High C sharp	277 mm

Note how, in the photograph on the previous page, these extra chime bars are stored: by hanging on the side of the frame until they are needed.

To play in the key of G (one sharp), replace Low F and High F with Low F sharp and High F sharp.

To play in the key of D (two sharps), replace Low F and High F with Low F sharp and High F sharp; and also replace Low C and High C with Low C sharp and High C sharp.

Ways to Use Chime Bars in the Classroom:

Method 1:

Chime Bars can be hung on a frame, and then played as a single complete instrument, by one individual: rather like a xylophone or keyboard.

Method 2:

Individual Chime Bars can be given out to different pupils, one chime bar per pupil. Pupils can follow a piece of music, and whenever "their" note appears they can strike their chime bar: in a very similar way to how music is played by hand bell ringers.



Students playing chime bars using the "Method 2" described in the text

Method 3 (For Accompanying Songs) Drones:

Chime Bars can be used as an accompaniment to singing, and used in chord arrangements (and this is one of the best and easiest ways to use chime bars in primary school).

The simplest way of all to use chime bars is to use them as drones, in the key in which the song is written.

For example, if the song is in the key of "C", three chime bars (which make up the chord of C) can be used to accompany the song throughout:

This would be the chime bar notes of C, E and G.

You can also use octaves. So, you could use Low C, Top C, Low E, Top E, Low G and Top G.

One child should play one chime bar: so there might be between three and six children accompanying the song, if only one set of chime bars is used.

Musical Hint: The note a song ends on normally depicts its key. So, if the last note is a *G*, play in the key of *G*. You can also approach this the other way round. If you want to play in the key of *C*, sound the note *C* to give you the pitch of the last note of the song.

Method 4 (Accompanying Songs) - Different Chords:

Most songs (and especially many of those sung in primary school) are made up of just two or three chords.

Try to find some songs or music books that have guitar chords written on them, as the chords can easily be followed for chime bar accompaniments. (See also the examples at the end of these notes).



Arranging students in three groups of three, to play chord accompaniments

"Bobby Shaftoe" is a typical song in the key of "*G*"

It has just two chords: *G* and *D* (*D7* can also be used optionally instead of *D*)

The chord of *G* is made up of the following three notes: *G*, *B* and *D*.

Give the "*G* chord" chime bars out to one group of students.

The chord of *D* is made up of three different notes:

D, *F* sharp and *A*.

(The chord of *D7*, if you prefer to use this, is made up of four different notes: *D*, *F* sharp, *A*, and *C*)

Give the "*D* chord" or "*D7* chord" chime bars out to another group of students.

Remember that you can make up any chord with both upper and lower notes, if there are chime bars to spare.

So, for instance, the chord of D could use any or all of the following:

Low D, High D, Low F sharp, High F sharp, Low A.

We can now accompany the song:

In the explanation below, we will use the chords "G" and "D".

Whenever the G chord appears above the words of the song ("Bobby Shaftoe" is one of the song examples at the end of these notes), children in the "G chord" group can strike their chime bars. When the chord changes to D, the "G chord" group should stop playing, and the "D" group takes over the accompaniment. When the chord changes back to "G", the "D" group takes over, and so on.

For ease of reference here are the chords most frequently associated with popular keys:

The key of C: the chord of C, the chord of F and the chord of G (or G7)

The key of D: the chord of D, the chord of G, and the chord of A (or A7)

The key of G: the chord of G, the chord of C and the chord of D (or D7)

Here are some common chords, and the notes that make up the chords: (All of these can be played with the set of chime bars described in these notes).

Chord:	Notes:
C	C, E, G
D minor (Dm)	D, F, A
D	D, F sharp, A
D7	D, F sharp, A, C
E minor (Em)	E, G, B
F	F, A, C
G	G, B, D
G7	G, B, D, A

A	A, C sharp, E
A7	A, C sharp, E, G
A minor (Am)	A, C, E
B minor (Bm)	B, D, F sharp

Setting Up Chime Bars on a Frame:

To play in the Major Key of C major (or the Minor Key of A minor), hang up the following Chime Bars:

Chime Bar Number	Note:
1	Low C
2	Low D
3	Low E
4	Low F
5	Low G
6	Low A
7	Low B
8	High C
9	High D
10	High E
11	High F
12	High G

To play in the Major Key of G (One Sharp) or the Minor Key of E minor, hang up the following Chime Bars:

Chime Bar Number	Note:
1	Low C
2	Low D
3	Low E
13	Low F sharp
5	Low G
6	Low A
7	Low B
8	High C
9	High D
10	High E
14	High F sharp
12	High G

To play in the Major Key of D (Two Sharps) or the Minor Key of B minor, hang up the following Chime Bars:

Chime Bar Number	Note:
15	Low C sharp
2	Low D
3	Low E
13	Low F sharp
5	Low G
6	Low A
7	Low B
16	High C sharp
9	High D
10	High E
14	High F sharp
12	High G

On the following pages are three example songs, with words, notes and chords, for chime bar accompaniment. [Additional song examples are provided on the CD Rom supporting Active Learning Training].

---o--O--o---

[In this example, the small letters in black denote the names of the chords. The large letters in red name the individual notes of the song.]

Twinkle, Twinkle Little Star



C C G G A A G F F E E D D C G G F F E E D

Twinkle Twinkle Little Star How I wonder what you are Up above the world so high



G G F F E E D C C G G A A G F F E E D D C

Like a Diamond in the Sky Twinkle Twinkle Little Star How I wonder what you are

This is a good song for Chime Bar "Method 2" described in the notes.

Give out the following five chime bars to five pupils:

Low C, Low D, Low E, Low F, and Low G.

Follow the red lines.

The pupil holding the Low C chime bar plays the first two notes; the pupil holding the Low G chime bar plays the next two notes, and so on.

"Twinkle Twinkle Little Star" is also a good song for practising "Method 4": playing chords.

To use "Method 4", give out chime bars to three groups of students:

"Chord C Group": C, E and G

"Chord F Group": F A and C

"Chord G7 Group": G, B, D and C

Follow the chord letters in black on the top of the music to accompany the song.

---o--O--o---

BOBBY SHAFTOE -- *Northumbrian Folk Song*

D

Bobby Shaftoe's gone to sea,

A7

Silver buckles on his knee,

D

He'll come back and marry me,

A7

D

Bonny Bobby Shaftoe.

D

Bobby Shaftoe's bright and fair,

A7

Combing down his yellow hair,

D

He'll be mine for ever more,

A7

D

Bonny Bobby Shaftoe

BANKS OF THE OHIO

G **D**
I asked my love to take a walk

G
Just to walk a little way

C
And as we walked, along we talked

G **D** **G**
All about our wedding day

Chorus:

G **D**
And only say that you'll be mine

G
And in no other arms entwine

C
Down beside where the waters flow

G **D** **G**
Down by the banks of the Ohio