

## **MAKING A CIGAR BOX GUITAR..**

*June 2009*

This is just one man's approach. It is pragmatic and full of idiosyncrasies. I just hope it is helpful to you to get you first CBG made. Please search for the other plans, articles and videos on the net that are about making a CBG. In fact I suspect that this article is not sufficient in itself to make the CBG; people learn in different ways and variety of tutorial inputs help most of us. Many heads make a good CBG.

Oh yes, my pictures are not necessarily sequential, but should make their point. I decided to take most of them well after I had started this project. If I do another project I will take more pictures!

Part 1.

### **Get your Cigar Box.**

The best bet is to go to eBay and plug in a search for "cigar box", or variations on those words. You will be faced with both collector's items (that are so expensive you would not want to make a CBG out of them) then you will nearly always find a few that might well meet your needs and price.

You can do net searches for Cigar makers/distributors etc in your area. Then write to them and tell them what you are looking for. Go on the Cigar Box Nation and ask if someone locally can help you.



*This box has the dimensions mentioned below.*

A good size to begin with would be:-

270mm (10  $\frac{3}{4}$ ) x165mm (6  $\frac{1}{2}$ ) x 40mm (1  $\frac{1}{2}$ ) you should be able to acquire one about this size reasonably easily. Try for a bit deeper even a bit bigger; but you can make one out of smaller boxes too.

Not everyone uses actual Cigar Boxes. Some make their own boxes, others use wine bottle boxes, tins, well anything that is available and cheap.

I have collected some good sized wooden 35mm slide boxes for future projects.

Join Cigar Box Nation. Most helpful; look at their picture gallery; it will blow your mind. You really should explore this site before you start making.

<http://www.cigarboxnation.com/>

*Remember Cigar Box Nation is your best friend.*

## MAKING A CIGAR BOX GUITAR..

Part 2.

### **Get you “Neck” and prepare it.**

You need a piece of hardwood about 36” x 2” x 1” (1000 x 50 x 25 mm). These are nominal sizes and will certainly be smaller than the given dimension. The 2” dimension is your top/fret board.

You need to make sure this wood is both “straight and true”, if not dress it until it is. You must not end up with a “wavy” fret board or a bent neck.

### **How many strings?**

Decide on “how many strings you want” and how long will the string length be”.

You can have as many strings as you like. Many use 3 strings, many use 4 strings. (Even 6... but not for me!)

*Can't make up your mind?* Use 3 strings.

### **Choose your string length.**

The hardwood is long enough for you to have a string length of 25.5 inches (650mm), a number of people choose 24.5” (620mm), likewise 23.5” (600mm).

*Can't make up your mind?* Choose 24.5”.

*So from now on I am assuming you will be making a 3 string CBG with a string length of 24.5”. You do not have to do this of course, but you might have to adjust my advice.*

### **Tuning pins and head.**

You can use separate (single) machine heads, set of three machine heads in a row, violin or cello pegs, nuts and eye bolts, variations on any of these themes. Get them from a music store or hardware store or eBay. If you are not sure look at all the pictures on Cigar Box Nation (there are more than 1000!) to get your ideas.

*Can't make up your mind?* Get a set of three machine heads in a row (You will probably have to buy a pair)

Divide the width of your fret board (finger board..whatever) by 4 and mark the positions of your 3 strings. Project these up to the head of the board and from these marks decide the position of the

You do not have to do anything fancy with the tuning pin part of the neck. Straight, "as is" will work, but remember that the strings will have to coriginate from below the level of the fret board **nut**. You will have to drill three holes to correspond with the holes on the shaft of the tuning pins (or construct a channel) to allow for this. (i.e. the strings coming up to the nut) tuning pegs. Locate them accurately and drill them with the correct diameter holes.



*This one has a channel, not three individual holes for the strings to emerge*

*Can't decide? Drill three appropriate holes (shape them later if required.)*

Do not fit the machine heads yet, they may get in your way for a while.

### **Position your nut.**

This will be just below bottom tuning pin and serves as the start for your string length. The nut will be a hard substance about 0.25" wide (5mm) and leave it high at the moment if you must make it now. It should be let into a groove in the fret board about 3/16 deep (4mm) for the full width. It is the edge that butts on to the top of the fret board that is your string length starting point. (Not the middle of the nut, or anything else you might think.) In other words you measure from where it becomes free and suspended.



*What should you do? Cut the groove for the nut now, but do not make the nut. Use a square, a fine toothed saw and a sharp chisel to cut the groove.*

*OK I have done more in this part than I thought I would so I am stopping here.*

## MAKING A CIGAR BOX GUITAR..

Part 3.

### **To fret or not to fret.**

Ask yourself this question: *This is how I want to play my CBG most of the time:*

1. Amplified slide. *Don't fret it.*
2. Amplified slide with some finger work. *Fret it, but not really required once you learn how.*
3. Amplified finger style/chords etc. *Fret it.*
4. Acoustic. *Probably fret it even if you use a slide with it.*

*Want me to decide for you? I am not so decisive this time. The problem is that fretting a neck/finger board takes you into a whole new and possibly difficult sequence of work. So, let me tell you your fretting options.*

*Tied with nylon fishing line or catgut. Easy and works quite well.*

*Use tooth picks or nails and tie them into position. Works OK, but that method is not for me. Possibly OK for playing slide on your knee.*

*Use proper fret wire, possibly mandolin or banjo wire but a medium guitar fret wire is OK. Buy at a music shop/eBay/guitar "hospital" etc. This is the correct and better way.*

*Can't decide? Don't fret it. (It is quicker and easier) If you decide to ignore my advice, I tell you how to fret later. 😊*

## MAKING A CIGAR BOX GUITAR.

Part 4.

### **To amplify or not?**

In my humble opinion, CBGs do not make "good" acoustic guitars. The best it does acoustically is a resonator guitar. They have small bodies, not madly thin sound boards, not much air in the case (body) to help with vibrations.

*Can't decide?* Amplify it.

### **How do I amplify it?**

I have now opened a big can of worms.

#### *Amplifiers*

You can buy the bits and make it all yourself (cheap and if you do the job OK it works)

You can buy quite low cost amps. The Rowland mini cube comes out quite well, but so do others too. They seem to be marketed as "Guitar practice amps"

You can go the whole hog and get the best of everything....If you have got it already, use it, but don't buy it for your CBG.

#### *Pick ups (or variations on this term)*

As above really, but if you want to be a "real" CBG person you buy a Piezo audio transducer and fit that inside your box and connect it up to your amplifier.

I need to tell you something at this point... Until I started this CBG thing I did not have a clue about anything electronic, but now, thanks to my CBG needs and help from the Cigar Box Nation, not only have I wired up my Piezo amplifier but I have also built my first electronic kit. A small, cheap 9 volt amplifier; and it works!

No, I am not going into that stuff now, we will wait until the guitar is nearly finished.

#### *Can't make up your mind?*

1. If you are no good at all about electronic stuff then buy a guitar practice amp and a readymade up Piezo set up from eBay.
2. If you have knowledge or can have someone help you, or even "go it alone". Then get the bits/kit and make it yourself.

MAKING A CIGAR BOX GUITAR..

Part 5.

### **Fitting the neck.**

So far you have positioned the tuning pins and the nut.

Measure the string length from the edge of the nut to where the bridge will be. Make a mark. It is only a guideline for you to position the bridge where you want it on the box. The best position is about a third or close to half the box measured from the far edge of the box.

So now you have the neck resting on the box with the bridge position where you want it. Now mark the neck where the box begins and ends. (top edge and bottom edge)

( Sorry, I do not have a picture of this to show you! ☹ )

The sequence that you are now embarking on has as its goal to mount the neck *under the lid* of the box, in what is known as a “*through-neck*”. The end result will be that this *through-neck* will be glued to the underneath of the lid. (A sort of definition:- *Through-neck*.. it goes right through the box from the front to the back)

(Another picture I do not have ☹ )

The process requires that you mark the side of the box (lid uppermost) the section of the neck (the nominal 2 x 1) You mark the top edge as the entry and the bottom edge as the exit. B U T you must allow for the thickness of the lid.

You do this by modifying the through-neck, you do this by cutting a long flat sunken “platform” the full width of the neck; the depth of which is the thickness of the lid of the box and the length of which, is the entry of the through-neck to the exit of the through-neck.

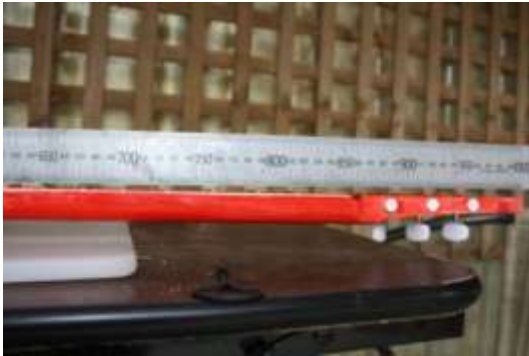
The following picture is a variation of what I have been telling you. This variation leaves more of the lid free to vibrate and is glued only at each end of the lid. I still think your model should touch the lid for the full length and be glued accordingly. Like, “do as I say, not do what I did on this CBG”. !!!!!



On the box you cut the through neck entry hole and the exit hole where you have marked the section of the neck. Do this carefully and leave the lid intact. The neck has to be held firmly between the lid and bottom (of the hole) when the box lid is closed. The sides should fit snugly too.



This should leave you with a neck and the top of the box flat and level. Possibly the position of the neck in regard to the top of the box is the one you will need to look at carefully. If it is pointing up or down, instead of flat with the lid; you will have to pack and adjust accordingly. I can't really stress enough that the tension of tuning up the strings will almost inevitably pull the neck up to some extent. Therefore it is better to have some backwards tilt. I can't tell you how much exactly.. you will learn, (The hard way?)



*Wow, a lot of "backwards" non alignment of backwards tilt?*



*That is better. I think they aim for one degree*

### **The tail.**

The piece of wood sticking out of the back is where you make arrangements for your strings to terminate.

Fix the position of the strings as you did for the tuning pins, look at the pictures on Cigar Box Nation and decided what style you will adopt.

*Can't decide?* Use dismantled pop rivets as washers having drilled appropriate sized holes.



*This uses traditional acoustic guitar pegs.*

## MAKING A CIGAR BOX GUITAR.

### Part 6.

#### **Finish the mechanical part of the guitar.**

1. Glue the lid to the neck.
2. String up the guitar with little tension. Do not do it tight yet, just tight enough to be able to set the string height suitable for you.
3. (Use light tension steel strings) Tune to D, F#, a, [key of D] strings 1 3 5. Or whatever you like to tune it too. Look on Cigar Box Nation for alternatives.
4. Adjust the height of your nut and bridge (string height) to suit your playing technique. You will do this with trial and error and sandpaper etc. Nut first, say 2 visiting card thickness over the first fret as a start.
5. Drill/cut/shape sound holes in your cigar box. I suggest two 1' dia. (25mm) holes one each in the top corners of the lid of the box.

This is the end of the mechanical making of the CBG. Please note at every stage you will need to check and adjust as might be required. Possibly the position of the neck in regard to the top of the box is the one you will need to look at carefully. If it is pointing up, instead of a little down with the lid, you will have to pack and adjust accordingly. If you have kept it flat and true and your platform is cut correctly, you should not have any problems. *[I am sorry I really do not have any "formulae" to guarantee you the*

*correct angle and it is a pain if you get it wrong, because the CBG is fully made before you find out! I think I saw a guy who posted and "adjustable" system on CBG, but I have failed to find it at this stage]*

I suppose the answer is to have a separate fret board the thickness of the lid, then you do not have to cut that platform. You just stick it on the top of the neck!

## MAKING A CIGAR BOX GUITAR

### Part 7

#### **Fretting.**

So you have chosen to fret your finger board. "The best of luck to you!" I do not want to put you off, but it is a bit of a palaver getting it all right; but I am sure you can do it.

You will need a medium guitar fret wire / or mandolin fret wire. Buy it at music shops or guitar repair places or eBay. (Personally I like the short straight sets in a packet, but they are more expensive than buying off a roll.) A hammer (if it is a composite head, great) a very good pair of wire cutters, a file or two and a suitable saw.

From now on you can spend a lot of money buying the right gear or you can cobble something together that will work. If you want to buy it then go to a Luthier supplies place or eBay. If you want to cobble it together then watch this space.

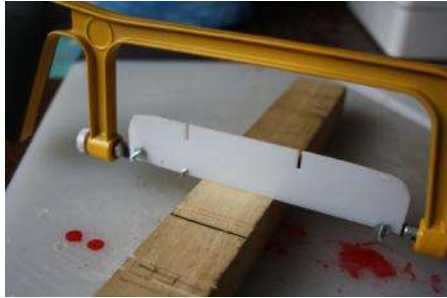
The width of the cut to accept the fret tine is about the width of what I know as a junior hacksaw blade. I wipe the file along the side of the blade a few times to get it just narrow enough.

Now to get the right depth, just saw and try until you get it right! Don't go too deep or you will spoil the fret board! [I told you it was a painful process] In fact all it does is weaken the fret board if it is a *separate fret board* you are making. We are not. But still get it to the right depth by cobbling up something.

Here is a picture of what I have done.



*Wiping the edge of the blade with a file. A plastic depth guide screwed through the blade set at the right depth for the fret tine.*



*Just saw till the plastic depth gauge touches the fret board.*

*Make sure you do it level.*

OK it is not perfect but it works with care. I think it can be improved upon, so work on it.

**Whoops, I have jumped ahead a bit; so now we start the process.**

Firstly decide your string length, then find a printable fret position calculator (there is one here.)

<http://www.stewmac.com/cgi-bin/hazel.cgi>

Free Information/ Fret calculator. **Oh boy, that is a fabulous site... if only I was rich! Spend some time on it and drool!**

Here are two I printed for you. Imperial and Metric.

**24.5" fret scale**

[Printable](#)

fret	from nut	fret to fret
1	1.375"	1.375" (nut-1)
2	2.673"	1.298" (1-2)
3	3.898"	1.225" (2-3)
4	5.054"	1.156" (3-4)
5	6.146"	1.091" (4-5)
6	7.176"	1.030" (5-6)
7	8.148"	0.972" (6-7)
8	9.066"	0.918" (7-8)
9	9.932"	0.866" (8-9)
10	10.750"	0.818" (9-10)

**Notes on fret layout**

The most accurate way to lay out your scale is making all measurements from the nut (using the "fret to fret" distance only to confirm your layout). Laying out frets only by measuring fret to fret will compound error. For example, if you're laying out frets by marking with a scribe and your accuracy is plus or minus 10 thousandths, you could be off by as much as 1/8 inch at the 12th fret.

Measurements are given from the end of the fingerboard (face of the nut) to the center of a fret slot.

11	11.522"	0.772" (10-11)
12	12.250"	0.728" (11-12)
13	12.938"	0.688" (12-13)
14	13.586"	0.649" (13-14)
15	14.199"	0.613" (14-15)
16	14.777"	0.578" (15-16)
17	15.323"	0.546" (16-17)
18	15.838"	0.515" (17-18)
19	16.324"	0.486" (18-19)
20	16.783"	0.459" (19-20)
21	17.216"	0.433" (20-21)
22	17.625"	0.409" (21-22)

### Bridge placement for 24.5" scale

[Printable](#)



**Distance from nut to center of forward-most mounting screw or pivot post**

### 630 mm fret scale

[Printable](#)

fret	from nut	fret to fret
1	35.359 mm	35.359 mm (nut-1)
2	68.734 mm	33.375 mm (1-2)
3	100.235 mm	31.501 mm (2-3)
4	129.969 mm	29.733 mm (3-4)
5	158.033 mm	28.065 mm (4-5)
6	184.523 mm	26.489 mm (5-6)
7	209.525 mm	25.003 mm (6-7)

### Notes on fret layout

The most accurate way to lay out your scale is making all measurements from the nut (using the "fret to fret" distance only to confirm your layout). Laying out frets only by measuring fret to fret will compound error. For example, if you're laying out frets by marking with a scribe and your accuracy is plus or minus 2 millimeters, you could be off by as much as 24 millimeters at the 12th fret.

Measurements are given from the end of the fingerboard (face of the nut) to the center of a fret slot.

8	233.125 mm	23.599 mm (7-8)
9	255.400 mm	22.275 mm (8-9)
10	276.424 mm	21.025 mm (9-10)
11	296.269 mm	19.845 mm (10-11)
12	315.000 mm	18.731 mm (11-12)
13	332.680 mm	17.680 mm (12-13)
14	349.367 mm	16.687 mm (13-14)
15	365.118 mm	15.751 mm (14-15)
16	379.984 mm	14.867 mm (15-16)
17	394.017 mm	14.032 mm (16-17)
18	407.261 mm	13.245 mm (17-18)
19	419.763 mm	12.501 mm (18-19)
20	431.562 mm	11.800 mm (19-20)
21	442.700 mm	11.137 mm (20-21)
22	453.212 mm	10.512 mm (21-22)

### Bridge placement for 630 mm scale

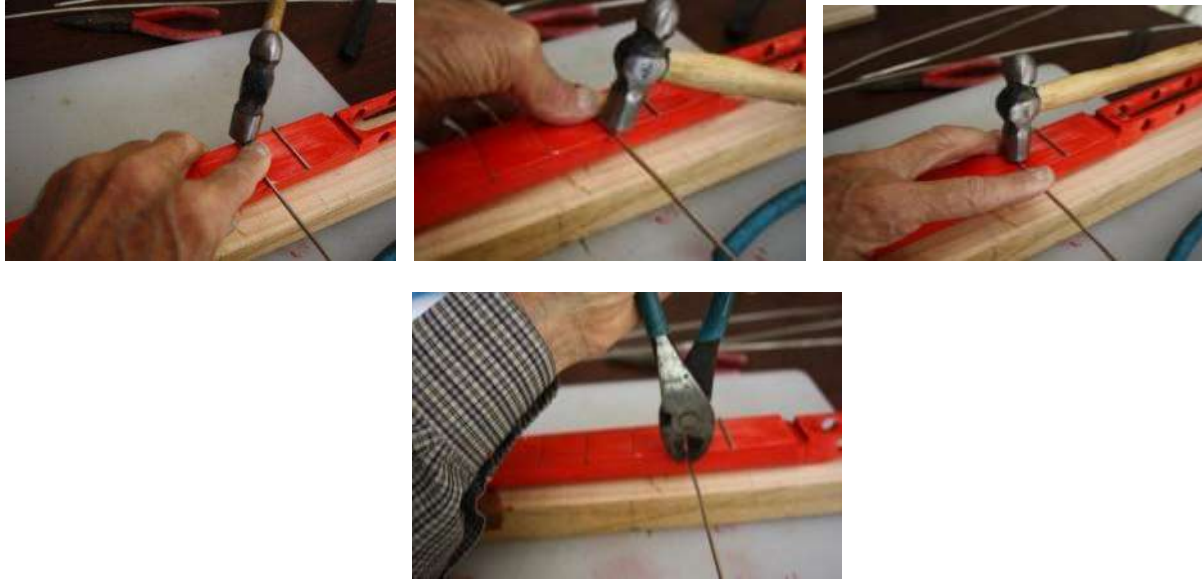
[Printable](#)



**Distance from nut to center of forward-most mounting screw or pivot post**

Armed with your chart, a square, a sharp pencil; mark off the positions of the frets as accurately as you can. Make sure your markings are square.

Saw the fret slots, and then tap in the frets. Tap one edge, tap the opposite edge, tap it down in the middle. Be careful because if you “tap” them too hard they will bend and you will need to re do it. Cut the fret to size at the edges of the fret board.



You then need to file the edges of the frets smooth where you have cut them. You can only do them one by one (Not really true but I will not go into that now) and with great care not to file the fret board. ☹ Do it, or you will end up with bleeding fingers during a riff.

Make sure your frets are level. This is what I use, a file with a couple of wooden blocks glued on to it. You can only file gently; if a fret is really wrong it will need re setting (re fretting!)



*Slide the file up and down.*



*Carefully filing the edges of the frets.*

OK, That is it. You have done it. There is a lot more I could have told you but this is all you really need to get the job done. There are more gadgets (fret press) and more hints and tips. Go on the net, there are many good tutorials that are detailed and helpful.



Here is a *DIY fret press*. Put it in your drill press and press the frets in firmly. Use hard wood, this is soft wood and it did not work very well!

## **Making a Cigar box Guitar**

Part 8

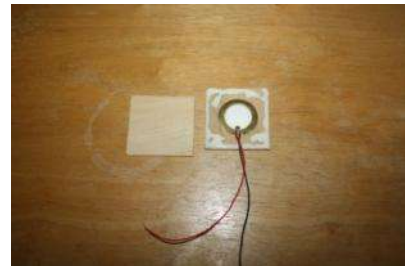
### **A Pick-up for your CBG.**

This is not your sophisticated Stratocaster/Gibson thing, this is real CBG stuff. ☺

You will need an Audio Piezo transducer (CAT. NO. AB3440. Jaycar, Australia), 1 x Standard Control Pot 500 Ohm, 1 x 1/4 Mono Jack, 1 x Knob to cover the top of the control pot. All these are available at Jaycar, Australia and I am sure in your local electronic shop wherever you live; of course eBay too.

There are sets of pictures below that will illustrate the process to some extent.

Break off the plastic covering of the Piezo transducer, with care to avoid damaging the disk. Find or make two very thin pieces of wood (say 1/16 thick (2mm)) and sandwich the disk between the two pieces of wood. Just glue the edges and avoid getting glue on the disk. Squash it flat during drying.



Put a book on it.

## Wiring it up.

You will need to be able to solder, if you can't, then get someone else to do this for you.

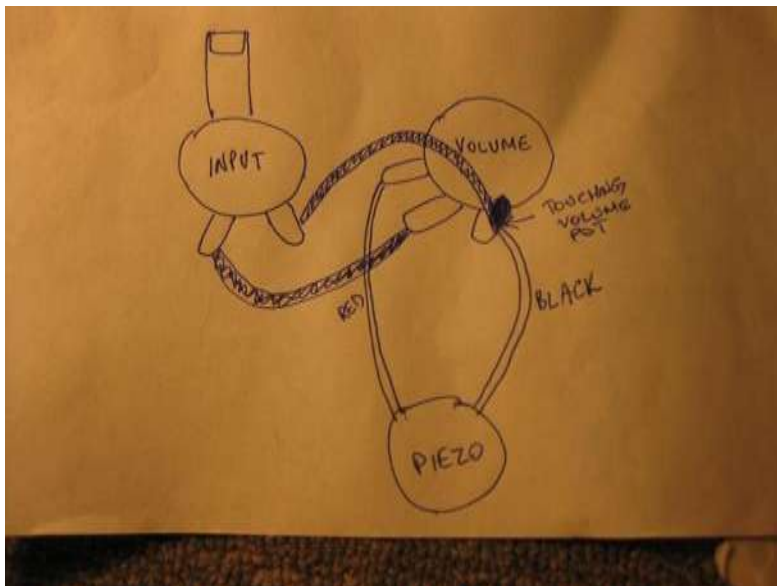
No real text for this, all pictures and diagrams. The hand drawing is from my friend in the Cigar Box Nation Forum. BUT there is one thing I have to warn you about, that is *finding the appropriate place to position the volume control and the amplifier jack on your box*. You must look at both the clearance the two devices need "around" them and the depth of thread it has to fix it to the box. You may well have to remove parts of the box lining, and/or cut away a bit of the thickness of the wall of the box.

Let's get to the wiring.



Here are the pieces.

Using the 3<sup>rd</sup> hand I am ready to solder.



Here is the wiring diagram.



*Here it is wired up (Piezo is not sandwiched of course)*

### **Fix the Piezo.**

Glue the Piezo under the lid, just close to the bridge position and a “little bit” in front and to the side of the bass string.

### **Part 9.**

#### **Nuts and bridges.**

There is nothing spectacular about these items. Look at pictures and decide what you want to make.

The matter of the grooves is sometimes a worry. The theory is that your string should sit “just over half way” in the groove, and it should be just wide enough to accommodate the width of the string “without being able to vibrate from side to side.” You can get small packs of tiny files that should able you to achieve these goals, but I doubt that other than the highest level of professional builders get anywhere near it! I just do not make mine too big for the string!

The “lead in” of the groove should smooth but the edge break should be “sharp” (but not cutting sharp)

I have dealt with string height above, but to review what I said.

Adjust the nut height first then the bridge height... always keep it higher than you want it to finally be.

Tension the strings (stretch them with you finger underneath them too if you like) Leave for say 24 hours.

Bring the strings up to pitch, then do final adjustments to the string height according to your playing technique.



*Here are pencil marks for me to sand down the nut to.*



*Getting close enough for me.*



*A starting position for the height of my bridge.*

## **Part 10**

### **Working with bone.**

Decent bone is hard to get domestically. You may be lucky. The animals we eat are all too young these days to get a decent bit of thick bone out of it.

You can get along side your butcher and he might be able to get something big and thick for you, but for occasional use I suggest a pet shop as the best source for bone that can be cut up to a decent thickness. In Australia we have some pre-packed “smoked bone” in the pet shops that I have been able to extract nice pieces of bone from.

When you get the bone, you need to get the fat out of it and bleach it. Do this by boiling it in water with “Caustic soda” added. This will get the fat out. It smells terribly bad, so use an outdoor boiling source. You should also add “Napisan” (bleach). Boil for at least an hour.

I use bone for turning lace bobbins and I go to a “knackers’ yard” (horse bones). I get a pile of them and boil them for hours!

Dry them out in the sun (it helps bleach them) then band saw them in a manner that will give you the thickness you want for the job you want.



*Bone samples*



*Shaping bone for a*

*nut*



*Bone on tail and bridge.*

*Bone nut*

Here are a few more pictures. One shows the set of tiny round files in use (You can only see 1, I am sorry as there are about a dozen) The other shows how I stop the thick string from distorting or pulling the nut to one side. Just wind it round so that it is almost in line with the nut groove. With the top string I have drilled another hole in the spindle.





PS. I see I have not finished fitting the

NUT!

Well, at the moment I think you are finished... I might think of something else to add to it.

Tune up now, and play to your heart's content.

You may have to do some adjustments, just use your ingenuity and learn from your (my?) mistakes.

NO... I am not going to tell you how to make an amplifier. I bought a kit and made it. That does not make me qualified in any way to teach you how to do it. It does say that an electronic ignoramus can do simple electronics.

Oh well, you might like to see my DIY circle cutter in action on my amplifier CB. So here goes.

## Part 11





*Sequence used in cutting a hole for my amplifier speaker.*

**This is the “small print”:**

There are no rules for the making of a CBG. Do what you like, experiment, and make mistakes, whatever. I am not a madly experienced CBG maker, but I have made instruments as a hobby for many years, there are many better CBG makers than I.

I do like to write, and in this article I have tried to answer as many questions as I could, mostly the questions that I had to ask myself. Thanks to the Cigar Box Nation, I had most of them answered by the experts.

I have provided you with guidelines, not a hand holding tutorial. For example, I have not mentioned, lacquering/varnishing/painting/ preserving the paper cigar labels on the box/separate fret board etc. I have not really dealt with the neck angle and all sorts of stuff like that which we argue over forever and in the end we each do our own thing

When I made my first CBG, I stopped many times and thought of what I should do, so I thought that if you found yourself in a similar position you might want someone to tell what to do. So I have! I hope you might have found it useful.

I have been pragmatic in what I have told you to do, and usually told you the easiest way so you can progress with your CBG reasonably quickly. I have NOT always told you the best way as there are so many ways.

There are quite a few DIY articles on the net in the form of plans, slide shows, and videos. Search them out and read/view them. My effort just joins that list. Between us all you should be able to make a pretty good CBG and what is more, have fun doing it.

Finally I apologise if I have “spoken down” to you at any time in this tutorial. If I have not been clear, then ask the CB Nation forums for help.

Brian Lemin.

Cooranbong. Australia. June 2009.